

Myrmica longisculpta, a new species from Himalaya
(Hymenoptera: Formicidae: Myrmicinae)

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Abstract. *Myrmica longisculpta* sp. nov. is described from south-western slopes of Himalaya in the Jammu and Kashmir region of India. It is most similar to species of the *Myrmica rugosa* Mayr, 1865 species group but based just on workers, this species cannot be placed with certainty to any species group in the scheme provided by RADCHENKO & ELMES (2010).

Key words. Hymenoptera, Formicidae, Myrmicinae, *Myrmica*, taxonomy, new species, Himalaya, India.

Introduction

The ant genus *Myrmica* Latreille, 1804 in the Old World, is represented by 144 valid species (RADCHENKO & ELMES 2010; BHARTI & SHARMA 2011a,b) which are well distributed in the Palaearctic zone and South-east Asian tropical and subtropical regions. The *Myrmica* fauna of the central Asian mountains which comprise Hindu Kush, Karakorum, south-western slope of Himalaya (Afghanistan, Pakistan, India, Nepal and Bhutan), contains 35 species representing 7 species groups; 33 species (94.29 %) are endemic to this region. Although the species groups in *Myrmica* as proposed by RADCHENKO & ELMES (2001, 2010) are based on arbitrary morphological divisions, most appear to be monophyletic and seem to have some phylogenetic value as verified by molecular studies (JANSEN et al. 2009, 2010).

Myrmica longisculpta sp. nov. has a combination of morphological features by which it can be discriminated from all other species in the Himalaya and elsewhere. The species from this region are interesting because many have morphological features that are considered to be plesiomorphic (RADCHENKO & ELMES 2010). However, unfortunately the diversity of species from Indian Himalaya is very poorly represented in this census. There are reasons galore for this under-representation of species diversity, one of the most significant being the lack of material from this region.

The diversification of major ant lineages as elucidated by MOREAU et al. (2006) occurred from the beginning of the early Paleocene to the late Cretaceous, 60 to 100 million years ago in the age of angiosperm evolution. Interestingly, this covers the same time span during which the start of the formation of Himalaya occurred. The initial mountain building processes were underway about 70 million years ago when the north-moving Indo-Australian plate collided with the Eurasian plate, followed by a second phase of mountain development about 65 million years ago (BHARTI 2008b). The Himalaya are a formidable isolation barrier that has led to lot of endemism, especially in the genus *Myrmica* (RADCHENKO & ELMES 2001, 2010). They suggested that the species isolated in this region at that time represent 'old lineages' and these have subsequently diversified in this region. When we started exploring the Indian Himalayan fauna we found as per expectations quite a number of undescribed/unnoticed and morphologically quite distinct species (BHARTI 2008a,b, 2011; BHARTI & SHARMA 2011a,b). The authors hope that better understanding the diversity of the Himalayan *Myrmica* fauna will contribute to the understanding the evolution of *Myrmica* throughout the Old World.

Material and methods

The specimens were preserved in 70% alcohol. These were later pinned as per standard procedure in ant taxonomy. The mounted material was analyzed using a Nikon SMZ-1500 stereo zoom microscope. For digital images, MP evolution digital camera was used on the same microscope with Auto-Montage (Syncroscopy, Division of Synoptics, Ltd) software. Later, images were cleaned using Helicon Filter 5 software. For morphological measurements (all in mm) RADCHENKO & ELMES (2010) have been followed:

- HL maximum length of head in dorsal view, measured in a straight line from the anterior point of clypeus (including any carina or ruga, if they protrude beyond the anterior margin) to the mid-point of occipital margin.
- HW maximum width of the head in dorsal view behind the eyes.
- FW minimum width of the frons between the frontal carinae.
- FLW maximum distance between the outer borders of the frontal lobes.
- SL maximum straight-line length of scape from its apex to the articulation with condylar bulb.
- AL diagonal length of the alitrunk seen in profile, from anterior end of the neck shield to the posterior margin of propodeal lobes.
- PL maximum length of petiole from above/in dorsal view, measured from the posterodorsal margin of petiole to the articulation with propodeum, the petiole should be positioned so that measured points lay on the same plane.
- PPL maximum length of post-petiole in dorsal view between its visible anterior and posterior margins.
- PW maximum width of petiole in dorsal view.
- PPW maximum width of postpetiole from above/in its dorsal view.
- PH maximum height of petiole in profile, measured from the uppermost point of petiolar node perpendicularly to the imaginary line between the anteroventral (just behind the subpetiolar process) and posteroventral points of petiole.
- PPH maximum height of postpetiole in profile from the uppermost to the lowermost point, measured perpendicularly to the tergo-sternal suture.
- ESL maximum length of propodeal spine in profile, measured along the spine from its tip to the deepest point of the propodeal constriction at the base of the spine.
- ESD distance between tips of propodeal spines in dorsal view.
- PNW maximum width of pronotum in dorsal view.

Indices used:

| | | | |
|--------------|-------------------------|------------------------|----------------------------|
| Cephalic | CI = HL/HW | Petiolar 3 | PI ₃ = PW/HW |
| Frontal | FI = FW/HW | Post-petiolar 1 | PPI ₁ = PPL/PPH |
| Frontal lobe | FLI = FLW/FW | Post-petiolar 2 | PPI ₂ = PPH/PPW |
| Scape 1 | SI ₁ = SL/HL | Post-petiolar 3 | PPI ₃ = PPW/PW |
| Scape 2 | SI ₂ = SL/HW | Post-petiolar 4 | PPI ₄ = PPW/HW |
| Petiolar 1 | PI ₁ = PL/PH | Propodeal spine length | ESLI = ESL/HW |
| Petiolar 2 | PI ₂ = PL/HW | Propodeal spine width | ESDI = ESD/ESL |

Taxonomy

Myrmica longisculpta sp. nov.

(Figs. 1–3; Table 1)

Type material. HOLOTYPE: Worker, **INDIA: JAMMU AND KASHMIR:** Sarthal, 32.812947°N, 75.762503°E, 2200m a.s.l., 15.vi.2009 (coll. Sharma, Punjabi University). PARATYPES: 4 workers, with same data as of holotype, not from same nest; 1 worker, **INDIA: JAMMU AND KASHMIR:** Machedi, 32.72364°N, 75.669464°E, 2000 m a.s.l., 3.viii.2008 (coll. Sharma) and 1 worker, **INDIA: JAMMU AND KASHMIR:** Shopian, 33.668354°N, 74.779472°E, 3100 m a.s.l., 12.ix.2009 (coll. Sharma). One paratype will be deposited in Natural History Museum, London.

Description. Head much longer than broad, sides parallel, occipital margin straight; mandibles with 8 teeth (apical and preapical are the largest); clypeus convex, anterior clypeal margin prominent and somewhat pointed medially and extending over mandibles, posterior margin clear, broad, extending between antennal bases; frontal carinae short, slightly broader anteriorly than posteriorly and curving outwards to merge with rugae that surround the antennal socket (in three paratype workers frontal carina of one side merges with rugae that surround antennal insertions); antennae 12 segmented; scape slender, narrow, weakly curved at base without any trace of lobe or carina, widening towards apex, just extending beyond the upper margin of head, antennae with oblique short hairs having pubescence on apical 3 segments; eyes large, placed almost at midline of head; head covered with numerous interspersed short and long suberect hairs; mandibles and clypeus also equipped with long suberect hairs.

Alitrunk dorsum feebly convex; promesonotal suture indistinct; metanotal groove broad, shallow; propodeal lobes rounded apically; propodeal spines long, sharp, projected backward, divergent; tibiae of hind and middle legs with well developed pectinate spur; petiole longer than broad, with very short anterior peduncle with a tooth like subpetiolar process, post-petiole a little longer than broad; promesonotum with long erect, as well as short hairs; propodeum with 1 to 2 pairs of short suberect hairs; petiole and post-petiole equipped with long and short suberect hairs directed backwards.

Gaster with numerous long erect to suberect hairs, and with few short suberect hairs between them.

Punturation. Head longitudinally rugulose with punctures; clypeus convex, longitudinally rugulose, space between rugae smooth and shiny; frontal triangle highly polished and shiny; all antennal segments densely punctuated except scape, first 2 segments are minutely punctuated; cephalic dorsum longitudinally rugose up to vertex behind which it is reticulated; whole of the alitrunk distinctively longitudinally coarsely rugose with much pronounced rugae; the pronotum dorsum with somewhat broken longitudinal sculpture; the lateral parts of the body

Table 1. The mean, standard deviation, minimum and maximum values (in mm) of the measurements and indices of seven workers of *Myrmica longisculpta* sp. nov.

| | Holo-type | Workers (6) | | | | Holo-type | Workers (6) | | | | |
|--------------|-----------|-------------|-----------|------|------|-----------|------------------|------|------|------|------|
| | | Mean±SD | Min | Max | | | Mean | Min | Max | | |
| Measurements | HL | 1.05 | 1.05±0.06 | 0.92 | 1.11 | Indices | CI | 1.29 | 1.30 | 1.28 | 1.33 |
| | HW | 0.81 | 0.80±0.05 | 0.72 | 0.85 | | FI | 0.44 | 0.49 | 0.48 | 0.53 |
| | SL | 0.78 | 0.77±0.03 | 0.72 | 0.81 | | FLI | 1.08 | 1.07 | 1.05 | 1.11 |
| | PL | 0.42 | 0.44±0.02 | 0.40 | 0.45 | | PI ₁ | 1.40 | 1.46 | 1.29 | 1.61 |
| | PH | 0.30 | 0.30±0.02 | 0.28 | 0.35 | | PI ₂ | 0.52 | 0.55 | 0.52 | 0.58 |
| | PW | 0.23 | 0.23±0.01 | 0.22 | 0.25 | | PI ₃ | 0.28 | 0.29 | 0.27 | 0.32 |
| | PPL | 0.35 | 0.37±0.02 | 0.33 | 0.39 | | PPI ₁ | 0.94 | 1.03 | 0.95 | 1.15 |
| | PPH | 0.37 | 0.36±0.03 | 0.32 | 0.40 | | PPI ₂ | 1.02 | 1.03 | 0.97 | 1.14 |
| | PPW | 0.36 | 0.35±0.01 | 0.33 | 0.36 | | PPI ₃ | 1.56 | 1.48 | 1.32 | 1.57 |
| | FLW | 0.39 | 0.40±0.01 | 0.39 | 0.41 | | PPI ₄ | 0.44 | 0.43 | 0.41 | 0.46 |
| | FW | 0.36 | 0.37±0.01 | 0.36 | 0.38 | | SI ₁ | 0.74 | 0.74 | 0.69 | 0.78 |
| | ESL | 0.22 | 0.22±0.02 | 0.19 | 0.25 | | SI ₂ | 0.96 | 0.96 | 0.94 | 1.00 |
| | AL | 1.41 | 1.39±0.05 | 1.30 | 1.44 | | ESLI | 0.27 | 0.27 | 0.23 | 0.31 |
| | ESD | 0.36 | 0.36±0.01 | 0.35 | 0.37 | | ESDI | 1.63 | 1.69 | 1.44 | 1.85 |
| | PNW | 0.58 | 0.60±0.03 | 0.55 | 0.62 | | | | | | |

with distinct longitudinal rugae, as does the petiole and post-petiole dorsum; gaster smooth, highly polished and shiny.

Male and female unknown.

Differential diagnosis. *Myrmica longisculpta* sp. nov. most resembles species that Radchenko & Elmes (2010) placed in the *rugosa* complex of the *M. rugosa* species group, which have frontal carinae merging with rugae that extend to occipital margin of head. The coarse body sculpture with the presence of very pronounced/elevated longitudinal rugae on the alitrunk clearly separates it from allied species (including *Myrmica afghanica* Radchenko & Elmes, 2003, which is not assigned to any species-group). It most resembles *Myrmica rugosa* Mayr, 1865 but has a relatively wider frontal lobe and a petiole with longitudinal rugae than that species. The fact that some specimens in part appear to have frontal carinae that merge with rugae that surround antennal sockets is problematic. This is a very distinctive species group character which discriminates the *smythiesii* group from allied groups. However *Myrmica longisculpta* sp. nov. is most unlikely to be in the *smythiesii* species group, species of which are generally small with weak sculpture. Moreover the exact placement of this species in a particular group will become clearer when males are found.

Etymology. Named in reference to the presence of deep longitudinal sculpture on the alitrunk.

Ecology. The species has been hand-collected from two localities (Sarthal, 32.812947°N, 75.762503°E, 2200 m a.s.l and Shopian, 33.668354°N, 74.779472°E, 3100 m a.s.l.) and from leaf litter using Winkler's extractor at another locality (Machedi, 32.72364°N, 75.669464°E, 2000 m a.s.l.). The collection site at Machedi has a patchy *Cedrus* forest along with agricultural land surrounding the site; moreover the area has a lot of anthropogenic activities with



Fig. 1. *Myrmica longisculpta* sp. nov., head in frontal view.

dry type of environment (mean temperature during collection period 32°C, relative humidity 36.62 % and thickness of leaf litter 2.1 cm). The collection site at Sarthal has dense *Cedrus* forest with abundant leaf litter and no agricultural land. It remains snow clad from November to the beginning of March and has very limited anthropogenic activities with only nomads visiting the area (mean temperature during collection period 22°C, relative humidity 66.38 %, thickness of leaf litter 3.9 cm) with a comparatively wet environment. At the third collection site (Shopian) specimens were collected under a stone. The area has scattered *Cedrus* trees, as the forest has largely been cleared by human activities (mean temperature during collection period was 22°C and relative humidity 54 %).

The ecology of the Himalaya is temperature-dependent. The snow line occurs at an average of 6000 meters above sea level and the average altitude at which the forest disappears is 3000 meters. Two of the habitats (Machedi and Sarthal) represent the transitional zone between subtemperate and temperate Himalaya whereas the more northerly and higher Shopian site



Figs. 2–3. *Myrmica longisculpta* sp. nov. 2 – body in lateral view; 3 – body in dorsal view.

penetrates into the Palaearctic zone whose boundary in Southern Asia is largely altitudinal (where an altitude of 2000–2500 meters above sea level forms the boundary between Palaearctic and Indo-Malayan ecozones). At this altitude the microclimate plays an important role for ants like *Myrmica* which prefer to live under stones or in rare cases in leaf litter, because the soil temperature is comparatively higher than ambient temperature in these microhabitats (BHARTI 2008b).

Distribution. Himalaya (India: Jammu and Kashmir).

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