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Research Article
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A New Species of Army Ant Genus *Aenictus* (Hymenoptera: Formicidae) from India

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ABSTRACT

A new species, *Aenictus kadalarensis* sp. nov., belonging to the army ant genus *Aenictus* Shuckard 1840, is discovered from Kerala, India. The species is described based on the worker caste, and it belongs to the *Aenictus pachycerus* group. This paper provides a detailed discussion of its morphology and the characteristics that distinguish this species from its closely related species within the *A. pachycerus* group.

Keywords: Western Ghats, Kerala*, A. pachycerus* species group, *A. kadalarensis* sp. nov.

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INTRODUCTION

Aenictus Shuckard 1840, is the largest genus of the subfamily Dorylinae in the old world, with most species found in the Afrotropical and Southeast Asian regions, compared to the Australian region and the southern parts of the Palearctic region (Borowiec, 2016). Workers of *Aenictus* can be identified by 8-10 segmented antenna, elevated position of the propodeal spiracle, and binodal waist (Borowiec, 2016). Phylogenetically, this genus is sister to *Aenictogiton* and *Dorylus* (Borowiec, 2019).

There are 224 species known worldwide (Antwiki, 2023). From India, 35 species have been reported, of which 22 species have been described based on the worker caste and 12 based only on the male caste (Bharti, Guenard, Bharti, & Economo, 2016; Antony & Prasad, 2022; Dhadwal & Bharti, 2023; Antweb, 2023). This exemplifies 'dual taxonomy', where a new species is described based either on the worker caste or male caste, disregarding the corresponding castes (Borowiec, 2016). Due to the remarkable differences among the castes, identifying a particular caste of the same species becomes challenging, unless both castes from the same colony are collected simultaneously.

Aenictus species found in the eastern part of the Oriental, Indo-Australian, and Australasian regions are classified into 12 species groups namely *Aenictus ceylonicus* group, *Aenictus currax* group, *Aenictus hottai* group, *Aenictus inflatus* group, *Aenictus javanus* group, *Aenictus laeviceps* group, *Aenictus leptotyphlatta* group, *Aenictus minutulus* group, *Aenictus pachycerus* group, *Aenictus philippinensis* group, *Aenictus silvestri* group, and *Aenictus wroughtoni* group (Jaitrong & Yamane, 2011; Jaitrong & Hashimoto, 2012). In this paper, we describe a newly discovered species belonging to the *Aenictus pachycerus* group. This taxonomic group can be distinguished by several features, including long 10 segmented antennae, absence of typhlatta spot, convex anterior clypeal margin which is devoid of denticles, a triangular mandible with a prominent apical tooth followed by 4-12 smaller denticles, an indistinct metanotal groove, an angular propodeal junction, a concave declivity of the propodeum, and a weakly developed subpetiolar process (Jaitrong & Yamane, 2011).

It is worth noting that the *A. pachycerus* group exhibits a wide distribution across various biogeographic regions. Specifically, this group can be found in India, Sri Lanka, Southern China, the Malay Peninsula, Sumatra, Borneo, the Philippines, New Guinea, and Australia (Jaitrong & Yamane, 2011).

This newly described species adds to the growing body of knowledge regarding the biodiversity within the *Aenictus pachycerus* group and contributes to our understanding of its geographical distribution. Further research and exploration of this group in different regions may reveal additional species and shed light on their ecological significance and evolutionary history.

MATERIALS AND METHODS

The specimens were collected from the Kadalar estate near Munnar (Idukki district, Kerala). Fieldwork was conducted during daytime around 11 AM. Worker ants were seen on the ground, actively moving on a small rotten log. Upon lifting the log, more individuals were encountered. The specimens were collected using a plastic aspirator and stored in 70% ethanol at the collection site. GPS coordinates of the collection site were noted (Datum WGS 84). Taxonomic analysis was done using ZEISS Stemi 508 stereo microscope with an attached Axiocam 208 color camera in NISER, and photographs were taken using a Keyence VHX 6000 digital microscope in ATREE. The holotype and two paratypes are deposited in ATREE Insect Museum, Bengaluru (AIMB), and will be later transferred to the Zoological Survey of India, Calicut.

Measurements

Measurements and morphological terminology follow Zettel and Sorger, 2010 and Bharti, Wachkoo, & Kumar, 2012.

HL Head length, measured in full-face view along the midline from clypeus margin to occipital margin.

HW Head width. Maximum width of head, in full-face view.

SL Scape length. Length of antennal scape excluding basal constriction.

WL Weber's length, measured from the point at which the pronotum meets the cervical shield to the posterior margin of the metapleuron in profile.

GL Gaster length in lateral view from the anteriormost point of the first gastral segment to the posteriormost point (excluding sting).

PL1 Petiole length. Maximum length of the petiole in dorsal view.

PL2 Postpetiole length. Maximum length of the postpetiole in dorsal view.

PHL Pronotal hair length. Length of longest hair on pronotum measured in a straight line from insertion to tip.

TL Total length. HL+WL+ PL1+ PL2+GL.

CI Cephalic index. HW/HL × 100.

SI Scape index. SL/HW × 100.

RESULTS

Description of new species

***Aenictus kadalarensis* sp. nov.** (Figs. 1-5)

Material examined Holotype worker (AIMB/Hy/ Fr 25004). India, Kerala, Munnar, Idukki, Kadalar tea estate, 10.1330°N 76.9977°E, 1416 m, 19.v.2022, aspirator, coll. Bikash Sahoo.

64 paratype workers; same data as holotype.

Measurements of the holotype (in mm)**:** HL, 0.72; HW, 0.6; SL, 0.47; WL, 1; PL1, 0.24; PL2, 0.26; GL, 1; TL, 3.22; CI, 83.3; SI, 78; PHL, 0.20.

Measurements of paratype (n=10) (in mm): HL, 0.71-0.76; HW, 0.66-0.68; SL, 0.47-0.56; WL, 1- 1.1; PL1, 0.24-0.27; PL2, 0.22-0.27; GL, 0.95-1; TL, 3.20-3.36; CI, 88-94.3; SI- 70.1-84.8; PHL, 0.20-0.26.

Diagnosis Worker: *A. kadalarensis* sp. nov. is unique in the following combination of features: i) Head longer than broad with subparallel margins. ii) Masticatory margin with a broad apical tooth followed by seven denticles. iii) Dorsal side of propodeum and petiole microreticulate. iv) Declivity of propodeum concave. v) Subpetiolar process present, anteroposteriorly angulate.

Description

Worker: Monomorphic body.

Head: Subrectangular in frontal view, longer than broad, posterior margin concave; lateral sides subparallel. Antennae with 10 segments; scapes short, not reaching beyond the posterior region of head (Fig. 1). Anterior clypeal margin convex, without teeth; angularly produced in the middle (Fig. 2). Typhlatta spot absent. Parafrontal ridge present, extending 1/3 of the head length (ca 0.25 mm), with a small tooth between antennal sockets. Mandibles triangular, a large apical tooth followed by seven denticles of similar size (Fig. 3).

Mesosoma: Elongated**,** dorsal outline almost straight in profile view**,** pronotum moderately convex in lateral view, mesonotum straight; metanotum continuous; metanotal groove slightly impressed. Mesonotum continues with mesopleuron. Mesopleuron demarcated from metapleuron by a shallow impression. Propodeum acutely angulate. Dorsal outline of propodeum is almost straight but slightly downcurved at the most posterior part. Propodeal declivity shallowly concave, encircled by a thin rim (Fig. 2, Fig. 4).

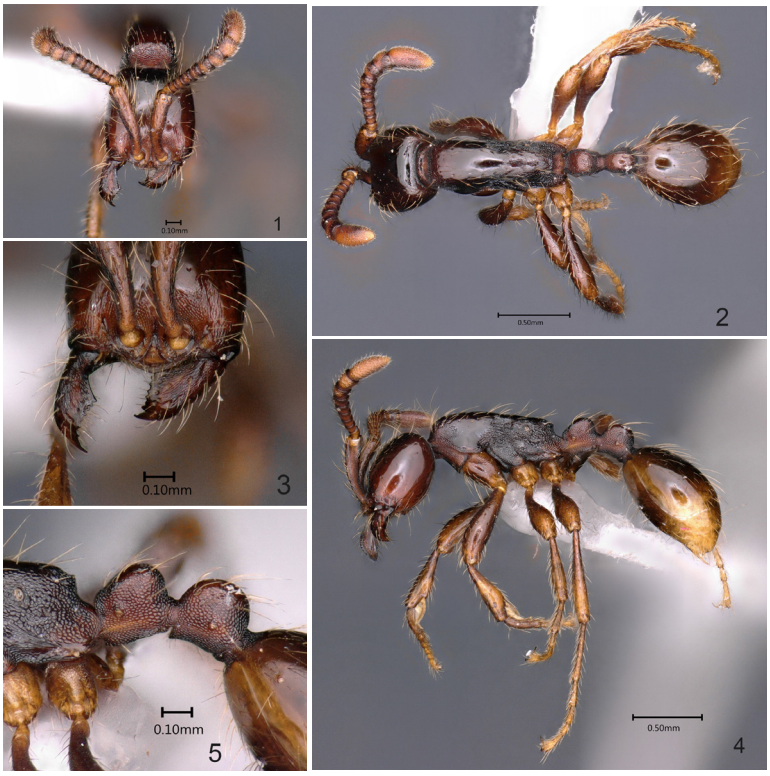
Metasoma: Both petiole and postpetiole are almost the same length in profile; petiole slightly higher than postpetiole in width. Dorsal outline of petiole slightly tapered towards the posterior side. Postpetiole dorsally convex. Subpetiolar process low, quadrilateral shape, and anteroposteriorly angulate not developed as a process (Fig. 5). In lateral view, gaster oval with 4 tergites, sting distinct apically (Fig. 4).

Sculpture: Head smooth and shining except for hair pits in frontal view. The area between the parafrontal ridges micro-reticulate. Area beside parafrontal ridge reticulate with sparse rugae. Mandibles with longitudinal striation with scattered punctures and flagellomeres microreticulate with punctures. Reticulation on occiput is feeble (Fig. 1). Dorsally, areas behind occiput densely reticulate. Dorsum of pronotum and mesonotum smooth and shiny. Anterior most pronotum reticulate. Dorsal face of propodeum and declivity microreticulate. Dorsum of petiole microreticulate (Fig. 2). Subpetiolar process microreticulate. Dorsum of postpetiole smooth medially and feebly microreticulate. Gaster smooth and shiny except hair pits. In lateral view, pronotum smooth posteriorly and microreticulate anteriorly. In some individuals, lateral pronotum microreticulate

posteriorly as well. Mesonotum, petiole, and postpetiole microreticulate in lateral view. Mesopleuron and metapleuron microreticulate along with moderate longitudinal striation. Legs feebly reticulate (Fig. 4).

Pilosity: Whole body with sparse, suberect long hairs. Long hairs present on scape, occiput, dorsum of petiole, postpetiole, and gaster. Short hairs present on lateral mesosoma, petiole, and postpetiole. Relatively denser and short hairs on funiculus of antenna, tibia, and tarsus of legs (Fig. 2, Fig. 4).

Color: Dark reddish brown to black. Head and antennae dark reddish brown. Occiput and mandible black. Mesosoma, petiole, and postpetiole reddish brown to black. Gaster is black except the apical part, which is yellowish. Legs light yellow to black (Figs. 1-5).



Figures 1-5. *Aenictus kadalarensis* sp. nov., worker (holotype). 1) Head in full-face view, 2) Body in dorsal view, 3) Mandibles, 4) Body in lateral view, 5) Petiole with subpetiolar process.

Male: Unknown

Queen: Unknown

Habitat and natural history: The specimens were collected from the ground where a few workers were seen on a rotten log and more individuals were present under the log. The collection was made in the month of May, prior to the monsoon. The

type locality is a tea and cardamom plantation surrounded by evergreen forest. The forest vegetation is mostly comprised of *Cullenia exarillata, Mesua ferrea, Palaquium ellipticum* trees along with other tree species like *Diospyros sylvatica, Drypetes elata, Cinnamomum keralense, Syzygium gardneri, Dimocarpus longan, Aglain jainii*, and *Litsea oleoides* (Pascal, Ramesh, & De Franceschi, 2004). This area is part of the Southern Western Ghats biodiversity hotspot.

Etymology: The name of the species is derived from the type locality, Kadalar tea estate, Munnar, Kerala. The species is known only from the type locality.

Comparative notes

The *Aenictus pachycerus* species group comprises 17 species (Antwiki, 2023; Jaitrong, Yamane, & Tasen, 2012; Jaitrong & Wiwatwitaya, 2013; Jaitrong & Yamane, 2011; Yamane & Wang, 2015), of which 4 species are present in India; *A. aitkenii* (Forel, 1901), *A. dentatus* (Forel, 1911), *A. pachycerus* (Smith, 1858), and *A. punensis* (Forel, 1901) (status of *A. aratus* Forel, 1900 in India is dubious (Shattuck, 2008)) (Bharti et al., 2016). *A. kadalarensis* sp.nov. can be distinguished from these species by having a smooth pronotum (microreticulated in *A. aitkenii* and *A. dentatus*) and the lack of longitudinal rugulae on propodeum dorsum (present in *A. punensis*).

Aenictus kadalarensis sp. nov. is similar to *Aenictus carolianus* Zettel and Sorger, 2010, known from Cebu island (Philippines), in general morphology and body measurements. The new species can be differentiated from the latter by the following characters.

- Presence of subpetiolar process in *A. kadalarensis* sp. nov. (Fig. 6-1), which is absent in *A. carolianus* (Fig. 6-2).

- Dorsal propodeum and dorsal petiole are microreticulate in *A. kadalarensis* sp. nov. (Fig. 7-1), while smooth in the latter (Fig. 7-2).

- *A. kadalarensis* sp. nov. has a mandible with a large apical tooth followed by seven denticles, whereas *A. carolianus* has a mandible with a large apical tooth followed by only around five denticles.

Based on these distinct characters as well as the geographical separation from its closely resembling species, we can consider it a valid species.

Aenictus kadalarensis sp. nov. keys out at couplet 17 given by Bharti et al. 2012. Couplet 17 is edited, and a new couplet is added here.

17. Longitudinal rugulae present on propodeal dorsum; head shining except for microreticulate band of occiput……..……*A. punensis* (Forel)

– Longitudinal rugulae lacking on propodeal dorsum; head partly shiny or completely microreticulate ……..……18

18. Head opaque and everywhere microreticulate……*A. pachycerus* (Fr. Smith)

– Head smooth and shining except the area close to parafrontal ridges..... .....*A. kadalarensis* sp. nov.

Figures 6. 1) *A. kadalarensis* sp.nov., subpetiolar process present, 2) *A. carolianus*, subpetiolar process absent (modified and taken from Zettel & Sorger, 2010).

Figures 7. 1) *A. kadalarensis* sp.nov., dorsal propodeum and dorsal petiole microreticulate, 2) *A. carolianus*, smooth dorsal propodeum and dorsal petiole (modified and taken from Zettel & Sorger, 2010).

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