

## Notes on the genus *Myrmoteras* Forel, 1893 (Formicidae: Formicinae) from Sumatra: a new species, new record and new description of queens

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**ABSTRACT:** The species list of the ant genus *Myrmoteras* Forel, 1893 from Sumatra, Indonesia was updated with a total of six species. We described and illustrated *Myrmoteras yamanei* sp.n. based on the worker caste from the highland of Sumatra, reported *M. tonboli* Agosti, 1992 as newly recorded from Sumatra and illustrated, and described the hitherto unknown queens of *M. baslerorum* Agosti, 1992 and *M. tonboli* Agosti, 1992. The worker-based key to Sumatran species of the genus *Myrmoteras* is also provided.

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**KEY WORDS:** ants, alpha-taxonomy, Indonesia, highland.

## О муравьях рода *Myrmoteras* Forel, 1893 (Formicidae: Formicinae) Суматры: новый вид, новая находка и новое описание королев

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**РЕЗЮМЕ:** Видовой состав муравьев рода *Myrmoteras* Forel, 1893 Суматры (Индонезия) увеличен до шести видов. Дано иллюстрированное описание *Myrmoteras yamanei* sp.n. на основе касты рабочих из высокогорий Суматры; впервые на Суматре отмечен *M. tonboli* Agosti, 1992, даны иллюстрации; описаны ранее неизвестные королевы *M. baslerorum* Agosti, 1992 и *M. tonboli* Agosti, 1992. Дан ключ для определения видов рода *Myrmoteras* Суматры по рабочим особям.

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КЛЮЧЕВЫЕ СЛОВА: муравьи, альфа-таксономия, Индонезия, высокогорье.

## Introduction

The ant genus *Myrmoteras* Forel, 1893 consists of small – to medium-sized species that is characterized by the oddly-shaped head, huge eyes and extraordinarily long mandibles which can be opened up to 270° (Agosti, 1992). This genus is distributed in the Oriental and the Australasian regions (Moffett, 1985; Xu, 1998; Agosti, 1992; Zettel, Sorger, 2011; Bui *et al.*, 2013; Satria, Herwina, 2020). A total of 41 valid species were assigned to the genus, and the following four species were listed from Sumatra in the previous studies: *Myrmoteras* (*Myrmoteras*) *baslerorum* Agosti, 1992; *M.* (*Myagroteras*) *donisthorpei* Wheeler, 1916; *M.* (*Myagroteras*) *estrudae* Agosti, 1992; *M.* (*Myagroteras*) *marianneae* Agosti, 1992 (Agosti, 1992; Satria, Herwina, 2020).

In our course of inventory and taxonomic studies of the ants of Sumatra, we herein described a new species of the genus *Myrmoteras*; reported a new record of *M.* (*Myagroteras*) *tonboli* Agosti, 1992 in Sumatra; and described the hitherto unknown queens of *M.* (*Myagroteras*) *baslerorum* Agosti, 1992 and *M.* (*Myagroteras*) *tonboli* Agosti, 1992. The worker-based key to Sumatran species of this genus is also provided. The present study increased the number of *Myrmoteras* species known from Sumatra to six species.

## Materials and Methods

ABBREVIATIONS OF THE SPECIMEN DEPOSITORIES. MZB, Bogor Zoological Museum, Bogor, Indonesia; RSC, Collection managed by Rijal Satria, Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang, West Sumatra, 35171, Indonesia.

IMAGING. Multi-focused montage images were produced using Helicon Focus Pro. (Helicon Soft Ltd., <http://www.heliconsoft.com/>) from a series of source images taken by a Canon EOS KissX5 digital camera attached to a Nikon SMZ1270 stereomicroscope. Artifacts/ghosts and unnecessary parts (unfocused appendages, insect pin, etc.) surrounding or covering target objects were erased and cleaned up using the retouching function of Helicon Focus Pro, and the

color balance, contrast and sharpness were adjusted using Adobe Photoshop CS6.

MEASUREMENTS. The following parts of the bodies were measured using ImageJ 1.49m (National Institute of Health, USA, available at <http://imagej.nih.gov/ij/>) based on the photographs taken using a Canon EOS KissX5 digital camera attached to the Nikon SMZ1270 stereomicroscope under suitable magnifications. Measurements and morphological terminology follow Moffet (1985), Agosti (1992), and Bui *et al.* (2013).

Abbreviations of measurements and indices are as follows: EL — maximal diameter of compound eye measured in lateral view; HfL — the maximum length of the hind femur; HL — maximum length of head in full-face view, measured from the midpoint of a line drawn across the anteriormost points of clypeus to the midpoint of posteriormost points of head; HW — maximum width of head in full-face including eyes; ML — maximum length of mandible measured from mandibular insertion to apical most point of mandible; PpW — maximum width of the propodeum in dorsal view; PrW — maximum width of pronotum measured in dorsal view; SL — maximum length of antennal scape excluding the basal condylar bulb; TL — total body length excluding mandibles, roughly measured; WL — the maximum diagonal length from the anterior most point of the pronotal slope (excluding neck) to the posteroventral corner of the propodeal lobe in profile view; CI = HW/HLx100; SI = SL/HWx100.

## Taxonomy

### *Myrmoteras* (*Myrmoteras*) *baslerorum* Agosti, 1992

Figs 1, 2, 7A, C.

*Myrmoteras* (*Myrmoteras*) *baslerorum* Agosti, 1992: 412, figs 3, 34, 41, 42, holotype worker, type locality Mt. Tujuh Lake, 1400 m., Jambi, Sumatra, Indonesia.

NON-TYPE MATERIAL EXAMINED. INDONESIA: West Sumatra: 50 Kota District, Situjuah Limo Nagari, Situjuah Banda Dalam, Sago Mountain (ca. 200 km from the type locality),  $-0.321152^{\circ}$ ,  $100.660902^{\circ}$ , ca. 1500 m alt., 4/vii/2022, R. Satria leg., 5 workers, 2 queens (individual code: SEMUT-25vii22C, SEMUT07ix22A) colony code: SAGO-4viiM, (RSC).

WORKER DIAGNOSIS. The following diagnosis partly modified from Agosti (1992), as shown in *italic*, based on our examination of the newly

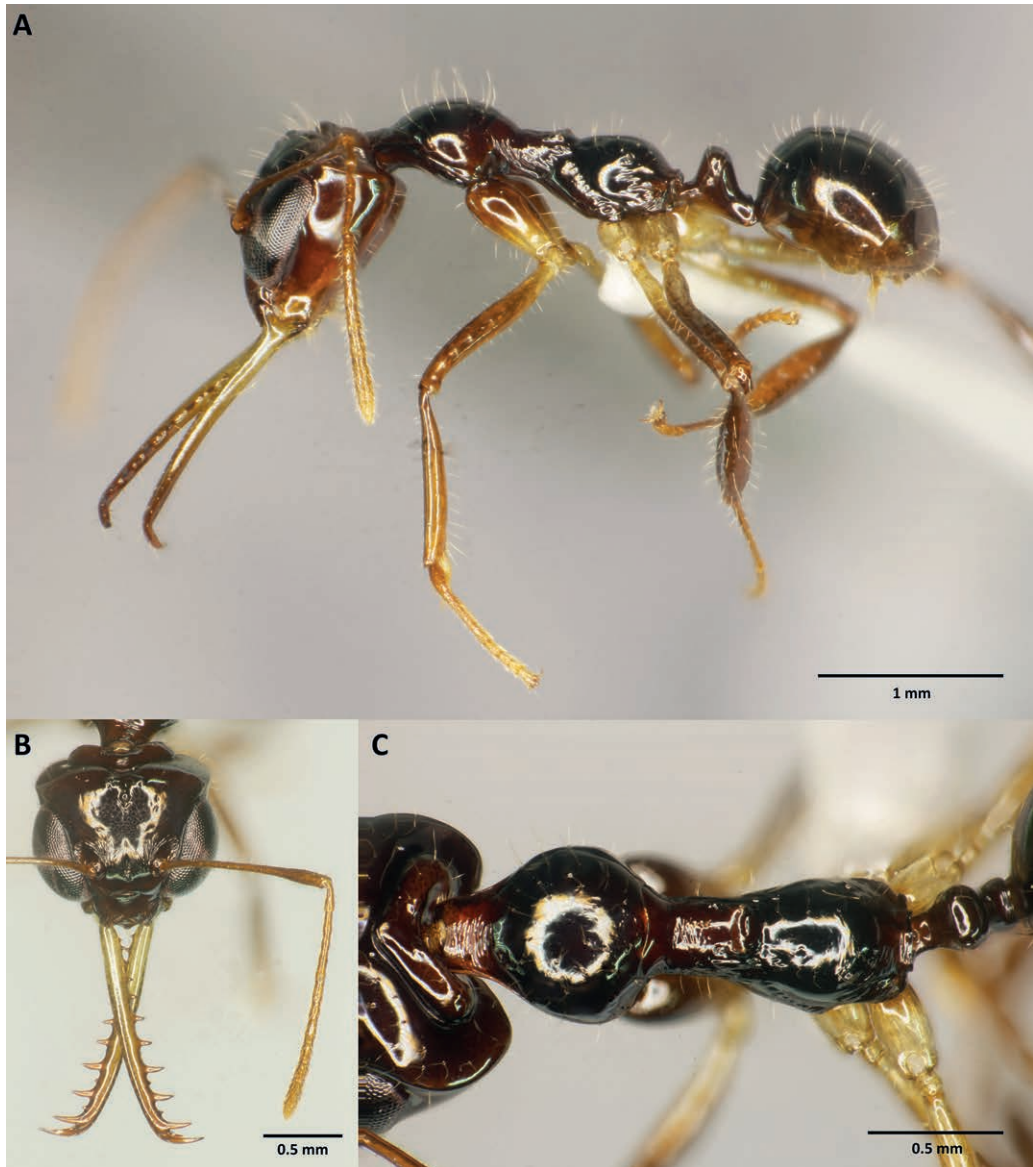


Fig. 1. *Myrmoteras (Myrmoteras) baslerorum* Agosti, 1992, worker (individual code: SEMUT26vii22A; colony code: SAGO-4viiM). A — habitus in lateral view; B — head in full-face view; C — mesosoma in dorsal view; D — postero-ventral part of metapleuron.

Рис. 1. *Myrmoteras (Myrmoteras) baslerorum* Agosti, 1992, рабочий (инд. код SEMUT26vii22A; код колонии SAGO-4viiM). А — внешний вид, латерально; В — голова, вид сверху; С — мезосома, дорсально; D — постероventральная часть метаплевры.

collected material. *Body generally dark brown, with antennae, mandible and legs paler than body (Fig. 1); body with sparse erect hairs; head in full-face view smooth and shiny, except area around antennal insertions with faint longitudinal rugae; frontal sulcus absent; palp formula 5,3; mesopleuron,*

*metapleuron and lateral face of propodeum smooth and shiny; propodeum in lateral view with dorsal outline roundly convex.*

DEALATE QUEEN MEASUREMENTS AND INDICES. (n=1): TL 5.02 mm, HL 1.24 mm, HW 1.27 mm, EL 0.73 mm, ML 1.51 mm, SL 1.33 mm,

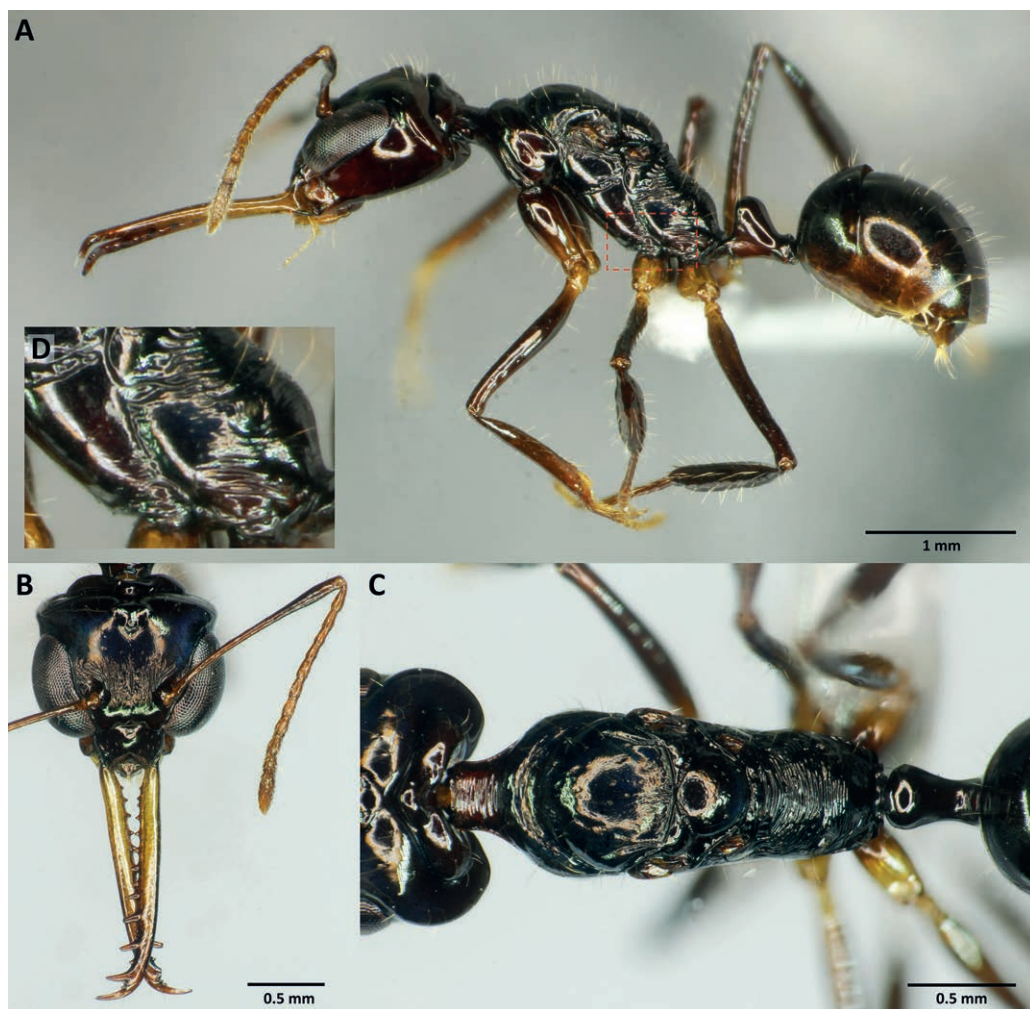


Fig. 2. *Myrmoteras (Myrmoteras) baslerorum* Agosti, 1992, queen (individual code: SEMUT25vii22C; colony code: SAGO-4viiM). A — habitus in lateral view; B — head in full-face view; C — mesosoma in dorsal view. Рис. 2. *Myrmoteras (Myrmoteras) baslerorum* Agosti, 1992, королева (инд. код SEMUT25vii22C; код колонии SAGO-4viiM). A — внешний вид, латерально; B — голова, вид сверху; C — мезосома, дорсально.

WL 1.93 mm PrW 0.77 mm, PpW 0.61 mm, HfL 1.49 mm, CI 102, SI 104.

**DEALATE QUEEN DESCRIPTION.** In general appearance the queen is similar to the worker; for worker description see Agosti (1992). Body and legs (except mid- and hind coxae) dark-brown; antennae, mandible, mid- and hind coxae paler than body. Body with sparse erect hairs; dorsum of head, pronotum and gastral tergites without pubescence. Head in full-face view smooth and shiny, except area between antennal insertions with faint longitudinal rugae. Frontal sulcus absent. Anterior clypeal margin concave. Mandible with 11–13 teeth that reduce in size from the apical to basal teeth; two denticles present between first and

second teeth; one denticle present between second and third teeth, and between third and fourth teeth. Palp formula 5,3. Orbital groove present, but very narrow and shallow. Scape a little shorter than funicular segments combined; funicular segments each longer than broad. Mesosoma with main sclerites associated with wing function (Fig. 2A, C), in dorsal view long and stout. Anterodorsal slope of pronotum in lateral view steep. Mesoscutum in lateral view weakly and roundly raised, with anterodorsal slope relatively steep; mesoscutum without posteromedian depression; parapsidal furrow weak and slightly curved. Mesopleuron with oblique furrow, distinct and wide. Propodeum relatively long, in lateral view with its dorsal outline relatively

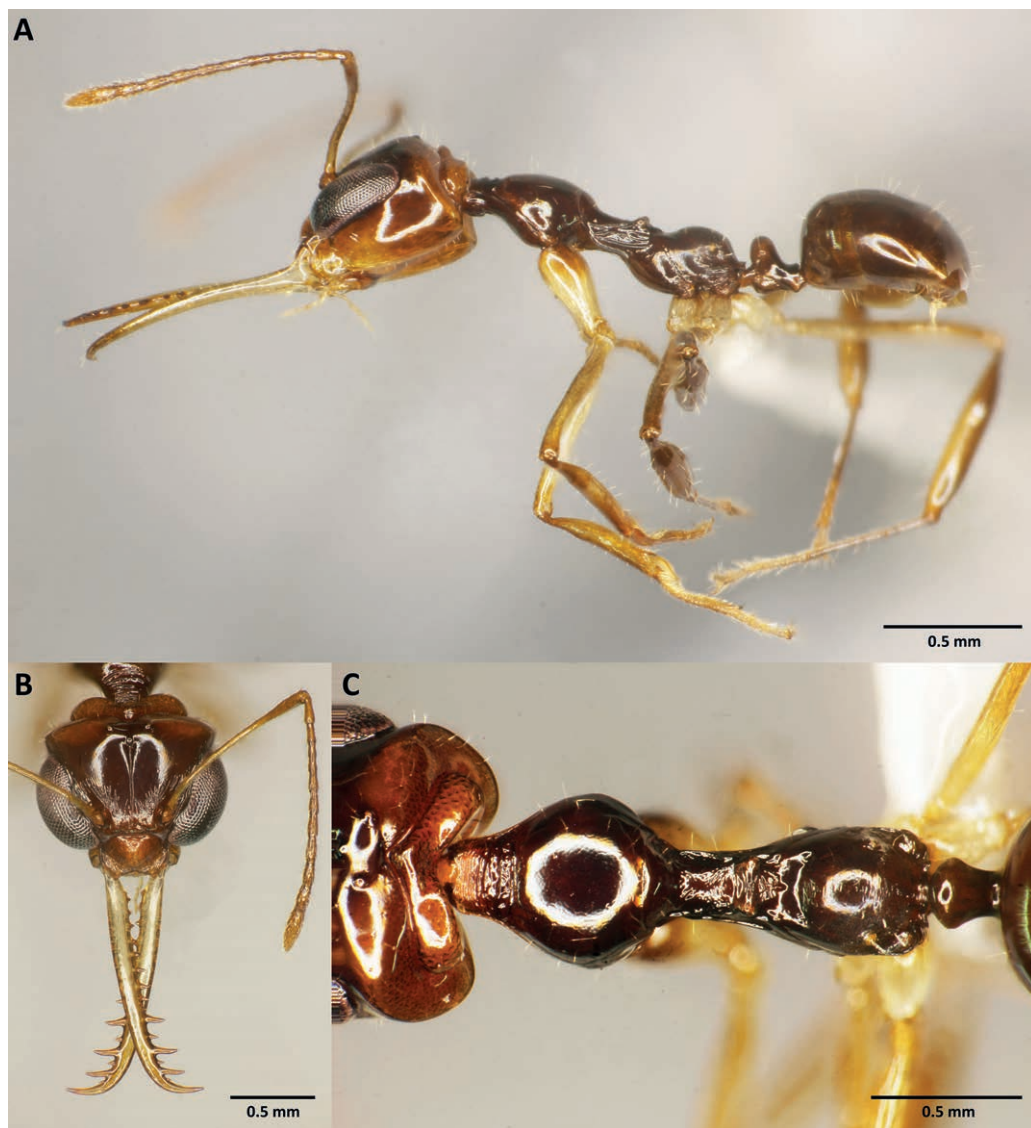


Fig. 3. *Myrmoteras (Myrmoteras) tonboli* Agosti, 1992, worker (individual code: SEMUT25vii22B; colony code: SAGO-4vii2000D). A — habitus in lateral view; B — head in full-face view; C — mesosoma in dorsal view. Рис. 3. *Myrmoteras (Myrmoteras) tonboli* Agosti, 1992, рабочий (инд. код SEMUT25vii22B; код колонии SAGO-4vii2000D). А — внешний вид, латерально; В — голова, вид сверху; С — мезосома, дорсально.

sinuate and sloping. Wing venation as in Fig. 7A, C. Anteriormost part of pronotum transversely rugose, and its remainder part smooth and shiny. Mesoscutum, mesoscutellum and mesopeluron smooth and shiny. Postero-ventral part of metapleuron with longitudinal rugae and shiny (shown in a red square in Fig. 2A; enlarged in Fig. 2D). Dorsum of propodeum with faint transverse rugae. Petiolar node in lateral view with vertical anterior face and steep posterior slope; ventral outline of petiole beneath the node slightly sinuate.

**DISTRIBUTION.** So far known only from the highlands of Sumatra: Jambi (Mt. Tujuh, 1400 m alt.; Mt. Kerinci, 1750–1850 m alt.; Km 15 Sungaipenuh to Tapan, 1450 m alt.) in Agosti (1992); and West Sumatra (Mt. Sago, ca. 1500 m alt.) in the present study.

**REMARKS.** No information about the biology of this species is available, except that the colony examined was collected from leaf litter in the highland primary forests.

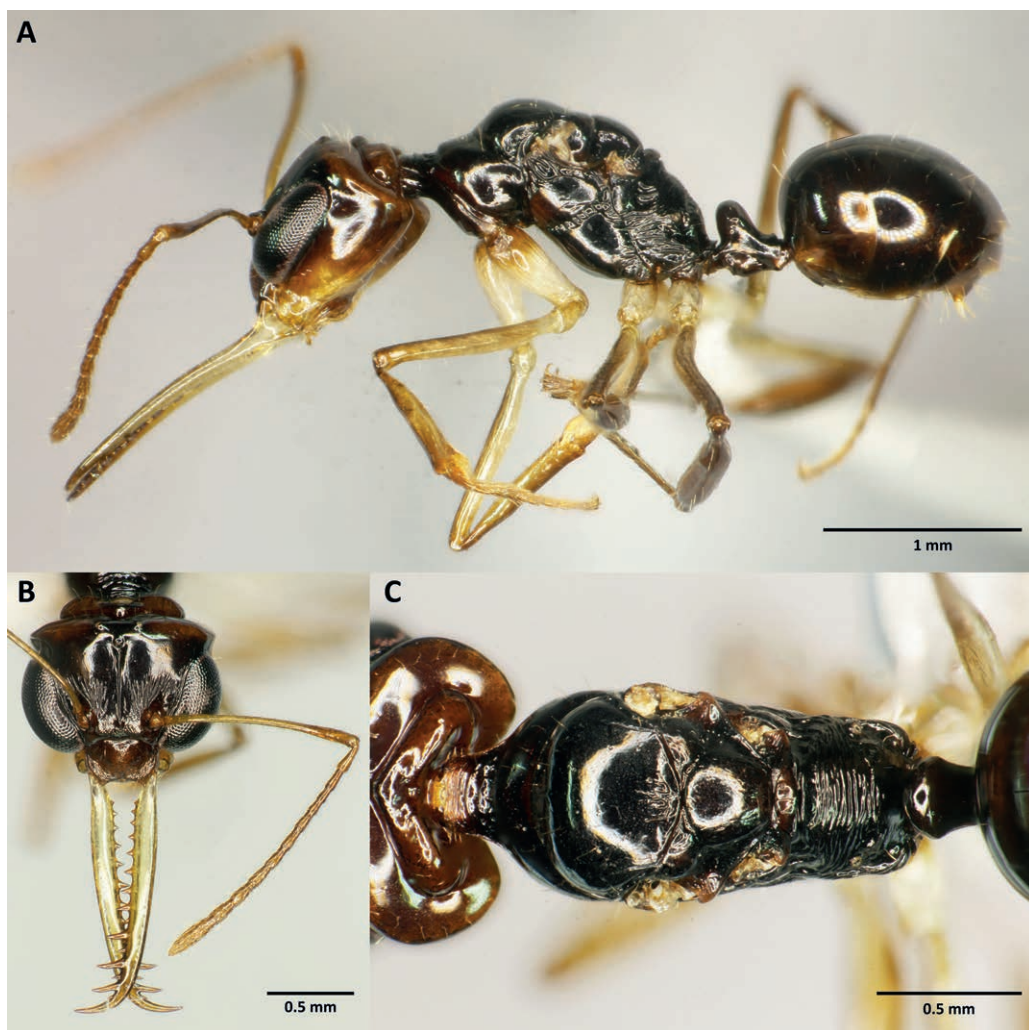


Fig. 4. *Myrmoteras* (*Myrmoteras*) *tonboli* Agosti, 1992, queen (individual code: SEMUT24vii22B; colony code: SAGO-4vii2000D). A — habitus in lateral view; B — head in full-face view; C — mesosoma in dorsal view. Рис. 4. *Myrmoteras* (*Myrmoteras*) *tonboli* Agosti, 1992, королева (инд. код SEMUT24vii22B; код колонии SAGO-4vii2000D). A — внешний вид, латерально; B — голова, вид сверху; C — мезосома, дорсально.

***Myrmoteras* (*Myagoteras*) *tonboli***

**Agosti, 1992**

Figs 3, 4, 7B, D.

*Myrmoteras* (*Myrmoteras*) *baslerorum* Agosti, 1992: 412, figs 3, 34, 41, 42, holotype worker, type locality Mt. Tujuh Lake, 1400 m., Jambi, Sumatra, Indonesia.

NON-TYPE MATERIAL EXAMINED. INDONESIA: West Sumatra: 50 Kota District, Situjuah Limo Nagari, Situjuah Banda Dalam, Sago Mountain,  $-0.326062^{\circ}$ ,  $100.665368^{\circ}$ , ca. 2000 m alt., 4/vii/2022, R. Satria leg., 4 workers, 2 queens (individual code: SEMUT24vii22C, SEMUT24vii22B), colony code: SAGO-4vii2000D, (RSC).

**WORKER DIAGNOSIS.** The following diagnosis partly modified from Agosti (1992), based on our examination of the newly collected material. Body generally dark brown, with antennae, mandible and legs paler than body (Fig. 3); body with sparse erect hairs; head in full-face view smooth and shiny, except area between antennal insertions with faint longitudinal rugae; frontal sulcus present, shallow and narrow; palp formula 5,3; mesopleuron, and lateral face of propodeum smooth and shiny; posteriormost of metapleuron with faint longitudinal rugae; propodeum in lateral view with dorsal outline roundly convex.

**DEALATE QUEEN MEASUREMENTS AND INDICES.** (n=2): TL 4.14–4.16 mm, HL 1.06–1.07

mm, HW 1.18–1.19 mm, EL 0.61 mm, ML 1.33–1.34 mm, SL 1.15 mm, WL 1.48 mm, PrW 0.70–0.71 mm, PpW 0.58 mm, HfL 1.22 mm, CI 111, SI 96–97.

**DEALATE QUEEN DESCRIPTION.** In general appearance the queen is similar to the worker; for worker description see Agosti (1992). Body (except antero-ventral part of head) dark-brown; antero-ventral part of head, antennae, mandible, and legs paler than body. Body with very sparse erect hairs; dorsum of head, pronotum and gastral tergites without pubescence. Head in full-face view smooth and shiny, except area between antennal insertions with faint longitudinal rugae, and anteriormost part of clypeus with irregular rugoso-reticulate. Frontal sulcus reaching the middle ocellus, narrow and shallow. Anterior clypeal margin concave. Mandible with 12–13 teeth that reduce in size from the apical to basal teeth; one denticle present between first and second teeth, between second and third teeth, and between third and fourth teeth. Palp formula 5,3. Orbital groove absent. Scape a little shorter than funicular segments combined; funicular segments each longer than broad. Mesosoma with main sclerites associated with wing function (Fig. 4A, C), in dorsal view short and stout. Anterodorsal slope of pronotum in lateral view gradually sloping posteriad. Mesoscutum in lateral view highly and roundly raised, with anterodorsal slope relatively steep; mesoscutum without posteromedian depression; parapsidal furrow very weak and slightly curved. Mesopleuron with oblique furrow, distinct and wide. Propodeum relatively short, in lateral view with its dorsal outline roundly convex. Wing venation as in Fig. 7B, D. Anteriormost part of pronotum transversely rugose, and its remainder part smooth and shiny. Mesoscutum and mesoscutellum smooth and shiny. Mesopleuron smooth and shiny, with its posteriormost part sculptured. Metapleuron and lateral face of propodeum with longitudinal rugae and shiny; dorsum of propodeum with faint transverse rugae. Petiolar node in lateral view with vertical anterior face and steep posterior slope; ventral outline of petiole beneath the node slightly sinuate.

**DISTRIBUTION.** So far known only from the highland of Borneo (Mt. Kinabalu, 1500–1600 m a.s.l., Sabah, Malaysia) and Sumatra (Mt. Sago, ca. 2000 m alt., 50 Kota District, West Sumatra, Indonesia).

**REMARKS.** No information about the biology of this species is available, except that the colonies examined were collected from leaf litter in the highland primary forests.

***Myrmoteras (Myagoteras) yamanei* sp.n.**

Figs 5, 6.

**HOLOTYPE.** Worker (individual code: SEMUT-23vii2022A; colony code: SAGO-1000F), Indonesia, West Sumatra: 50 Kota District, Situjuh Limo Nagari,

Situjuh Banda Dalam, Sago Mountain,  $-0.315547^{\circ}$ ,  $100.64969^{\circ}$ , ca. 1000 m alt., 5/vii/2022, R. Satria leg. (MZB).

**PARATYPES.** Queen (n=1, head detached, individual code: SEMUT24vii22A; colony code: SAGO-1000F), same data as holotype (RSC). Workers (n=3, individual codes: SEMUT23vii2022B, SEMUT23vii2022C, SEMUT23vii2022D; colony code: SAGO-1000F), same data as holotype (RSC).

**WORKER MEASUREMENTS AND INDICES.** Holotype (n=1): TL 3.63 mm, HL 0.98 mm, HW 1.07 mm, EL 0.60 mm, ML 1.27 mm, SL 0.95 mm, WL 1.40 mm, PrW 1.49 mm, PpW 0.43 mm, HfL 0.96 mm, CI 109, SI 88.

Paratypes (n=3): TL 3.63–3.64 mm, HL 0.97–0.98 mm, HW 1.07 mm, EL 0.60 mm, ML 1.27–1.29 mm, SL 0.95 mm, WL 1.40–1.43 mm, PrW 0.58–0.59 mm, PpW 0.43 mm, HfL 0.95–0.96 mm, CI 109–110, SI 88.

**WORKER DESCRIPTION.** Body, fore-coxa and tibiae dark-brown; antennae, mandible and legs (except tibiae and fore-coxa) paler than body (Fig. 5). Body with sparse erect hairs; dorsum of head, pronotum and gastral tergites without pubescence. Clypeus and frons irregularly rugose. Vertex of head (including occipital lobe) smooth and shiny. Frontal sulcus reaching the middle ocellus, faint and shallow; posterior-half wider than anterior-half. Anterior clypeal margin concave. Mandible with 11–13 teeth that reduce in size from the apical to basal teeth; two denticles present between first and second teeth; one relatively large denticle present between second and third teeth, and between third and fourth teeth. Palp formula 5,3; orbital groove present, but narrow and shallow. Scape a little shorter than funicular segments combined; funicular segments each longer than broad. Pronotum in lateral view flattened dorsally; anteriormost part of pronotum transversely rugose, and its remainder part smooth or faintly rugose. Dorsum of mesonotum longitudinally or irregularly rugose; side of mesonotum irregularly rugose. Mesopleuron smooth and shiny, but its posterior third with longitudinal rugae. Metapleuron and lateral face of propodeum with longitudinal rugae and shiny; dorsum of propodeum weakly irregular rugae and shiny; propodeum in lateral view with its dorsal outline slightly angulate (Fig. 5A). Petiolar node in lateral view with vertical anterior face and steep posterior slope; ventral outline of petiole beneath the node slightly sinuate.

**DEALATE QUEEN MEASUREMENTS AND INDICES.** (n=1): TL 3.75 mm, HL 0.97 mm, HW 1.09 mm, EL 0.62 mm, ML 1.28 mm, SL 0.95 mm, WL 1.40 mm, PrW 0.65 mm, PpW 0.55 mm, HfL 0.96 mm, CI 112, SI 87.

**DEALATE QUEEN DESCRIPTION.** In general appearance the queen is similar to the worker. Body, fore-coxa and tibiae dark-brown; antennae, mandible and legs (except tibiae and fore-coxa) paler than body (Fig. 6). Body with sparse erect hairs; dorsum of head,

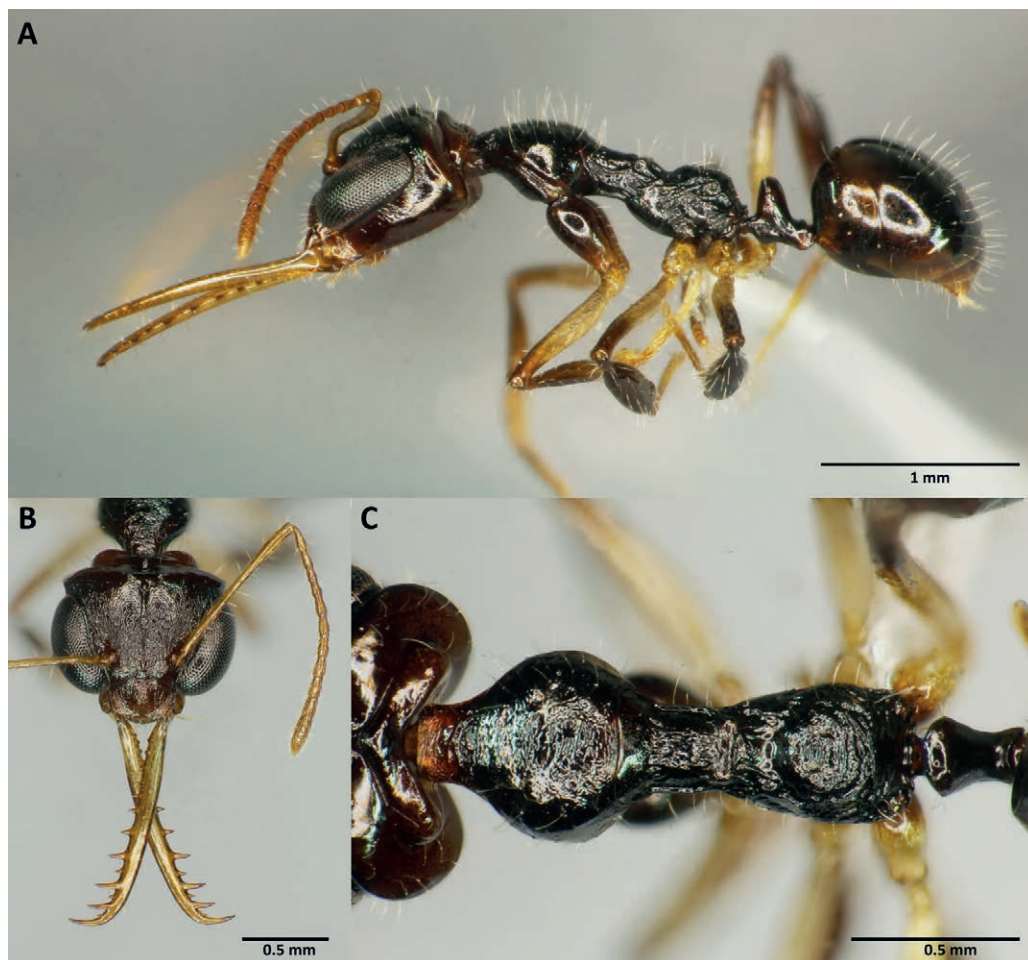


Fig. 5. *Myrmoteras* (*Myrmoteras*) *yamanei* sp.n., worker (holotype, individual code: SEMUT23vii22A; colony code: SAGO-1000F). A — habitus in lateral view; B — head in full-face view; C — mesosoma in dorsal view. Рис. 5. *Myrmoteras* (*Myrmoteras*) *yamanei* sp.n., рабочий (голотип, инд. код SEMUT23vii22A; код колонии SAGO-1000F). A — внешний вид, латерально; B — голова, вид сверху; C — мезосома, дорсально.

pronotum and gastral tergites without pubescence. Head in full-face view irregularly rugose. Vertex (including occipital lobe) smooth and shiny. Frontal sulcus reaching the middle ocellus, narrow and shallow; posterior-half wider than anterior-half. Anterior clypeal margin concave. Mandible with 11 teeth that reduce in size from the apical to basal teeth; two denticles present between first and second teeth; one denticle between second and third teeth, and between third and fourth teeth. Palp formula 5,3. Orbital groove present, but narrow and shallow. Scape a little shorter than funicular segments combined; funicular segments each longer than broad. Mesosoma with main sclerites associated with wing function (Fig. 6A, C), in dorsal view short and stout. Anterodorsal slope of pronotum in lateral view gradually sloping posteriad. Mesoscu-

tum in lateral view weakly and roundly raised, with anterodorsal slope relatively steep; mesoscutum with faint and shallow posteromedian depression; parapsidal furrow very weak and slightly curved. Mesopleuron with oblique furrow, distinct and wide. Propodeum relatively short, in lateral view with its dorsal outline slightly angulate. Anterior part of pronotum transversely rugose, and its remainder part smooth and shiny. Mesoscutum irregularly rugose. Mesoscutellum smooth and shiny. Mesopleuron smooth and shiny, with its posteriormost part sculptured. Metapleuron and lateral face of propodeum with longitudinal rugae and shiny; dorsum of propodeum with irregular rugae. Petiolar node in lateral view with vertical anterior face and steep posterior slope; ventral outline of petiole beneath the node slightly sinuate.



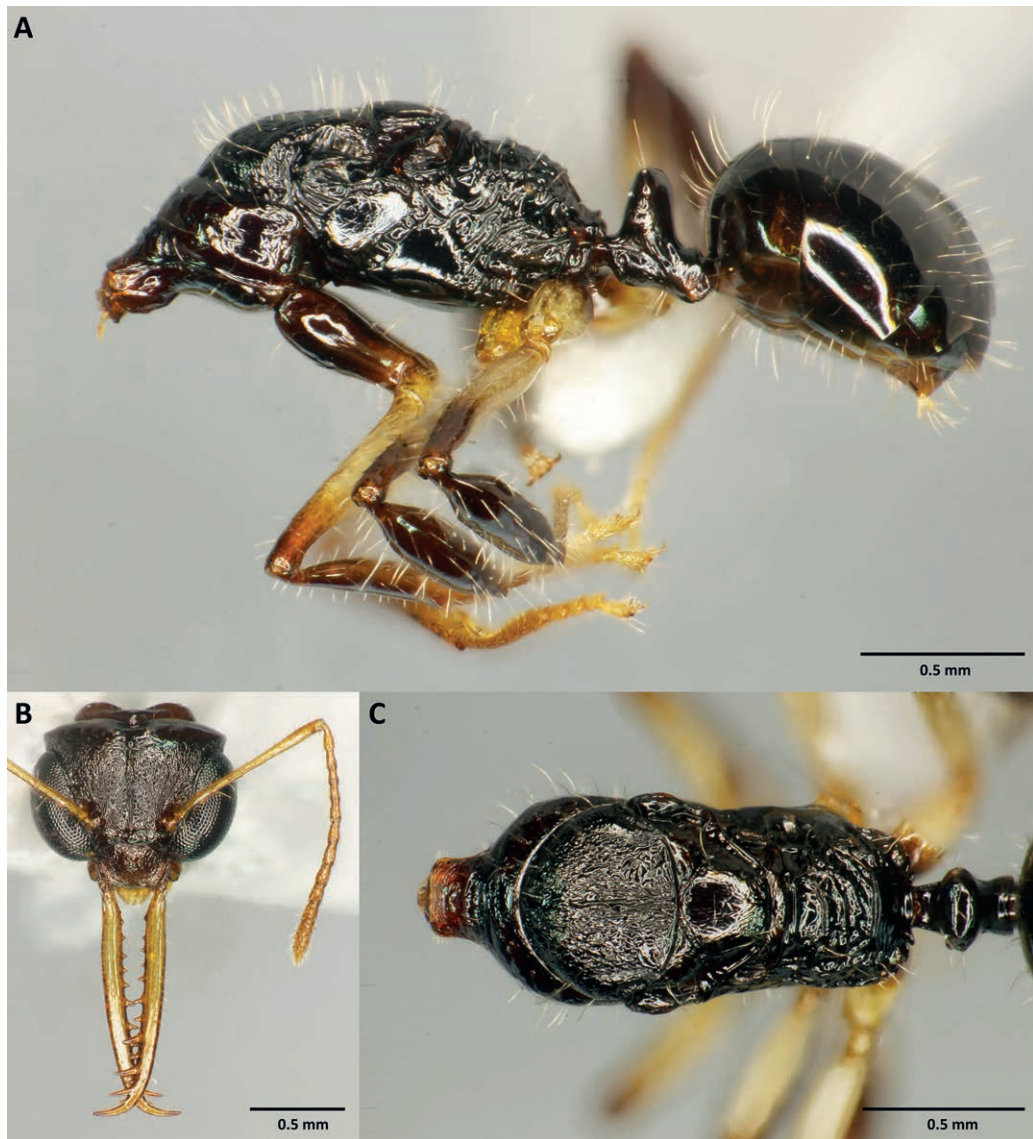


Fig. 6. *Myrmoteras (Myrmoteras) yamanei* sp.n., queen (paratype, individual code: SEMUT24vii22A; colony code: SAGO-1000F). A — habitus in lateral view; B — head in full-face view; C — mesosoma in dorsal view. Рис. 6. *Myrmoteras (Myrmoteras) yamanei* sp.n., королева (паратип, инд. код SEMUT24vii22A; код колонии SAGO-1000F). A — внешний вид, латерально; B — голова, вид сверху; C — мезосома, дорсально.

**DISTRIBUTION.** So far known only from the highland of Sumatra.

**COMPARATIVE DIAGNOSIS.** *Myrmoteras yamanei* sp.n. is morphologically most similar to *M. danieli* Agosti, 1992, *M. maudeae* Agosti, 1992, and *M. susanneae* Agosti, 1992 among the species known from the Sundaland. However, it is distinguishable from the latter three by a combination of the following characteristics of the worker: body generally dark brown, with antennae, mandible and legs (except tibiae

and fore-coxa) yellowish brown (vs. reddish brown in *M. susanneae*; femora reddish brown in *M. danieli* and *M. maudeae*); body with sparse long erect hairs (vs. sparse short pubescence in *M. maudeae*); frons with irregularly rugose (vs. faint longitudinal rugae in the latter three); head in full-face view with frontal sulcus which is shallow and has posterior half wider than anterior half (vs. deep and has anterior half as wide as posterior half in the latter three); palp formula 5,3 (vs. 6,4 in *M. maudeae* and *M. susanneae*); mesopleuron

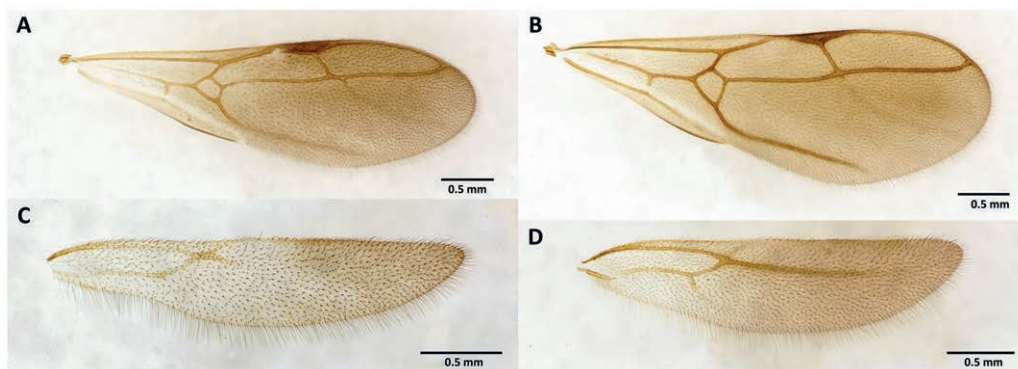


Fig. 7. Queens of *Myrmoteras*. A–B — forewing; C–D — hindwing; A, C — *Myrmoteras (Myrmoteras) baslerorum* Agosti, 1992 (individual code: SEMUT07ix22A; colony code: SAGO-4viiM); B, D — *Myrmoteras (Myrmoteras) tonboli* Agosti, 1992, (individual code: SEMUT24vii22B; colony code: SAGO-4vii2000D).  
Рис. 7. Королевы *Myrmoteras*. А–В — переднее крыло; С–D — заднее крыло; А, С — *Myrmoteras (Myrmoteras) baslerorum* Agosti, 1992 (инд. код SEMUT07ix22A; код колонии SAGO-4viiM); В, D — *Myrmoteras (Myrmoteras) tonboli* Agosti, 1992, (инд. код: SEMUT24vii22B; код колонии SAGO-4vii2000D).

smooth and shiny, but its posterior third with longitudinal rugae (vs. smooth and shiny in *M. maudeae* and *M. susanneae*; generally sculptured with anterior third smooth and shiny in *M. danieli*); metapleuron and lateral face of propodeum with longitudinal rugae and shiny (vs. smooth and shiny in *M. maudeae* and *M. susanneae*); dorsal face and posterior slope of propodeum in lateral view forming an angulate corner (vs. forming a round corner in the latter three).

**REMARKS.** No information about the biology of this species is available, except that the colony examined was collected from leaf litter in primary highland forests. The male of this species is still unknown.

**ETYMOLOGY.** The species epithet *yamanei* is derived from the name of Prof. Seiki Yamane, Emeritus Professor of Kagoshima University, an authority on entomology and taxonomy in Asia who has contributed greatly to the development of the research fields.

#### KEY TO SUMATRAN SPECIES OF *MYRMOTERAS* BASED ON THE WORKER CASTE\*

1. Trigger hairs present, at least one fourth as long as mandible; the labrum cone-shaped, in full frontal view, the insertions of the trigger hairs visible between the bases of the mandibles; the apical part of the mandible (last apical tooth) bent ventrally ..... (subgenus *Myrmoteras*), *M. baslerorum*
- Trigger hairs absent; labrum flat; teeth of mandible in the same plain, with the apical tooth not bent ventrally ..... (subgenus *Myagoteris*)..2
2. Head in full-face view with frons shining and smooth except area between antennal insertions with faint longitudinal rugae.....*M. tonboli*

\* The following key was modified from Agosti (1992).

- Head in full-face view with frons sculptured almost entirely .....3
- 3. Dorsum of pronotum smooth and shiny .....4
- Dorsum of pronotum sculptured.....5
- 4. Genae (part ventral of the eye) with longitudinal rugulae; area above the propodeal spiracles transversally sculptured .....*M. marianneae*
- Genae at most with some dorsoventral rugulae adjacent to the eye; dorsum of propodeum without transversal sculptured ..... *M. estrudae*
- 5. Body reddish brown; head in full-face view granulate, giving the impression of a longitudinal sculpture, but the lines are built up by individual small granules; frontal sulcus distinct and wide; dorsum of pronotum and mesonotum granulate; dorsum of propodeum smooth and shining or slightly granulate; dorsal face and posterior slope of propodeum in lateral view forming a round corner .....*M. donisthorpei*
- Body dark brown; clypeus and frons irregularly rugose; frontal sulcus faint and shallow, with posterior-half wider than anterior-half; anterior-most part of pronotum transversely rugose, and its remainder part smooth or faintly rugose; dorsum of propodeum weakly irregular rugae and shiny; dorsal face and posterior slope of propodeum in lateral view forming an angulate corner .....  
..... *M. yamanei* sp.n.

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\* see comments above