Revision and redefinition of the crematogastrine ant genus

*Tetheamyrma* BOLTON, 1991, with the description of a new species and the first description of the dealate queen (Hymenoptera: Formicidae)

David Emmanuel M. General & Perry Archival C. Buenavente

**Abstract**

The crematogastrine ant genus *Tetheamyrma* BOLTON, 1991 is revised, based on morphological analysis of a new species and an independent molecular study. Because of morphological disparity between the genotype species and the new species, the genus is redefined. The worker and queen of *Tetheamyrma bidentata* sp.n. are described. The female reproductive caste of *Tetheamyrma* is described for the first time. A key to the species and a distribution map are provided.

**Key words:** *Tetheamyrma bidentata*, revision, Formicidae, Philippines.

Received 27 July 2018; revision received 11 October 2018; accepted 16 October 2018

Subject Editor: John S. LaPolla

David Emmanuel M. General (contact author), University of the Philippines Los Baños Museum of Natural History, Los Baños, Laguna, Philippines; Philippine National Museum of Natural History, Manila, Philippines.

E-mail: dmgeneral@up.edu.ph


**Introduction**

Specimens of the remarkable ant described were first collected from leaf litter from Samar Island, Philippines, as by-catch of a mite (Acari) survey. The specimens keyed out to *Mayriella* Forel, 1902 in Bolton's generic guide (Bolton 1994) but did not look like it. *Mayriella* has deep antennal scrobes and large eyes, which are absent in the unknown ants, but there are some similarities between them and *Mayriella*, namely: a reduced number of antennal segments, with an antennal club formula of 10 : 2; a bidentate anterior clypeal margin; and the absence of spongiform tissue ventrally on the waist nodes.

The senior author had a chance to bring the specimens to the Museum of Comparative Zoology (MCZ) and consult with the experts there, Edward O. Wilson, Gary Alpert, and Stefan Cover, but they could not determine the genus of these ants. High-resolution images were sent to Barry Bolton, who opined that the ants may belong to the genus *Tetheamyrma* BOLTON, 1991. However, there were many morphological differences, particularly the lack of spongiform tissue, which seemed to preclude this classification. Bolton (1991) defined *Tetheamyrma* as another myrmicine lineage which developed spongiform tissue, independently of *Strumigenys* F. SMITH, 1860 and *Dacetinops* BROWN & WILSON, 1957.

Without fresh specimens for DNA sequencing, the true generic identification of this ant remained uncertain until recently. In early 2015, the junior author collected fresh conspecific specimens from Luzon Island: one dealate queen from leaf litter on Mt. Natib in Bataan Province and one worker from Mt. Banahaw in Laguna Province. Coincidentally, Michael Branstetter requested the loan of these ants for nondestructive extraction of DNA for a global phylogenomic study of ants and other Hymenoptera.

Using targeted enrichment of ultraconserved elements (UCEs), Branstetter & al. (2017) found strong support that the unknown ants from Luzon Island, originally labeled in their dataset as “GenusPH01_sp_EX1093”, belonged to the genus *Tetheamyrma* (Fig. 1), also confirming Bolton's preliminary opinion based on morphology.

Meanwhile, we continued to collect fresh specimens from the islands of Samar and Mindanao, providing us with enough material to describe this new species of *Tetheamyrma* and to describe the female reproductive caste of this genus for the first time. The morpho-
logical disparity between the genotype species and the new species compels a revision and redefinition of the genus.

Methods and abbreviations

Specimens were examined and measured using a Leica S8APO stereomicroscope with ocular micrometer. Images were kindly provided by Michael Branstetter, Jack Longino, and Mac Pierce and by AntWeb.

The following measurements and indices are reported:

- **CI** Cephalic index: HW / HL × 100.
- **EL** Maximum eye length along the maximum diameter.
- **HL** Maximum head length in full-face (dorsal) view, measured from the anterior-most point of the clypeal margin to the posterior-most point of head capsule.
- **HW** Maximum head width in full-face (dorsal) view.
- **ML** Mesosomal length (Weber’s Length) measured from the anterior edge of the pronotum (excluding the collar) to the posterior edge of the propodeal lobe.
- **PW** Maximum width of pronotum in dorsal view.
- **SI** Scape index: SL / HW × 100.
- **SL** Length of scape, excluding the basal neck and condyle.

Depositories of type material:

- **ANIC** Australian National Insect Collection, Canberra, Australia.
- **BMNH** Natural History Museum, London, UK.
- **MCZ** Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA.
- **MHNG** Muséum d’Histoire Naturelle, Geneva, Switzerland.
- **NHMW** Naturhistorisches Museum, Wien, Austria.
- **PNMNH** Philippine National Museum of Natural History, Manila, Philippines.
- **UPLB** University of the Philippines Los Baños Museum of Natural History, Los Baños, Laguna, Philippines.

All field collections were conducted under the permits of either the PNMNH or the Philippine Department of Environment and Natural Resources.

**Taxonomy**

**Genus Tetheamyrma BOLTON, 1991**

**Type species:** *Tetheamyrma subspongia* Bolton, 1991, by monotypy.


**Redescription of worker (changes in genus definition numbered)**

Monomorphic ants. Head and mesosoma densely rugoreticulate dorsally, laterally, and ventrally, except for smooth genal bridge. Head pilosity composed of fine hairs of varying lengths and flexibility.

Antennae with 10–11 segments, with very large 2-segmented apical club (1). Antennal scape short, just reaching or barely exceeding posterior margin of compound eye. Antennal scrobe absent. Compound eye small, located laterally, just forward of midlength of head. Frontal carina present or absent (2). Frontal lobe wide, completely concealing torulus, wider than median part of clypeus inserted between them. Posterior median clypeus narrowly inserted between frontal lobes. Anterior clypeus medially with a pair of setae straddling midpoint. Median clypeus narrowly bicarinate. Mandible triangular.


**Key to the species of Tetheamyrma**

**BOLTON, 1991**

1. Spongiform tissue absent from ventral surfaces of petiole, postpetiole, and first gastral sternite; antenna with 10 segments; frontal carina just reaching level of anterior margin of eye; anteromedian clypeus produced into a bidentate process (Philippines) (Figs. 2a - c, 3a - c) ................................................................. *bidentata sp.n.*

- Spongiform tissue present on ventral surfaces of petiole, postpetiole, and first gastral sternite; antenna with 11 segments; frontal carina not reaching level of anterior margin of eye; anteromedian clypeus medially emarginate but not produced into a bidentate process (Malaysia) (Fig. 4a - c) ............................................ *subspongia* Bolton, 1991
Species accounts

*Tetheamyrma bidentata*

**General & Buenavente sp.n.**

Figures 2a - c, 3a - c

Holotype worker measurements (mm): CI 100, EL 0.05, HL 0.41, HW 0.41, ML 0.45, PW 0.26, SI 58, SL 0.24.

Paratype worker measurements (n = 17, mm) [mean value and range]: CI 96 (87 - 111), EL 0.05 (0.05 - 0.06), HL 0.46 (0.41 - 0.50), HW 0.44 (0.40 - 0.50), ML 0.51 (0.45 - 0.58), PW 0.30 (0.26 - 0.34), SI 57 (50 - 66), SL 0.25 (0.21 - 0.29).

Worker: Monomorphic ants. Head densely rugo-reticulate dorsally, laterally, and ventrally, except for smooth genal bridge. Frontal lobes sculptured. Head pilosity composed of stiff decumbent hairs about as long as distance between them. In full-face view, head widest behind eyes, narrowing slightly anteriorly. Posterior margin of head shallowly emarginated. Antennae with 10 segments, with very large 2-segmented club. Antennal scape short, just reaching level of posterior margin of eye, smooth except for piligerous punctures, with short decumbent hairs. Antennomeres 3 to 8 much broader than long. Antennal scrobe absent. Compound eye small, composed of about eight ommatidia, located laterally, entirely forward of midlength of head. Frontal carina short, slightly beyond level of anterior margin of eye. Frontal lobes broad, completely concealing torulus, much wider than posterior clypeus inserted between them. Median clypeus narrowly bicarinata, with carinæ starting at posterior clypeus and terminating at the apices of bidentate process. Anterior clypeal margin produced into median bidentate process. Mandible triangular, smooth. Mandibular dentition composed of apical and subapical teeth, a short diastema, third tooth (shorter than subapical tooth), and three to four denticles. Basal external margin of mandible smooth.

In lateral view, palp formula 2,2 (undissected). Occipital carina present. Mesosomal outline smoothly con-

Fig. 2: *Tetheamyrma bidentata* sp.n. Paratype worker. (a) Full-face view; (b) lateral view; (c) dorsal view; (d) labels. Images courtesy of M. Pierce and J.T. Longino.

In dorsal view, mesosoma rugo-retticulate, widest at the pronotal humeri with lateral margins converging posteriorly. Propodeal spines slightly divergent. Petiole node transverse, broader than long. Petiole and postpetiole rugo-retticulate. Dorsum of gaster smooth between piliferous scalloped foveae. Foveae diminishing in size posteriorly from anterior third of tergite. Gastral pilosity composed of erect fine hairs slightly longer than distance between them.

In ventral view, genal bridge bounded laterally by a longitudinal carina.

Sculpture: antennal scape smooth to weakly reticulate; head, mesosoma, petiole, and postpetiole dorsally and laterally reticulate, with smooth interstices; mandibles, metapleuron, propodeal declivity smooth; subpetiolar process finely reticulate; gaster smooth between scalloped foveae that bear long, fine setae; foveae diminishing in size posteriorly from anterior third of tergite.

Pilosity: head with short, fine, decumbent, recurved setae arising from interstices of reticulate sculpture; a pair of setae straddle anterior median clypeus; a pair of longer setae extend laterally from lateral margin of head behind eyes; antennal scape with short decumbent hairs; a short, decumbent hair may arise from center of compound eye;
mesosoma, except propodeal declivity, with fine, short erect setae; petiole, postpetiole, and gaster with longer fine, erect setae.

Color: dark reddish brown with brown appendages.

**Queen:** Measurements (mm): CI 103, EL 0.11, HL 0.50, HW 0.51, ML 0.66, PpH 0.18, PpL 0.13, PpW 0.18, PSL 0.10, PtH 0.18, PtL 0.21, PtW 0.19, PW 0.43, SI 54, SL 0.28.


(collection code PACB170), PNM13644; 2 workers, Davao Oriental, Municipality of San Isidro, Mt. Hamiguitan, Barangay La Union, Sitio Tumaguite, N° 6° 44' 05.1", E 126° 08' 34.1", 396 m a.s.l., 16. - 17.VII.2016, leg. P.A.C. Buenavente, (collection code PACB182), PNM13639 and PNM13640. All specimens are deposited in NMNH, with accession numbers that start with "PNM".

Bionomics: This species was collected in elevations ranging from about 170 to 1300 m a.s.l. It was collected from leaf litter in good secondary and primary forest.

Etymology: The specific epithet refers to the bidentate anterior clypeal margin of this species.

_Tetheamyrma subspongia_ Bolton, 1991

Figure 4a - c

_Tetheamyrma subspongia_ Bolton, 1991: 10; worker described; MALAYSIA (Sabah) [Holotype not seen].

Measurements (mm; from original description of holotype): CI 92, EL 0.08, HI 0.55, HW 0.51, ML 0.66, PW 0.36, SI 63, SL 0.32.

**Worker:** Monomorphic ants. In full-face view, head widest behind compound eyes. Posterior margin of head shallowly emarginate. Lateral head margin slightly converging anteriorly. Antennae with 11 segments, with very large 2-segmented apical club. Antennal scape short, just exceeding posterior margin of compound eye. Antennal scape shallowly reticulate, with short decumbent hairs. Antennomeres 3 - 9 much broader than long. Antennal scape about 0.05 times length of head. Compound eye small, composed of about 10 ommatidia, located laterally, just forward of midlength of head. Frontal carina short, barely reaching anterior margin of eye. Frontal lobes wide, completely concealing torulus, wider than median clypeus inserted between them. Median clypeus narrowly inserted between frontal lobes. Median clypeus narrowly bicarinulate. Anterior clypeus medially and laterally, and ventrally, except for smooth genal bridge. Frontal lobes sculptured. Head pilosity composed of fine flexuous hairs of varying lengths.


**Discussion**

This genus appears to be restricted to forests in good condition on Borneo and in the Philippines (Fig. 5). The genus is variable, with two species that are quite different from each other. The key provides just a few salient differences between the type species, _Tetheamyrma subspongia_, and _T. bidentata_ sp.n. The most important morphological feature of _T. subspongia_, the spongiform tissue on the venter of the petiole, postpetiole and first gastral segment, is...
absent from *T. bidentata*. It is possible that this absence represents a secondary loss of spongiform tissue in *T. bidentata*.

**Acknowledgments**

We are grateful to the following institutions for providing funding, logistics, and technical assistance for fieldwork: “Removing Barriers to Invasive Alien Species Management in Production and Protection Forests in Southeast Asia” (FORIS) Project, funded by the United Nations Environment Program – Global Environment Facility (UNEP-GEP), Centre for Agriculture and Biosciences International (CABI), Department of Environment and Natural Resources (DENR), and its Biodiversity Management Bureau (BMB). We also thank the DENR for providing the permits for collection and local transport of specimens. We are grateful to our home institutions for their continuous support of our research.

**References**


