

***Myrmica radchenkoi*, a New Species of Ant (Hymenoptera:
Formicidae) from Indian Himalaya**

by

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ABSTRACT

Myrmica radchenkoi sp. nov. is reported from Indian Himalaya with discovery of workers and queen. This new species reinforces the placement of its close ally, earlier reported *Myrmica rigatoi* Radchenko and Elmes, 1998 in the *inezae* species group, where it has been provisionally placed so far. The queen in *Myrmica radchenkoi* sp. nov. which is described herewith also shows some close proximity with already described queen of *Myrmica inezae*.

Key words: *Myrmica radchenkoi*, new species, *Myrmica rigatoi*, *inezae*, Himalaya.

INTRODUCTION

Genus *Myrmica* in the old world is represented by 142 valid species. These species are well distributed in the Palearctic zone and South-east Asian tropical and subtropical regions. The central Asian mountains which comprise Hindu Kush, Karakorum and the South-western slope of Himalaya (Afghanistan, Pakistan, India, Nepal and Bhutan) include 33 species representing 7 species groups. 31 species (94%) are endemic to this region. The diversity of this region is quite interesting because the species representing this region show plesiomorphic features (Radchenko & Elmes 2010). Unfortunately the diversity of species from Indian Himalaya is very poorly represented in this census. One significant reason is lack of material from this region and hence poor representation. The geological history of Himalaya and its physical isolation has led to a high degree of endemism, thus many species groups which remain concentrated here diversified in this region only (Bharti 2008a & b, 2011, Bharti & Sharma 2011; Radchenko & Elmes 2001, 2010). Recently, the author and his team has started exploring

Himalayan fauna and as per expectations the region has quite a number of undescribed species which would contribute significantly to understanding the *Myrmica* of the old world and would provide an insight into many unresolved questions.

Myrmica radchenkoi sp. nov. which is being described here shows very interesting features in terms of its placement in species groups. These species groups in *Myrmica* as created by Radchenko and Elmes (2001, 2010) are arbitrary divisions but seem to be correct as they have been verified by molecular studies (Jansen *et al.* 2009, 2010) and appear to be monophyletic. Only one species, *Myrmica rigatoi* Radchenko & Elmes, 1998 (which has some close proximity with this new species) has been reported from North-eastern Pakistan. Earlier this species was placed in the *ritae* group, however Radchenko & Elmes (2010) recently transferred it to the *inezae* group due to some close affinities. With the discovery of *M. radchenkoi* sp. nov. their decisions seem to be validated (see discussion).

MATERIALS AND METHODS

The specimens were collected through winkler's extractor and were preserved in 70% alcohol. These were later pinned as per standard procedure in ant taxonomy. Then the mounted material was analyzed and measured on a Nikon SMZ-1500 stereo zoom microscope. For digital images, an MP evolution digital camera was used on the same microscope with Auto-Montage (Synchroscopy, Division of Synoptics, Ltd) software. Later, images were cleaned as needed with Adobe Photoshop CS.

Morphological measurement followed Radchenko and Elmes (1998, 2010):

HL : length of head in dorsal view, measured in a straight line from the anterior point of median clypeal margin to mid-point of the occipital margin.

HW : maximum width of the head in dorsal view behind the eyes.

FW : minimum width of the frons between the frontal lobes.

FLW : maximum width between external borders of the frontal lobes.

SL : maximum straight-line length of antennal scape in profile.

AL : diagonal length of the alitrunk seen in profile, from the neck shield to the posterior margin of metapleural lobes (workers) and from the anterior-dorsal point of alitrunk to posterior margin of metapleural lobes (queens).

SCW : maximum width of the scutum from above (queens).

SCL : length of scutum+scutellum from above (queens).

AH : Height of alitrunk, measured from upper level of mesonotum perpendicular to the level of lower margin of mesopleuron (queens and males).

PL : maximum length of petiole from above.

PPL : maximum length of post-petiole from above.

PW : maximum width of petiole from above.

PPW : maximum width of post-petiole from above.

PH : maximum height of petiole in profile.

PPH : maximum height of post-petiole in profile.

ESL : maximum length of propodeal spine in profile.

ESD : distance between tips of spine from above.

INDICES USED

Cephalic	CI = HL/HW
Frontal	FI = FW/HW
Frontal lobe	FLI = FLW/FW
Scape (1)	SI1 = SL/HL
Scape (2)	SI2 = SL/HW
Petiole (1)	PI 1 = PL/PH
Petiole (2)	PI2 = PL/HW
Petiole (3)	PI3 = PW/HW
Post-petiole (1)	PPI1 = PPL/PPH
Post-petiole (2)	PPI2 = PPH/PPW
Post-petiole (3)	PPI3 = PPW/PW
Post-petiole (4)	PPI4 = PPW/HW
Spine length	ESLI = ESL/HW
Spine width	ESDI = ESD/ESL

DESCRIPTION

Myrmica radchenkoi sp. nov.

(Figs. 1-6, Tables 1 & 2)

Holotype Worker: India, Jammu and Kashmir, Machedi, 32.72364°N, 75.669464°E, 2000 meters above msl, 3rd August, 2008. Paratypes, 3 workers and 1 queen with same data as that of holotype.

Holotype and paratypes in Department of Zoology {Dr Himender Bharti's Collections-DST (YEG)-550, DST (YEG)-557 to DST (YEG)-560}, Punjabi University Patiala, India.

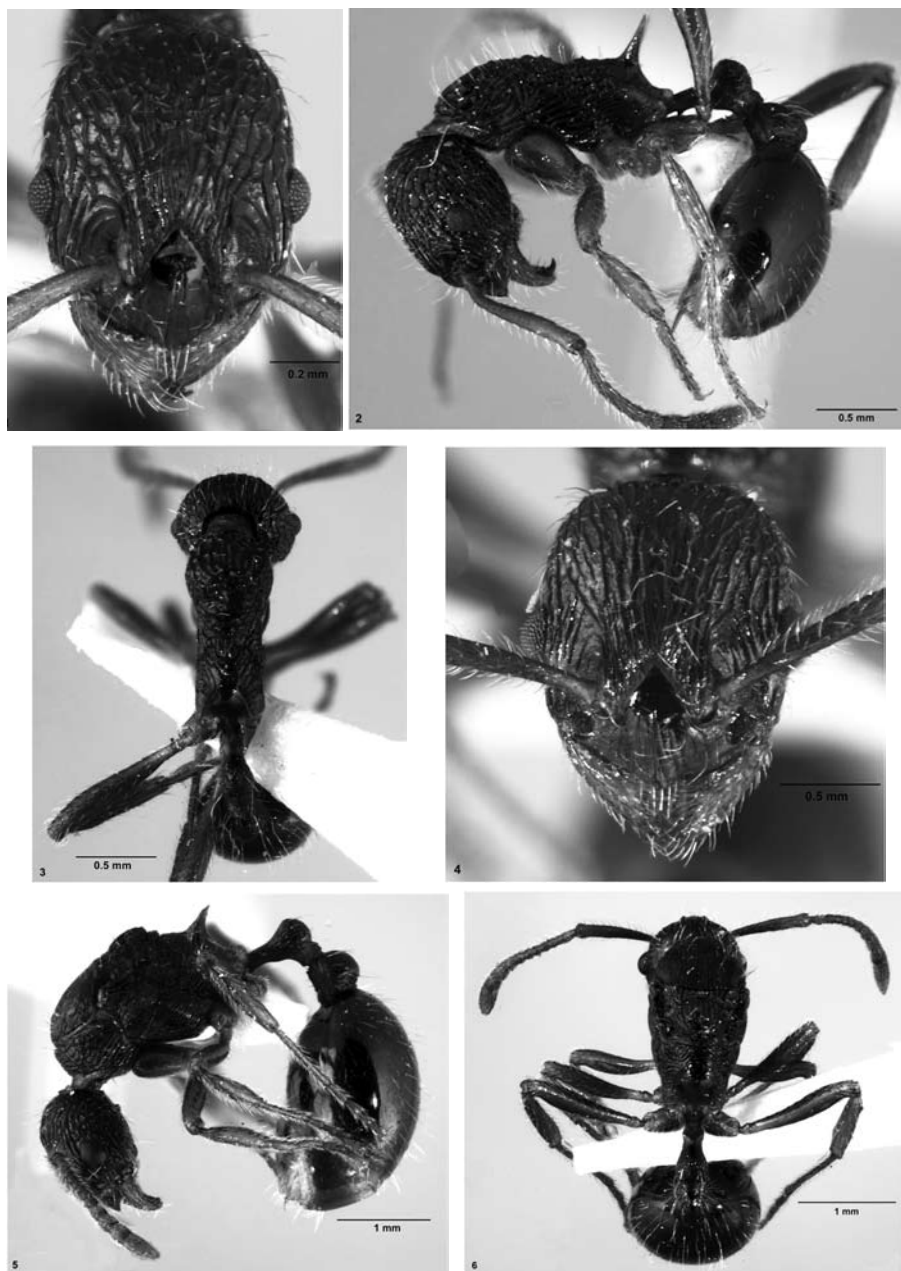
Description of worker (Figs. 1-3):

Worker measurements: FLW:0.40, FW:0.38, HL:1.13, HW:0.88, SL:1.01, PL:0.58, PPL: 0.42, PW: 0.25, PPW: 0.37, PH: 0.32, PPH: 0.39, AL: 1.61, TL: 5.09.

Head: Head in dorsal view much longer than broad, occipital margins slightly convex; mandibles with 7 teeth, longitudinally striate, apical tooth large; palp formula 6:4; dorsal surface of head with reticulate sculpture which is quite irregular and wide, surface between reticulations shining, very weakly punctated; clypeus shining with prominent longitudinal striations in the middle; frontal triangle shining; frontal carinae running straight and in some specimens slightly curved outward to merge with rugae that surround the antennal sockets; roughly 16-17 rugae between the frontal carinae at the level with eyes; antennae 12 jointed, scape slender curved at the base, punctured, opaque, finely longitudinally striate, without any trace of lobe or carina,

Table 1. The mean, standard deviation, minimum and maximum values (mm) of the measurements made on samples of species (workers only). The measurement codes are as indicated in the text and the numbers of individuals measured are given in parenthesis.

Morphometrics	Mean±SD	Workers (3)	
		min	Max
HL	1.10±0.03	1.07	1.13
HW	0.85±0.03	0.81	0.88
SL	0.99±0.02	0.96	1.01
PL	0.57±0.01	0.56	0.58
PH	0.31±0.01	0.30	0.32
PW	0.25±0.01	0.24	0.25
PPL	0.39±0.03	0.36	0.42
PPH	0.36±0.03	0.33	0.39
PPW	0.36±0.01	0.36	0.37
FLW	0.40±0.01	0.39	0.40
FW	0.39±0.01	0.38	0.39
ESL	0.35±0.01	0.34	0.36
AL	1.56±0.05	1.49	1.61
ESD	0.42±0.01	0.41	0.42
PNW	0.60±0.01	0.58	0.60



Figs. 1–6. *Myrmica radbenkoi* 1: worker, head frontal view; 2: worker, profile; 3: worker, dorsal view; 4: queen, head frontal view; 5: queen, profile; 6: queen, dorsal view.

extending $\frac{1}{4}$ beyond the upper margin of head, funicular club with apical 4 joints; eyes large, placed below midline of head; dorsal surface of head covered with interspersed erect hairs; anterior margin of mandibles densely pilose, along with sides of head, scape, similar oblique hairs present on flagellum and along with pubescence.

Alitrunk, petiole and postpetiole: Pronotum rounded anteriorly; alitrunk dorsum feebly convex, pro-mesonotal suture shallow but distinct; metanotal groove broad and shallow; longitudinally striate; pronotum transversally

striated anteriorly with wide longitudinal striations posteriorly; mesonotum, roughly transversally striated; propodeum with few coarse transverse rugae (behind the metanotal groove a single transverse carina present), declivity smooth and shining; propodeal lobes rounded; propodeal spines very long, pointed and directed upwards; sides of alitrunk longitudinally striated with striations wide apart; mid and hind tibiae with pectinate spurs; petiole with a very long peduncle (PLI 1.80), petiole with sharp subpetiolar process, petiole much longer than broad (PL 0.56, PW .035); petiolar node with fine transverse striations; postpetiole longer than broad, smooth dorsally, longitudinal in profile; whole of the alitrunk covered with very long erect hairs along with petiole and postpetiole; legs with similar type of pilosity but hairs shorter in length.

Gaster smooth, covered with long erect pilosity which is dense on last gastral tergite and sternite.

Color dark brown, with legs, mandibles and antennae light brown.

Description of Queen (dealate) (Figs.3-6):

Queen measurements: FLW: 0.45, FW: 0.41, HL: 1.21, PL: 0.75, PH: 0.38, ESL: 0.35, HW: 0.97, SL: 1.02, PPH: 0.45, PPW: 0.49, PW: 0.33, PPL: 0.43, ESD: 0.41, SCW: 0.89, SCL: 1.36, AL: 1.94, AH: 1.13, TL: 6.33 CI: 1.25, FI

Table 2. The mean, minimum and maximum indices calculated from the measurements given in Table 1.

Index	Mean	Workers (3)	
		min	Max
CI	1.29	1.27	1.32
FI	0.45	0.43	0.48
FLI	1.03	1.02	1.05
PI1	1.86	1.81	1.87
PI2	0.67	0.65	0.69
PI3	0.29	0.28	0.30
PPI1	1.08	1.06	1.11
PPI2	1.00	0.92	1.05
PPI3	1.48	1.44	1.50
PPI4	0.43	0.42	0.44
SI1	0.90	0.89	0.90
SI2	1.17	1.14	1.19
ESLI	0.42	0.41	0.43
ESDI	1.18	1.14	1.21

:0.45, FLI:1.09, PI1:1.97, PI2:0.77, PI3:0.34, PPI1:0.95, PPI2:0.91, PPI3:1.48, PPI4:0.41, SI1:0.84, SI2:1.05, ESLI:0.36, ESDI: 1.17

Head: Similar to worker except mandibles with 8 teeth, apical tooth very large, longitudinal striations on the mandibles and clypeus more dense and fine.

Alitrunk, petiole and postpetiole: Pronotum transversally striate in frontal view, with cross meshes or reticulate sculpture on anterolateral corners and rest of it in profile finely longitudinally striate; scutum and scutellum as a whole very finely longitudinally striate, sclerite between scutellum and propodeum transversally striate; petiole with long peduncle (PLI 1.97); postpetiole broader than long, rest like worker.

Etymology: The species is named after Professor Alex Radchenko for his contribution to genus *Myrmica*.

Distribution and Habitat: collected from leaf litter in a patchy *Cedrus* forest and the area is a transitional zone between temperate and sub temperate Himalaya (temperature of collection site 32°C).

Remarks: Due to long propodeal spines (ESLI 0.42) and very long peduncle of petiole (PI1 1.86) and altogether different sculpture of head and alitrunk, *Myrmica radchenkoi* sp. nov. can be clearly separated from its close ally *M. rigatoi* Radchenko & Elmes, 1998 (where PI1 1.65 and ESLI 0.52). As stated earlier, on the basis of clypeus without median notch, propodeal spines very long, propodeal lobes rounded, *M. rigatoi* has been provisionally placed in the *inezae* group (Radchenko & Elmes 2010). This group is currently represented by three species only (*Myrmica inezae*, *Myrmica mixta* and *Myrmica rigatoi*) distributed in Himalaya and South-western China. This group shares several features with the *ritae* group, but due to absence of median notch at anterior margin of clypeus, it was separated as a distinct group. It is believed that this group represents an old relict fauna of *Myrmica* derived from a *ritae*-like ancestor which was isolated in Central Asia where it adapted to high altitude regions and underwent speciation (Radchenko & Elmes 2010). Earlier, *Myrmica rigatoi* was placed in the *ritae* group (Radchenko & Elmes 2001), but as stated previously, it is now shifted provisionally to the *inezae* group (due to lack of sufficient representative species of its kind). However, with the discovery of *Myrmica radchenkoi* sp. nov. this placement seems quite justifiable, as the queen of *Myrmica radchenkoi*

sp.nov. which has been described here shares some important features with already reported queen of *Myrmica inezae* (Radchenko & Elmes 2002). Both have long propodeal spines, rounded propodeal lobes, transverse rugosity on sclerite bordering scutellum and anterior margin of propodeum (in *Myrmica radchenkoi* sp.nov. PII:1.97, ESLI: 0.36, ESDI: 1.17 and in *Myrmica inezae* PII:1.63, ESLI:0.41, ESDI: 0.76). Therefore it is advocated that the placement of *Myrmica rigatoi* and of course *Myrmica radchenkoi* sp. nov. in the *inezae* group is correct and may be further substantiated in the near future with discovery of males in this group.

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