

Grunts (Actinopterygii: Perciformes: Haemulidae) of Bangladesh with two new distributional records from the northern Bay of Bengal assessed by morphometric characters and DNA barcoding

Kazi Ahsan HABIB^{1,2}, Md Jayedul ISLAM², Najmun NAHAR²,
Mohammad RASHED^{1,2}, Amit Kumer NEOGI², Barry RUSSELL^{3,4}

¹ Sher-e-Bangla Agricultural University, Department of Fisheries Biology and Genetics, Faculty of Fisheries, Aquaculture and Marine Science, Dhaka, Bangladesh

² Sher-e-Bangla Agricultural University, Aquatic Bioresource Research Lab, Department of Fisheries Biology and Genetics, Dhaka, Bangladesh

³ Museum and Art Gallery of the Northern Territory, Darwin NT, Australia

⁴ School of Environmental and Life Sciences, Charles Darwin University, Darwin NT, Australia

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Corresponding author: Kazi Ahsan Habib (ahsan.sau@gmail.com)

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Abstract

Grunts (family Haemulidae) are among the most commercially important fish in Bangladesh. This paper provides brief diagnostic characters of five previously reported grunt species: *Plectorhinchus pictus* (Thunberg, 1792); *Pomadasys andamanensis* McKay et Satapoomin, 1994; *Pomadasys argenteus* (Forsskål, 1775); *Pomadasys argyreus* (Valenciennes, 1833); *Pomadasys maculatus* (Bloch, 1793) and two new distributional records: *Pomadasys guoraca* (Cuvier, 1829) and *Plectorhinchus macrospilus* Satapoomin et Randall, 2000. The fishes were collected from the Saint Martin's Island coral reef-like ecosystem and the adjacent sea of the Sundarbans mangrove forest of Bangladesh. The examined specimens were identified and diagnosed based on their morphometric characters and DNA barcoding COI gene. The new records of *Pomadasys guoraca* and *Plectorhinchus macrospilus* from Bangladesh greatly extend their distributional range in the Bay of Bengal. An updated checklist of grunts of Bangladesh is provided.

Keywords

Saint Martin's Island, Sundarbans, Bangladesh, morphology, COI barcoding gene

Introduction

The family Haemulidae Gill, 1885 (commonly known as grunts), comprises 134 valid species representing 19 genera, distributed worldwide (Randall 1995; Nelson et al. 2016; Froese and Pauly 2020; Fricke et al. 2021a). They are known as grunts for producing sounds by rubbing their pharyngeal teeth together (Tavera et al. 2012). Grunts in-

habit both hard and soft bottoms of nearshore tropical, subtropical, brackish, and warm temperate waters (McKay 1984; Randall 1995; Froese and Pauly 2020). Generally, they tend to gather during the day and forage at night (Tavera et al. 2012; Froese and Pauly 2020).

The Haemulidae comprises two subfamilies: Haemulinae Gill, 1885 which includes 92 valid species and the Plectorhinchinae Jordan et Thompson, 1912 which

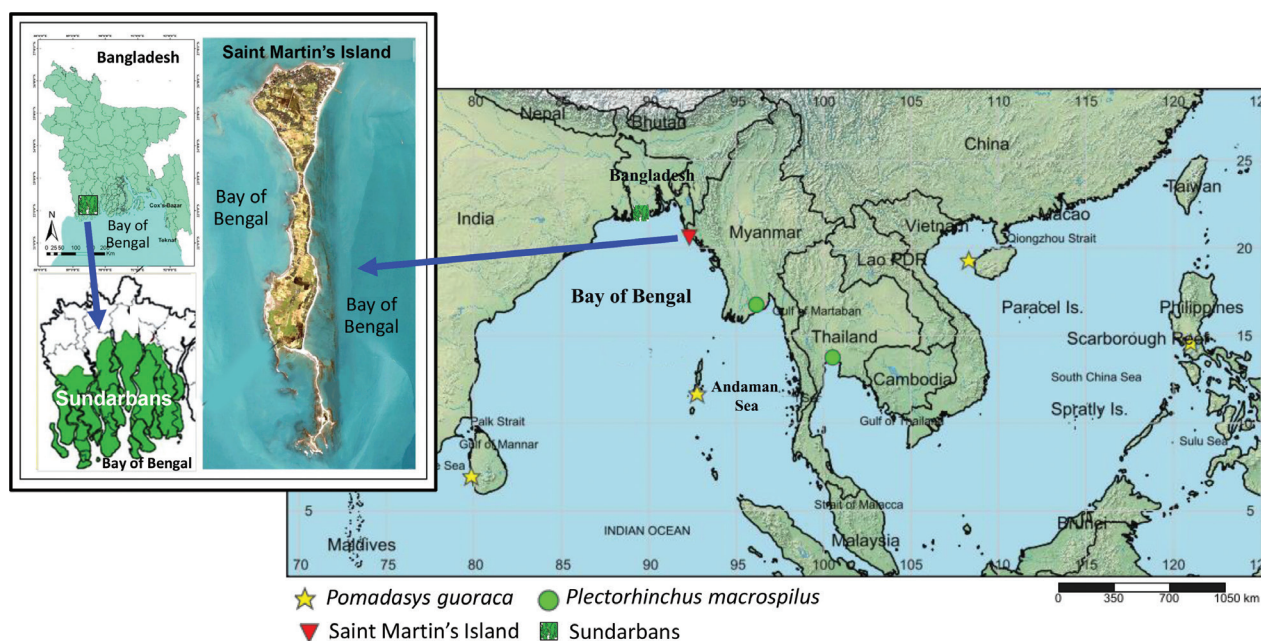


Figure 1. Map showing previous distribution of newly recorded fish species *Pomadasys guoraca* (★) and *Plectorhinchus macrospilus* (●) in the presently reported study, and the location of the Saint Martin's Island (▼) and Sundarbans (■) of Bangladesh in the northern Bay of Bengal from where the species were collected.

has 42 species (Fricke et al. 2021a). These two groups differ greatly in diversity and distribution. Haemulines are identified by having a short dorsal fin with 12–16 soft rays in the majority of the genera; possess two chin pores and a median chin groove; generally, inhabit tropical and temperate reefs on sandy and muddy bottoms and are distributed in the New World (Johnson 1980; Smith and Heemstra 2012; McKay 2001). On the other hand, the Plectorhinchinae, generally known as sweetlips, are characterized by having a long dorsal fin with 15–26 soft rays, 4–6 chin pores without median pit; and are primarily found around coral and rocky reefs in the tropical Indo-Pacific, western Atlantic and Mediterranean (Talwar and Kacker 1984; McKay 2001; Smith and Heemstra 2012).

Ten valid species of grunts have been reported previously from the marine waters of Bangladesh (Hussain 1970; Rahman et al. 2009; Thompson and Islam 2010; Baki et al. 2017; Fanning et al. 2019; Froese and Pauly 2020; Naznin et al. 2020). Based on collected specimens, we herein provide brief diagnoses of seven of these grunts, including two new records for Bangladesh. Additionally, we provide a brief diagnosis of six of the seven collected species based on mitochondrial cytochrome c oxidase subunit I (COI) DNA barcode gene sequences.

Materials and methods

Sample collection

The presently reported survey was carried out from July 2016 through September 2018. The grunt specimens were collected from Saint Martin's (St. Martin's) Island and the

adjacent seaward side of the Sundarbans mangrove forest of Bangladesh (Fig. 1). All of the specimens were photographed and tagged on site. The collected specimens were then transferred and preserved at the Aquatic Bioresource Research Laboratory (ABR Lab), Sher-e-Bangla Agricultural University (SAU) in Dhaka, Bangladesh.

Morphological study and species deposition

The morphological study was undertaken using reference works of Talwar and Kacker (1984), McKay and Satapoomin (1994), Satapoomin and Randall (2000), and McKay (2001). All measurements were taken with Vernier calipers to the nearest 0.1 mm. After completing the morphological study, a piece of fresh muscle tissue was collected from each individual and preserved in 98% ethanol for molecular analysis. All of the examined specimens are deposited in the ABR Lab of SAU.

Genetic analysis

Genomic DNA was extracted from the collected muscle tissue using a TIANamp Marine Animals DNA Kit (TIANGEN) following the manufacturer's protocol. The partial fragment of the mitochondrial (mtDNA) cytochrome c oxidase subunit I (COI) gene was amplified with the primers FishF2 (5'-TCGACTAATCATAAAGATATCGGCA-3'), and FishR2 (5'-ACTTCAGG-GTGACCGAAGAATCAGAA-3') (Ward et al. 2005). Polymerase chain reaction (PCR) was performed in a 50 µL reaction mixture in 0.2 mL small reaction tubes in a

thermal cycler (2720 Thermal Cycler, Applied Biosystems). The PCR condition profile consisted of a preheating at 95°C for 2 min followed by 35 cycles of denaturation at 94°C for 40 s, annealing at 54°C for 40 s, extension at 72°C for 1 min, and a final extension at 72°C for 10 min. PCR samples with a single and clear visible band were purified with the PCR Purification Kit (TIANGEN-Universal DNA Purification Kit). Sequencing was conducted with the same PCR primers by the Sanger standard method with automated sequencing (ABI 3730x1 DNA analyzer) at Macrogen Inc. (Korea). Nucleotide sequences were edited and aligned using the bioinformatics software MEGA-7 (Kumar et al. 2016). The obtained COI Sequences were checked using BLAST search engine provided by National Center for Biotechnology Information (NCBI) and Bold database. Finally, the consensus sequences obtained from collected specimens through DNA sequencing were submitted to GenBank.

Phylogenetic analysis was performed using Maximum likelihood (ML) methods through IQ Tree (Nguyen et al. 2015; Trifinopoulos et al. 2016) with bootstrap analysis of 10 000 replications. ML tree was visualized using Figtree v1.4.3 and edited by Adobe Illustrator. We used the evolutionary model TPM2u+F+G4 in the phylogenetic analysis obtained as the best-fit model using the program Modelfinder (Kalyaanamoorthy et al. 2017). This model was selected by applying the Bayesian information criterion. Two sequences of *Lethrinus nebulosus* (Forsskål, 1775) and *Gymnocranius griseus* (Temminck et Schlegel, 1843) retrieved from GenBank were used as outgroups in the phylogeny. Kimura-2 parameter (K2P) distance model (Kimura 1980) was used for calculating the genetic distance among the sequences using MEGA-7. Nucleotide and haplotype diversity and polymorphic sites were analyzed by DNASP (Librado and Rozas 2009).

Conservation status

The conservation status of many species of grunts has been published in the IUCN Red List of threatened species (<https://www.iucnredlist.org/species/123439745/123494892>) and are included here. The remaining assessments of species, listed here as ‘not yet assessed’, are scheduled for publication later in 2021.

Results

In the material collected within the presently reported study, we identified five previously recorded grunt species: *Plectorhinchus pictus* (Thunberg, 1792); *Pomadasys andamanensis* McKay et Satapoomin, 1994; *Pomadasys argenteus* (Forsskål, 1775); *Pomadasys argyreus* (Valenciennes, 1833); *Pomadasys maculatus* (Bloch, 1793) and previously unrecorded species, *Pomadasys guoraca* (Cuvier, 1829) and *Plectorhinchus macrospilus* Satapoomin et Randall, 2000. The former has not been recorded from the adjacent seaward coast of the Sundarbans mangrove

forest of Bangladesh, while the latter is new to Saint Martin’s Island. Diagnostic characters of all seven species collected by us are given below, and barcodes for six of the species from Bangladesh are provided for the first time.

Taxonomy

Plectorhinchinae Jordan et Thompson, 1912 *Plectorhinchus* Lacepède, 1801

Plectorhinchus pictus (Thunberg, 1792)

English common name: fork-striped slathey

Local common name: futki datina (Bangla)

Fig. 2a

Material examined. Bangladesh • 2 specimens; F1804SM-21 (110 mm SL), Cox’s Bazar, Bay of Bengal, Saint Martin’s Island, 20°36’39.6”N, 92°19’37.2”E, 20 April 2018, Amit Kumer Neogi, GenBank: [MK340608](#); F1804SM-22(105 mm SL), Cox’s Bazar, Bay of Bengal, Saint Martin’s Island, 20°36’39.6”N, 92°19’37.2”E, 20 April 2018, Amit Kumer Neogi, GenBank: [MK340609](#).

Diagnostic characters. Meristics: D-X, 23; P₁-17; P₂-I, 5; A-III, 7; C-18

Body deep and compressed. Profile of snout steep; lips fleshy; chin with six pores, but no median pit; lower jaw without longitudinal groove at midline. Caudal peduncle slender and long; scales small, ctenoid. Color varying greatly with size. Juveniles dark brown to black above, 4 broad longitudinal black bands on the body, silvery yellow below; dorsal and caudal fins yellow with black patches and broken stripes (Fig. 2a).

Remarks. This species has previously been included by the majority of authors in the genus *Diagramma* Oken, 1817, but recent phylogenetic analyses (Sanciangco et al. 2011; Tavera et al. 2012; Tavera et al. 2018) have shown that *Diagramma* (including type species *D. pictus*) is deeply nested within *Plectorhinchus* (and sister to its type species *Plectorhinchus chaetodonoides* Lacepède, 1801), and Tavera et al. (2018) have proposed that *Diagramma* should be considered a junior synonym of *Plectorhinchus* Lacepède, 1801. As pointed out by Parenti (2019), however, accepting *Plectorhinchus* as the senior synonym of *Diagramma* creates several nomenclatural problems: *Plectorhinchus pictus* (Tortonese, 1936) becomes a secondary homonym of *P. pictus* (Thunberg, 1792), and the next available name for *P. pictus* (Tortonese) is *Plectorhinchus cinctus punctatatus* Fang, 1942 (see Fricke et al. 2021b) which is secondarily preoccupied in *Plectorhinchus* by *Diagramma punctatum* Cuvier, 1830 (see Fricke et al. 2021b). This problem was long ago recognized by Whitley (1951), who anticipated *Diagramma* as a synonym of *Plectorhinchus* and accordingly proposed the name *Plectorhinchus fangi* Whitley, 1951, as a replacement for *P. cinctus punctatus* Fang (a species not yet recorded from the Bay of Bengal). Thus, we

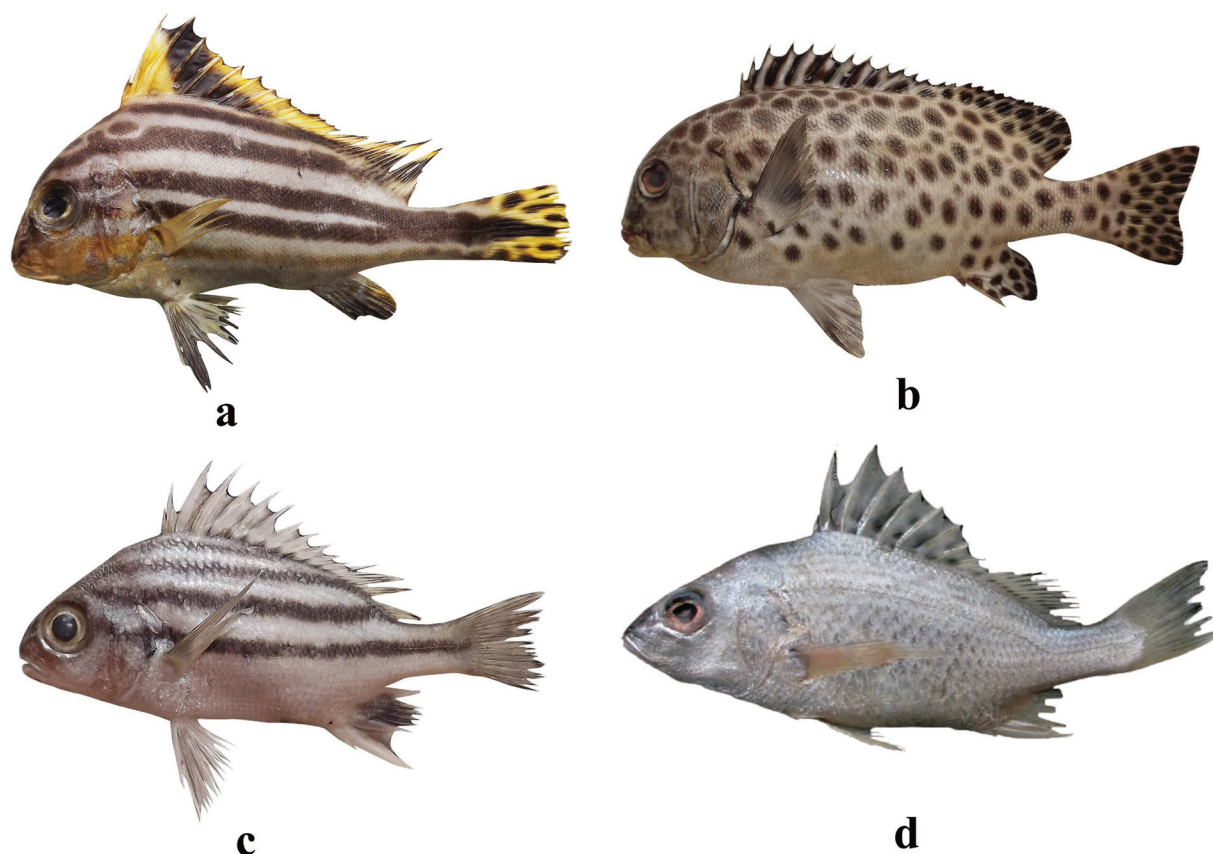


Figure 2. Lateral view of collected specimen, **a.** *Plectorhinchus pictus*, subspecies *cinerascens* (F1804SM-22; 105 SL mm), striped juvenile phase; **b.** *Plectorhinchus macrospilus* (F1803SM-67; 335 mm SL); **c.** *Plectorhinchus andamanensis*, (F1803SM-19; 137 mm SL); **d.** *Pomadasys argenteus* (F1602Sb-01; 132 mm SL).

regard *Plectorhinchus pictus* (Thunberg, 1792) as the correct name for the species described here from Bangladesh.

Specimens of *P. pictus* from the Bay of Bengal are part of a distinct subspecies, *Plectorhinchus pictus cinerascens* Cuvier, 1830—one of five geographically separate subspecies recognized by Johnson et al. (2001, as *Diagramma*): *P. pictus pictus* (Thunberg), *P. pictus labiosum* Macleay, *P. pictus punctatum* Cuvier, and *P. pictus centurio* Cuvier). *Plectorhinchus pictus*, subspecies *cinerascens* of Johnson et al. (2001) differs from all others in the configuration of the body stripes of juveniles, size of spots, and nature of the lines on the cheeks and operculum of large juveniles to small adults. Juveniles of about 150 mm TL often have broad, clearly defined body stripes, not yet beginning to break into broken lines or numerous spots; and progress from a striped to a fully spotted phase at 180–240 mm TL (Johnson et al. 2001: fig. 5). A more detailed genetic study is necessary to determine whether this geographically distinct color variety should be afforded separate species recognition (Johnson et al. 2001).

Distribution. *Plectorhinchus pictus cinerascens*, occurs from the Bay of Bengal to the Arabian/Persian Gulf (Johnson et al. 2001).

Conservation status. Not yet assessed, not listed in the IUCN Red List of Threatened Species (<https://www.iucnredlist.org/species/123439745/123494892>).

***Plectorhinchus macrospilus* Satapoomin et Randall, 2000**

English common name: largespot sweetlip

Local common name: dagi datina (Bangla)

Fig. 2b

Material examined. Bangladesh • 1 specimen; F1803SM-67 (335 mm SL), Cox's Bazar, Bay of Bengal, Saint Martin's Island, 20°36'39.6"N, 92°19'37.2"E, 27 March 2018, Md. Jayedul Islam and Kazi Ahsan Habib, GenBank: MK340677.

Diagnostic characters. Meristics: D-XII, 21; P₁-17; P₂-I, 5; A-III, 8; C-18; LL-59; GR- 5 + 15.

Body compressed; dorsal profile of head strongly convex. Small mouth with fleshy lips, moderately thick; chin with 6 pores and no median pit. Dorsal fin slightly notched. Caudal fin truncate. Scales ctenoid; absent in front of snout, lips, and chin. Color of body whitish to grayish ground color on most parts of body; contrasting with many large, irregularly rounded black spots on body, nape, and soft portions of median fins, and smaller black spots on head. Posterior edge of opercle slightly serrate, margin of subopercle and interopercle smooth (Fig. 2b). Lateral line continuous. Meristic measurements are given in Table 1 and Table 2.

Remarks. *Plectorhinchus macrospilus* is one of six species of its genus that have numerous dark spots in adults;

Table 1. Meristic counts of the two new records of *Plectorhinchus macrospilus* and *Pomadasys guoraca* collected in the presently reported study, compared with reference data.

Character	<i>Plectorhinchus macrospilus</i>		<i>Pomadasys guoraca</i>	
	This study <i>n</i> = 1	Satapoomin and Randall 2000	This study <i>n</i> = 3	Talwar and Kacker 1984
Dorsal-fin spines	XII	XII	XII	XII–XIII
Dorsal-fin soft rays	21	21	14	14
Pectoral-fin soft rays	17	17	17	—
Pelvic-fin spines	I	I	I	—
Pelvic-fin soft rays	5	5	5	—
Anal-fin spines	III	III	III	III
Anal-fin soft rays	8	8	7	7–9
Caudal-fin rays	18	17	17–20	—
Gill rakers	5 + 15	—	—	—

Table 2. Morphometric measurements of two new records of *Plectorhinchus macrospilus* and *Pomadasys guoraca* collected in the presently reported study.

Measurements	<i>Plectorhinchus macrospilus</i>	<i>Pomadasys guoraca</i>
	<i>n</i> = 1	<i>n</i> = 3
Total length [mm]	335	148–197
Standard length [mm]	300	116–159
Percentage of standard length		
Body depth	40.0	42.70–49.10
Head length	26.6	32.70–36.80
Inter orbital wide	9.0	7.70–8.20
Pre orbital length	8.3	9.40–10.60
Post orbital length	12.6	13.80–14.70
Eye diameter	7.3	10.06–11.48
Snout length	9.3	44.03–60.34
Caudal peduncle length	14.0	12.30–12.93
Dorsal-fin base length	60.6	55.35–61.48
largest 5 th dorsal-fin length	11.0	16.98–18.03
Pectoral-fin base length	7.0	—
Pectoral-fin length	20.6	29.56–33.61
Pelvic-fin base length	19.6	5.03–5.74
Pelvic-fin length	20.3	22.64–27.05
Anal-fin base length	11.3	15.09–14.75
Anal-fin length	14.3	22.41–22.13
Caudal-fin base length	13.0	11.95–13.11
Caudal-fin length	20.3	30.17–30.30
Pre dorsal length	35.0	—
Pre pectoral length	27.6	—
Pre pelvic length	32.3	—
Pre anal length	60.6	—

others are *Plectorhinchus chaetodonoides*; *Plectorhinchus gaterinus* (Forsskål, 1775); *Plectorhinchus picus* (Cuvier, 1828); *Plectorhinchus pictus* (Thunberg, 1792); and *Plectorhinchus cinctus* (Temminck et Schlegel, 1843). The dark spots of *P. macrospilus* are generally larger than those of the other five species, and *P. macrospilus* also has greater number of dorsal soft rays (21 vs. 15–20 for other species). Subadult *P. chaetodonoides* are similar in coloration to *P. macrospilus* but are easily distinguished by gill raker count (9–12 + 28–33 versus 5 + 15 for *P. macrospilus*).

Distribution. *Plectorhinchus macrospilus* is known to occur from Thailand (Satapoomin and Randall 2000) and Myanmar (Yangon and Myiek Archipelago) (Allen and Erdmann 2012; Russell 2016; Psomadakis et al. 2019). This study confirms its occurrence also in the northern Bay of Bengal.

Conservation status. Not yet assessed, not listed in the IUCN Red List of Threatened Species (<https://www.iucnredlist.org/species/123439745/123494892>).

Haemulinae Gill, 1885 *Pomadasys* Lacepède, 1802

Pomadasys andamanensis McKay et Satapoomin, 1994

English common name: andaman grunt

Local common name: dagi datina (Bangla)

Fig. 2c

Material examined. Bangladesh • 1 specimen; F1803SM-19 (137 mm SL), Cox's Bazar, Bay of Bengal, Saint Martin's Island, 20°36'39.6"N, 92°19'37.2"E, 20 April 2018, Amit Kumer Neogi, GenBank: MK340687.

Diagnostic characters. Meristics: D-XII, 13-14; P₁-18; P₂-I, 5; A-III, 8; C-18; LL-50

Body deep, compressed, depth 2.7 in standard length. Snout rounded, scales extending to nostrils; dorsal mouth small, terminal, without fleshy lips; 2 pores and a median pit on the chin. Lateral line single and complete; total gill rakers on first arch 17. Silvery white with 4 horizontal dark brown stripes on the dorsal half of body; anal fin with a dark brown streak covering anterior two-thirds of the soft-rayed portion (Fig. 2c).

Remarks. *Pomadasys andamanensis* is sometimes confused with *P. furcatus*, but can be distinguished by having four undivided dark brown longitudinal bands versus six to seven longitudinal brown bands in *P. furcatus* that frequently bifurcate anteriorly and after division longitudinally may number 10 thinner bands (Psomadakis et al. 2019).

Distribution. *Pomadasys andamanensis* is known to occur from Phuket Island, Andaman Sea, Thailand (McKay and Satapoomin 1994) and Andaman Sea off Myanmar (Psomadakis et al. 2019). Recently recorded from Saint Martin's Island, Bangladesh (Naznin et al. 2020).

Conservation status. Not yet assessed, not listed in the IUCN Red List of Threatened Species. (<https://www.iucnredlist.org/species/123439745/123494892>)

Pomadasys argenteus (Forsskål, 1775)

English common name: silver grunt

Local common name: rupali datina (Bangla)

Fig. 2d

Material examined. Bangladesh • 1 specimen; F1602Sb-01 (132 mm SL), Alorkol, Sundarbans, Bagerhat, 21°42.35'N, 89°35.24'E, 12 February 2016, Amit Kumer Neogi.

Diagnostic characters. Meristics: D-XII, 14; P₁-I, 16; P₂-I, 5; A-III, 7

Body ovate, compressed, depth 2.7 in standard length. Dorsal profile of head steep, mouth small, maxilla reaching to eye; lips not thickened. Chin with two pores and a median pit. Lateral line with 47 scales; 5 scales between lateral line and dorsal-fin origin. Body color silver-mauve above and white below; scattered charcoal scale spots on back and upper sides; spots only on body, absent on head and snout; snout dark brown (Fig. 2d).

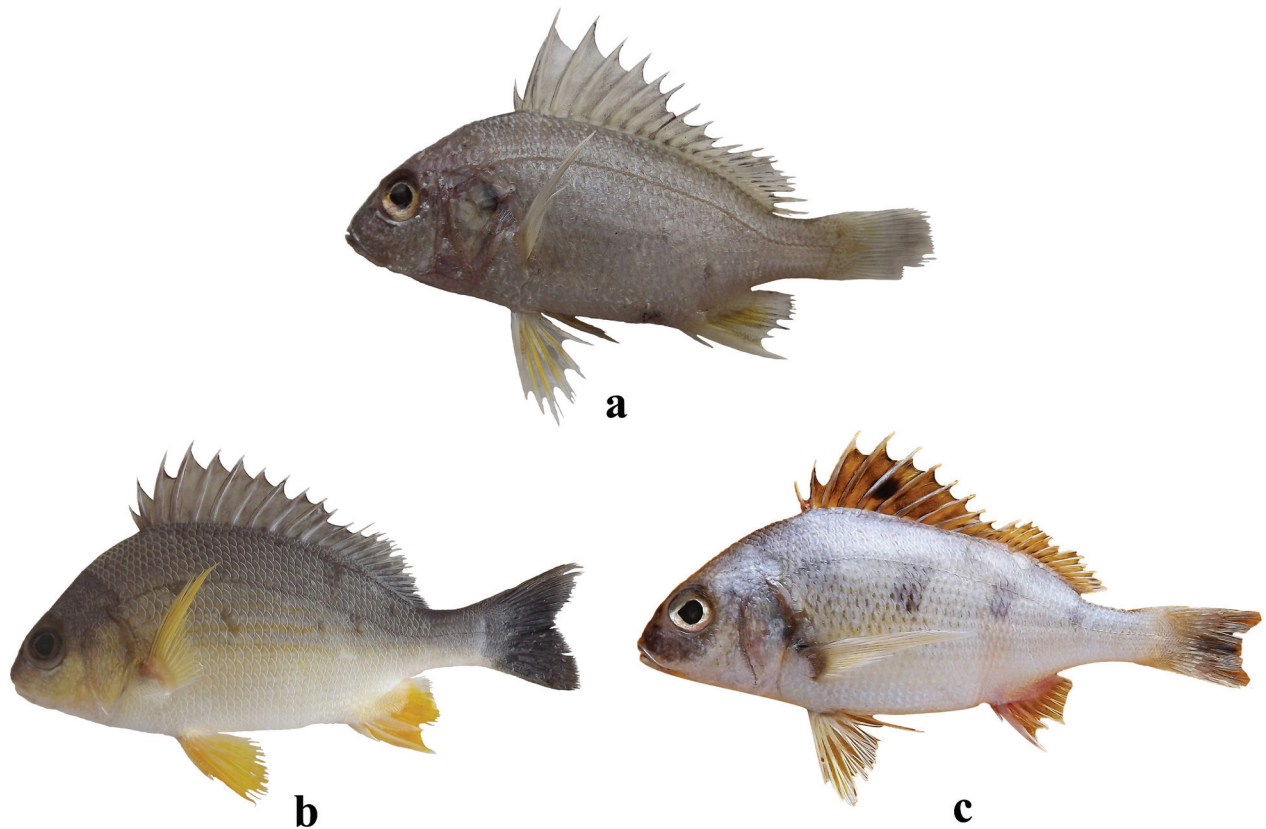


Figure 3. Lateral view of a collected specimen, **a.** *Pomadasys argyreus* (F1712SM-14.; 129 mm SL); **b.** *Pomadasys guoraca* (F1709SM-09; 197 mm SL); **c.** *Pomadasys maculatus* (F1708SM-10; 96 mm SL).

Distribution. *Pomadasys argyreus* is known to occur in Bangladesh (Hussain 1970; Rahman et al. 2009), Myanmar (Hla 1987), and the Andaman and Nicobar Islands (Rajan et al. 2011). Elsewhere in the Indian Ocean from the Red Sea and Persian Gulf (Wright 1988; Randall 1995; Froese and Pauly 2020) and India (Talwar and Jhingran 1991; Bijukumar and Sushama 2000). In the western Pacific from southern Japan (Masuda et al. 1984) and the Philippines to northern Australia (Johnson 2010), and New Caledonia (Thollot 1996).

Conservation status. Listed as ‘Least Concern’ in the IUCN Red List of Threatened Species (Dahanukar et al. 2012).

Pomadasys argyreus (Valenciennes, 1833)

English common name: bluecheek silver grunt

Local common name: rupali datina (Bangla)

Fig. 3a

Material examined. Bangladesh • 1 specimen; F1712SM-14 (129 mm SL), Cox’s Bazar, Bay of Bengal, Saint Martin’s Island, 20°36’39.6’’N, 92°19’37.2’’E, 12 December 2017, Amit Kumer Neogi, GenBank: [MK340688](#).

Diagnostic characters. Fin Formula: D-XII, 13; P₁-I, 14; P₂-I, 5; A-III, 7

Body ovate, laterally compressed, depth 2.4 in standard length; head blunt, upper profile convex; mouth

small; maxilla reaching to eye, lips not thickened; chin with 2 pores and a median pit. Scale on lateral line 47, 5 scale rows between lateral line and dorsal fin origin. Color of body silvery, darker above; fins yellowish-brown; a large blue-black blotch on the operculum (Fig. 3a).

Distribution. *Pomadasys argyreus* is known to occur in Bangladesh (Hussain 1970), elsewhere in Indo-West Pacific: Pakistan, India, Sri Lanka eastward to Southeast Asia and south to Papua New Guinea (McKay 2001; Psoomadakis et al. 2015; Froese and Pauly 2020).

Conservation status. Listed as ‘Least Concern’ in the IUCN Red List of Threatened Species (Al Abdali et al. 2019).

Pomadasys guoraca (Cuvier, 1829)

English common name: silver-grunt

Local common name: rupali datina (Bangla)

Fig. 3b

Material examined. Bangladesh • 3 specimens; F1709SM-08 (156 mm SL), Cox’s Bazar, Bay of Bengal, Saint Martin’s Island, 20°36’39.6’’N, 92°19’37.2’’E, 29 September 2017, Amit Kumer Neogi, GenBank: [MK340689](#); F1709SM-09 (148 mm SL), Cox’s Bazar, Bay of Bengal, Saint Martin’s Island, 20°36’39.6’’N, 92°19’37.2’’E, 29 September 2017, Amit Kumer Neogi, GenBank: [MK340690](#); F1710SM-03 (197 mm SL),

Cox's Bazar, Bay of Bengal, Saint Martin's Island, 20°36'39.6"N, 92°19'37.2"E, 20 October 2017, Kazi Ahsan Habib, GenBank: [MK340691](#).

Diagnostic characters. Meristics: D-XII, 14; P₁-17; P₂-I, 5; A-III, 7; C-18-20; LL-52-53

Body elongate and compressed, rounded; eye diameter 3.3 in head length; snout 0.7 in head length. Mouth small, lips slightly thick. Maxilla extending below front edge of eye. Villiform teeth. Scales ctenoid. Body silvery, slightly darker on back. Yellow stripes present below lateral line. Dorsal fin silvery; pectoral, pelvic and anal fin yellowish; caudal fin black with white edge (Fig. 3b). Meristic measurements are given in Table 1 and Table 2.

Remarks. *Pomadasys guoraca* is distinguished from the related species, *Pomadasys aheneus* McKay et Randall, 1995, by having yellow stripes below lateral line (vs. no stripes); yellow anal and paired fins (vs. dusky anal and paired fins); caudal fin dusky with narrow white margin (vs. caudal fin dusky without white margin).

Distribution. *Pomadasys guoraca* is known to occur on the eastern coast of Africa, Oman, Thailand, Philippines, Madagascar (Roux 1986; Stiassny and Ramino-soa 1994; GBIF 2020; Froese and Pauly 2020; Orrell 2020), Sri Lanka (Orrell 2020), Andaman and Nicobar Islands (Rajan et al. 2011), India (Talwar and Kacker 1984). This study confirms the occurrence of this species in the northern Bay of Bengal, Bangladesh for the first time.

Conservation status. Listed as 'Least Concern' in the IUCN Red List of Threatened Species (Borsa et al. 2019).

Pomadasys maculatus (Bloch, 1793)

English common name: saddle grunt

Local common name: guti datina (Bangla)

Fig. 3c

Material examined. Bangladesh • 4 specimens; F1602sb-38-2 (91 mm SL), Alorkol, Sundarbans, Bagerhat, 21°42.35'N, 89°35.24'E, 10 February 2016, Amit Kumer Neogi, GenBank: [MF588665](#); F1708SM-10 (96 mm SL), Cox's Bazar, Bay of Bengal, Saint Martin's Island, 20°36'39.6"N, 92°19'37.2"E, 29 August 2017, Amit Kumer Neogi, GenBank: [MK340692](#); F1708SM-11 (98 mm SL), Cox's Bazar, Bay of Bengal, Saint Martin's Island, 20°36'39.6"N, 92°19'37.2"E, 20 August 2017, Kazi Ahsan Habib, GenBank: [MK340693](#); FCC1901SB-14 (101 mm SL), Cox's Bazar, Bay of Bengal, Saint Martin's Island, 20°36'39.6"N, 92°19'37.2"E, 20 January 2019, Md. Jayedul Islam, GenBank: [MN458364](#).

Diagnostic characters. Meristics: D-XII, 14; P₁-17; P₂-I, 5; A-III, 7; C-18

Body compressed; head blunt and dorsal profile convex; mouth small and slightly oblique; maxilla reaching to eye; narrow bands of small pointed teeth in the jaws. Scales ctenoid, moderate; present on head excluding snout. Chin with two pores and a median pit. Lateral line

slightly arched. Body color silvery white, nape and back with a series of incomplete variable cross bars on the upper half of the body; spinous dorsal fin large with black blotch; dorsal and caudal fins edged with black, other fins yellowish (Fig. 3c).

Distribution. *Pomadasys maculatus* is reported in Bangladesh; elsewhere from east coast of Africa, Madagascar, Red Sea, Gulf of Aden, Persian Gulf, Pakistan, India, Sri Lanka to northern half of Australia from Shark Bay to Moreton Bay, New Guinea, Philippines to southern Japan (McKay 2001; Habib et al. 2020).

Conservation status. Listed as 'Least Concern' in the IUCN Red List of Threatened Species (Collen et al. 2010).

Genetic description. We successfully barcoded six of the seven collected grunt species viz. *Plectorhinchus macrospilus*, *Plectorhinchus pictus*, *Pomadasys andamanensis*, *Pomadasys argyreus*, *Pomadasys guoraca*, and *Pomadasys maculatus*, and submitted to GenBank (NCBI) and BOLD system. The COI sequences of *Plectorhinchus macrospilus*, *Pomadasys andamanensis*, and *Pomadasys guoraca* were submitted for the first time to GenBank as reference DNA barcode sequence. We identified 11 COI barcode sequences of 6 species. For *Pomadasys argenteus*, we were unable to obtain a clear sequence. Sequence alignment of COI gene yielded about 602 nucleotide base pairs after removing the ambiguous sequences near primer ends. The COI sequences of 11 individuals of 6 species comprised 11 haplotypes with 174 polymorphic sites. The estimated mean ratio of transition and transversion was 2.88. The sequence analysis revealed that the mean nucleotide compositions in 11 COI sequences of 6 species were A = 22.5% ± 0.52%, T = 28.11% ± 0.59%, C = 30.45% ± 0.63%, G = 18.95% ± 0.71%. The overall GC content was 49.39%. The nucleotide diversity was calculated as 0.134 and the haplotype diversity was 1.0 for the sequences. The mean interspecific distance was 23.4% among the six species studied. The overall genetic distance among the sequences of COI gene was 16.3%. Among the six grunt species of the presently reported study, the highest pairwise genetic distance was found as 23.36% between *Plectorhinchus pictus* and *Pomadasys argyreus*, and the lowest distance (9.9%) was found between *Plectorhinchus macrospilus* and *Plectorhinchus pictus*.

In the phylogeny, we used 11 COI sequences of six species obtained in the presently reported study and three other sequences of *Pomadasys maculatus*, *Pomadasys argyreus*, and *Plectorhinchus pictus* retrieved from GenBank. The phylogenetic tree showed six clades, each belonging to the separate species (Fig. 4). No valid conspecific sequence of *Plectorhinchus macrospilus*, *Pomadasys andamanensis*, and *Pomadasys guoraca* was found in GenBank for comparison. However, the COI sequence of these three species clearly formed three separate clades from other species of grunt in the constructed ML tree with over 90% bootstrap value.

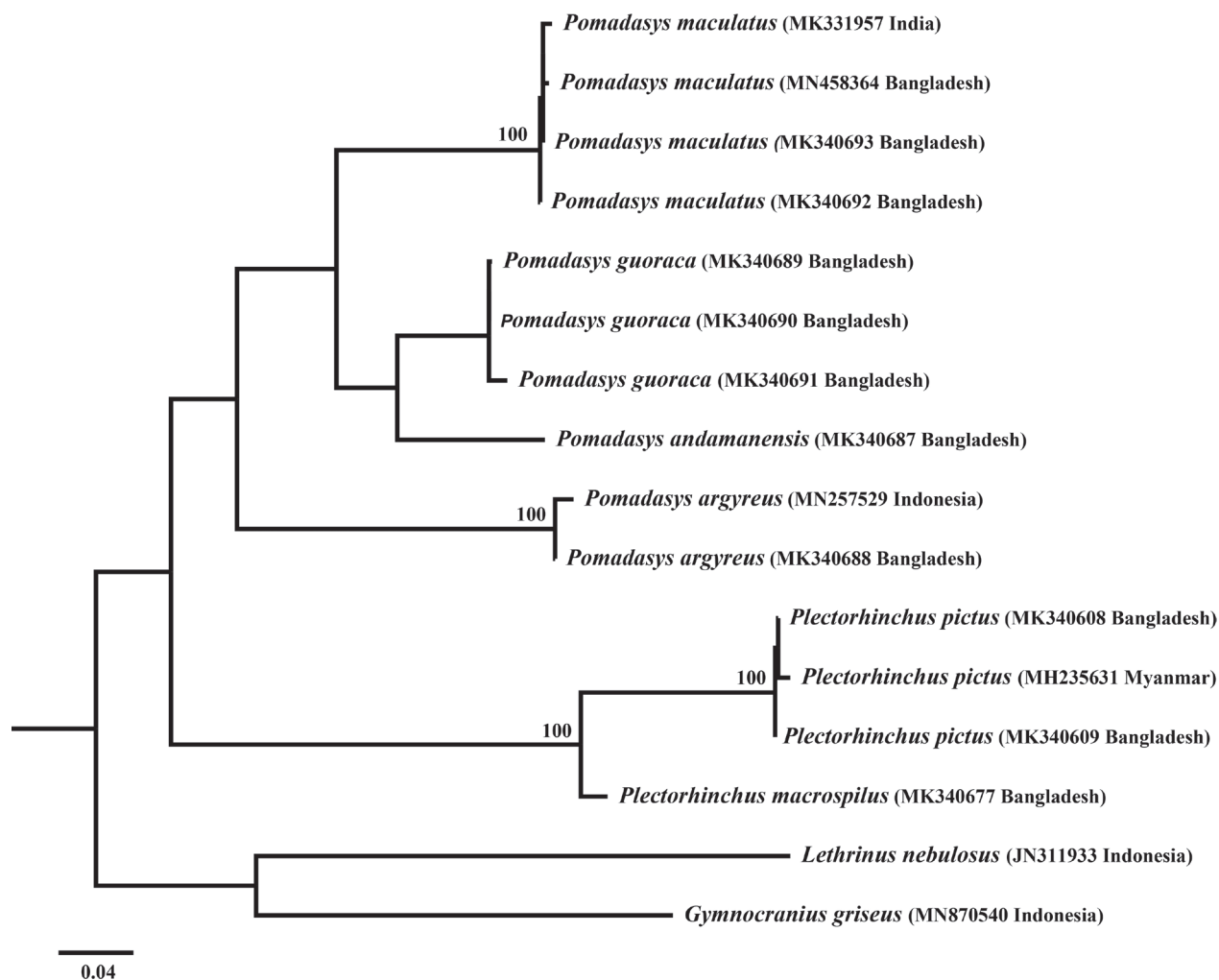


Figure 4. Maximum-likelihood tree constructed for COI barcode sequences of grunt species obtained in the presently reported study (Bangladesh) and for conspecifics reported in GenBank. The GenBank accession numbers and country of origin are given within parenthesis beside species name. Numbers on nodes represent support values for Maximum-Likelihood (bootstrap). Bootstrap support of >70% are shown above branches. Scale bar indicates number of nucleotide substitutions per site. Sequences of *Lethrinus nebulosus* and *Gymnocranius griseus* were used as outgroups.

Discussion

Grunts are one of the most commercially important fish groups in Bangladesh. Ten species of haemulids were previously recorded from Bangladeshi marine waters (Hussain 1970; Rahman et al. 2009; Thompson and Islam 2010; Baki et al. 2017; Fanning et al. 2019; Habib and Islam 2020; Naznin et al. 2020). Recent studies on the identification of haemulid species in Bangladesh (Baki et al. 2017; Fanning et al. 2021) were conducted mainly by morphological analysis, and except for the work of Naznin et al. (2020), genetic analysis using DNA barcoding (Floyd 2002; Tautz 2003; Ward 2005) was not applied. Our study is the first attempt to identify the grunts (Haemulidae) of Bangladesh based on both morphology and DNA Barcoding.

In the presently reported study, we identified seven species of grunts, confirmed by morphology and DNA barcoding. Among these, two species (viz.

Pomadasys guoraca and *Plectorhinchus macrospilus*) were not previously recorded from Bangladesh.

Pomadasys guoraca is widely distributed in the Indo-West Pacific from the east coast of Africa to the Philippines (Roux 1986). Recently, this species was reported from Andaman and Nicobar Islands, the eastern boundary of the Bay of Bengal (Rajan et al. 2011). Previously, the species was not reported in the marine waters of Bangladesh: our record of *P. guoraca* from Saint Martin's Island of Bangladesh has confirmed its distribution in the northern Bay of Bengal.

Plectorhinchus macrospilus was previously known only from the Andaman Sea, off south-western Thailand (Satapoomin and Randall 2000). More recent studies also recorded it from Yangon and the Myiek Archipelago of the Andaman Sea (Allen and Erdmann 2012; Russell 2016). Our study extends the range of *P. macrospilus* from the Andaman Sea into the northern Bay of Bengal.

Table 3. Grunt species (Actinopterygii: Perciformes: Haemulidae) recorded from Bangladesh.

English common name	Scientific name	References	IUCN Red List status
Painted sweetlips	<i>Plectorhinchus pictus</i> (Thunberg, 1792)	Hussain 1970 Rahman et al. 2009 This study	Not yet assessed
Crescent sweetlips	<i>Plectorhinchus cinctus</i> (Temminck et Schlegel, 1843)	Hussain 1970 Rahman et al. 2009	Not yet assessed
Largespot sweetlip	<i>Plectorhinchus macrospilus</i> Satapoomin et Randall, 2000	This study	Not yet assessed
Indian Ocean oriental sweetlips	<i>Plectorhinchus vittatus</i> (Linnaeus, 1758)	Hussain 1970 Rahman et al. 2009	Least Concern
Andaman grunt	<i>Pomadasys andamanensis</i> McKay et Satapoomin, 1994	Naznin et al. 2020 This study	Not yet assessed
Silver grunt	<i>Pomadasys argenteus</i> (Forsskål, 1775)	Hussain 1970 Rahman et al. 2009 This study	Least Concern
Bluecheek silver grunt	<i>Pomadasys argyreus</i> (Valenciennes, 1833)	Hussain 1970 This study	Least Concern
Banded grunter	<i>Pomadasys furcatus</i> (Bloch et Schneider, 1801)	Baki et al. 2017	Least Concern
Silver-grunt	<i>Pomadasys guoraca</i> (Cuvier, 1829)	This study	Least Concern
Javelin grunter	<i>Pomadasys kaakan</i> (Cuvier, 1830)	Baki et al. 2017	Not yet assessed
Saddle grunt	<i>Pomadasys maculatus</i> (Bloch, 1793)	Hussain 1970 Tomascik 1997 This study	Least Concern
Cock grunter	<i>Pomadasys multimaculatus</i> (Playfair, 1867)	Fanning et al. 2019	Least Concern

Two previously recorded species, *Plectorhinchus cinctus*, reported by Hussain (1970) and *Plectorhinchus vittatus* (Linnaeus, 1758), reported by Rahman et al. (2009), were not found in the presently reported survey. Based on other valid reports, we have compiled an updated list of grunts found in Bangladesh (Table 3) which brings the total known species to 12, including the two species newly recorded here. The conservation status of Bangladesh species of grunts also is included in Table 3. Of those species included in the IUCN Red List of threatened species, all those assessed are listed as ‘Least Concern’, but assessments of five species from Bangladesh remain to be published. Further research may reveal additional species of haemulids in Bangladeshi marine waters.

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Conflict of interest

The authors declare that they have no conflict of interest.

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