



## NEW DISTRIBUTIONAL RECORDS OF ANTS OF GENUS *CREMATOGASTER* LUND (HYMENOPTERA: FORMICIDAE) FROM INDIA

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### ABSTRACT

New locality records and illustrations for five known species viz., *Crematogaster biroi* Mayr, 1897, *C. contemta* Mayr, 1879, *C. dohrni artifex* Mayr, 1879, *C. rothneyi* Mayr, 1879, and *C. subnuda* Mayr, 1879 are provided from India. These records expand the area of occurrence and distribution of these species in India. In addition, *Crematogaster travancorensis* Forel (1902) is redescribed based on the worker caste collected from Pachmarhi, Madhya Pradesh and Ri Bhoi, Meghalaya, India.

**Key words:** Acrobat ants, Central India, taxonomy, *Crematogaster*, Crematogastrini, Formicidae, Hymenoptera, Madhya Pradesh, Delhi, new records, redescription, geographical distribution.

*Crematogaster* Lund, 1831 is a hyperdiverse myrmicine ant genus that is presently represented by 782 extant species/subspecies worldwide (Bolton, 2024) and 34 species/ subspecies in India (Bharti et al., 2016; Akbar et al., 2023). These ants are morphologically unique among due to the attachment of postpetiole to the dorsum of first gastral segment and its spatulate sting which is used to apply venom by contact rather than by injection (Buren, 1959; Marlier, 2004; Blaimer, 2012). Taxonomically, these ants have been classified into the two subgenera *Crematogaster* sensu stricto Lund, 1831 and *Orthocrema* Santschi, 1918 based on molecular and morphological observations (Blaimer, 2012). Subgenus *Crematogaster* comprises of a large group with more than 350 species/subspecies (Hosoishi, 2020) and many species groups (Blaimer, 2012). The present study redescribes, *Crematogaster travancorensis* collected from Pachmarhi, Madhya Pradesh and Ri Bhoi, Meghalaya (India). Moreover, new distributional records for five known species viz., *C. biroi* Mayr, 1897, *C. contemta* Mayr, 1879, *C. dohrni artifex* Mayr, 1879, *C. rothneyi* Mayr, 1879, and *C. subnuda* Mayr, 1879 are also provided.

### MATERIALS AND METHODS

The workers of *Crematogaster* spp. were collected from different parts of India by direct hand collection method and preserved in 70-90% alcohol. Later, specimens were mounted on card points, morphologically studied, and photographed.

*Crematogaster* specimens in the National Pusa Collection (NPC), New Delhi were also examined. The morphological study was done under the Leica S8AP0 stereo microscope and photography was done by using LEICA MC190 HD digital camera attached to the LEICA M205 C stereozoom automontage microscope. The measurements were recorded by using LEICA software LAS V4.13.0 in millimeters (mm) up to two decimals. All the studied specimens and type specimens have been deposited in the NPC, Division of Entomology, Indian Agricultural Research Institute (IARI), New Delhi, India. All new locality records for the species have been asterisked. The measurements and indices are as follows:

Eye length (EL): Maximum diameter of the compound eye measured in oblique lateral view; HL Head length (HL): Maximum distance from the midpoint of anterior clypeal margin to the midpoint of posterior margin of head, measured in full-face view; Head width (HW): Maximum width of the head in full-face view by excluding the eyes; Pronotal width (PRW): Maximum pronotal width in dorsal view; Petiole width (PTW): Maximum petiole width in dorsal view; Postpetiole width (PPW): Maximum postpetiole width in dorsal view; Scape length (SL): Maximum scape length excluding basal condyle and neck; Propodeal spine length (SPL): Measured from tip of propodeal spine to closest point on outer rim of propodeal spiracle, maximizing spine length in lateral view; Total length (TL): Roughly measured from

anterior clypeal margin to tip of the gaster; Weber's length (WL): Diagonal length of mesosoma in profile view from the posteroventral margin of the propodeal lobe to the anterior-most point of the pronotal slope, excluding the neck; Cephalic index (CI): HW/HLx 100; Ocular index (OI): EL/ HWx 100; Relative eye length index (REL): EL/ HLx 100; Scape index (SI): SL/ HWx 100; Propodeal spine index (SPI): SPL/ WLx 100

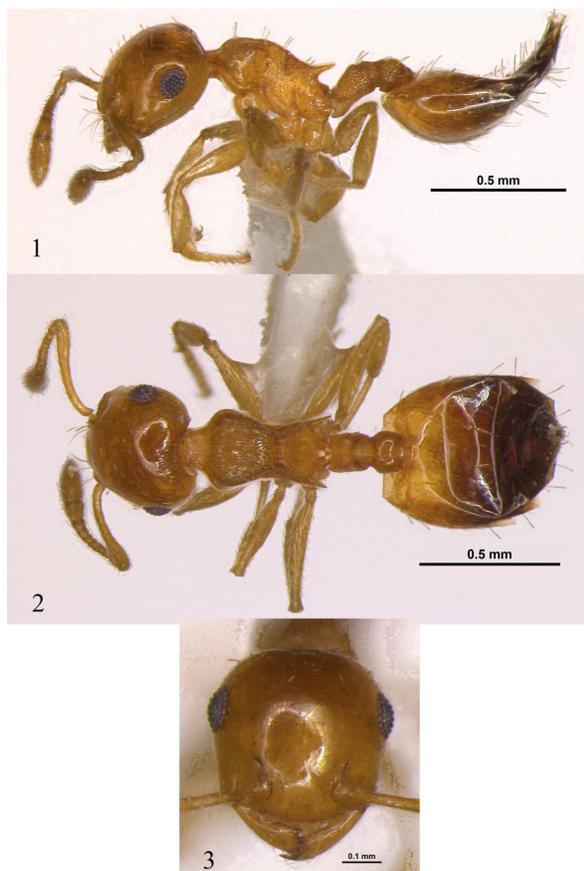
## RESULTS AND DISCUSSION

### 1. *Crematogaster biroi* Mayr, 1897 (Figs. 1-3)

*Crematogaster biroi* Mayr, 1897: 428; syntype workers, Colombo, Sri Lanka (Biró) [Type-depository: Hungarian Natural History Museum (HNHM), Budapest, Hungary].

=*Crematogaster biroi* var. *aikenii* Forel, 1902: 203;  
 =*Crematogaster biroi* var. *smythiesii* Forel, 1902: 203;  
 =*Crematogaster urvijae* Bharti, 2003: 85.

Material examined. India: Madhya Pradesh: Gwalior, 8 workers, 07.VIII.2020, Coll. A. Harshana.



Figs. 1-3. *Crematogaster biroi* (worker). 1. Body in profile view, 2. Body in dorsal view, 3. Head in full-face view

Delhi: IARI, 4 workers, XI.2022, Coll. A. Harshana. Bihar: Samastipur (Pusa), 2 workers, 19.XI.1914, Coll. T. B. Fletcher. Punjab: Ludhiana (Punjab Agricultural University), 7 workers, 09.VII.2023, Coll. A. Harshana.

Diagnosis (Worker): Mandible with four teeth on masticatory margin; mesosoma sculptured (Fig. 2); short triangle-shaped processes absent from posterior portions of mesonotal dorsum; standing pilosity on body short and sparse; metanotal groove covered by lamellate ridges dorsolaterally; subpetiolar process strongly developed (Fig. 1); compound eyes with more than 20 ommatidia; dorsum of head smooth and shining; area in front of occipital carinae sculptured (Hosoishi and Ogata, 2016).

Distribution in India: Arunachal Pradesh, Bihar\*, Delhi\*, Himachal Pradesh, Jammu & Kashmir, Karnataka, Madhya Pradesh\*, Meghalaya, Orissa, Punjab, Sikkim, Uttarakhand, West Bengal (Bharti et al., 2016; Akbar et al., 2023).

### 2. *Crematogaster contemta* Mayr, 1879 (Figs. 4-6)

*Crematogaster contemta* Mayr, 1879: 685 (w.), India (West Bengal) [Type-depository: Naturhistorisches Museum (NHMW), Wien, Austria].

Material examined. India: Madhya Pradesh: Gwalior, 13 workers, 7-9.VI.2019, Coll. A. Harshana; Indore (College of Agriculture), 5 workers, 29.XII.2023, Coll. A. Harshana; Jabalpur (JNKVV), 5 workers, 12.IX.2020, Coll. A. Harshana; Pachmarhi, 22 workers, 26.III.2022, Coll. A. Harshana. Delhi: Sanjay Van, 3 workers, 01.IV.2023, Coll. A. Harshana. Uttar Pradesh: Jhansi, 7 workers, 29.VII.2023, Coll. A. Harshana.

Diagnosis (Worker): Palp formula 5,3; distinct occipital carina present; antennae 11 segmented with 3 segments club; mandible with five teeth but sometimes 4<sup>th</sup> tooth not distinct; head mostly smooth and shiny; basal portion of metanotum smooth; dorsum of pronotum sculptured to not distinctly sculptured; propodeal spines horn-shaped, down curved (Fig. 4); bicolored species with head, mesosoma, petiole and postpetiole are yellowish-brown while gaster is dark brown to black.

Distribution in India: Arunachal Pradesh, Assam, Delhi\*, Gujarat, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh\*, Maharashtra, Nagaland, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal (Bharti et al., 2016; Akbar et al., 2023).



Figs. 4-6. *Crematogaster contemta* (worker). 4. Body in profile view, 5. Body in dorsal view, 6. Head in full-face view

### 3. *Crematogaster dohrni artifex* Mayr, 1879 (Figs. 7-9)

*Crematogaster artifex* Mayr, 1879: 684 (w.m.), Thailand (Siam) and Singapore (Changi) [Type-depository: NHMW, Wien, Austria].

Material examined. India: Madhya Pradesh: Pachmarhi, 35 workers, 07.IX.2020 & 26.III.2022, Coll. A. Harshana. Meghalaya: 9 workers, 2021, Coll. Pynhunlin Nola K. Dohling; Ri Bhoi (Umiam), 17 workers, 02.XI.2023, Coll. A. Harshana. Uttarakhand: Dehradun (FRI), 1 worker, 26.III.2023, Coll. A. Harshana.

Diagnosis (Worker): Dorsum of head longitudinally striate (Fig. 9); dorsum of pronotum rugose (Fig. 8); propodeal spines moderately long; palp formula 5,3 and fourth maxillary segment from the base is smaller than 3<sup>rd</sup> and 5<sup>th</sup> segments; antennae 11 segmented with 3 segmented club; mandible with 5 teeth. (Polymorphism present among workers, some workers have distinct ocelli).



Figs. 7-9. *Crematogaster dohrni artifex* (worker). 7. Body in profile view, 8. Body in dorsal view, 9. Head in full-face view

Distribution in India: Andaman and Nicobar Islands, Arunachal Pradesh, Karnataka, Madhya Pradesh\*, Meghalaya, Uttarakhand\* (Bharti et al., 2016; Akbar et al., 2023).

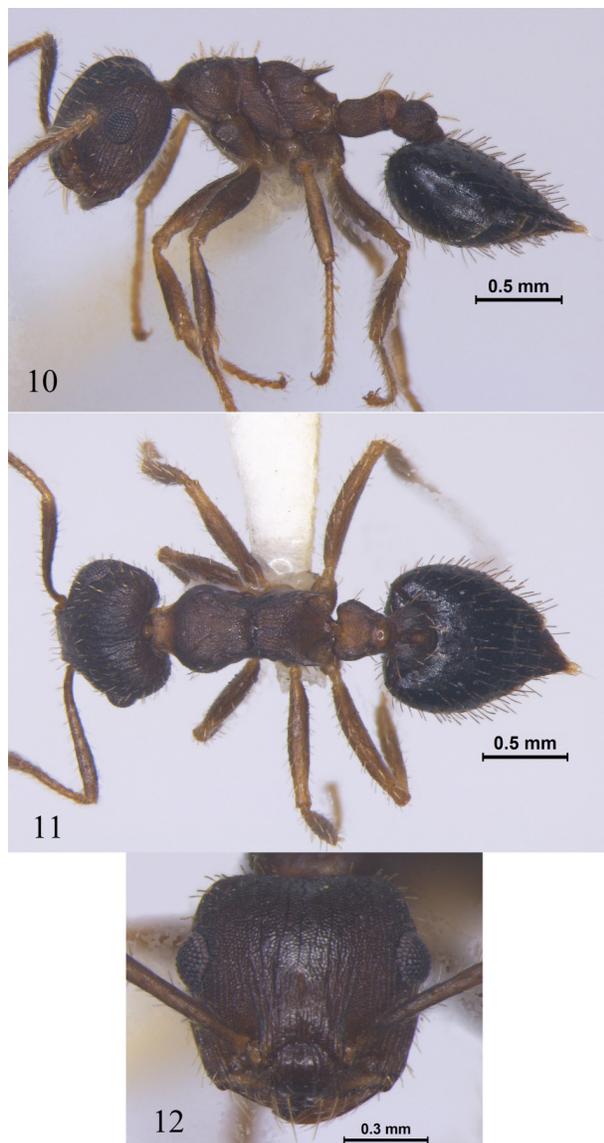
Ecological aspect: Workers were found to be working as scavenger and feeding on dead grasshopper and lizard.

### 4. *Crematogaster rothneyi* Mayr, 1879 (Figs. 10-12)

*Crematogaster rothneyi* Mayr, 1879: 685 (w.), India (West Bengal) [Type-depository: NHMW, Wien, Austria].

=*Crematogaster rothneyi civa* Forel, 1902: 203.

Material examined. India: Madhya Pradesh:



Figs. 10-12. *Crematogaster rothneyi* (worker). 10. Body in profile view, 11. Body in dorsal view, 12. Head in full-face view

Gwalior, 5 workers, 02.V.2023, Coll. A. Harshana; Shivpuri, 3 workers, 7.X.2019, Coll. A. Harshana; Jabalpur (Bhedaghat), 2 workers, 5.IX.2020, Coll. A. Harshana. Uttar Pradesh: Jhansi, 2 workers, 2022, Coll. Venkatesh.

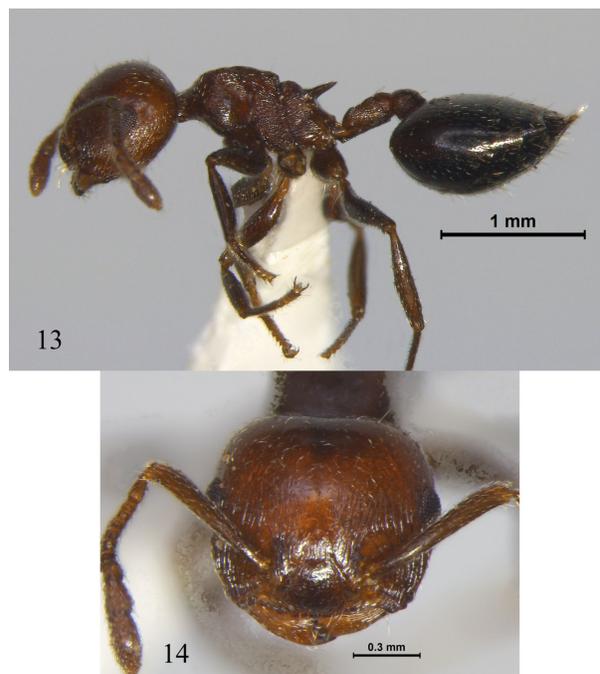
**Diagnosis (Worker):** Propodeal spines short to moderate in length, at apex directed backward and inwards; head with longitudinal striae and reticulation (Fig. 12) while mesosoma, petiole, and postpetiole reticulate; gaster with microreticulation; posterior margin of head slightly concave; antennal scapes extending to posterior margin of the head (SI: 109); body covered with yellowish erect setae.

**Distribution in India:** Bihar, Goa, Gujrat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh\*, Maharashtra, Meghalaya, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal (Bharti et al., 2016; Akbar et al., 2023).

##### 5. *Crematogaster subnuda* Mayr, 1879 (Figs. 13-14)

*Crematogaster subnuda* Mayr, 1879: 682 (w.), India (West Bengal) [Type-depository: NHMW, Wien, Austria].

**Material examined:** India: Bihar: Samastipur (Pusa), 6 workers, 31.V.1932, Coll. Samuel. Chhattishgarh: Balod, 3 workers, VI.2020, Coll. Chunendra. Chhattishgarh: Raipur (IGKV), 15 worker, 08.IX.2023, Coll. A. Harshana. Delhi: IARI, 1 worker, 06.XII.2021, Coll. A. Harshana; Sanjay Van, 6 workers, 01.IV.2023, Coll. A. Harshana. Madhya Pradesh: Damoh, 11 workers, 11.IX.2020, Coll. A. Harshana; Gwalior, 17 workers, 14.IV.2019 & 01.V.2020, Coll. A. Harshana; Indore (College of Agriculture), 5 workers, 08.I.2024, Coll. A. Harshana; Jabalpur (Bhedaghat & JNKVV), 19 workers, 04.IX.2020, Coll. A. Harshana; Pachmarhi, 14 workers, 09.IX.2020, Coll. A. Harshana; Shivpuri, 2 workers, 07.X.2019, Coll. A. Harshana. Jharkhand: Ranchi, 10 workers, 2022, Coll. H. S. Gadad. Punjab: Ludhiana (Punjab Agricultural University), workers,



Figs. 13-14. *Crematogaster subnuda* (worker). 13. Body in profile view, 14. Head in full-face view

30°54'04"N 75°48'59"E, 263m, 09.VII.2023, Coll. A. Harshana; Patiala (Punjabi University), 2 workers, 03.III.2023, Coll. A. Harshana. Uttar Pradesh: Jhansi, 6 workers, 29.VII.2023, Coll. A. Harshana.

Diagnosis (Worker): Palp formula 5,3; antennae 11 segmented with a three segmented club; pronotum sculptured and flat dorsally; propodeum bispinose with slender and straight spines (Fig. 13); most of the head smooth and shining; mandible usually with four teeth; head, mesosoma, petiole, and postpetiole are Chestnut brown while gaster is brownish-black.

Distribution in India: Arunachal Pradesh, Assam, Bihar\*, Chhattishgarh\*, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand\*, Karnataka, Maharashtra, Madhya Pradesh\*, Meghalaya, Mizoram, Nagaland, Orissa, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, Uttarakhand, West Bengal (Bharti et al., 2016; Akbar et al., 2023).

#### 6. *Crematogaster travancorensis* Forel (1902) (Figs. 15-18)

*Crematogaster (Oxygyne) travancorensis* Forel, 1902: 200 (w.), India (Kerala). [Type-depository: Muséum d'histoire naturelle de la Ville de Genève (MHNG), Geneva, Switzerland]

Material examined. India: Madhya Pradesh: Pachmarhi, 7 workers, 26.III.2022, Coll. A. Harshana. Meghalaya: Ri Bhoi (Umiam), 11 workers, 02.XI.2023, Coll. A. Harshana.

Measurements and indices. (Workers, N = 4). EL: 0.18-0.21; HL: 0.81-0.87; HW: 0.87-0.98; PRW: 0.49-0.56; PTW: 0.29-0.31; PPW: 0.26-0.28; SPL: 0.19-0.23; SL: 0.76-0.79; TL: 3.61-4.10; WL: 1.02-1.11; CI: 107-113; OI: 21; REL: 22-24; SI: 80-88; SPI: 18-20.

Diagnosis (Worker). Anterior portion of head with longitudinal rugulae or striate while posterior half microreticulate and shiny; pronotum microreticulate and shiny; propodeal spines long (SPL: 0.19-0.23 mm); body colour dark-brown to black.

Description (Worker). Head. Head broader than long, sides of head slightly convex, posterior margin about straight, posterolateral corners rounded and head covered with semierect pubescence including ventral surface (Fig. 17); palp formula 5,3; mandible triangular with four teeth on masticatory margin; antennae 11-segmented with 3 segmented club, scape distinctly



Figs. 15-18. *Crematogaster travancorensis* (worker). 15. Body in profile view, 16. Body in dorsal view, 17. Head in full-face view, 18. Petiole and postpetiole in dorsal view

surpassing posterior margin of head, and length of second antennal segment about equal to combined length of third and fourth segment, antennae covered with semierect to erect pubescence; anterior clypeal margin about straight to slightly concave, and having a few long setae; compound eyes broadly oval, convex, positioned laterally at about midlength of head with 11-13 ommatidia in maximum diameter.

Mesosoma. Promesonotum about convex in profile view, higher than metanotal groove and propodeum, and having 10 or more yellowish erect setae (Fig. 15); propodeal dorsum about flat and little longer than propodeal declivity; propodeal spines long; distal end of foretibia with pectinate spur and basitarsus with hairy notch; propodeal spiracles oval; mesosoma with sparse semierect to erect pubescence. Metasoma. Petiole in dorsal view slightly diamond-shaped and a little variables, sides not distinctly flared up, and petiole broader than postpetiole; postpetiole bilobed, with less

distinct median impression; petiole and postpetiole both with a pair of yellowish erect setae; gaster covered with semierect to erect pubescence. Sculpture and colour. Dorsum of posterior half of head, promesonotum, and gaster microreticulate and shiny; lower half of head and mandibles striate; antennal scapes seemingly sculptured; most of dorsum of the petiole and postpetiole smooth and shiny. Head, mesosoma, and metasoma darker in colour.

Distribution in India: Kerala, Madhya Pradesh, Manipur, Meghalaya, West Bengal (Kurmi et al., 2015; Bharti et al., 2016; Akbar et al., 2023).

Ecological aspect: Workers were tending aphids, *Cinara* sp. on *Pinus kesiya* (Pinaceae) at Umiam, Meghalaya.

#### ACKNOWLEDGEMENTS

Dr Shingo Hosoishi (Institute of Tropical Agriculture, Kyushu University, Fukuoka, Japan) is acknowledged for his valuable taxonomic opinion and help in improvement of the manuscript; also the Director, ICAR-IARI, and the Head, Division of Entomology, ICAR-IARI, New Delhi for providing the necessary facilities. Dean, College of Agriculture (RVSKVV), Indore (M.P.) is acknowledged for encouragement.

#### FINANCIAL SUPPORT

The first author acknowledges University Grants Commission, New Delhi for providing funds through the National Fellowship for OBC (NFOBC).

#### AUTHOR CONTRIBUTION STATEMENT

AH collected the specimens, performed taxonomic

(Manuscript Received: February, 2024; Revised: February, 2024;

Accepted: February, 2024; Online Published: March, 2024)

Online First in [www.entosocindia.org](http://www.entosocindia.org) and [indianentomology.org](http://indianentomology.org) Ref. No. e24030

studies, and wrote manuscript. DD helped in the planning and conduction of work along with improvement of the manuscript.

#### CONFLICT OF INTEREST

No conflict of interest.

#### REFERENCES

- Akbar S A, Bharti H, Wachkoo A A. 2023. *Crematogaster bonnieae* (Hymenoptera, Formicidae), a new acrobat-ant species from the Western Ghats, India. *Annales Zoologici Fennici* 60(1): 9-17.
- Bharti H, Guénard B, Bharti M, Economo E P. 2016. An updated checklist of the ants of India with their specific distributions in Indian states (Hymenoptera, Formicidae). *ZooKeys* 551: 1-83.
- Blaimer B B. 2012. A subgeneric revision of *Crematogaster* and discussion of regional species-groups (Hymenoptera: Formicidae). *Zootaxa* 3482: 47-67.
- Bolton B. 2024. An online catalog of the ants of the world. Available at: <https://antcat.org/catalog/429870> Accessed: 16 February 2024
- Buren W F. 1959. A review of the species of *Crematogaster* sensu stricto, in North America (Hymenoptera: Formicidae), part I. *Journal of the New York Entomological Society* 66: 119-134.
- Hosoishi S. 2020. Taxonomic review of the *Crematogaster ransonneti*-group in Asia, with description of a new species from Malaysia (Hymenoptera: Formicidae: Myrmicinae). *Raffles Bulletin of Zoology* 68: 759-768.
- Hosoishi S, Ogata K. 2016. Systematics and biogeography of the ant genus *Crematogaster* Lund subgenus *Orthocrema* Santschi in Asia (Hymenoptera: Formicidae). *Zoological Journal of the Linnean Society* 176: 547-606.
- Kurmi A, Thomas M, Namdev B K, Sheela S, Pachori R. 2015. Lac insect associated ants and their distribution in Lac eco-systems of Madhya Pradesh. *International Journal of Agriculture Sciences* 7(15): 915-917.
- Marlier J F, Quinet Y, de Biseau J C. 2004. Defensive behaviour and biological activities of the abdominal secretion in the ant *Crematogaster scutellaris* (Hymenoptera: Myrmicinae). *Behavioural Processes* 67: 427-440.