

A Remarkable New Species of the Army Ant Genus *Aenictus* (Hymenoptera, Formicidae) with a Polymorphic Worker Caste

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ABSTRACT A new species of the army ant genus *Aenictus* is described from Sarawak, East Malaysia. This Bornean species is remarkable in having a polymorphic worker caste, and an inflated propodeum filled with red liquid in larger workers. The smaller workers possess narrower heads with the sides almost parallel, very short antennae and legs, and normal propodea. They were few in number and their function in colony organization is not known.

Key Words: army ant / *Aenictus* / new species / Borneo / polymorphism.

Since the establishment of the genus *Aenictus* (Shuckard, 1840), its worker caste has been believed to be monomorphic in all the members of the genus (Wilson, 1964; Gotwald, 1995). In our experience in some species there is a recognizable size variation in the worker within a single colony and sometimes between different colonies of the supposedly same species, though polymorphism of usual sense (Wilson, 1953) has not been noticed, that is, the change is gradual without distinct allometric transformation.

In March 1997 during a night walk in the jungle we found a raiding column of a strange yellowish army ant in the Lambir Hills National Park, Sarawak, Borneo (cf. Hashimoto & Yamane, in prep.). Surprisingly the workers had distinctly inflated propodea that were filled up with a red liquid. From the specimens preserved in 80% alcohol the liquid completely dissolved into alcohol by the next morning.

When we collected workers from the column running down from the canopy very small workers, though few in number, were witnessed. A close examination of these small individuals under a binocular microscope revealed that they are clearly distinguished from the majority of workers by the lack of propodeal inflation and possession of very short antennae and legs. Since intermediate specimens were also found, this species may not be typically dimorphic. But it must be the first polymorphic *Aenictus* species with the peculiar propodeal inflation in larger specimens.

Aenictus inflatus Yamane et Hashimoto, sp. nov.

Larger worker (holotype). Body 2.2 mm long. Head 0.50 mm wide, 0.60 mm long excluding mandibles, and 0.35 mm high. Alitrunk 0.70 mm long; pronotum 0.30 mm wide; propodeum 0.34 mm wide. Petiole + postpetiole 0.35 mm long. Gaster 0.95 mm long and 0.51 mm wide in the widest part. Antennal scape 0.53 mm long. Fore femur 0.64 mm long; hind femur 0.85 mm long.

Head almost unsculptured, shining, distinctly longer than wide, with roundly convex sides, widest at the midlength, with almost straight posterior margin in full face view, and without a collar (Fig. 1, A & B). Clypeus flat, anteriorly entire, roundly weakly produced, and unarmed. Right and left torular sclerites merged medially to form a single sclerite. Mandible triangular, approaching 'typical' sensu Wilson (1964); its masticatory margin with an acute, relatively long apical tooth followed by a much smaller preapical tooth; basal tooth slightly smaller than preapical one; space between them with 3 minute denticles; upper margin of mandible with at least 2 visible teeth that are slightly smaller than basal tooth on masticatory margin. Antenna 12-segmented. Scape relatively long, longer than head width, widened in the apical half; all the flagellar segments each longer than wide; apical segment slightly longer than the preceding two combined; flagellar segments, especially apical one, microsculptured.

Pronotum distinctly narrower than head, unsculptured and shining. Mesonotum still narrower than pronotum (Fig. 1, C); mesonotum and mesopleuron finely and very densely punctate and opaque; dorsal face sloping. Metanotal depression almost absent. Propodeum slightly wider than pronotum, distinctly inflated, almost unsculptured and shining; propodeal junction round (Figs. 1, C & D).

Petiole and postpetiole nearly of the same size, each longer than wide, almost unsculptured except for ventral face; in profile posterior slope slightly steeper than anterior one in both the petiole and postpetiole; subpetiolar process almost absent (Fig. 1, D). Gaster almost unsculptured; tergite 1 distinctly longer than wide; lateral margins convex.

Legs slender; basal portion of femora and tibiae distinctly narrowed; hind basitarsus slightly shorter than the rest of tarsus.

Body hairs relatively short, and recumbent to subrecumbent on head, alitrunk, petiole, postpetiole and legs; those on gastral sternites slightly longer and suberect; antennal scape, coxae and ventral face of cranium with a few rather long hairs in addition to normal ones.

Body yellow to yellowish brown. Head brownish; upper gena paler, but typhlatta spot absent. Propodeal cuticle transparent. Gaster yellowish; tergite 1 apically and the subsequent tergites darker.

Smallest worker (paratype). Body 1.75 mm long. Head 0.38 mm wide, 0.53 mm long excluding mandibles, 0.28 mm high. Alitrunk 0.75 mm long; pronotum 0.26 mm wide; propodeum 0.20 mm wide. Petiole + postpetiole 0.38 mm long. Gaster 0.40 mm wide in the widest part, and 0.68 mm long. Scape 0.23 mm long. Fore femur 0.33 mm long; hind femur 0.40 mm long.

In body color, the shape of petiole, postpetiole and gaster, and pilosity similar to the larger workers. But it strikingly differs from the latter in the relative lengths of antennae and legs, and the shape of head and propodeum. The following differences are noted: head relatively much narrower, more rectangular in full face view with almost parallel sides (Fig. 1, F). Scape very short, scarcely reaching the midlength of head, much shorter than head width, and more strongly curved outwardly than in the larger workers; all the flagellar segments proportionally short. Alitrunk in profile with

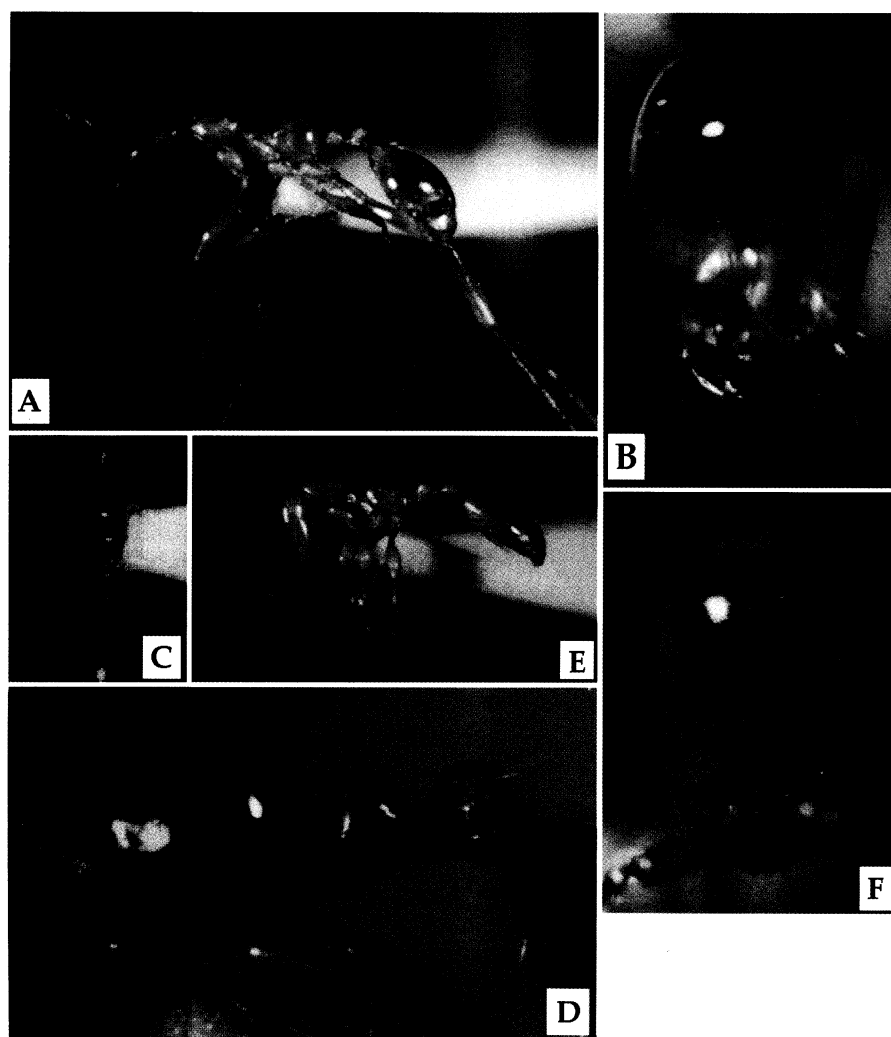


Fig. 1. Large (A - D, holotype) and small (E, F) workers of *Aenictus inflatus* sp. nov. A and E, whole body in profile (to the same scale); B and F, head in frontal view; C, propodeum and waist (petiole and postpetiole) from above; D, ditto in profile.

almost straight dorsal outline; propodeum scarcely inflated (Fig. 1, E), distinctly narrower than pronotum; punctuation on mesonotum and mesopleuron much finer and more superficial. Legs much shorter; all the femora strongly widened near the midlength; all the tibiae rather strongly widened in apical one-third (Fig. 1. E).

Variation. When the smallest and largest specimens are compared, they look like completely different species. However, in addition to the similarity between them mentioned above, we have found some intermediate specimens in the development of propodeum and lengths of antennae and legs. There is a general tendency that larger specimens have more inflated propodea, more rounded

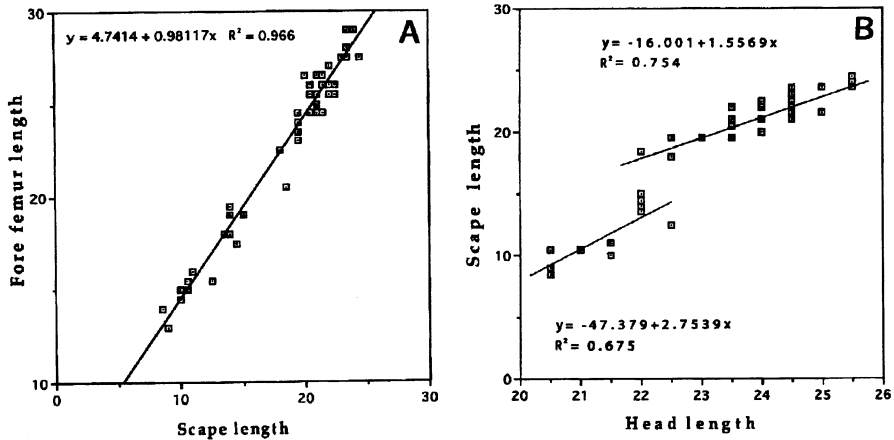


Fig. 2. Scape length against fore femur length (A) and head length against scape length (B). 1 unit = ca. 0.026 mm.

heads, longer antennae and legs. But the relative length of antennal scape abruptly and disproportionately decreases at a head width of about 0.4 mm and at a head length of 0.55-0.56 mm (Fig. 2, B), producing two curves with different slopes. On the other hand, the curve for scape length and fore femur length is monophasic (Fig. 2, A). Color pattern also varies; smaller specimens tend to be paler. In some larger specimens frons and vertex of head are rather dark brown in contrast with yellow upper gena. In this case the upper gena apparently represents a typhlata spot.

Holotype: large worker, 2 iii 1997, Lambir Hills National Park, Miri, Sarawak, Borneo from a raiding column in the night, Sk. Yamane and Y. Hashimoto leg. Will be deposited in the Collection of Forest Research Center, Kuching, Sarawak.

Paratypes: 100 workers (both large and small) from the same column. Will be deposited in the Museum of Nature and Human Activities, Hyogo (Sanda); BORNEENSIS, Tropical Biology and Conservation Unit, Universiti Malaysia Sabah (Kota Kinabalu); the Bogor Zoological Museum (Cibinon); the National Museum of Natural History (Washington, DC); and the Natural History Museum (London).

DISCUSSION

In all the known Indo-Australian species of the genus *Aenictus*, the worker caste is monomorphic (Wilson, 1964; Godwald, 1995). Although some degree of size variation has been known, for example in *A. aratus* and *A. laeviceps* (Wilson, 1964; Topoff, 1971; Gotwald, 1982), no distinct structural difference has been noticed between the size classes of single species. Relative lengths of antennal scape and legs are often regarded as important characters that separate species and sometimes even species groups. Allometric growth pattern in some body parts described above shows that the present new species is a first *Aenictus* species that is polymorphic (and almost dimorphic) in worker caste. The small workers are more similar to usual workers of *Aenictus* species than are larger ones. They are easily distinguished from small species such as *A. piecei*, *A. minutus* etc. by the long head with

parallel sides and weak body sculpture (only mesothorax distinctly sculptured). Their function is not known. However, since they are few in number (ca. 3.3% of all the workers captured), there is a possibility that they are a mere expression of ancestral form of this species owing to the short supply of food during their larval stage. This situation is quite different from that described by Topoff (1971) for *A. laeviceps* in which the smaller workers predominate in number.

This species is also unique in having an inflated propodeum filled with a red liquid. In the dried larger specimens the propodeum was almost empty and with transparent cuticle. The red liquid may have flowed out from the metapleural gland orifice while the specimens were in alcohol. Although we did not observe the ants using this liquid during their marching, it is quite possible that they use it to calm the prey (ants) while raiding.

At the present this species cannot be associated with any species group in Oriental region, and is apparently endemic to Borneo. Ongoing DNA analysis will provide useful information on the phylogenetic position of this interesting species.

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働きアリに多型がある特異なヒメサスライアリの1新種

ボルネオ島マレーシア領のサラワク州からえられたヒメサスライアリ属 (*Aenictus*) の1新種を記載した。本種の働きアリには、頭幅がせまく両側がほぼ平行で、触角と脚が非常に短く、前伸腹節は正常である小型働きアリと、頭部がより丸く、触角と脚が長く、前伸腹節が異常に肥大し内部に赤い液体をもつ大型働きアリの2型が存在する。働きアリカストの多型と、肥大し赤色の液体をもつ前伸腹節はこれまで本属ではまったく知られていなかった。両型とも体長には相当の変異があり一部でオーバーラップするが、頭長と触角柄節の相関をみると、頭長 0.55-0.56 mm 付近で傾きと y 切片が明瞭に異なる2つの曲線がえられる。コロニーあたりの小形働きアリの比率は低く、コロニー組織における役割は未知である。大型働きアリがもつ赤色の液体の機能は不明であるが、他種のアリの巣を襲ったときに反撃するアリをなだめるために用いられている可能性がある。

