

Aretidris, a new genus of ants (Hymenoptera: Formicidae: Myrmicinae) from the mountains of Luzon Island, Philippines

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Abstract

A new genus of myrmicine ants, with two new species, is described from the Philippines. *Aretidris* gen.n. comprises ground-foraging ants apparently restricted to elevations above 900 meters a.s.l. on Luzon Island. Two new species, *Aretidris buenaventei* sp.n. and *Aretidris clousei* sp.n., are described. An identification key and a brief discussion are provided.

Key words: *Aretidris buenaventei*, *Aretidris clousei*, new genus, new species, ants, Formicidae, Philippines, identification key.

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Introduction

In 2003, a single specimen of a remarkable myrmicine ant was collected by Ms. Bambet Alto, an undergraduate biology student, in primary upper montane forest at 1550 m a.s.l. on Mt. Isarog, Luzon Island, Philippines. With the assistance of Gary Alpert, I brought the ant to the Museum of Comparative Zoology, Harvard University, in 2004. The ant was imaged and the images were sent to Barry Bolton, who opined that it may belong to the genus *Lordomyrma*. It is listed as "*Lordomyrma* spPH01" in ALPERT & al. (2006). DNA was extracted from this specimen by Eli Sarnat and included in LUCKY & SARNAT (2010) as "Genus undet PH03". Ultimately, the unique specimen was lost (R. Taylor, pers. comm.).

Fortuitously, Perry Buenavente joined expeditions of the National Museum of the Philippines as a volunteer and, in 2010, collected a good nest series of workers of a different but morphologically similar species from Mt. Palali, another mountain on the same island. Eventually, DNA was successfully extracted from a specimen and sequenced and is listed, analyzed and discussed as "Myrmicine Genus #26 PH02" in WARD & al. (2015). This species is listed, with images, in the genus accounts and included in the myrmicine key as "Unnamed Genus PH03" in GENERAL & ALPERT (2012). And very recently in 2014, Ron Clouse collected from Mt. Bulusan, yet another mountain on Luzon, a series of ants that seem to be conspecific with the lost Isarog ant. Thus, there is now sufficient material for the taxonomic description of this interesting new genus and two new species.

Methods and abbreviations

Specimens were examined and measured using a Wild M-5A stereomicroscope with ocular micrometer. Images (Figs. 1 - 12) were created using a Canon 7D digital cam-

era attached to a Leica MZ16 stereomicroscope. Montage images were rendered using Helicon Focus 6. Images were edited with Adobe Photoshop CS6 Extended. The map was created using ArcMap 10.

The following measurements (in millimeters) and indices are reported:

- CI Cephalic index: $HW / HL \times 100$.
- EI Eye index: $EL / HW \times 100$.
- EL Eye length along the maximum diameter.
- HFL Maximum length of hind femur in anterior view.
- 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, excluding eyes.
- ML Mesosomal length measured from the anterior edge of the pronotum (excluding the collar) to the posterior edge of the propodeal lobe.
- MtL Maximum length of gaster (= metasoma), from base of abdominal tergite IV to apex of abdominal tergite VII, measured in lateral view.
- PW Maximum width of pronotum in dorsal view.
- SI Scape index: $SL / HW \times 100$.
- SL Length of scape, excluding the basal neck and condyle.
- TL The total outstretched length of the ant from the mandibular apex to the gastral apex; when measured in profile the sum of mandibular length + head length + mesosomal length + lengths of waist segments + length of gaster.

Depositories of type material:

ANIC Australian National Insect Collection, Canberra, Australia.

- BMNH Natural History Museum, London, UK.
 CASC California Academy of Sciences, San Francisco, CA, USA.
 DMGC Private Collection, David Emmanuel M. General.
 MCZC Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA.
 NHMW Naturhistorisches Museum, Wien, Austria.
 PACB Private Collection, Perry Archival C. Buenavente.
 PNM National Museum of the Philippines, 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 PNM or the Philippine Department of Environment and Natural Resources.

Taxonomy

Aretidris gen.n.

Type species: *Aretidris buenaventei* sp.n.

Diagnosis of worker: Palp formula: 3, 2. Antennae 12-segmented (including antennal scape) with distinct 3-segmented club. Spur formula: 0, 0. Antennal scrobe absent. In full face view, gena bounded laterally by a longitudinal ridge that runs from dorsal edge of eye to mandibular insertion and is noticeably thickened anteriorly. In full face view, labrum visible below the anterior clypeal margin, even when mouthparts are fully withdrawn into the head. Mandibles with a long narrow basal stem such that a large gap exists between the basal margin of the mandible and the anterior clypeal margin; masticatory margin with a row of 14 small teeth or denticles. In lateral view, promesonotum strongly convex. Entire length of anterior margin of katepisternum produced into a thickened flange, obscuring the posterior margin of procoxa. Metanotal groove strongly impressed. Propodeum convex with a denticle at the junction between the propodeal dorsum and declivity. Petiole sessile. Protuberance or tooth present above and anterior to petiolar spiracle. Petiole slightly larger than postpetiole. Sting long and functional.

Description of worker: Palp formula: 3, 2. Antennae 12-segmented (including antennal scape) with distinct 3-segmented club. Antennal scrobe absent. Antennal scape weakly incrassate, reaching beyond the posterior margin of head by at least the thickness of the distal part of scape. In full face view (Figs. 4, 10), gena with a longitudinal ridge that runs from dorsal edge of eye to mandibular insertion and is noticeably thickened anteriorly. Gena reticulate. Frontal lobes longitudinally striate. Frontal carina short, ending at about mid-length of eye. Clypeus bicarinate; median part narrowly inserted between frontal lobes; anterior margin simple, almost straight, and without an isolated median seta. Labrum visible below anterior clypeal margin, even when mouthparts are fully withdrawn into the head. Mandible smooth, with a long narrowed base such that a large gap exists between the basal margin of the mandible and the anterior clypeal margin, and with 14 small teeth or denticles; apical and subapical teeth largest and the rest diminishing in size posteriorly. Posterior margin of head strongly convex. Lateral margin of head converging anteriorly. Eyes located laterally on the head just anterior of the mid-length, and convex, breaking the lateral margin of head. In lateral view, mandibles bent downward

apically. Eyes with eight ommatidia in longest axis. Promesonotum and propodeum convex, separated by a prominently impressed metanotal groove. Entire length of anterior margin of katepisternum produced into a thickened flange, obscuring the posterior margin of procoxa. Denticle present where propodeal dorsum meets propodeal declivity. Propodeal spiracle circular, located at least one diameter from edge of declivity. Metapleural gland orifice circular, directed posteriorly (best observed in oblique posterior view), without guard hairs, located at the apex of the propodeal lobe; gland bulla small. Longitudinal ruga present above metapleural gland orifice. Petiole sessile, slightly larger than postpetiole; spiracle below base of anterior face; a protuberance or tooth above and anterior to petiolar spiracle; node rounded, junction of convex petiolar dorsum with anterior and posterior faces indistinct; subpetiolar process absent. Postpetiole slightly flattened dorsally, dorsum forming rounded angles with anterior and posterior faces; subpostpetiolar process present as a low rounded lobe in anterior half of sternite, its anterior margin broadly emarginate in ventral view. First gastral tergite large, about half the total length of gaster. Mesotibial and metatibial spurs absent. Pilosity present as mostly long erect or suberect hairs; shorter erect hairs on coxae; erect hairs on gaster sparse. Color reddish-orange to brown, gaster and appendages lighter; antennal club lighter in color than rest of flagellum and scape.

Queen and male castes: Unknown.

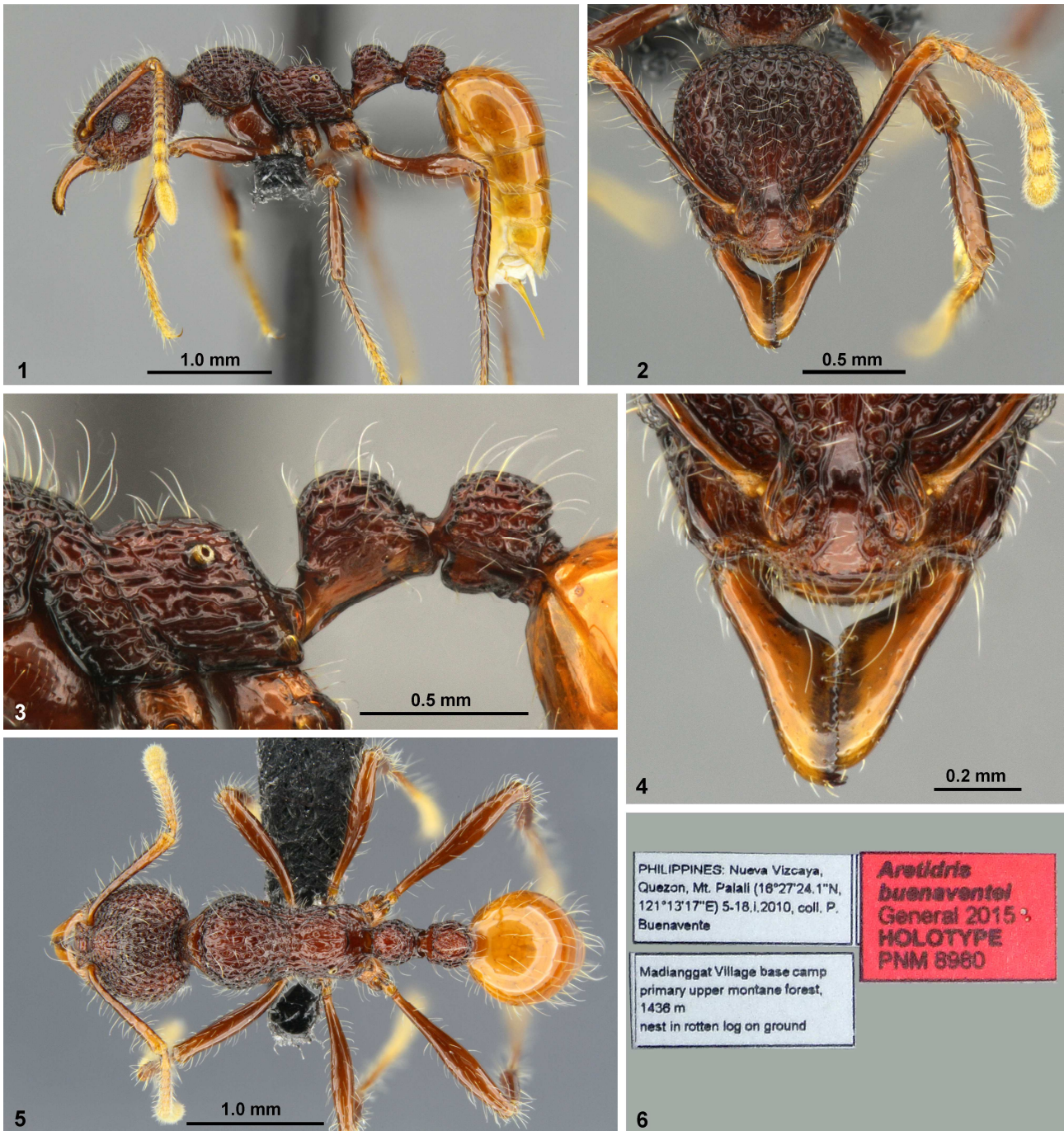
Bionomics: These ants nest in rotten logs and forage individually in the leaf litter during the day. They occur at elevations greater than 900 m a.s.l. on the island of Luzon.

Etymology: *Areté* (ἀρετή, Ancient Greek, excellence) + *idris* (ἴδρις, Greek, ant) (WHEELER 1956). Coincidentally, *arête* (French, ridge) also fits the fact that *A. clousei* sp.n. was collected on a low ridge bordering a mountain lake.

Comparative notes: *Aretidris* is unique among ant genera, with a combination of narrow-based mandibles with a denticulate masticatory margin, gena with a ridge running from the dorsal edge of the eye to the mandibular insertion, palp formula 3 : 2, convex propodeum armed with a denticle, metapleural gland orifice at the apex of the propodeal lobe, and a protuberance over the petiolar spiracle.

This genus shares some similar characters, e.g., bicarinate median clypeus, with *Lordomyrma* EMERY, 1897. However, *Aretidris* has narrow-based mandibles, a genal ridge, and a convex propodeum, all characters absent in *Lordomyrma* as currently defined. *Lordomyrma*, moreover, has an antennal scrobe (present but poorly developed in *L. furcifera* EMERY, 1897, *L. infundibuli* DONISTHORPE, 1940, and *L. crawleyi* MENOZZI, 1923), long frontal carina, and propodeal spines, all characters absent in *Aretidris* (see TAYLOR 2009, 2012). LUCKY & SARNAT (2010) found that *Aretidris* is sister to *Lordomyrma*, essentially disproving Bolton's hunch about the identity of "*Lordomyrma* spPH01". WARD & al. (2015) improved the resolution of the phylogenetic relationship of these two genera and recovered them in separate subclades within the newly expanded myrmicine tribe Crematogastrini FOREL, 1893.

Aretidris would have been included in the old sense of the myrmicine tribe Stenammini ASHMEAD, 1905 (BOLTON 2003). Although BOLTON (2003) established well the morphological diagnosis of Stenammini, WARD & al.



Figs. 1 - 6: *Aretidris buenaventei* sp.n. (holotype). (1) Lateral view of body; (2) head in full-face view; (3) lateral close-up of propodeum and waist segments; (4) close-up of anterior head and mandibles, (5) dorsal view of body; (6) labels.

(2015) found many erstwhile stenammae genera distributed throughout the Crematogastrini clade. WARD & al. (2015) thus transferred fifteen extant genera out of the Stenammini into the Crematogastrini. Now included in the Crematogastrini are all the genera under consideration in this paper, namely, *Aretidris* (= Myrmicine Genus #26 PH02 sensu WARD & al. (2015)), *Lordomyrma*, *Vollenhovia* MAYR, 1865, *Romblonella* WHEELER, 1935, *Calypatomyrmex* EMERY, 1887, *Lasiomyrma* TERAYAMA & YAMANE, 2000 and *Indomyrma* BROWN, 1986.

WARD & al. (2015) were unable to sequence *Lasiomyrma* and *Indomyrma*, two endemic Asian genera. Neither genus is morphologically similar to *Aretidris*.

Lasiomyrma has an anterior median clypeus produced into an obtuse angle, 11-segmented antenna, elongate-triangular mandibles that usually close tightly with anterior clypeal margin (line drawing of frontal head shows a gap in *L. gracilinoda* TERAYAMA & YAMANE, 2000), flat dorsum of promesonotum and propodeum, propodeal spines present, and a pedunculate petiole (TERAYAMA & YAMANE 2000). In contrast, *Aretidris* has an entire anterior clypeal margin, 12-segmented antenna, narrow-based triangular mandibles that always close with a gap between the mandibular basal margin and the anterior clypeal margin, convex dorsum of promesonotum and propodeum, propodeal armament reduced to denticles, and a sessile petiole.

Indomyrma has reduced eyes with a total of less than 12 ommatidia, an antennal scrobe, albeit weakly developed, bounded dorsally by a distinct frontal carina, median clypeal margin expanded as a notched convex apron that barely covers basal borders of completely closed mandibles, flat dorsum of promesonotum and propodeum, erect hairs in bilateral positions on head, mesosoma, petiole and postpetiole, propodeal spines present, and a pedunculate petiole (BROWN 1986). In contrast, *Aretidris* has larger eyes with about eight ommatidia in its longest axis, no antennal scrobe, a short frontal carina, entire median clypeal margin without an apron, strongly convex dorsum of promesonotum and propodeum, erect hairs on head, mesosoma, petiole and postpetiole abundant but not in bilateral positions, propodeal armament reduced to denticles, and a sessile petiole.

WARD & al. (2015) found *Aretidris* (as Myrmicine Genus #26 PH02) to be a sister taxon to the genus *Vollenhovia* in the Crematogastrini. These two genera are not particularly similar morphologically, sharing only a couple of petiolar features: a protuberance over the petiolar spiracle (also found in *Gauromyrmex* MENOZZI, 1933 and *Romblonella*) and a lack of a petiolar peduncle. That *Aretidris* and *Vollenhovia* together are sister to *Calyptomymex* is even more unexpected and problematic. I can find no morphological similarities between *Aretidris* and *Calyptomymex*.

Aretidris is already included in the myrmicine generic key of GENERAL & ALPERT (2012), as "Unnamed Genus PH03". Only a simple substitution of the name is necessary to key it out among the ant genera of the Philippines.

Key to workers

- 1 Head and mesosoma heavily sculptured; erect hairs moderately abundant on head and mesosoma; 1st gastral tergite slightly less than half the length of gaster; body larger (HW > 0.88).
..... *A. buenaventei* sp.n.
- Head and mesosoma mostly smooth; erect hairs sparsely distributed on head and mesosoma; 1st gastral tergite extremely large, accounting for most of the length of gaster; body smaller (HW < 0.84).
..... *A. clousei* sp.n.

Aretidris buenaventei sp.n. (Figs. 1 - 6)

Type material: Holotype worker, Philippines: Luzon Island, Nueva Vizcaya Province, Municipality of Quezon, Mt. Palali, Madianggat Village, 1436 m a.s.l., 16° 27' 24.1" N, 121° 13' 17" E, 5.I. 2010, primary upper montane forest, ex log nest, leg. P.A.C. Buenavente (PNM 8980) (deposited in PNM). Paratypes: 22 workers with same data as holotype (PNM 8981 - 9002) (one pin each to: ANIC, BMNH, CASC, DMGC, NHMW, PACB, UPLB; two pins to MCZC; the rest to PNM).

Description of holotype worker: CI 88, EI 18, EL 0.16, HFL 1.3, HL 1.03, HW 0.90, ML 1.40, MtL 1.85, PW 0.73, SI 108, SL 0.98, TL 5.43. With all the character states of the genus. Body, except gaster and appendages, heavily sculptured. Head alveolate, each cavity bearing an erect or suberect hair. Mesosoma, petiole, and postpetiole alveolate with superimposed rugae. Mandible, median clypeus, and gaster smooth. First gastral tergite slightly less than half the length of gaster.

Description of paratype workers: CI 84 - 95, EI 16 - 19, EL 0.15 - 0.18, HFL 1.15 - 1.35, HL 0.98 - 1.08, HW 0.88 - 0.95, ML 1.38 - 1.50, MtL 1.75 - 1.93, PW 0.73 - 0.78, SL 0.88 - 1.03, TL 5.28 - 5.74 (17 measured).

Bionomics: This species was found when a rotten log on the forest floor containing its nest was disturbed in the dying light of late afternoon. Some foragers were collected by hand from nearby after the nest series of workers and brood were collected.

Etymology: This species is dedicated to my friend and colleague, Perry Archival C. Buenavente, researcher of the National Museum of the Philippines, who tirelessly surveys ant diversity in the Philippines and collected the type nest series.

Aretidris clousei sp.n. (Figs. 7 - 12)

Type material: Holotype worker, Philippines: Luzon Island, Sorsogon Province, Municipality of Bulusan, Bulusan Volcano Natural Park, Aguingay Lake, Southwest Ridge, 900 m a.s.l., 12° 46' 13" N 124° 04' 16" E, 9.VI.2014, secondary forest, ex leaf litter, leg. R. Clouse (PNM 9004) (deposited in PNM). Paratypes: 2 workers with same data as holotype; 2 workers with same data as holotype except 10.VI.2014 (PNM 9005 - 9008) (one pin each to: ANIC, BMNH, MCZC, UPLB).

Description of holotype worker: CI 87, EI 23, EL 0.19, HFL 1.13, HL 0.95, HW 0.83, ML 1.38, MtL 1.23, PW 0.68, SI 103, SL 0.85, TL 4.65. With all the character states of the genus. Body mostly smooth. Scattered punctures over the head and mesosoma bear long erect to suberect hairs. First gastral tergite (= abdominal tergite IV) huge, accounting for most of the length of gaster.

Description of paratype workers: CI 84 - 89, EI 20 - 24, EL 0.16 - 0.20, HFL 1.10 - 1.15, HL 0.93 - 0.98, HW 0.80 - 0.84, ML 1.33 - 1.40, MtL 1.13 - 1.23, PW 0.68 - 0.73, SI 97 - 106, SL 0.80 - 0.88, TL 4.55 - 4.76 (4 measured).

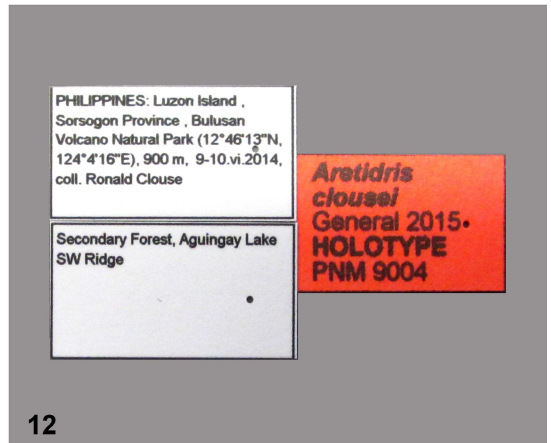
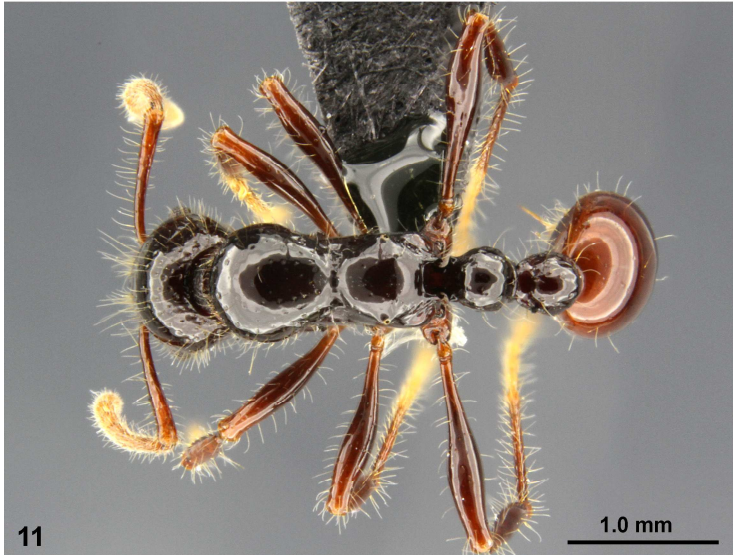
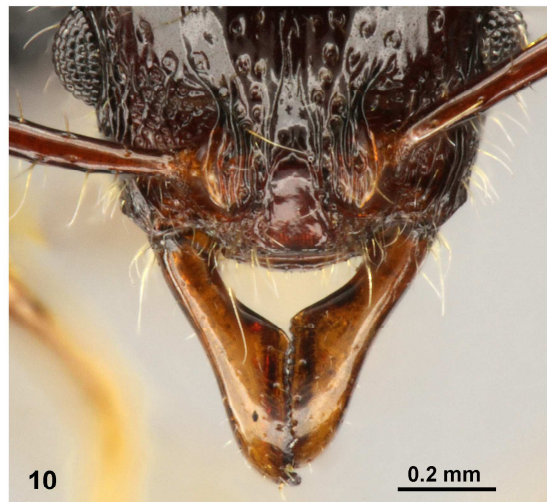
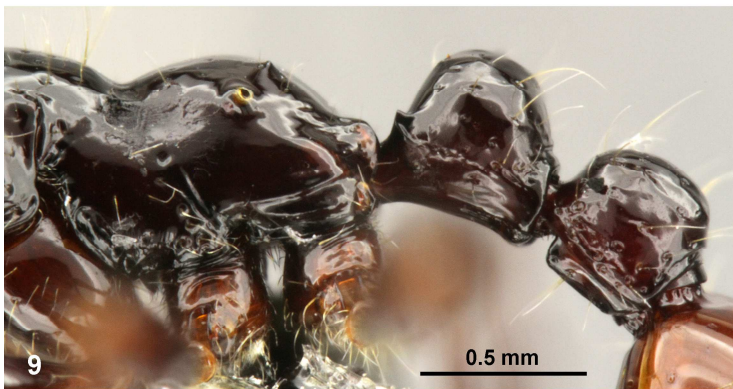
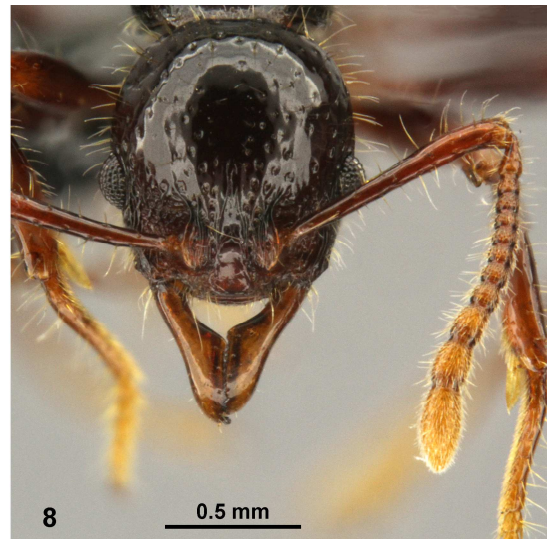
Bionomics: This species was collected by leaf litter sifting. It forages diurnally as individuals in the leaf litter.

Etymology: This species is dedicated to my good friend Ronald M. Clouse who collected all the type specimens.

Discussion

This genus has been collected at high elevations only on Luzon Island (Fig. 13) (elevations of surveys in parentheses): (a) Sorsogon Province, Municipality of Bulusan, Bulusan Volcano Natural Park (900 m a.s.l.); (b) Camarines Sur Province, Naga City, Panicuason Village, Mt. Isarog Natural Park (1550 m a.s.l.); and (c) Nueva Vizcaya Province, Municipality of Quezon, Madianggat Village, Mt. Palali (1436 m a.s.l.).

Historical collections from other high-elevation localities in the Philippines by C.F. Baker, C.S. Banks, W.L. Brown, Jr., J.W. Chapman, H.M. Curran, D. Empeso, R.C. MacGregor, H.M. Torrevillas, and F.X. Williams do not contain any specimens of *Aretidris* (GENERAL & ALPERT 2012; G.D. Alpert, pers. comm.; SHATTUCK & al. 2014; WHEELER & CHAPMAN 1925). Recent collections from low-elevation localities on Luzon Island and high-elevation localities on other islands by P.A.C. Buenavente, R.M. Clouse, P. Sharma, A.C. Diesmos, A. Reginaldo, and myself do not contain *Aretidris* ants either. Although only a few other localities have been sampled for the presence



Figs. 7 - 12: *Aretidris clousei* sp.n. (holotype). (7) Lateral view of body; (8) head in full-face view; (9) lateral close-up of propodeum and waist segments; (10) close-up of anterior head and mandibles; (11) dorsal view of body; (12) labels.

of these ants, it appears that *Aretidris* ants are restricted to high elevations. More localities need to be sampled to establish the range of these ants and the occurrence of other species.

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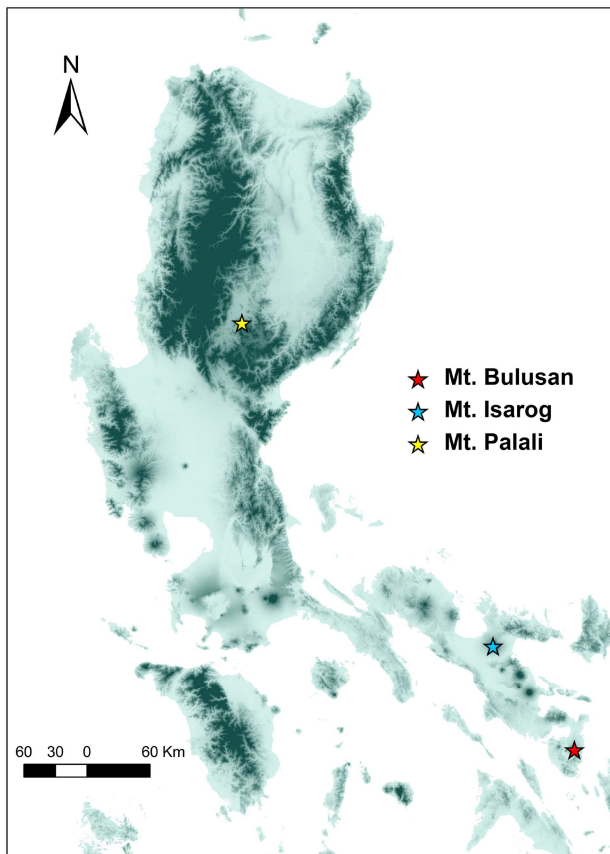


Fig. 13: False-color map of Luzon Island, Philippines, showing the locations where *Aretidris* was collected. Darker regions represent areas higher in elevation.

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