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Molluscan diversity in the mangrove ecosystem of Mumbai, west coast of India

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HIGHLIGHTS

- Molluscan diversity of mangrove ecosystem of Mumbai, India has been studied.
- A total of 61 molluscs, represented by 46 gastropods, 14 bivalves and 1 polyplacophora has been documented.
- Two gastropods, *Salinator fragilis* and *Auriculastra subula* were reported for the first time from the West Coast of India.
- The results aid in identifying sensitive areas and in preparing region-specific conservation management plan.

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ABSTRACT

Ever increasing human population, habitat destruction and pollution along the Mumbai coast are some of the major threats to molluscan fauna. Molluscs form a major group of organisms that makes-up an integral part of mangrove ecosystems. A study, carried out in 8 mangrove areas of Mumbai, west coast of India, from August 2015 to May 2016, revealed a distribution of 61 molluscan species, represented by 46 gastropods, 14 bivalves and 1 polyplacophora. The number of species reported from the study is the second highest for the mangrove ecosystems of India, after Andaman and Nicobar Islands mangroves. The study also reports 2 new distributional records for gastropods, namely *Salinator fragilis* and *Auriculastra subula*. The molluscan diversity was the highest in the mangroves of Versova, north-western Mumbai. The molluscan species diversity from mangrove ecosystem along the Mumbai coast has been documented in detail in order to provide useful baseline data for supporting conservation management.

1. Introduction

Mangroves are a group of vascular plants, having special morphological, physiological and non-visible adaptations (Ong and Gong, 2013) and support diverse groups of aquatic and terrestrial fauna by acting as breeding and feeding grounds (Kathiresan and Qasim, 2005; Aksornkoae, 1989). Mollusca, an important animal phylum, which inhabits the mangrove environment, is represented by predators, herbivores, detritivores or filter feeders in the mangrove food web (Cannicci et al., 2008). Mollusca is the second largest phylum with a global estimated diversity of around 0.2 million species, of which, 85,000 species have been described, including 52,525 species from marine, 24,000 from terrestrial and 7,000 from freshwater ecosystems (Chapman, 2009). A total of 3,271 molluscan species have been reported from Indian waters; of which 215 species occur exclusively in the mangrove ecosystem (Appukuttan, 2008; Boominathan et al., 2012). This list also includes terrestrial arboreal molluscs that inhabit the mangrove environment. Various studies relating to molluscan diversity have been carried out in different mangrove environs of India viz., Sundarbans (Dey, 2006), Bhavanapadu (Ranjan and Babu, 2015), Nuvvalarevu (Chakravarty and Ranjan, 2014), Pondicherry (Satheeshkumar and Khan, 2012), Karangad (Venkatesan et al., 2010), Andaman and Nicobar Islands (Das and Roy, 1989), Gulf of Kutch (Saravanakumar et al., 2007), Raigad (Pawar, 2012), Ratnagiri (Kulkarni and Mukadam, 2015), Coastal estuaries of Karnataka (Boominathan et al., 2012), Kerala (Radhakrishnan et al., 2006) and Lakshadweep (Susan et al., 2012). However, similar studies in the mangroves of Mumbai are scanty.

Effect of increasing anthropogenic pressure on Mumbai mangroves, due to various developmental activities like reclamation for housing, sewage treatment, slums, garbage dumps, and industrial waste water, is evident (Joshi and Kale, 2013; Singare et

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al., 2014; Yedla, 2003) and is the biggest threat to the mangrove ecosystem and its associated flora and fauna. Even a small scale modification in the mangrove ecosystem, for instance, affects the diversity of molluscs and might even lead to local extirpation (Maia and Coutinho, 2013). As development is inevitable, causing threats to the molluscs, the mangrove environs of Mumbai need special attention for protection and conservation. The present study was carried out to obtain an inventory of molluscan fauna from the unexplored areas of the Mumbai mangroves for biodiversity documentation.

2. Materials and methods

2.1. Description of the study area

Mumbai lies 18°53′–19°19′ N latitudes and 72°47′–72°59′ E longitudes, in the Ulhas river mouth of central west coast of India. Creeks like Malad, Manori, Mahim, Mahul, and Thane surround the city and support mangrove growth with an area of about 50 km^2 (Forest Survey of India, 2015). The mangroves in Mumbai were classified as 8 contiguous areas viz., Gorai (GOR), Versova (VER), Juhu (JUH), Bandstand (BST), Bandra (BAN), Sewri (SEW), Vikhroli (VIK), and Elephanta Island (ELE) (Fig. 1). Mangrove habitat of Gorai, Versova, Sewri, Vikhroli, and Bandra were characterized by creek mudflats, rocky cliffs and bays, whereas rocky cliffs and open shorelines were found at Bandstand and Juhu. In case of Elephanta, it was an Island category mangrove habitat. Vijay et al. (2005) reported seven species of true mangroves in Mumbai and noted the dominance of *Avicennia marina.*

2.2. Collection of samples

For evaluating the molluscan diversity, 25 representative sites from the 8 mangrove areas of Mumbai were selected based on the mangrove diversity and various typical habitat characteristics following Vijay et al. (2005) and Lakshmi et al. (2012) as shown in Fig. 1.

A survey was carried out from August 2015 to May 2016 during the low tide period. In each of the 25 sites, a 100 m line transect was laid perpendicularly from the seaward margin into the mangrove forest, along which 3 to 4 quadrats (1 × 1 m) were fixed, covering all the zones of mangroves (Satizabal et al., 2012). Mollusc specimens within the quadrats were collected by handpicking and the arboreal forms were collected from mangrove structures like stem, prop roots, and pneumatophores of mangrove following Sasekumar (1974). Bivalves including mussels and oysters were collected by scraping surfaces like rocks and shells (Shunmugam and Vairamani, 2008). Identification was carried out, following the taxonomical descriptions by Apte (2014), Rao (2003) and Dey (2006). The specimens of *Salinator fragilis* and *Auriculastra subula*, were identified following keys by Golding et al. (2007), Martins (1994), and previous descriptions of specimens from elsewhere (Woolacott, 1945; Golding et al., 2007). The specimens of the identified uncommon/rare species were provided to the National Zoological Collections (NZC) repository in Marine Biological Research Centre (MBRC), Zoological Survey of India (ZSI), Chennai, India.

3. Results

A total of 61 molluscan species were recorded from Mumbai mangroves. The class Gastropoda, with 46 species, dominated the mangrove environs while Bivalvia and Polyplacophora were represented by 14 and 1 species, respectively (Table 1). The total number of species in the surveyed mangrove areas ranged from 10 to 27 in each area. The gastropods, represented by 46 species (Figs. 3–5), belonged to 31 genera of 22 families while, 14 species of recorded bivalves (Fig. 2) belonged to 14 genera of 12 families. The most important families in terms of number of species were, Ellobidae (7), Neritidae (6), Littorinidae (4) among gastropods, whereas Ostreidea (2), Arcidae (2) were the dominant families among bivalves. Members of the family Littorinidae were arboreal in nature and were observed in mangrove roots, leaves, barks etc. The highest molluscan diversity was recorded in Versova mangroves (27 species) and the least in Bandra and Gorai mangroves (10 species) each.

Among gastropods, species of the following genera: *Pirenella*, *Cassidula*, *Melampus*, *Littoraria*, *Telescopium*, *Neripteron*, *Onchidium*, and *Elysia bengalensis* were observed to occur exclusively in the mangrove environment. Species of *Nerita*, *Nassarius*, and *Trochus* were common to both mangrove and non-mangrove environs. In case of bivalve species, *Geloina erosa*, *Pharella javanicus*, and *Glauconome chinensis* were observed exclusively in the mangrove environment.

Telescopium telescopium, *Neripteron violaceum*, and *Onchidium* sp. were reported from all the surveyed areas. Clusters of *Elysia bengalensis* (Mangrove sea slug) were observed in the standing water puddles of Sewri and Vikhroli mangroves. Freshwater Pulmonate species, *Macrochlamys* sp. and *Physella gyrina* were observed in the marginal area of Vikhroli mangroves. Representatives from family Ellobidae were observed in all the study sites except Elephanta Island and no bivalve was documented from the mangroves in Bandra. Edible oysters like *Saccostrea cucullata* and *Crossostrea* sp. were found attached on the rocks or mangroves stems.

Collection of rock oysters from Danapani region during the low tide period by a group of local women for consumption, was observed. A heap dead shells of *Telescopium telescopium* was observed at Gorai mangroves, indicating shell collection carried out by locals. In many surveyed mangrove areas (Juhu, Versova and Bandra), the substratum was completely covered by the domestic wastes (plastic and polyethylene).

The present study reports two new distributional records for gastropods, *Salinator fragilis* (Lamarck, 1822) and *Auriculastra subula* (Quoy and Gaimard, 1832), from the west coast of India. Details of the collected specimens are given in Table 2.

Discussion

The higher diversity of gastropods, compared to bivalves in mangroves, is attributed to the better tolerance capacity of gastropods to hard conditions that prevail in the mangrove ecosystem (Hogarth, 2015). This feature is in concurrence with many research findings across Indian mangroves (Table 3). Kathiresan and Qasim (2005) attributed low faunal species richness in the west coast mangroves to lack of proper survey. The present study reports the second highest molluscan diversity in mangrove ecosystems of India, after Andaman and Nicobar Islands (Table 3), which could be attributed to intensive surveys carried out in different mangrove associated ecosystems like mudflats, creeks, saltmarsh, rock cliffs, and island areas, as reported by Lakshmi et al. (2012). Mangroves of Mumbai are dominated by *Avicennia marina*, which supports good diversity of molluscs as the physical structure can create suitable habitat and provide food materials (Jagtap et al., 2001; Kabir et al., 2014; Printrakoon and Wells, 2008).

The predominant mangrove molluscan families observed in Mumbai viz., Ellobidae, Littorinidae, Potamididae and Neritidae are also widespread in the Indo-Pacific region and South-East Asia (Hogarth, 2015; Walthew, 2012). Out of these, the families Ellobidae and Littorinidae are of tropical origin (Ellison et al., 1999). The distribution of bivalves are generally confined to a very narrow zone of low tide seaward limit, due to feeding and larval settlement requirements. Very few species, like, *Geloina erosa*, *Glauconome*

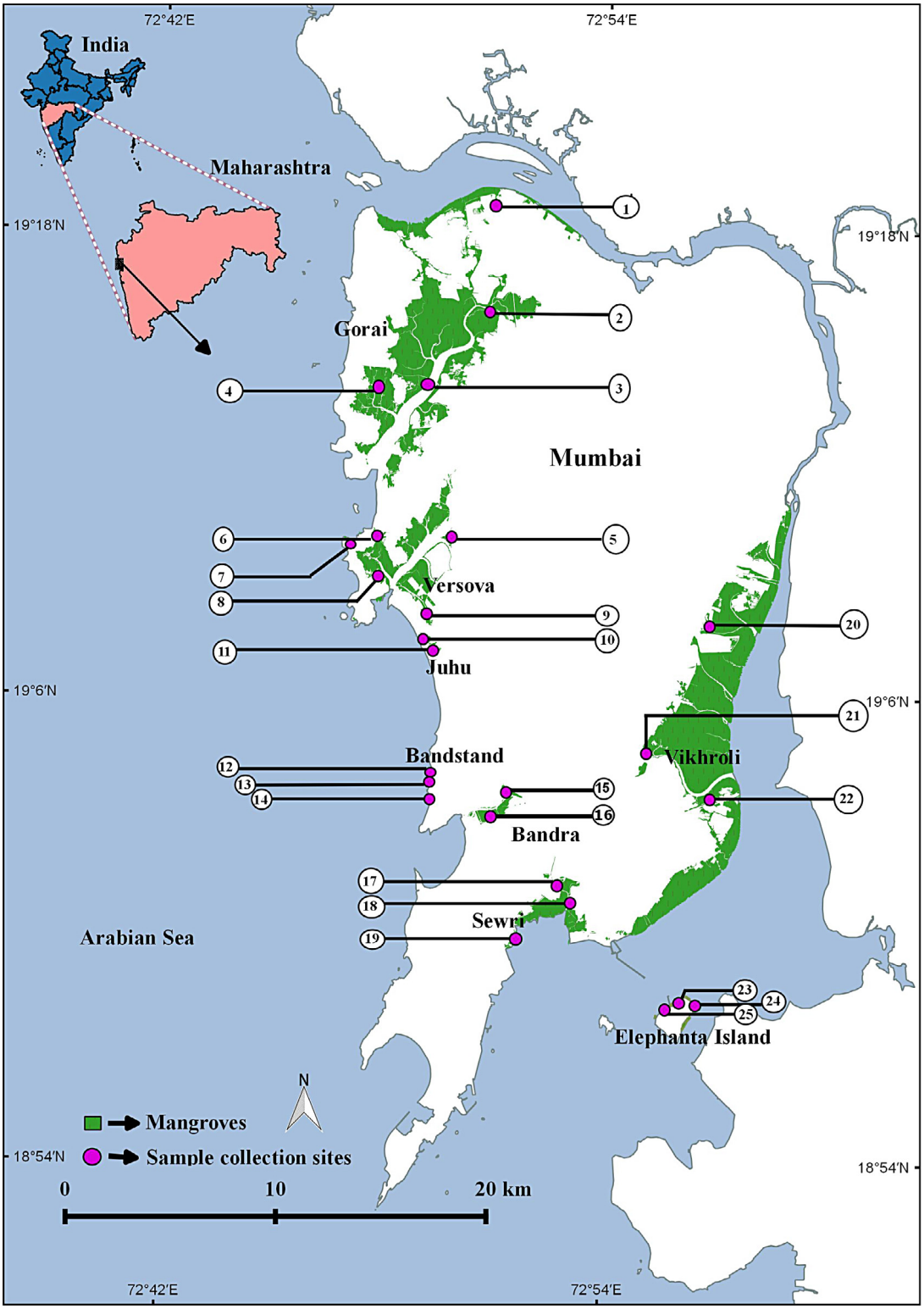

Fig. 1. Map showing the study areas in mangrove ecosystem of Mumbai. *Figure Legend:* Gorai (1) Bhyander (2) Dahisar (3) Gorai jetty (4) Near Essel World; Versova (5) Malad Creek (6) Dharavali (7) Aksa Beach (8) Pascalwadi (9) Near CIFE; Juhu (10) Versova Beach (11) Near Rajiv Gandhi Institute; Bandstand (12) Chimbai (13) Shirley (14) Bandstand; Bandra (15) Near BKC (16) Mithi River; Sewri (17) Chembur-Wadala road (18) Mahul jetty (19) Sewri Flamingo watch; Vikhroli (20) Vikhroli (21) Ghatkopar (22) Mankhurd; Elephanta Island (23) Mangrove point1 (24) Mangrove point2 (25) Mangrove point3.

chinensis, *Pharella* sp. and *Crassostrea* sp. are well adapted to the spray zones and changing environmental conditions of inter-tidal mangrove areas (Jiang and Li, 1995; Kabir et al., 2014; Morton, 1983; Nagelkerken et al., 2008). The molluscan diversity of Sewri region (21 species) was greater than that reported in an earlier study from the region (Verma et al., 2004).

Mumbai mangroves are among the severely affected areas due to illegal mangrove cutting and inflow of toxic and non-toxic contaminants, mainly from treated and untreated wastewater,

Table 1
List of molluscan species recorded in mangrove ecosystem of Mumbai.

No.	Family	Species	Mangrove areas in Mumbai							
			GOR	VER	JUH	BST	BAN	SEW	VIK	ELE
Bivalvia										
1	Laternulidae	***Laternula* sp.**	—	+	—	—	—	—	—	—
2	Pharidae	***Pharella javanicus*** (Lamarck, 1818)	—	—	—	—	—	+	—	—
3	Donacidae	***Donax scortum*** (Linnaeus, 1758)	—	+	—	—	—	—	—	—
4	Teredinidae	***Teredo* sp.**	—	—	—	—	—	+	—	—
5	Glauconomidae	***Glauconome chinensis*** (Gray, 1828)	+	+	+	+	—	—	+	—
6	Trapezidae	***Neotrapezium sublaevigatum*** (Lamarck, 1819)	—	—	—	+	—	—	—	—
7	Cyrenidae	***Geloina erosa*** (Lightfoot, 1786)	—	—	—	—	—	+	—	+
8	Veneridae	***Gafrarium divaricatum*** (Gmelin, 1791)	—	+	—	+	—	—	—	—
9	Arcidae	***Barbatia* sp.**	—	—	—	+	—	—	+	—
10		***Tegillarca granosa*** (Linnaeus, 1758)	—	—	—	—	—	+	—	—
11	Noetiidae	***Noetiella pectunculiformis*** (Dunker, 1866)	—	+	—	—	—	—	—	—
12	Mytilidae	***Perna viridis*** (Linnaeus, 1758)	—	+	—	—	—	—	—	—
13	Ostreidae	***Crassostrea* sp.**	—	—	+	—	—	+	+	+
14		***Saccostrea cucullata*** (Born, 1778)	—	+	—	—	—	—	—	+
Sub-total			1	7	2	4	0	5	3	3
Gastropoda										
1	Littorinidae	***Littoraria carinifera*** (Menke, 1830)	+	—	+	—	—	—	—	—
2		***Littoraria intermedia*** (Philippi, 1846)	+	+	—	+	—	+	—	—
3		***Littoraria scabra*** (Linnaeus, 1758)	—	+	—	+	—	+	—	+
4		***Littoraria undulata*** (Gray, 1839)	—	—	—	—	—	—	—	+
5	Ranellidae	***Gyrineum natator*** (Röding, 1798)	—	+	+	—	—	—	—	+
6	Assimineidae	***Assiminea brevicula*** (Pfeiffer, 1855)	—	—	—	—	—	—	—	+
7		***Assiminea* sp1**	—	—	—	—	—	+	—	—
8		***Assiminea* sp2**	—	+	—	—	—	—	—	—
9	Iravadidae	***Iravadia bombayana*** (Stoliczka, 1868)	—	—	—	—	+	—	—	—
10	Buccinidae	***Cantharus spiralis*** (Gray, 1839)	—	—	—	—	—	+	—	+
11	Muricidae	***Indothais lacera*** (Born, 1778)	—	—	—	—	—	—	—	+
12		***Indothais sacellum*** (Gmelin, 1791)				+				
13		***Semiricinula tissoti*** (Petit de la Saussaye, 1852)	—	—	—	+	—	—	—	—
14	Cerithiidae	***Clypeomorus bifasciata*** (G.B. Sowerby II, 1855)	—	—	+	+	—	—	—	—
15	Planaxidae	***Planaxis sulcatus*** (Born, 1778)	—	+	—	—	—	+	—	—
16	Potamididae	***Pirenella cingulata*** (Gmelin, 1791)	+	+	+	+	—	+	+	+
17		***Pirenella conica*** (Blainville, 1829)	—	—	—	—	—	—	+	—
18		***Telescopium telescopium*** (Linnaeus, 1758)	+	+	+	+	+	+	+	+
19	Thiaridae	***Melanoides tuberculata***(O.F. Müller, 1774)	—	+	—	—	—	—	—	—
20	Haminoeidae	***Haminoea crocata*** (Pease, 1860)	—	—	—	—	—	+	+	+
21	Plakobranchidae	***Elysia bengalensis*** (Swennen, 2011)	—	—	—	—	—	+	+	—
22	Physidae	***Physella gyrina*** (Say, 1821)	—	—	—	—	—	—	+	—
23	Ariophantidae	***Macrochlamys* sp.**	—	—	—	—	—	—	+	—
24	Onchidiidae	***Onchidium* sp.**	+	+	+	+	+	+	+	+
25	Amphibolidae	***Salinator fragilis*** (Lamarck, 1822)	—	—	—	—	—	—	—	+
26		***Salinator burmana*** (Blanford, 1867)	—	—	—	—	—	—	—	+
27	Ellobiidae	***Ellobium gangeticum*** (L. Pfeiffer, 1855)	+	—	+	—	+	—	+	—
28		***Melampus sincaporensis*** (L. Pfeiffer, 1855)	+	—	+	+	+	+	+	—
29		***Melampus* sp.** (Linnaeus, 1758)	—	—	—	—	+	—	+	—
30		***Auriculastra subula*** (Quoy and Gaimard, 1832)	—	—	—	—	+	—	+	—
31		***Cassidula aurisfelis*** (Bruguière, 1789)	+	+	+	+	+	+	+	—
32		***Cassidula nucleus*** (Gmelin, 1791)	—	+	+	+	—	—	—	—
33		***Pythia plicata*** (Férussac, 1821)	—	—	—	—	—	—	+	—
34	Neritidae	***Neripteron violaceum*** (Gmelin, 1791)	+	+	+	+	+	+	+	+
35		***Nerita albicilla*** (Linnaeus, 1758)	—	+	—	—	—	—	—	—
36		***Nerita balteata*** (Reeve, 1855)	—	+	—	—	—	—	—	—
37		***Nerita chamaeleon*** (Linnaeus, 1758)	—	+	+	—	—	—	—	—
38		***Nerita oryzarum*** (Récluz, 1841)	—	+	—	+	—	—	—	+
39	Nassariidae	***Nassarius foveolatus*** (Dunker, 1847)	—	—	—	—	—	+	—	—
40		***Nassarius stolatus*** (Gmelin, 1791)	—	—	—	—	—	+	—	—
41		***Nassarius sufflatus*** (Gould, 1860)	—	—	—	—	—	+	—	—
42	Melongenidae	***Volegalea cochlidium*** (Linnaeus, 1758)	—	+	—	+	—	—	—	—
43	Chilodontidae	***Euchelus asper*** (Gmelin, 1791)	—	—	—	+	—	—	—	—
44	Trochidae	***Trochus cariniferus*** (Reeve, 1842)	—	+	—	+	—	—	—	—
45		***Clanculus scabrosus*** (Philippi, 1850)	—	+	—	+	—	—	—	—
46		***Umbonium vestiarium*** (Linnaeus, 1758)	—	—	+	—	—	—	—	—
Sub-total			9	19	13	17	9	16	15	14
Polyplacophora										
47	Chitonidae	***Ischnochiton yerburyi*** (E. A. Smith, 1891)	—	+	—	—	—	—	—	—
Total			10	27	15	21	9	21	18	17

GOR — Gorai, VER — Versova, JUH — Juhu, BST — Bandstand, BAN — Bandra, SEW — Sewri, VIK — Vikhroli, ELE — Elephanta Island.
+ → denotes **Presence**.
— → denotes **Absence**.

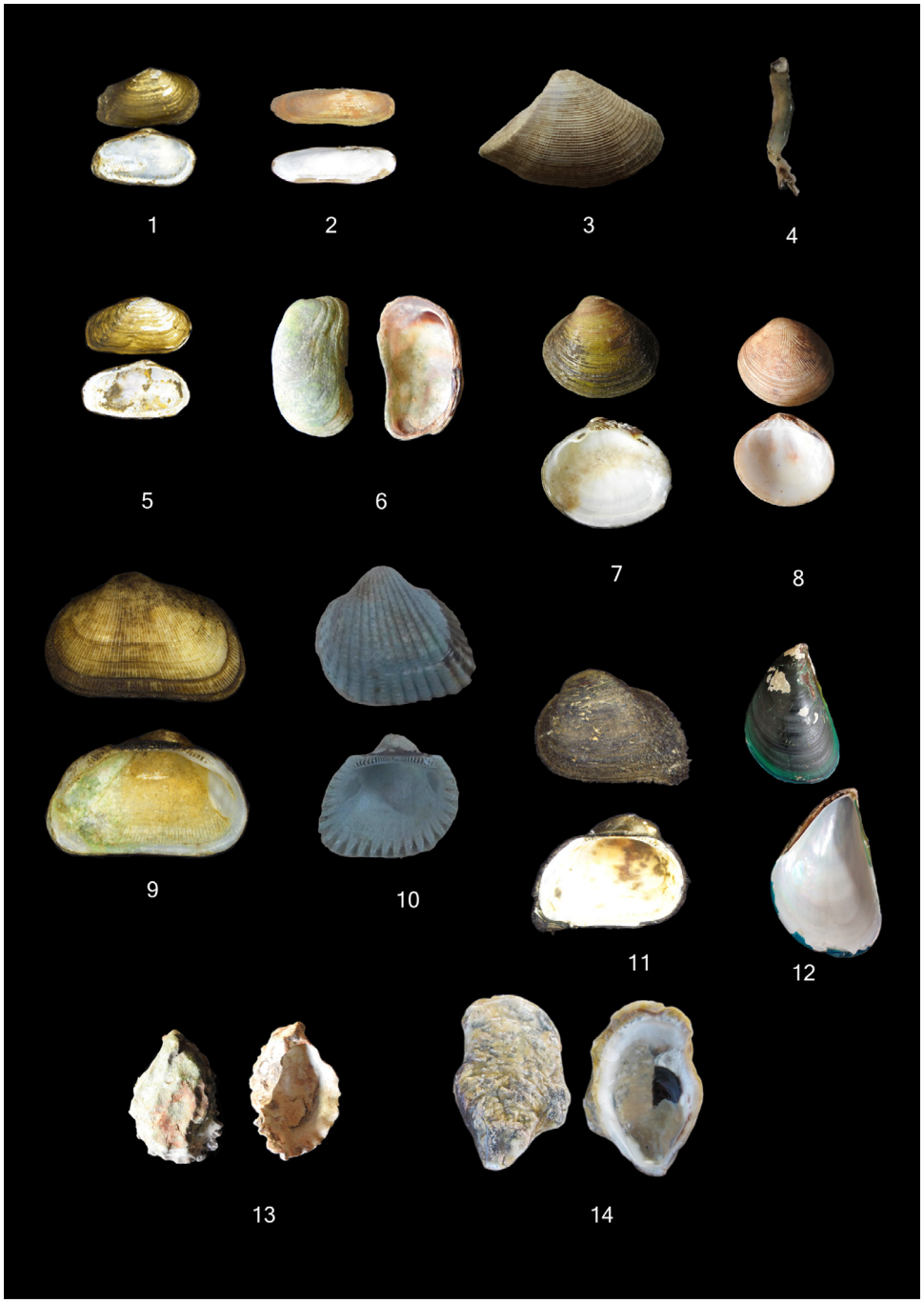

Fig. 2. Bivalves collected from the mangrove ecosystem of Mumbai.

Table 2
Details of the new distributional records.

Details	*Salinator fragilis*	*Auriculastra subula*
Family	Amphibolidae Gray, 1840	Ellobiidae (L. Pfeiffer, 1854 (1822))
Measurements	Shell length 3.98–4.47 mm, Shell width 4.04–4.49 mm, Aperture height 2.80–3.12 mm, Aperture width 1.98–2.56 mm.	Shell length 9.32–9.34 mm, Shell width 3.52–3.57 mm, Aperture height 5.62–6.01 mm, Aperture width 2.52–2.56 mm.
Features	Shell small to medium in size, transparent, umbilicated and creamy fawn colored with broad dark brown band surrounding the upper portion of the whorl. The whorls, five in number. Sutures are deeply impressed. Aperture is large and roundly expanded. The Inner columellar lip, strictly attached to major part of the body wall, creates wide umbilical cavity.	Shell solid, oval-elongate to fusiform in shape, shiny and pale yellow color in appearance and moderately high spire. Aperture forms the major portion of the shell (about 50%–65%). Columella truncate and having one or two folds. The inner lip with one small twisted columellar plicae and sharp outer lip with smooth thickening inside.
Habitat	Muddy patches in mangrove habitats.	Muddy mangrove swamps.
Remarks	New record to west coast of India.	New record to west coast of India.

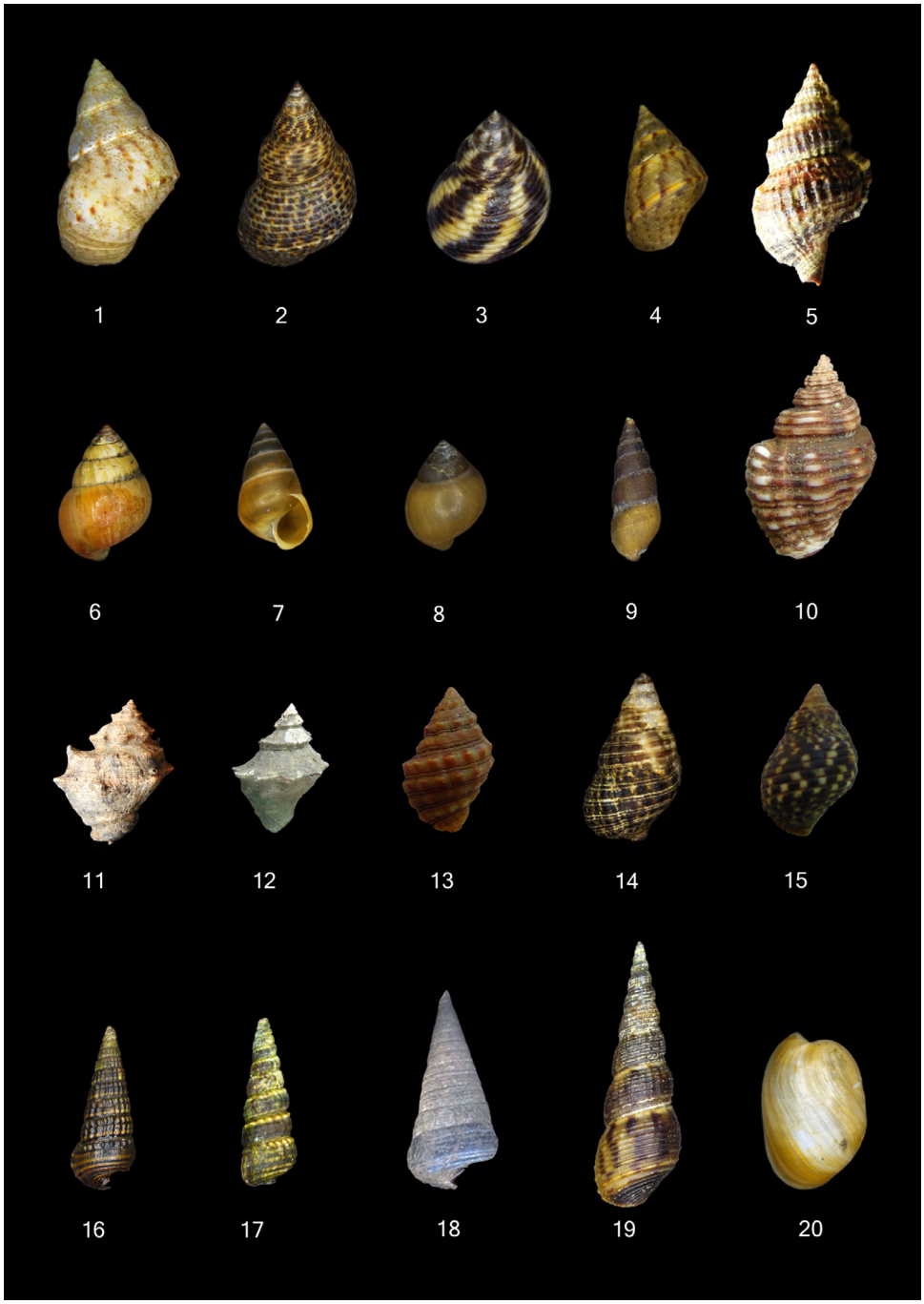

Fig. 3. Gastropods collected from the mangrove ecosystem of Mumbai.

released into the creeks from the city with high loads of suspended solids (Qasim, 2004; Untawale et al., 1992). This was also witnessed in the present survey, especially, in Bandra mangroves. Dhananjayan et al. (2012) reported higher concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) in water and sediments of Sewri mudflats than the coastal sediments of USA, China, Egypt, Greece and Antarctica. Increasing human population results in the increased generation of solid wastes, making the management cumbersome and finally affecting the coastal ecosystems. The gastropod, *Neripteron violaceum* and members of Ellobidae family (*Cassidula* and *Melampus*) are reported as pollution indicators in mangrove ecosystems of Puducherry (Satheeshkumar and Khan, 2012) and Sri Lanka (Dissanayake and Chandrasekara, 2014). Widespread distribution of the above said species indicates that the mangrove ecosystem of Mumbai city are under stress. However, members of Ellobidae family were not observed in Elephanta Island in the present study, as also reported by Pawar (2012). The effect of degrading environmental conditions of mangrove ecosystem on the distribution of molluscan species along the Mumbai coast needs to be studied further.

Saccostrea cucullata, *Crassostrea* sp., *Geloina erosa* and *Perna viridis* support inshore fisheries in many countries, including India (Hutchison et al., 2014; Ramachandra et al., 2012). The unregulated collection of molluscs and severe pollution along the coastal creeks of Mumbai may lead to the end of the fishery (Datta et al., 2010; Murthy et al., 2001; Sundaram, 1987; Sundaram and Deshmukh, 2011). In many parts of the world's mangrove ecosystem, plastic

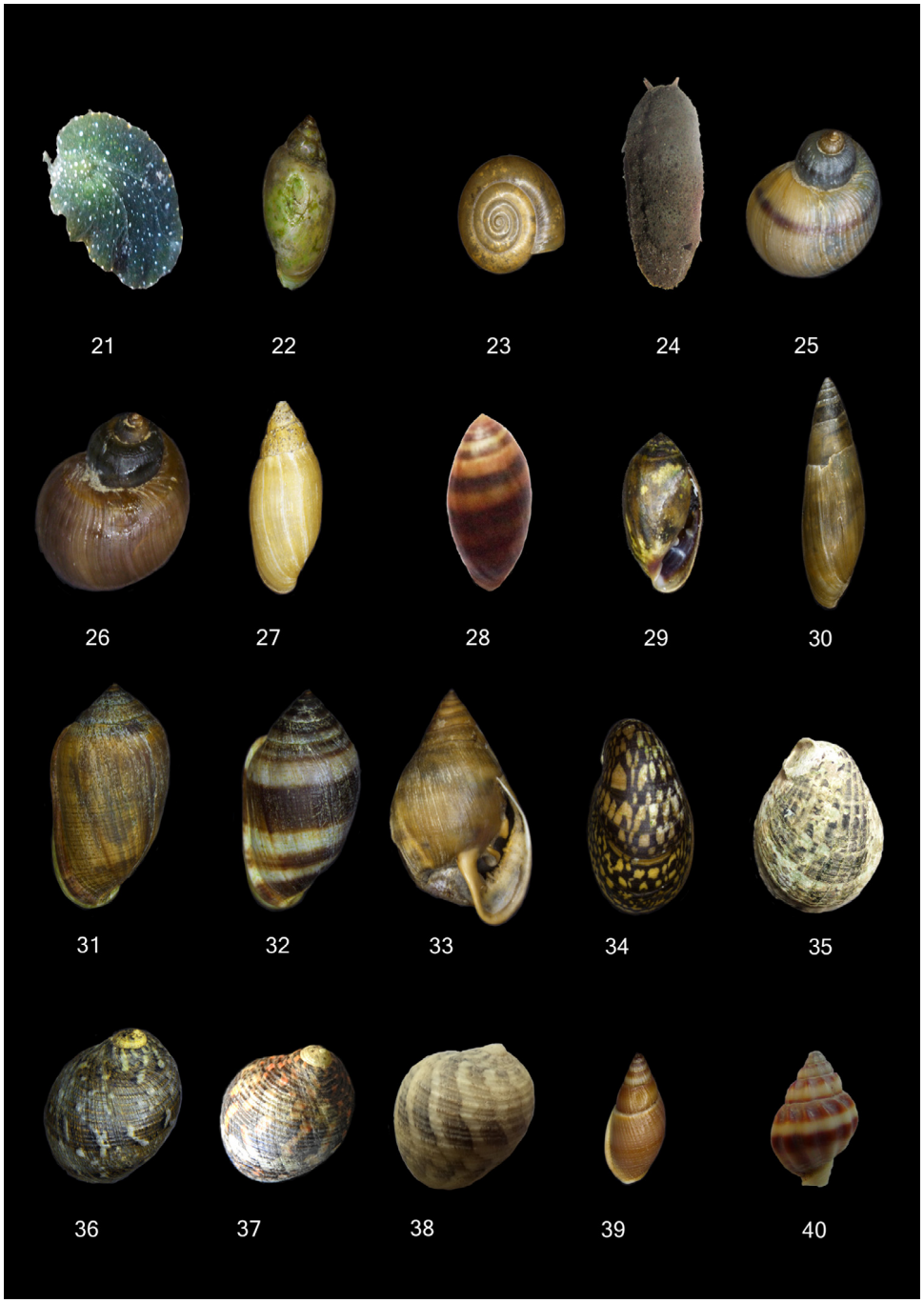

Fig. 4. Gastropods collected from the mangrove ecosystem of Mumbai.

and polyethylene are considered as a major threat to the biodiversity (Dissanayake and Chandrasekara, 2014; Ivar do Sul et al., 2014; Sandilyan and Kathiresan, 2012). Tide dominated mangrove creeks of Mumbai (Vikas et al., 2015), receive huge quantities of plastic and polyethylene material from the coastal waters as well as direct disposal from the surrounding human settlements. The complex root structures of mangroves retain the above wastes and thus affect the habitat utility of benthic faunal groups, mainly molluscs.

Salinator fragilis is a pulmonate gastropod recently reported in India, by Abhijna et al. (2015) from the Sundarbans mangroves and Kakinada Bay, east coast of India. Observation of this species from the muddy mangrove patches of Elephanta Island, Mumbai, during the current study provides the first evidence on their occurrence in the west coast of India. Another species, *Auriculastra subula*, is widely distributed along the Indo-pacific region. However, distribution in the Western Indian Ocean is reported only from Mauritius (Van Damme and Richter, 2016) and the present study confirms the range of this species further to the west coast of India.

4. Conclusion

Mangrove ecosystems serve as a habitat for diverse floral and faunal groups associated with them, thus adding to their conservation significance. Mollusca are one of the dominant faunal groups inhabiting the mangrove ecosystems, the diversity of which is not comprehensively studied in India. The present investiga-

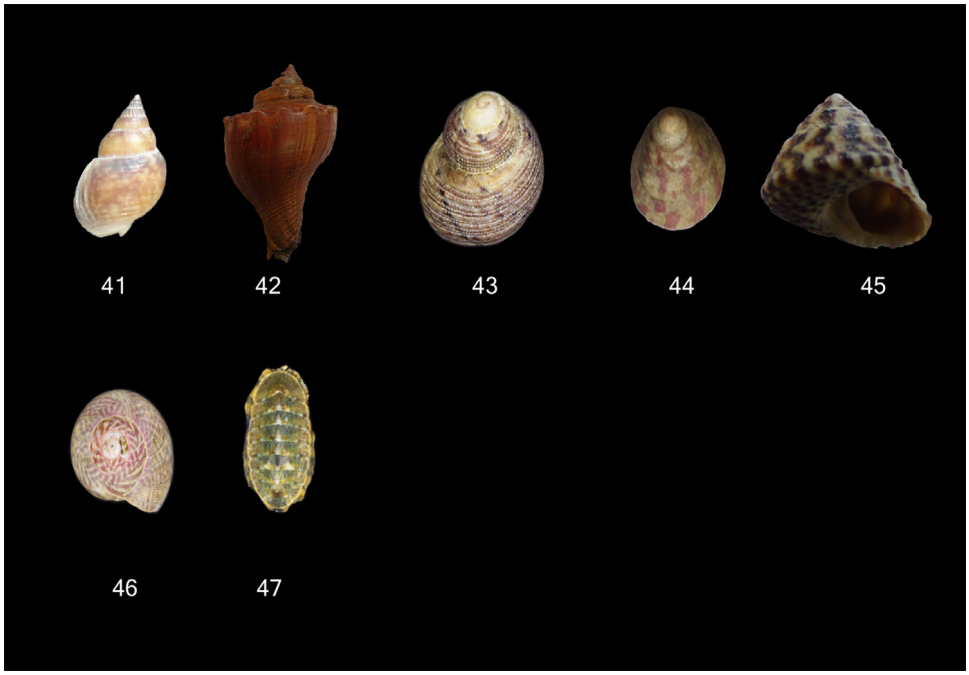

Fig. 5. Gastropods collected from the mangrove ecosystem of Mumbai.

Table 3
Molluscan diversity in different mangrove ecosystems.

Reference	Place	No. of Gastropods	No. of Bivalves	No. of Polyplacophorans
Irma and Sofyatuddin (2011)	Indonesia	14	5	–
Zvonareva et al. (2015)	Central Vietnam	53	–	–
Printrakoon and Wells (2008)	Thailand	31	16	–
Jiang and Li (1995)	China	30	24	–
Hamdard et al. (2016)	Karachi (Pakistan)	12	2	–
Ghasemi et al. (2011)	Iran	28		–
Dey (2006)	Sundarbans	31	25	–
Ranjan and Babu (2015)	Bhavanapadu	15	4	–
Chakravarty and Ranjan (2014)	Nuvvalarevu	6	3	–
Satheeshkumar and Khan (2012)	Pondicherry	21	16	–
Venkatesan et al. (2010)	Karangad (Gulf of Mannar)	13	12	–
Das and Roy (1989)	Andaman and Nicobar Islands	66	32	–
Saravanakumar et al. (2007)	Gulf of Kutch	17	16	–
Pawar (2012)	Uran (Raigad)	38	13	–
Kulkarni and Mukadam (2015)	Bhayte (Ratnagiri)	4	8	–
Boominathan et al. (2012)	Kali, Gangavali, Sharavathi and Aghanashini Estuary	12	4	–
Radhakrishnan et al. (2006)	Kerala	14	7	–
Susan et al. (2012)	Lakshadweep	9	–	–
Present Study	**Mumbai**	**46**	**14**	**1**

tion on molluscan species diversity associated with the mangrove ecosystems along Mumbai coast, revealed the distribution of 46 gastropods, 14 bivalves and 1 polyplacophora, totaling to 61 molluscan species with 2 new distributional records for gastropods, namely *Salinator fragilis* and *Auriculastra subula*. This comprehensive account on the diversity of mangrove molluscs shall serve as baseline information for future studies on biodiversity assessment and conservation planning of the mangrove ecosystems of Mumbai, which are facing severe threats from various anthropogenic activities including mangrove encroachment, waste disposal and over exploitation.

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