



New Distributional Records with a Preliminary Checklist of Gyrinidae (Order: Coleoptera) of Maharashtra, India

Pallavi Takawane ^{a,b++}, Rita Deb ^{c,d*}, Sandeep Pokale ^e
and K A Subramanian ^d

^a Dr. D.Y. Patil Art's Commerce and Science Women's College, Pimpri, 411018, India.

^b Dr. D.Y. Patil Art's Commerce and Science Women's College, Pimpri and Working on Aquatic Beetles of Maharashtra, India.

^c Department of Zoology, University of Madras, Chepauk, Chennai, Tamil Nadu 600005, India.

^d Zoological Survey of India, 130, Southern Regional Centre, Santhome High Road, Mandavelipakkam, Chennai, Tamil Nadu 600028, India.

^e Department of Zoology, Dr.B. N. Purandare Arts, Smt. S.G.Gupta Commerce and Smt.S.A.M.Science College,Lonavla-410403, Maharashtra, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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⁺⁺ Assistant Professor;

*Corresponding author: Email: rita.deb24@zsi.gov.in;

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ABSTRACT

The present study is based on some collections of aquatic beetles of family Gyrinidae Latreille, 1810 from different locations of Maharashtra. This study contributes new and updated records of family Gyrinidae from the state of Maharashtra. 12 species of the family have been reported so far from Maharashtra. The present study reports the presence of *Dineutus (Cyclous) spinosus* (Fabricius, 1781) and *Gyrinus convexiusculus* Macleay, 1871 from Maharashtra for the first time, the range of the genus *Gyrinus* Geoffrey, 1762 to one more state of India, Maharashtra has also been extended.

Keywords: Fauna; habitat; aquatic beetle; range extension; dineutus; gyrinus.

1. INTRODUCTION

There are about 13,000 known species of aquatic beetles globally reported by Short in 2017. In India, 786 species of aquatic beetles have been documented (Chandra et al. 2017; Sheth et al 2018, 2020, 2021). Gyrinidae Latreille, 1810, ranks as the second-largest family within the aquatic Adephaga Schellenberg, 1806. The global diversity of Gyrinidae is extensive, comprising around 1000 species distributed across 25 genera and there are 73 species documented in India (Chandra et al. 2017; Deepa et al. 2023).

The members of the family Gyrinidae commonly known as Whirligig beetles, is characterized by their distinctive spinning behaviour on the water surface. These beetles exhibit communal habits, forming colonies, and exclusively inhabit clean and clear aquatic environments. Both the adult and larvae stages are strictly aquatic, and they can be found in both lotic (flowing water) and lentic (still water) environments (Beutel & Leschen, 2016 and Jaiswal et. al 2023). Gyrinidae is notable for their divided eyes, a distinctive feature thought to provide them with the ability to see both above and below the water surface (Beutel & Leschen 2016).

Vazirani (1984) described a total of eight Gyrinidae species from Maharashtra. In Ujani dam of Bhigwan, Maharashtra, Sharma (2002) documented four Gyrinidae species. Subsequently, Sheth et al. (2019) recorded a total of six Gyrinidae species from the Northern Western Ghats of Maharashtra. Three species of Gyrinidae were reported by Deb et al (2023b) from the Western Ghats. *Dineutus (Cyclous) indicus* Aube, 1938 exhibits a notable prevalence in various districts across the state of Maharashtra (Vazirani, 1984; Sharma, 2002; Sheth, et al. 2019; Thakare & Zade, 2011; Deb, et. al 2023a & b; Deb & Subramanian, 2023).

The current investigation contributes new and updated records of family Gyrinidae in the state of Maharashtra. Through the consolidation of specimens gathered by the authors, data from the Zoological Survey of India, Western Regional Centre, and information extracted from existing literature. This checklist serves as a foundational reference for future researchers in understanding and researching the family Gyrinidae of order coleoptera.

2. MATERIALS AND METHODS

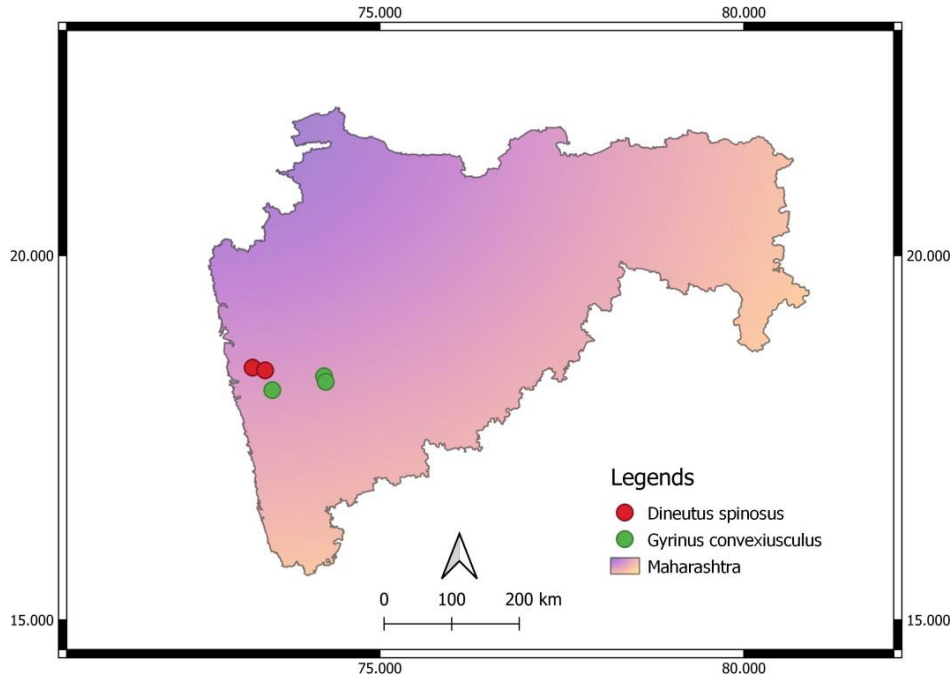
Maharashtra, situated in the western peninsular region of India, covers a significant portion of the Deccan Plateau. The state of Maharashtra is broadly confined by 16.7° to 22.0° N latitude and 72.6° to 80.9° E longitude. Gyrinid beetles were collected from various localities within Maharashtra (Map 1; Image 1) using a pond net of mesh size 0.5 mm, labelled with sample sites, date of collection. Map was made using Quantum Geographic Information System (QGIS) software. The collected specimens were preserved in 75% ethanol in the repository of the Zoological Survey of India, Western Regional Centre, Pune. Beetles were studied and photographed under Leica S9i stereo zoom microscope (Image 2). Identification was done based on characters described by Vazirani (1984).

3. RESULTS AND DISCUSSION

A total of 14 species (Table 1) has been recorded from Maharashtra state including the new records of *Dineutus (Cyclous) spinosus* Fabricius, 1781 and *Gyrinus convexiusculus* Macleay, 1871 (Image 2). Vazirani (1984) systematically documented a total of 56 species belonging to the Gyrinidae family in India. Among these, 8 distinct species were recorded within the state of Maharashtra. *Patrus similis* Ochs, 1929 was documented by Sharma (2002) from Ujani Dam on the Bhima River in Maharashtra.

Subsequently, Sheth et al., 2019 documented the discovery of two additional Gyrinid species, namely *Dineutus (Cyclous) unidentatus* Aubé, 1838, and *Patrus productus* Régimbart, 1883 in the Northern Western Ghats. After four years, Deb et al (2023) reported another gyrid species *Patrus punctulatus* (Regimbart, 1886)

from Indrayani River, Pune. Over all, at the genus level, there have been reports of 2 species of *Dineutus* Macleay, 1825 and 10 species of *Patrus* Aubé, 1838 from the state. Especially, as of the current date, there has been no reported information on any species within the genus *Gyrinus* Geoffrey, 1762 in this region.



Map 1. Sampling site of *Dineutus Spinosus* and *Gyrinus Convexiusculus* in Maharashtra

Table 1. Checklist of Gyrinidae species in Maharashtra

Sr.No.	Scientific name	Localities in Maharashtra
Genus: <i>Dineutus (Cyclous)</i> Macleay, 1825		
1	<i>Dineutus (Cyclous) indicus</i> Aube, 1938	Pune, Gondia, NWG, Nagpur, Ahmednagar, Satara, Aurangabad, Raigad, Dhule, Thane, Sangli, Kolhapur, Nashik
2	<i>Dineutus (Cyclous) unidentatus</i> Aube, 1838	Pune, NWG, Nashik
3	<i>Dineutus (Cyclous) spinosus</i> Fabricius, 1781	Pune (Present study)
Genus: <i>Patrus</i> Aubé, 1838		
4	<i>Patrus assimilis</i> Ochs, 1957	NWG, Pune
5	<i>Patrus discifer</i> Walker 1859	NWG, Pune, Raigad, Nashik
6	<i>Patrus limbatus</i> Régimbart, 1883	Pune, Satara, Ratnagiri, NWG
7	<i>Patrus productus</i> Régimbart, 1883	Pune, NWG
8	<i>Patrus similis</i> Ochs, 1929	Pune
9	<i>Patrus haemorrhous</i> Regimbart, 1891	Nashik, Nanded
10	<i>Patrus fletcheri</i> Ochs, 1925	Nashik
11	<i>Patrus ritsemai</i> Regimbart, 1882	Aurangabad, Nanded
12	<i>Patrus aenipennis</i> Regimbart, 1907	Ratnagiri
13	<i>Patrus punctulatus</i> Regimbart, 1886	Pune, Satara
<i>Gyrinus</i> Geoffrey 1762		
14	<i>Gyrinus convexiusculus</i> Macleay, 1871	Pune (Present study)

NWG- Northern Western Ghats



Image 1. Collection localities of *Dineutus (Cyclous) spinosus* Fabricius, 1781: a- Valvan Dam, b- Indrayani River, Kundamala; *Gyrinus convexiusculus* Macleay, 1871: c- Bhima River, Paragaon Daund, d- Bhima River, Siddhatek, Daund, e- Baneshwar waterfall, Nasrapur © Pallavi Takawane

This study reports two new records of Gyrinid species and also first report of the genus *Gyrinus* Geoffroy, 1762 for the state.

3.1 *Dineutus (Cyclous) spinosus* (Fabricius, 1781) (Image 2)

Material examined: Maharashtra, Pune district: 9 exs., Valvan, Indrayani River, Lonavala, 26.vii.2022, coll. Rita Deb; 2 exs., Kundamala, Talegaon Dabhade, 14.x.2023, coll. Pallavi Takawane.

Habitat: Stagnant or slow-moving water with grassy vegetation.

Description: Body size is about 6.7-8.2 mm; oval form, convex and elongated body shape; moderate punctation are present on head, pronotum and elytra; antennae black; dorsal colour mainly black with bronze hue, scutellum small, Pronotum and elytra are with large yellow lateral band; Elytral apex with two spines, epipleural angle and para sutural angle is produced into spine as shown in the Image 2;

ventral side colour ranges reddish brown to rust, legs brownish in color, metacoxal process truncate; male protarsi dilated, female protarsi lack dilation.

Distribution: India- Andhra Pradesh, Assam, Bihar, Maharashtra, Manipur, Meghalaya, Odisha, Tamil Nadu, Telangana, Uttar Pradesh, West Bengal.

Elsewhere: Bangladesh, Burma, Thailand, Malaysia, Myanmar, Thailand, Pakistan, Vietnam.

3.2 *Gyrinus convexiusculus* Macleay, 1871 (Image 2)

Material examined: Maharashtra, Pune district: 1 ex., Baneshwar waterfall, Nasrapur, 20.iii.2023, coll. Pallavi Takawane; 2 exs., Siddhatek, Daund, 15.v.2023, coll. Pallavi Takawane; 1 ex., Paragaon, Daund, 26.viii.2023, coll. Pallavi Takawane.

Habitat: commonly found in shallow, slow moving water with sandy bottom or grassy vegetation.

Description: body size ranges between 4-4.8 mm; elongated and convex body shape; head, pronotum and elytra black in colour; pronotum has faint and uneven grooves with its posterior behind the eyes interrupted in middle; the scutellum is triangular but not a perfect 'V' shape; elytra have 11 striae of punctures; joined at the apical region; ventral body surface black and leg are reddish yellow in colour; female protarsi subparallel.

Distribution: India- Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Puducherry, Tamil Nadu, West Bengal.

Elsewhere: New Zealand, Sri Lanka, Australia, China, Indonesia.



Image 2. *Dineutus (Cyclous) spinosus* (Fabricius, 1781) a. Dorsal view b. ventral view *Gyrinus convexiusculus* Macleay, 1871 c. Dorsal view d. ventral view © Rita Deb

4. CONCLUSION

12 species of the family Gyrinidae have been reported so far from Maharashtra. The present study indicates the presence of unexplored taxa i.e. *Dineutus (Cyclous) spinosus* and *Gyrinus convexiusculus* in various areas of Maharashtra for the first time, suggesting significant opportunities for further exploration of aquatic beetles. This study also extends the range of the genus *Gyrinus* Geoffrey 1762 to one more state of India, Maharashtra. This information serves as foundational data for comprehending the diversity of Gyrinid beetles in the region, providing valuable insights for future research endeavors in the state of Maharashtra.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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