

24 October 1980

PROC. ENTOMOL. SOC. WASH.
82(4), 1980, pp. 599-608

**TAXONOMY OF THE AFRICAN ARMY ANT, *AENICTUS DECOLOR*
(MAYR), WITH A DESCRIPTION OF THE QUEEN
(HYMENOPTERA: FORMICIDAE)**

WILLIAM H. GOTWALD, JR. AND J. M. LEROUX

(WHG) Department of Biology, Utica College of Syracuse University, Utica, New York 13502; (JML) Laboratoire de Zoologie de l'École Normale Supérieure, 46, rue d'Ulm, 7500 Paris, France.

Abstract.—*Aenictus batesi* Forel and *A. bidentatus* Donisthorpe are junior synonyms of *A. decolor* (Mayr), new synonymy. The worker caste of *A. decolor* is redescribed and the queen is characterized for the first time. This queen is only the third sub-Saharan *Aenictus* queen to be described. The taxonomy and distribution of *A. decolor* are discussed.

The genus *Aenictus* currently comprises the tribe Aenictini of the Old World army ant subfamily Dorylinae. *Aenictus* is represented by 34 species in the Indo-Australian Region and by at least 15 species in Africa (Wilson, 1964). While the Indo-Australian forms were taxonomically revised by Wilson (1964), those of the African continent remain in a state of taxonomic chaos. One of us (WHG) is currently revising the African species, and this paper is a contribution toward that revision.

Contributing most to the taxonomic disorder of this group of diminutive army ants are the many descriptions in the literature of unassociated phenae. That is, many species are based solely on the worker caste, others on just males, and at least two on unassociated queens. This fact no doubt accounts for many yet-to-be-discovered synonyms in the group. Thus when these phenae are collected together and described, the taxonomy of the genus is increasingly refined and stabilized.

Only two *Aenictus* queens of sub-Saharan species have been described thus far. Queens are rarely collected because most species of the genus are subterranean and biologically cryptic (Gotwald and Cunningham-van Sommeren, 1976). Four queens of *A. decolor* were collected in Ivory Coast, and these provide the basis for the description that follows. At the same time, the taxonomy of the species is reviewed. New synonymies are noted and a redescription of the worker included.

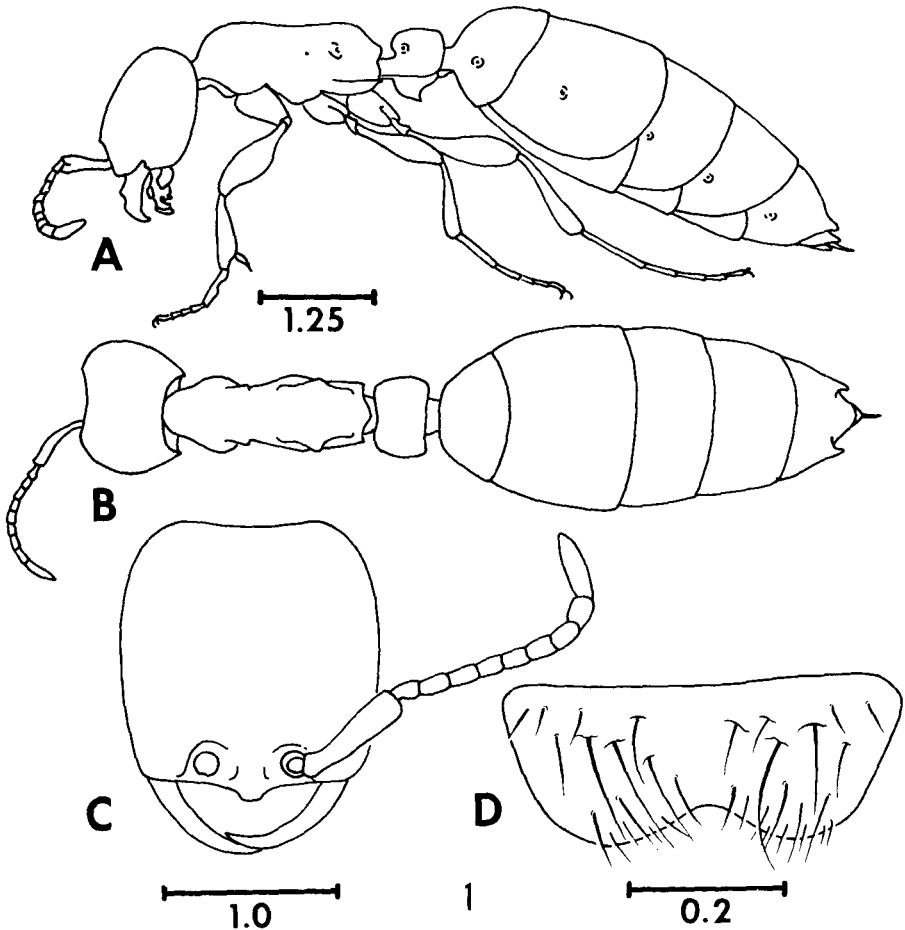


Fig. 1. *Aenictus decolor*, external morphology of queen, pilosity omitted. A, General habitus, lateral view. B, General habitus, dorsal view. C, Head, dorsal view. D, Labrum, external view. Scales in mm.

Aenictus decolor (Mayr)

Typhlatta decolor Mayr, 1878: 668, worker. Type-locality "Ost-Afrika."

Type in the Naturhistorisches Museum Wien; examined 1977.

Aenictus batesi Forel, 1911: 255-256, worker. Type-locality "Altkalabar" (Calabar, Nigeria). Types in the Naturhistorisches Museum Basel and the Muséum d'Histoire Naturelle, Genève; examined 1977. NEW SYNONYMY.

Aenictus bidentatus Donisthorpe, 1942: 701-702, worker. Type-locality "E. P. Tafo, Gold Coast" (Ghana). Types in the British Museum (Natural History), London; examined 1977. NEW SYNONYMY.

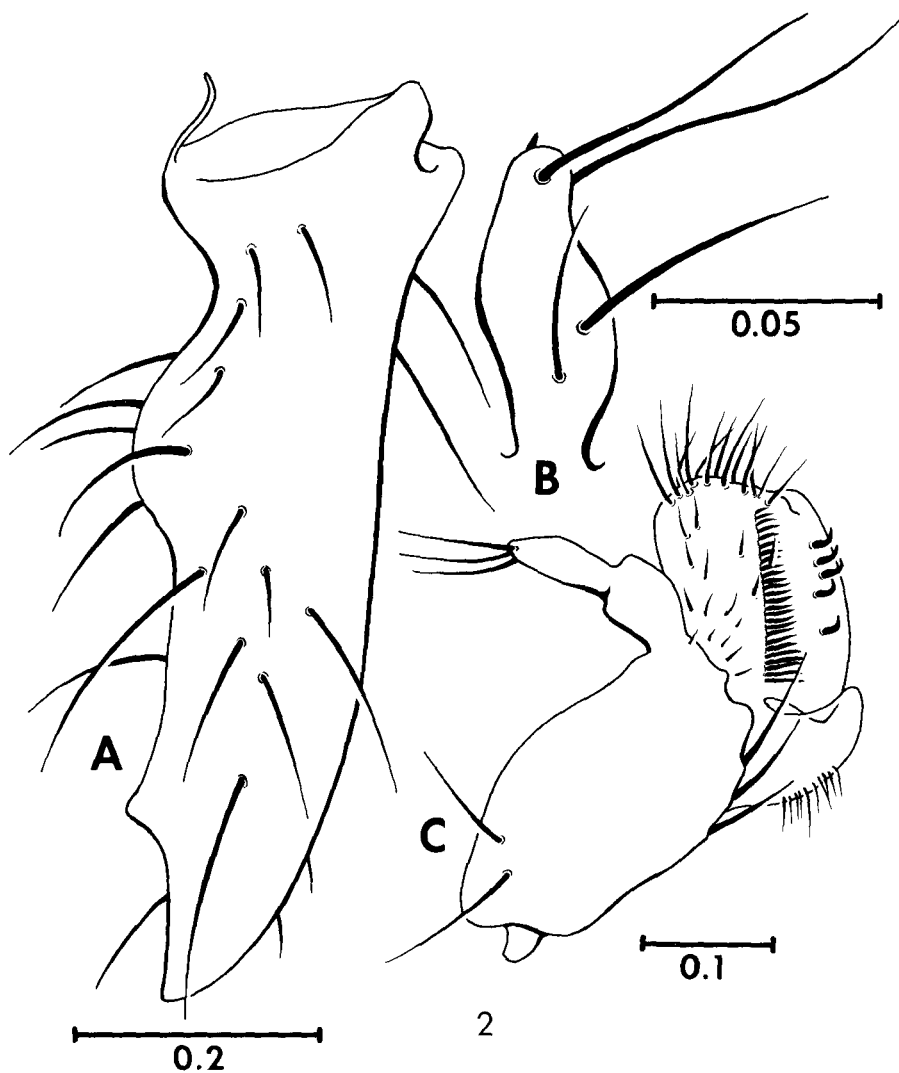


Fig. 2. *Aenictus decolor*, mouthparts of queen. A, left mandible, dorsal view. B, left labial palpus, lateral view. C, left maxilla, external view. Scales in mm.

Aenictus decolor was originally described in the genus *Typhlatta*, a genus erected by F. Smith (1858). The genus was eventually reduced to subgeneric status in *Aenictus* (Wheeler, 1930) and was subsequently synonymized under *Aenictus* when Wilson (1964) determined that the subgeneric distinctions in *Aenictus* were untenable. Recently collected specimens of *Aenictus*

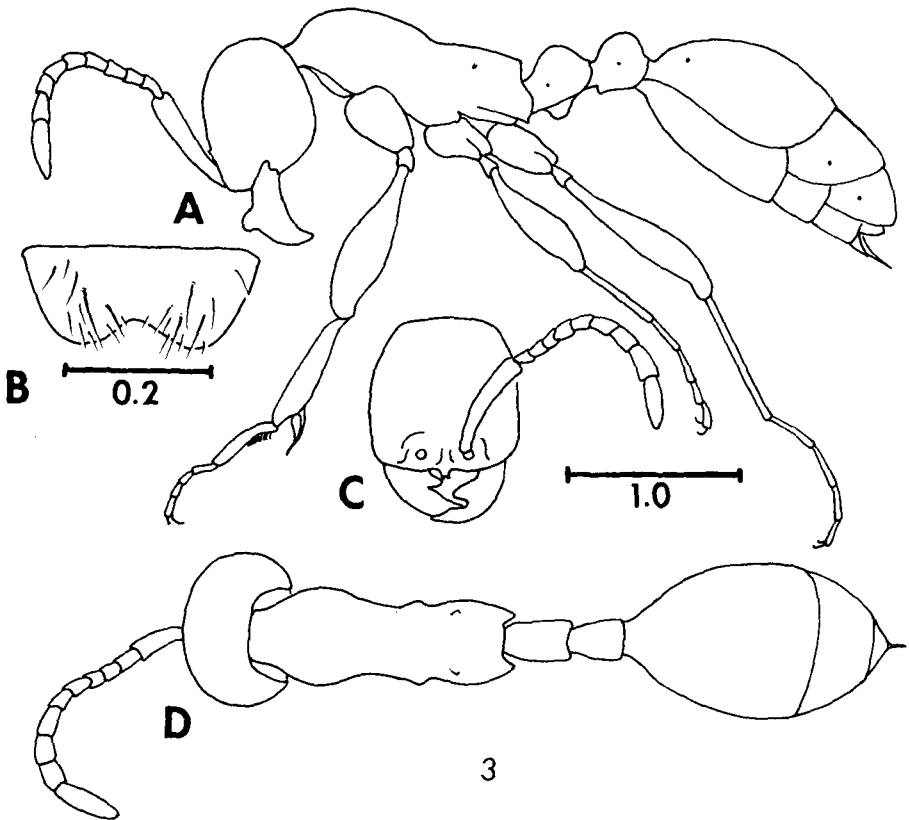


Fig. 3. *Aenictus decolor*, external morphology of worker, pilosity omitted. A, General habitus, lateral view. B, Labrum, external view. C, Head, dorsal view. D, General habitus, dorsal view. Scales in mm.

were compared with the types of *decolor*, *batesi*, and *bidentatus* (by WHG), and it was determined that these types represent the same species. Most conspicuous among the features of this species is the large, distally rounded, second subapical tooth situated midway along the medial border of the worker mandible. The type-specimens of *A. decolor* and *batesi* are larger than those of *bidentatus*, but in all other characteristics, including mandibular dentition, sculpturing of the propodeum, clypeal morphology and coloration, they appear identical. The differences in size may be clinal in origin. Unfortunately, the type-locality of *A. decolor* is given only as "E. Africa."

Queen, composite description.—Total length 6.69–7.30 mm, head length 1.08–1.17 mm, head width 1.08–1.12 mm, cephalic index 92.3–100, trunk

(thorax + propodeum) length 1.53–1.62 mm, petiole length 0.54–0.63 mm, length of petiolar node 0.45–0.49 mm, width of petiolar node 0.66–0.76 mm, gaster length 3.45–3.88 mm, scape length 0.54–0.58 mm, and hind femur length 0.94–0.99 mm.

Habitus as in Figs. 1A and 1B. Head, trunk, petiole, and gaster orange brown, darkest on dorsal surface of gaster; antennae and legs lighter, orange to orange yellow.

Head as in Fig. 1C. Head sutureless on dorsal and lateral surfaces; without eyes; dorsal surface glossy, occipital region bordered, except ventrally, by clearly defined, sharp ridge; antennal fossae moderately impressed, each fossa bordered medially by slightly elevated ridge; clypeus produced anteriorly as a truncated process. Labrum as in Fig. 1D. Mouthparts as in Fig. 2. Mandible with 2 subapical teeth, proximal tooth large and smoothly rounded; maxillary palpus 2-segmented; labial palpus 1-segmented. Antenna 10-segmented.

Trunk without conspicuous sutures, punctures sparse, integument glossy; meso- and metathoracic spiracles elevated but inconspicuous, propodeal spiracle large, elevated, and directed posteriorly. Distal margin of bulla covering metapleural gland orifice prominent, parallel to longitudinal axis of trunk; margin begins at point directly ventral to propodeal spiracle. Declivity of propodeum with distinct cariniform margins that are continuous between dorsal and declivitous propodeal surfaces; Declivity in lateral view straight or only slightly concave.

Petiolar node as in Figs. 1A and 1B. Dorsal surface of node clearly defined by precipitous angle with which it joins pleural surfaces; node glossy. Subpetiolar tooth large, directed posteriorly.

Gaster as in Figs. 1A and 1B. Integument of gaster glossy without conspicuous punctures; tergite of 5th gastral segment with pair of laterally placed pygidial spines; spines with numerous setae. Tip of ovipositor prominent.

Pubescence yellow, sparse, and most conspicuous on lateral surfaces of propodeum, petiole, on 1st gastral tergite, and on pygidial spines. Tarsal claws simple.

Remarks.—The queen description is based upon 4 specimens collected by JML in 1976 from the subterranean nests of Leroux colonies 760526-1, 760715, 760724, and 760509 at the Laboratoire d'Ecologie Tropicale de Lamto, Ivory Coast. Lamto is located in Guinea savanna at 6°13'N, 5°41'W.

None of the four queens was physogastric, indicating that each was in a non-gravid phase of the colony reproductive cycle. The *A. decolor* queen is easily distinguished from the queens thus far described from other sub-Saharan species (*A. congolensis* Santschi and *A. eugenii* Emery) because (1) its mandibles are provided with subapical teeth, and (2) it possesses the

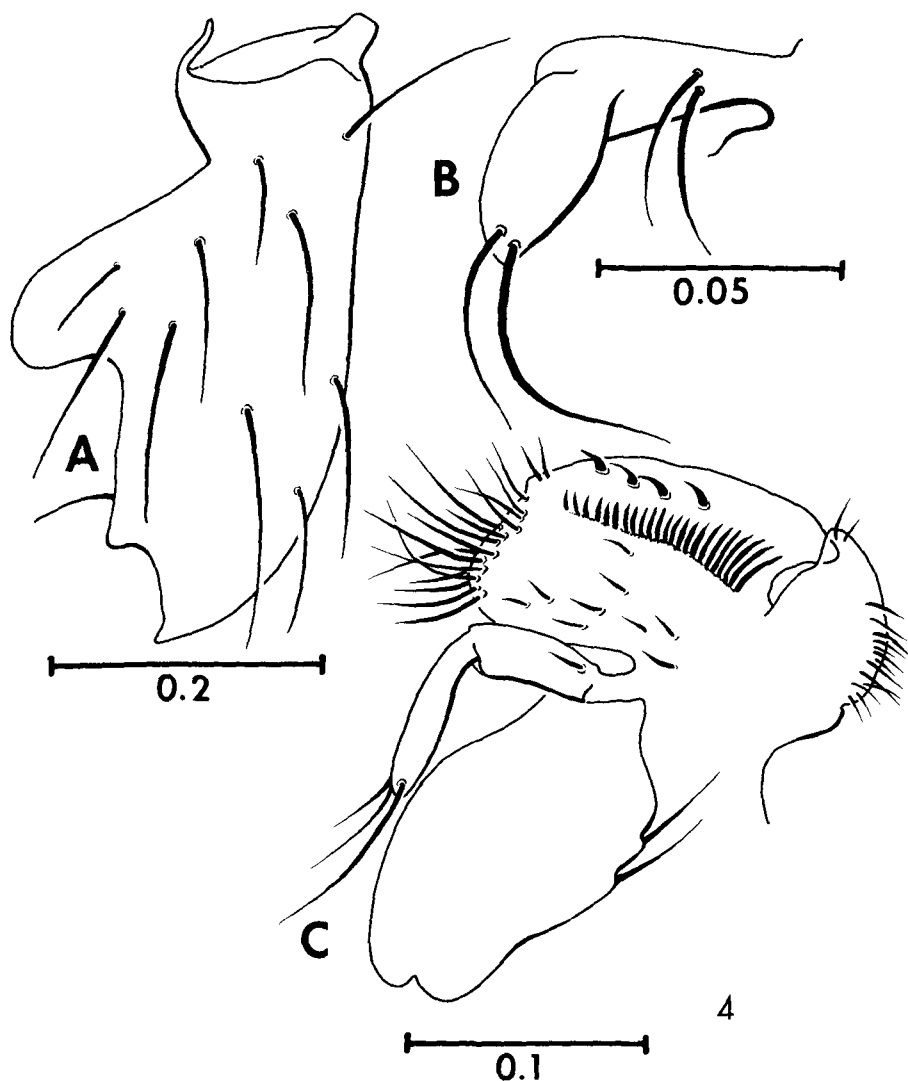


Fig. 4. *Aenictus decolor*, mouthparts of worker. A, Left mandible, dorsal view. B, Right labial palpus, medial surface. C, Left maxilla, external view. Scales in mm.

pygidial spines. As a general rule, the mandibles of army ant queens in both the New World (Ecitoninae) and Old World (Dorylinae) are devoid of sub-apical teeth (Gotwald, 1969). This is certainly true of the queens of *A. congolensis* and *A. eugenii* (see Wheeler, 1930; Gotwald and Cunningham-van Someren, 1976).

Two additional *Aenictus* females from the African continent have been described. However, these queens, *A. abeillei* (André) and *A. vaucheri* Emery, were collected in Northern Africa (Algeria and Morocco respectively). Both were described alone and remain unassociated with workers and/or males (Wheeler, 1930). Several females of Asian *Aenictus* species have been described, but these differ from their African counterparts in so many details that Wheeler (1930) observed that they would seem to belong to entirely different genera. These morphological differences between the queens suggest that, following an initial dispersal of *Aenictus* from Asia to Africa sometime between the late Oligocene and late Pliocene, the two populations became isolated from each other (Gotwald, 1979).

Worker, composite description.—Total length 2.90–3.28 mm, head length 0.60–0.67 mm, head width 0.54–0.63 mm, cephalic index 87.0–95.4, trunk (thorax + propodeum) length 0.96–1.03 mm, petiole length 0.27 mm, length of petiolar node 0.13–0.22 mm, width of petiolar node 0.13–0.18 mm, post-petiole length 0.18–0.24 mm, length of post-petiolar node 0.13–0.18 mm, width of postpetiolar node 0.18–0.22 mm, gaster length 0.85–1.08 mm, scape length 0.40–0.45 mm, and hind femur length 0.67–0.76 mm.

Habitus as in Figs. 3A and 3D. Head, trunk, and waist (petiole plus post-petiole) orange brown; gaster, legs, and antennae, lighter, yellow orange.

Head as in Fig. 3C. Head sutureless on dorsal and lateral surfaces; without eyes; dorsal surface glossy, without conspicuous punctures, occipital margin clearly defined as in queen. Antennal fossae with elevated, sharply defined medial borders; lateral borders not as well developed but ending caudally in slightly elevated point (Fig. 3A) in lateral view. Clypeal process excavated medially. Labrum as in Fig. 3B. Mouthparts as in Fig. 4. Mandible with 2 subapical teeth, proximal tooth large and rounded apically; maxillary palpus 2-segmented; labial palpus 2-segmented. Antenna 10-segmented.

Anterior dorsal slope of pronotum densely punctate, balance of dorsal surface and pleurae glossy, without conspicuous punctures. Remainder of trunk coarsely sculptured with densely-packed, deep punctures and, on pleurae, longitudinal rugae. Declivity of propodeum bordered by sharply produced ridge. Distal margin of bulla covering metapleural gland orifice prominent and formed as in Fig. 3A.

Petiole and postpetiole as in Figs. 3A and 3D. Petiolar and postpetiolar nodes densely and coarsely punctured; subpetiolar tooth well-developed but variable in shape, rounded apically and densely punctured.

Gaster as in Figs. 3A and 3D. Integument of gaster glossy, without conspicuous punctures.

Pubescence yellow, consisting of sparsely but generally distributed, often erect, setae. Tarsal claws simple.

Remarks.—Eight worker ants, two from each of the four colonies from

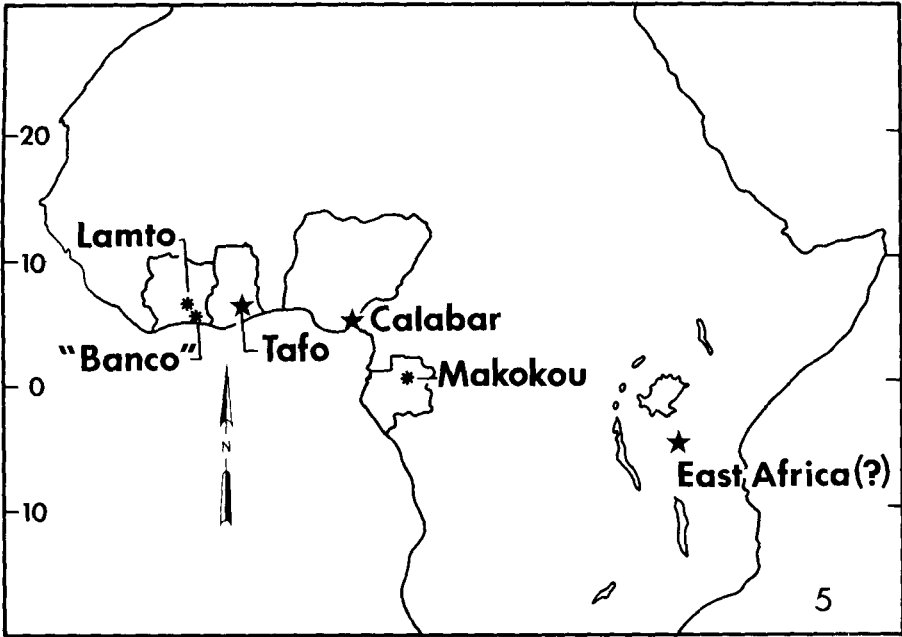


Fig. 5. Distribution of *Aenictus decolor* in sub-Saharan Africa. Stars indicate type-localities of *A. decolor* and its synonyms; asterisks indicate other collection localities.

which the queens were taken, were measured for the composite description. The worker mandible, with its large second subapical tooth, is so distinctive that it alone separates this species from all other African species of which we are currently aware. Of the three descriptions of this species in the literature, only that of *batesi* specifically notes the presence of the second subapical tooth: "Der Endzahn ist nicht sehr spitz und hat eine sehr breite Basis . . ."

Workers of the genus *Aenictus* are essentially monomorphic (Schneirla, 1971; Topoff, 1971) with only a small difference in total length between the smallest and largest workers in any one colony. For the Asian species *A. gracilis* Emery, this difference in one colony was calculated to be 0.5 mm (Schneirla, 1971). For the workers of *A. decolor* measured in this study, it is 0.38 mm. Mayr (1878) determined the length of the type of *A. decolor* to be 3.3 mm; Forel's (1911) specimens of *batesi* ranged in length from 3.5 to 3.7 mm; and Donisthorpe (1942) reported the holotype of *bidentatus* to be 3 mm long. The longest specimen measured in the current study was 3.28 mm and is similar in this respect to the *decolor* and *bidentatus* types. According to Forel's description, *A. batesi* is obviously larger. However, examination of the type-specimens revealed *A. decolor* to be represented by

Table 1. Associated phena of African *Aenictus* species for which the queen is known.

Species	Worker Known	Queen Known	Male Known
<i>A. abeillei</i> (André)	0	+	0
<i>A. vaucheri</i> Emery	0	+	0
<i>A. congolensis</i> Santschi	+	+	0
<i>A. decolor</i> (Mayr)	+	+	0
<i>A. eugenii</i> Emery	+	+	0

the largest specimens for the entire species. With all other characteristics so similar, these differences in size were not sufficient enough to warrant maintaining *batesi* and *bidentatus* as separate from *decolor*.

Distribution.—With exception of the locality recorded for Mayr's type-specimens, *A. decolor* appears to be primarily West African in distribution (Fig. 5). This species has been observed and collected in moist semi-deciduous forest at Tafo, Ghana; in rainforest at Parc National du Banco, Ivory Coast and at the Laboratoire de Primatologie et d'Ecologie Equatoriale, Makokou, Gabon (see Gotwald, 1976); and in humid Guinean savanna of central Ivory Coast. The type-locality for *bidentatus* is Tafo and that of *batesi* is Calabar, Nigeria. This distribution pattern suggests that *A. decolor* is common to West African forests, less common or at least more subterranean in moist West African savanna, and least common in dry savannas, especially in East Africa.

CONCLUSIONS

The taxonomy of African *Aenictus* is complicated by the many descriptions of unassociated phena. Only as workers, queens, and males are associated will we be able to estimate accurately the level of diversity represented in this genus in Africa. The status, with respect to such associations, of African species of *Aenictus* for which queens have been described is summarized in Table 1. *Aenictus decolor* is now known from the workers and queen, but the male has eluded discovery. Most likely the male has already been described independently and merely remains to be collected with the workers. *Aenictus batesi* and *A. bidentatus* are junior synonyms of *A. decolor*, a species that is most common in the forests and humid savanna habitats of West Africa.

ACKNOWLEDGMENTS

We are grateful to Monsieur le Professeur M. Lamotte, Mme. B. Delage-Darchen, and Mr. R. Vuattoux, for making possible the field work that led to the discovery of the *A. decolor* queens. We thank as well Dr. Edward B. Cutler for critically reading portions of the manuscript and Mrs. Virginia Marsicane for typing the manuscript. The research

was supported, in part, by National Science Foundation grants DEB-7703356 and DEB-7905835 (W. H. Gotwald, Jr., Principal Investigator).

LITERATURE CITED

- Donisthorpe, H. 1942. New species of ants (Hym., Formicidae) from the Gold Coast, Borneo, Celebes, New Guinea and New Hebrides. *Ann. Mag. Nat. Hist.* (11) 9: 701-709.
- Forel, A. 1911. Die Ameisen des K. Zoologischen Museums in München. *Sitzungber. Akad. Wiss. Math.-Physikal. Kl.* 41: 249-303.
- Gotwald, W. H., Jr. 1969. Comparative morphological studies of the ants, with particular reference to the mouthparts (Hymenoptera: Formicidae). *Cornell Univ. Agric. Exp. Stn. Mem.* 408, 150 pp.
- . 1976. Behavioral observations of the genus *Aenictus* (Hymenoptera: Formicidae). *Biotropica* 8: 59-65.
- . 1979. Phylogenetic implications on army ant zoogeography (Hymenoptera: Formicidae). *Ann. Entomol. Soc. Am.* 72: 462-467.
- Gotwald, W. H., Jr. and G. R. Cunningham-van Someren. 1976. Taxonomic and behavioral notes on the African ant, *Aenictus eugenii* Emery, with a description of the queen (Hymenoptera: Formicidae). *J. N.Y. Entomol. Soc.* 84: 182-188.
- Mayr, G. 1878. Beiträge zur Ameisen-Fauna Asiens. *Verh. Zool.-Bot. Ges. Wien* 28: 645-686.
- Schneirla, T. C. 1971. *Army ants: a study in social organization*. W. H. Freeman and Co., San Francisco, Calif. 349 pp.
- Smith, F. 1858. Catalogue of the hymenopterous insects collected at Sarawak, Borneo; Mount Ophir, Malacca; and at Singapore by A. R. Wallace. *J. Proc. Linn. Soc. Zool.* 2: 42-130.
- Topoff, H. 1971. Polymorphism in army ants related to division of labor and colony cyclic behavior. *Am. Nat.* 105: 529-548.
- Wheeler, W. M. 1930. Philippine ants of the genus *Aenictus* with descriptions of the females of two species. *J. N.Y. Entomol. Soc.* 38: 193-212.
- Wilson, E. O. 1964. The true army ants of the Indo-Australian area (Hymenoptera: Formicidae: Dorylinae). *Pac. Insects* 6: 427-483.