

**Additions to Knowledge of the Ant Fauna of Taiwan  
(Hymenoptera, Formicidae, Solenopsidini):  
Genera *Anillomyrma* and *Carebara***

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**Abstract** Two species of Formicidae recorded from Taiwan, of which one is new to science: *Carebara sakamotoi* sp. nov. The other, *Anillomyrma decamera* (EMERY, 1901), is now recorded for the first time from Taiwan.

This paper is a supplement to ‘A Synopsis of the Family Formicidae of Taiwan (Insecta, Hymenoptera)’ (TERAYAMA, 2009). It concerns a first record of a species of the genus *Anillomyrma* and a new species of the genus *Carebara* from Taiwan.

The genus *Anillomyrma* EMERY, 1913, is one of the rare ant taxa, containing only two described species from the Oriental region (EGUCHI *et al.*, 2010). In Taiwan a single unnamed species was recorded by LIN and WU (2003).

The genus *Carebara* WESTWOOD, 1840, comprises about 175 species, and mainly distributed in the tropical and subtropical areas. In Taiwan 4 species have been known up to the present. Recently the genera *Oligomyrmex*, *Afroxydris* and *Paedalgus* were synonymized with the genus *Carebara* by FERNANDEZ (2004). However, EGUCHI *et al.* (2011) regarded *Oligomyrmex* as an independent genus. The taxonomic status of these ‘genera’ should be settled by further studies in the future. In this paper, we tentatively follow the view proposed by FERNANDEZ.

The following abbreviations and indices are used in this paper for descriptions.

HL, head length: maximum full face view length from the anteriormost margin of clypeus to the occipital margin of the head (when the occipital margin is concave, to a transverse line connecting its posteriormost extensions).

HW, head width: maximum dorsal view distance across head including eyes in full face view.

SL, scape length: length of scape excluding radicle.

CI, cephalic index: HW/HL x 100.

SI, scape index: SL/HW x 100.

WL, WEBER's length of alitrunk: maximum diagonal distance from the base of anterior slope of pronotum to the tip of propodeal lobe.

PL, petiole length: maximum length of petiole in lateral view, measured from ventral juncture with propodeum to juncture with postpetiole.

PNL, petiolar node length: maximum length of petiolar node in lateral view.

PH, petiole height: maximum height of petiole in lateral view, measured perpendicularly from apex of petiolar node to venter of petiole.

DPW, petiole width: maximum width of petiole in dorsal view.

PPL, postpetiole length: maximum length of postpetiole in lateral view, measured from ventral juncture with petiole to juncture with gaster.

PPH, postpetiole height: maximum height of postpetiole in lateral view, measured perpendicularly from apex of postpetiolar node to venter of postpetiole.

PPW, postpetiole width: maximum width of postpetiole in dorsal view.

TL, total body length: outstretched length from the mandibular apex to the gastral apex.

### Subfamily Myrmicinae, Tribe Solenopsidini

#### *Anillomyrma decamera* (EMERY, 1901)

(Figs. 1–3)

*Monomorium decamera* EMERY, 1901.

*Anillomyrma decamera* (EMERY, 1901): ETTERS HANK, 1966.

*Anillomyrma decamera continentis* WHEELER, 1927. Provisional synonym by BOLTON, 1987; Synonymy by EGUCHI *et al.*, 2010.

*Diagnosis.* Small ant, measuring slightly less than 2 mm in total length. Head rectangular, distinctly longer than wide. Mandible with 4 teeth, mandibular blades crossing over at full closure. Antenna 10-segmented, with a 3-segmented club; scape short. Eyes completely lacking. Petiolar peduncle lacking an anteroventral process. Postpetiole in dorsal view broadly attached to anterodorsal part of gaster. Body pale yellow, masticatory margin of mandible brownish.

*Measurements* (mm; n = 3): HL 0.37–0.39; HW 0.30–0.31; SL 0.23–0.24; CI 80–81; SI 77–78; WL 0.48–0.50; PL 0.19–0.20; PH 0.11–0.12; DPW 0.08–0.09; PPL 0.11–0.12; PPH 0.08–0.09; DPW 0.10–0.11; TL 1.7–1.9.

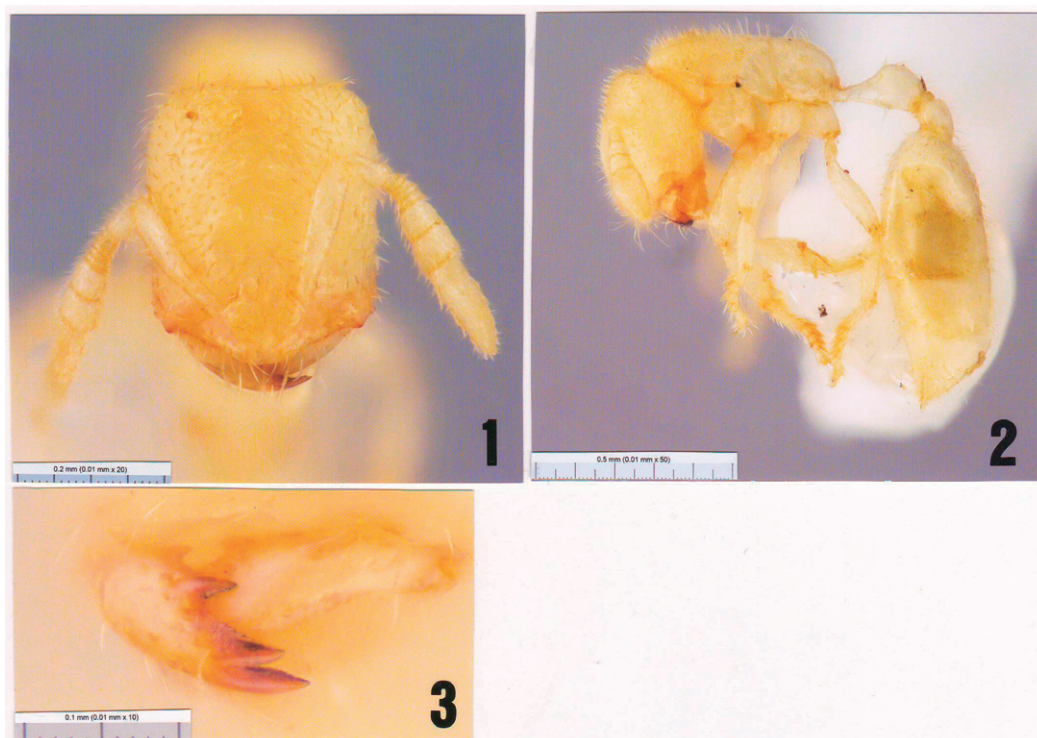
*Specimens examined.* 3 workers, Tainan City, Taiwan, 25. i. 2010, H. SAKAMOTO leg.

*Remarks.* This represents the first record of this species from Taiwan. The specimens were found in soil about 30 cm in depth.

#### *Carebara sakamotoi* sp. nov.

(Figs. 4–7)

*Diagnosis.* Among the Asian congeners, this species resembles *C. caprelous* (WHEELER, 1927) from Vietnam, *C. caprelous laeviceps* WHEELER, 1928, from southern China, and *C. bihornatus* (XU, 2003) from mountain region of Yunnan Province in China in the occipital horns connected by a developed transverse ridge in major worker. However, it is separated from *C. caprelous* and *C. caprelous laeviceps* by the 9-segmented antennae (11-segmented in the latter two), and eyes absent in minor worker (small eyes present in the latter two), and from *C. bihornatus* by the thick head capsule with convex anterior margin



Figs. 1–3. *Anillomyrma decamera* (EMERY, 1901), worker. — 1, Head, full face view; 2, body, lateral view; 3, right mandible.

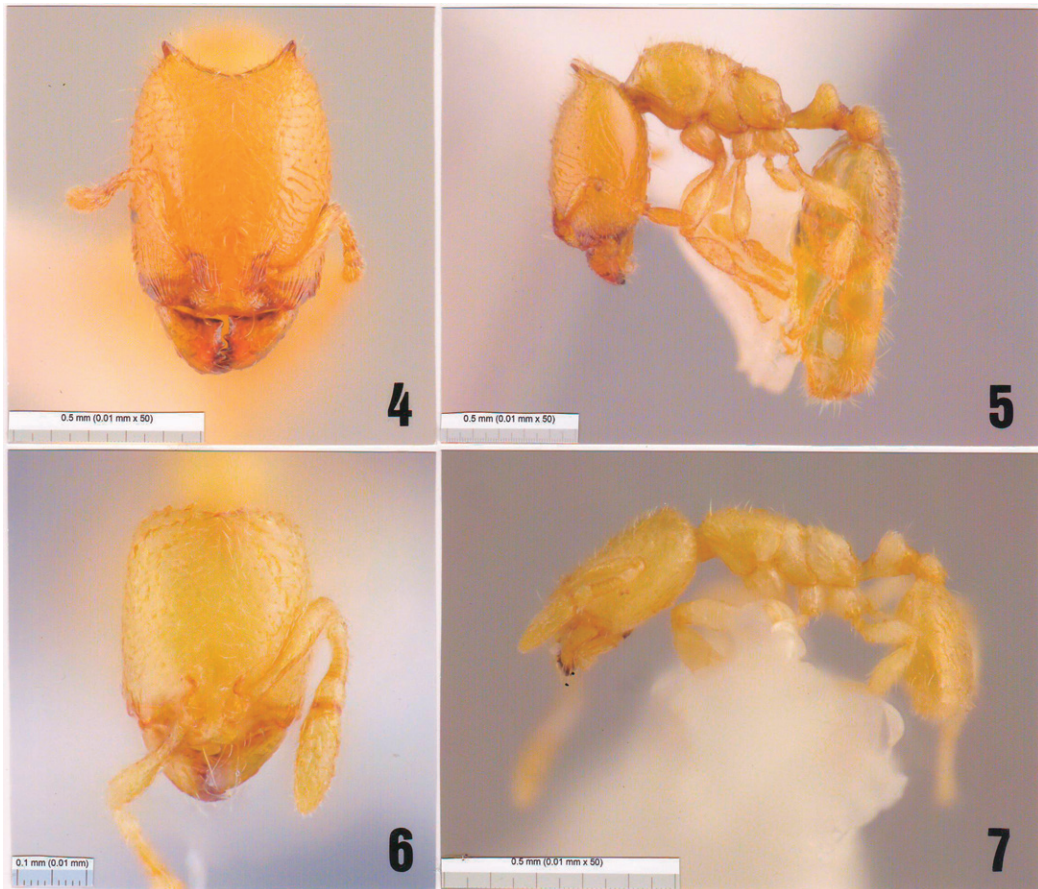
in profile and acute triangular occipital horns in major worker (thin with straight anterior margin of head and obtuse triangular occipital horns in *bihornatus*), and head with convex anterior margin in profile and triangular petiolar node in minor worker (head with straight anterior margin and reversed U-shaped petiolar node in *bihornatus*).

*Description. Holotype.* Major worker. *Structure:* Head long, 1.38 times as long as wide, with weakly convex sides and strongly concave posterior margin in full face view; occipital horn 0.06 mm long, forming acute triangle, and about 1.2 times as long as its basal width; horns connected by a developed transverse ridge; head in lateral view 1.80 times as long as high, with weakly convex dorsal and ventral margins.

Mandible with 5 teeth; apical tooth largest; basal smallest and dully angulated. Clypeus slightly produced medially, with straight anterior margin. Antenna with 9 segments, apical 2 segments forming a club; scape short, 2nd segment longer than wide, 3rd to 7th segments each wider than long, 8th segment 1.3 times as long as wide, terminal segment 3.2 times as long as wide; the ratio of apical 3 segments about 1: 2.5 : 8 in length from the base. Eye small, consisting of 4 facets, situated at anterior 1/3 of head.

Dorsal outline of pronotum moderately convex in profile, disc 0.35 mm in maximum width, 1.50 times as wide as long, with convex anterolateral corners in dorsal view. Mesonotal dorsum almost straight in profile. Matanotal groove distinct. Propodeum with straight dorsal outline and dully angulate posterolateral corner in profile.

Petiole longer than high, with reversed U-shaped node and straight ventral margin; in dorsal view, node 1.5 times as wide as long. Postpetiole lower than petiole, with convex



Figs. 4–7. *Carebara sakamotoi* sp. nov. (4, 5, holotype major worker; 6, 7, paratype minor worker) — 4, 6, Head, full face view; 5, 7, body, lateral view.

anterior margin and straight dorsal margin; in dorsal view, 1.4 times as wide as long in dorsal view.

Gaster large; 0.55 mm in maximum width in dorsal view.

*Sculpture*: Frons of head microreticulate and scattered with shallow small punctures; frontal lobes with many thin longitudinal striae; vertex moderately microreticulate; malar space reticulate; genal area smooth. Mandible smooth and shining. Antennal scape weakly microreticulate and club microreticulate. Alitrunk largely smooth excepting mesopleura and lower half of side of propodeum that are microreticulate. Petiole and postpetiole microreticulate. Gaster smooth and shining. Coxae and trochanters microreticulate; femora and tibiae smooth.

*Color*: Head, alitrunk, petiole and postpetiole yellow; eye black; masticatory margin of mandible blackish brown; 1st gastral segment brownish yellow, 2nd to terminal segment yellow; legs yellow.

*Measurements* (mm): *Holotype*; HL 0.73; HW 0.53; SL 0.26; CI 72; SI 50; WL 0.65; PL 0.24; PH 0.18; DPW 0.15; PPL 0.15; PPH 0.13; PPW 0.18; TL 2.7. *Paratype major worker*; HL 0.70; HW 0.51; SL 0.25; CI 73; SI 49; WL 0.68; PL 0.23; PH 0.18; DPW 0.15; PPL 0.15; PPH 0.13; DPH 0.18; TL 2.8.

*Paratype minor worker. Structure:* Head 1.23 times as long as wide, with parallel sides and weakly concave posterior margin in full face view; posterolateral corner forming an dull angle, posterior margin carinate; head in lateral view 1.75 times as long as high, with weakly convex dorsal and ventral margins. Mandible with 5 teeth; apical 4 teeth acute; basal tooth small and blunt. Anterior margin of clypeus straight. Antenna with 9 segments, apical 2 segments forming a club; 3rd to 7th segments each wider than long; 7th segment 0.5 times, 8th 1.1 times, and terminal segment 2.7 times as long as wide; the ratio of apical 3 segments 1 : 4 : 13.6 in length from the base. Eye absent.

Pro- and mesonotal dorsum almost flat; pronotal disc 0.19 mm in maximum width, with round anterolateral corners in dorsal view; metanotal groove absent; propodeal disc very weakly convex, posterolateral corner rounded, not forming an angle in profile; propodeal teeth absent.

Petiole longer than high, with subtriangular node and straight ventral margin; tip of the node rounded. Postpetiole as long as wide, with straight dorsal margin in profile.

Gaster 0.24 mm in maximum width in dorsal view.

*Sculpture:* Frons and vertex of head weakly microreticulate; mandible smooth. Pronotum smooth; dorsa of mesonotum and propodeum smooth; mesopleuron microreticulate; lower half of side of propodeum microreticulate, upper half smooth and shining. Petiole weakly microreticulate, postpetiole microreticulate. Gaster very weakly microreticulate.

*Color:* Body yellow; masticatory margin of mandible blackish brown.

*Measurements* (mm): HL 0.34; HW 0.28; SL 0.19; CI 81; SI 68; WL 0.35; PL 0.13; PH 0.06; DPW 0.08; PPL 0.06; PPH 0.06; PPW 0.10; TL 1.1.

*Holotype.* Major worker, Tainan City, Taiwan, 26. i. 2010, H. SAKAMOTO leg.

*Paratypes.* 1 major worker and 2 minor workers, same data as holotype.

*Type depository.* The types are deposited in the National Institute of Agro-Environmental Sciences, Tsukuba, Japan.

*Etymology.* The specific epithet is named after the collector of this species, Dr. H. SAKAMOTO.

*Remarks.* The shape of the petiolar node of the paratype major worker is subtriangular, with a blunt tip. The specimens were found in soil about 30 cm in depth.

### Newly formatted key to Taiwanese species of the genus *Carebara*

*Carebara amia* (FOREL, 1913) is excluded in this key, since it is known from female only and taxonomically ambiguous.

- 1a. Occipital horns connected by a developed transverse ridge in major worker.
  - b. Occipital horn large, acutely triangular in major worker.
  - c. Eyes absent in minor worker.
  - d. Occipital margin carinate in minor worker. .... *Carebara sakamotoi* sp. nov.
- 1aa. Occipital horns not connected by a transverse ridge in major worker.
  - bb. Occipital horn a small triangle or tooth in major worker.
  - cc. Eyes present in minor worker.
  - dd. Occipital margin not carinate in minor worker. .... 2
- 2a. Major worker smaller; total length ca. 2 mm.
  - b. Eye small in major worker; its diameter smaller than the maximum width of antennal scape.

- c. Mesopleuron without a groove at midlength in major worker.
- d. Five or six distinct transverse rugae present on vertex in major worker.
- e. Pronotum of minor worker microreticulate..... *Carebara sauteri* (FOREL, 1912)
- 2aa. Major worker large; total length > 3.5 mm.
  - bb. Eye large in major worker; its diameter larger than the maximum width of antennal scape.
  - cc. Mesopleuron with a transverse groove at about midlength in major worker.
  - dd. Major worker without transverse rugae on vertex.
  - ee. Pronotum of minor worker smooth and shining..... 3
- 3a. Major worker smaller, HL 0.80 mm, HW 0.75 mm.
  - b. First gastral tergite in the major without longitudinal striae.
  - c. Subpetiolar process long, bearing an anteroventral tooth in major worker.
  - d. Minor worker with acute propodeal teeth..... *Carebara oni* (TERAYAMA, 1996)
- 3aa. Major worker larger, HL 1.15 mm, HW 1.08 mm.
  - bb. First gastral tergite with many longitudinal striae in major worker.
  - cc. Subpetiolar process short, bearing a blunt angle in major worker.
  - dd. Minor worker without propodeal teeth..... *Carebara qianliyan* TERAYAMA, 2009

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### References

- BOLTON, B., 1987. A review of the *Solenopsis* genus-group and revision of Afrotropical *Monomorium* MAYR. *Bull. Bri. Mus. (Nat. Hist.) (Ent.)*, **54**: 263–452.
- EGUCHI, K., T. V. BUI, D. M. GENERAL and G. D. ALPERT, 2010. Revision of the ant genus *Anillomyrma* EMERY, 1913 (Hymenoptera: Formicidae: Myrmicinae: Solrnopsidini). *Myrmecological News*, **13**: 31–36.
- EGUCHI, K., T. V. BUI and S. YAMANE, 2011. Generic synopsis of the Formicidae of Vietnam (Insecta: Hymenoptera), Part 1 – Myrmicinae and Pseudomyrmecinae. *Zootaxa*, **2878**: 1–61.
- EMERY, C., 1901. Spicilegio mirmecologico. *Bull. Della Soc. Ent. Ital.*, **33**: 57–63.
- ETTERSHPANK, G., 1966. A generic revision of the world Myrmicinae related to *Solenopsis* and *Pheidologeton*. *Aust. Jour. Zool.*, **14**: 73–171.
- FERNANDEZ, F., 2004. The American species of the myrmicine ant genus *Carebara* (Hymenoptera: Formicidae). *Caldasis*, **26**: 191–238.
- FOREL, A., 1913. H. SAUTER's Formosa-Ausbeute: Formicidae II. *Arch. Nat.*, **79A**(6): 183–202.
- LIN, C.-C. and W.-J. WU, 2003. The ant fauna of Taiwan (Hymenoptera: Formicidae), with the keys to subfamilies and genera. *Ann. Nat. Mus. Taiwan*, **46**: 5–69. [In Chinese with English abstract.]
- TERAYAMA, M., 2009. A synopsis of the Family Formicidae of Taiwan (Insecta, Hymenoptera). *Liberal Art. Bull. Kanto Gakuen Univ.*, **17**: 81–266.
- WHEELER, W. M., 1927. Ants collected by Professor F. SILVESTRI in Indochina. *Boll. Lab. Zool. Gener. Agri. Portici*, **20**: 83–106.
- WHEELER, W. M., 1928. Ants collected by Professor F. SILVESTRI in China. *Boll. Lab. Zool., Gener. Agri. Portici*, **22**: 3–38.
- XU, Z.-H., 2003. A systematic study on Chinese species of the ant genus *Oligomyrmex* MAYR (Hymenoptera, Formicidae). *Acta Zootaxonomica Sinica*, **28**: 310–322.

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