

**DISTRIBUTION OF FAMILY PERISTEDIIDAE (ORDER:SCORPAENIFORMES) ALONG
THE INDIAN EXCLUSIVE ECONOMIC ZONE**

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Summary

Knowledge of family Peristediidae (Order-Scorpaeniformes) from Indian waters comprising Arabian Sea, Bay of Bengal and Andaman Sea is limited. The present study aims to unwind the taxonomic ambiguity and demarcates the distribution of peristediids within Indian waters. Indian peristediids were now represented by seven species; *Satyrichthys laticeps* (Schlegel 1852); *Scalicus serrulatus* (Alcock 1898); *Scalicus investigatoris* Alcock 1898; *Scalicus orientalis* Fowler 1938; *Heminodus philippinus* Smith 1917; *Peristedion amblygenys* Fowler 1938 and *Satyrichthys milleri* Kawai 2013. A key to all genera and species of peristediids from Indian Exclusive economic Zone as well as the diagnosis, synonymy and distribution of each species were provided.

Introduction

The family Peristediidae armored sea robins consists of about 34 species (Kawai, 2013) distributed in six genera, inhabit the bottoms of the tropical and temperate waters of the world oceans in depths ranging from 50 to 800 m (Kawai, 2008, 2013). The family is characterized by having four rows of bony plates, a rostral projection, lower two pectoral fin rays free, and barbels on the lower jaw (Miller, 1974; Kawai, 2008, 2013). Kawai (2008) done a pioneer work on family peristediidae on the basis of morphology and inferred pattern of phylogeny and well demarcated all the six monophyletic genera in the family; via *Gargariscus* Smith 1917;

Heminodus Smith 1917; *Paraheminodus* Kamohara 1957; *Peristedion* Lacépède 1801; *Satyrichthys* Kaup 1873 and *Scalicus* Jordan 1923.

Diagnostic characters of the genus (Kawai, 2008) as follows ***Gargariscus***: Upper jaw teeth present; lateral margin of head extremely indented; posterior parts of lower lateral row of bony plates separated from each other; and barbels on lower jaw not branched except for posteriormost lip and chin barbels. ***Heminodus***: Upper jaw teeth present; lateral margin of head smooth; posterior parts of lower lateral rows of bony plates separated from each other; and one or two very short barbels present; the genus is monotypic. ***Paraheminodus***: Upper jaw teeth present; lateral margin of head smooth; posterior parts of lower lateral rows of bony plates separated from each other; barbels on lower jaw not branched except for posteriormost barbels. ***Peristedion***: Upper jaw teeth absent; lateral margin of head smooth; and posterior pairs of bony plates in lower lateral rows contralaterally sutured along midline. The genus *Peristedion* is the largest in the family. ***Satyrichthys***: Upper jaw teeth absent; lateral margin of head smooth; posterior parts of lower lateral rows of bony plates separated from each other; barbels on lower jaw not branched except for posteriormost lip and chin barbels (some species without chin barbels); number of dorsal fin soft rays fewer than 20; number of anal fin soft rays fewer than 19. ***Scalicus***: Upper jaw teeth absent; lateral margin of head smooth; posterior pairs of lower lateral rows of bony plates separated from each other; barbels on lower jaw not branched except for posteriormost lip and chin barbels; and number of dorsal and anal fin soft rays greater than 19.

Among these six genera *Heminodus* and *Gargariscus* are recognized as monotypic, including only one species; *Heminodus philippinus* Smith 1917 and *Gargariscus prionocephalus* (Duméril 1869).

Materials and Methods

The specimens used in this study were collected by exploratory deep-sea fishery surveys of FORV ‘*Sagar Sampada*’ conducted by the Centre for Marine Living Resources and

Ecology (CMLRE). A total of 82 stations were covered under 14 Cruises along the continental slope of entire Indian EEZ, for a period from 2010 to 2013; depth ranging from 200 to 1000 m. The specimens were collected by a High Speed Demersal Trawl—Crustacean Version (HSDT-CV)/ EXPO, operated at a speed of 3 knots. Immediately after collection the specimens were preserved in a 5% buffered formaldehyde solution. Samples were identified follows (Alcock, 1898; Fowler, 1938; Yatou, 1985; Kawai, 2008, 2013; Kawai & Nakaya, 2007). Counts and measurements follow (Kawai *et al.*, 2004; Kawai, 2013). Terminology and counts for bony plates and barbels follow (Kawai, 2013). All the measurements were made by using digimatic calipers from the formaldehyde preserved specimens. Illustrations of lateral aspects of head and arrangement of barbels were presented in Fig 1&2. Photo plates of species recorded (Fig. 3—9) and distribution map (Fig. 10) were provided.

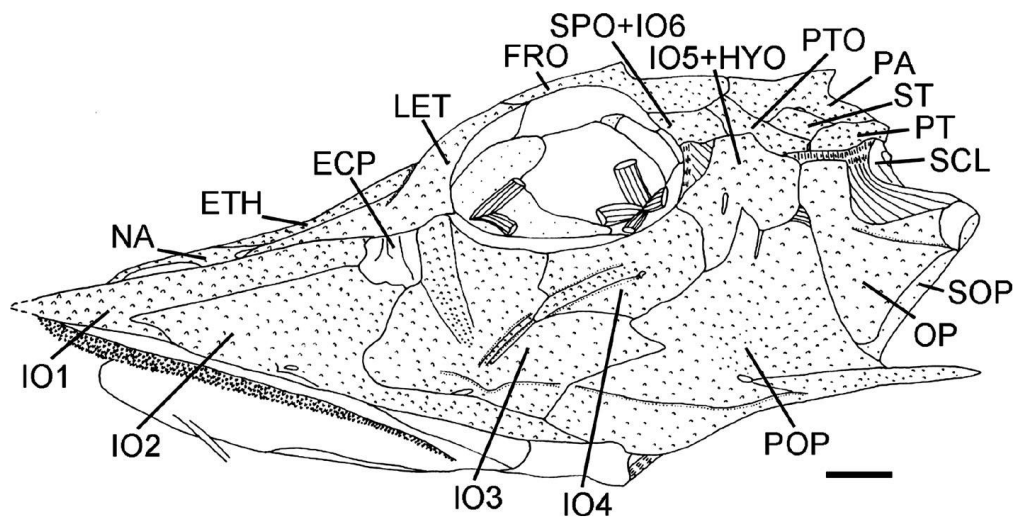


Fig. 1. Peristediidae—Lateral aspect of head; Abbreviations: ECP, ectopterygoid; ETH, ethmoid; FRO, frontal; HYO, hyomandibular; IO, infraorbital; LET, lateral ethmoid; NA, nasal; OP, opercle; PA, parietal; POP, preopercle; PT, posttemporal; PTO, pterotic; SCL, supracleithrum; SOP, subopercle; SPO, sphenotic; ST, supratemporal. Scale bar: 5mm. (Kawai, 2008)

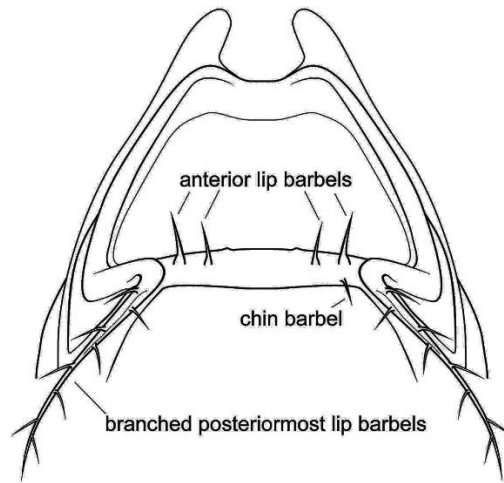


Fig. 2. Illustration of the ventral side of the lower jaw, showing barbel arrangement.

***Scalicus serrulatus* (Alcock 1898)**

Order—Scorpaeniformes

Suborder—Platycephaloidei

Family—Peristediidae Jordan & Gilbert 1883

Genus—*Scalicus* Jordan 1923

Synonyms—*Peristethus serrulatum* Alcock 1898; *Peristethuim serrulatum* (Alcock 1899)

Diagnosis —*Dorsal soft fin rays more than 19; all the bony ridges of head are finely serrulate; rostral projections parallel to each other; 4 barbels on lip, 1 barbel on chin; anteriorly directed spines on posterior bony plates of upper lateral row.*

Description—Body fusiform covered with four rows of bony plates. Two rostral projection (length 3.7 in HL) parallel to each other. Nasal, mesethmoid and lateral ethmoid spines are present. Pre-orbital spine present on the anterior margin of the orbit; post-ocular, parietal spine are very short and stout. Posttemporal spine with ridge; large single backwardly directed preopercular spine; two opercular spine, uppermost smaller and lowermost larger with a ridge; nuchal spine short; upper jaw teeth absent; lateral margin of the head smooth; supra ocular spine very short and stout; deeply concave intra orbital space. All the bony ridges of head are finely serrulated; 4 barbels on lip, 3 unbranched anteriorly directed and 1 filamentous barbel reaching up to the middle of the orbit; 1 chin barbel.

Bony plates on body arranged in four horizontal rows; posterior parts of lower lateral rows of bony plates separated from each other, each with one backwardly directed spine except dorsal and ventral rows of caudal peduncle; bony plates before anus which are large with a low ridge. Antrose spines present on upper lateral bony plates of caudal peduncle.

Color of fresh specimen—Head and body uniform red with small greenish markings. All the fins have deep red including the detached pectoral rays. Edges of the dorsal fin, distal part of the pectoral fins and caudal fin were black.

Distribution—Indo-West Pacific, southern Japan and the Andaman Sea. Depth range of 200-330 m



Fig. 3. *Scalicus serrulates* (146 mm SL)

***Scalicus investigatoris* (Alcock 1898)**

Order—Scorpaeniformes

Suborder—Platycephaloidei

Family—Peristediidae Jordan & Gilbert 1883

Genus—*Scalicus* Jordan 1923

Synonyms—*Peristethus investigatoris* Alcock 1898; *Peristethium investigatoris*, Alcock 1899; *Peristedion investigatoris* (Alcock 1898)

Diagnosis. *Equilateral triangular rostral projection; long filamentous barbels, reaching up to the origin of anal fin; 6 barbels on lip and 3 barbels on chin; Antrose spines absent on posterior bony plates of upper lateral row.*

Description—Body fusiform covered with four rows of bony plates. Equilateral triangular rostral projections (17.2 in HL). No rostral, nasal spines; single mesethmoid present; small and stout supraocular spine on dorso-posterior region of the orbit. Parietal spine large; posttemporal spine present with ridge. Preopercle with two backwardly directed spines, outer spine longer and stronger than inner; two opercular spines, uppermost smaller and lowermost larger with a horizontal ridge. Mouth large and inferior. Upper jaw teeth absent; lateral margin of the head smooth; 6 barbels on lip, 5 anterior unbranched and 1 posterior filamentous barbel which reaching up to the origin of anal fin (111.3 in HL); 3 barbels on chin, third one having tuft like with three filaments.

Bony plates on body arranged in four horizontal rows, each plate with one backwardly directed spine except dorsal and ventral rows of caudal peduncle; bony plates before anus which are large with a low ridge. Antrose spines absent on upper lateral bony plates of caudal peduncle.

Color of fresh specimens—Head and body uniform red; pectorals, first dorsal and distal half of longest barbel blackish; dorsal fin rays with black edge, pelvic black.

Color in preservative— Body surface pale brown, ventral surface whitish, first spinous dorsal and distal half of longest barbel blackish; dorsal fin rays with a black edge, pelvic black.

Distribution—Arabian Sea, Andaman Sea, off Durban, South Africa, Western Central Pacific in depth of 200- 658 m



Fig. 4. *Scalicus investigatoris* (165 mm SL)

***Peristedion amblygenys* Fowler 1938**

Order—Scorpaeniformes

Suborder—Platycephaloidei

Family—Peristediidae Jordan & Gilbert 1883

Genus—*Peristedion* Lacépède, 1801

Diagnosis—*A species of peristedion with a pair of attenuated, long, flat, rostral extensions, as long as snout; anteriorly directed spines on posterior bony plates of upper lateral row.*

Description—Body fusiform, covered with four rows of bony plates. Head depressed, snout narrow rather than broad, snout length 2.25 in HL, 42 (41.8); orbital diameter 1.6 in snout length, 18.6 (18.3); interorbital space deeply concave. A pair of attenuated, long, flat, rostral extensions, as long as snout. (38.1 in HL). Rostral, nasal, mesethmoid and lateral ethmoid spines were absent. Frontal first and second spines rudimentary. Stout, supra ocular spine present on the dorso- posterior region of orbit; parietal spine also stout; posttemporal spine very short with ridge; nuchal spine short and stout; preopercular spine absent; single small opercular spine; longitudinal ridge running from base of the rostral projection to the anterior limit of the orbit. Head depressed, lateral margin of head smooth, snout narrow rather than broad, interorbital space deeply concave, mouth large and inferior, no teeth on upper jaw, lower jaw, vomer and palatine. A total of six tuft of barbels on lip; each having 3-4 filaments, posteriormost one longest (33.3 in HL) and branched. Two tufted barbels on chin.

Bony plates on body arranged in four horizontal rows; each plate with one backwardly directed spine, except dorsal and ventral rows of caudal peduncle and bony plates before anus. Anterior most bony plate largest, second one possess weak spine. Antrose spines present on upper lateral bony plates of caudal peduncle. Posterior pairs of bony plates in lower lateral rows contralaterally sutured along the mid-line.

Color in preservative—In preservative both dorsal and ventral surface of the body uniform creamy white, a black color is retained on the margin of dorsal fin rays; pectoral whitish, with black terminally and transverse light brown band.

Distribution—Andaman Sea (first record) and Philippines in depth of 194-801 m

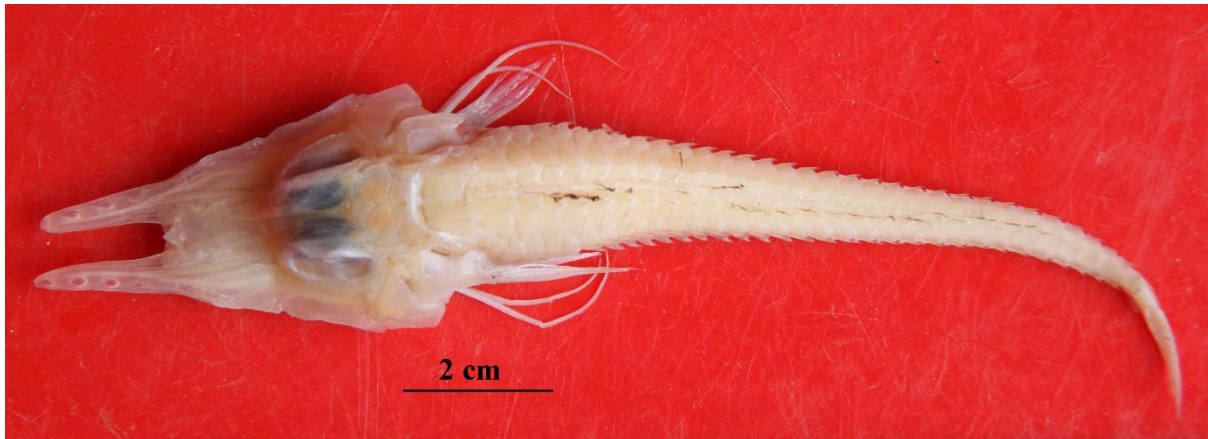


Fig. 5. *Peristedion amblygenys* (128 mm SL)

***Scalicus orientalis* (Fowler 1938)**

Order—Scorpaeniformes

Suborder—Platycephaloidei

Family—Peristediidae Jordan & Gilbert 1883

Genus—*Scalicus* Jordan 1923

Synonym—*Nemaperistedion orientale* Fowler 1938

Diagnosis—Two little long, broad, isosceles-triangular rostral projection; six lip barbels, long filamentous barbel (with blackish flaps) reaches beyond the anus (105.45 in HL). Three barbels on chin; antrose spines on upper lateral bony plates of caudal peduncle.

Description—Body strongly depressed, covered with four rows of hard bony plates, two little long, broad, isosceles-triangular rostral projection (6.2 in HL). Head length 38.08 (37-40 % of SL); snout length 50.8 (50) % of HL, orbit diameter 23.00 (22.2-23.3), inter orbital width 17.6 (16.9-17.5). Nasal, mesethmoid, lateral ethmoid spines are present. Small and stout supraocular

spine present on the dorso-posterior region of orbit; parietal spine large and sharp; posttemporal spine short with ridge; single long backwardly directed preopercular spine reaches well on pectoral fin; two opercular spines; uppermost smaller, lowermost with a ridge. Interorbital space deeply concave. Mouth inferior; no teeth on upper jaw; six lip barbels; five unbranched and one long filamentous barbels, (with blackish flaps) reaches beyond the anus (105.45 in HL). Three barbels on chin.

Bony plates on body arranged in four horizontal rows; each plate with one backwardly directed spine, except dorsal and ventral rows of caudal peduncle and bony plates before anus which are large with a low ridge; antrose spines on upper lateral bony plates of caudal peduncle.

Color of fresh specimen- Head and body uniform red color. Ventral surface pale red, spinous dorsal, distal half of longest barbel blackish.

Distribution—Andaman Sea, Philippines, Tosa Bay, East China Sea and Indonesia. Depth 350-500 m.

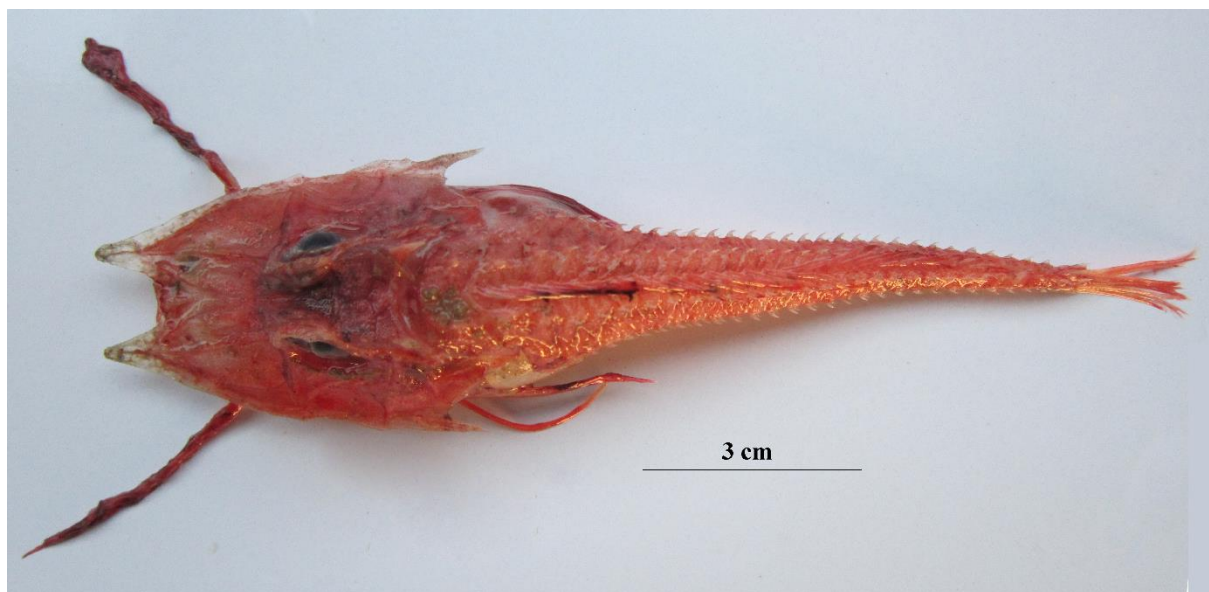


Fig. 6. *Scalicus orientalis* (137 mm SL)

***Heminodus philippinus* Smith 1917**

Order—Scorpaeniformes

Suborder—Platycephaloidei

Family—Peristediidae Jordan & Gilbert 1883

Genus—*Heminodus* Smith 1917

Synonyms—*Heminodus japonicus* Kamohara 1952

Diagnosis. *A species of Heminodus with 1 -2 barbels on lip and no barbels on chin; short triangular rostral projection; teeth on upper jaw; antrose spine on upper lateral bony plates of caudal peduncle.*

Description—Body fusiform covered with four rows of bony plates, short triangular rostral projections on each side (11.7 in HL), nearly parallel to each other. Bony plates are arranged in four horizontal rows, each plate with a single backwardly directed spine; upper lateral bony plates of caudal peduncle devoid of antrose spine; first four plates on upperlateral rows are small. Lower lateral row of bony plate ending at caudal peduncle. Four bony plates on the ventral side before anus, among them anterior most is largest.

head large and depressed; snout broad with short triangular parallel rostral projections on each side; inter orbital concave; rostral, nasal, mesethmoid and lateral ethmoid spines are absent. Supraocular spine small and stout placed on the dorso-posterior region of orbit; parietal spine large and pointed. Short posttemporal spines with ridge. Pre opercular spine also with a ridge; opercular spine having small inner and large outer projections. Mouth large and inferior, villiform teeth on upper jaw; lower jaw, vomer and palatine toothless. Two short barbels on lip (6.73, 11.70 mm in HL) and no barbels on chin.

Dorsal fin originating between first and second bony plates in dorsal row, ending on anterior part of caudal peduncle. Anal fin originating just after anus and terminating on the anterior part

of caudal peduncle. Two detached pectoral fin rays, upper one slightly larger than lower. Pelvic fin reaching posteriorly to point between origin of dorsal fin and anus. Caudal fin truncate.

Color in preservative—Whole body pale brown. Head and dorsal body part having dusky brown irregular spots. All fins are whitish in color; anterior part of first three dorsal spine have dusky brown color. Two dusky bands on pectoral and caudal fin.

Distribution—Previous records of *Heminodus philippinus* came only from southern Japan, the Philippines, Indonesia at depth range of 300-410 m. The present record from Off Andaman coast of India represent the first report.



Fig. 7. *Heminodus philippinus* (117 mm SL)

***Satyrichthys milleri* Kawai 2013**

Order—Scorpaeniformes

Suborder—Platycephaloidei

Family—Peristediidae Jordan & Gilbert 1883

Genus—*Satyrichthys* Kaup 1873

Diagnosis—*A species of Satyrichthys with equilateral-triangular rostral projections; 4 (rarely 5) lip and 4 chin barbels and lacking anteriorly directed spines on posterior bony plates of upper lateral row.*

Description—Body fusiform, covered with bony plates. Head large, depressed and extremely expanded around lateral edges, length 2.3 (2.0–2.4) in SL. Snout length 2.0 (1.8–2.2) in HL. Flat equilateral-triangular rostral projections, length 4.3 in HL; interorbital concave, width 3.6 (3.8–4.7). Rostral, nasal and fourth suborbital spines are absent. Single rudimentary mesethmoid spine; large stout supraocular spine on dorso-posterior region of orbit; large and stout parietal spine; stout posttemporal spine with ridge.

Mouth large, inferior. Lower jaw reaching up to ventral anterior border of orbit, length 2.7 (2.4–2.8) in HL. Longitudinal ridge running from preopercle to rostral projection. Preopercle with two backwardly directed spines, outer spine longer and stronger than inner. Two opercular spines; uppermost smaller, lowermost larger with a ridge, vomer and palatine toothless. Four barbels on lip; anterior three unbranched, posteriormost longest and branched, 1.2 (0.9–1.5) in HL. Four unbranched barbels on chin.

Bony plates on body arranged in four horizontal rows; each plate with one backwardly directed spine, except dorsal and ventral rows of caudal peduncle and bony plates before anus. Antrose spines absent on upper lateral bony plates of caudal peduncle.

Dorsal fin originating between first and second bony plates in dorsal row, ending on anterior portion of caudal peduncle. Anal fin originating posterior to anus. Pectoral fin reaching to base of first anal fin ray; lower two rays completely free and greatly thickened, upper ray longer than lower. Pelvic fin reaching up to the anus. Caudal fin weakly emarginate.

Color of fresh specimen—Head and body dark brown. Dorsal and pectoral fins, except for free rays, and posterior half of longest barbel blackish. Anal, pelvic and caudal fins blackish, free pectoral fin rays dark brown.

Distribution—Andaman Sea, East China Sea, Taiwan, Philippines, Indonesia, Vanuatu and Fiji, in depth of 259–860 m.

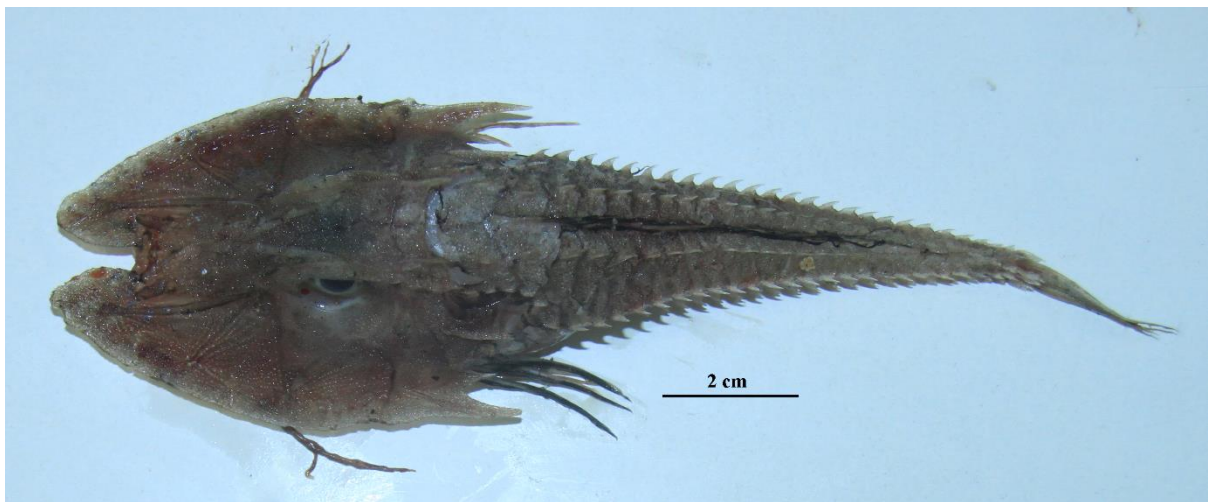


Fig. 8. *Satyrichthys milleri* (160 mm SL)

***Satyrichthys laticeps* (Schlegel, 1852)**

Order—Scorpaeniformes

Suborder—Platycephaloidei

Family—Peristediidae Jordan & Gilbert 1883

Genus—*Satyrichthys* Kaup 1873

Synonyms: *Peristethus halyi* Day 1888; *Peristethus adeni* Lloyd 1907; *Satyrichthys adeni* (Lloyd 1907)

Diagnosis—*A species of Satyrichthys with four (rarely three or five) lip and 2–5 chin barbels; antrose spines present on upper lateral bony plates of caudal peduncle; parietal bones unequal in size on midline; no dusky spots on dorsal fin.*

Description—Body fusiform, covered with four rows of bony plates. Lateral margin of head smooth; posterior parts of lower lateral rows of bony plates separated from each other. Two long inwardly directed rostral projections (length 3.9 in Head Length (HL)). Nasal, mesethmoid spines present; no frontal spine; stout and small supraocular spine on dorso-posterior region of orbit. Parietal spine large/well developed. Post-temporal spine with ridge. Upper jaw toothless; pre opercle with large pointed single spine. Opercle with three spine, arranged serially. Labial tentacle reaches beyond the limit of orbit. Mouth large inferior. Specimen from Arabian Sea do not have the nasal spine; opercle with two spines, arranged serially; post-temporal spine without ridge. Three barbels on lip; two unbranched and posteriormost one longest and branched. Two unbranched barbels on chin. Bony plates on body arranged in four horizontal rows; each plate with one backwardly directed spine, except dorsal and ventral rows of caudal peduncle and bony plates before anus, which are three in number with a low ridge. Antrose spines (forwardly directed spines) on upper lateral bony plates of caudal peduncle. Parietal bones unequal in size on midline.

Color of fresh specimen—Head and body have uniform red color; ventral surface pale red. All the fins are reddish including the barbels.

Distribution—Andaman Sea, Arabian Sea, Bay of Bengal, Japan, Taiwan, East China Sea, Sulu Sea, South China Sea, Indonesia, Sri Lanka, , Saya de Malha Bank, off Indian coast of southern Africa, in depth of 58–300 m.



Fig. 9. *Satyrichthys laticeps* (240 mm SL)

Key to Indian Peristediids

- 1A. Upper jaw teeth present.....2
- 1B. Upper jaw teeth absent3
- 2A. One or two short barbel on lip, longest barbel very short; no chin barbel, irregular dusky spots on head and dorsal part of the body.....*Heminodus philippinus*
- 3A. Lateral margin of the head smooth; Posterior pairs of bony plates in lower lateral rows contralaterally sutured.....*Perstedion* 4
- 3B Lateral margin of the head smooth; posterior parts of lower lateral rows of bony plates separated by ventral rows of plates.....5
- 4A Attenuated long flat rostral extensions as long as snout; four to five circular sensory pores on each rostral projections*P. amblygenys*
- 5A Dorsal fin soft rays fewer than 20.....*Satyrichthys* 6

- 5B** Dorsal fin soft rays more than 19..... *Scalicus* 7
- 6A.** Antrose spines present; parietal bone unequal; four (rarely three or five) lip and 2–5 chin barbels.....*Satyrichthys laticeps*
- 6B** Antrose spine absent; equilateral triangular projections; four (rarely three or five) lip and 2–5 chin barbels.....*Satyrichthys milleri*
- 7A** Antrose spine present on upper lateral row of posterior bony plates.....**8**
- 7B** Antrose spine absent on upper lateral row of posterior bony plates**9**
- 8A** Isocelus triangular rostral projection; filamentous barbell having blackish flap reaching beyond anus; 6 lip and 3 chin barbels.....*Scalicus orientalis*
- 8B** Rostral projection parallel to each other; 3 lip and 1 chin barbel; all the bony edges and head are finely serrulated; green spots on dorsal body and head.....*Scalicus serrulates*

9A Pair of small equilateral triangular projection; 6 lip and 3 chin barbels.....*Scalicus investigatoris*

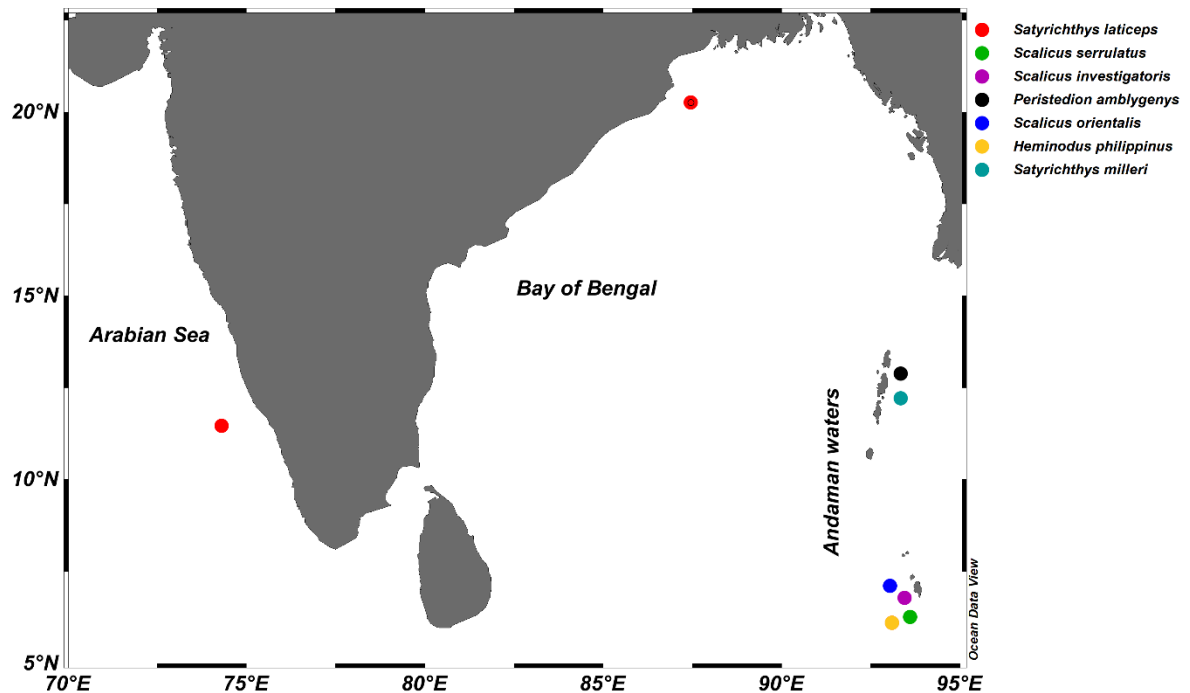


Fig. 10. Map showing the geographical distribution of family peristediidae

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