



First record of six new species of ants (Hymenoptera: Formicidae) from Kerala

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Abstract

Ants, member of formicidae family belongs to Hymenopteran order are ecologically dominant in most terrestrial ecosystem. The present results are based on the study conducted in various parts of Kerala and ants collected by standard protocols during March 2016 to March 2017. From the study, six species of ants are newly recorded from the state of Kerala. *Nylanderia indica* and *Lepisiota opaca pulchella* of subfamily formicinae and *Crematogaster anthracina*, *Crematogaster biroi*, *Monomorium orientale* and *Trichomyrmex aberrans* of subfamily myrmicinae are the newly recorded species and they are described in detail.

Keywords: formicinae, myrmicinae, new record, March, ant, Kerala

1. Introduction

Rich and magnificent biodiversity of India makes it a paradise for ecological studies but cataloguing of species are still in its infancy here, especially myrmecological studies. Ants live in highly organized and integrated units and have emerged as the most successful group of organism that are preferred frequently by various workers in recent times for their studies [1, 2]. Ants being very sensitive to habitat transformation and disturbance which makes them a good choice as indicator species [3]. Ants (Hymenoptera: Formicidae) are burgeon group of organisms playing great role in shaping the terrestrial communities. They exert direct and indirect effects on both closely and distantly related taxa [4] and have diverse functional roles, including scavenging, predation, granivory, and omnivory [5, 6, 7]. Ants are found everywhere, except in Iceland, Greenland and Antarctic [5]. Taxonomic studies on ants in India are very scanty though they play major role in functioning of ecosystems. Bingham's (1903) fauna is the main source of knowledge of ants in India. A comprehensive and critical list of ant species of India is provided with up-to-date state-wise distribution which also reported total of 828 valid species and subspecies belonging to 100 genera are listed from India [9].

2. Materials and Methods

The present studies are based on the ants collected from various localities of Kerala during the period of March 2016 – March 2017.

Ants were collected using different methods of sampling such as pitfall trap, bait traps, sifting and hand picking. The specimens collected were preserved in 70% ethanol. These specimens were mounted on a triangular strip of paper in such a way that the ant rests on the apex of the triangle with its thorax between the first and second appendages attached to the paper. In the case of larger ants, the attachment was made at the petiole in order to balance the weight. The mounted specimens were pinned at broad end of the triangle. They were

then observed using Labomed CZM4 stereomicroscope and identified with the help of Bingham and Bolton's taxonomic keys. A label indicating the scientific name, the site and month of collection was attached to the specimen. The specimen was then preserved in an insect box. Photographic records of the specimen were taken for future reference. Specimens are deposited at the Department of Zoology museum, University of Kerala, Kariavattom, Thiruvananthapuram. The result describes six species as new records from Kerala for the first time. They are distributed under five genera coming under two subfamilies namely Formicinae and Myrmicinae of family Formicidae. Ants are polymorphic social insects having three distinct forms- the perfect and fertile female, the male, and workers (major or minor). The largest forms are soldiers. Identification of ants is mainly based on the worker caste.

3. Result and Discussion

Identification key is based on the worker caste of ants

Key to the sub-families of family Formicidae [10]

1. Body with a single reduced segment i.e. petiole between alitrunk and abdomen2
Body with two reduced segment i.e. petiole and post petiole between alitrunk and abdomen4
2. Apex of gaster with a semicircular or circular acidopore, usually guarded by setae, sting absentFormicinae
Apex of gaster without a semicircular or circular acidopore, sting present3
3. Either pygidium or hypopygidium armed with peg like teeth or short spinesPonerinae
Pygidium or hypopygidium unarmed.....Dolichoderinae
4. Posterior margin of clypeus not projecting in between antennal sockets, promesonotal suture present, hind tibia with a conspicuous pectinate spur

.....Pseudomyrmecinae
 Posterior margin of clypeus projecting in between antennal sockets, promesonotal suture absent, hind tibia with only a simple spur.....Myrmiciinae

Systematics

Order Hymenoptera

Family Formicidae Latreille, 1809

(i) Subfamily Formicinae Latreille, 1809

1. *Nylanderia indica* Forel, 1894
2. *Lepisiotaopacapulchella* Forel, 1892

(ii) Subfamily Myrmicinae Lepeletier de Saint-Fargeau, 1835

3. *Crematogaster anthracina* Smith, 1857
4. *Crematogaster biroi* Mayr, 1897
5. *Trichomyrmex abberens* Forel, 1902
6. *Monomorium orientale*, Mayr, 1879

Subfamily: Myrmicinae

Myrmicinae is a cosmopolite subfamily with the highest local and global species richness, especially in the Neotropical and Indo-Australian regions [11, 12]. Members of the subfamily Myrmicinae are with two segmented pedicel (petiole and post petiole), pygidium is transversally rounded and without arms, presence of eyes and frontal lobes and antennal sockets were well separated, frontal carinae usually large, nearly always covering the antennal insertions and well separated from each other. Most genera from Myrmicinae are polymorphic in nature [13].

Crematogaster anthracina

Material examined: Holotype, India: Kerala, Thrissur, 10.3711°N 76.3087°E, 18m, 11 October 2016, hand picking, Coll. Anupa K Antony. Holotype deposited in Museum of Department of Zoology, University of Kerala, Thiruvananthapuram, Kerala, India.

Diagnostic Characters

Reddish brown body with highly smooth and shining head. Pronotum sculptured. Metanodal spines thick at base less divergent and curved. Head nearly square, posteriorly transverse; mandibles finely rugulose, opaque, but not striate. Presence of small hairs on the head region. Antennae are 11 segmented, short, the scape not extending to the top of the head; the club of the flagellum remarkably thick, formed of the apical three joints. The abdomen darker brown in colour and has sparse pilosity.

Body Length: 4mm

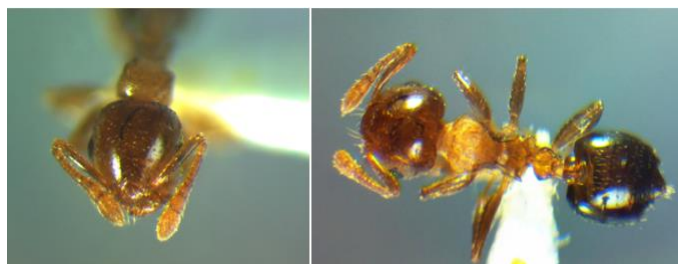


Fig 1-2: Holotype worker of *Crematogaster anthracina* sp. (1) Head in full-face view. (2) Body in dorsal view

Crematogaster biroi

Material examined: Holotype, India: Kerala, Thrissur, 10.5270°N 76.3608°E, 90m, 8 August 2016, beating vegetation, Coll. Anupa K Antony. Holotype deposited in Museum of Department of Zoology, University of Kerala, Thiruvananthapuram, Kerala, India.

Diagnostic Characters: Pale Yellowish body with last segments of abdomen dark brown. Head subquadratic, little longer than broader. Mandibles smooth, the masticatory margin concave, armed with 4 acute teeth. Surface of head is highly smooth and shining. Pronotum and metanotum sculptured. Antennae with the scape just extending to the top of the head, 11 segmented with 2 jointed club. Antennal segments, except scape are fully covered with tiny hairs. Scapes reaching posterolateral corners of head. Metanodal spines are long and curved inward.

Body Length: 1.8mm

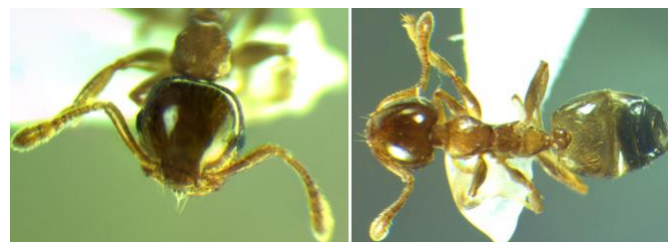


Fig 3-4: Holotype worker of *Crematogaster biroi* sp. (3) Head in full-face view. (4) Body in dorsal view

Monomorium orientale

Material examined: Holotype, India: Kerala, Thrissur, 10.2222°N 76.934603°E, 8m, 9 August 2016, Soil sifting, Coll. Anupa K Antony. Holotype deposited in Museum of Department of Zoology, University of Kerala, Thiruvananthapuram, Kerala, India.

Diagnostic Characters: Golden yellow, the mandibles, antenna and legs slightly paler; The whole body is smooth and shining with sparse pilosity, the legs with the hairs oblique. Head rectangular, longer than broad and posteriorly transverse. Antennae 11-jointed, rather short, the scape not reaching the top of the head. Thorax is smooth with pronotum large compared First node of pedicel longer and cuneiform, higher than the 2nd, rounded above; the 2nd node subglobose, broader- than long, broader than the 1st node; abdomen elongate, oval and smooth.

Body Length -1.3 mm.



Fig 5-6: Holotype worker of *Monomorium orientale* sp. (5) Head in full-face view. (6) Body in dorsal view

Trichomyrmex abberens

Material examined: Holotype, India: Kerala, Thiruvananthapuram, 8.5646°N 76.8852°E, 57m, 12 February 2016, hand picking, Coll. Rachel Jacob. Holotype deposited in Museum of Department of Zoology, University of Kerala, Thiruvananthapuram, Kerala, India.

Diagnostic Characters: Reddish yellow, the abdomen dark brown; head, thorax and abdomen smooth and shining, the metanotum transversely striate above, the sides of the thorax posteriorly finely rugulose; pilosity tolerably abundant. Head quadrate, as broad as long, posteriorly emarginate; mandibles finely and closely longitudinally striate and opaque. All over the head and antennal segments are covered by tiny hairs. Antennae long and slender, the scape reaching beyond the top of the head. First node pedicel is high, conical and rounded. Second node is not so high, longer than broad, rounded above; abdomen somewhat elongate, oval with pubescence. Body Length- 3mm.



Fig 7-8: Holotype worker of *Crematogaster anthracinasp.* (7) Head in full-face view. (8) Body in dorsal view

Subfamily: Formicinae

The ant subfamily Formicinae is a large and successful group, comprising about 3030 described species, distributed globally across a wide range of terrestrial environments [14, 15, 16]. The subfamily includes such well-known taxa as wood ants and their relatives (Formica), carpenter ants (Camponotus), weaver ants (Oecophylla), and honeypot ants (Myrmecocystus), and a diverse array of about fifty other genera. The females (workers and gynes) of this subfamily are readily distinguished from all other ants by the presence of an acidopore, a nozzle-shaped structure at the apex of the seventh abdominal sternum used to spray formic acid [10]. Formicine workers have a flexible promesonotal suture (secondarily immobile in a few taxa), closed metacoxal cavities, single petiolar node, complete tergosternal fusion of the petiole (second abdominal segment), and no functional sting; abdominal segments 4–6 are very large relative to the sternites, which they overlap laterally and usually also ventrally [15].

Lepisiota opaca pulchella

Material examined: Holotype, India: Kerala, Thrissur, 10.3711°N 76.3087°E, 18m, 11 October 2016, hand picking, Coll. Anupa K Antony. Holotype deposited in Museum of Department of Zoology, University of Kerala, Thiruvananthapuram, Kerala, India.

Diagnostic Characters: Head, thorax and abdomen dark brown, lighter on the anterior portion of the thorax, while the abdomen is dull black, with a light reddish-yellow spot above at base covering; the 1st and anterior portion of the 2nd segment. Pilosity and pubescence lacking. Head rounder, more convex in front. Thorax with broad pronotum, nearly as broad as the head, flat above, the metanotum short, its sides forming lateral acute tubercles. Node of the pedicel proportionately somewhat thick and high, surmounted by two parallel acute spines on the lateral angles above; abdomen large and massive, slightly depressed and acutely pointed at apex.

Body Length- 2.5 mm



Fig 8-9: Holotype worker of *Lepisiota opaca pulchellasp.* (8) Head in full-face view. (9) Body in dorsal view

Nylanderia indica

Material examined: Holotype, India: Kerala, Thrissur, 10.2222°N 76.934603°E, 8m, 9 August 2016, hand picking, Coll. Anupa K Antony. Holotype deposited in Museum of Department of Zoology, University of Kerala, Thiruvananthapuram, Kerala, India.

Diagnostic Characters: Colour is yellowish brown and the gaster is darker than other parts of the body and the body full of pubescence. Head is subquadrate; longer than wide, equally wide anteriorly and posteriorly, lateral margins gently convex, posterior margin shallowly concave to weakly convex with rounded posterolateral corners. Eyes small, oval, weakly convex; covering one-fourth of lateral cephalic margin. Antennae long 12 segmented, scape extending beyond the top of the head. Dorsal face of propodeum much shorter than declivitous face, in lateral view, propodeum lower than remainder of dorsum, dorsally angular to gently rounded. Scape with scattered erect setae and erect setae of varying length abundant on head and gaster, relatively sparse on promesonotum. Pronotum and mesonotum with scattered erect setae of varying lengths.

Body Length: 2mm



Fig 10-11: Holotype worker of *Nylanderia indica* sp. (10) Head in full-face view. (11) Body in dorsal view.

4. Conclusion

Kerala being a biodiversity rich state is a good location for ant taxonomists. About 268 species of ants belonging to 63 genera are already reported from Kerala^[9]. The present study added six new species of ants to the already published list of myrmecofauna of Kerala. Four species namely *Crematogaster anthracina*, *Crematogaster biroi*, *Monomorium orientale* and *Trichomyrmex aberrans* of subfamily myrmicinae and two species namely *Nylanderia indica* and *Lepisiota opaca pulchella* of subfamily formicinae were newly reported from Kerala through this work.

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