



First record of genus *Protanilla* (Hymenoptera: Formicidae: Leptanillinae) from India with description of a new species



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ABSTRACT

Protanilla wardi sp. nov. from Kerala, India is described and illustrated, which also confirms first record of the genus from this country. The new species is somewhat close to *P. rafflesi* Bolton, 1990 for its anteriorly concave petiolar node but differs from the latter by its vertical, not anteriorly inclined postpetiolar node. The new species represents only the 9th known species of this rare ant genus to be described.

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Introduction

Leptanillinae is a primitive ant subfamily which is significantly important on the basis of its affinities with other subfamilies and placement within Formicidae (Brady et al., 2006; Moreau et al., 2006; Ward, 2014). Earlier studies on the subfamily placed leptanillines close to army ant groups (Baroni Urbani, 1977; Wheeler and Wheeler, 1985). Bolton (1990) hypothesized that doryline attributes evolved convergently and leptanillines are not particularly close to the doryline and rather constitute a sister-group of the Ponerinae. Most of the recent works favor the placement of Leptanillinae as one of the earliest branching lineages of extant ants (Ward, 2014). However, it still remains difficult to attain global consensus about true affinities of the subfamily. New additions and morphological characterization of these species may help to resolve this dispute (Baroni Urbani and de Andrade, 2006; Borowiec et al., 2011; Xu, 2012; Johan et al., 2013). However, given the convergence in evolution of morphological characters, it will also require molecular phylogenetic approaches to resolve this uncertainty and establish true relationships.

The genus *Protanilla* is distributed in South Palaearctic, Oriental and Indo-Australian regions (Baroni Urbani and De Andrade, 2006; Xu, 2012; Bolton, 2015) and is currently represented by 8 species (Xu, 2012; Bolton, 2015). Significant contributions to the genus include those of Bolton (1990); Xu and Zhang (2002); Xu (2002, 2012) and Borowiec et al. (2011).

The eight valid species of the genus include: *P. bicolor* Xu, 2002; *P. concolor* Xu, 2002; *P. gengma* Xu, 2012; *P. izanagi* Terayama, 2013; *P. lini* Terayama, 2009; *P. rafflesi* Bolton, 1990; *P. schoedli* Baroni Urbani and De Andrade, 2006; and *P. tibeta* Xu, 2012. *Protanilla wardi* sp. nov. described here represents first record of the genus from India and 9th valid species of the genus.

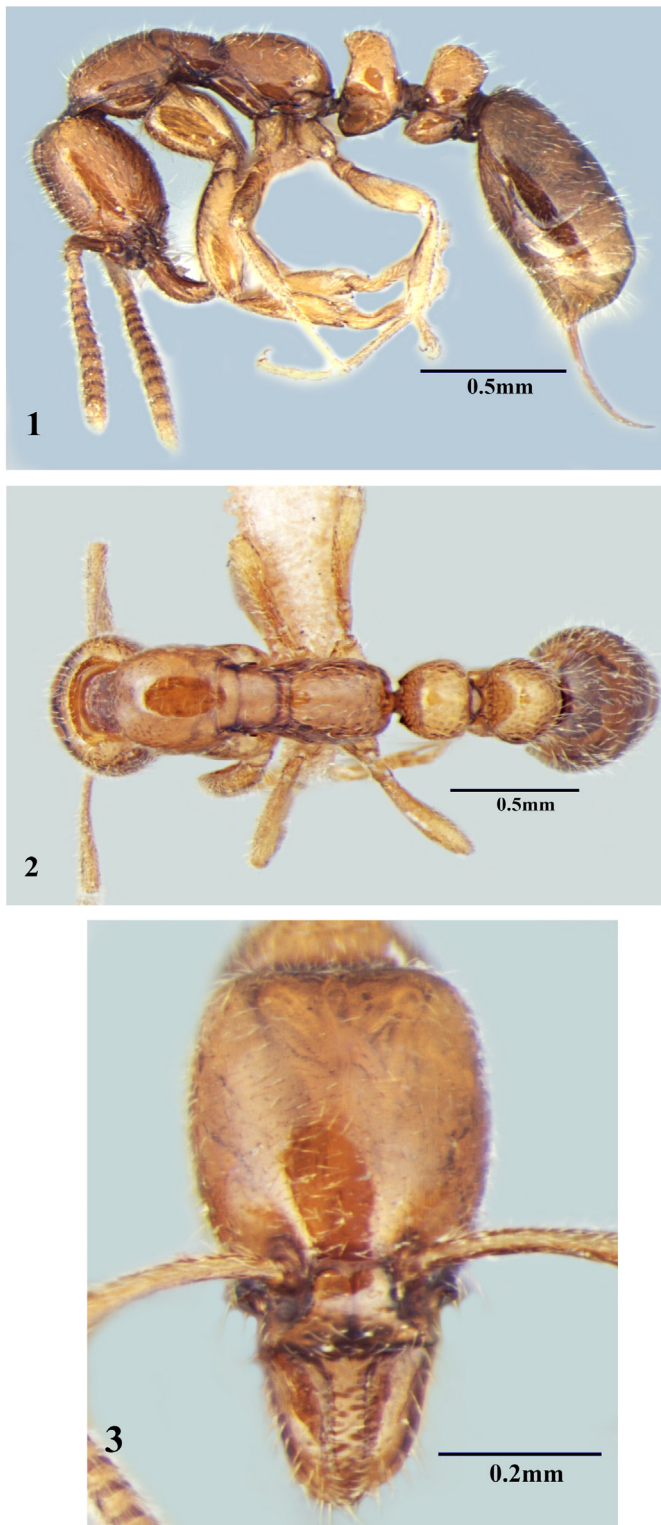
Two specimens were collected from Silent Valley National Park, which forms the core area of the Nilgiri Biosphere Region. The specimens were collected from leaf litter of approximately 2 cm thickness. The study area is situated at an altitude of 900 m above mean sea level. It is a shady place exposed to limited sunlight. Mean annual temperature of the region is 20.2 °C with average annual rainfall 6066 mm and 95% relative humidity. The region is famous for its undisturbed tropical moist evergreen forests. Eleven distinct evergreen vegetation types are identified in the region with *Dipterocarpus*, *Humboldtia*, *Diospyros*, *Persea*, *Mesua*, *Poeciloneuron*, and *Hopea*, plant genera of most common occurrence. The unique geomorphic and physiographic features with characteristic Archaean peaks form main skeleton of the region. The region is an ecological island free from anthropogenic interferences and harbors rare and endemic flora and fauna (Nair, 1991). Several new and rare ant species have been recently discovered from the region (Bharti and Akbar, 2013a, 2013b, 2013c, 2014).

Materials and methods

Two specimens of the new species were collected from a leaf litter sample using the Winkler extraction method. Taxonomic analysis was conducted using a Nikon SMZ 1500 stereo zoom microscope. For digital

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Figs. 1–3. *Protanilla wardi* sp. nov., Holotype worker: 1. Body in lateral view; 2. Body in dorsal view; 3. Head in full-face view.

images, an MP evolution digital camera was used on the same microscope with Auto-Montage software (Syncroscopy, Division of Synoptics, Ltd.). Later, images were cleaned with Adobe Photoshop CS6. Description pattern, morphological terminology for measurements (given in millimeters) and indices found below follow Bolton (1987) and Xu and Zhang (2002): TL—total length: The total outstretched length of

the ant from the mandibular apex to the gastral apex. HL—head length: The length of the head proper, excluding the mandibles, measured in a straight line from the mid-point of the anterior clypeal margin to the mid-point of the vertexal margin, in full-face view. HW—head width: The maximum width of the head in full face view, excluding the eyes. CI—cephalic index = $HW \times 100 / HL$. SL—scape length: The maximum straight line length of the antennal scape excluding the basal constriction or neck close to the condylar bulb. SI—scape index = $SL \times 100 / HW$. ML—mandibular length: The straight-line length of the mandible from apex to the base. PW—pronotal width: The maximum width of the pronotum in dorsal view. WL—mesosomal length (Weber's length): The diagonal length of the mesosoma in profile view from the point at which the pronotum meets the cervical shield to the posterior base of the metapleuron. PNL—petiolar node length: With petiolar node in lateral view, the maximum longitudinal length of the node without its anterior and posterior peduncles. PNH—petiolar node height: With petiolar node in lateral view, the maximum vertical height of the node from summit to lowermost part of subpetiolar process. PNW—petiolar node width: The maximum width of the petiolar node in dorsal view. PPNL—postpetiolar node length: With postpetiolar node in lateral view, the maximum longitudinal length of the node without its anterior and posterior peduncles. PPNH—postpetiolar node height: With postpetiolar node in lateral view, the maximum vertical height of the node from summit to lowermost part of subpostpetiolar process. PPNW—postpetiolar node width: The maximum width of the postpetiolar node in dorsal view.

Acronyms of depositories

BMNH: Natural History Museum, London, U.K.

PUAC: Punjabi University Patiala, Ant Collection at Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India.

Systematics

Protanilla wardi sp. nov. (Figs. 1–3)

Type material

Holotype worker: India, Kerala, Silent Valley National Park (11°53'N, 76°26'E), 900 m, Winkler method, 24.x.2011, Shahid A. Akbar leg. Paratype: 1 worker, with same data as holotype. Holotype in PUAC and Paratype will be deposited in BMNH.

Measurements (holotype in brackets)

TL 1.84–(1.85), HL 0.54–(0.56), HW 0.42–(0.44), CI 77–(78), SL 0.44–(0.45), SI (102)–104, ML 0.80–(0.82), PW 0.28–(0.29), WL 0.89–(0.91), PNL 0.23–(0.24), PNH 0.35–(0.37), PNW 0.24–(0.25), PPNL 0.18–(0.19), PPNH 0.36–(0.37), PPNW 0.26–(0.28) (2 individuals measured).

Description

In full face view, head longer than broad, narrowed anteriorly. Sides evenly convex, anterolateral corners of head prominent and tooth-like. Posterior margin almost straight, slightly concave, posterior corners gently rounded. Mandibles elongate and down-curved apically, dorso-lateral surface with a longitudinal groove, basal corners roundly prominent, masticatory margin with 20 peg-like teeth. Clypeus nearly trapezoidal, with a depressed longitudinal central line, anterior margin straight. Apex of labrum roundly convex, with 4 peg-like teeth. Antennae 12-segmented, apex of scape surpasses occipital corner by about 1/6 of its length, flagellar segments 4–9 about as broad as long.

In profile view dorsum of pronotum slightly convex. Promesonotal suture distinct, depressed. Dorsum of mesonotum straight, slopes down

posteriorly. Metanotal groove strongly notched. Dorsum of propodeum weakly slopes down posteriorly, posterodorsal corner evenly convex; declivity weakly convex, about 1/2 length of the dorsum. In profile view petiolar node narrowed upward, anterior face concave, posterior face straight while dorsum slightly convex; anterodorsal corner pointed and posterodorsal corner rounded. Ventral face of petiole projected forward, anteroventral corner extruding, without a circular semi-transparent fenestra; posterior margin slightly convex. Postpetiolar node vertical, with dorsum roundly convex, anterodorsal corner rounded, posterodorsal corner bluntly angled; ventral face strongly inclined forward, anteroventral corner bluntly pointed. Sting strong and extruding.

In dorsal view mesonotum constricted. Both petiolar node and postpetiolar node transverse and almost as broad as long; sides evenly convex, anterior and posterior faces nearly straight. Anterior margin of gaster slightly concave.

Mandibles smooth and shiny, sparsely punctured. Head and body smooth and shiny. Dorsum of head and gaster with sparse erect to suberect hairs and sparse decumbent pubescence. Mesosoma, petiole and postpetiole with sparse erect to suberect hairs and abundant decumbent pubescence. Scapes and tibiae with abundant suberect to subdecumbent hairs and dense decumbent pubescence. Mandibles and antennal sockets with long hairs. Body in color blackish brown, mesosoma with slight reddish-brown tinge; head, legs, petiole and postpetiole brownish yellow.

Etymology

The new species is named after Prof. Philip S. Ward.

Differential diagnosis

P. wardi sp.nov. is somewhat allied to *P. rafflesi* Bolton, 1990 for its anteriorly concave petiolar node, but the new species is easily separated from the latter by its vertical, not anteriorly inclined postpetiolar node. Also in *P. wardi* sp.nov. petiolar node nearly square in dorsal view, as broad as long, weakly narrowed backward (PNL 0.24, PNW 0.25, PNH 0.37) while in *P. rafflesi* petiolar node anteroposteriorly compressed in dorsal view, distinctly broader than long, weakly widened backward (PNL 0.17, PNW 0.24, PNH 0.29). The new species also shares some affinities with *P. lini* Terayama, 2009 in vertical postpetiolar node, however the two species can be easily differentiated from each other: *P. wardi* is smaller in size (TL 1.84, HL 0.56, HW 0.44), mandibles with 20 peg-like teeth, anterior clypeal margin straight, anterior face of petiole concave; while *P. lini* is larger in size (TL 2.9, HL 0.60, HW 0.48), mandibles with 10 peg-like teeth, anterior clypeal margin concave, anterior face of petiole straight.

Key to known species of *Protanilla* of the world based on worker and queen castes (modified after Xu, 2012)

1. Mandibles surmounted by a large erect convex lamella; dorsolateral surface of mandible with a large distinct longitudinal groove running from the base to the terminal quarter of the jaw (Japan)-----
P. izanagi Terayama
– Mandibles elongate, narrowly triangular and downcurved; dorsolateral surface of mandible without such distinct longitudinal groove-----2
2. In full face view, anterior margin of clypeus strongly concave. In dorsal view, petiolar node laterally compressed and roughly elliptical, distinctly longer than broad. Body bicolor, the middle portion black, the rest brownish yellow-----3
– In full face view, anterior margin of clypeus straight to weakly concave. In dorsal view, petiolar node anteroposteriorly compressed

or square, as broad as long or broader than long. Body concolor, uniformly yellowish brown or reddish brown-----4

3. In full face view, anterior 1/3 of the head distinctly narrowed forward. In profile view, anterodorsal corner of petiolar node roundly prominent. Head brownish yellow. Body small with HL 0.53, HW 0.43 mm (China: Yunnan Province)-----
P. bicolor Xu
– In full face view, anterior 1/2 of the head distinctly narrowed forward. In profile view, anterodorsal corner of petiolar node rounded. Head light black to blackish brown. Body large with HL 0.73, HW 0.60 mm (China: Yunnan Province)-----
P. gengma Xu
4. In dorsal view, petiolar node nearly square, as broad as long, and weakly narrowed backward. In profile view, anterior face of petiolar node vertical, postpetiolar node not inclined forward-----5
– In dorsal view, petiolar node anteroposteriorly compressed, distinctly broader than long, and weakly widened backward. In profile view, anterior face of petiolar node steeply sloped, postpetiolar node strongly inclined forward-----6
5. Mandibles with 10 peg-like teeth. Anterior clypeal margin concave. Anterior face of petiole straight. Larger species (HL 0.60, HW 0.48; China: Taiwan Province)-----
P. lini Terayama
– Mandibles with 20 peg-like teeth. Anterior clypeal margin straight. Anterior face of petiole concave. Smaller species (HL 0.56, HW 0.44; India)-----
P. wardi sp. nov.
6. In full face view, vertexal margin almost straight. In dorsal view, anterior margin of gaster weakly concave (Sri Lanka)-----

P. schoedli Baroni Urbani & De Andrade
– In full face view, vertexal margin weakly concave. In dorsal view, anterior margin of gaster straight-----7
7. In full face view, anterior 1/2 of the head distinctly narrowed forward. In profile view, petiolar node relatively thin and roughly triangular, dorsal face very short, about 1/2 length of anterior face (China: Yunnan Province)-----
P. concolor Xu
– In full face view, anterior 1/3 of the head distinctly narrowed forward. In profile view, petiolar node relatively thick and roughly trapezoidal, dorsal face long, about as long as anterior face-----8
8. In profile view, posterodorsal corner of propodeum evenly convex. Petiolar node strongly narrowed upward, anterior face nearly straight, dorsal face weakly convex, anterodorsal corner blunt (China: Tibet)-----
P. tibeta Xu
– In profile view, posterodorsal corner of propodeum strongly convex. Petiolar node weakly narrowed upward, anterior face weakly concave, dorsal face strongly convex, anterodorsal corner roundly protruding (Singapore, Malaysia)-----
P. rafflesi Bolton

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this work.

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