

The Army Ant *Aenictus hottai* (Hymenoptera: Formicidae: Aenictinae) and Related Species in Southeast Asia, with a Description of a New Species

by

Decha Wiwatwitaya¹ & Weeyawat Jaitrong^{2,3}

ABSTRACT

The *Aenictus hottai* group is established to include two species (a named and a new species) occurring in Southeast Asia: *Aenictus hottai* Terayama et Yamane, 1989 and *Aenictus yamanei* Wiwatwitaya et Jaitrong, sp. nov. Both are probably restricted to Sundaland and inhabit lowland primary forests.

Key words: Taxonomy, Formicidae, Aenictinae, *Aenictus yamanei*, army ants, new species.

INTRODUCTION

Currently 95 species are listed in the army ant genus *Aenictus* from the Oriental, Indo-Australian, and Australasian regions (Jaitrong & Eguchi 2010; Bolton 2011). Among them 67 species are known only from the worker caste. All of those species except one have a smooth and shining gaster. The species with a finely reticulated gaster, *Aenictus hottai* Terayama et Yamane, 1989, is also characterized by a well-developed subpetiolar process with a poster-oventrally produced arm, and is found only in Southeast Asia (Terayama & Yamane 1989; Rościszewski & Mashchwitz 1994; Malsch *et al.* 2003; Jaitrong & Nabhitabhata 2005).

In the course of our examination of *Aenictus* specimens collected from Southeast Asia, we found another species from Malay Peninsula and Sarawak that is closely related to *A. hottai* but is much smaller than the latter. In this paper we describe this ant as a new species based on the worker caste and both species are classified into the *Aenictus hottai* group herein established.

¹Department of Forest Biology, Faculty of Forestry, Kasetsart University, Bangkok 10900, Thailand, E-mail: ffordew@ku.ac.th

²Thailand Natural History Museum, National Science Museum, Technopolis, Khlong 5, Khlong Luang, Pathum Thani 12120, Thailand, E-mail: polyrhachis@yahoo.com

³Graduate School of Science and Engineering, Kagoshima University, Kagoshima 8900065, Japan

MATERIALS AND METHODS

This study is mainly based on the materials deposited in the Ant Museum of Kasetsart University (Thailand), the collection of Sk. Yamane at Kagoshima University (Japan) and The Natural History Museum of the National Science Museum (Thailand). For the *Aenictus hottai*, paratypes were examined.

Most morphological observations were made with a Nikon SMZ1000 stereoscope. Multi-focused montage images were produced using Helicon Focus 4.75 Pro from a series of source images taken by a Nikon EOS Kiss×4 digital camera attached to a Nikon ECLIPSE E600 microscope. Workers of each species were measured using a micrometer, all measurement are expressed in millimeters, representing to the second decimal place.

The abbreviations used for the measurements and indices are as follows: TL, total length, roughly measured from the anterior margin of head to the tip of gaster in stretched specimens; HL, maximum head length in full-face view, measured from the anterior clypeal margin to the midpoint of a line drawn across the posterior margin of head; HW, maximum head width in full-face view; SL, scape length excluding the basal of constriction and condylar bulb; ML, mesosomal length measured from the point at which the pronotum meets the cervical shield to the posterior margin of metapleuron in profile; PL, petiole length; CI (cephalic index), $(HW/HL) \times 100$; SI (scape index), $(SL/HW) \times 100$.

Abbreviations of the type depositories are as follows: AMK, Ant Museum at Kasetsart University, Thailand; MZB, Entomological collection at Museun Zoologicum Bogoriense, Cibinong, Indonesia; SKYC, Collection of Sk. Yamane at Kagoshima University, Japan; THNHM, Natural History Museum of the National Science Museum, Thailand; FRCS, Forest Research Center, Sarwak, Malaysia.

SYSTEMATICS

Aenictus hottai species group

Antenna long, consisting of 10 segments; antennal scape relatively long. Anterior clypeal margin roundly convex, lacking denticles. Mandible subtriangular, very dense with punctures; its masticatory margin with a large and sharp apical tooth followed by a small subapical tooth and 16-20 minute

inconspicuous denticles. Frontal carina not reaching midlength of head, well developed anteriorly and poorly developed posteriorly; parafrontal ridge present not reaching midlength of head; seen in profile its anteriormost part well developed and subtriangular, and poorly developed posteriorly. Occipital margin of head forming a narrow collar. Promesonotum seen in profile strongly convex dorsally and sloping gradually to metanotal groove; propodeal junction angulated; declivity of propodeum concave, encircled with a rim. Subpetiolar process well developed with a posteroventrally produced arm.

Entire head very densely punctate and opaque. Mesosoma and waist also with a similar type of sculpture. First gastral segment with weaker and superficial sculpturation than head, densely reticulate, subopaque and slightly shining (Figs. 1D, 2D). Body dark brown to reddish brown; typhlatta spot absent.

Remarks. This species group is closely related to *Aenictus dentatus* group and *Aenictus philippinensis* group (see Wilson 1964), all having the well-developed frontal carina and parafrontal ridge. *A. hottai* group is separated from the others by the first gastral segment densely and superficially reticulate, subopaque and slightly shining, and the well-developed subpetiolar process with a posteroventrally produced arm (in the other groups the first gastral segment is smooth and shiny or rarely shagreened).

Distribution. Malay Peninsula (southern Thailand and Malaysia), W. Sumatra, and Borneo (Sarawak).

Checklist of species. *A. hottai* Terayama et Yamane, 1989, and *A. yamanei* Wiwatwitaya et Jaitrong, sp. nov.

Aenictus hottai Terayama et Yamane

Figs. 1A-D, 3

Aenictus hottai Terayama & Yamane, 1989: 598, figs. 1-2; Bolton, 1995: 59.

Types. The holotype and 9 paratype workers (MZB and SKYC) from Ulu Gadut nr Padang, W. Sumatra, Indonesia, 27-30 VIII 1985 (two paratypes were examined, SKYC).

Measurements. Workers (n = 10 including two paratypes): TL 4.65-5.00 mm; HL 1.05-1.13 mm; HW 0.93-1.00 mm; SL 0.93-1.00 mm; ML 1.63-1.75 mm; PL 0.40-0.43 mm; CI 88-91; SI 93-100.

Redescription (paratypes and non-type specimens). Head in full-face view slightly longer than broad, with sides convex and posterior margin almost straight. Antennal scape almost reaching posterolateral corner of head. Frontal carina not reaching midlength of head, well developed anteriorly and poorly developed posteriorly; parafrontal ridge extending posterior less than 1/3 of head length; seen in profile its anterior part raised high and subtriangular, and poorly developed posteriorly. Mandible broad and triangular, its masticatory margin with a large apical tooth followed by a small subapical tooth and a series of 16-17 minute denticles of uniform size; basal margin of mandible lacking denticles. Mososoma stout; anepisternum clearly demarcated from katepisternum. Propodeum in profile with almost straight dorsal outline; propodeal junction acutely angulate; opening of propodeal spiracle clearly circular with its diameter about 2.4 times as long as diameter of postpetiolar spiracle. Petiole round and almost as long as high; posterior slope of petiole seen in profile feebly convex, seen from above with blunt lateral carinae but not margined basally by a carina; subpetiolar process large with anterior corner rounded, posteroventrally produced into an arm with a blunt tip; margin

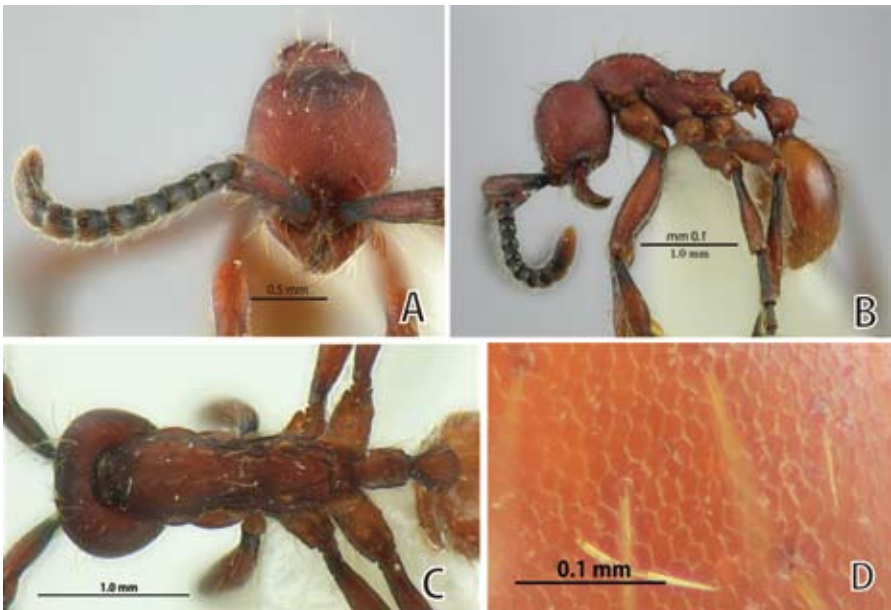


Fig. 1. *Aenictus hottai*, paratype. A, Head in full-face view; B, habitus, lateral aspect; C, habitus, dorsal aspect; D, sculpture on first gastral tergite.

connecting anterior corner and the tip of the arm clearly concave. Postpetiole slightly longer than petiole, its dorsal outline slightly elevated posteriorly.

Head, mesosoma, petiole, postpetiole, and legs densely punctate and opaque; mandible densely punctate extensively, finely striate along basal margin, and smooth and shiny along masticatory margin and at apex; antennal scape micropunctate. Propodeal dorsum with several short longitudinal ridges in front of junction. Posterior face of petiole wrinkled. Gaster with weaker sculpturation than head, finely and superficially reticulate, subopaque and slightly shining.

Head with a pair of long standing hairs mixed with relatively sparse short hairs over the surface; mesosoma with relatively sparse long standing hairs mixed with sparse short hairs over the surface; length of the longest pronotal hair 0.50-0.53 mm. Entire Body dark reddish-brown.

Non-type material examined. THAILAND: Bala-Hala, Narathiwat Prov., 25 IX 2001, K. Eguchi leg., Eg01-TH-668 (AMK, SKYC, THNHM). **MALAYSIA:** Ulu Gombak, Malay Peninsula, VII-IX 1992, F. Ito leg., MG353 (SKYC); Lambir N.P., Miri, Sarawak, 24 I 1993, Sk. Yamane leg. (AMK, SKYC, THNHM). **INDONESIA:** Ulu Gadut nr Padang, W. Sumatra, 27-30 VIII 1985 (same colony as the type series, SKYC, THNHM).

Distribution. Malay Peninsula (southern Thailand and Malaysia), Borneo (Sarawak), Sumatra (Fig. 3).

Bionomics. According to the specimen examined, all colonies of *A. hottai* were collected from the forest floor in the lowland primary forest. Rościszewski & Mashchitz (1994), Malsch *et al.* (2003) also observed this species in a lowland primary forest in Pasoh, Malay Peninsula. This species is probably a Sundaland species; so far northern limit of its range in latitude is the Thai-Malay border (ca. 7°N) near the Kangar-Pattani line (see Woodruff 2003, fig. 1). Rościszewski & Mashchitz (1994) reported that in the Pasoh Forest Reserve *A. hottai* preyed on ants of the ponerine genus *Odontomachus*.

Remarks. *A. hottai* is very similar to *A. yamanei* in general appearance as they share the dense punctation on the head and mesosoma, the peculiar subpetiolar process and the superficially reticulate first gastral segment. However, *A. hottai* is separated from *A. yamanei* by the following conditions: body much larger (HW 0.93-1.00 mm, ML 1.63-1.75 mm in *A. hottai*; HW 0.63-0.70 mm; ML 1.22-1.27 mm in *A. yamanei*), head relatively shorter (CI

88-91 vs 79-85), posterior face of petiole feebly convex and wrinkled and not margined with a rim (shallowly concave without longitudinal wrinkles and margined with a very thin rim in *A. yamanei*).

***Aenictus yamanei* Wiwatwitaya et Jaitrong, sp. nov.**

Figs. 2A-D, 3

Types. Holotype. Worker from Niah N.P., Sarawak, Borneo, Malaysia, 9 I 1993, Sk. Yamane leg. (FRCS). Nine paratype workers, same data as holotype (AMK, SKYC and THNHM).

Measurements. Holotype and paratype workers ($n = 10$): TL 3.70-3.80 mm; HL 0.83-0.85 mm; HW 0.63-0.70 mm; SL 0.68-0.73 mm; ML 1.22-1.27 mm; PL 0.32-0.35 mm; CI 79-85; SI 96-103.

Description (holotype and paratypes). Head in full-face view clearly longer than broad, with sides feebly convex and posterior margin almost straight or feebly concave. Head from the tip of frontal carina to occipital margin longitudinally and very shallowly impressed. Antennal scape extending posteriorly beyond 3/4 of headlength. Frontal carina not reaching midlength of head,

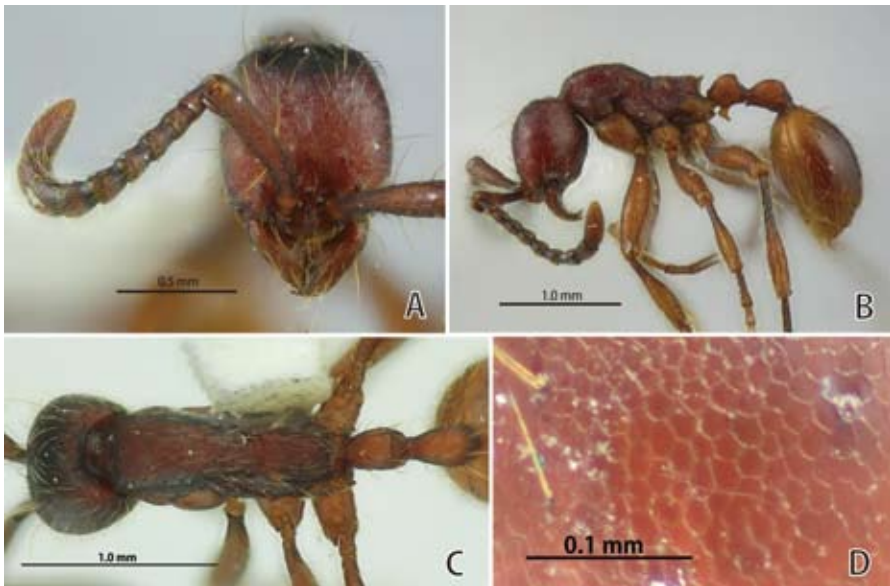


Fig. 2 *Aenictus yamanei* sp. nov., holotype. A, Head in full-face view; B, habitus, lateral aspect; C, habitus, dorsal aspect; D, sculpture on first gastral tergite.

and well developed anteriorly and poorly developed posteriorly; parafrenal ridge present extending posteriorly by less than 1/3 of head length; in profile its anteriormost part raised as a subtriangular process, and poorly developed posteriorly. Clypeus short, its anterior margin convex, lacking denticles. Mandible broad and triangular, its masticatory margin with a large apical tooth followed by a small subapical tooth and a series of about 19-20 minute denticles of two sizes, the larger alternating with 4-6 smaller; basal margin of mandible lacking denticles. Mesosoma relatively stout; promesonotum seen in profile strongly convex dorsally and sloping gradually to metanotal groove; mesopleuron clearly demarcated from metapleuron by a deep groove; anepisternum clearly demarcated from katepisternum by a deep groove. Propodeum in profile with almost straight dorsal outline; propodeal junction acutely angulate; declivity of propodeum shallowly concave, and encircled with a rim; opening of propodeal spiracle clearly circular with its diameter about 2.3 times as long as diameter of postpetiolar spiracle. Petiole slightly longer

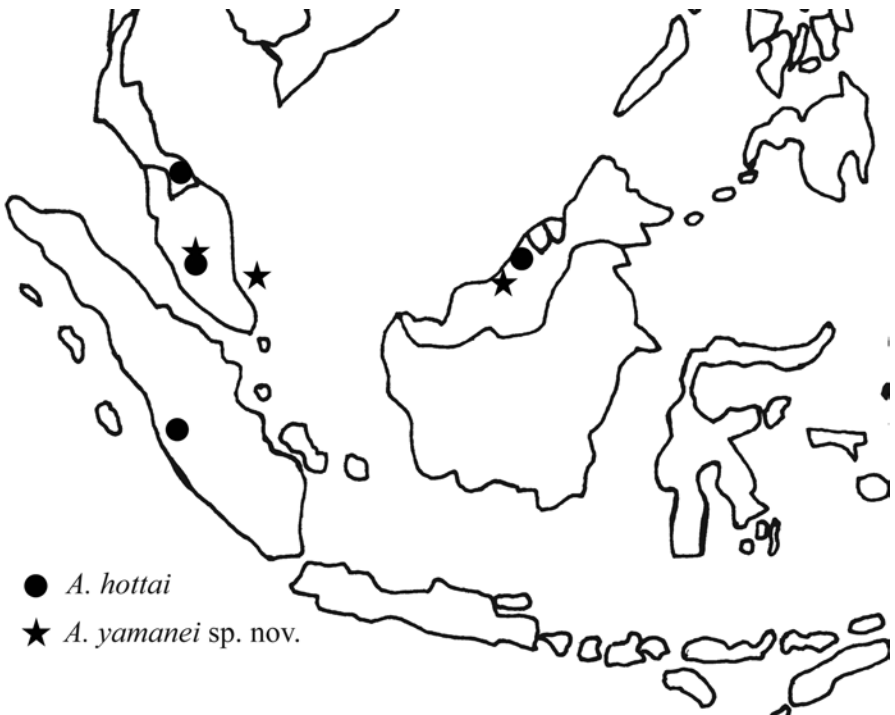


Fig. 3. Distribution of *Aenictus hottai* and *Aenictus yamanei* sp. nov.

than high, its dorsal outline elevated posteriorly, posterior face of petiole shallowly concave, and encircled with a carina; subpetiolar process large with anterior corner rounded, posteroventrally produced into an arm with a blunt tip; margin connecting anterior corner and the tip of the arm almost straight. Postpetiole clearly longer than petiole, its dorsal outline roundly convex.

Head, mesosoma, petiole, and postpetiole densely punctate and opaque; antennal scape micropunctate; mandible extensively puncto-striate, with outer zone, apical portion and masticatory margin rather smooth and shiny. Propodeal dorsum with a few short longitudinal ridges in front of junction. Gastral segment I with fine and superficial reticulation, subopaque and slightly shining. Punctuation on femora weaker than on head and mesosoma; tibiae of legs entirely micropunctate.

Head with a pair of long standing hairs mixed with relatively dense short hairs over the surface; mesosoma with relatively sparse long standing hairs mixed with dense short hairs over the surface; length of the longest pronotal hair 0.38-0.40 mm. Entire body dark reddish-brown.

Non-type material examined. MALAYSIA: Ulu Gombak, Malay Peninsula, VII-IX 1992, F. Ito leg., MG105 (SKYC, THNHM); Tioman-Is., IX 1992, F. Ito leg., FI92MT-10 (SKYC, THNHM).

Etymology. The specific name is dedicated to Prof. Seiki Yamane of Kagoshima University, Japan.

Distribution. Malay Peninsula (Malaysia) and Borneo (Sarawak) (Fig. 3).

Bionomics. *A. yamanei* is sympatric with *A. hottai* in at least Ulu Gombak, Malay Peninsula. All colonies of *A. yamanei* were collected from the forest floor in the lowland primary forest. So far we have no information about its prey.

Remarks. For discrimination of this species from *A. hottai*, see under *A. hottai*. The workers of two colonies collected from West Malaysia (MG103 and FI92MT-10) are slightly smaller and brighter than those of the type series.

KEY TO SPECIES BASED ON THE WORKER CASTE

1. Larger species (HW 0.93-1.00 mm; ML 1.63-1.75 mm); head relatively shorter (CI 88-91).....*A. hottai*

- Smaller species (HW 0.63-0.70 mm; ML 1.22-1.27 mm); head relatively longer (CI 79-85).....*A. yamanei* sp. nov.

ACKNOWLEDGMENTS

We would like to express our deep gratitude to Prof. Seiki Yamane (Kagoshima University), who kindly allowed Weeyawat Jaitrong to examine the materials in his collection. We are also grateful to Dr. Katsuyuki Eguchi (Nagasaki University) and Prof. Fuminori Ito (Kagawa University) for their help in collecting the materials. This work was partly supported by Monbusho Grant-in-Aid (#04041067 for FY1992-93; Leader: T. Inoue, Kyoto Univ.).

REFERENCES

- Bolton, B. 1995. A New General Catalogue of the Ants of the World, Harvard University Press, Cambridge, Massachusetts.
- Bolton, B. 2011. Bolton's Catalogue and Synopsis Version: 3 January 2011. [Cited 6 April 2011] Available from URL: <http://www.gap.entclub.org/>.
- Jaitrong, W. & J. Nabhitabhata. 2005. A list of known ant species of Thailand. The Thailand Natural History Museum Journal 1: 9-54.
- Jaitrong, W. & K. Eguchi. 2010. A new army ant of the genus *Aenictus* from Thailand (Hymenoptera: Formicidae). The Thailand Natural History Museum Journal 4: 13-17.
- Malsch, A.K.F., K. Rościszewski & U. Maschwitz. 2003. The ant species richness and diversity of a primary lowland rain forest, the Pasoh Forest Reserve, West-Malaysia. In: Okuda T, Manokaran N, Matsumoto Y, Niiyama K, Thomas SC, Ashton PS (eds) Pasoh: Ecology of a lowland rainforest in Southeast Asia, pp. 348-373.
- Rościszewski, K & U. Mashchwitz. 1994. Prey specialization of army ants of the genus *Aenictus* in Malaysia. *Andrias* 13: 179-187.
- Terayama, M. & S. Yamane. 1989. The ant genus *Aenictus* (Hymenoptera, Formicidae) from Sumatra, with descriptions of three new species. *Japanese Journal of Entomology* 57: 597-603.
- Wilson, E.O. 1964. The true army ants of the Indo-Australian area (Hymenoptera: Formicidae: Dorylinae). *Pacific Insects* 6: 420-483.
- Woodruff, D.S. 2003. The location of the Indochinese-Sundaic biogeographic transition in plants and birds. *Natural History Bulletin of the Siam Society* 51: 97-108.



