**A NEW SPECIES OF THE ANT GENUS *DILOBOCONDYLA*
(HYMENOPTERA: FORMICIDAE) FROM INDIA,
WITH NOTES ON ITS NESTING BEHAVIOUR**

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ABSTRACT. A new species of *Dilobocondyla*, viz., *D. bangalorica*, sp. nov. is described from India. The worker, queen, male and larvae are described, along with notes on nesting behaviour. The genus *Dilobocondyla* is reviewed and 12 species are recognised: *D. bangalorica*, sp. nov., *D. borneensis* Wheeler, *D. cataulacoidea* (Stitz), *D. chapmani* Wheeler, *D. didita* (Walker), *D. fouqueti* Santschi, *D. fulva* Viehmeyer, *D. karnyi* Wheeler, *D. rufobrunnea* Wheeler, *D. sebesiana* Wheeler, *D. selebensis* (Emery), and *D. simalura* Forel.

Key words: *Dilobocondyla bangalorica*, Myrmicinae, new species, India, nesting habits.

Introduction

Dilobocondyla Santschi (1910) with *Atopomyrmex selebensis* Emery (1898) as the type species, is a small genus of myrmicine ants belonging to the tribe Formicoxenini. It is known by 9 species and 2 subspecies from the Indo-Australian Region (Bolton, 1995). A new species, *D. bangalorica* is here described from India for the first time.

Early taxonomic works on the genus are by Walker (1859), Emery (1898), Stitz (1911), Forel (1915), Viehmeyer (1916), Wheeler (1916, 1924), Donisthorpe (1932, 1935), Taylor (1991), and Wang & Wu (1992). Sunil et al. (1997) recorded the genus *Dilobocondyla* from Bangalore for the first time.

Wheeler (1924) wrote, "All the species of *Dilobocondyla* seem to be rare and very local ants and are therefore known mostly from single specimens. Like the species of the allied genus *Podomyrma* they nest as rather small colonies in the wood of living trees." In his paper he gave a key to the species and subspecies of the genus based on workers and gynes, then known.

Materials and Methods

A few *Dilobocondyla* workers were collected on 15 July 2003 from *Plumeria alba* L. (Apocynaceae) tree from the Indian Institute of Science Campus, Bangalore (13°01' N 77°34'E). A worker ant was traced to its nest, a cavity in a dead twig of *P. alba* tree, and later the whole colony was excavated and brought to the laboratory. A thorough survey to study the nesting habits of *D. bangalorica*, sp. nov. was made (May-July, 2004) in Cubbon park and Lalbagh Botanical gardens in Bangalore. A few more nests were found during this survey and three of them were collected on 7 July 2004, to study the colony structure of *D. bangalorica*. Various places in Masinagudi, (Western Ghats), Coorg and Mananthavady (Wayanad district, Kerala) were also surveyed, from May 2004-March 2005, to understand the distribution of *D. bangalorica*, sp. nov. I could not notice the nest of *D. bangalorica* on any other trees and in any other places surveyed.

The holotype is deposited in the Insect Museum at the Centre for Ecological Sciences (CES), Indian Institute of Science, Bangalore. Paratypes will be deposited in the

Zoological Survey of India, Kolkata, and in the British Museum (Natural History), London, UK.

All the specimens were examined using Wild stereo zoom microscope. All the drawings were made using the Wild Camera Lucida attached to the microscope. From the colony, which was collected on 15 July 2003, 9 workers were randomly selected and were used for measurements.

The linear measurements and indices employed in this study are described below:

HL	Head length: length of head from the posterior margin of the head to the anterior extremity of the clypeus.
HW	Head width: maximum width of head, including the eyes.
EL	Eye length: Length of compound eye measured in the same view as HL.
MFC	Minimum frontal carina distance: minimum distance between the frontal carinae.
SL	Scape length: length of the first antennal segment, excluding the radicle.
PRNW	Pronotum width: width of the pronotum at the dorso-lateral margins.
PTL	Petiole length: length of the petiole, measured in dorsal view.
PTW	Petiole width: maximum width of the petiole in dorsal view.
PTH	Petiole height: Maximum height of the petiole, measured in lateral view at right angles to petiole length.
PPTL	Postpetiole length: Length of postpetiole measured in dorsal view.
PPTW	Postpetiole width: width of postpetiole measured in dorsal view.
TL	Maximum measurable length in lateral view.
CI	Cephalic index: $HW/HL \times 100$
SI	Scape index: $SL/HW \times 100$
PTWI	Petiole width index: $PTW/PTL \times 100$
PPTWI	Postpetiole width index: $PPTW/PPTL \times 100$

Dilobocondyla Santschi

Dilobocondyla Santschi, 1910: 283-284. Type species: *Atopomyrmex selebensis* Emery, 1898: 234 (q.); by subsequent designation of Wheeler, 1911: 162.

Podomyrma (*Mesomyrma*) Stitz, 1911: 363. Type species: *Podomyrma* (*Mesomyrma*) *cataulacoidea* Stitz; by monotypy. Synonymy by Emery, 1912: 102.

Diagnosis: Head in frontal view with occipital corners acutely angulate to dentate; frontal carinae and antennal scrobes present and well developed; midpoint of anterior clypeal margin with an unpaired median seta; apical margin of mandibles with 6 teeth, mandibles elongate-triangular; palp formula 4, 3; antennae 12 segmented with 3 segmented club; compound eyes present and of moderate size. Mesosoma and petiolar nodes unarmed; petiole pedunculate with an anteriorly directed ventral tooth; postpetiole articulated on anterior surface of the first gastral segment. Gaster small and circular in dorsal view.

Synonymic list of *Dilobocondyla* species

The 12 species of *Dilobocondyla*, distributed in the Indo-Australian Region, are listed below:

1. *Dilobocondyla bangalorica*, sp. nov. India: Bangalore.
2. *Dilobocondyla borneensis* Wheeler, 1916: 12 (w.). Borneo.
= *braunsi* Forel, 1912: 767 (synonymy by Bolton, 1982: 325)
3. *Dilobocondyla cataulacoidea* (Stitz), 1911: 364 (w.). New Guinea.
= *concolor* Viehmeyer, 1914: 40 (w.) (synonymy by Taylor 1991: 601)
4. *Dilobocondyla chapmani* Wheeler, 1924: 250 (w.). Philippines.
5. *Dilobocondyla didita* (Walker), 1859: 375 (w.). Sri Lanka.
= *escherichii* (Forel), 1911: 223 (w.) (synonymy by Donisthorpe, 1932: 576).

6. *Dilobocondyla fouqueti* Santschi, 1910: 283 (w.). Vietnam.
= *lighti* Wheeler, 1927: 6 (w.) (synonymy by Wang & Wu, 1992: 562).
7. *Dilobocondyla fulva* Viehmeyer 1916: 127 (w. q.). Singapore.
Raised to species by Taylor 1991: 601.
8. *Dilobocondyla karnyi* Wheeler, 1924: 249 (w.). Indonesia: Java.
9. *Dilobocondyla rufobrunnea* Wheeler, 1935: 43 (w. q. and m.), stat. rev. Philippines.
Raised to species.
10. *Dilobocondyla sebesiana* Wheeler, 1924: 248 (q.). Indonesia: Sumatra.
11. *Dilobocondyla selebensis* (Emery), 1898: 234 (q.). Sulawesi.
12. *Dilobocondyla simalurana* Forel, 1915: 25 (w.), stat. rev. Sumatra.
Raised to species.

***Dilobocondyla bangalorica*, sp. nov.**

Holotype Worker (Plate 1, 1&2): Head (Plate 1, 3) as long as broad (CI 100), slightly broader behind than in front, with almost straight cheeks, posterior corners dentate, directed outwards and broadly emarginated. Mandibles large and convex with 6 teeth (Plate 1, 4). Palp formula 4, 3. Clypeus almost flat, antero-medially emarginated, with a clear notch in the middle and sinuate at the corners with ridges. Frontal area distinct and triangular; frontal carinae long, sharp and continued to the posterior corners of the head, roughly 11 strong rugae between frontal carinae, antennal scrobes deep and well defined. Antennae slender, 12 segmented with 3 segmented club; scape (SL 0.60, SI 66) slightly curved at the base, funiculus reaching about 1/3 the length of the head. Eyes large (EL 0.20) and convex and almost in the middle of the sides. Thorax broad, not broader than head, pronotum broader than long (PRNW 0.65), its anterior lateral angles projecting outwards as tooth (Plate 1, 5), pro-mesonotal suture indistinct dorsally, meso-metanotal suture distinct and broadly constricted. Propodeum rounded and convex above with an abrupt small concave declivity (Plate 1, 6). Metasternal angles lamellate and rounded. Petiole long (Plate 1, 7) (PTL 0.40, PTH 0.20) and arcuate in profile; 2.0x as long as broad (PTWI 50), with a strong antero-ventral, anteriorly directed tooth. Postpetiole higher, as long as broad (PPTWI 100) broader behind than in front, smaller than front and its sides rounded (Plate 1, 8). Gaster circular in dorsal view rather convex above (Plate 2, 1 & 2). Femora and tibiae incrassated (Plate 2, 3 & 4).

Head, thorax, petiole and postpetiole strongly rugo-reticulate, with uniform meshes, the inter-rugal spaces shining, mandibles longitudinally striate, clypeus rather shining with a median and a pair of lateral carinae, base of gaster striate, rest closely punctate, coxae and femora lightly sculptured.

Body hairs sub erect, long, abundant and uniform (Plate 2, 1, 2, 5 & 6).

Head, thorax, petiole and postpetiole ferruginous, scape of antennae, coxae, tips of legs and cheeks lighter, gaster brownish black.

Measurements: TL 3.93, HW 0.90, HL 0.90, EL 0.20, MFC 0.35, SL 0.60, PRNW 0.65, PTL 0.40, PTH 0.20, PTW 0.2, PPTL 0.30, PPTW 0.30, CI 100, SI 66, PTWI 50, PPTWI 100.

Worker measurements (n=9): TL 3.40-4.05, HW 0.88-0.90, HL 0.88-0.95, EL 0.20, MFC 0.33-0.35, SL 0.55-0.60, PRNW 0.60-0.65, PTL 0.35-0.40, PTW 0.20, PTH 0.18-0.20, PPTL 0.28-0.30, PPTW 0.30, CI 95-100, SI 60-66, and PTWI 50-57, PPTWI 100-101.

Queen: Similar to workers in colour (little darker) and sculpture. Head as long as broad, ocelli present, clypeus depressed in middle, deeply emarginated with well formed

carinae. Antennae 12 segmented, with 3 segmented club; antennal scrobes well developed and running to the top of the head. Thorax gibbous, not broader than head; pro-mesonotal and meso-metanotal suture well developed. Pronotum wider than in workers, postpetiole longer and wider than in workers. Gaster circular in dorsal view. Femora and tibiae incrassated as in workers.

Measurements: TL 4.75; HW 1.05, HL 1.05, EL 0.25, MFC 0.40, SL 0.65, PRNW 0.85, PTL 0.50, PTW 0.25, PTH 0.25, PPTL 0.43, PPTW 0.40, CI 100, SI 62, and PTWI 50, PPTWI 94.11.

Allotype Male (Plate 3, 1): Same data as the holotype and paratypes: Head distinctly broader than long (CI 123), broader medially with rounded cheeks, posteriorly weakly emarginated, posterior corners not evidently dentate as in workers. Mandibles well developed and somewhat convex (reduced when compared to that of workers) with distinct teeth. Clypeus nearly flat, its anterior border rounded and entire. Frontal area distinct, frontal carinae not very long, and not continued to the posterior corners of the head. Antennal scrobes well defined. Antennae 13 segmented, longer and stouter than in workers, but with no distinct club, scape remarkably short (SL 0.15), first funicular segment very small, broader than long, remaining funicular segments cylindrical and longer than broad. Eyes large and convex and almost in the middle of the sides of the head, ocelli large and distinct. Pronotum broader than head, its anterior lateral borders form angles, but not project as tooth as in workers, mesonotum convex and broader than pronotum. Wings transparent (Plate 3, 2 & 3). Propodeum rounded and convex above with an abrupt small concave declivity. Petiole long (PTL 0.40), more than 2x as long as broad (PTWI 45) with a very weak ventral tooth. Gaster small, elongate, and convex above. Legs long and slender, femora clearly and tarsi slightly incrassated, less incrassated than in workers.

Head, thorax and petiole deeply sculptured, postpetiole and gaster smooth, mandibles rather smooth, clypeus longitudinally striate, base of gaster not striate as in workers, coxae and femora smooth and shining.

Body hairs long, suberect and sparse.

Black, head, thorax and petiole darker, gaster posteriorly brownish black, mandibles, antennae and legs pale white, coxae, femora and tibiae with tinge of brown; wings whitish with colourless veins.

Measurements: TL 3.40; HW 0.80, HL 0.65, EL 0.30, MFC 0.18, SL 0.15, PRNW 0.65, PTL 0.40, PTW 0.18, PTH 0.20, PPTL 0.30, PPTW 0.25, CI 123, SI 19, PTWI 45, PPTWI 83.

Male genitalia as in figures 4, 5, 6 and 7 in Plate 3. It consists of a pair of well developed parameres, a pair of volsella and the median aedeagus. Anterior margin of hypopygium biconcave, with a prominent median rounded lobe, anterior lateral lobes prominent and rounded, sides slightly concave, posterior border more or less rounded and hairy; outer border of paramere convex, anteriorly rounded, inside concave, and medially slightly constricted; volsella well developed, volsella consists of cuspis and digitus, cuspis of volsella projects out from parameres; aedeagus narrow, broader in the middle, tapering anteriorly with a distinct pointed tip.

Holotype Worker, INDIA: Karnataka: Bangalore (13°01'N 77°34'E): Malleswaram: Indian Institute of Science Campus: 15.vii.2003, Coll. Thresiamma Varghese (collected from a nest in a cavity of living *Plumeria alba* tree) (CES).

Paratypes: 91 workers, same data as holotype. INDIA: Karnataka: Bangalore: Jubilee Garden, 13°01'N 77°34'E. Paratypes are deposited in the Insect Museum at the Centre for Ecological Sciences (CES), Indian Institute of Science, Bangalore. 2 Paratypes each will be deposited at the Museum of the Zoological Survey of India, Kolkatta (India), and at the British Museum of Natural History, London.

Non type specimens: INDIA: 5 workers, Karnataka: Bangalore (13°01' N 77°34'E): Malleswaram: Indian Institute of Science Campus: 20.ii.1997, Coll. M. Sunil Kumar & K.T. Sree Hari. Karnataka: Bangalore (13°01' N 77°34'E): Malleswaram: Indian Institute of Science Campus: 14 workers, 14 males, 5 alates, 07.vii.2004, Coll. Thresiamma Varghese. Karnataka: Bangalore (13°01'N 77°34'E): Cubbon park, 1 queen, 43 workers, 14 males, 31 alates, 07.vii.2004, Coll. Thresiamma Varghese. Same locality, 22 workers, 1 male, 13 alates, 07.vii.2004, Coll. Thresiamma Varghese.

Comparison: *Dilobocondyla bangalorica* keys to couplet 8 in Wheeler (1924). It comes closest to *D. cataulacoidea* in having (1) an average worker size above 3.25mm, (2) frontal carinae sharp, continuing to the posterior corners of the head, (3) similar body colour, (4) distinct meso-metanotal constriction, and (5) pronotum broader than long. *D. bangalorica*, however, is distinguished from *D. cataulacoidea* by the following characters: Smaller worker size, (*D. bangalorica* worker 3.93, vs *D. cataulacoidea* 4.50), head width less than 1.00 (HW 1.03 in *D. cataulacoidea*), gaster striate only at base and brownish black (gaster longitudinally striate and black in *D. cataulacoidea*), mandibles with 6 teeth (5 teeth in *D. cataulacoidea*), and head as long as broad (CI 100, except one worker in *D. bangalorica* (head longer than broad in *D. cataulacoidea*)).

D. bangalorica also differs from other known species by having a small worker size (3.93), by smaller queen size (4.75), having the thorax and pedicel sculptured, by its coloration, having 6 well defined mandibular teeth, and by having less rugosities between frontal carinae.

Etymology: The species is named after its type locality, Bangalore.

Distribution and biology: *Dilobocondyla bangalorica* was found nesting in a cavity of live *Plumeria alba* L. tree at the Indian Institute of Science Campus (Plate 4, 1). A single colony contained 1 queen, 91 workers, 15 males, 15 eggs, 10 pupae and 127 larvae at different developmental stages. The nest was shallow and wide (Plate 4, 2, 3 & 4). The workers forage individually on tree trunks and among foliage (Plate 4, 5 & 6). When disturbed, they hide in deep grooves on tree trunk. Eggs are small (Plate 4, 7) and roughly oval. Larvae are elongate cylindrical with segmented body (Plate 4, 8). They have a well formed neck, posteriorly little robust and rounded.

A comprehensive survey was made (May 2004- March 2005) in and around Bangalore, Masinagudi (Western Ghats), Coorg and in Mananthavady district of Kerala state to study the distribution and nesting behaviour of *D. bangalorica*. I saw 5 more nests of *D. bangalorica* on live *Plumeria* tree, two at the Cubbon Park, and one at the Indian Institute of Science campus, Bangalore respectively.

One nest of *D. bangalorica* was collected from *P. alba* tree, at the Indian Institute of Science Campus on 7 July 2004. It contained 14 workers, 14 males, 5 alates, 2 eggs, 34 larvae and 16 pupae. Either I failed to get the queen or that was an orphaned colony.

On the same day (7 July 2004), two nests of *D. bangalorica* from *P. rubra* were collected from the Cubbon park, and contained 1 queen, 43 workers, 31 alates, 14 males, 13 eggs, 58 larvae, 23 pupae, and 22 workers, 1 male, 13 alates, 1 egg, 26 larvae and 13 pu-

pae respectively. *D. bangalorica* prefers to inhabit the holes on dead twigs of 2 species of *Plumeria* tree, *P. alba* L., and *P. rubra* L.

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Plate 1. Figures 1-8, *Dilobocondyla bangalorica*, sp. nov., paratype worker: 1, profile; lateral view 2, dorsal view 3, head; frontal view; 4, mandibles; 5, antero-lateral corners of pronotum showing pronotal teeth; 6, alitrunk, lateral view; 7, petiole, lateral view; 8, petiole and post petiole, dorsal view.

Plate 2. Figures 1-6, *Dilobocondyla bangalorica*, sp. nov., paratype worker: 1, gaster, dorsal view; 2, gaster, lateral view; 3, legs; 4, tarsus enlarged; 5, femur of hind leg enlarged to show setae; 6, setae on femur enlarged.

Plate 3. Figures 1-7, *Dilobocondyla bangalorica*, sp. nov., Male: 1, profile, lateral view; 2, fore wing; 3, hind wing; 4, hypopygium; 5, genitalia, dorsal view; 6, genitalia, inner view showing volsella and aedeagus; 7, volsella showing cuspis and digitus.

Plate 4. Figures 1-8. 1, host plant, *Plumeria alba* L.; 2, nest on *Plumeria alba* hole; 3, 4, nest opened; 5, *Dilobocondyla bangalorica*, sp. nov. workers foraging on *Plumeria alba* trunk; 6, *D. bangalorica*, sp. nov. forager among foliage of *Plumeria alba* trunk; 7, eggs; 8, larva, lateral view.