



First report on the occurrence of nine ornamental fish species from Odisha

S R Mohanty^a, S Roy^a, S Fullonton^b, D Ray^c, Anil Mohapatra^{*a} & S S Mishra^d

^aEstuarine Biology Regional Centre, Zoological Survey of India, Gopalpur-on-Sea, Ganjam – 761 002, India

^bDepartment of Wildlife and Biodiversity Conservation, North Orissa University, Odisha – 757 003, India

^cBajkul Milani Mahavidyalaya, Kismat Bajkul, Purba Medinipur, West Bengal – 721 655, India

^dMarine Fish Section, Zoological Survey of India, Kolkata – 700 016, India

*[E-mail: anil2k7@gmail.com]

Received 14 August 2019; revised 04 October 2019

The current study reports nine ornamental fish species, new to Odisha coast, India. These are *Gymnothorax pseudotile*; *Antennarius indicus*; *Ostichthys acanthorhinus*; *Lutjanus lunulatus*; *Pomadasys furcatus*; *Parascolopsis aspinosa*; *Pomacanthus semicirculatus*; *Chaetodon decussatus* and *Amphiprion clarkii*. The present study provides the detailed information on morphometric measurements, species characteristic features, distribution and photographs of reported ornamental fishes for the first time from the region.

[**Keywords:** Gopalpur-on-Sea, Kasafala, Paradeep, Taxonomy]

Introduction

Marine fishes are more attractive due to their vibrant colour patterns and unique shapes for which these can be well utilised as ornamental fishes, as most of them are hardy enough to be reared in the salt-water aquarium. According to Global Marine Aquarium data, the trading of marine ornamental fishes around the globe is about 1,471 species and in Indian waters, about 400 species belonging to 175 genera and 50 families of ornamental fishes are reported¹. Coastal waters of Odisha harbours about 605 fish species belonging to 138 families and 27 orders², many of which can be potential ornamental fish species. Nine such ornamental fishes, viz., *Gymnothorax pseudotile* Mohapatra *et al.* 2017; *Antennarius indicus* Schultz, 1964; *Ostichthys acanthorhinus* Randall, Shimizu & Yamakawa, 1982; *Lutjanus lunulatus* (Park, 1797); *Pomadasys furcatus* (Bloch & Schneider, 1801); *Parascolopsis aspinosa* (Rao & Rao, 1981); *Pomacanthus semicirculatus* (Cuvier, 1831); *Chaetodon decussatus* Cuvier, 1829 and *Amphiprion clarkii* (Bennett, 1830) are reported here as new occurrences along the Odisha coast.

Materials and Methods

Fish specimens were sampled from Gopalpur fish landing centre (19°15'47.56" N; 84°54'59.26" E), Paradeep fishing harbour (20°17'25.90" N; 86°42'26.73" E) and from Kasafala (21°30'43.7" N; 87°07'37.1" E),

Panchupada river estuary, Odisha, India at Bay of Bengal Sea. Authors collected the specimens from fishermen of Gopalpur beach, Paradeep fishing harbour and Kasafala normally from the trawl net fisheries. After collection, the fish specimens were photographed and preserved in 10 % formalin. Morphometric measurements were taken with digital calliper of 0.1 mm accuracy. All the species are submitted in the National repository (Estuarine Biology Regional Centre, Zoological Survey of India, Gopalpur-on-Sea).

Results

Taxonomic details and description of all nine reported species based on the specimens collected has been presented with comments on distribution.

1. *Gymnothorax pseudotile* Mohapatra, Smith, Ray, Mishra & Mohanty, 2017

(Bengal low-fin moray)

Order: Anguilliformes L.S. Berg 1943

Family: Muraenidae Rafinesque 1815

Genus: *Gymnothorax* Bloch 1795

2017. *Gymnothorax pseudotile* Mohapatra, Smith, Ray, Mishra & Mohanty (Shankarpur fishing harbour, West Bengal, India).

Material examined: EBRC/ZSI/F 10115, 1 specimen, 460 mm TL, Kasafala, Panchupada river in Balasore district, date of col. 18th March 2018.

Characters: Body robust, slender, laterally compressed on posterior part; anus at about middle of body with preanal length 1.9 times TL. Head long, about 7.8 times in TL; snout blunt, 6.6 times in head length (HL). Eye large, situated slightly closer to rictus than snout tip, its diameter 11.8 in times HL. Anterior nostril tubular, short, not reaching snout tip; posterior nostril rounded, pore-like, located above anterior margin of eye. Lower jaw slightly shorter than upper jaw. Gill opening rounded, positioned below lateral midline. Branchial pores 2; infraorbital pores 3; supraorbital pores 3, mandibular pores 5. Dorsal fin low, originating above posterior half of gill opening; predorsal length 8.6 times in TL; anal fin low, originates behind anus; both dorsal and anal fin continuous with caudal fin. Teeth sharp, pointed, but not elongate.

Colour: Dorsally dark brown, body with small white dots and ventral side pale whitish with small brown spots. Dorsal fin pale in colour (Fig. 1).

Distribution (Indian coastline): The species is known only from West Bengal on the north-eastern coast of India in the Bay of Bengal^{3,4} and the present report broadened the territory of the species further southward to Odisha coast. The Kasafal fish landing centre is located at the northern part of the Odisha coast and the species seems to be distributed along the estuarine dominated areas.

2. *Antennarius indicus* Schultz, 1964 (Indian frogfish)

Order: Lophiiformes Garmann 1899

Family: Antennariidae Jarocki 1822

Genus: *Antennarius* Daudin 1816

1964. *Antennarius indicus* Schultz (Vizagapatnam, India).

Material examined: EBRC/ZSI/F 9768, 1 specimen, 125 mm TL, Gopalpur fish landing centre, date of col. 13th March 2018.

Characters: D XII; A 7; P 12; V absent. Body depth 2.4 times in TL. Head 2.4 times in TL. Eyes usually moderate 10.6, while interorbital space 4.2 times in HL. Predorsal length 3.1 times in TL. Body short, globose, slightly compressed. Mouth large, oblique with numerous, small, villiform teeth. Gill opens behind and below the pectoral fin base as a small pore. First, second and third dorsal fin spines free from the other fins whereas first modified as a lure;

pectoral fin lobe form leg shape and long. Skin with spinulose and some membranous flaps. Second dorsal spine equals to illicium. Esca having bunch of leaf-like appendages.

Colour: Body is yellowish-brown in colour having 3 dark ocelli on side. All the fins with deep brown rows of spots. The illicium is dark with bands (Fig. 2).

Distribution: Western Indian Ocean: East Africa, Seychelles, Gulf of Aden and Gulf of Oman to east coast of India and Sri Lanka⁵. Along east coast of India Joshi *et al.*⁶ listed this species from the Gulf of Mannar, and it is originally described from Andhra Pradesh (Visakhapatnam) coast⁷. The present record forms its first occurrence from Odisha coast and extends its territory further northwards.

3. *Ostichthys acanthorhinus* Randall, Shimizu & Yamakawa, 1982 (Spinesnout soldierfish)

Order: Holocentriformes Betancur-R. *et al.* 2013

Family: Holocentridae Bonaparte 1833

Genus: *Ostichthys* Cuvier 1829

1982. *Ostichthys acanthorhinus* Randall, Shimizu & Yamakawa (Gulf of Oman, north-western Indian Ocean).



Fig. 1 — *Gymnothorax pseudotile* Mohapatra *et al.*, 2017 (EBRC/ZSI/F 10115)

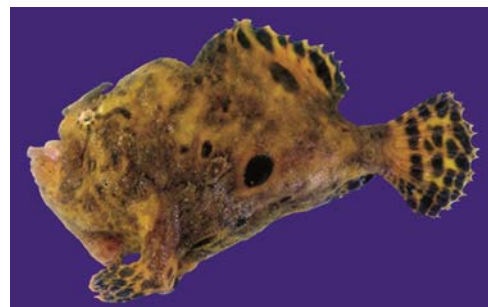


Fig. 2 — *Antennarius indicus* Schultz, 1964 (EBRC/ZSI/F 9768)

Material examined: EBRC/ZSI/F 9650, 3 specimens, 80-92 mm TL, Paradeep fishing harbour, date of col. 4th March 2018.

Characters: D: XII, 13; A: IV, 11; P: 15; V: I, 7. Body covered by strong ctenoid scales. Head large, 2.6-2.7 times in TL; body depth, 2.6-2.7 times in TL. Head with large eye, 2.9-3.1 times in head length (HL); snout short, 5.2-5.8 times in HL. Opercle with spine anteriorly and edge serrated with one short spine posteriorly; each nasal bone has prominent spine. Four scales in between lateral line and dorsal fin origin. Caudal fin forked; caudal peduncle length, 10.0-10.8 and depth, 13.1-13.3 times in TL.

Colour: Fresh specimen reddish in colour but faded to silvery white after preservation (Fig. 3).

Distribution: Red Sea, Gulf of Oman, from the Arabian Sea to Myanmar, Indonesia and northern Australia⁸. This species has been first recorded from Kerala coast as *Myripristis kaianus*^{9,10} and recently reported from West Bengal¹¹. This species was also collected from Wadge Bank, south to Tamil Nadu¹² and from Viskhapatnam, Andhra Pradesh¹³. The present manuscript established its first record from Odisha.

4. *Lutjanus lunulatus* (Park, 1797); Lunartail snapper

Order: Perciformes Bleeker 1863

Family: Lutjanidae Gill 1861

Genus: *Lutjanus* Bloch 1790

1797. *Perca lunulatus* Park ('Habitat in Sumatræ littore' = Bengkulu Province, Sumatra, Indonesia).

1985. *Lutjanus lunulatus*: Allen, (FAO Fisheries Synopsis).

Material examined: EBRC/ZSI/F 10402, 1 specimen, 243 mm TL, Gopalpur fish landing centre, date of col. 1st January 2018.

Characters: D: X, 14; A: III, 9; P: 16; V: I, 5. Body oblong and moderately compressed. Body depth 3.2 times in TL. Head 3.2 times in TL. Eyes usually moderate 4.5 while interorbital space 5.1 times in HL. Mouth terminal and fairly large. Predorsal length 2.9 times in TL. Above lateral line, longitudinal scale rows are obliquely arranged. Vomerine tooth triangular without a posterior extension. Preopercular notch not clear.

Colour: Caudal fin with a black crescent marking; body and fins uniformly yellowish with silvery on lower sides (Fig. 4).

Distribution: Indo-West Pacific: North-eastern Arabian Sea to Philippines and Vanuatu⁵. From Indian coast it has been known from West Bengal, Tamil Nadu and Andaman Islands, however Allen¹⁴ shown its distribution throughout coasts of India¹⁵.

5. *Pomadasys furcatus* (Bloch & Schneider, 1801); Banded grunter

Family: Haemulidae Gill, 1885

Genus: *Pomadasys* Lacepède, 1802

1801. *Grammistes furcatus* Bloch and Schneider ('India orientali' [Indonesia]).

1984. *Pomadasys furcatus*: McKay, in Fischer and Bianchi, (*Western Indian Ocean; Fishing Area 51*)

Material examined: EBRC/ZSI/F 10221, 1 specimen, 202 mm TL, Gopalpur fish landing centre, date of col. 18th May 2018.

Characters: D: XII, 15; A: III, 10; P: 16; V: I, 5. Body is oblong and compressed. Body depth 3.2 times in TL. Head profile strongly convex and 4.1 times in TL. Predorsal length 3.4 times in TL. Mouth small or moderate and teeth are villiform in bands. The maxilla reaches up to hind nostril or eye. Eye large 3.3; inter orbital space 3.6, and snout 3.1 times in HL. Margin of preopercle concave and serrate. Chin having two pores and a median pit.

Colour: Silvery white body with six dark longitudinal parallel bands. Pectoral fins are dusky in colour (Fig. 5).

Distribution: Indo-West Pacific: Red Sea, Somalia, Mozambique and Madagascar to Natal, South Africa;



Fig. 3 — *Ostichthys acanthorhinus* Randall, Shimizu & Yamakawa, 1982 (EBRC/ZSI/F 9650)



Fig. 4 — *Lutjanus lunulatus* (Park, 1797) (EBRC/ZSI/F 10402)

from Gulf of Aden, through India, Sri Lanka, to west coast of Thailand; Indonesia and Papua New Guinea⁵. McKay¹⁶ shows its distribution all along west coast of India. This species has been reported only from Andhra Pradesh¹⁷ coast. The present report forms its new record from Odisha coast.

6. *Parascalopsis aspinosa* (Rao & Rao, 1981); Smooth dwarf monocle bream

Family: Nemipteridae Regan 1913

Genus: *Parascalopsis* Boulenger 1901

1981. *Scolopsis aspinosa* Rao & Rao, (Off Waltair (A.P.), eastern coast of India).

2009. *Parascalopsis aspinosa*: Barman and Mishra (India)

Material examined: EBRC/ZSI/F 9653, 2 specimens, 130-135 mm TL, Paradeep fishing harbour, date of col. 4th March 2018.

Characters: D: X, 9; A: III, 7; P: II, 14; V: I, 5. Body moderately deep, 3.6 times in TL; head 2.9-3.1 times in TL; head length little longer than body depth. Snout short, pointed, 3.9-4.3 times in head; eye large 3.1-3.5 times in head, interorbital space 4.7-5.4 times in HL; Lateral line scales 36-38. Pectoral and pelvic fins reaching just beyond origin of anal fin. Gill rakers on first arch 12 in number. Mouth small and maxilla reaching to mid-pupil. Caudal fin emarginate.

Colour: Body light rosy-reddish with silvery yellow ventrally. Dorsal fin with orange edge and black blotch on basal half of fin between eighth dorsal spine and first soft ray. Caudal and pectoral fin pale yellowish (Fig. 6).

Distribution: It is distributed in the northern Indian Ocean, from the Andaman Sea to the Arabian Sea, including the Gulf of Aden, southern Red Sea, and Persian (Arabian) Gulf¹⁸. It has been reported from Andhra Pradesh¹⁹, Tamil Nadu²⁰ and West Bengal²¹ as well along the entire east coast. The present report of this species from Odisha, being first from the state, confirms its range all along the east coast of India.

7. *Pomacanthus semicirculatus* (Cuvier, 1831); Semicircle angelfish

Family: Pomacanthidae Jordan & Evermann 1898

Genus: *Pomacanthus* Lacepède 1802

1831. *Holacanthus semicirculatus* Cuvier (Timor, Bourou, Waigeo, Indonesia, and Port Praslin, New Ireland Island, Bismarck Archipelago).

2012. *Pomacanthus semicirculatus*: Allen and Erdmann (Reef fishes of the East Indies).

Material examined: EBRC/ZSI/F 10230, 1 specimen, 284 mm TL, Paradeep fishing harbour, date of col. 9th July 2018.

Characters: D XIII, 22; A III, 19; P 20; V I, 5. Body laterally compressed and deep, ovate in shape; its depth 1.9 times in TL (1.6 times in SL). Head is 4.6 times in TL. Eye moderate 4.3 times in HL. Interorbital space 2.8 times in HL. A prominent spine at angle of preoperculum; single continuous dorsal fin with prolonged tip; ventral fin reaching to anus; caudal fin rounded. Scales are ctenoid.

Colour: The specimen depicts adult colouration of *P. semicirculatus* having a pale brownish-green body colour with blue spots on scales and lips yellowish (Fig. 7).

Distribution: Indo-West Pacific: Red Sea and East Africa to Samoa, north to southern Japan, south to Western Australia and New South Wales, including Lord Howe Island²². In India, this species is reported from Lakshadweep²³, Andaman Islands²⁴; Tamil Nadu²⁵, West Bengal²⁶ and Gujarat²⁷. The present study established its first record from Odisha coast and second from a region where there is no coral reef present after West Bengal in India, which suggests this species is having wide range of habitat preferences.



Fig. 5 — *Pomadasys furcatus* Bloch and Schneider, 1801 (EBRC/ZSI/F 10221)



Fig. 6 — *Parascalopsis aspinosa* Rao & Rao (EBRC/ZSI/F 9653)

8. *Chaetodon decussatus* Cuvier, 1829 (Indian vagabond butterflyfish)

Family: Chaetodontidae Rafinesque, 1810

Genus: *Chaetodon* Linnaeus 1758

1829. *Chaetodon decussatus* Cuvier (India).

Material examined: EBRC/ZSI/F 9672, 1 specimen, 125 mm TL, Gopalpur fish landing centre, date of col. 13th March 2018.

Characters: D XIII, 25; A III, 21; P 16; V I, 5. Body roughly oval in shape, strongly compressed. Body depth 1.7 times in total length (TL) and pointed towards snout. Depth of head less than the body depth, 3.7 times in TL. Mouth terminal; lower jaw and upper jaw equal in size. Body covered with soft ctenoid scales. Eyes large 3.1 times in head length (HL). Interorbital space flat, 3.6 times in HL. Single continuous dorsal fin; ventral fin reaching to anus; caudal fin rounded. Caudal peduncle length 25.0 and depth 10.4 times in TL. Head surface convex from dorsal spine origin to end of the black band and concave towards the tip of the snout.

Colour: Body cream-colored with dark thin stripes, some lines go upwards to dorsal fin origin while lower most lines go downwards to anal fin. Broad black area across the rear edge of the body, dorsal fin and anal fin; anal fin with yellow convex stripe; a dark bar through middle of caudal fin, sandwiched with yellow bands and a narrow band at end; a black band over eye connected from origin of dorsal spine to lower edge of opercle (Fig. 8).

Distribution: Indo-West Pacific: Yemen and Oman, Sri Lanka and Maldives, Andaman Sea east to Indonesia, the Philippines; also Christmas Island⁵. From the coasts of peninsular India, the species is reported from Kerala²⁸, Tamil Nadu²⁵ and Puducherry²⁹. Roy *et al.*³⁰ earlier provided an underwater picture of *C. decussatus* from Gopalpur coast (Odisha) without any taxonomic information. The current study provides first material evidence of *C. decussatus* from Odisha coast.

9. *Amphiprion clarkii* (Bennett, 1830); Yellowtail Clownfish

Family: Pomacentridae Bonaparte, 1832

Genus: *Amphiprion* Bloch and Schneider, 1801

1830. *Anthias clarkii* Bennett (Southern coast of Sri Lanka).

2012. *Amphiprion clarkii*: Allen and Erdmann (Reef fishes of the East Indies)

Material examined: EBRC/ZSI/F 10135, 1 specimen, 89.61 mm TL, Kasafala, Panchupada river in Balasore district, date of col. 18th March 2018.

Characters: D X, 14; A II, 12; P 19; V I, 5. Body oval, elongated and compressed; depth 2.6 times in TL; head profile steep, 3.7 times in TL; snout blunt, 3.4 times in HL. Mouth small, terminal and protractile; eyes moderate, 3.4 times in HL; inter orbital space, 3.0 times in HL.

Colour: Black body with three white bands. Caudal, pectoral and ventral fin yellowish in colour, but dorsal and anal fin blackish (Fig. 9).

Distribution: Distribution in tropical and subtropical waters of the Indo-West Pacific region – from the Persian Gulf, through India, Sri Lanka, Maldives to Fiji and Micronesia, north to Japan, south to Australia³¹. In India, the species is reported from



Fig. 7 — *Pomacanthus semicirculatus* (Cuvier, 1831) (EBRC/ZSI/F 10230)



Fig.8 — *Chaetodon decussatus* Cuvier, 1829 (EBRC/ZSI/F 9672)



Fig. 9 — *Amphiprion clarkii* (Bennett, 1830) (EBRC/ZSI/F 10135)

Lakshadweep (Jones & Kumaran²³, as *A. bicinctus* Ruppell); Andaman Islands²⁴ and from Gulf of Mannar, Tamil Nadu⁶. The current study confirms its occurrence in Odisha coast.

Discussion

Barman *et al.*² enlisted 605 fish species under 138 families and 27 orders from marine and estuarine waters of Odisha. During the last one decade around 24 publications have added 42 new species to Odisha coast. However, all the nine species reported here is hitherto not recorded from Odisha coast and forms the first record.

It may possible that, *G. pseudotile*, a very recently described species, might have been confused with *Gymnothorax tile* by earlier workers as both have minute scattered pale spots but that can be easily distinguished by its low and pale dorsal fin v/s higher and body coloured dorsal fin in the later. Earlier only four species were known from Odisha in the family Muraenidae [*Gymnothorax meleagris* Schultz; *G. tile* (Hamilton) and *Strophidon sathete* (Hamilton)], *Gymnothorax odishi* Mohapatra, Mohanty, Smith, Mishra, Roy³² and the present report forms the fifth species. Similarly, *A. indicus* have closely related to *Antennarius hispidus*, which is well recorded and the only species in the family known from this coast, but can be differentiated by the type of the esca. *Ostichthys acanthorhinus* is the third genus and third species now reported from Odisha coast from the family Holocentridae. Till date 8 species in the genus *Lutjanus* has been recorded from and the present report of *L. lunulatus* becomes the ninth species of the genus in the family from the state. *Pomadasy furcatus* is now the only species in the family Haemulidae known from Odisha coast with horizontal stripes differing clearly from other 6 species known till date [*viz.*, *Diagramma picta* (Thunberg); *Plectorhinchus gibbosus* (Lacepède); *Pomadasy argenteus* (Forsskål); *P. argyreus* (Valenciennes); *P. kaakan* (Cuvier) and *P. maculatus* (Bloch)]. Among the nemipterid fishes, *Parascolopsis aspinosa* is the only species of this genus recorded now from Odisha coast. In the family Pomacanthidae *Pomacanthus semicirculatus* is now added as the second species after earlier record of *Apolemichthys xanthurus* (Bennett). The only species of the genus *Chaetodon* was earlier known from Odisha coast is *C. vagabundus* Linnaeus based on Misra³³ who reported only one species in the genus from India and

Pakistan. It may possible that *C. decussatus* was misidentified from Odisha and West Bengal coast as well. Both the species are closely related and differs by having soft portion of anal fin mostly black in *C. decussatus* against soft portion of anal fin mostly yellow in *C. vagabundus*. Record of *Amphiprion clarkii* forms the second species in the family Pomacentridae after *Abudefduf bengalensis* (Bloch) listed from Paradeep in a project report³⁴.

Occurrence of *C. decussatus* from Gopalpur-on-Sea confirms earlier report; where many other reef-associated animals have been sighted. But it is very interesting to note the record of *A. clarkii* from Kasafala, Balasore and *P. semicirculatus* from Paradeep. Like *C. decussatus* both the species are normally known to be reef-associate. However, all these nine species are attractive and have beautiful colouration pattern with higher demand for aquarium trade and can be used as ornamental fishes. The report of these new records takes the total coastal fishes of Odisha to a higher number i.e. 656. Further investigation and regular monitoring may prove in enriching the fish faunal diversity of this maritime state.

Acknowledgements

We gratefully acknowledge Dr. Kailash Chandra, Director, Zoological Survey of India, for immense support and providing working facilities. We thank Shri Shankar Bej, Fisherman from Paradeep, for helping out the team during the collection period.

Conflict of Interest

Authors don't have any conflict of interest.

Author Contributions

SRM, SR, SF, and DR: Collection, preservation, identification and manuscript preparation. AM and SSM: Identification, manuscript preparation and critical analysis.

References

- 1 Behera D P & Nayak L, A check list on distribution of ornamental fishes in Chilika lagoon, east coast of India, *Journal of Fisheries Sciences.com*, 8 (1) (2014) 52–60.
- 2 Barman R P, Mishra S S, Kar S, Mukharjee P & Saren S C, Marine and estuarine fish fauna of Orissa, *Rec Zool Surv India, Occ Pap*, 260 (2007) 1–186.
- 3 Mohapatra A, Smith D G, Ray D, Mishra S S & Mohanty S R. *Gymnothorax pseudotile* sp. nov. (Muraenidae: Muraeninae) from Bay of Bengal India, *Zootaxa*, 4286 (4) (2017) 586–592.

- 4 Chakraborty P, Saren S C, Sengupta A & Mishra S S, Notes on the record of *Gymnothorax pseudotile* Mohapatra *et al.*, 2017 (Muraenidae: Muraeninae) from the Sundarbans, West Bengal, India, *Rec Zool Surv India*, 118 (3) (2018) 318–321.
- 5 Froese R & Pauly D, *FishBase*, World Wide Web electronic publication. www.fishbase.org version (2019).
- 6 Joshi K K, Sreeram M P, Zacharia P U, Abdussamad E M, Varghese M, *et al.*, Check list of fishes of the Gulf of Mannar ecosystem, Tamil Nadu, India, *J Mar Biol Assoc India*, 58 (1) (2016) 34–54.
- 7 Schultz L P, Three new species of frogfishes from the Indian and Pacific Oceans with notes on other species (family Antennariidae), *Proc US Natl Mus*, 116 (3500) (1964) 171–182.
- 8 Greenfield D W, Randall J E & Psomadakis P N, A review of the soldierfish genus *Ostichthys* (Beryciformes: Holocentridae), with descriptions of two new species from Myanmar, *J Ocean Sci. Foun*, 26 (2017) 1–33.
- 9 Tholasilangam T, Venkataraman G & Krishna K K N, A study of the fishery and estimation of relative abundance of ground fish off Cochin, *Indian J Fish XI Sec A*, (2) (1964) 709–714.
- 10 Randall J E, Shimizu T & Yamakawa T, A revision of the holocentrid fish genus *Ostichthys*, with descriptions of four new species and a related new genus, *Japanese J Ichth*, 29 (1) (1982) 1–26.
- 11 Ray D, Mohapatra A, Yennawar P & Ghorai N, New records of four Squirrelfishes (Beryciformes: Holocentridae) from the coastal waters of West Bengal, India, *Rec Zool Surv India*, 115 (2) (2015) 207–211.
- 12 Karuppasamy K, *Biodiversity of fish species along Wadge bank, South India*, M.F.Sc Thesis submitted to the Tamil Nadu Fisheries University, Nagapattinam, 2016, 1-177.
- 13 Rao V G, Krishna N M & Venu D, *Ostichthys acanthorhinus* Randall, Shimizu & Yamakawa, 1982 a first record of spiny snout squirrel fish (Beryciformes: Holocentridae) from Visakhapatnam, Middle East Coast of India, *J Exp Zool Ind*, 19 (2) (2016) 667–669.
- 14 Allen G R, FAO species catalogue. The snappers of the world. An annotated and illustrated catalogue of the Lutjanid species known to date, *FAO Fisheries Synopsis*, 6 (125) (1985) 1–208.
- 15 Barman R P, A monograph on the snappers (Pisces: Perciformes: Lutjanidae) of India, *Mem Zool Surv India*, 22 (4) (2017) 1–87.
- 16 McKay R J, Haemulidae, *FAO species identification sheets for fishery purposes. Western Indian Ocean (Fishing Area 51)*, Vol 2, edited by W Fischer & G Bianchi, (Rome: FAO), 1984, pp. 1–11.
- 17 Barman R P, Kar S & Mukherjee P, Marine and estuarine fishes. Fauna of Andhra Pradesh, *State Fauna Series, (Publ Zool Surv India, Kolkata)*, 5 (2) (2004) 97–311.
- 18 Russell B C & Golani D, A review of the fish genus *Parascolopsis* (Nemipteridae) of the western Indian ocean, with description of a new species from the northern Red Sea, *Israel J Zool*, 39 (1993) 337–347.
- 19 Rao D M & Rao K S, A revision of the genus *Scolopsis* Cuvier (Pisces: Nemipteridae) with descriptions of two new species from Indian waters. *Proc K Ned Akad Wet C -Biol Med Sci*, 84 (1) (1981) 131–141.
- 20 Mogalekar H S, Canciyal J, Patadia D S & Sudhan C, Marine and estuarine fish fauna of Tamil Nadu, India, *Proc Int Acad Ecol Environ Sci*, 8 (4) (2018) 231–271.
- 21 Yennawar P, Mohapatra A & Tudu P C, An account of Ichthyofauna of Digha coast, West Bengal, *Rec Zool Surv India*, 117 (1) (2017) 4–21.
- 22 Myers R F, *Micronesian reef fishes*, 2nd edn, (Coral Graphics, Barrigada, Guam), 1991, pp. 298.
- 23 Jones S & Kumaran M, *Fishes of the Laccadive Archipelago*, (The Nature Conservation and Aquatic Sciences Service, Trivandrum), 1980, pp. 1–757.
- 24 Rajan P T, Sreeraj C R & Immanuel T, Fishes of Andaman Andaman and Nicobar Islands: a checklist, *J Andaman Sci Assoc*, 18 (1) (2013) 47–87.
- 25 Barman R P, Mishra S S, Kar S, Mukherjee P & Saren S C, Marine and estuarine fish, *Fauna of Tamil Nadu, State Fauna Series, (Publ Zool Surv India, Kolkata)*, 17 (2) (2011) 293–417.
- 26 Ray D, Yennawar P, Ghorai N & Mohapatra A, Addition of three Angelfish (Family: Pomacanthidae) to the Ichthyofauna of West Bengal, *India J Bombay Nat Hist Soc*, 109 (3) (2012) 209–212.
- 27 Barman R P, Mukherjee P & Kar S, Marine and estuarine fishes, *Fauna of Gujarat, State Fauna Series, (Publ Zool Surv India, Kolkata)*, 8 (1) (2000) 311–411.
- 28 Bijukumar A & Raghavan R, A checklist of fishes of Kerala, India, *J Threat Taxa*, 7 (13) (2015) 8036–8080.
- 29 Mishra S S & Krishnan S, Marine Fishes of Pondichery and Karaikal, *Rec Zool Surv India, Occ Paper*, 216 (2003) 1–53.
- 30 Roy S, Dash S & Mishra S S, First record of *Seriolina nigrofasciata* (Ruppell 1829) (Perciformes: Carangidae) from Odisha coast, India, *Rec Zool Surv India*, 117 (2) (2017) 186–189.
- 31 Allen G R & Erdmann M V, *Reef fishes of the East Indies*, Tropical Reef Research, Perth, AU, 2 (2012) 561–630.
- 32 Mohapatra A, Mohanty S R, Smith D G, Mishra S S & Roy S, *Gymnothorax odishi* sp. nov. (Muraenidae: Muraeninae), a short brown unpatterned moray eel from Bay of Bengal, India, *Zootaxa*, 4420 (1) (2018) 123–130.
- 33 Misra K S, An aid to the identification of the common commercial fishes of India and Pakistan, *Rec Ind Mus*, 57 (1962) 1-320.
- 34 Indian Oil Corporation Limited, Environmental Impact Assessment (EIA) and Risk Assessment (RA) Studies for Obtaining CRZ Clearance for Pet Coke Evacuation Project at Paradip Refinery, Odisha. Bhagavathi Ana Labs Pvt Ltd (a Bureau Veritas Group Company), 2015, pp. 110.