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Systematics of nemipterid fishes (Perciformes: Nemipteridae) of Odisha coast, north-western Bay of Bengal with first records of four species

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The north-eastern coast of India is rich in marine floral and faunal biodiversity, yet relatively less studied. This study aims to review and update the species diversity of nemipterids along the north-eastern coast of India, particularly Odisha, and provide a simple key for easy identification. An ichthyofaunal survey piloted during 2017 – 2020 along the Odisha coast confirmed the occurrence of seven valid species of nemipterids namely, *Nemipterus bipunctatus* (Valenciennes, 1830), *N. japonicus* (Bloch, 1791), *N. nematophorus* (Bleeker, 1854), *N. peronii* (Valenciennes, 1830), *N. randalli* Russell, 1986, *Parascolopsis aspinosa* (Rao & Rao, 1981), and *Scolopsis vosmeri* (Bloch, 1792), adding four species to the previously annotated checklist of 2007. The present paper reports the first record of four species namely, *N. nematophorus*, *N. peronii*, *N. randalli*, and *P. aspinosa* from the Odisha coast in the Bay of Bengal. Based on the findings of the present study and available literature, a key to the reported and identified species of the family Nemipteridae from the Odisha coast was developed with a detailed description of taxonomic characters for easy identification.

[**Keywords**: Ichthyofaunal diversity, Nemipteridae, Odisha, Taxonomy]

Introduction

The nemipterids or threadfin breams are one of the most commercially important groups of tropical and subtropical marine fishes in the Indo-West Pacific region but are considered one of the most taxonomically difficult families to handle[1]. These small to medium-sized bottom-dwelling fishes constitute an important component of both traditional and commercial fisheries, mainly caught by bottom trawls and handlines[1]. More than 60 species of nemipterids under five genera have been identified and described worldwide[2] and 25 species including one recently described species *Nemipterus andamanensis* Bineesh, Russell & Chandra, 2018 recorded from Indian waters[3-5]. Catch data statistics of India[6] shows nemipterids as an important and targeted finfish resource. The landings of threadfin breams along the Indian coast have significantly increased from about 0.2 lakh tonnes in the early eighties[7] to about 1.23 lakh tonnes in 2020(ref. 8), mainly due to the expansion of fishing ground and increasing fishing efforts. Exploratory surveys and experimental fishing along the Indian Exclusive Economic Zone (EEZ) revealed the abundance of these species beyond 50 m water depth[7]. These are excellent food fish with higher market demand and are sold mainly in fresh and dry salted conditions. Bulk catches of nemipterids are also used as raw material for surimi and fish meal plants mostly on the southern coast of India[9]. The fishery of nemipterids is influenced by upwelling and the fishes tend to move to inshore shallow waters during the monsoon season, especially along the west coast of India. They are one of the high-level carnivorous (trophic level: 3.53), mostly feeding on small shrimps, stomatopods, crabs and small fishes[7-10]. These fishes also play a key role in the trophic level as a prey component of several demersal fishes such as groupers, flatheads, croakers, nemipterids, flounders, and sharks[11]. Nemipterids are frequently caught in multispecies catches in the trawl fisheries. Due to the problem in the correct identification of similar and sympatric species of the genus, species-wise landing statistics are not available for most of the species[1]. This may be true for the present study area where only a few species have been reported by the earlier researchers. To address this

knowledge gap, the present study aimed to review and update the species diversity of nemipterids along the north-eastern coast of India and provide a simple key for easy identification.

Despite commercial value, nemipterids are one of the less-studied groups throughout the north-eastern region of the Indian coast. In 2017, Yennawar *et al.*[12] reported seven nemipterid species from the Digha coast, West Bengal including the four previous records by Mohapatra *et al.*[13] namely, *N. bipunctatus* (Valenciennes, 1830), *N. japonicus* (Bloch, 1791), *N. nematophorus* (Bleeker, 1854), *N. peronii* (Valenciennes, 1830), *N. randalli* Russell, 1986, *Parascolopsis aspinosa* (Rao & Rao, 1981), and *Scolopsis vosmeri* (Bloch, 1792). Similarly, four species of nemipterids namely, *N. bipunctatus* (Valenciennes, 1830), *N. furcosus* (Valenciennes, 1830), *N. japonicus* (Bloch, 1791) and *S. vosmeri* (Bloch, 1792) were reported along the Odisha coast by Barman *et al.*[14]. In the present study, seven species of nemipterids were collected during the ichthyofaunal survey along the Odisha coast, out of which four species were confirmed as the first records based on morpho-meristic characteristics.

Materials and Methods

Seven species of nemipterids were collected from Paradeep Fishing Harbour (20º17.345' N, 086º42.422' E), and Pentakota fish landing centre (19º48'0.8892" N, 85º50'48.138" E), Odisha, India for a period of four years during 2017 – 2020 (Figs. 1 & 2). The fishes were captured using bottom set gillnets (58 mm), bottom trawls (cod-end mesh size 40 mm), and long lines (hook no X-XI). Specimens were shipped to the biology laboratory of the Puri Field Centre of ICAR-Central Marine Fisheries Research Institute (CMFRI) and photographed fresh. Species identification was carried out based on the standard taxonomic keys[1,15]. Morpho-meristic characters were documented following the standard method[16]. All the morphometric characters with 0.1 mm accuracy and total body weight with 0.1 g accuracy were measured using a digital Vernier calliper and weighing balance, respectively. Morphometric measurements were expressed in terms of % standard length (% SL). Colour patterns were obtained from freshly collected fishes. One specimen of each species was fixed in 10 % formalin and stored at the Puri Field Centre of ICAR-CMFRI, Odisha, India for future reference.

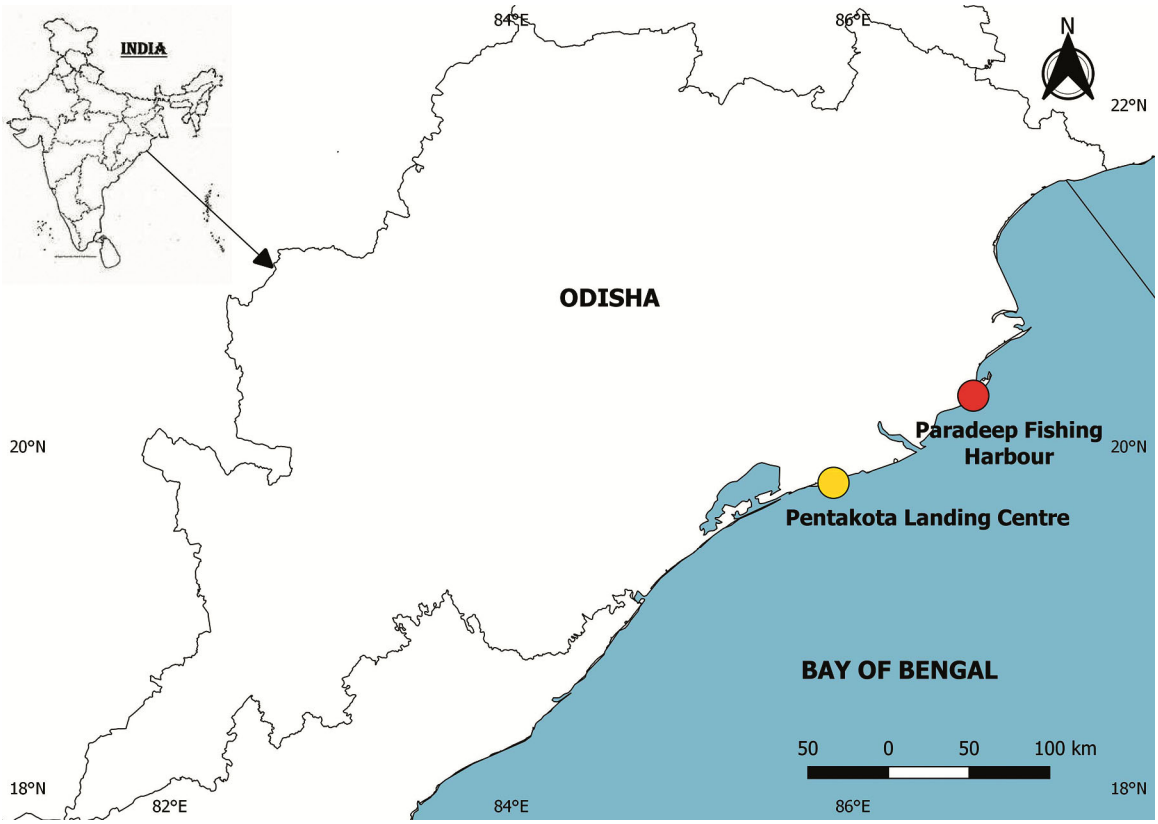

Fig. 1 — Map showing the sampling locations along the Odisha coast

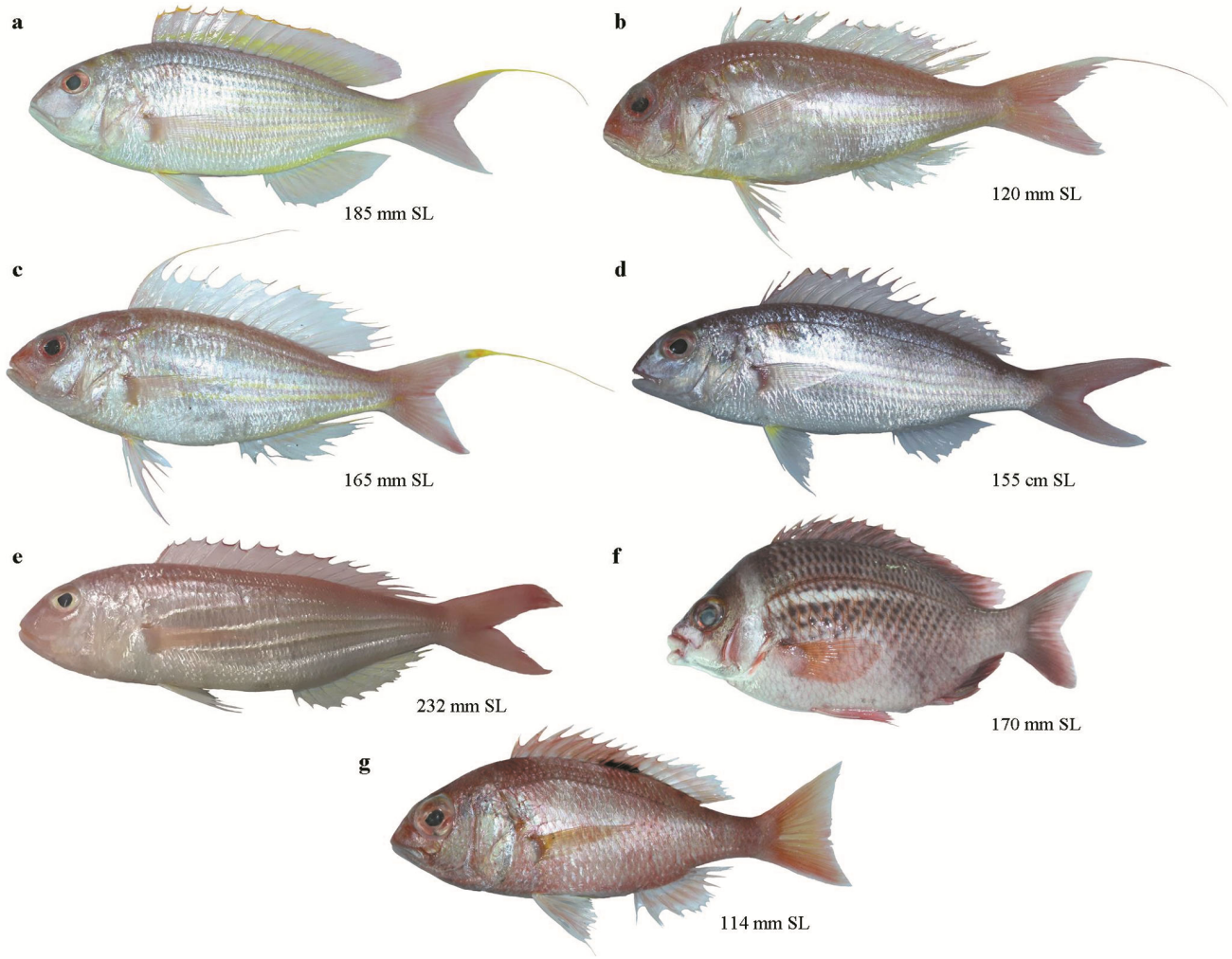

Fig. 2 — Lateral views of (a) *Nemipterus japonicus* (Bloch, 1791), 185 mm SL, fresh, Pentakota, Puri, Odisha, India; (b) *N. randalli* Russell, 1986, 120 mm SL, fresh, Pentakota, Puri, Odisha, India; (c) *N. nematophorus* (Bleeker, 1854), 165 mm SL, fresh, Paradeep, Jagatsinghpur, Odisha, India; (d) *N. peronii* (Valentines, 1830), 155 mm SL, Paradeep, Jagatsinghpur, Odisha, India; (e) *N. bipunctatus* (Valenciennes, 1830), 232 mm SL, fresh, Pentakota, Puri, Odisha, India; (f) *Scolopsis vosmeri* (Bloch, 1792), 170 mm SL, fresh, Paradeep, Jagatsinghpur, Odisha, India; and (g) *Parascolopsis aspinosa* (Rao and Rao, 1981), 114 mm SL, fresh, Paradeep, Jagatsinghpur, Odisha, India

Comparative materials examined

N. bipunctatus (Valenciennes, 1830): 6 ex., 114 – 188 mm SL, Pentakota, Puri and Paradeep fishing harbour, Jagatsinghpur, Odisha, India, 27 December 2017, 30 November 2018, and 30 January 2019; *N. japonicus* (Bloch, 1791): 4 ex., 129 – 233 mm SL, Pentakota, Puri, Odisha, India, 23 January 2019; *S. vosmeri* (Bloch, 1792): 1 ex., 170 mm SL, Paradeep Fishing Harbour, Jagatsinghpur, Odisha, India, 23 January 2019.

Results

***Nemipterus nematophorus* (Bleeker, 1854)**

Double whip threadfin bream (Figs. 2c, 3c, 4c, Table 1)

Material examined: 9 ex., 129 – 166 mm SL, Paradeep fishing harbour, Jagatsinghpur and Pentakota, Puri, Odisha, India, 30 November 2018, 10 December 2018 and 30 January 2019.

Diagnosis: Dorsal fin rays X + 9; anal fin rays III + 7; pectoral fin rays 17 – 18; ventral fin rays I + 5; total gill rakers 12 – 14.

Body moderately deep, depth 30.2 – 33.9 % in SL; eye diameter 9.4 – 11.8 % in SL; head length 9.0 – 10.5 % of SL; head depth 27.5 – 32.7 % in SL; inter-orbital width 5.6 – 6.4 % in SL; dorsal fin with first and second spines close together and almost fused to produce into a long filament (first dorsal spine length 47.5 – 59.2 % in SL); both pectoral and pelvic fins

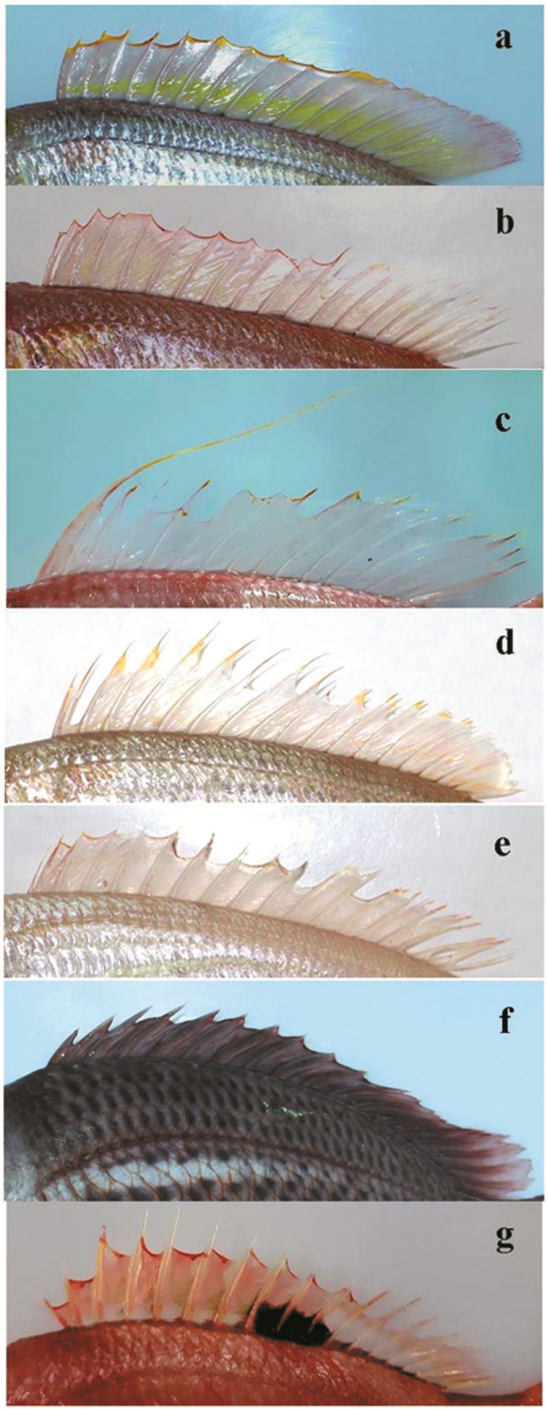

Fig. 3 — Dorsal fin structure: (a) *Nemipterus japonicus* (Bloch, 1791); (b) *N. randalli* Russell, 1986; (c) *N. nematophorus* (Bleeker, 1854); (d) *N. peronii* (Valentines, 1830); (e) *N. bipunctatus* (Valenciennes, 1830); (f) *Scolopsis vosmeri* (Bloch, 1792); and (g) *Parascolopsis aspinosa* (Rao and Rao, 1981)

reach to the level of anus, pectoral fin 29.0 – 33.1 % in SL and ventral fin 29.7 – 36.7 % in SL; the upper lobe of caudal fin extended into a very long filament, upper lobe length 49.0 – 79.9 % in SL.

Colour: Head and upper part of body pinkish, silvery-white on ventral surface; a broad golden-yellow stripe below the lateral line with a golden patch nearly below the origin of lateral line; three narrow horizontal yellow stripes along the lower half of the body; yellow stripe on either side of ventral midline; dorsal fin translucent pinkish, dorsal filament and margin of fin yellow; pectoral fin pale pink and ventral fin pink; auxiliary scale yellow; anal fin translucent with a faint yellow stripe along the fin extending from near base of the first spine to middle of the last ray; caudal fin pink, upper tip and filament yellow.

Distribution: Along the Indian coasts, the species was reported from West Bengal[13], Odisha (present report), Andhra Pradesh[17], Tamil Nadu[18], Andaman & Nicobar Islands[19], and Kerala[20].

***Nemipterus peronii* (Valentines, 1830)**

Notchedfin threadfin bream (Figs. 2d, 3d, 4d, Table 1)

Material examined: 5 ex., 167 – 185 mm SL, Pentakota, Puri and Paradeep fishing harbour, Jagatsinghpur, Odisha, India, 13 November 2017, 3 & 10 January 2018, and 30 November 2018.

Diagnosis: Dorsal fin rays X + 9; anal fin rays III + 7; pectoral fin rays 15 – 17; ventral fin rays I + 5; total gill rakers 9 – 11.

Body slender, body depth 29.9 – 32.2 % in SL; eye diameter 8.6 – 9.2 % in SL; head length 37.9 – 39.1 % of SL; head depth 34.6 – 36.0 % in SL; inter-orbital width 5.4 – 6.9 % in SL; dorsal fin spines elongated with an inter-spinous membrane deeply notched; pectoral fin short not reaching to the origin of the anal fin, pectoral fin 22.2 – 23.4 % in SL; ventral fin just reaching to the anus, ventral fin 20.3 – 26.1 % in SL; caudal fin deeply forked without any filamentous extension, upper lobe slightly longer than the lower lobe (upper lobe 33.5 – 39.5 % in SL).

Colour: Head and upper part of body pinkish with 7 or 8 distinct darker pink saddles reaching to or just below the lateral line; lower part of body silvery shined with faint golden lines along the horizontal scale row; a diffuse pale reddish spot below and just behind the origin of lateral line; several irregular golden-yellow stripes over the snout and inter-orbital region, upper lip yellow; dorsal fin whitish-pink, with a pale yellow line or series of spots just above the base of fin; the tip of spinous part of dorsal reddish-yellow; anal fin pale whitish-pink with a pale yellowish line over its middle part; pectoral fin translucent, ventral fin whitish, axillary scale yellow; caudal fin pinkish in colour.

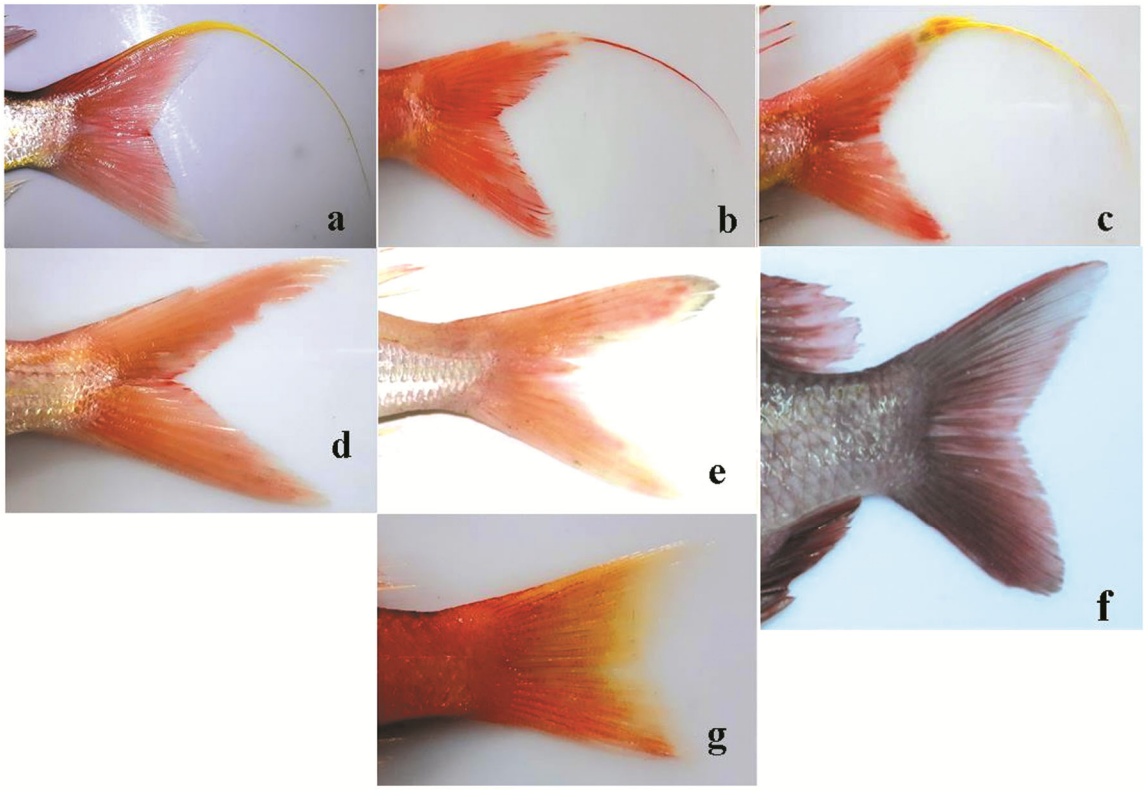

Fig. 4 — Caudal fin shape: (a) *Nemipterus japonicus* (Bloch, 1791); (b) *N. randalli* Russell, 1986; (c) *N. nematophorus* (Bleeker, 1854); (d) *N. peronii* (Valentines, 1830); (e) *N. bipunctatus* (Valenciennes, 1830); (f) *Scolopsis vosmeri* (Bloch, 1792); and (g) *Parascolopsis aspinosa* (Rao and Rao, 1981)

Distribution: Along the Indian coast, the species was reported from West Bengal[13], Odisha (present report), Andhra Pradesh[17], Tamil Nadu[18], Andaman and Nicobar Islands[19], Kerala[20], Karnataka[21], and Maharashtra[22].

***Nemipterus randalli* Russell, 1986**

Randall's threadfin bream (Figs. 2b, 3b, 4b, Table 1)

Material examined: 8 ex., 108 – 134 mm SL, Pentakota, Puri and Paradeep Fishing Harbour, Jagatsinghpur, Odisha, India, 13 November 2017, and 30 November 2018.

Diagnosis: Dorsal fin rays X + 9; anal fin rays III + 7; pectoral fin rays 15 – 17; ventral fin rays I + 5; total gill rakers 13 – 15.

Body moderately deep, depth 30.5 – 34.7 % in SL; snout length and eye diameter almost equal, eye diameter 9.4 – 11.8 % in SL; head length 33.4 – 41.3 % of SL; head depth 30.8 – 34.0 % in SL; inter-orbital width 5.3 – 5.8 % in SL; preopercle naked, chick with 3 rows of scales; 3 to 4 pair of small recurved canines anteriorly in upper jaw; pectoral and ventral fin very long, reaching beyond or to the level of origin of anal fin base; pectoral fin 31.4 – 36.5 % in head length and ventral fin 22.0 – 25.7 % in head length; caudal fin forked, upper lobe of caudal fin with long filament (upper caudal filament 31.6 – 68.9 % in SL).

Colour: Body silvery-pink with 3 – 4 faint yellow strips on each side below the 91 lateral line, ventral surface silvery; broad yellow stripe on either side of ventral midline; a pinkish blotch immediately below origin of lateral line; dorsal fin pale bluish with red outer margin, lower three-fourths of the fin with yellow markings; anal fin pale bluish with yellow medial stripe; pectoral fin transparent; ventral fin whitish, pale yellowish at base area; caudal fin yellow-orange, edge with pink and with yellowish upper margin; caudal filament light reddish in colour.

Distribution: Along the Indian coast, the species was reported from West Bengal[13], Odisha (present report), Andhra Pradesh[17], Tamil Nadu[18], Andaman and Nicobar Islands[19], Kerala[20], Karnataka[21], and Maharashtra[22], and Gujarat[23].

***Parascolopsis aspinosa* (Rao and Rao, 1981)**

Smooth dwarf monocle bream (Figs. 2g, 3g, 4g, Table 1)

Table 1 — Meristic counts and proportional measurement of Morphometric characters of the four nemipterid fish species collected from Odisha coastal waters in the north-eastern region of India

Species	*N. randalli* (*n* = 8)	*N. nematophorus* (*n* = 9)	*N. peronii* (*n* = 5)	*P. aspinosa* (*n* = 3)
Standard lengths (mm)	108-134	129-166	167-185	104-111
		Counts		
Dorsal-fin rays	X + 9	X + 9	X + 9	X + 9
Anal-fin rays	III + 7	III + 7	III + 7	III + 7
Pectoral-fin rays	15-17	17-18	15-17	16-17
Pelvic-fin rays	I + 5	I + 5	I + 5	I + 5
Gill rakers (upper limb)	4-6	5-6	3-5	4-5
Gill rakers (lower limb)	8-9	7-8	6	5-6
Gill rakers (total)	13-15	12-14	9-11	9-11
		Proportional measurements		
Head length	33.4-41.3	30.1-35.0	28.4-30.0	37.9-39.1
Head depth	30.8-34.0	27.5-32.7	27.5-30.4	34.6-36.0
Snout length	9.4-11.0	8.5-9.9	8.8-9.8	8.6-9.7
Post orbital length	15.8-21.3	12.4-16.0	9.5-11.3	16.0-17.9
Eye diameter	9.4-11.8	9.0-10.5	8.6-9.2	12.3-12.9
Upper jaw length	11.6-14.4	11.5-13.6	9.7-10.6	12.7-13.4
Inter-orbital length	5.3-5.8	5.6-6.4	5.4-6.9	8.2-8.5
Pre-dorsal length	32.7-38.9	29.3-32.9	30.8-33.1	32.4-34.0
Pre-pectoral length	34.4-40.1	30.9-33.3	28.9-31.3	37.8-38.5
Pre-pelvic length	32.1-38.6	32.2-38.4	31.1-35.2	38.9-40.5
Pre-anal length	60.2-70.7	60.7-69.8	66.3-68.1	65.4-66.6
Pectoral-fin length	31.4-36.5	29.0-33.1	22.2-23.4	29.5-31.8
Pelvic-fin length	22.0-25.7	29.7-36.7	20.3-26.1	24.7-27.3
Caudal peduncle length	14.9-19.5	16.3-19.6	13.8-16.3	15.0-17.8
Caudal peduncle depth	8.1-9.8	9.8-10.8	9.6-10.6	10.4-10.7
Caudal upper lobe length	31.6-68.9	49.0-79.9	33.5-39.5	26.4-30.3
Depth at dorsal origin	30.5-34.7	30.2-33.9	29.9-32.2	36.1-36.4
Depth at anal origin	21.7-29.0	27.8-30.6	26.3-28.7	30.3-30.7
1st dorsal spine length	7.8-11.2	47.5-59.2	7.1-9.1	7.1-8.0
5th dorsal spine length	11.1-15.2	13.9-17.9	17.5-20.5	14.7-16.4
Last dorsal ray length	12.4-17.4	18.1-21.5	9.1-10.1	10.8-12.2
3rd anal spine length	9.6-11.5	9.7-11.7	7.7-9.7	11.8-12.2
Last anal ray length	13.6-15.6	15.0-21.6	9.4-10.2	12.0-12.6

Material examined: 3 ex., 104 – 111 mm SL, Paradeep Fishing Harbour, Jagatsinghpur, Odisha, India, 30 November 2017.

Diagnosis: Dorsal fin rays X + 9; anal fin rays III + 7; pectoral fin rays 16 – 17; ventral 146 fin rays I + 5; total gill rakers 9 – 11.

Body depth 36.1 – 36.4 % in SL; eyes large and its diameter 12.3 – 12.9 % in SL; head length 28.4 – 30.0 % of SL; head depth 27.5 – 30.4 % in SL; head scales reaching forward to between the level of the anterior border of the eyes and nostril; inter-orbital width 8.2 – 8.5 % in SL; snout length less than eye diameter; posterior margin of preopercle more or less vertical; the lower limb of preopercle without scales; posterior margin of suborbital smooth or with few tiny spines; pectoral and ventral fin long and reaching to the level or beyond the anus; pectoral fin 29.5 – 31.8 % in SL; ventral fin 24.7 – 27.3 % in SL.

Colour: Body reddish colour with four pale reddish saddles on the back and two on caudal peduncle; dorsal fin reddish-yellow with a reddish edge; a black blotch at the base of dorsal fin between the eighth spine and first ray; pectoral, ventral and anal fin yellow; caudal fin yellow and reddish towards base.

Distribution: Along the Indian coast, the species was reported from West Bengal[13], Odisha (present report), Andhra Pradesh[17], Tamil Nadu[18], Andaman and Nicobar Islands[19], Kerala[20], Karnataka[21], and Maharashtra[22], and Gujarat[23].

Discussion

Among all the species of the genus, *Nemipterus* reported along the Odisha coast, *N. peronii* can be easily distinguished from others by the presence of elongated dorsal spines with inter-spinous membranes deeply notched/incised. *N. randalli* has been previously misidentified as *N. mesoprion* but both the species can be distinguished morphologically based on the presence of light reddish upper caudal filament in *N. randalli*, which is absent in *N. mesoprion*. Similarly, the juvenile of *N. randalli* is also often misidentified as *N. japonicus*, however, both the species can be distinguished externally, based on the upper caudal filament and colour pattern of dorsal fin (caudal filament yellow, outer margin of dorsal fin yellow and edge red with a pale lemon stripe near base of fin broadening posteriorly in *N. japonicus* versus outer margin edge red and lower three-fourths of the dorsal fin with yellow markings in *N. randalli*). *N. nematophorus* too has been misidentified as *N. japonicus* on several occasions because of its yellowish caudal filament and sometimes the dorsal fin filament is torn out or unnoticeable in the field as it adheres to the surface of the body resulting in a similar appearance as *N. japonicus*. However, the intact specimens of the above two species can be distinguished externally in the first two dorsal spines fused and produced to form a long filament in *N. nematophorus*, compared to absent in *N. japonicus*. *N. bipunctatus* and *N. furcosus* have been sometimes confused with each other due to similar body profiles and lack of upper caudal lobe filament, but these species can also be distinguished based on the presence or absence of bands on the body and shape of upper caudal fin tip (upper lobe of caudal fin tip rounded and body with five greenish-yellow upwardly curved bands on sides in *N. bipunctatus*, as compared to the pointed upper lobe of caudal fin tip and body lacking bands in *N. furcosus*). *N. furcosus* was reported to occur in West Pacific from southern Japan to northeastern Australia, and the Indian Ocean including the Maldives, Gulf of Mannar, Sri Lanka, Andaman Sea, Strait of Malacca and northwestern Australia[1,2]. However, the record from Odisha, north-eastern coast of India by Barman *et al.*[14] is questionable since the authors did not record any specimens of *N. furcosus* during the ichthyofaunal survey along with the six coastal districts of Odisha coast during the period 2017 – 2020.

Scolopsis igcarensis Mishra, Biswas, Russell, Satpathy & Selvanayagam, 2013 was described as a new species from coastal waters of southern India and Sri Lanka. The species have been distinguished from the most similar congener, *S. vosmeri*, in having a typical white vertical cheek band which is completely absent in *S. igcarensis*[24]. However, a recent taxonomic study by Russell *et al.*[5] revealed that *S. igcarensis* represents the juvenile and sub-adult forms of *S. vosmeri* based on the fresh specimens from the Bangladesh coast, northern Bay of Bengal. Their study redescribes *S. vosmeri* based on both morphological and molecular data and recognises *S. igcarensis* as a junior synonym of *S. vosmeri*.

Parascolopsis aspinosa closely resembles *P. boesemani* available along the Indian coast. These two species are easily distinguishable based on suborbital and spot on the dorsal fin (posterior margin of suborbital smooth or with few tiny spines and a black spot between the eighth spine and first dorsal ray in *P. aspinosa* versus a finely denticulate posterior margin of suborbital and a blood-red blotch between seventh and tenth spine in *P. boesemani*).

The present record of four species of nemipterids namely, *N. randalli*, *N. nematophorus*, *N. peronii* and *P. aspinosa* from the Odisha coast (Fig. 2) were an expected observation as these species were already recorded along neighbouring coasts *i.e*., West Bengal and Andhra Pradesh. An earlier study by Barman *et al.*[13] reported only four species (*N. bipunctatus*, *N. furcosus*, *N. japonicus* and *S. vosmeri*) from this region, which could be attributed to the lack of thorough sampling efforts and under-reporting or misidentification with other congeners in the area. The demand for nemipterids is an all-time high in India in recent times due to their good meat texture for the surimi processing industry. Along with the industrial demand, these species are also favoured by the local consumers due to their affordable cost and delicacy. This study provides a simple key for all the species available along the north-eastern coast of India which will help samplers, researchers, scientists and fishery managers for proper identification of these species in the field and species-specific catch data recording.

Key to the eight species of nemipterids occurring on the north-eastern coast of India adapted from Russell (1990)[1], Russell & Tweddle (2013)[15], Russell & Ho (2017)[25] and the observation made in the present study

1a. Suborbital naked, with a large backwardly pointing spine and a series of smaller spines or

serrations on its posterior margin; posterior margin of preopercle coarsely denticulate or serrate; canine teeth absent; second anal-fin spine usually longer and more robust than first and third spine; 4 to 7 transverse rows of scales on cheek ……..…… **(*Scolopsis*)**

- Small antrorse spine or bony ridge present below eye; maxilla smooth along its external edge; scales on top of head extending forward to between level of the snout and anterior nostril; pectoral fin not reaching to level of anus; anterior part of anal fin not black; body depth 2 to 2.6 times in standard length (Fig. 2f) ……. ***S. vosmeri***

1b. Suborbital scaly or naked with weak suborbital spine or absent and posterior margin of suborbital smooth, denticulate or finely serrate; posterior margin of preopercle serrated; no canine teeth in jaws; second anal-fin spine usually longer and more robust than first and third spine; 4 to 5 transverse scale rows on cheek …….. **(*Parascolopsis*)**

- Suborbital and maxilla naked; head scales reaching forward to or in front of anterior margin of eyes; posterior margin of suborbital smooth or with just a few tiny spines; a black blotch at the base of middle of dorsal fin (Figs. 2g, 3g) …… ***P. aspinosa***

1c. Suborbital naked without suborbital spine and its posterior margin smooth; posterior margin of preopercle finely denticulate or smooth; small pointed or recurved canine teeth may present anteriorly in both jaws; 3 transverse scale rows on cheek.…**(*Nemipterus*)** …….. **2**

2a. The membrane between dorsal spines deeply incised (Figs. 2d, 3d) …….…. ***N. peronii***

2b. The membrane between dorsal spines not incised or only slightly emarginated ……..... **3**

3a. Upper lobe of caudal fin with a filamentous extension …..……... **4**

3b. Upper lobe of caudal fin pointed or rounded without any filamentous extension ……. **6**

4a. First two dorsal spines fused, produced to form a long filament (Figs. 2c, 3c) …… ***N. nematophorus***

4b. First two dorsal spines separated by a membrane, not produced and smaller than the following spines ……..…. **5**

5a. Pelvic fins very long, extending to or beyond the level of origin of anal fin; dorsal fin pale bluish, outer margin edged with red, lower three-fourths of the fin with yellow markings (Fig. 3b); anal fin pale bluish with yellow medial strip; caudal filament light reddish (Fig. 4b) …….. ***N. randalli***

5b. Pelvic fins moderately long, extending to or just beyond the level of the vent; dorsal fin whitish, outer margin yellow, edged with red, a pale lemon stripe near the base of fin broadening posteriorly (Fig. 3a); anal fin whitish with pale lemon broken lines or scribbling over most of the fin; caudal filament yellowish (Fig. 4a) .....… ***N. japonicus***

6a. Scales below the lateral line in ascending rows anteriorly and body with five greenish-yellow upwardly curved bands on sides (Fig. 2e); head with 1 – 2 indistinct mauve-blue bands on snout; dorsal fin without stripes (Fig. 3e) and anal fin with 2 to 5 yellowish undulating stripes; upper lobe of caudal fin tip rounded or slightly rounded (Fig. 4e) ……..…..… ***N. bipunctatus***

6b. Scales below the lateral line in more or less horizontal rows and body without any bands; pectoral fin short, just reaching to or usually short of the level of anus; a line drawn upwards from the posterior edge of the suborbital reaching the dorsal profile at about origin of dorsal fin; body with darker saddles on back reaching up to the lateral line; caudal fin with lower margin white-edged; dorsal and anal fins without stripes; upper lobe of caudal fin tip pointed …. ***N. furcosus***

Conclusion

The newly reported four species of nemipterids might have been overlooked along the coast for many years due to similarity in morphological features in comparison with several congeneric species occurring along the region. Therefore, the present study is an indication of the need for extensive sampling and long-term observation along the coast. Reports on these species not only add to the fish diversity of the state but also helps in collection of species-specific catch and effort data as one of the most common information used in assessing the stock status of fishes.

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Conflict of Interest

The authors declare no conflict of interest.

Ethical Approval

This article does not contain any experimental studies with animals performed by any of the authors.

Author Contributions

SKR conceptualise the work, analysed the data, and wrote the manuscript. SKP collected the specimens of *Nemipterus* spp. and helped in draft preparation. SG & PR corrected the manuscript.

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