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journal homepage: [www.elsevier.com/locate/jape](http://www.elsevier.com/locate/jape)Two remarkable new species of *Aenictus* (Hymenoptera: Formicidae) from India

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## ABSTRACT

Descriptions of two new species *Aenictus indicus* sp. nov. and *Aenictus wilsoni* sp. nov. are provided from India. The presence of an unusual distinct ridge between mesonotum and mesopleuron relates them to three sympatric Philippine species, *Aenictus philippinensis* Chapman, 1963; *Aenictus rabori* Chapman, 1963 and *Aenictus pangantihoni* Zettel and Sorger, 2010. An identification key to the worker caste of Indian species is provided.

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## Introduction

*Aenictus* Shuckard, 1840 is the only extant genus in the subfamily Aenictinae. Although widespread in distribution, they are uncommon in collections. Currently 133 species and 33 subspecies are listed in *Aenictus* (Bolton, 2011), making it one of the larger ant genera in the world. Since Wilson's (1964) taxonomic revision, only a few species have been described from southeast Asia, including Terayama and Yamane (1989), Terayama and Kubota (1993), Tang et al. (1995), Yamane and Hashimoto (1999), Zhou and Chen (1999), Mathew and Tiwari (2000), Zhou (2001), Jaitrong and Nabhitabhata (2005), Terayama (2009), Jaitrong and Eguchi (2010), Jaitrong and Nur-Zati (2010), Jaitrong and Yamane (2010), Jaitrong et al. (2010), Zettel and Sorger (2010), and Jaitrong et al. (2011). Moreover, Shattuck's (2008) review from Australia is also pertinent to this study.

All known species of the genus except three have no ridge demarcating the mesonotum from the mesopleuron in the worker caste. Species with an unusual distinct ridge between the mesonotum and the mesopleuron are *Aenictus pangantihoni*, *Aenictus philippinensis*, and *Aenictus rabori*. We have recently identified another two species: *Aenictus indicus* sp. nov. from southern India and *Aenictus wilsoni* sp. nov. from northern India with this unusual ridge, which are described as new to science in the present study. The presence of a ridge between the mesonotum and the mesopleuron has significant importance from an evolutionary point of view.

## Materials and methods

The specimens were collected using Winkler's extractor and hand picking methods. The taxonomic analysis was using a Nikon SMZ 1500 stereo zoom microscope. An MP evolution digital camera was used for digital images on the same microscope with Auto-Montage (Syncroscopy, Division of Synoptics, Ltd.) software. Images were subsequently cleaned as per the requirement for Adobe Photoshop CS5. Holotype and paratypes of both species have been deposited in PUPAC, Punjabi University Patiala Ant Collection, Patiala. Some paratypes of *Aenictus wilsoni* will be deposited at BMNH, Natural History Museum, London, UK and MCZ, the Museum of Comparative Zoology, Harvard University, USA.

Morphological terminology for measurements (given in millimeters) and indices include:

HL	Maximum length of head in dorsal view, measured in straight line from the anterior most point of the median clypeal margin to the midpoint of a line drawn across the posterior margin of head.
HW	Maximum width of head in dorsal view.
SL	Maximum length of the scape excluding the basal neck and condyle.
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 first gastral segment to the posteriormost point (excluding sting).
PL1	Maximum length of the petiole in dorsal view.
PL2	Maximum length of the postpetiole in dorsal view.

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TL	Total length: HL + WL + PL1 + PL2 + GL.
CI	Cephalic index: HW/HL × 100.
SI	Scape index: SL/HW × 100.

### Systematic accounts

#### *Aenictus indicus* sp. nov. (Figs. 1–4)

**Type material.** Holotype worker. India, Tamil Nadu, Meghamalai, 9.7415°N 77.4206°E, 1400 m, 11.iii.2002, Winkler (coll. H. Bharti).

The holotype had a fractured first gastral tergite whereas the second gastral tergite was missing.

**Worker measurements.** TL 4.52; HL 0.92; HW 0.84; SL 0.67; WL 1.33; PL1 0.35; PL2 0.38; GL 1.54. Indices: CI 91.30; SI 79.76 (n = 1).

**Head.** Head longer than broad, with convex sides; seen in full face view its posterior margin weakly convex; occiput with a well demarcated collar. Parafrontal ridge indistinct, about 0.22 mm long; vertex with a longitudinal impression. Antenna 10 segmented; scape reaching up to 4/5 the posterior margin of the head. Clypeus angularly produced in middle; mandible broad, triangular with large apical tooth, followed by eight irregular, indistinct denticles.

**Mesosoma.** Mesosoma constricted at the metanotal groove; promesonotum in profile distinctly convex; propodeum lower than promesonotum, its dorsal outline straight. Mesonotum demarcated from the mesopleuron by a conspicuous ridge; metanotal impression distinct. Propodeal junction bounded by a rim, meets at right angle.

**Petiole, Postpetiole.** Both rounded above; petiole anteriorly margined by a transverse carina, as long as postpetiole; subpetiolar process a low, convex, forward directed lobe.

**Gaster.** Gaster elongate-elliptical, narrowed posteriorly.

**Sculpture.** Body opaque and microreticulate except for gaster, which is smooth and shining; rugae completely lacking. Microreticulations are feebler on scape and legs; mandibles gently striate.

**Pilosity.** Moderate; suberect, denser on antennae and legs; sparse on gaster.

**Color.** Medium reddish brown.

**Distribution and habitat.** A single specimen was collected in a leaf litter sample in the High Wavy Mountains of southern Western Ghats. This species appears to be uncommon in Western Ghats, which is considered as one of the global biodiversity hot spots.

**Etymology.** The species epithet is Latin for India.

**Remarks.** This is an intriguing species as it possesses a ridge between the mesonotum and mesopleuron, a character shared only by three Phillipine *Aenictus* species. However, it can be easily separated from *Aenictus pangantihoni* and *Aenictus rabori* by a microreticulate head capsule but is closer to *Aenictus philippinensis*, from which it can be distinguished by a combination of characters. *Aenictus philippinensis* has a rounded clypeus, 0.28 mm long parafrontal ridge, convex basal face of propodeum, and straight occiput lacking a collar, whereas *Aenictus indicus* has an angularly produced clypeus in the middle, 0.22 mm long parafrontal ridge, straight basal face of propodeum and occiput with a well demarcated collar. The metanotal impression is strongly developed in the former, whereas only a low impression is present in the latter providing a different appearance between the two.

#### *Aenictus wilsoni* sp. nov. (Figs. 5–8)

**Type material.** Holotype worker. India, Himachal Pradesh, Andretta, 32.0744°N 76.5856°E, 940 m, 12.vi.2010, hand picking (coll. Aijaz A. Wachkoo). 14 paratype workers; same data as holotype.

**Non type material.** 93 workers 12.vi.2010, 21 workers 20.vi.2010 with the same data as holotype and paratypes.

**Worker measurements.** TL, 4.02–4.32; HL, 0.79–0.84; HW, 0.7–0.74; SL, 0.68–0.71; WL, 1.30–1.38; PL1, 0.31–0.33; PL2, 0.34–0.41; GL, 1.25–1.37. Indices: CI, 85.06–90.12; SI, 93.15–100 (n = 15).

**Head.** Head longer than broad; narrowed posteriorly, sides convex; seen in full face view its posterior margin convex; some specimens have occiput with well demarcated collar. Parafrontal ridge distinct, about 0.27 mm long. Antenna 10 segmented; scape reaching up to the posterior margin of head. Clypeus convex, extending slightly anterior of frontal lobes; mandible broad, triangular with large apical tooth, followed by eight irregular, ill defined denticles.

**Mesosoma.** Promesonotum gently convex in profile; propodeum lower than promesonotum, its dorsal outline straight. Mesonotum demarcated from the mesopleuron by a distinct ridge; which is immediately followed by three fossae placed horizontally; metanotal impression indistinct. An oblique excavation is present between the lower 1/3 of the meso and metapleuron. Propodeal junction forms an angle of about 90°.

**Petiole, Postpetiole.** Petiole rectangular in dorsal view, margined anteriorly by a transverse carina. Postpetiole gibbous, broadened



**Figs. 1–4.** *Aenictus indicus* sp. nov., 1. head in full-face view; 2. dorsal view; 3. lateral view; 4. ridge demarcating mesonotum and mesopleuron.





Figs. 5–8. *Aenictus wilsoni* sp. nov., 5. head in full-face view; 6. dorsal view; 7. lateral view; 8. ridge demarcating mesonotum and mesopleuron.

posteriorly; subpetiolar process a low, almost non-existent inconspicuous convex lobe.

**Gaster.** Gaster oval, sting exerted.

**Sculpture.** Head, mesosoma, petiole and postpetiole entirely microreticulate and opaque. In addition, low ill defined longitudinal rugae cover mesonotum and propodeum; lower half of mesopleuron consists of broad, sturdy rugae as well. Mandibles striate with punctured apices.

**Pilosity.** Moderate; suberect, denser on antennae and legs; sparse on gaster.

**Color.** Blackish, with brown gena, gaster, and appendages.

**Distribution and habitat.** Andretta, the type locality of this species is a fascinating green hill station (devoid of litter) surrounded on all sides by tea gardens and pine forests before they merge with the Dhauladhar range (a southern branch of the main Outer Himalayan chain of mountains). This species is uncommon in the Shivalik range of northwest Himalaya and was collected twice from the same locality while raiding the soil surface.

**Etymology.** The species epithet is given to honor E. O. Wilson.

**Remarks.** *Aenictus wilsoni* can be easily separated from *Aenictus pangantihoni* and *Aenictus rabori* by its microreticulate head capsule but is somewhat similar to *Aenictus philippinensis* from which it can be fairly separated by a combination of characters. *Aenictus philippinensis* has medium reddish brown color, smaller scapes (SI, 78.20), convex basal face of the propodeum and a strongly impressed metanotum, whereas *Aenictus wilsoni* has a blackish color, longer scapes (SI, 93.15–100), straight basal face of propodeum and indistinct metanotal impression. Presence of rugae, ridge immediately followed by three fossae; an oblique excavation present between the lower 1/3 of the meso and metapleuron are found in latter only.

**Key to species of *Aenictus* of India based on worker caste (after Wilson, 1964)**

1. Mandibles narrow, 3- or 4-toothed, and in closed position their inner borders are often (but not always) separated from the anterior clypeal border by a large gap..... 2
  - Mandibles broad and triangular; bearing a distinct apical tooth and a preapical tooth, followed by at least 4 or 5 smaller teeth or denticles, the posteriormost of which are much smaller than the apical tooth; mandibular gap lacking..... 5

2. Anterior clypeal border entire and convex and bearing approximately 6 small but distinct teeth; a small (HW, 0.51–0.53 mm), shining, very hairy brownish yellow species with very short scapes (SI, 66–69)..... *A. brevicornis* (Mayr)
  - Anterior clypeal border lacking teeth, and emarginate..... 3
3. Scapes very short (SI, 58–61); junction of propodeal faces an even convex curve..... 4
  - Scapes longer (SI of at least 70); junction of propodeal faces angulate..... *A. ceylonicus* (Mayr)
4. Clypeus strongly emarginate; mandibles thick, strongly curved inward; at closure the inner mandibular borders are separated from the anterior clypeal border by a gap as wide as the maximum width of the scape..... *A. doryloides* Wilson
  - Clypeus straight or slightly convex; mandibles neither conspicuously thickened or curved inward; in closure the inner mandibular borders either reach the anterior clypeal border or are separated from it by a gap much narrower than in *doryloides*..... *A. piercei* Wheeler & Chapman
5. “Typhlatta spots” present; these are a pair of large, pale, circular areas covering most of the posterolateral portions of the head and contrasting sharply with the much darker remainder of the head..... 6
  - “Typhlatta spots” absent..... 9
6. Subpetiolar process prominent and angular..... 7
  - Subpetiolar process absent or at most very low and rounded..... *A. gracilis* Emery
7. Seen from the side, the propodeal faces join through a smooth curve..... *A. laeviceps* (Fr. Smith)
  - Seen from the side, the propodeal faces join in a sharp angle..... 8
8. Pronotal dorsum microreticulate and opaque; a somewhat larger species, HW, 0.79–0.92 mm..... *A. binghami* Forel
  - Pronotal dorsum smooth and shining; HW, 0.63–0.78 mm..... *A. fergusonii* Forel
9. Subpetiolar process large and angulate..... 10
  - Subpetiolar process either absent or else merely a low, evenly round lobe..... 11
10. Whole mesosoma opaque and sculptured, mandibles with 5 indistinct denticles..... *A. shillongensis* Mathew & Tiwari

- Pronotum shining, remainder of mesosoma and petiole microreticulate; mandibles with more than 5 denticles.....  
.....*A. peguensis* Emery
11. Mesonotum demarcated from mesopleuron by a conspicuous ridge..... 12  
– Mesonotum not visibly demarcated from mesopleuron..... 13
12. Reddish brown; head width 0.84 mm; metanotal impression present; parafrenal ridge about 0.22 mm long.....  
.....*A. indicus* sp. nov.  
– Blackish; head width 0.7–0.74 mm; metanotal impression absent; parafrenal ridge about 0.27 mm long.....  
.....*A. wilsoni* sp. nov.
13. Anterior clypeal border dentate; small species, HW 0.43–0.53 mm; scapes long, scape index at least 102 and usually much more..... 14  
– Anterior clypeal border not dentate; larger species, HW at least 0.57 mm; scapes shorter, scape index not exceeding 102 and usually much less..... 15
14. Head width 0.43–0.44 mm; scape index 116–119.....  
.....*A. wroughtoni* Forel  
– Head width 0.46–0.53 mm; scape index 102–108.....  
.....*A. sagei* Forel
15. Occiput constricted behind into narrow but distinct “collar”; propodeal angle (junction of basal and declivitous faces) longer in profile than maximum length of propodeal spiracle, very thin acute, and far overhanging the declivitous face; a large species (HW, 0.78–0.81 mm) with long (SI about 137).....  
.....*A. dentatus* Forel  
– Occiput not constricted behind into a large collar; propodeal angle no longer than maximum spiracle width and not overhanging the declivitous face.....16
16. Pronotum densely microreticulate and opaque.....  
..... *A. aitkenii* Forel  
– Pronotum mostly smooth and shining..... 17
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 opaque and everywhere microreticulate.....  
.....*A. pachycerus* (Fr. Smith)

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