



The Journal of Zoology Studies
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ISSN 2348-5914
JOZS 2014; 1(6): 01-10
JOZS © 2014
Received: 14-10-2014
Accepted: 18-11-2014

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New records of three species of genus *Pheidole* Westwood (Hymenoptera: Formicidae) from Kerala

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Abstract

The genus *Pheidole* Westwood which is known as big headed ants are one of the most species rich genera in the world. In the present study three species of Genus *Pheidole* Westwood were listed. *P. constanciae* Forel, *P. ghatica* Forel and *P. indica* Mayr were recorded for the first time from Kerala. These species construct nest in soil. Species were collected mainly by food bait and brush method. Redescription and distribution of the species were provided. Each species were compared with closely related species.

Keywords: Formicidae, Myrmicinae, *Pheidole*, Kerala

1. Introduction

Species of the genus *Pheidole* can be found in almost every habitat, occupying a large variety of ecological niches and functions. This genus is the largest genus belonging to the tribe Pheidolini^[1], considered as hyperdiverse and enjoys worldwide distribution. They are abundant in new world. Bingham^[2] provided the description of *Pheidole* species in Fauna of British India and Wilson^[3] published *Pheidole* Monograph of New World. Bharti^[4, 5] added species to the Indian ants. Currently there are 54 valid species of *Pheidole*^[6] in India and nine species were recorded from Kerala.

Studies on *Pheidole*'s of Kerala was started in 1851 by Jerdon^[7]. He was followed by Forel^[8] and Bingham^[2]. The present study aims to re-describe three new records of *Pheidole* species from Kerala.

2. Materials and Methods

The specimens were collected by brush method, hand picking, all-out search method and food bait. The samples were collected during 2010 to 2013 from all districts of Kerala which include hilly areas, forests, marshy area, coastal regions, mid lands, wet lands and mid-arid regions. Species were analyzed using Leica MZ6 stereozoom microscope. Identification upto subfamily and genus level followed “The ants”^[9] and “Identification guide to the ant genera of the world”^[10]. Species level identification was carried out with the help of Bingham^[2]. In addition to these, original descriptions from web resources (www.antweb.org)^[11] were also used for the identification. Description format and morphological terminology for measurements and indices follow Longino^[12] and Fischer^[13] and include: HL = Head length; maximum distance from the mid-point of the anterior clypeal margin to the mid-point of the posterior margin of the head, measured in full-face view; in majors from midpoint of tangent between anterior most positions of clypeus to midpoint of tangent between posterior most projections of the vertex; SL = Scape length; maximum scape length, excluding basal condyle and neck; MDL = Mandible length; maximum length of mandible measured in oblique fronto-lateral view, from apex to lateral base; EL = Eye diameter; maximum diameter of compound eye measured in oblique lateral view; PW = Pronotal width; maximum width of pronotum measured in dorsal view; WL = Webers length; diagonal length of mesosoma in lateral view from the anterior point of the pronotal slope and excluding the neck, to the postero-ventral margin of the propodeum; PSL = Propodeal spine length; in dorso-caudal view, with the apex of the measured spine, its base, and the centre of the propodeal concavity between the spines in focus: measurement was taken from apex to base along the one axis of a dual-axis micrometer, aligned along the length of the spine, crossing the second axis at the base of the measured spine, and the latter connecting the base with the centre of the propodeal concavity; PTH = Petiole length; maximum height of petiolar node measured in lateral view from the highest (median) point of the node, orthogonally, to the ventral outline of the node; PTW = Petiolar node width; maximum petiolar node width, measured in dorsal view; PPH = Post petiole height; maximum height of post-petiole in profile from uppermost to lowermost point, measured perpendicularly to tergo-sternal suture; PPL = Post petiole length; maximum length of post petiole in dorsal view between its visible anterior and posterior margin; PPW = Post petiole width; maximum width of post petiole from above/ in its dorsal view; CI = Cephalic index; HW / HL x 100; EI = Eye index; EL / HW x 100; SI = Scape index; SL / HW x 100; MDI = Mandible index; MDL / HW x 100; PSLI = Propodeal

spine index; PSL / HW x 100. All specimens are at SXC and will eventually transfer to ZSIWGRC.

2.1 Acronyms of depositories

SXC = St. Xavier’s College for Women, Aluva, Kerala, India.

ZSIWGRC = Zoological Survey of India Western Ghats Regional centre, Calicut, Kerala, India.

3. Results and Discussion

Pheidole constanciae Forel

(Figs: 1a-1h)

Pheidole constanciae Forel, 1902c : 177, 194 (w.q.) India (MNHG).

[Also described as new by Forel, 1902g : 543]

Material examined: (1 Major, 2 Minors) India: Kerala, Kannur: St. Angelos fort 11° 51' N, 75° 22' E. 23.v.2012, brush method (Coll: Presty John).

Redescription

Major worker

Measurements and Indices (mm): HW = 1.192, HL = 1.282, SL = 0.578, MDL = 0.614, EL = 0.137, WL = 0.945, PSL = 0.135, PPH = 0.459, PTH = 0.135, PTW = 0.202, PPW = 0.459, PW = 0.240, CI = 92.979, EI = 11.493, SI = 48.499, MDI = 51.510, PSLI = 11.325, PWI = 20.134, PpWI = 340, PeI = 56.25, PpI = 51.510.

Head: 1.07x longer than broad (Fig: 1b), lateral sides convex, rectangular; occipital emargination wide, broad (0.473 mm); vertex with broad transverse impression (Fig: 1a); frontal carina long (0.578 mm) divergent posteriorly, space between the posterior carina (0.472 mm) wider than anterior carina (0.351 mm); frontal lobe inconspicuous, not covering antennal grooves; antennal groove distinct; scape short (0.578 mm), stout, cylindrical reaching up to half from its insertion below the top of head. F1 longer than all funicular segments (Fig: 1c), F2 = F6 (F1 = 0.140 mm, F2 = F6 = 0.052 mm, F3 = 0.043 mm, F4 = 0.035 mm, F5 = 0.035 mm, F7 = 0.050 mm, F8 = 0.087 mm). CL3 longer than CL1, CL2, 1.11x longer than CL1 + CL2 (CL1 = 0.131 mm, CL2 = 0.105 mm, CL3 = 0.263 mm). Clypeus medially vertically carinate (Fig: 1b), emarginated medially; fronto-clypeal suture acarinate; eyes small (0.137 mm), antero-laterally located, 8-9 ommatidia along longitudinal axis; mandibles broad (0.614 mm), triangular with two prominent teeth along masticatory margin.

Mesosoma and pedicel: Pronotum and mesonotum forming two different convexities (Fig: 1a), attenuated

anteriorly; pronotal tubercle absent; promesonotum forms a dome in its posterior declivity; humeral area conspicuous, laterally produced to obtuse cones; promesonotal groove shallow (0.121 mm); mesometanotal groove 2x broader than promesonotal groove; base of metanotum flat; metanotum broadly oval, laterally submargined; spines short (0.135 mm), erect, acute, directed upwards, with narrow triangular base (0.081 mm); first node of pedicel without any appendix beneath, conical, transverse above, petiolate anteriorly, 1.06x higher than second node of pedicel; second node convex, rounded above, laterally produced to acute cones (Fig: 1d), 3.4x broader than first node of pedicel dorsally.

Gaster: Subcircular (Fig: 1d), 1.25x longer than broad, opaque.

Sculpture: Head upto vertex longitudinally striated (Fig: 1b); vertex, head laterally, posteriorly, occiput, mesopleuron reticulated; antennal scrobe, clypeus laterally, mandibles, pronotum, gaster, katepistenum smooth, polished, shining; promesonotum and metanotum dorsally, transversely striated; second node of pedicel rugoreticulate.

Vestiture: Short. Head laterally, gaster decumbent; head laterally with semi-erect hairs; mesosoma with erect hairs.

Colour: Head, mesosoma, pedicel reddish brown; legs golden brown; pedicel chestnut brown; gaster brown; pilosity reddish yellow.

Minor Worker

Measurements and Indices (mm): HW = 0.534, HL = 0.520, SL = 0.636, MDL = 0.369, EL = 0.136, WL = 0.859, PSL = 0.054, PPH = 0.161, PTH = 0.157, PTW = 0.115, PPW = 0.202, PW = 0.201, CI = 102.692, EI = 19.662, SI = 118.435, MDI = 69.101, PSLI = 10.112, PWI = 37.640, PpWI = 175.652.

Head: Oval, 1.02x longer than broad, sides convex (Fig: 1f), posterior margin flat; occipital emargination absent, occipital collar distinct; vertex convex; frontal carina, frontal lobe inconspicuous; antennal scrobe absent; antennal groove distinct; scape long (0.646 mm), slender, cylindrical, goes beyond the top by half from its insertion. F1 longer than all funicular segments (Fig: 1g), F3 = F4 (F1 = 0.116 mm, F2 = 0.036 mm, F3 = F4 = 0.039 mm, F5 = 0.041 mm, F6 = 0.034 mm, F7 = 0.045 mm, F8 = 0.047 mm). CL3 longer than CL1, CL2 (CL1 = 0.123 mm, CL2 = 0.136 mm, CL3 = 0.231 mm). Clypeus convex, acarinate (Fig: 1f), emarginated medially; eyes small (0.136

mm), medially located, 10-11 ommatidia along longitudinal axis; malar space 1.1x longer than eye diameter; mandibles long (0.369 mm), triangular, masticatory margin dentate.

Mesosoma and pedicel: Pronotum convex (Fig: 1e), lateral tubercle obtuse, attenuated anteriorly; promesonotum forms a dome in its posterior declivity; humeral area inconspicuous, laterally rounded; promesonotal groove inconspicuous; mesometanotal groove shallow (0.111 mm); metanotum broadly oval; spines short (0.054 mm), erect, acute; first node of pedicel without appendix beneath, petiolate anteriorly (Fig: 1e), stout, nodiform, transverse above; second node of pedicel globose, rounded, oval, convex above, laterally rounded, 1.02x higher than first node of pedicel laterally, 1.75x broader than first node of pedicel dorsally.

Gaster: Broadly elongated (Fig: 1h), 1.25x longer than broad, oval, opaque.

Sculpture: Head, pronotum, clypeus, gaster smooth, polished and shining. Antennal groove, mandibles laterally longitudinally striated; nodes of pedicel, metanotum rugose; mesonotum reticulate.

Vestiture: Abundant, long. Standing erect hairs on mesosoma; head, gaster decumbent; antennae, legs pubescent.

Colour: Head, gaster brown; mesosoma lighter than head; antennae, legs, nodes of pedicel yellowish brown; pilosity reddish yellow.

Distribution: India [East Khasi Hills, Meghalaya, Tamil nadu, Western India: Niligris; Kerala: Kannur].

Ecology: Nocturnal, found nesting behind the roots of trees.

Remarks: Since the available description of this species is inadequate for easy identification, a redescription is provided here.

The major worker of *P. constanciae* Forel closely resembles *P. wroughtoni* Forel in having (i) Head anteriorly longitudinally striate; (ii) Pronotal tubercle absent; (iii) Gaster broadly oval.

However *P. constanciae* differs from *P. wroughtoni* in having (i) Frontal lobe inconspicuous, antennal groove present (in *P. wroughtoni* frontal lobe conspicuous, antennal groove absent); (ii) Head square (in *P. wroughtoni* head rectangular); (iii) Scape extends upto half from its insertion behind the top of head (in *P.*

wroughtoni scape not extending upto half from its insertion).

The minor worker of *P. constanciae* closely resembles *P. wroughtoni* in having: (i) Lateral tubercle obtuse; (ii) Mesometanotal groove shallow; (iii) Gaster broadly oval.

However the minor worker of *P. constanciae* differs from *P. wroughtoni* in having (i) Pronotum smooth (in

P. wroughtoni pronotum transversely striate); (ii) Head without mandibles oval (in *P. wroughtoni* head without mandibles square); (iii) Metanotum not subdentate (in *P. wroughtoni* metanotum subdentate).

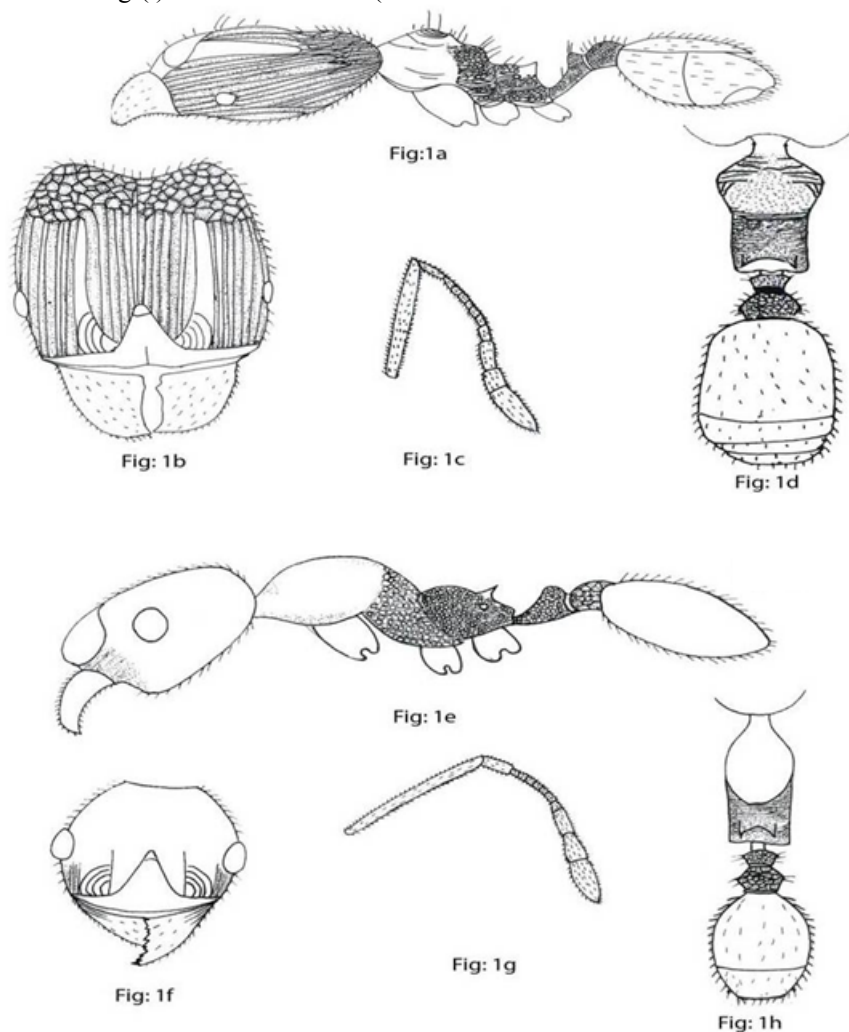


Fig 1:- *Pheidole constanciae* Forel: Major: 1a) Body profile; 1b) Head dorsal view; 1c) Antenna; 1d) Body dorsal view.
Minor: 1e) Body profile; 1f) Head dorsal view; 1g) Antenna; 1h) Body dorsal view.

***Pheidole ghatica* Forel**

(Figs: 2a-2h)

Pheidole ghatica Forel, 1902c : 180 (s.) 196 (w.) India (MHNG).

[Also described as new by Forel, 1902g : 545]

Material examined: (1 Major) India: Kerala, Trivandrum: Palode 8° 43' N, 77° 1' E. 03.iv.2011, soil

core; (4 Majors) India: Kerala, Trivandrum: Vizhijam 8° 24' N, 76° 59' E. 19.iv.2011, soil core; (1 Major, 3 Minors) India: Kerala, Kollam: Punalur 9° 1' N, 76° 55' E. 09.iii.2011, brush method; (1 Major) India: Kerala, Kollam: Yeroor 8° 56' N, 76° 56' E. 9.v.2011, food bait; (1 Major) India: Kerala, Kollam: Arippa 10° 51' N, 76° 16' E. 2.x.2011, brush method; (6 Majors, 3 Minors) India: Kerala, Kollam: Punalur 9° 1' N, 76° 55' E. 12.xii.2011, brush method; (1 Major) India:

Kerala, Idukki: Vagamon 9° 41' N, 76° 54' E. 30.xii.2011, food bait; (1 Major, 1 Minor) CPCRI 12° 12' N, 75° 9' E. 25.i.2012, soil core; (1 Major, 1 Minor) India: Kerala, Ernakulam: Koothattukulam 9° 49' N, 76° 36' E. 01.ii.2012, soil core; (1 Major) India: Kerala, Wayanad: Sultanbathery 11° 39' N, 76° 15' E. 02.v.2012, soil core; (1 Major, 1 Minor) India: Kerala, Wayanad: Tholpetty 11° 54' N, 76° 3' E. 19.iv.2012, food bait; (1 Major, 1 Minor) India: Kerala, Palakkad: Chulanur 10° 44' N, 76° 30' E. 07.iii.2012, food bait; (2 Majors, 2 Minors) India: Kerala, Malappuram: Thavanoor 10° 51' N, 75° 58' E. 26.iii.2012, food bait; (1 Minor) India: Kerala, Trivandrum: CTCRI 8° 32' N, 76° 55' E. 23.iv.2011, (Coll: Presty John).

Redescription

Major worker

Measurements and Indices (mm): HW = 1.225, HL = 1.258, SL = 0.661, MDL = 0.6129, EL = 0.161, WL = 1.177, PSL = 0.136, PPH = 0.204, PTH = 0.272, PTW = 0.125, PPW = 0.225, PW = 0.548, CI = 97.376, EI = 13.157, SI = 53.947, MDI = 50, PSLI = 11.124, PWI = 44.736, PpWI = 179.487, PeI = 22.941, PpI = 41.176.

Head: Little longer (1.026x) than broad; lateral sides parallel; occipital emargination deep, wide (0.548 mm); transverse impression on vertex absent (Fig: 2a); frontal carina inconspicuous (Fig: 2b); antennal scrobe narrow, indistinct; scape short (0.661 mm), slender, cylindrical, reaching upto half from its insertion below the top of head. F1, F8 longer than all funicular segments (Fig: 2c), F1 = F8, F4 = F5 (F1 = F8 = 0.096 mm, F2 = 0.038 mm, F3 = 0.064 mm, F4 = F5 = 0.032 mm, F6 = 0.067 mm, F7 = 0.064 mm). CL3 longer than CL2 and CL3, shorter than CL1 + CL2 (CL1 = 0.132 mm, CL2 = 0.161 mm, CL3 = 0.258 mm, CL1 + CL2 = 0.293 mm). Clypeus weakly carinated (Fig: 2b), slightly medially emarginated; median and submedian process of hypostoma inconspicuous; eyes anterio-laterally located, 11 ommatidia along longitudinal axis, 1.98x shorter than malar space; mandibles broad (Fig: 2b), massive, triangular with two apical teeth.

Mesosoma and pedicel: Pronotum and mesonotum forming two different convexities (Fig: 2a), lateral tubercle distinct; promesonotum forms a dome in its posterior declivity; promesonotal groove indistinct; humeral area inconspicuous (Fig: 2d); base of mesonotum curved, raised medially; mesometanotal groove and promesonotal groove equal, broad, shallow (0.136 mm); metanotal spines short (0.136 mm), acute, erect; first node of pedicel without appendix beneath, squamiform, petiolate anteriorly, transverse above, 1.33x longer than second node laterally; second node

1.18x broader than first node of pedicel dorsally, laterally produced to acute cones (Fig: 2d).

Gaster: 1.43x longer than broad, round (Fig: 2d), opaque.

Sculpture: Head, clypeus laterally, lateral margin of mandibles longitudinally striated (Fig: 2b); mandibles punctate; pronotum anteriorly and laterally, gaster posteriorly smooth, shining; pronotum dorsally with scattered transverse striae; mesonotum, metanotum, gaster anteriorly reticulostriated; nodes of pedicel reticulopunctate.

Vestiture: Short, sparse, appressed to decumbent hairs on head; standing erect hairs on mesosoma; semi-erect hairs on gaster.

Colour: Head and mesosoma castaneous brown; pedicel little darker than mesosoma; gaster black with fuscous above; legs, antennae brownish yellow; pilosity pale yellow.

Minor Worker

Measurements and Indices (mm): HW = 0.494, HL = 0.636, SL = 0.864, MDL = 0.310, EL = 0.131, WL = 1.054, PSL = 0.054, PPH = 0.135, PTH = 0.162, PTW = 0.137, PPW = 0.161, PW = 0.366, CI = 77.672, EI = 26.595, SI = 174.813, MDI = 62.753, PSLI = 10.925, PWI = 74.113, PpWI = 117.096.

Head: Ovoidrectangular (Fig: 2f), 1.027x longer than broad, lateral sides parallel; occipital emargination absent; collar present; vertex without transverse impression; frontal carina very short (0.270 mm), parallel; antennal groove broad, deep, reaching upto the median of eyes; scape long (0.864 mm), slender, cylindrical, goes beyond the top of head by one fourth from its insertion. F1 longer than all funicular segments (Fig: 2g), F3 = F6, F4 = F7 = F8 (F1 = 0.071 mm, F2 = 0.0385 mm, F3 = F6 = 0.035 mm, F4 = F7 = F8 = 0.052 mm, F5 = 0.033 mm). CL3 longer than CL1 and CL2, shorter when CL1 + CL2 (CL1 = 0.121 mm, CL2 = 0.105 mm, CL3 = 0.157 mm, CL1 + CL2 = 0.226 mm). Clypeus convex, acarinate; eyes large (Fig: 2e), round, 11 ommatidia along longitudinal axis, anterio-medially located, 1.12x shorter than malar space.

Mesosoma and pedicel: Pronotum and mesonotum forming two different convexities (Fig: 2e), slightly attenuated anteriorly; pronotum dorsally flat, laterally tuberculate; promesonotal, mesometanotal groove distinct; promesonotal groove little broader than (1.125x) mesometanotal groove; mesonotum with a conspicuous prominence dorsally; metanotum

rhomboid, base flat; spines short (0.136 mm), erect, acute; first node of pedicel without appendix beneath, attenuated anteriorly, squamiform, 1.33x longer than second node of pedicel laterally; second node globoid, oval (Fig: 2h), (1.8x) broader than first node of pedicel dorsally.

Gaster: Semicircular (Fig: 2h), 1.3x longer than broad.

Sculpture: Head rugose; mandibles laterally longitudinally striated; pronotum transversely striated; mesonotum, metanotum, nodes of pedicel foveolate; gaster punctuate anteriorly.

Vestiture: Scattered; head decumbent laterally; gaster with abundant, semi-erect, reduced standing hairs on mesosoma.

Colour: Head, mesosoma, pedicel and scape brownish yellow; gaster chestnut brown; legs paler than head; pilosity pale yellow.

Distribution: India [Kerala: Trivandrum, Kollam, Idukki, Kasargod, Wayand, Palakkad, Malappuram]

Ecology: Nests in soil.

Remarks: Since the available description of this species is inadequate for easy identification, a redescription is provided here.

The major worker of *P. ghatica* Forel closely resembles *P. peguensis* Emery in having (i) Pronotal tubercle obtuse; (ii) Occipital emargination deep, wide; (iii) Scape short extend below the top of head by half from its insertion behind the top of head.

However *P. ghatica* differs from *P. peguensis* in having (i) Clypeus weakly carinated (in *P. peguensis* clypeus smooth); (ii) Metanotal spine short (0.056 mm); (in *P. peguensis* metanotal spine long (greater than 0.07 mm); (iii) Gaster striated anteriorly (in *P. peguensis* gaster not striated anteriorly).

The minor worker of *P. ghatica* closely resembles *P. peguensis* in having (i) Clypeus convex, acarinate; (ii) Antennal groove broad, deep, reaching upto the median of eyes; (iii) Pronotum laterally tuberculate.

However the minor worker of *P. ghatica* differs from *P. peguensis* in having (i) Scape extend beyond the top of head by one fourth from its insertion (in *P. peguensis* scape extend beyond the top of head by half from its insertion); (ii) Second node of pedicel not oval dorsally (in *P. peguensis* second node of pedicel oval); (iii) Gaster Semicircular (in *P. peguensis* gaster not semicircular (round)).

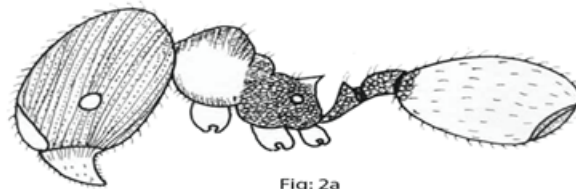


Fig: 2a

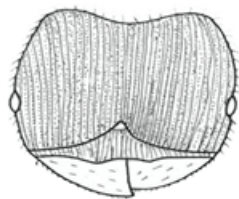


Fig: 2b



Fig: 2c



Fig: 2d

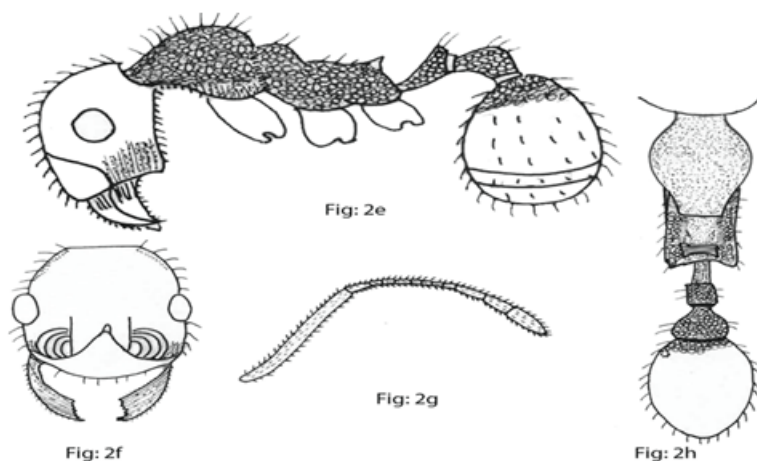


Fig 2:- *Pheidole ghatica* Forel: **Major:** 2a) Body profile; 2b) Head dorsal view; 2c) Antenna; 2d) Body dorsal view. **Minor:** 2e) Body profile; 2f) Head dorsal view; 2g) Antenna; 2h) Body dorsal view.

***Pheidole indica* Mayr**

(Figs: 3a-3h)

Pheidole indica Mayr, 1879: 679 (s.w.q.) India (NHMW).

Pheidole indica r. *himalyana* Forel, 1902c:185, 199.India (MHNG) (Raised to species by Bingham, 1903). [Synonomised by Eguchi, 2004].

Pheidole indica r. *rotschana* Forel, 1902c:185, 199(s.w) India (MHNG) (Raised to species by Bingham, 1903) [Synonomised by Eguchi, 2004].

Pheidole javana ssp. *jubilans* var. *formosae* Forel, 1912a: 60 (s.w.m) Taiwan (MHNG) [Synonomised by Eguchi, 2004].

Pheidole striativentris Mayr, 1879: 678 (s.w) India (NHMW) [Synonomised by Eguchi, 2004].

Material examined: (1Major) India: Kerala, Ernakulam: Aluva N 10° 6' 17.7834", E 76° 21' 4.302". 14.ii.2012, brush method; (1 Minor) India: Kerala, Ernakulam: Aluva 10° 6' N, 76° 21' E. 14.ii.2012, brush method; (3 Majors, 1 Minor) India: Kerala, Thrissur: Athirappilly 10° 17' N, 76° 34' E. 26.i.2011, food bait; (1 Minor) India: Kerala, Calicut: Devagiri 19° 56' N, 75° 12' E. 17.ii.2011, soil core; (1 Minor) India: Kerala, Malappuram: Canoly plot 11° 16' N, 76° 12' E. 24.ii.2011, food bait; (2 Majors) India: Kerala, Kollam: Munrothuruthu 8° 59' N, 76° 36' E. 19.iii.2011, food bait; (2 Majors) India: Kerala, Thrissur: Peechi 10° 31' N, 76° 22' E 23.v.2011, food bait; (1 Major, 3 Minors) India: Kerala, Kollam: Arippa 10° 51' N, 76° 16' E. 2.x.2011, food bait; (3 Majors, 2 Minors) India: Kerala, Kottayam: RRI 9° 34' N, 76° 34' E. 30.i.2012, food bait; (3 Majors, 2 Minors) India: Kerala, Kottayam: Thelakom 9° 36' N, 76° 31'E. 30.i.2012, soil core; (4 Majors, 4 Minors)

India: Kerala, Ernakulam: Koothattukulam 9° 49' N, 76° 36' E. 01.ii.2012, food bait; (4 Majors, 4 Minors) India: Kerala, Ernakulam: Budhatankettu 10° 8' N, 76° 40' E. 18.vii.2012, brush method; (3 Majors, 3 Minors) India: Kerala, Kannur: Pazhassi dam 11° 59' N, 75° 39' E. 26.v.2012, brush method; (2 Major, 1 Minor) India: Kerala, Kannur: Aralam 11° 43' N, 75° 41' E". 24.v.2012, food bait; (4 Majors, 6 Minors) India: Kerala, Thrissur: Vazhani 10° 38' N, 76° 18' E. 15.v.2012, food bait; (2 Majors, 1 Minors) India: Kerala, Wayanad: Kuzhinilam 11°49' N, 75°58' E. 21.iv.2012, food bait; (3 Majors, 1 Minor) India: Kerala, Kollam: Punalur 9° 1' N, 76° 55' E. 09.iii.2012, brush method; (3 Majors, 2 Minors) India: Kerala, Palakkad: Neliyampathy 10° 32' N, 76° 41' E. 06.iii.2012, food bait; (2 Majors, 2 Minors) India: Kerala, Kollam: Kumbavurutty 8 ° 56' N, 77° 9' E. 04.iv.2012, (Coll: Presty John).

Redescription

Major worker

Measurements and Indices (mm): HW = 1.243, HL = 1.270, SL = 0.810, MDL = 0.394, EL = 0.459, WL = 0.933, PSL = 0.088, PPH = 0.166, PTH = 0.2, PTW = 0.157, PPW = 0.315, PW = 0.648, CI = 97.870, EI = 36.926, SI = 65.164, MDI = 31.697, PSLI = 7.079, PWI = 52.131, PpWI = 200.636, PeI = 24.228, PpI = 48.611.

Head: 1.01x longer than broad, square, excluding mandibles; occiput emarginated, wide (0.540 mm) (Fig: 3a); vertex transversely impressed; frontal carina long (0.945 mm), divergent posteriorly; antennal scrobe reaching upto vertex; frontal lobe conspicuous, not covering antennal grooves; scape short (0.810 mm), stout, cylindrical reaching upto three fourth from its insertion below the top of head. F1 longer than all

funicular segments (Fig: 3c), F3 = F6, F4 = F5 (F1 = 0.135 mm, F2 = 0.040 mm, F3 = F6 = 0.051 mm, F4 = F5 = 0.054 mm, F7 = 0.048 mm, F8 = 0.108 mm). CL3 longer than CL1 and CL2, shorter than CL1 + CL2 (CL1 = 0.148 mm, CL2 = 0.162 mm, CL3 = 0.246 mm, CL1 + CL2 = 0.310 mm). Fronto-clypeal suture triangular, acarinate; clypeus acarinate (Fig: 3b), little emarginated medially; median, submedian hypostomal process absent; eyes small (0.459 mm), round anterio-laterally located, 12 ommatidia along longitudinal axis; 1.48x longer than malar space mandibles broad (0.394 mm) triangular; dentition crenulated.

Mesosoma and pedicel: Pronotum and mesonotum forming two different convexities (Fig: 3a); pronotum not attenuated anteriorly, laterally bituberculate, obtuse; promesonotum forms a dome in profile in its posterior declivity; humeral area weakly developed, laterally rounded; promesonotal groove shallow (0.177 mm); mesometanotal groove 1.1x broader than promesonotal groove; mesometanotal groove = PTH (0.2 mm); metanotum posteriorly forming a slope, base flat, not forming channels laterally; spines long (0.810 mm), acute, erect with broad triangular base (0.111 mm); legs long cylindrical; first node of pedicel without appendix beneath, nodiform, sessile, attenuated anteriorly, 1.2x higher than second node of pedicel; second node broader (2x) than first node, as long as broad, globose, oval, laterally rounded.

Gaster: 1.81x longer than broad, oval (Fig: 3d), opaque.

Sculpture: Head anteriorly, gena longitudinally striate; head posteriorly transversely striate; antennal scrobe, gaster, rugo-reticulate; mandibles, nodes of pedicel with scattered punctures; head laterally, occiput little reticulated (Fig: 3b); clypeus, pronotum anteriorly, smooth, polished, shining; pronotum dorsally transversely striated; mesometanotum foveolate.

Vestiture: Abundant, long. Head dorsally, mesosoma erect; gaster decumbent.

Colour: Head reddish brown; mesosoma, pedicel brown; gaster black; antennae, legs brownish yellow; pilosity red.

Minor Worker

Measurements and Indices (mm): HW = 0.554, HL = 0.643, SL = 0.671, MDL = 0.301, EL = 0.155, WL = 1.2, PSL = 0.067, PPH = 0.155, PTH = 0.2, PTW = 0.108, PPW = 0.216, PW = 0.351, CI = 86.158, EI = 27.978, SI = 121.111, MDI = 54.332, PSLI = 12.093, PWI = 63.357, PpWI = 200.

Head: Round (Fig: 3f), 1.16x longer than broad, lateral sides convex; occipital emargination absent (Fig: 3f), occipital collar distinct; vertex convex; frontal carina short (0.164 mm), parallel, not divergent posteriorly; frontal lobe not covering antennal groove, inconspicuous; antennal groove distinct; scape long (0.671 mm), slender, cylindrical, goes beyond the top of head by one fourth from its insertion. F1 longer than all funicular segments (Fig: 3g) (F1 = 0.095 mm, F2 = 0.038 mm, F3 = 0.027 mm, F4 = 0.030 mm, F5 = 0.034 mm, F6 = 0.041 mm, F7 = 0.047 mm, F8 = 0.053 mm). CL3 longer than CL1 and CL2, shorter than CL1 + CL2 (CL1 = 0.109 mm, CL2 = 0.184 mm, CL3 = 0.239 mm, CL1 + CL2 = 0.293mm). Clypeus, fronto-clypeal suture smooth, acarinate (Fig: 3f), not emarginated medially; eyes large (0.155 mm), medially located, 9-10 ommatidia along longitudinal axis; malar space 1.41x longer than eye diameter; mandibles long (0.301 mm), triangular, masticatory margin dentate.

Mesosoma and pedicel: Pronotum and mesonotum forming two different convexities (Fig: 3e), lateral tubercle indistinct, attenuated anteriorly; promesonotum forms a dome in its posterior declivity; humeral area laterally rounded; promesonotal group shallow (0.155 mm), equal to eye diameter and PPH; mesometanotal group 1.43x broader than promesonotal group; basal and apical portion of metanotum equal, laterally submargined; spines short (0.067 mm) (Fig: 3e), erect, stout; first node of pedicel without appendix beneath, petiolate anteriorly, stout, squamiform, transverse above, not emarginated 1.29x higher than second node of pedicel laterally; second node of pedicel oval, convex above, laterally rounded, 2x broader than first node of pedicel dorsally.

Gaster: Broadly elongated (Fig: 3h), 1.45x longer than broad, opaque.

Sculpture: Head, clypeus, fronto-clypeal suture, pronotum, first node of pedicel dorsally, gaster smooth, polished, shining; mesonotum, metanotum foveolate; nodes of pedicel punctate; mandibles laterally longitudinally striated.

Vestiture: Abundant, long. Standing erect hairs on mesosoma; gaster, nodes of pedicel, head laterally decumbent; head anteriorly with semi-erect hairs; antennae pubescent.

Colour: Head, gaster chestnut brown; mesosoma reddish brown; nodes of pedicel, antennae, legs brownish yellow; pilosity yellow.

Distribution: Japan, Sri Lanka, Taiwan, India [Kolkata, Jammu and Kashmir, Kerala: Ernakulam, Thrissur, Calicut, Kollam, Kottayam, Kannur, Wayanad, Palakkad].

Ecology: Granivorous, create nest behind the grass.

Remarks: Since the available description of this species is inadequate for easy identification, a redescription is provided here.

The major worker of *P. indica* Mayr closely resembles *P. binghamii* Forel in having (i) Gaster smooth; (ii) Pronotal tubercle obtuse; (iii) Pronotum dorsally transversely striate.

However *P. indica* differs from *P. binghamii* in having (i) Occipital deeply emargination (in *P. binghamii*

occiput not deeply emarginate); (ii) Head not reticulate posteriorly (in *P. binghamii* head reticulate posteriorly); (iii) Second node of pedicel latterly produced to obtuse cones (in *P. binghamii* second node of pedicel not latterly produced to obtuse cones).

The minor worker of *P. indica* closely resembles *P. binghamii* in having (i) Pronotum smooth, shining; (ii) Occipital emargination absent; occipital collar distinct; (iii) Posterior margin of head rounded.

However the minor worker of *P. indica* differs from *P. binghamii* in having (i) Head round (in *P. binghamii* head oval); (ii) Pronotal tubercle absent (in *P. binghamii* pronotal tubercle present); (iii) Metanotum not dentate (in *P. binghamii* metanotum dentate).

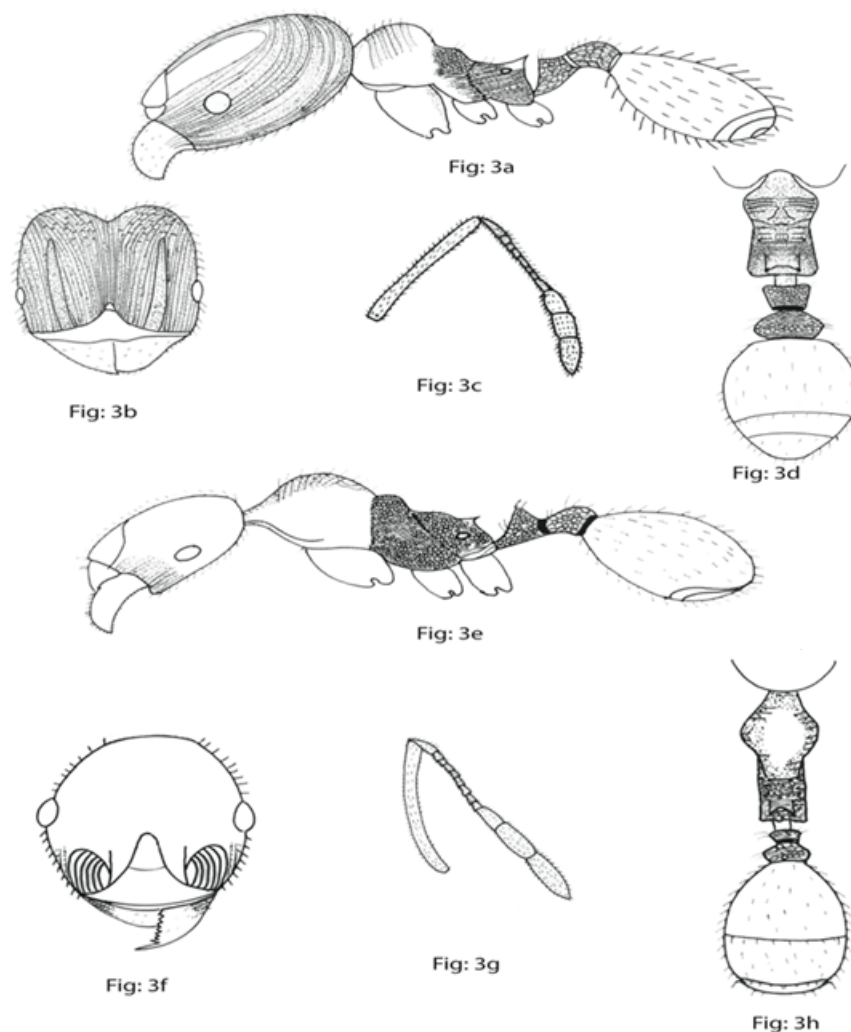


Fig 3:- *Pheidole indica* Mayr: **Major:** 3a) Body profile; 3b) Head dorsal view; 3c) Antenna; 3d) Body dorsal view. **Minor:** 3e) Body profile; 3f) Head dorsal view; 3g) Antenna; 3h) Body dorsal view.

4. Acknowledgements

We wish to extend our gratitude to KSCSTE, Trivandrum for providing financial assistance for carrying out this work. Thanks are also due to Dr. T.C Narendran for his moral support, encouragement and valuable suggestions throughout this work. We also wish to thank Sr. Reethamma V A, Principal, St. Xavier's College for Women, Aluva for providing necessary facilities to carry out our work.

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