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A first comprehensive checklist of ants (Hymenoptera: Formicidae) from Chintamoni Kar bird sanctuary, West Bengal, India

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Abstract

Chintamoni Kar Bird Sanctuary (CKBS), West Bengal, is a small yet biodiverse urban forest fragment primarily known for its avifauna, while its insect diversity remains poorly documented. A previous faunal assessment by Mitra et al. (2018) recorded nine ant species as part of a broader insect survey. In the present study, a dedicated survey of ants conducted in October 2024 documented 34 species representing 24 genera across five subfamilies. When combined with the records of Mitra et al., the cumulative checklist for CKBS now comprises 35 species belonging to 25 genera. The subfamily Myrmicinae was the most species-rich, with 13 species (37.14%), followed by Formicinae with 12 species (34.29%) and Ponerinae with 5 species (14.29%). Several species are reported here for the first time from the sanctuary, providing valuable baseline data for future ecological and conservation monitoring of ant diversity in this protected area.

key words: Formicidae, urban biodiversity, faunal inventory, India, baseline survey

1. Introduction

Ants represent one of the most ecologically dominant and taxonomically diverse insect groups, comprising 16 subfamilies, 346 genera, and 14,345 valid species worldwide (Bolton, 2025). In India, the ant fauna comprises 887 valid species and subspecies (Bharti et al., 2016; AntWiki, 2025). Over 140 million years of evolutionary history have

established ants as ubiquitous components of terrestrial ecosystems (Hölldobler & Wilson, 1990; Moreau et al., 2006). Globally, their populations are estimated at 20 quadrillion individuals with a collective biomass of roughly 12 megatons of dry carbon, equivalent to 20 percent of human biomass and surpassing the combined biomass of all wild birds and mammals (Schultheiss et al., 2022). This remarkable abundance, particularly pronounced in tropical and subtropical regions, highlights their critical roles in ecosystem functioning and their value as indicators of environmental change (Guénard et al., 2012).

Ants contribute to ecosystem processes as ecosystem engineers through soil bioturbation, seed dispersal, predation, and nutrient cycling (Folgarait, 1998; Taylor et al., 2018). Their communities respond sensitively to habitat disturbance, making them excellent bioindicators of ecosystem health. Shifts in species composition, abundance, and functional group structure often mirror broader environmental changes across spatial and temporal scales (Andersen, 1997; Underwood & Fisher, 2006). Thus, documenting local ant diversity not only enhances faunal inventories but also provides valuable insights into ecological stability and conservation priorities.

Within this context, Chintamoni Kar Bird Sanctuary (CKBS) in Narendrapur, West Bengal, represents a unique setting. It is the only protected forest fragment within the urban limits of Kolkata, spanning just 17 acres, yet sustaining over 150 bird species alongside diverse invertebrate communities (Forest Department, 2005; Mitra et al., 2018). Despite its small size, CKBS functions as an urban biodiversity refuge. However, its insular nature also subjects it to edge effects, invasive species colonization, and microclimatic alterations, rendering it a natural laboratory for studying urban ecological dynamics.

Although the sanctuary's avifauna and flora have been relatively well studied, its insect diversity, particularly ants, remains poorly explored. The only prior record comes from Mitra et al. (2018), who documented nine ant species during a broad insect survey, insufficient for understanding community structure, functional guilds, or conservation implications. Given the ecological significance of ants and their sensitivity to disturbance, a comprehensive faunal inventory is necessary for monitoring ecosystem health, detecting invasive taxa, and informing management interventions.

The present study addresses this gap by conducting the first dedicated survey of ants in CKBS. A total of 35 species representing five subfamilies are documented, thereby establishing critical baseline data for future ecological research, long-term monitoring, and conservation planning in this urban protected area.

2. Materials and methods

Study Area

The study was conducted at Chintamoni Kar Bird Sanctuary (CKBS) (Fig. 1), located in Narendrapur, South 24 Parganas, West Bengal, India (22.4293° N, 88.4007° E). The sanctuary spans approximately 17 acres and represents the only protected forest fragment within Kolkata's urban limits.

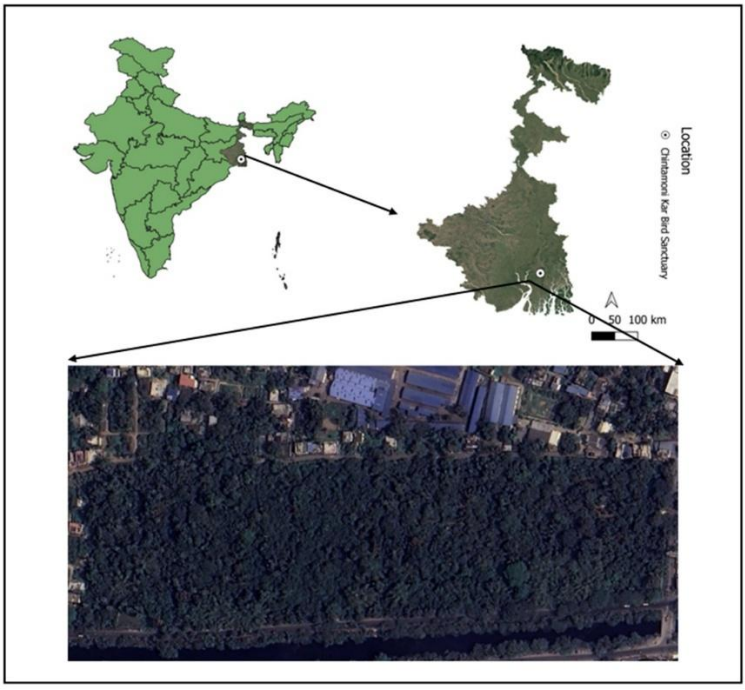

Figure 1. Map showing the location of Chintamoni Kar Bird Sanctuary (CKBS), West Bengal, India,

Sampling Period and Strategy

Fieldwork was conducted during the post-monsoon season (October 2024), a period characterized by high insect activity. To obtain a representative inventory of the ant fauna. Sampling sites were selected to encompass the sanctuary's habitat heterogeneity, including areas with differing vegetation structure, ground cover, and litter depth.

Collection Methods

Ant specimens were collected using a combination of methods which include hand picking, pitfall trapping, and Winkler extraction. Hand collection was employed to sample actively foraging ants from vegetation, the ground surface, and beneath logs. Pitfall traps, consisting of plastic containers (6 cm diameter × 9 cm depth) partially filled with a soap solution, were deployed at ground level to capture surface-active species. Additionally, leaf litter samples were sifted and processed using Winkler extractors to obtain cryptic and litter-dwelling ants. This multi-method approach maximized the likelihood of recording species across different ecological niches.

Preservation and Morphological Examination

Specimens were preserved in 100% absolute ethanol immediately after collection to maintain morphological integrity and to allow for potential molecular analyses. Morphological

examinations were conducted using a Nikon SMZ1500 stereo zoom microscope, providing magnification up to 112.5× for detailed diagnostic assessments.

Taxonomic Identification

Taxonomic identification was carried out using standard entomological keys and references, including Bingham (1903) and Bolton (1994). Online resources such as AntWiki and AntWeb were also consulted for updated taxonomy, distribution data, and high-quality reference images.

Specimen Imaging and Processing

High-resolution photographs of specimens were captured using a Nikon D5600 DSLR camera equipped with a Laowa 25 mm f/2.8 2.5–5× Ultra Macro lens. The setup included a NiSi NM-200S macro focusing rail, Digitek DFL-088 flash, and a Radiant diffuser to ensure stability and uniform illumination. Post-processing was performed in Adobe Photoshop 2023 to enhance clarity and contrast for publication-quality documentation.

Mapping and Spatial Analysis

A georeferenced spatial map of the study area (Fig. 1) was prepared using QGIS software (version 3.34.0). Sampling locations were marked to visualize habitat coverage and to aid in spatial interpretation of ant distribution within the sanctuary.

3. Results & Discussion

Survey of ant diversity in Chintamani Kar Bird Sanctuary (CKBS), West Bengal, revealed the presence of 35 species distributed across 25 genera and 5 subfamilies (Table 1, Fig. 2-35). The subfamily Myrmicinae emerged as the most dominant, comprising 13 species (37.14%), followed by Formicinae with 12 species (34.29%). Ponerinae was represented by 5 species (14.29%), while Dolichoderinae accounted for 3 species (8.57%) and Pseudomyrmecinae for 2 species (5.71%). At the genus level, the distribution showed Myrmicinae with 10 genera (40.00%), followed by Formicinae with 6 genera (24.00%), Ponerinae with 5 genera (20.00%), Dolichoderinae with 3 genera (12.00%), and Pseudomyrmecinae with 1 genus (4.00%) (fig. 36). This rich representation of both Formicinae and Myrmicinae aligns with patterns commonly observed in tropical and subtropical regions of India and the wider Oriental region, where these groups tend to dominate due to their wide ecological tolerances and adaptability (Dad et al., 2019; Hazarika et al., 2019; Subedi et al., 2021).


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Figures 2-35. Ant diversity in Chintamani Kar Bird Sanctuary. 2. *Dolichoderus affinis glabripes* 3. *Tapinoma melanocephalum* 4. *Technomyrmex albipes* 5. *Anoplolepis gracilipes* 6. *Camponotus compressus* 7. *Camponotus irritans* 8. *Camponotus oblongus* 9. *Camponotus parius* 10. *Camponotus sylvaticus* 11. *Nylanderia bourbonica* 12. *Oecophylla smaragdina* 13. *Paratrechina longicornis* 14. *Polyrhachis illaudata* 15. *Polyrhachis rastellata* 16. *Polyrhachis tibialis* 17. *Carebara diversa* 18. *Cataulacus latus* 19. *Crematogaster rogenhoferi* 20. *Crematogaster sagei* 21. *Crematogaster subnuda* 22. *Meranoplus bicolor* 23. *Monomorium pharaonic* 24. *Myrmicaria brunnea* 25. *Pheidole indica* 26. *Pheidole smythiesii* 27. *Tetramorium bicarinatum* 28. *Trichomyrmex destructor* 29. *Bothroponera tesseronoda* 30. *Brachyponera jerdonii* 31. *Diacamma rugosum* 32. *Leptogenys kitteli* 33. *Pseudoneoponera rufipes* 34. *Tetraponera rufonigra* 35. *Tetraponera nigra*

Table 1. Ant diversity in Chintamani Kar Bird Sanctuary (CKBS), West Bengal.

Sr. No.	Species	Subfamily
1.	*Dolichoderus affinis glabripes* Forel, 1895	Dolichoderinae
2.	*Tapinoma melanocephalum* (Fabricius, 1793)	
3.	*Technomyrmex albipes* (Smith, F., 1861)	
4.	*Anoplolepis gracilipes* (Smith, F., 1857)	Formicinae
5.	*Camponotus compressus* (Fabricius, 1787)	
6.	*Camponotus irritans* (Smith, F., 1857)	
7.	*Camponotus oblongus* (Smith, F., 1858)	
8.	*Camponotus parius* Emery, 1889	
9.	*Camponotus sylvaticus* (Olivier, 1792)	
10.	*Nylanderia bourbonica* (Forel, 1886)	
11.	*Oecophylla smaragdina* (Fabricius, 1775)	
12.	*Paratrechina longicornis* (Latreille, 1802)	
13.	*Polyrhachis illaudata* Walker, 1859	
14.	*Polyrhachis rastellata* (Latreille, 1802)	
15.	*Polyrhachis tibialis* Smith, F., 1858	
16.	*Carebara diversa* (Jerdon, 1851)	Myrmicinae
17.	*Cataulacus latus* Forel, 1891	
18.	*Crematogaster rogenhoferi* Mayr, 1879	
19.	*Crematogaster sagei* Forel, 1902	
20.	*Crematogaster subnuda* Mayr, 1879	
21.	*Meranoplus bicolor* (Guérin-Méneville, 1844)	

Sr. No.	Species	Subfamily
22.	*Monomorium pharaonis* (Linnaeus, 1758)	
23.	*Myrmicaria brunnea* Saunders, 1842	
24.	*Pheidole indica* Mayr, 1879	
25.	*Pheidole smythiesii* Forel, 1902	
26.	*Tetramorium bicarinatum* (Nylander, 1846)	
27.	*Trichomyrmex destructor* (Jerdon, 1851)	
28.	*Solenopsis geminate* (Fabricius, 1804) recorded by Mitra et al., 2018	
29.	*Bothroponera tesseronoda* (Emery, 1877)	Ponerinae
30.	*Brachyponera jerdonii* (Forel, 1900)	
31.	*Diacamma rugosum* (Le Guillou, 1842)	
32.	*Leptogenys kitteli* (Mayr, 1870)	
33.	*Pseudoneoponera rufipes* (Jerdon, 1851)	
34.	*Tetraponera nigra* (Jerdon, 1851)	Pseudomyrmecinae
35.	*Tetraponera rufonigra* (Jerdon, 1851)	

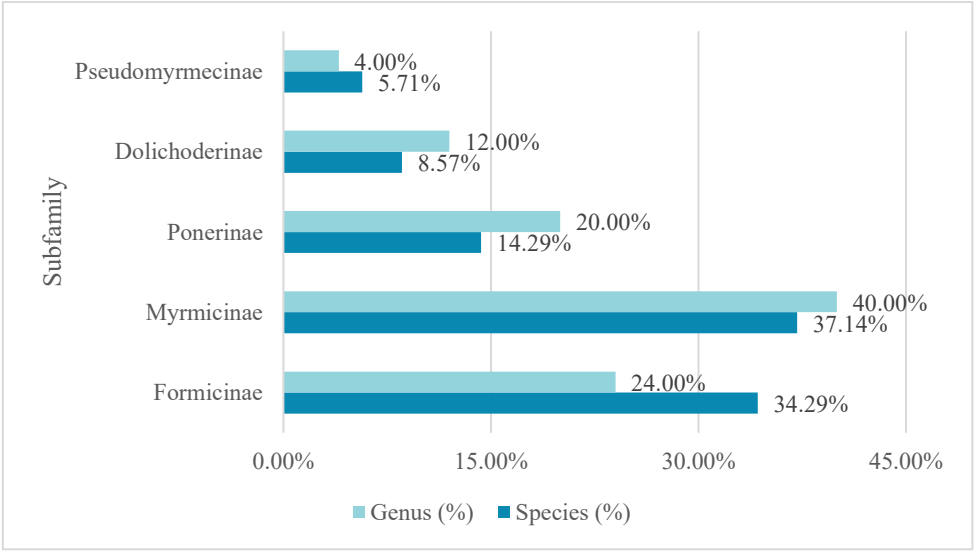

Figure 36. Percentage distribution of ant subfamilies by genera and species richness.

At the genus level, *Camponotus* was the richest, contributing five species to the sanctuary's fauna, followed by *Crematogaster* and *Polyrhachis* with three species each, also demonstrated significant diversity, highlighting the presence of varied microhabitats and resources that support these ecologically versatile genera. Several genera, such as *Diacamma* and *Leptogenys* from the subfamily Ponerinae, are known for their predatory behavior and preference for less-disturbed environments, suggesting that aside from areas subject to urban encroachment, CKBS still retains patches of structurally complex, semi-natural habitats.

These findings gain additional urgency against the backdrop of the sixth mass extinction, driven largely by anthropogenic activities, which is significantly impacting biodiversity across the globe particularly within the invertebrate strata (Cowie et al., 2022). In response, there has

been an intensified effort to make inventories of invertebrates to better understand and conserve these critical components of ecosystems (Baidwan et al., 2024). The detailed checklist from CKBS contributes meaningfully to this global conservation effort, capturing a rich snapshot of ant biodiversity within an urban forest fragment.

Compared to earlier surveys, most notably by Mitra et al. (2018), which documented only nine ant species as part of a broader assessment of insect fauna, the present study indicates a dramatic expansion in our understanding of CKBS's ant biodiversity. The previous record comprised genera such as *Anoplolepis, Camponotus, Diacamma, Leptogenys, Myrmicaria, Oecophylla, Pachycondyla* (now *Pseudoneoponera*), *Solenopsis*, and *Tetraponera*. In contrast, the current checklist far exceeds these baselines, providing a much more robust and detailed picture of the sanctuary's ant fauna. This reflects not only the importance of targeted surveys utilizing comprehensive sampling methods, but also the ecological value of CKBS as an urban biodiversity refuge.

The composition and abundance patterns observed in this study suggest that CKBS, despite its modest size (17 acres) and urban location, harbors a healthy mosaic of habitats capable of supporting high levels of ant taxonomic and functional diversity. The coexistence of widespread, disturbance-tolerant species (such as *Anoplolepis gracilipes* and *Paratrechina longicornis*) with habitat-sensitive taxa reinforces the need for monitoring and management, especially in the face of urban pressures and habitat fragmentation. Urban forest islets have been recognized as important refugia for native biodiversity, particularly when they maintain structural complexity and habitat heterogeneity, and studies from tropical regions have shown that such fragments can support surprisingly diverse native ant communities, even in highly urbanized landscapes (Rajesh et al., 2022).

The documentation of such elevated diversity underscores CKBS's conservation significance and highlights its role as a model site for studying urban biodiversity and informing future research and ecosystem management strategies within similar protected areas.

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Conflict of interest

The authors declare that they have no competing interests.

References

Andersen, A.N. (1997). Using ants as bioindicators: multiscale issues in ant community ecology. Conservation Ecology 1(1), 33–42.

AntWeb. (2025). AntWeb. California Academy of Sciences. Retrieved August 18, 2025, from https://www.antweb.org

AntWiki. (2025). AntWiki. Retrieved August 18, 2025, from https://www.antwiki.org

Baidwan, P.S., Kapoor, R., Randhawa, H.K. & Bharti, H. (2023). Description of *Diacamma rugosum jerdoni* (Insecta: Hymenoptera) male along with two new additions to the myrmecofaunal diversity of Kerala, India. Halteres 14, 20–30.

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.

Bingham, C.T. (1903). The fauna of British India, including Ceylon and Burma: Hymenoptera. Vol. II. Ants and cuckoo-wasps. Taylor and Francis, London, pp. 1–506.

Bolton, B. (1994). Identification guide to the ant genera of the world. Harvard University Press, Cambridge, MA, pp. 1–222.

Bolton, B. (2025). AntCat: An online database. California Academy of Sciences. Retrieved July 4, 2025, from https://www.antcat.org

Cowie, R.H., Bouchet, P. & Fontaine, B. (2022). The Sixth Mass Extinction: fact, fiction or speculation? Biological Reviews 97(2), 640–663.

Dad, J. M., Akbar, S. A., Bharti, H. & Wachkoo, A. A. (2019). Community structure and ant species diversity across select sites of Western Ghats, India. Acta Ecologica Sinica, *39*(3), 219-228.

Folgarait, P.J. (1998). Ant biodiversity and its relationship to ecosystem functioning: a review. Biodiversity & Conservation 7(9), 1221–1244.

Forest Department, Government of West Bengal. (2005). Chintamoni Kar Bird Sanctuary. Wildlife Wing. Retrieved August 14, 2025, from https://www.wildbengal.com/chintamonikar-wls.php

Guénard, B., Weiser, M.D. & Dunn, R.R. (2012). Global models of ant diversity suggest regions where new discoveries are most likely are under disproportionate deforestation threat. Proceedings of the National Academy of Sciences 109(19), 7368–7373.

Hazarika, H. N., Adhikari, K. & Khanikor, B. (2019). Diversity and distribution of ants (Hymenoptera: Formicidae) in Gauhati University Campus, Assam. International Journal for Research in Engineering Application and Management 4, 2454-9150.

Hölldobler, B. & Wilson, E.O. (1990). The ants. Harvard University Press, Cambridge, MA, 736 pp.

Mitra, S., Roy, S. & Dey, S. (2018). Insect faunal diversity of Chintamani Kar Bird Sanctuary and other protected areas of West Bengal. International Journal of Entomology Research 3(2), 180–189.

Moreau, C.S., Bell, C.D., Vila, R., Archibald, S.B. & Pierce, N.E. (2006). Phylogeny of the ants: diversification in the age of angiosperms. Science 312(5770), 101–104.

Rajesh, T. P., Manoj, K., Prashanth Ballullaya, U., Shibil, V. K., Asha, G., Varma, S., Mohan, P. & Sinu, P. A. (2022). Urban tropical forest islets as hotspots of ants in general and invasive ants in particular. Scientific Reports 12(1), 1–10.

Schultheiss, P., Nooten, S.S., Wang, R., Wong, M.K., Brassard, F. & Guénard, B. (2022). The abundance, biomass, and distribution of ants on Earth. Proceedings of the National Academy of Sciences 119(40), e2201550119.

Subedi, I. P., Budha, P. B., Kunwar, R. M., Charmakar, S., Ulak, S., Pradhan, D. K., Pokharel, Y. P., Velayudhan, S. T., Sathyapala, S. & Animon, I. (2021). Diversity and distribution of forest ants (Hymenoptera: Formicidae) in Nepal: Implications for sustainable forest management. *Insects, 12*(12), 1128.

Taylor, A.R., Lenoir, L., Vegerfors, B. & Persson, T. (2018). Ant and earthworm bioturbation in cold-temperate ecosystems. Ecosystems 22(5), 981–994.

Underwood, E.C. & Fisher, B.L. (2006). The role of ants in conservation monitoring: if, when, and how. Biological Conservation 132(2), 166–182.