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On the collection of Freshwater Mollusca from Bastar Plateau Zone, Chhattisgarh

Rehanuma Sulthana*, Boni A. Laskar and J. Deepa

Freshwater Biology Regional Centre, Zoological Survey of India, Hyderguda P.O. Ring Road, Hyderabad – 500 048, Telangana, India; rehansiddhu@gmail.com, boniamin.laskar@gmail.com, deepajzsi@gmail.com

Abstract

Chattisgarh is one of the biodiversity rich states located in the east-central part of the country. The Bastar plateau zone of Chattisgarh is blessed with dense forests and waterfalls. The freshwater molluscs were collected during field visit under the research programme of Zoological Survey of India for Riverine Fishes of North Eastern Ghats from this zone. About 244 individuals of freshwater molluscs were collected during the field survey. In all, 17 freshwater molluscs species under 13 genera and seven families were recorded in the current study. Of these, *Idiopoma dissimilis, Angulyagra microchaetophora, Mieniplotia scabra, Tarebia granifera, Radix biacuminata, Parreysia favidens, Radiatula caerulea, Radiatula khadakvaslaensis* have been reported for the first time from Chattishgarh.

Keywords: Bastar District, Bivalvia, Gastropoda, Taxonomy

Introduction

The Phylum Mollusca forms the second largest invertebrate group and have got both economical and ecological significance. Freshwater molluscs are an important biotic component in freshwater ecosystem and play a vital role in its functioning (Vaughn *et al.*, 2004). The estimated global freshwater gastropods are 4,000 species (Strong *et al.*, 2008), of which about 150 freshwater gastropods are reported from India (Mukopadhay *et al.*, 2014). About 1200 valid species (Lopes-Lima *et al.*, 2018) of freshwater bivalves exist globally of which 67 species are represented in India (Mukopadhay *et al.*, 2014). As per IUCN Red List (2016), 297 species of molluscs are listed under the extinction category which forms 40% of animal extinctions (Cowie *et al.,* 2017). Some species are not yet assessed properly while most of them are listed under least concerned category. Despite their uses and great diversity, very few studies have been carried out in Bastar plateau of Chhattisgarh. Malacofaunal diversity studies are needed as they contribute as an aid in assessment of ecological status of the water bodies and play a crucial role in food chain. The present study is based on a collection of molluscs from a field survey to Bastar zone. Recently Mukopadhyay *et al.* (2018) reported 9 species of freshwater malacofauna from Bastar district of Chhattisgarh. The present study reports 17 species of molluscs belonging to 13 genera of 7 families from the selected locations of Bastar district.

Material and Methods

Study location: The field survey was conducted during the month of January 2018 from the selected locations of districts- Bastar and Dantewada (Figure 1, Table 1). Chhattisgarh has got three different agro climatic zones *i.e.*, Bastar plateau, Chhattisgarh plains and Northern hills region each endowed with unique assemblage of flora and fauna both in terrestrial and aquatic habitats. The present study is carried out in Bastar and Dantewada districts that is situated in the southern part of the state and falls under Bastar plateau. Bastar is definitely one of the biologically rich habitats in the Chhattisgarh state with its own social, political, and economic challenges. Godavari is one of the four rivers that flow through the state and Indravati river

* *Author for correspondence*

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is its main tributary that flows for about 210 km in Bastar district. Indravati river is originated from Dandakaranya range in Kalahandi district of Odisha state, enters Jagdalpur district after flowing in western direction and meets Godavari river near village Bhadrakali in Bijapur district. Apart from this river Bastar has got many other forms of freshwater bodies like ponds and reservoirs occupying approximately 2566 ha of area. Dantewada district is situated in the southern most part of Bastar plateau.The name Dantewada is derived from the famous Danteshwari temple situated at sangam point of Shankini and Dankini rivers.

The specimens were collected qualitatively by visual and tactile search method (Cummings *et al.,* 2016) from the selected freshwater habitats. Gastropods were collected by simple handpicking of shells attached to aquatic weeds and by using dip nets, whereas bivalves are carefully searched for, collected from mud samples as well as by handpicking of the shells from the bottom of the streams during the month of January 2018. Then they were washed to get rid of dirt in an enamel tray and narcotized using 4% formalin and then preserved in 70% ethanol after getting rid of mucus in the field. After due sorting, identification was done using standard literature

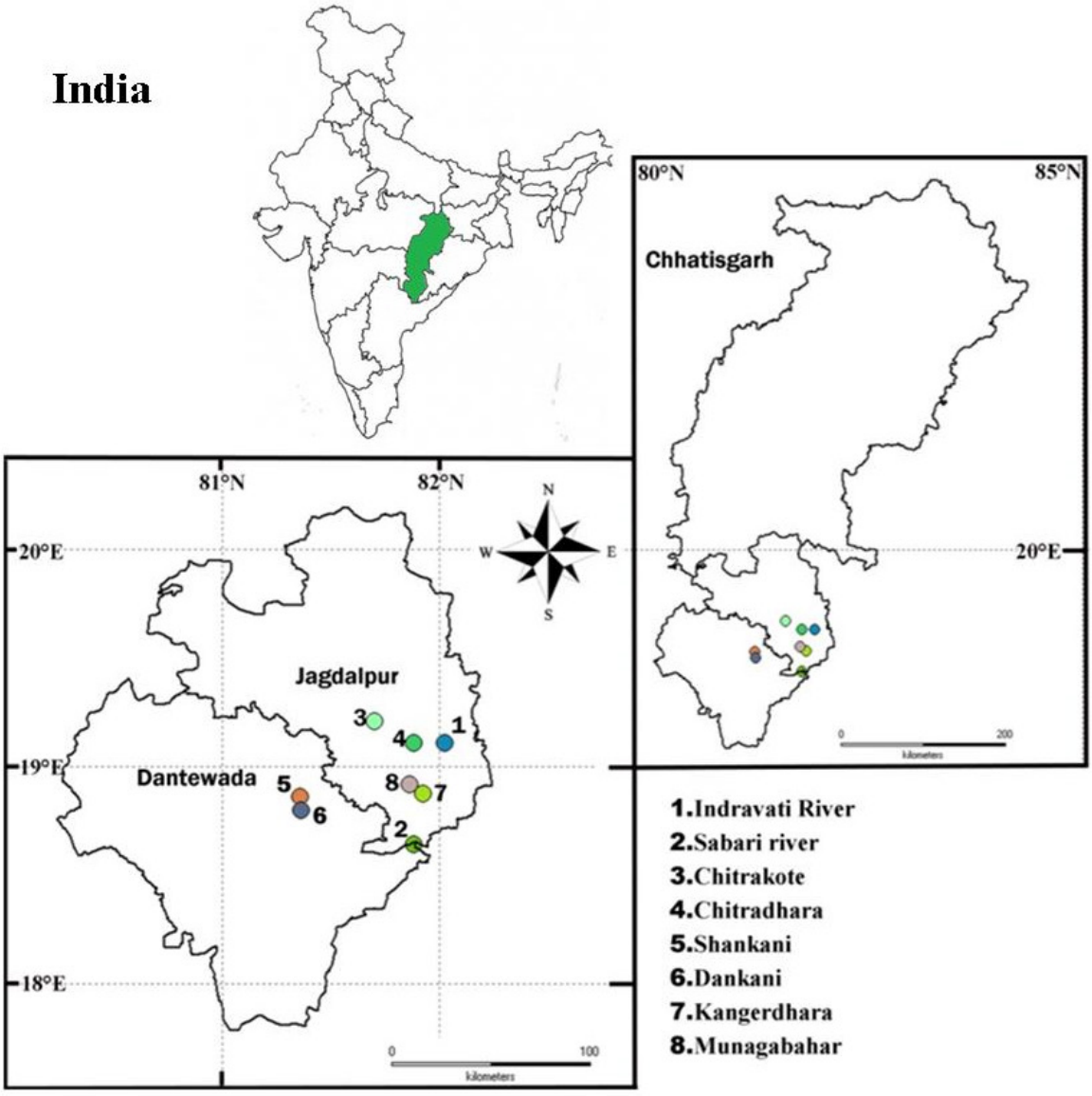

Figure 1. Map showing the sampling sites in the state Chhattisgarh.

Table 1. Collection localities with geo-coordinates and date of collection

Sl.no.	Locality	State/UT	Date	Latitude	Longitude
1	Indravati River	Chhattisgarh	17.i.2018	19.10833° N	82.02166° E
2	Sabari river Pushpal	Chhattisgarh	18.i.2018	18.63944° N	81.88000° E
3	Chitrakote	Chhattisgarh	19.i.2018	19.20638° N	81.69833° E
4	Chitradhara	Chhattisgarh	19.i.2018	19.10638° N	81.87916° E
5	Shankini	Chhattisgarh	20.i.2018	18.86083° N	81.35472° E
6	Dankini	Chhattisgarh	20.i.2018	18.79616° N	81.35916° E
7	Kangerdhara	Chhattisgarh	21.i.2018	18.87389° N	81.92361° E
8	Munagabahar	Chhattisgarh	21.i.2018	18.91508° N	81.86138° E

(Subba Rao, 1989; Ramakrishna and Dey, 2007; Preston, 1915). Identified species were sorted and preserved in 70% ethanol in suitable containers, labeled, and deposited in the National Zoological Collection in Freshwater Biology Regional Centre (FBRC), Zoological Survey of India (ZSI), Hyderabad.

Results

Systematic Account

Class GASTROPODA

Order ARCHITAENIOGLOSSA

Family VIVIPARIDAE

Subfamily VIVIPARINAE

Genus ***Filopaludina*** Habe, 1964

1. *Filopaludina bengalensis* (Lamarck, 1822) (Figure 2a)

Material examined: FBRC/ZSI/INV/1536, 16 ex, Indravati river, Jagdalpur, Bastar, 17.i.2018; FBRC/ZSI/INV/1773, 11 ex, Chitradhara, Jagdalpur, 19.i.2018.

Shell characters: Shell thin with shallow sutures; aperture sub circular with narrow black margin; body whorl as high as spire; body whorl convex in profile; shell with alternating narrow and broad or variable bands.

Distribution in India: Common throughout India.

Remarks: Common edible species in north east parts of India.

Genus ***Idiopoma*** Pilsbry, 1901

2. *Idiopoma dissimilis* (Mueller, 1774) (Figure 2b)

Material examined: FBRC/ZSI/INV/ 1537, 02 ex, Indravati river, Jagdalpur, Bastar, 17.i.2018; FBRC/ZSI/INV/1597, 08 ex, Dankani river, Bastar, 20.i.2018.

Shell characters: Shell without dark spiral bands; aperture rim black; deeply impressed suture; spire swollen; operculum thick.

Distribution in India: Common throughout India.

Genus ***Angulyagra*** Rao, 1931

3. *Angulyagra microchaetophora* (Benson, 1836)

Material studied: FBRC/ZSI/INV/1526, 13 ex, Indravati river, Jagdalpur, 17.i.2018; FBRC/ZSI/INV/1772, 6 ex, Munagabahar, 17.i.2018.

Shell characters: Small and imperforate shell with a strongly domed inner lip and a sharp outer lip; two spiral ridges on spiral whorl.

Distribution in India: Nagaland, Assam, Manipur, Chhattisgarh.

Family AMPULLARIIDAE

Genus ***Pila*** Roeding, 1798

4. *Pila globosa* (Swainson, 1822)

Material examined: FBRC/ZSI/INV/1597, 02 ex, Dankani river, Bastar, 20.i.2018.

Shell characters: Thick shell with a depressed spire and swollen body whorl; globose shell with colour bands inside the aperture; columellar margin slightly expanded.

a. ***Filopaludina bengalensis*** **(Lamarck, 1822) b.** ***Idiopoma dissimilis*** **(O. F. Müller, 1774)**

c. ***Radix biacuminata*** **(Annandale & Rao, 1925) d.** ***Tarebia granifera*** **(Lamarck, 1816)**

Figure 2. Freshwater Molluscs: Gastropods of Bastar Plateau Zone, Chhattisgarh.

Distribution in India: Arunachal Pradesh, Delhi, Uttar Pradesh, Dadra-Nagar-Haveli, Odisha, Jammu-Kashmir, Mizoram, Madhya Pradesh, Meghalaya, Maharashtra, Rajasthan, Manipur, Mahé, Nagaland, Himachal Pradesh, Jharkhand, Chhattisgarh, Goa, Chandigarh, Darjiling, West Bengal, Assam, Diu, Andaman Is., Bihar, Daman, Uttaranchal.

Superfamily CERITHIOIDEA

Family THIARIDAE

Subfamily THIARINAE

Genus ***Mieniplotia*** Low & Tan, 2014

5. *Mieniplotia scabra* (Mueller, 1774) (Figure 3f)

Material examined: FBRC/ZSI/INV/1527, 04 ex, Indravati river, Jagdalpur, 17.i.2018

Shell characters: Turreted shell with sculptured whorls bearing spines projected outward; height of the spire as high as body whorl.

Distribution in India: Chhattisgarh, West Bengal, Uttaranchal, Uttar Pradesh, Tamil Nadu, Sikkim, Pondicherry, Maharashtra, Madhya Pradesh, Kerala, Jharkhand, Darjeeling, Bihar.

Genus ***Mieniplotia*** Olivier, 1804

6. *Melanoides tuberculata* (Mueller, 1774)

Material examined: FBRC/ZSI/INV/1535, 07 ex, Indravati river, Jagdalpur, 17.i.2018 FBRC/ZSI/INV/1587, 02 ex, Chitrakote, Jagdalpur, 19.i.2018; FBRC/ZSI/INV/1594, 02 ex, Dankani river, Bastar, 20.i.2018.

Shell characters: Shell sculptured with vertical ribs and spiral striations; 10-14 whorls; height of the spire 5 times that of aperture; central teeth of radula usually with 11 cusps; shell covered with brownish spots and longitudinal stripes.

Distribution in India: Common throughout India.

Genus ***Tarebia*** Adams, 1854

7. *Tarebia lineata* (Gray, 1828) (Figure 3e)

Material examined: FBRC/ZSI/INV/1528, 26 ex, Indravati river, Jagdalpur, Chhattisgarh, 17.i.2018; FBRC/ZSI/INV/1584, 06 ex, Chitrakote, Jagdalpur, Chhattisgarh, 19.i.2018.

Shell characters: Conical shell with distinct spiral lines; apex acute; swollen body whorl.

Distribution in India: Common throughout India.

8 .*Tarebia granifera* (Lamarck, 1816) (Figure 2d)

Material examined: FBRC/ZSI/INV/1529, 13 ex, Indravati river, Jagdalpur, 17.i.2018; FBRC/ZSI/INV/1583, 06 ex, Chitrakote, Jagdalpur, 19.i.2018; FBRC/ZSI/INV/1589, 02 ex, Shankani, Bastar, 20.i.2018; FBRC/ZSI/INV/1600, 08 ex, Dankani river, Bastar, 20.i.2018

Shell characters: Fusiform shell sculptured with nodules all over the shell; spiral grooves inwards the aperture.

Distribution in India: Common throughout India.

Superfamily LYMNAEOIDEA

Family LYMNAEIDAE

Subfamily AMPHIPEPLEINAE

Genus ***Radix*** Montford, 1810

9. *Radix biacuminata* (Annandale & Rao, 1925) (Figure 2c)

Material examined: FBRC/ZSI/INV/1534, 03 ex, Indravati river, Jagdalpur, 17.i.2018;

Shell characters: Shell thin, spindle shaped, fragile, narrow with large ovoid aperture; slightly twisted columella with broad fold; umbilicus completely occluded; pale luteous in colour.

Distribution in India: Andhra Pradesh, Uttaranchal, Madhya Pradesh, Chhattisgarh, Telangana.

Family BULLINIDAE

Subfamily BULLININAE

Genus ***Indoplanorbis*** Annandale & Prashad (1921)

10. *Indoplanorbis exustus* (Deshayes, 1832) (Figure 3g)

Material examined: FBRC/ZSI/INV/1533, 01 ex, Indravati river, Jagdalpur, 17.i.2018; FBRC/ZSI/INV/1580, 03 ex, Chitrakote, Jagdalpur, 19.i.2018; FBRC/ZSI/INV/ 1593, 02 ex, Dankani river, Bastar, 20.i.2018.

Shell characters: Shell large and thick with deeply impressed sutures and ear shaped aperture; animal sinistrally coiled, short leaf shaped foot with rounded anterior portion and posterior less pointed.

e. *Tarebia lineata* (Gray, 1828) **f. *Mieniplotia scabra* (Mueller, 1774)**

g. *Indoplanorbis exustus* (Deshayes, 1832)

Figure 3. Freshwater Molluscs: Gastropods of Bastar Plateau Zone, Chhattisgarh.

Distribution in India: Common throughout India.

Class BIVALVIA

Order UNIONIDA

Superfamily UNIONOIDEA

Family UNIONIDAE

Subfamily PARREYSIINAE

Genus ***Lamellidens*** Simpson, 1900

11. *Lamellidens corrianus* (Lea, 1834) (Figure 4h)

Material examined: FBRC/ZSI/INV/1592, 06 ex, Dankani river, Bastar, 20.i.2018.

Shell characters: Shell elliptical; valves covered by blackish brown periostracum; umbo somewhat elevated; dorsal margin almost straight; each valve has two cardinals.

Distribution in India: Common throughout India.

12. *Lamellidens marginalis* (Lamarck, 1819) (Figure 4i)

Material examined: FBRC/ZSI/INV/1599, 01 ex, Dankani river, Bastar, 20.i.2018; FBRC/ZSI/INV/1581, 02 ex, Chitrakote, Jagdalpur, 19.i.2018.

Shell characters: Shell ovoid, valves blackish brown with light brown border along ventral margin; umbo not much elevated; shell interior nacreous; posterior side broad, roundly angular, margin produced; dorsal margin slightly curved; central margin shrinked in middle.

Distribution in India: Common throughout India.

Genus ***Parreysia*** Conrad, 1853

13. *Parreysia corrugata* (Mueller, 1774) (Figure 4j)

Material examined: FBRC/ZSI/INV/1531, 04 ex, Indravati river, Jagdalpur, 17.i.2018; FBRC/ZSI/INV/1577, 3 ex, Sabri river, 18.i.2018; FBRC/ZSI/INV/1582, 06 ex, Chitrakote, Jagdalpur, 19.i.2018.

Shell characters: Shell elliptical to oval; umbo prominent, sculptured with radiating oblique, linear ridges; ventral margin convex; cardinal teeth strong, not lamellar;

Distribution in India: Common throughout India.

14. *Parreysia favidens* (Benson, 1862)

Material examined: FBRC/ZSI/INV/1576, 06 ex, Sabri river, 18.i.2018; FBRC/ZSI/INV/1589, 01 ex, Shankani, Bastar, 20.i.2018; FBRC/ZSI/INV/1595, 36 ex, Dankani river, Bastar, 20.i.2018;

Shell characters: Shell is bulky and heavily ribbed on beak. Strong and broad cardinal teeth are present. Thick bivalves angulate at both of the anterior and posterior margins.

Distribution in India: Common throughout India.

Genus ***Radiatula*** Simpson, 1900

15. *Radiatula caerulea* (Lea, 1831)

Material examined: FBRC/ZSI/INV/1578, 03 ex, Sabri river, 18.i.2018; FBRC/ZSI/INV/1771, 03 ex, Kangerdhara, Bastar, 21.i.2018.

Shell characters: Shell elongated; the surface of the valves completely sculptured in young ones but in adults only upper half sculptured.

Distribution in India: Andhra Pradesh, Jharkhand, Meghalaya, Mizoram, Odisha, Punjab, Rajasthan, Madhya Pradesh, Uttar Pradesh, West Bengal.

16. *Radiatula khadakvaslaensis* (Ray, 1966)

Material examined: FBRC/ZSI/INV/1596, 06 ex, Dankani river, Bastar, 20.i.2018.

Shell characters: Elongated shell with pointed posterior end; umbo with conspicuous sculpture; shell somewhat inflated, triangularly oval.

Distribution: In India: Maharashtra, Chhattisgarh, Karnataka, Tamil Nadu.

Order VENERIDA

Superfamily CYRENOIDEA

Family CYRENIDAE

Genus ***Corbicula*** Megerlevon Muehlfeld, 1811

17. *Corbicula striatella* Deshayes, 1854 (Figure 4k)

Material examined: FBRC/ZSI/INV/1532, 05 ex, Indravati river, Jagdalpur, 17.i.2018; FBRC/ZSI/INV/1579, 02 ex, Sabri river, 18.i.2018; FBRC/ZSI/INV/1586, 07 ex, Chitrakote, Jagdalpur, 19.i.2018; FBRC/ZSI/INV/1598, 18 ex, Dankani river, Bastar, 20.i.2018; FBRC/ZSI/INV/1770, 03 ex, Kangerdhara, Bastar, 21.i.2018.

Shell characters: Shell thick, inflated and triangular; dorsal margin arched more on anterior side; umbo prominent

h. ***Lamellidens corrianus*** **(Lea, 1834) i.** ***Lamellidens marginalis*** **(Lamarck, 1819)**

j. ***Parreysia corrugata*** **(Mueller, 1774) k.** ***Corbicula striatella*** **Deshayes, 1854**

Figure 4. Freshwater Molluscs: Bivalves of Bastar Plateau Zone, Chhattisgarh.

with shining brown periostracum; concentric regular striae raised into ridges.

Distribution: In India: Common throughout India.

Discussion

About 244 examples of Molluscs were collected from selected 8 locations of Bastar plateau for about 6 days during the month of January 2018 and identified as 17 species of freshwater molluscs. All these species belongs to 13 genera and 7 families of Molluscs. Of these seven families, Unionidae has maximum number of species followed by Thiaridae with 4 species and Viviparidae with 3 species. Of these, 9 species belonging to 6 families are reported by Mukopadhyay *et al.* (2018) earlier, which were also collected during current study. The family Lymnaeidae is reported here for the first time. Eight species *viz., Idiopoma dissimilis, Angulyagra microchaetophora, Mieniplotia scabra, Tarebia granifera, Radix biacuminata, Parreysia favidens, Radiatula caerule* and *Radiatula khadakvaslaensis* are reported for the first time. Conservation status of all these presently reported species are Least Concern as per IUCN list except for *Radix biacuminata* (Annandale and Rao, 1925), which is assessed as Data Deficient and *Radiatula khadakvaslaensis* (Ray, 1966), assessed as Vulnerable. Though the survey was time limited, documentation of 17 species suggests that the Bastar plateau is endowed with rich freshwater molluscs. More extensive faunal explorations of this area will surely reveal many more species that may help to fill the gaps on the knowledge of diversity and distribution of freshwater mollusca.

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