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A New Species of the Ant Genus *Carebara* Westwood (Hymenoptera: Formicidae) from India

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ABSTRACT

Carebara quratulain sp. n. is described from Salim Ali Bird Sanctuary, Kerala, India. The new species represents the 25th species of the genus reported from India. A revised key for major workers is provided for the Indian species.

Key words: Formicidae, India, *Carebara*, Cryptic, new species.

INTRODUCTION

The ant genus *Carebara* Westwood, 1840 mostly include hypogaeic ants that nest in the soil, leaf litter with reports of lestobiotic mode of living and extreme size dimorphism (Bolton and Belshaw, 1993; Fernández, 2010). These ants constitute one of the largest myrmicine genus with more than 250 extant species reported globally (Fischer *et al*., 2014). The taxonomy of the genus *Carebara* has seen great improvements during the last decade but the genus still awaits an updated global revision (Garcia *et al*., 2013). Pertaining to present study, recent contributions to the genus include those of Sheela and Narendran (1997), Xu (2003), Zhou *et al*. (2006), Terayama (1996, 2009), Fernández (2010), Terayama *et al*. (2012), Bharti and Kumar (2013), Sharaf and Aldawood (2013), Bharti and Akbar (2014), Fischer *et al*. (2014, 2015). So far approximately 41 species of the genus *Carebara* are known from the Oriental region (Guénard and Dunn, 2012; Bharti and Akbar, 2014; Bharti and Kumar 2013; Terayama *et al*., 2012; Xu 2003; Zhou *et al*., 2006) and 24 species are known from the India (Bharti *et al*., 2016). The genus *Carebara* from India is not completely documented yet (Bharti and Akbar, 2014; Bharti and Kumar, 2013; Fernández, 2010) and the paper here is part of the series of publications aimed at cataloguing *Carebara* fauna from the country.

MATERIALS AND METHODS

The specimens were collected by hand picking method from Salim Ali Bird Sanctuary, Kerala, India. Taxonomic analysis was conducted using Nikon SMZ 1500

stereo zoom microscope. For digital images, MP evolution digital camera was used on same microscope with Auto-Montage (Syncroscopy, Division of Synoptics, Ltd.) software. Later, images were cleaned as per requirement with Adobe Photoshop CS6. Holotype and paratypes of the species have been deposited in PUAC (Punjabi University Patiala, Ant Collection at Department of Zoology and Environmental Sciences, Punjabi University, Patiala, Punjab, India). One paratype of the species will be deposited at BMNH (British Museum of Natural History, London, UK). Description pattern, morphological terminology for measurements and indices follow (Fernández 2010) and include: ED Eye diameter; maximum length of compound eye. HL Head length; the length of the head proper, excluding the mandibles, measured in a straight line from the mid- point of the anterior clypeal margin to the mid-point of the posterior margin of head, in full face view. HHL Head horn length; the straight dorsal distance from the base of the horn to its apex in full lateral view. The base of the horn was arbitrarily considered as the midpoint of the concavity where posterior margin of head and spine meet. HW Head width; the maximum width of the head in full face view behind eyes. ML Mandible length; in full face view, the maximum length between anterior clypeal margin and mandible apex, with mandibles closed. MSL Mesosomal length; the diagonal length of the mesosoma in lateral view, from frontal most point of declivous area of pronotum to posteriormost point of apex of metapleural lobes. PTH Petiole height; maximum height of petiole in lateral view. PTL Petiole length; maximum length of petiole in dorsal view. PTW Petiole width; maximum width of petiole in dorsal view. PPTH Postpetiole height; maximum height of postpetiole in lateral view. PPTL Postpetiole length; maximum length of postpetiole in dorsal view. PPTW Postpetiole width; maximum width of postpetiole in dorsal view. PW Pronotal width; maximum width of the pronotum in dorsal view. SL Scape length; maximum straight line length of the antennal scape excluding the basal constriction or neck close to the condylar bulb. CI Cephalic index; HW / HL × 100. EI Eye index; ED / HW × 100.

Key to Indian species of *Carebara* based on major worker

Among the known Indian species of the genus 10 species; *C. bengalensis, C. carinate, C. lamellifrons, C. leei, C. lignata, C. propomegata, C. raja, C. rothneyi, C.similis, and C. wroughtonii* do not have the description of majors and are not included in the key.

1. Antenna 11-segmented 2

- Antenna 9-segmented 4

2. Head truncate, shield like, with frontal lobes extended forward forming broad rounded lamina; posterolateral edges sharply angulate (Oriental Region: India; Kerala; Iritty; Karnataka; Gundlupet, Figs. 1-2) ……...*C. nayana* (Sheela and Narendran)

- Head rectangular in shape, longer than broad, sides straight to weakly convex; posterolateral corners rounded .....…3

3. Head with a deep median longitudinal groove and a single ocellus, body strongly sculptured, relatively larger in size and dark reddish brown to black in color, SI 41-42 (Wide spread: Afrotropical Region, Indo-Australian Region, Oriental Region, Palaearctic region; Figs. 3-4)……..……..……..……..*C. diversa* (Jerdon)

- Head without deep median longitudinal groove and without ocellus, body weakly sculptured, relatively smaller in size and reddish brown in color, SI 46-51 (Wide spread: Australasian region, Afrotropical, Indo-Australian Region, Oriental Region, Palaearctic region; Figs. 5-6)……...……*C. affinis* (Jerdon)

4. Eyes distinct with numerous ommatidia (>8); base of first gastral tergite finely reticulate with traces of fine longitudinal rugae (Oriental Region: India; No image available)……...…… *C. aborensis* (Wheeler)

- Eyes rudimentary with few ommatidia (<4); base of first gastral tergite smooth and shinning 5

5. Vertex without a pair of distinct horns or minute teeth 6

- Vertex with a pair of distinct horns or minute teeth 7

6. Head distinctly longer than broad, smooth and shiny (Oriental Region: India; Jammu and Kashmir; Bilawar, Figs. 7-8)……..…*C. rectangulata* Bharti and Kumar

- Head almost as broad as long with distinct striations sculpture throughout (Oriental Region: India, Sri Lanka; Figs. 9-10)…….…… *Carebara nana* (Roger)

7. Vertexal corners protruding into a pair of well developed acute horns or spines…8

- Vertex with a pair of minute horns or teeth in lateral view 9

8. Head rectangular with straight parallel sides, punctured only and finely longitudinally rugulose anteriorly; occiput and vertex smooth and shinning (Oriental Region: India; Himachal Pradesh; Andretta, Figs. 11-12)…*C. hornata* Bharti and Kumar

- Head with convex sides, sparsely punctured and longitudinally obscurely striated anteriorly; occiput and vertex wrinkled (Oriental Region, Palaearctic region; Figs 13- 14) .....*C. asina* (Forel)

9. Propodeum unarmed, posterodorsal corner rounded or bluntly angled…....10

- Propodeum with a pair of protruding dents or spines 13

10. Cephalic dorsum unsculptured, smooth and shining; vertexal horns reduced (Oriental Region: India; Himachal Pradesh; Mandi, Andretta, Jammu and Kashmir; Kathua; Punjab; Maharaja Ranjeet Sagar Dam; Uttarakhand; Forest Research Institute, Figs. 15- 16) ……...…….……*C. dentata* Bharti and Kumar

- Cephalic dorsum sculptured, dull; vertexal horns more prominent.....11

11. Cephalic dorsum with a single median ocellus. Lateral sides of head straight (Oriental Region: India; Kerala; Salim Ali Bird Sanctuary, Figs 17-19)….....
.....*C. quratulain* sp. n.

- Cephalic dorsum without a single median ocellus. Lateral sides of head convex..12

12. Posterodorsal corner of propodeum smoothly rounded; dorsum of head weakly sculptured (Figs. 20-21) ……...……...*Carebara rectidorsa* (Xu)

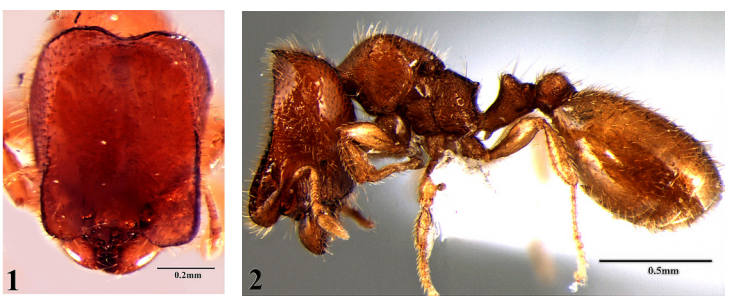
- Posterodorsal corner of propodeum clearly bluntly angled; dorsum of head strongly sculptured (Oriental Region: India; Arunachal Pradesh, Lumla, Kerala, Periyar tiger reserve, Thanikkudy; Figs. 22-23) ……..….....……*C. terayamai* Bharti and Akbar

13. Head with lateral sides convex, almost as long as broad (CI 84-85) (Oriental Region: India; Uttarakhand; Dakpathar, Rajaji forest; Himachal Pradesh; Ghati, Lwasa; Jammu and Kashmir; Shukrala; Figs. 24-25)…….....…*C. spinata* Bharti and Kumar

- Head with parallel lateral sides, longer than broad (CI 74-78) ….....14

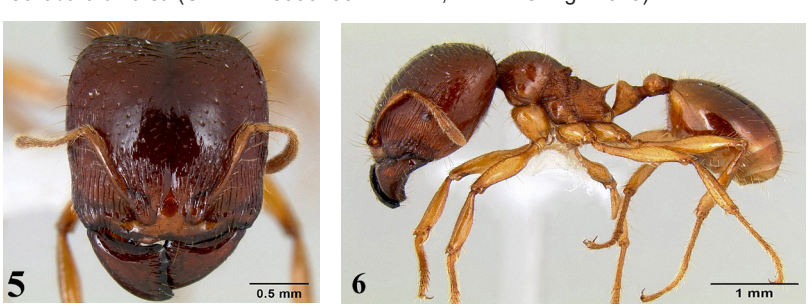
14. Anterior margin of clypeus concave without lateral developed teeth; Propodeal spines well developed; masticatory margin of mandible with 5-teeth (Oriental Region: India; Arunachal Pradesh; Lumla; Sikkim; Rorathang; Kerala; Periyar tiger reserve, Thanikkudy, Figs. 26- 27) ……..……*C. obtusidenta* (Xu)

- Anterior margin of clypeus with two prominent lateral teeth; Propodeal spines reduced; masticatory margin of mandible with 4-teeth (Oriental Region: India; Kerala; Silent Valley National park, Figs. 28-29)……*C. mukkaliensis* Bharti and Akbar.



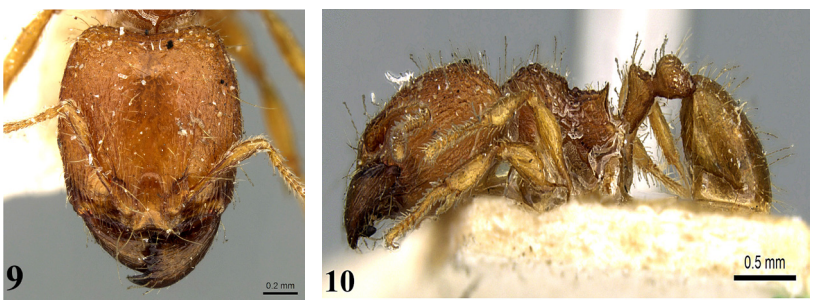
Figs. 1-2. *Carebara nayana*

Figs. 3-4. *Carebara diversa* (CASENT0906200- AntWeb, Estella Ortega 2013)



Figs. 5-6. *Carebara affinis* (CASENT0106016- Antweb, Michael Branstetter 2010)

Figs. 7-8. *Carebara rectangulata*

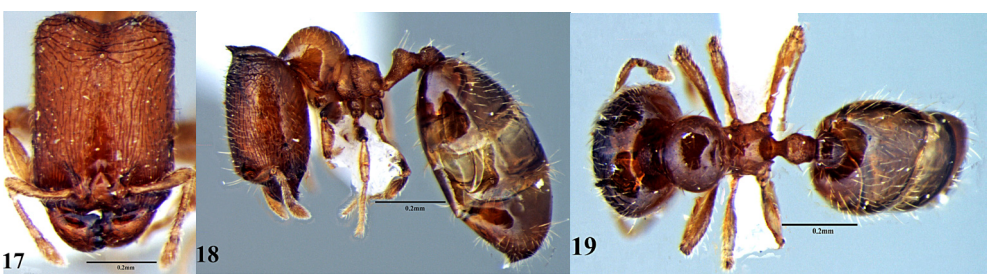


Figs. 9-10. *Carebara nana* (CASENT0906202- AntWeb, Estella Ortega 2013)

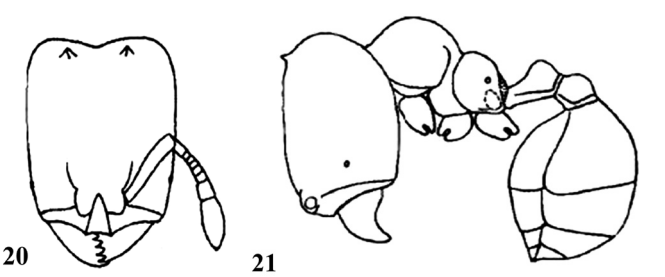
Figs. 11-12. *Carebara hornata*

Figs. 13-14. *Carebara asina* (CASENT0908897 - Antweb, Zachary Lieberman 2014)

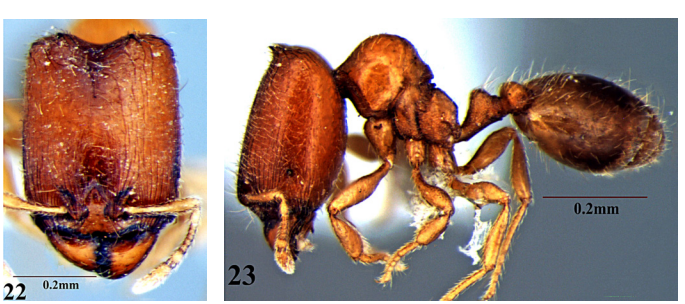
Figs. 15-16. *Carebara dentata*



Figs. 17-19. *Carebara quratulain* sp.n.

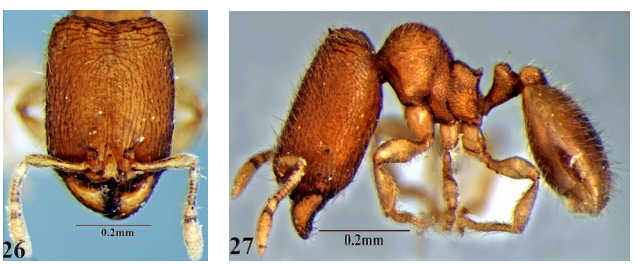


Figs. 20-21. *Carebara rectidorsa* (reproduced after Xu 2003; not to scale)



Figs. 22-23. *Carebara terayamai*

Figs. 24-25. *Carebara spinata*



Figs. 26-27. *Carebara obtusidenta*

Figs. 28-29: *Carebara mukkaliensis*

Carebara quratulain sp. n. (Figs. 17-19)

Type material. Holotype (major worker): INDIA: KERALA: Salim Ali Bird Sanctuary, 10°45`N, 76°44`E, 118m a.m.s.l., 10.10.2011, hand picking method, leg. H. Bharti and S. A. Akbar. Paratypes (3 major workers): same data as that of holotype. Holotype and paratype are in PUAC.

Measurements (range with holotype in brackets): HL 0.68-(0.70), HW 0.49-(0.52), SL 0.25-(0.27), ED 0.01-(0.02), ML (0.15)-0.16, MSL 0.48-(0.49), PW (0.27)-0.31, PTL (0.14)- 0.15, PPTL (0.13)-0.14, PTW 0.09-(0.11), PPTW 0.12-(0.14), PTH (0.13)-0.15, PPTH (0.11), HHL (0.05), CI 72-(74), EI 2-(4) (n=4).

Description major worker. Head longer than broad, rectangular in full face view. Occipital margin concave in the middle with occipital corners roundly prominent, lateral sides straight. Mandible with 4-teeth. Median portion of clypeus longitudinally depressed, bicarinate and divergent forward, anterior margin weakly concave. Single medium ocellus present posteriorly. Antennae 9-segmented with a 2-segmented

club, scapes short and clavate; reaching up to 1/3rd of posterior margin of head. Eyes with single ommatidium. In profile view, occiput with a pair of small well developed acute horns. Dorsum of head convex. Promesonotum high and roundly convex. Promesonotal suture obsolete on the dorsum. Metanotum reduced.

Metanotal groove deeply impressed. Propodeum with posterodorsal corners bluntly angled, dorsum straight to slightly convex and sloping down rearwards, declivity concave with thin lateral laminae. Petiole pedunculate anteriorly, ventral face straight almost parallel; anteroventral corner weakly and bluntly angled. Petiole node thick with anterior and posterior faces sloping, dorsal face roundly prominent. Postpetiole node roundly convex and lower than petiolar node. In dorsal view postpetiolar node broader than the petiolar node.

Mandibles and clypeus smooth and shiny. Head finely and longitudinally striate throughout, occiput with transverse striations. Mesosoma smooth and shining; lateral sides of propodeum punctuate. Petiole and postpetiole finely punctured. Gaster smooth and shining.

Head and body with abundant erect to suberect hairs. Scapes and tibiae with dense decumbent pubescence.

Body colour brown. Head brownish yellow, gaster darker.

Minor worker, female and male caste. Unknown.

Diagnosis. *C. quratulain* sp. n. is close to *C. rectidorsa* (Xu 2003), however the two species can be easily separated. In case of *C. quratulain* sp. n. posterior margin of head is strongly concave, cephalic dorsum with single medium ocellus, eyes with single ommatidium, anterior clypeal margin prominently concave, propodeum with posterodorsal corners bluntly angled and postpetiole broader than petiole in dorsal view, whilst in *C. rectidorsa* posterior margin of head is shallowly concave, cephalic dorsum without single medium ocellus, eyes with 2-ommatidia, anterior clypeal margin slightly concave, propodeum with posterodorsal corners gently rounded not bluntly angled and postpetiole as broad as petiole in dorsal view.

Etymology. The species epithet is Arabic for pleasure to eyes, in reference to beautiful appearance of this new species.

Ecology. The type locality of the new species is a low-land evergreen forest area, located between the branches of Periyar River. The region is considered as the richest bird habitat in peninsular India. The annual rainfall recorded here is round 3000mm which supports extensive plantations of teak, rosewood, mahagony and other wide variety of flowers and trees. The specimens were collected from a leaf litter sample taken from the forest floor near a teak tree. This subterranean species seems to be of rare occurrence as it was encountered only once during the extensive surveys in the region.

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