



ANTS (INSECTA: HYMENOPTERA: FORMICIDAE) OF BETHUADAHARI WILDLIFE SANCTUARY, NADIA, WEST BENGAL, INDIA

PARAMITA BASU, NEENA TAK AND A. K. SANYAL
Zoological Survey of India, New Alipore, Kolkata- 700053
E mail : paramitabasu1@gmail.com

INTRODUCTION

The state of West Bengal extends from the Himalayas in the north to the Bay of Bengal in the south. It lies between 20°31' N and 27°12' N latitude and 85°50' E and 89°52' E longitude covering a geographic area of 88,752 sq. km. Just being 2.70% of the country's total geographical area. West Bengal has 5 National Parks, 15 Sanctuaries, 2 Tiger Reserves and 1 Biosphere Reserve. The state has 4064 sq. km. of forests under protected areas network which is 34% of the State's total forest area and 4.54% of the total geographical area.

Ants are the most highly organized, polymorphic, social insects of the family Formicidae, having three distinct forms- 1. the perfect and fertile female, called queen, 2. the fertile male, called drone and 3. the sterile and wingless female forming castes of workers (major or minor) and soldiers. The major factor responsible for their ecological success is division of labour, different castes performing different biological functions. The identification of ants is mainly based on the worker caste.

Ants have contribution in nutrient cycling, decomposition of organic matter, soil formation, bioturbation, and in the suppression of soil borne diseases. They are often used as biological control agents of insect pests and fungal pathogens of

various tree species. According to Hölldobler & Wilson, 1990 tropical ants are predators, scavengers, and generalist foragers. Again, ants are sensitive to disturbance and rehabilitation so they are used as soil bioindicators of human impact or restoration success.

Rothney (1889) published an extensive note on ants of India. Later Forel (1900a, b, c) studied the formicidae fauna of India and Ceylon. Bingham's (1903) ant fauna of British India is the main source of knowledge of ants. Tiwari *et al.* (1993) studied extensively the ant fauna of West Bengal and later Ghosh *et al.* (2005) has worked out the ants of Ravindra Sarowar, Kolkata.

STUDY AREA

Bethuadahari Wildlife Sanctuary, geographically positioned at 23.30° N and 88.30° E, situated in Nadia district, West Bengal, which cover an area of 3,927 sq. km. and recorded forest area is only 12 sq. km. (0.30%). The sanctuary is categorized as Northern Tropical Moist Deciduous Forest- Group 3 and Subgroup C and covers an area of 0.6686 sq. km. or 66.87 Hacter or 165.15 acre and 3 villages are in the fringe of the sanctuary. This sanctuary was established under Notification No. 2772 on 19.08.1998.

As per the Champion and Seth's classification the study area is a forest of Tropical Moist Deciduous type. The upper canopy is mainly

comprised of Teak (*Tectona grandis*), Arjun (*Terminalia arjuna*), Siris (*Albizia lebbek*), Sissoo (*Delbergia sissoo*), Sal (*Shorea robusta*), Mahogany (*Swietenia macrophylla*) and Ficus (*Ficus* sp.). The middle and lower canopies are not well demarcated, they comprise Jamun (*Syzigium cumit*), Minjiri (*Cassia* sp.), Bael (*Aegle marmelos*), Atha (*Annona squamosa*), Hamjam (*Polyalthia suberosa*), etc. In the partly opened up areas weeds such as *Cassia tora*, *Ageratum* sp., etc. are found to thrive as the major ground vegetations. In the water logged areas ground flora is dominated by *Polygonum* sp. and various species of *Colocasia*. Grasses like *Imperata* sp. (Ulloo grass), *Paspalum* sp., *Panicum* sp., *Cynodon* sp., *Brachiaria* sp., etc. are also occurring sparsely.

RESULTS AND DISCUSSION

Systematic Account : Systematics and description of ant species identified from this sanctuary are as follows:

Order HYMENOPTERA

Family FORMICIDAE

Sub-family PONERINAE Lepeletier

1. *Sphinctomyrmex taylori* Forel
2. *Anochetus graeffei* Mayr
3. *Diacamma rugosum sculptum* (Jerdon)
4. *Pachycondyla (Bothroponera) rufipes* (Jerdon)
5. *Pachycondyla (Bothroponera) bispinosa* Smith
6. *Pachycondyla (Mesoponera) melanaria* Emery

Sub-family FORMICINAE Lepeletier

7. *Polyrachis bicolor* Smith
 8. *Oecophylla smaragdina* (Fabricius)
- ##### Sub-family MYRMICINAE Lepeletier
9. *Phidologeton affinis* (Jerdon)
 10. *Solenopsis geminata* (Fabricius)
 11. *Meranoplus bicolor* (Guerin)
 12. *Myrmecaria brunnea* Saunders
 13. *Monomorium pharaonis* (Linnaeus)
 14. *Monomorium floricola* (Jerdon)
 15. *Tetramorium (Triglyphothrix) lanuginosum* Mayr
 16. *Tetramorium (Triglyphothrix) walshi* (Forel)

Sub-family PSEUDOMYRMECINAE Emery

17. *Tetraponera (Tetraponera) rufonigra* (Jerdon)
18. *Tetraponera (Tetraponera) nigra* (Jerdon)
19. *Tetraponera (Tetraponera) allaborans* (Walker)

Key to the sub-families of family

FORMICIDAE

1. Petiole of the abdomen one jointed.....2
- Petiole of the abdomen two jointed.....3
2. A more or less marked constriction between basal two segments of abdomen....Sub-family *Ponerinae*
- No constriction between basal two segments of abdomen.....Sub-family *Formicinae*
3. Petiole not so elongate, the anterior node with a long petiole anteriorly and a short petiole posteriorly.....Sub-family *Myrmicinae*
- Petiole remarkably elongate, generally the anterior node is elongated petiolate, sometimes the posterior node is also petiolate giving flexibility to the abdomen.....Sub-family *Pseudomyrmecinae*

Family FORMICIDAE

Sub-family PONERINAE Lepeletier

Genus *Sphinctomyrmex*

Sphinctomyrmex taylori Forel

1900. *Sphinctomyrmex taylori* Forel, *J. Bombay Nat. Hist. Soc.*, **13**:328.

1993. *Sphinctomyrmex taylori* Tiwari et al., *State Fauna Series: Fauna of West Bengal*, **3**(8):243.

Material examined: 2 workers, soil, 23. xi. 2009, coll. P. Basu.

Distribution: India: West Bengal.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Anochetus*

Anochetus graeffei Mayr

1870. *Anochetus graeffei* Mayr, *Verh. zool.-bot. Ges. Wien*, **20**:961.

Material examined: 3 workers, leaf litter, 27. v. 2009; 1 worker, leaf litter, 24. vi. 2009; 2 workers, leaf litter, 21. vii. 2009; 2 workers, leaf litter, 19. viii. 2008, coll. P. Basu.

Distribution : India: Karnataka, Sikkim, West Bengal.

Elsewhere: China, Fiji, Java, Myanmar, Oceania, Sri Lanka.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Diacamma*

Diacamma rugosum sculptum (Jerdon)

1851. *Ponera sculpta* Jerdon, *Madras J. Lit. Sci.*, 17: 117. Worker.

1993. *Diacamma rugosum sculptum*, Tiwari *et al.*, *State Fauna Series: Fauna of West Bengal*, 3(8): 234.

Material examined: 3 workers, plant (Hamjam, Atha), 13. ix. 2008; 1 worker, plant (Hamjam, Sissoo), 13. vi. 2009, coll. P. Basu.

Distribution: India: Andaman & Nicobar Islands, Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Sikkim, Tamil Nadu, West Bengal.

Elsewhere: Borneo, Philippines, Singapore, Sri Lanka, Taiwan.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Pachycondyla*

Pachycondyla (Bothroponera) rufipes (Jerdon)

1851. *Ponera rufipes* Jerdon, *Madras J. Lit. Sci.*, 17: 119, Worker.

1911. *Pachycondyla (bothroponera) rufipes*, Emery, *Genera Insect*, 118: 76-77.

1993. *Bothroponera rufipes*, Tiwari *et al.*, *State Fauna Series: Fauna of West Bengal*, 3(8): 233.

Material examined: 7 workers, vegetations, 13. vi. 2009; 5 workers, leaf litter, soil, vegetation, 12. ix. 2009, coll. P. Basu.

Distribution: India: Andaman & Nicobar Islands, Assam, Karnataka, Kerala, Maharashtra, Meghalaya, Orissa, Sikkim, Tripura, Western India (from Kanara to Malabar), West Bengal.

Elsewhere: Myanmar, Sri Lanka.

Pachycondyla (Bothroponera) bispinosa Smith

1858. *Bothroponera bispinosa* F. Smith, *Cat. Hym. Brit. Mus.*, 6: 107, Worker.

1951. *Bothroponera bispinosa*, Chapman and Capco, *Monogr. Inst. Sci. Tech.*, Manila (Check List Ants Asia), 1: 49.

1993. *Bothroponera bispinosa*, Tiwari *et al.*, *State Fauna Series: Fauna of West Bengal*, 3(8): 232.

Material examined: 2 workers, leaf litter, soil, vegetation, 12. ix. 2009; 2 workers, litter, 11. x. 2008, coll. P. Basu.

Distribution: India: Assam, West Bengal.

Elsewhere: Myanmar.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Pachycondyla (Mesoponera) melanaria Emery

1893. *Mesoponera melanaria* Emery, *Ann. Soc. Ent. Fr.*: 260, Worker.

Material examined: 4 workers, leaf litter, 04. iv. 2009; 5 workers, leaf litter, 23. v. 2009; 2 workers, leaf litter of Teak, 15. viii. 2009, coll. P. Basu.

Distribution: India: Karnataka, Kerala. *Elsewhere:* Myanmar, Singapore, Sri Lanka, Sumatra.

Remark: This is recorded for the first time from West Bengal.

Sub-family FORMICINAE Lepeletier

Genus *Polyrhachis*

Polyrhachis bicolor Smith

1858. *Polyrhachis bicolor* Smith, *Cat. Hym. Brit. Mus.*, 6: 65, Female.

1951. *Polyrhachis (Myrmhopla) bicolor*, Chapman and Capco, *Monogr. Inst. Sci. Tech.*, Manila (Check List Ants Asia), 1: 286.

Material examined: 3 workers, vegetations, 22. iii. 2010, coll. P. Basu.

Distribution: India: Meghalaya, West Bengal.

Elsewhere: Borneo, Java, Myanmar, Philippines, Singapore, Sumatra.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Oecophylla*

Oecophylla smaragdina (Fabricius)

1775. *Formica smaragdina* Fabricius, *Syst. Ent.* : 828, Worker.

1951. *Oecophylla smaragdina*, Chapman and Capco, *Monogr. Inst. Sci. Tech.*, Manila (Check List Ants Asia), 1: 220.

1993. *Oecophylla smaragdina*, Tiwari *et al.*, *State Fauna Series: Fauna of West Bengal*, 3(8): 277.

Material examined: 3 workers, vegetations, 13. vi. 2009, coll. P. Basu.

Distribution: India: Andaman, Assam, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, North-West Himalayas, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal.

Elsewhere: Australia, Java, Malaysia, Myanmar, New Guinea, South China, Sri Lanka.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Sub-family MYRMICINAE Lapeletier
Genus *Pheidologeton*

Pheidologeton affinis (Jerdon)

1851. *Ocodoma affinis* Jerdon, *Madras J. Lit. Sci.*, 17: 110, Worker, Soldier.

1994. *Pheidologeton affinis*, Tiwari, et al., *State Fauna Series: Fauna of West Bengal*, 5(8): 52.

Material examined : 10 soldier max, 5 soldier min, 60 workers, vegetation, 13. vi. 2009, coll. P. Basu.

Distribution : India: Assam, Karnataka, Kerala, Maharashtra, Manipur, Rajasthan, Tamil Nadu, West Bengal.

Elsewhere: Malaysia, Myanmar, Sri Lanka.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Solenopsis*

Solenopsis geminata (Fabricius)

1804. *Atta geminata* Fabricius, *Syst. Piez.*: 423, Worker.

1862. *Formica geminata*, Roger, Berl. Ent. Zeitschr., 6: 289, Male, Female, Worker.

1993. *Solenopsis geminata*, Tiwari et al., *State Fauna Series: Fauna of West Bengal*, 3(8): 263.

Material examined : 1 worker, leaf litter, 12. ix. 2009; 2 workers, litter, 11. x. 2008, coll. P. Basu.

Distribution : India: Karnataka, Himachal Pradesh, Jammu & Kashmir, Rajasthan.

Elsewhere : Spread over both the hemispheres, Oceania, Philippines, Sri Lanka.

Remark : This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Meranoplus*
Meranoplus bicolor (Guerin)

1844. *Cryptocerus bicolor* Guerin, *Iconogr. Regne. Anim. Insect*, 7: 425.

1993. *Meranoplus bicolor*, Tiwari et al., *State Fauna Series: Fauna of West Bengal*, 3(8): 254.

Material examined: 1 worker, plant (Atha, Hamjam), 13. ix. 2008; 1 worker, vegetation, 13. vi. 2009; 1 worker, vegetation, 18. vii. 2009, coll. P. Basu.

Distribution: India: Gujarat, Karnataka, Kerala, Maharashtra, Manipur, Orissa, Rajasthan, Tamil Nadu, Tripura, Punjab, Uttar Pradesh, West Bengal.

Elsewhere: China, Bhutan, Indonesia, Malaysia, Myanmar, Nepal, Pakistan, Singapore, Sri Lanka, Thailand.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Myrmicaria*
Myrmicaria brunnea Saunders

1841. *Myrmicaria brunnea* Saunders, *Trans. Ent. Soc. Lond*, 3: 57, Male.

1903. *Myrmicaria brunnea*, Bingham, *Fauna Brit. India, Hym.*, 2: 118, Male, Female, Worker.

1993. *Myrmicaria brunnea*, Tiwari et al., *State Fauna Series: Fauna of West Bengal*, 3(8): 257.

Material examined: 2 workers, leaf litter, 27. v. 2009; 1 worker, leaf litter, 24. vi. 2009; 4 workers, leaf litter, 21. vii. 2009; 3 workers, leaf litter, 19. viii. 2008; 1 worker, leaf litter, 08. ix. 2008, coll. P. Basu.

Distribution: India: Karnataka, Kerala, Meghalaya, Tamil Nadu, West Bengal.

Elsewhere: China, Indonesia, Myanmar, Sumatra, Sri Lanka.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Monomorium*
Monomorium pharaonis (Linnaeus)

1758. *Formica pharaonis* Linnaeus, *Syst. Nat.*, 1: 580, Worker.

1994. *Monomorium pharaonis*, Wheeler et al., *Great Lakes Entomol.*, 26 (4): 297-310.

Material examined : 2 workers, vegetations, 24. vi. 2009, coll. P. Basu.

Distribution: India: Gujarat, Haryana, Himachal Pradesh, Karnataka, Meghalaya, Punjab, Rajasthan, Uttarakhand, Uttar Pradesh, West Bengal.

Elsewhere : Spread over the tropical region of both the hemispheres, Oceania.

Remark : This is new record from Bethuadahari WLS as well as Nadia district.

Monomorium floricola (Jerdon)

1851. *Atta floricola* Jerdon, *Madras J. Lit. & Sci.*, **17**: 107, Worker.

1987. *Monomorium floricola*, Bolton, *Bull. Br. Mus. (Nat. Hist.) Entomol.*, **54** (3): 309 (Syns).

1993. *Monomorium floricola*, Tiwari *et. al.*, *State Fauna Series: Fauna of West Bengal*, **3**(8): 256.

Material examined: 2 workers, tree (Teak, Sal), 27. v. 2009; 3 workers, tree (Teak, Sal), 24. vi. 2009; 3 workers, tree (Teak), 19. viii. 08, coll. P. Basu.

Distribution: India: Andaman & Nicobar Islands, Karnataka, Kerala, Manipur, Meghalaya, Orissa, Tamil Nadu, West Bengal.

Elsewhere: Oceania, Sri Lanka.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Genus *Tetramorium*

Tetramorium (Triglyphothrix)

lanuginosum Mayr

1870. *Tetramorium lanuginosum* Mayr, *Verh. zool.- bot. Ges. Wien*, **20**: 976, Worker.

1995. *Tetramorium lanuginosum*, Bolton, *New Genl. Cat. Ants World*: 410.

Material examined : 1 worker, leaf litter, 27. v. 2009; 3 workers, leaf litter, 24. vi. 2009; 1 worker, leaf litter, 21. vii. 2009; 1 worker, leaf litter, 19. viii. 2008; 1 worker, leaf litter, 08. ix. 2008, coll. P. Basu.

Distribution: India: Assam, Maharashtra, Meghalaya, Kerala, Orissa, West Bengal.

Elsewhere: Australia, Borneo, England, Germany, Japan, Java, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Singapore, Sri Lanka, Sumatra.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Tetramorium (Triglyphothrix) walshi (Forel)

1890. *Triglyphothrix walshi* Forel, *Ann. Soc. Ent. Belg.*, **34**: 107, Worker, Female.

1976. *Triglyphothrix walshi*, Bolton, *Bull. Br. Mus. Nat. Hist. (Ent.)*, **34** (5): 281-379.

Material examined: 1 worker, leaf litter, 27. v. 2009; 3 workers, leaf litter, 24. vi. 2009; 1 worker, leaf litter, 21. vii. 2009; 1 worker, leaf litter, 19. viii. 2008; 1 worker, leaf litter, 08. ix. 2008, coll. P. Basu.

Distribution: India: Arunachal Pradesh, Himachal Pradesh, Karnataka, Kerala, Meghalaya, Orissa, Rajasthan, Tamil Nadu, West Bengal.

Elsewhere: China, Philippines, Singapore, Sri Lanka.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Sub-family PSEUDOMYRMECINAE Emery

Genus *Tetraponera*

Tetraponera (Tetraponera) rufonigra (Jerdon)

1851. *Eciton rufonigra* Jerdon, *Madras J. Lit. Sc.*, **17**: 111, Worker.

1951. *Tetraponera (Tetraponera) rufonigra*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1**: 81.

1993. *Tetraponera rufonigra*, Tiwari *et al.*, *State Fauna Series: Fauna of West Bengal*, **3**(8): 248.

Material examined: 1 worker, soil, 24. viii. 2008, coll. P. Basu.

Distribution: India: Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Manipur, Meghalaya, Orissa, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere: Cambodia, China, Indonesia, Java, Myanmar, Singapore, Sri Lanka, Sumatra.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

Tetraponera (Tetraponera) nigra (Jerdon)

1851. *Eciton nigra* Jerdon, *Madras J. Lit. Sc.*, **17**: 112, Worker.

1951. *Tetraponera (Tetraponera) nigra*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila (Check List Ants Asia)*, **1**: 80.

1993. *Tetraponera rufonigra*, Tiwari et. al., *State Fauna Series: Fauna of West Bengal*, 3(8): 248.

Material examined: 1 worker, plant (Hamjam, Atha), 13. ix. 2008; 1 worker, vegetation, 11. x. 2008; 1 worker, vegetation, 08. iii. 2009; 3 workers, vegetation, 22. iii. 2010, coll. P. Basu.

Distribution: India: Andhra Pradesh, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Punjab, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere: Bangladesh, Borneo, Java, Malaysia, Myanmar, Philippines, Sri Lanka.

Remark: This is new record from Bethuadahari WLS as well as Nadia district.

***Tetraponera (Tetraponera) allaborans* (Walker)**

1859. *Pseudomyrma allaborans* Walker, *Ann. Mus. Nat. Hist.*, 4: 375, Male.

1951. *Tetraponera (Tetraponera) allaborans*, Chapman and Capco, *Monogr. Inst. Sci. Tech., Manila* (Check List Ants Asia), 1: 78.

1993. *Tetraponera rufonigra*, Tiwari et. al., *State Fauna Series: Fauna of West Bengal*, 3(8): 247.

Material examined: 1 worker, leaf litter, 27. v. 2009; 1 worker, leaf litter, 24. vi. 2009; 2 workers, leaf litter, 21. vii. 2009; 2 workers, leaf litter, 19. viii. 2008; 3 workers, leaf litter, 08. ix. 2008, coll. P. Basu.

Distribution: India: Assam, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Meghalaya, Orissa, Punjab, Sikkim, Tamil Nadu, West Bengal.

Elsewhere: China, Indonesia, Myanmar, Philippines, Singapore, Sri Lanka, South-East Asia to Western Australia.

SUMMARY

The manuscript deals with 19 species distributed under 13 genera of the family Formicidae. The present formicid specimens are belonged to four subfamilies namely Ponerinae with 4 genera, and 6 species; Formicinae with 2 genera and 2 species; Myrmicinae with 6 genera and 8 species and 1 genus and 3 species of Pseudomyrmecinae. Out of 19 species 17 species are new record from Bethuadahari Wildlife Sanctuary as well as Nadia District and 1 species like *Pachycondyla (Mesoponera) melanaria* Emery is new record from West Bengal.

ACKNOWLEDGEMENT

The authors are grateful to Dr. K. Venkataraman, Director, Zoological Survey of India for providing all the facilities and for his kind support and encouragement during the course of this work.

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