

First report of ten grouper species (Serranidae: Epinephelinae) from the West Bengal coast, along the east coast of India

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Present paper reports 10 groupers (family Serranidae) from West Bengal coast on the east coast of India for the first time. These 10 species are *Cephalopholis formosa*, *Epinephelus areolatus*, *E. bleekeri*, *E. caeruleopunctatus*, *E. erythrurus*, *E. fasciatus*, *E. longispinis*, *E. magniscuttis*, *E. radiatus*, *E. sexfasciatus*. This paper provides comprehensive morphometric characters, description, photography and distribution of these 10 groupers.

[Keywords: Digha mohona; Fish; New record; Serranidae; West Bengal]

Introduction

The family Serranidae is a diverse group of mostly demersal fishes of tropical and subtropical to temperate waters that generally inhabit coral reefs and rocky areas to mangroves, seagrass beds, estuaries and mud or sandy bottom; ranging from shallow coastal waters to medium depths, occasionally beyond 200 m¹. Most of the Serranids are hermaphroditic, solitary and predators. Groupers are one of the major components of artisanal fisheries¹.

This diverse family comprises of 544 species distributed in 75 genera², all characterized by having robust to somewhat compressed body shape, oblong-oval to rather elongate; mouth large with small, slender, inwardly-depressible teeth on jaws, maxilla exposed when mouth closed, enlarged caniniform teeth often present at front of jaws and operculum bearing 3 spines^{1,3}. The sub-family Epinephelinae contains 15 genera and 160 species, of which 110 are from Indo-Pacific region⁴ and the genus *Epinephelus* contains 98 species, including 70 species from Indo-Pacific area⁵. In Indian waters, around 85 species from 19 Genera of Serranidae fishes were recorded⁶.

The study of marine fish diversity from West Bengal coast of India has been done by many workers⁶⁻¹³, but the authors of this study encountered ten species of grouper, which were hitherto not recorded and hence, intended to report them from the coastal waters of West Bengal state.

Materials and Methods

Specimens were collected from Digha Mohona (21°37.843'N and 87°32.827'E) of West Bengal, through local survey. Digha Mohona of East Medinipur is one of the largest fish-landing centres of West Bengal. At Digha Mohona, Khadalgobra and Ramnagar canal join with the Sea (Fig. 1). It is a key breeding area of many fishes. Fishes were collected mainly by trawl nets; authors collected the specimens from fisherman of Digha Mohona. After collection of specimens photographs were taken and preserved in 10 % formaldehyde solutions. Morphometric measurement of fishes were taken by digital caliper to the nearest tenth of a mm and measuring tape with nearest tenth of mm. Meristic characters (D: Dorsal fin spine/ray, A: Anal fin spine/ray, P: Pectoral fin, V: Ventral fin, GR: Gill raker; LI: Lateral line scales) were also noted for identification. For proper identification, taxonomic key to species of Serranidae were followed according to Heemstra & Randall¹. The details of morphometric measurements of all these 10 species are given in Table 1. As most of the grouper species are either in the data deficient category or conservation important species in the IUCN list, so the IUCN categories of all 10 groupers are provided in this paper and distribution is provided in Table 2.

Results

***Cephalopholis formosa* (Shaw and Nodder, 1812): Bluelined Hind**

1812. *Sciaena formosa*. Shaw and Nodder: 23, pl. 1007 (type locality: Vizagapatam, Coromandel coast



Fig. 1 — Study area showing the collection site at Digha Mohana.

Table 1 — Morphometric measurements of the ten grouper species recorded from West Bengal coast

Sl. No.	Species	In Standard Length		In Head Length	
		Body Depth	Head Length	Pectoral Fin	Pelvic Fin
1	<i>Cephalopholis formosa</i>	2.70-2.82	2.51-2.57	-	-
2	<i>Epinephelus areolatus</i>	3.26-3.32	2.70-2.74	1.71-1.76	1.88-1.95
3	<i>Epinephelus bleekeri</i>	3.16-3.49	2.45-2.6	1.76-1.94	2.08-2.19
4	<i>Epinephelus caeruleopunctatus</i>	2.90	2.50	1.73	2.36
5	<i>Epinephelus erythrurus</i>	2.86	2.70	1.91	2.36
6	<i>Epinephelus fasciatus</i>	3.23	2.41	1.59	2.21
7	<i>Epinephelus longispinis</i>	3.30	2.43	1.69	2.19
8	<i>Epinephelus magniscuttis</i>	3.24	2.21	1.88	2.30
9	<i>Epinephelus radiatus</i>	2.57-3.06	2.13-2.23	2.04-2.15	2.56-2.44
10	<i>Epinephelus sexfasciatus</i>	2.80-3.12	2.41-2.59	1.67-1.71	2.06-2.21

of India, after “Rahtee Bontoo” of Russell, 1803:22, pl. 129).

Material examined: MARC/ZSI/F3808, 2 ex., 132.8--158 mm SL.

Diagnostic Characters: D: IX, 16; A: III, 8; P: 17; V: I, 5; GR: 27; LL: 51. Body was stout, covered with ctenoid scales; auxiliary scales absent; and body depth (BD) 2.70-2.82 times to standard length (SL). Length of head (HL) 2.51-2.57 times to SL; head covered with cycloid scales; interorbital space convex; preopercle rounded; finely serrated. Middle opercular spine closer to and lower than the upper spine; opercular flap obtusely pointed. Nine gill rakers on upper limb, and eighteen on lower limb of first arch

observed. Single, dorsal fin continuous origin above base of pectoral fin; membrane between dorsal spines incised; second anal spine longer and stronger than third; pectoral fins 1.68-1.70 times of HL and longer than ventral fins; ventral fins reach to anus; caudal fin rounded.

Colour: Body reddish brown with irregular longitudinal wavy blue lines along head, body and fins. Dark blue spots present along the snout, lips and the lower part of head and chest (Fig. 2).

Distribution: Indo-West Pacific ranging from India, Sri Lanka to Philippines, Japan, and Australia¹. In India, it has been reported from the coasts of

Table 2 — Distribution of all the ten groupers along the different states and union territories of Indian coast

Sl. No	Species	Andaman & Nicobar	West Bengal	Odisha	Andhra Pradesh	Tamil Nadu	Kerala	Karnataka	Maharashtra	Gujarat	Lakshadweep
1	<i>Cephalopholis formosa</i>	+	*	-	+	+	+	+	+	+	-
2	<i>Epinephelus areolatus</i>	+	*	-	+	+	+	+	+	+	+
3	<i>Epinephelus bleekeri</i>	+	*	+	+	-	+	+	+	-	-
4	<i>Epinephelus caeruleopunctatus</i>	+	*	-	+	+	+	-	-	-	+
5	<i>Epinephelus erythrurus</i>	+	*	-	+	-	-	+	+	+	-
6	<i>Epinephelus fasciatus</i>	+	*	-	-	-	+	+	+	-	+
7	<i>Epinephelus longispinis</i>	+	*	-	-	+	+	-	-	-	+
8	<i>Epinephelus magniscuttis</i>	-	*	-	+	-	-	-	-	-	-
9	<i>Epinephelus radiatus</i>	+	*	+	+	-	+	-	-	-	-
10	<i>Epinephelus sexfasciatus</i>	+	*	-	-	-	+	-	-	-	-

Fig. 2 — *Cephalopholis formosa*

Gujarat¹⁴, Maharashtra¹⁵, Karnataka¹⁶, Kerala¹⁷, Tamil Nadu¹⁸, Andhra Pradesh¹⁹, Andaman and Nicobar Islands²⁰, and very recently from Odisha²¹.

IUCN Status: Least concern (LC).

***Epinephelus areolatus* (Forsskal, 1775): Areolate Grouper**

1775. *Perca areolata*, *Descript. Animal.* p. 42.

Material examined: MARC/ZSI/ F2554 and F2602, 2 ex., 113--178 mm SL.

Diagnostic Characters: D: XI, 16; A: III, 8; P: 17; V: I, 5; GR: 25; LI: 52. Body moderately elongate and laterally compressed; auxiliary scales present on body; BD 3.26-3.32 times to SL. HL 2.70-2.74 times to SL. Interorbital space convex; preopercle angular with five serrae at angle. Lower jaw strongly projecting; mouth oblique; maxilla extends to below rear half of eyes; maxilla with small scales. Single, continuous dorsal spine with 4th spine longest; its membrane incised; second anal spine slightly longer than third; pectoral fins slightly longer than ventral

fins; ventral fins reaching to anus; caudal fin emarginated.

Colour: Body, head and fins pale in colour with close set of numerous rounded brownish spots, spots on body almost equal to size of pupil; pectoral fin pale with very small spots confined to rays; soft dorsal fin, anal, ventral and caudal fin with white edged blackish margin; especially caudal fin with prominent narrow white margin (Fig. 3).

Distribution: Much abundant in Western Indian Ocean²². From Indian coast, this species was reported from Maharashtra¹⁵, Tamil Nadu¹⁸, Gujarat¹⁴, Karnataka¹⁶, Kerala¹⁷, Andaman and Nicobar Islands^{20,23}, and Lakshadweep²⁴.

IUCN Status: Least concern (LC).

***Epinephelus bleekeri* (Vaillant, 1878): Bleeker's Grouper**

1875. *Serranus waandersi* Day (nec. Bleeker), *Fishes of India*: 12, pl. 8, fig. 1.

Material examined: MARC/ZSI/F2557, F756 and F2284, 3 ex., 115--205 mm SL.

Diagnostic characters: D: XI, 16-18; A: III, 8; P: 19; V: I, 5; GR: 28; LI: 53. Body elongate moderately deep and laterally compressed (Fig. 4); its depth 3.16-3.49 times to SL. HL 2.45-2.6 times to SL; preopercular angle with 6-7 serrae; maxilla with scales and reaching after vertical at posterior edge of eye. Operculum with three flat spines; middle opercular spines equidistance from lower and upper one. Eleven gill rakers present on the upper limb and seventeen on lower limb of first arch. Dorsal spine origin above the base of pectorals, 4th dorsal spine is longest among dorsal fin, pectoral fin slightly shorter than post orbital part of head; ventral fin short; caudal fin truncate.

Colour: Body reddish brown above and paler below with numerous orange spots on head, body, dorsal fin and upper 1/3rd of caudal fin and lower two third of caudal fin dark grey; pectoral fin light grey; anal fin purplish brown and ventral fin dark tip; a dark streak present at maxillary groove (Fig. 4).

Distribution: Indo-West Pacific¹. From Indian coast, this species has been reported from Maharashtra¹⁵, Kerala¹⁷, Karnataka¹⁶, Andhra Pradesh¹⁹, Odisha²³, and Andaman and Nicobar Islands^{20,22}.

IUCN Status: Near threatened (NT).

Epinephelus caeruleopunctatus (Bloch, 1790): White spot Grouper

1790. *Holocentrus caeruleopunctatus* Bloch, *Ausland. Fische* IV. P.94



Fig. 3 — *Epinephelus areolatus*



Fig. 4 — *Epinephelus bleekeri*

Material examined: MARC/ZSI/F2702, 1 ex., 296 mm SL.

Diagnostic characters: D: XI, 16; A: III, 8; P: 18; V: I, 5; GR: 26; LI: 59. Body moderately elongate (Fig. 5), head pointed, dorsal profile of head nearly pointed; BD 2.90 times to SL. HL 2.50 times to SL; Preopercle rounded and finely serrated and the serration is large at angle; opercular spines three; opercular flap acutely pointed, upper edge of operculum straight. Head covered with cycloid scales; maxilla scales less. Single continuous dorsal fin; 4th dorsal spine longest; membrane of dorsal spines incised; second and third anal spine more or less equal; pectoral fin fleshy and as long as postorbital part of head; ventral fin short not reaching to anus; caudal fin rounded.

Colour: Body dark brown; posterior head region, body and dorsal fin with scattered large chalky white spots; four indistinct dark blotches on base of dorsal fin and one oblique black saddle on rear half of

peduncle; upper edge of maxillary groove with a broad black streak; except spinous dorsal and ventral other fins with narrow white margin (Fig. 5).

Distribution: This Indo Pacific species ranges from east coast of Africa to Fiji in the central Pacific; also reported from Tonga, Red Sea¹. From Indian coast this species is reported from Kerala¹⁷, Andhra Pradesh¹⁹, Tamil Nadu¹⁸, Lakshadweep²⁴, and Andaman and Nicobar Islands^{20,22}.

IUCN Status: Least concern (LC).

Epinephelus erythrurus (Valenciennes, 1828): Cloudy Grouper *Serranus erythrurus* Valenciennes in Cuv. and Val., 1828:320 (type locality: Malabar, India).

Material examined: MARC/ZSI/F2561, 1 ex., 192 mm SL.

Diagnostic characters: D: XI, 17; A: III, 8; P: 18; V: I, 5; GR: 26; LI: 61.

Body moderately elongate, laterally compressed (Fig.6); BD 2.86 times to SL. HL 2.70 times to SL.



Fig. 5 — *Epinephelus caeruleopunctatus*



Fig. 6 — *Epinephelus erythrurus*

Scales present on maxilla reaches to hind border of eye; auxiliary scale present. Single continuous dorsal fin with unincised interspinous space; second anal fin longer than third; ventral fin not reaching to anus, rounded caudal fin.

Colour: Body reddish brown with irregular pale spots and blotches which form irregular dark reticulation on background; three dark streaks across operculum, first is broadest and darkest starts from eye to lower edge of opercular flap, second from lower edge of eye to subopercle, and third is faintest starts from dark maxillary streak to lower edge of preopercle; Dorsal, anal and ventral fins mottled; pectoral fins pale.

Distribution: This Indo West Pacific species spreads in India, Laccadive Islands, Sri Lanka, Gulf of Thailand, Indonesia, Singapore, and Borneo¹. From Indian coast, this species has been reported from Gujarat¹⁴, Maharashtra¹⁵, Karnataka¹⁶, Andhra Pradesh¹⁹, and Andaman and Nicobar Islands^{20,22}.

IUCN Status: Data deficient (DD).

***Epinephelus fasciatus* (Forsskal, 1775): Black tip Grouper.**

1775. *Perca fasciatus* Forsskal, *Deser. Anim.* 1775, p. 40.

Material examined: MARC/ZSI/ F2452, 1 ex., 103.5 mm SL.

Diagnostic characters: D: XI, 16; A: III, 8; P: 19; V: I, 5; GR: 25; LI: 56. Body moderately deep (Fig. 7), oblong and somewhat robust; BD 3.23 times to SL. HL 2.41 times to SL. Gill rakers 8+17; auxiliary scales present. Single continuous dorsal fin with

incised interspinous membrane; second anal spine stronger; pectoral sub equal to postorbital part of head; pelvic fin not reaching to anus; and rounded caudal fin.

Colour: Pale yellowish brown with five dark bars, last on peduncle; a dark band from below eye to interopercle; rim of orbit brown; fins reddish orange; the interspinous membranes along the upper triangular part of dorsal fin black (Fig. 7).

Distribution: This is a very common grouper in Indo-Pacific region¹. From Indian coast, this species has been reported from Maharashtra¹⁵, Kerala¹⁷, Karnataka¹⁶, Lakshadweep²⁶ and Andaman and Nicobar Islands^{20,23}.

IUCN Status: Least concern (LC).

***Epinephelus longispinis* (Kner, 1864): Longspine Grouper**

1864. *Serranus longispinnis* Kner: 483; 275, pl. 2, fig. 2 (Type locality: Madras, India).

Material examined: MARC/ZSI/ F2657, 1 ex., 82.3 mm SL.

Diagnostic characters: D: XI, 17; A: III, 8; P: 19; V: I, 5; GR: 25; LI: 52. Body moderately elongate (Fig. 8); BD 3.30 times to SL. Head covered with scales, HL 2.43 times to SL; Gill rakers 9 + 16. Single continuous dorsal spines, 3rd spine longest; interspinous membranes incised in anterior part of dorsal fin only; pectoral fin reaching to anus, caudal fin slightly rounded.

Colour: Head and body pale brown with dark reddish brown circles and separated spots. These



Fig. 7 — *Epinephelus fasciatus*

spots are more crowded in rear part of body and caudal peduncle; fins with similar reddish brown spots; a row of dark spots along distal margin of soft dorsal fin and the caudal fin.

Distribution: Indo-West Pacific¹. From Indian coast, this species was reported from Tamil Nadu¹⁸, Kerala¹⁷, and Andaman and Nicobar Islands²⁰. From Lakshadweep, the species is reported as *E. fario*²⁷.

IUCN Status: Least concern (LC).

Epinephelus magniscuttis Postel, Fourmanoir and Gueze, 1963: **Speckled Grouper**

1963. *Epinephelus magniscuttis* Postel, Fourmanoir and Guézé: 365, fig. 9 (Type locality: Reunion).

Material examined: MARC/ZSI/ F2478, 2 ex., 275-318 mm SL.

Diagnostic characters: D: XI, 14; A: III, 8; P: 18; V: I, 5; GR: 22; LI: 62. Body oblong (Fig. 9), slightly compressed, its depth 3.24 times to SL. Dorsal profile of head straight, head covered with minute scales; HL 2.21 times to SL; interorbital area flat; preopercle angular, upper edge finely serrated and angle with 3 large serrae; operculum with three spines, middle one pointed, situated midway between upper and lower spines. Dorsal fin single, continuous, interspinous membrane incised; 3rd dorsal spine longest; second anal spine strong and longer than third; pelvic fin not reaching to anus, caudal fin rounded.

Colour: Pale brown with small dark reddish spots irregularly distributed in mid lateral part of head and body; less in dorsal fin and caudal fin and absent



Fig. 8 — *Epinephelus longispinis*



Fig. 9 — *Epinephelus magniscuttis*

below pectoral fin. Upper margin of maxillary groove is dark brown; three dark bands originating from posterior margin of orbit. Dorsal dark brown; Pectoral, pelvic, anal and caudal light brown at the base and dark towards edges (Fig. 9).

Distribution: Indo-West Pacific¹. From Indian coast, this species has only been reported from Andhra Pradesh²⁸. Report of *E. magniscuttis* from the West Bengal coast suggests that this species might be a rare species in normal catches in India.

IUCN Status: Data deficient (DD).

***Epinephelus radiatus* (Day, 1867): Oblique banded Grouper**

1867. *Serranus radiatus* Day: 699 (Type locality: near Madras, India).

Material examined: MARC/ZSI/ F2085 and F2556, 4 ex., 105-174 mm SL.

Diagnostic characters: D: XI, 15; A: III, 8; P: 18; V: 1, 5; GR: 27; LI: 63-65. Body elongated, robust and moderately compressed, its depth 2.51-3.06 times to SL; HL 2.13- 2.23 times to SL; and interorbital space flat. Preopercle with five enlarge serrae; upper edge of operculum straight. Single, continuous dorsal fin with 3rd spine longest, interspinous membrane deeply incised; second and third anal spines subequal; ventral not reaches anus and caudal fin rounded.

Colour: Body light brownish grey with five oblique dark edged bands. Two narrow oblique dark brown bands on cheek; body, dorsal fin and base of anal fin with scattered dark brown dots; others remaining fins unmarked (Fig. 10).

Distribution: Widely distributed in Indo West Pacific region¹. From Indian coast it was reported

from Andhra Pradesh¹⁹, Kerala¹⁷, and Andaman and Nicobar Islands²⁰.

IUCN Status: Least concern (LC).

***Epinephelus sexfasciatus* (Valenciennes, 1828): Sixbar Grouper**
1828. *Serranus sexfasciatus* Cuvier and Valenciennes, *Hist. Nat. Poissons* II. p. 360.

Material examined: MARC/ZSI/ F2160 and F2555, 2 ex., 143-155 mm SL.

Diagnostic characters: D: XI, 15; A: III, 8; P: 18; V: I, 5; GR: 23; LI: 50.

Body elongate and moderately compressed; its depth 2.80-3.12 times to SL; dorsal profile of head convex, HL 2.41-2.59 times to SL; interorbital space flat. Preopercle with 3-4 large serrae; upper margin of operculum straight and its flap pointed; nostrils subequal. Mouth oblique, lower jaw projecting; and maxilla reaching below posterior border of eyes. Teeth small, midlateral part of lower jaw with two rows of subequal teeth; canines moderate. Single continuous dorsal fin origin slightly before base of pectoral fins, interspinous membrane incised, 3rd dorsal longest; 2nd anal spine strong but more or less equal to 3rd anal spine; pectoral fin not fleshy; caudal fin rounded.

Colour: Head and body light grayish brown with five dark brown bars on body and one on nape; dark bars are vertically divided by pale bars; scattered brown spots present on body, edge of dark bars, soft dorsal and caudal; ventral, soft dorsal and caudal fins dusky grey; pectoral fin orange red (Fig. 11).

Distribution: Indo Malayan and Western central Pacific region; ranging from Indonesia, Singapore,



Fig. 10 — *Epinephelus radiatus*



Fig. 11 — *Epinephelus sexfasciatus*

Malaysia, Thailand, Viet Nam, Philippines, Papua New Guinea, Louisiade Archipelago and Australia¹. From Indian waters, *E. sexfasciatus* was reported from Kerala¹⁷, and Andaman and Nicobar Islands²⁰.

IUCN Status: Data deficient (DD).

Discussion

The study of marine fish diversity from West Bengal coast has been done by many workers⁶⁻¹³ and recently the list of Digha has been updated by Yennawar et al.¹³, which reports only 5 species of grouper species from the family Serranidae i.e. *E. tauvina* (Forsskål, 1775), *E. coioides* (Hamilton, 1822), *E. lanceolatus* (Bloch, 1790), *E. latifasciatus* (Temminck & Schlegel, 1842), and *E. malabaricus* (Bloch & Schneider, 1801). The recent ten additional species increases the total species of grouper in West Bengal waters to fifteen. Among all these ten species, *E. fasciatus* and *E. sexfasciatus* were earlier restricted to West coast, and Andaman & Nicobar, and this report forms the first record of the species on the east coast of India. *E. magniscuttis*, a rare grouper, was only once reported earlier from India along the Andhra Pradesh coast²⁷. Distribution of *E. longispinis* was restricted to southern part i.e. Tamil Nadu, Kerala, Lakshadweep & Andaman and Nicobar Islands, earlier and this report extends the range of occurrence of the species all along the east coast to the northern most part of the east coast. The report of these ten species of groupers add culture prospective of groupers along the West Bengal coast, as culture of groupers due to very high market demand might be an alternative livelihood for the future.

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