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GROUND BEETLES (COLEOPTERA: CARABIDAE) OF KATEPURNA WILDLIFE SANCTUARY, AKOLA, MAHARASHTRA

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Abstract: Ground beetles (Coleoptera: Carabidae) play a significant role in regulating terrestrial ecosystems and a subfamily commonly known as Tiger beetles are important bioindicators of habitat quality. The present study was undertaken to assess the diversity and abundance of ground beetles across different habitats of Katepurna Wildlife Sanctuary, district Akola from June 2024 to March 2025. Systematic sampling was carried out using pitfall traps and hand collection methods across varied microhabitats, including forest, grassland, and agricultural landscapes. A total of 14 species belonging to 9 subfamilies of Carabidae were recorded. Species richness and abundance were highest in the forest habitat, followed by grasslands and agricultural fields. Seasonal variation was evident, with peak abundance during the monsoon months.

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INTRODUCTION

The family Carabidae, commonly referred to as ground beetles, constitutes one of the largest and most ecologically diverse groups within the order Coleoptera. Globally, more than 40,000 species have been described under more than 2,000 genera, distributed across nearly all terrestrial ecosystems (Lobl & Lobl, 2017). In India, carabids are well represented, with numerous species recorded from forest, grassland, and agricultural ecosystems (Andrewes, 1921–1936; Ghosh & Biswas, 2007).

Members of the family Carabidae are typically elongate, flattened, and agile beetles, adapted for an active, ground-dwelling lifestyle. They possess well-developed legs, strong mandibles for predation, and filiform antennae. Their elytra are often smooth or striated and display metallic or dark hues. Carabids exhibit a wide range of sizes and colors—from small, black ground beetles like *Scarites emarginatus* to brightly metallic species such as *Cicindela* spp. (tiger beetles). The morphological adaptations of these beetles make them efficient predators and runners in leaf litter and soil environments. Carabids are primarily predatory, feeding on various invertebrates including insect larvae, caterpillars, aphids, and other soft-bodied arthropods. Their foraging activity plays a vital role in regulating pest populations, making them important biological control agents in natural and agricultural systems (Lovei& Sunderland, 1996). Some species are omnivorous or granivorous, contributing to both seed predation and dispersal processes. Because they are highly sensitive to changes in habitat structure, moisture, and soil conditions, carabids are widely recognized as bioindicators of ecological integrity and environmental disturbance (Rainio & Niemela, 2003).Ground beetles occupy a variety of terrestrial habitats such as dry deciduous forests, scrublands, grasslands, and agricultural fringes.

Systematic studies on the Indian Carabidae were pioneered by Andrewes (1921–1936), who provided detailed taxonomic revisions of Indian species. Subsequent regional surveys (e.g., Thakare & Zade, 2012; Chaudhary, 2024) have emphasized the diversity and ecological significance of carabids in forested landscapes. However, comprehensive faunistic data from central Indian sanctuaries like Katepurna remain limited. Documenting the carabid fauna of such protected areas is therefore crucial for understanding their role in trophic regulation,

soil health, and conservation planning. Therefore, the present study was undertaken to document the diversity, abundance, and ecological composition of ground beetles in the Katepurna Wildlife Sanctuary, Akola District, Maharashtra. This baseline study aims to enhance understanding of the species composition and ecological roles of these beetles and to provide a reference framework for future biodiversity monitoring and conservation initiatives in central India.

MATERIAL AND METHODS

Study Area:

The study work was conducted from September 2022 to September 2024 in Katepurna Wildlife Sanctuary, District Akola, Maharashtra (Fig. 1). The Katepurna Sanctuary in Akola lies in close proximity to the catchments area of Katepurna reservoir (Mahan Dam). It lies approximately 37 km from Akola city and is geographically situated between 20°34′–20°39′ N latitude and 77°02′–77°07′ E longitude. It is spread over an area of 73.69 sq. km. and the sanctuary derives its name from the Katepurna River, which flows south to Northward through the central part of the sanctuary as the primary water source for the region. (Akola District Administration, Govt. of Maharashtra 2025).

To ensure systematic sampling across the sanctuary, transects were established in each major habitat type. Transects were designed to cover representative microhabitats, thus reducing sampling bias and providing comprehensive data on beetle diversity. The study area was systematically divided into distinct regions. Five representative locations were selected based on habitat variation and vegetation type for transects formation.,

Transect I: Area containing dry Deciduous Forest Patches, grassland and Katepurna River

Transect II Area containing scrubland and thorny Vegetation**.**

Transect III: Area containing open grasslands and herbs

Transect IV: Area containing Wetlands, Aquatic Systems like small seasonal ponds

Transect V: Areas containing agricultural Fringes adjoining the sanctuary, and shruby area near
the steams.

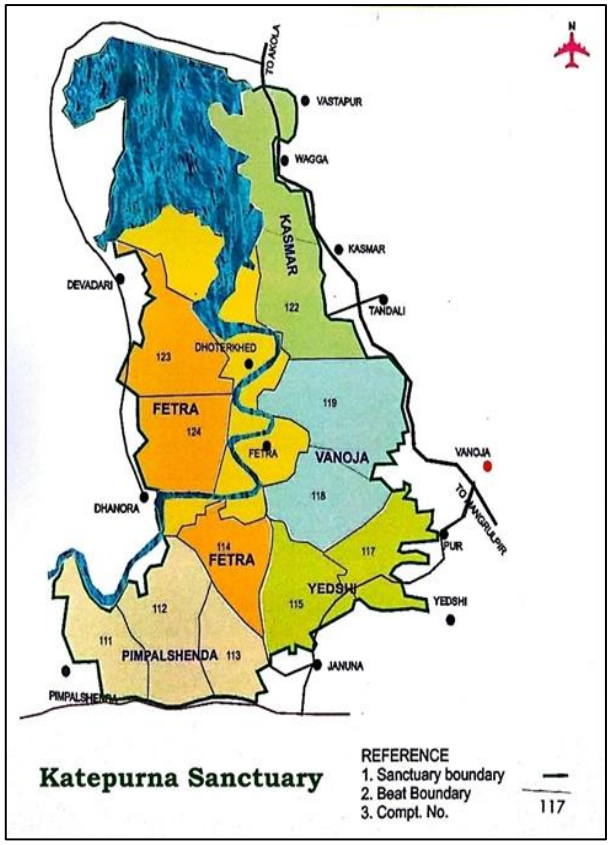

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Fig. 1 Map of Study Area

SPECIAL COLLECTING METHODS:

Hand collection is one of the most widely used and effective techniques for beetle sampling. Other trapping methods like Pitfall traps, light traps, Sweep netting, beating and umbrella method employed. The collected beetles were sorted and preserved in labeled container of 70% alcohol. The collected beetle specimens were primarily separated family wise and then identified on the basis of external morphological characters, including body shape, coloration, antennae type, elytra, tarsal formula, and genitalia when necessary. The classical series ‘The Fauna of British India, Including Ceylon and Burma’ and ZSI Literature served as the primary reference for initial identification. Further confirmation of doubtful taxa was carried out with the assistance of experts at the Zoological Survey of India (ZSI), New Alipore, Kolkata.

RESULT

A total of 14 species of carabid beetles (Carabidae) belonging to 9 subfamilies and 12 different genera were recorded from the Katepurna Wildlife Sanctuary. Although numerically less diverse compared to scarabs,

carabid beetles are ecologically significant as predators of other invertebrates, contributing to natural pest control and trophic regulation within the sanctuary ecosystems.

Systematic account and list of Carabid Beetles:

Order: Coleoptera Linnaeus, 1758
Suborder: Adephaga Leng, 1920
Family: Carabidae Latreille, 1802
Subfamily: Lebiinae Bonelli, 1810
Tribe: Lebiini Bonelli, 1810
1. *Cymindoidea indica* (Schmidt-Goebel, 1846)

Subfamily: Scaritinae Bonelli, 1810
Tribe Clivinini Rafinesque, 1815
2. *Sparostes striatulus* Putzeys, 1867
Tribe: Scaritini Bonelli, 1810
3. *Scarites ceylonicus* Chaudoir, 1881
4. *Scarites emarginatus* Herbst, 1806

Subfamily: Anthiinae
Tribe: Helluonini Hope, 1838
5. *Omphra sp.* Dejean, 1825
Subfamily: Siagoninae 1813
Tribe: Siagonini s.str.
6. *Siagona sp.* Latreille, 1774
Subfamily: Orthogoniinae Schaum, 1857
Tribe Idiomorphini Bates 1891
7. *Strigia stigma* Fabricius, 1801
Tribe Orthogoniini s.str.
8. *Orthogonius sp*. Macleay, 1825
Subfamily:Panagaeinae Bonelli, 1810
Tribe: Panagaeini s.str.
9. *Craspedophorus sp.* Hope, 1838
Subfamily: Carabinae Linnaeus, 1802
Tribe: Carabini s.str.
10. *Calosoma sp.* Weber, 1801
Subfamily: Brachininae Bonelli, 1810
Tribe: Brachinini s.str.
11. *Pheropsophus sp*. Solier, 1833
Subfamily: Licininae Bonelli, 1810
Tribe: Chlaeniini Brulle, 1834
12. *Chlaenius sp.* 1 Bonelli, 1810
13. *Chlaenius sp.* 2 Bonelli, 1810
Subfamily Cicindelinae Latreille, 1802
Tribe: Cicindelini s.str.
14. *Cicindela sp.* Linnaeus, 1758

Details of the Carabid beetle species examined:

1. *Cymindoidea indica* Schmidt-Goebel, 1846

1846. Schmidt-Goebel, Verhandlungen der Zoo.-Bot. Gesellschaft in Wien, 1: 120.

2005 Lorenz, Systematic list of extant ground beetles of the world (Coleoptera: Carabidae). Tutzing: 1–530.

Material examined: KWS, Fetra, Forest Rest House (Lat. 20.412941°N, Long. 77.177386° E, Alt. 454m) 13.11.2023, (4 exs), Kasmar 03.08.2023, (3 ex), 15.11.2023, (5 exs**),** Vanoja, 28.11.2023. (3 ex)

Distribution: India: Bihar, Kerala, Madhya Pradesh, Maharashtra, New Delhi, Odisha, Puducherry, Tamil Nadu, Uttar Pradesh, and West Bengal; also reported from Nepal, Sri Lanka, and Southeast Asia.

2. *Sparostes striatulus* Putzeys, 1867

1867. *Sparostes striatulus* Putzeys, *Ann. Soc. Ent. Belg.* **10**: 29.

1929. *Sparostes striatulus*, Andrewes, *Fauna Brit. India*, Coleoptera, Carabidae **1**: 345

Material examined: KWS, Vanoja, (Lat. 20.392941°N, Long. 77.170381° E, Alt. 454m), 17.11.2023, (5 exs).Kasmar, 10.12.2023, (4 exs**),** 10.12.2023, (3 exs**).**

Distribution: India: Bihar, Chhattisgarh, Karnataka, Kerala, Tamil Nadu, Uttarakhand and West Bengal. Elsewhere: China, Myanmar, Thailand and Vietnam.

3. *Scarites ceylonicus* Chaudoir, 1877

Material examined: KWS, Kasmar, (Lat. 20.43294°N, Long. 77.177322° E, Alt. 489m), 13.10.2023, (5 exs), 15.06.2024, (3 exs), Vanoja, 15.12.2022, (2 exs).

Distribution: India: Maharashtra, Madhya Pradesh; also Southeast Asia.

4. *Scarites emarginatus* Herbst, 1776

Material examined: KWS, Vanoja, (Lat. 20.412941°N, Long. 77.177386° E, Alt. 454m., 19.10.2023, (6 exs), Kasmar, 14.12.2023, (7 exs).

Distribution: Maharashtra, Madhya Pradesh, Himachal Pradesh, Uttarakhand, Punjab and Haryana, Rajasthan, Uttar Pradesh, also Southeast Asia.

5. *Omphra sp.* Dejean, 1825

1842. *Omphra* Reiche, *Ann. Soc. Ent. Fr.*: 330.

Material examined: KWS, Fetra, Forest Rest House (Lat. 20.412941°N, Long. 77.177386° E, Alt. 454m), 13.11.2022, (4 exs), 13.07.2023, (5 exs), Kasmar15.11.2023, (6 exs), Vanoja, 15.06.2024, (5 exs), 15.12.2022, (2 exs)

6. *Siagona sp*. Latreille, 1804

1804. *Siagona* Latreille, *Nouv. Dict. Hist. Nat.* **24**. Tab. Meth.: 141.

1929. *Siagona*, Andrewes, *Fauna Brit. India*, Coleoptera, Carabidae **1**: 174.

Material examined: KWS, Yedshi (Lat. 20.422941°N, Long. 77.190386° E, Alt. 454m), 03.10.2023, (4 exs), 03.10.2023, (2

exs), Vanoja, 15.06.2024, (5 exs), 15.06.2024, (3 exs**),** Kasmar, 19.12.2023, (4 exs).

7. *Strigia stigma* Fabricius, 1801

Material examined: KWS, Fetra, Forest Rest House (Lat. 20.412941°N, Long. 77.177386° E, Alt. 454m), 13.11.2023, (4 exs), Kasmar, 15.11.2023, (4 exs), 01.12.2024, (2 exs).

Distribution: India: Maharashtra, Madhya Pradesh; also Southeast Asia.

8. *Orthogonius sp.* Macleay, 1825

1825. *Orthogonius* Macleay, *Ann. Jav*. 26.

Material examined: KWS, Pimpalshenda (Lat. 20.412941°N, Long. 77.197381° E, Alt. 454m), 18.11.2022, (6 exs), Kasmar, 11.12.2023, (7 exs.), 15.11.2023, (6 exs), Vanoja, 09.07.2023, (7 exs).

9. *Craspedophorus sp.* Hope, 1838

Material examined: KWS, Vanoja (Lat. 20.398258°N, Long. 77.162987° E, Alt. 454m), 18.09.2023, (4 exs), Pimpalshenda,18.10.2022, (4 exs). 18.11.2023, (5 exs), Fetra, 11.06.2023, (6 exs), 18.07.2024, (5 exs).

10. *Calosoma sp.* Weber, 1771

Material examined: KWS, Fetra (Lat. 20.40436°N, Long. 77.172923° E, Alt. 494m), 30.09.2022, (3 exs), Yedshi, 21.11.2023, (2 exs), Vanoja, 01.12.2024, (3 exs).

11. *Pheropsophus sp*. Solier, 1833

1833. PheropsophusSolier, Ann. Soc. Ent. Fr.: 461.

1906. StinaptinusMaindr., Bull. Soc. Ent. Fr.: 15.

Material examined: KWS, Kasmar, (Lat. 20.412941°N, Long. 77.177386° E, Alt. 454m), 13.11.2023, (4 exs), 30.09.2022, (5 exs), Vanoja, 01.12.2024, (3 exs), 11.07.2024, (3 exs), 15.11.2023, (6 exs).

12. *Chlaenius sp.*1 Bonelli, 1810

1826. *Chlaenius* Dejean, *Spec. Gen. des Col*. **2**: 297.

Material examined: KWS, Fetra, Forest Rest House (Lat. 20.412941°N, Long. 77.170386° E, Alt. 454m), 15.07.2023, (2 exs), Kasmar, (4 exs),Vanoja, 10.03.2024, (7exs),

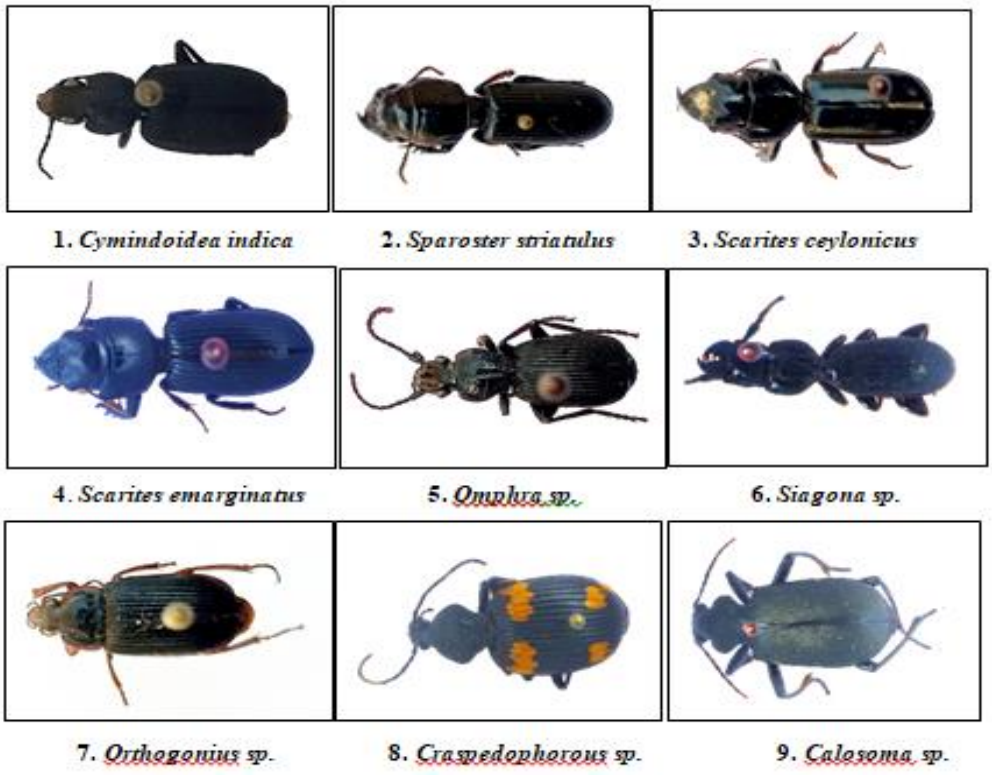
Distribution: India: Maharashtra, Madhya Pradesh; also Southeast Asia.

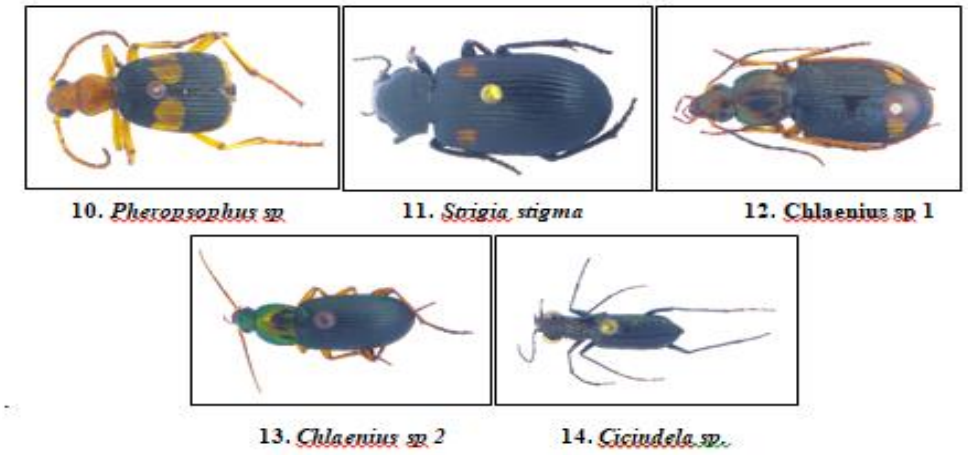
13. *Chlaenius sp.* 2 Bonelli, 1810

Material examined: KWS, Kasmar, (Lat. 20.42294°N, Long. 77.177875° E, Alt. 496m), 11.03.2022, (4 exs), Vanoja, 10.03.2024, (5 exs), 19.12.2023, (4 ex), KWS, Yedshi, 13.08.2022, (2 exs).

14. Cicindelala sp.

Material examined: KWS, Vanoja, (Lat. 20.392651°N, Long. 77.177726° E, Alt. 454m), 12.10.2024, (2 exs), KWS, Pimpalshenda, 11.08.2023, (1 ex).





Sr. no.	Subfamily	Genus/species	No. of exs
1.	Lebinae	*Cymindoidea indica*	**15** **12**
2.	Scaritinae	*Sparostes striatulus* *Scarites emarginatus* *Scarites ceylonicus*	**13** **10** **13**
3.	Anthiinae	*Omphra sp.*	**22**
4.	Siagoninae	*Siagona sp.*	**18**
5.	Orthogoniinae	*Orthogonius sp.*	**26**
6.	Panagaeinae	*Craspedophorus sp.*	**24**
7.	Carabinae	*Calosoma sp.*	**08**
8.	Paussinae	*Pheropsophus sp.* *Strigia stigma*	**21** **10**
9.	Licininae	*Chlaenius sp.* *Chlaenius sp. 2* *Cicindela sp.*	**13** **15** **03**
Total	**09**	**14**	**210**

List of Ground beetles from the study area

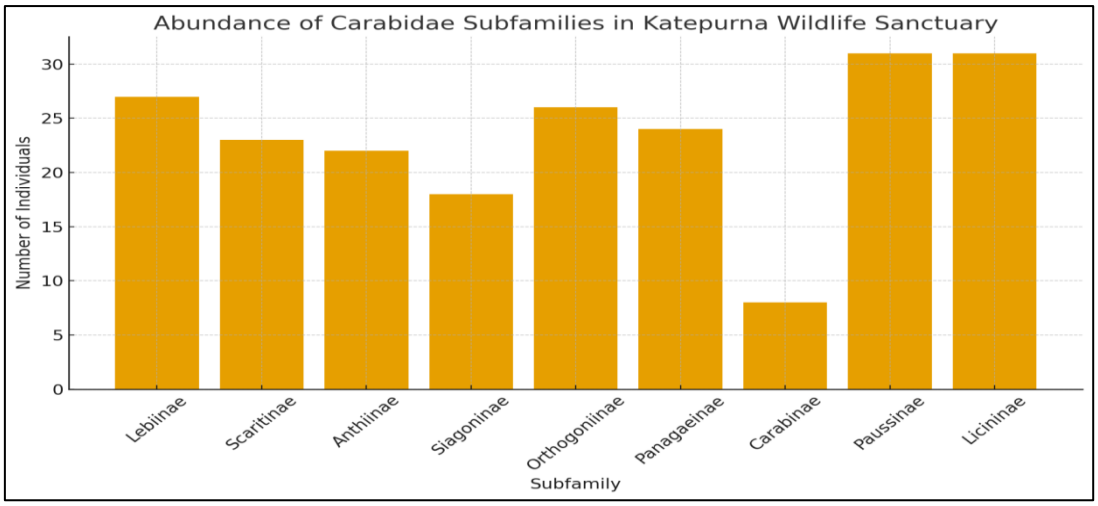


Fig. 2 Bar chart showing Abundance of Carabidae subfamilies in KWS

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