TWENTY-THREE NEW RECORDS OF COMMERCIAL FISH SPECIES (ACTINOPTERYGII) FROM THE SOCOTRA ARCHIPELAGO (NORTH-WESTERN INDIAN OCEAN)

Sergey V. Bogorodsky*, 1, 2, Fouad N. Saeed 3, and Uwe Zajonz 1

1 Senckenberg Research Institute and Museum of Nature (SMF), Section Ichthyology and Senckenberg Biodiversity and Climate Research Centre (SBiK-F), Biogeography, Frankfurt am Main, Germany
2 Station of Naturalists, Omsk, Russia
3 Environmental Protection Authority, Socotra Branch, Hadibo, Yemen


Abstract. The Socotra Archipelago is recognized globally as a UNESCO World Heritage Site. The unique ichthyofauna of Socotra accumulates fish species from different ecoregions, including commercial species which represent an important part of the local fishery. Positive identification of fish species and knowledge of their distributions are important for management strategies in fisheries and biodiversity conservation. Commercial fish species were collected at sea, taken from fish markets or landing sites, or observed underwater during two field trips in 2018 and 2019. Twenty-three new records of commercial fish species from twelve families are reported from the Socotra Archipelago based on collections and/or photographs: Plicomugil labiosus (Valenciennes, 1836); Epinephelus magniscutis Postel, Fourmanoir et Guézé, 1963; Epinephelus marginatus (Lowe, 1834); Epinephelus morrhua (Valenciennes, 1833); Epinephelus rivulatus (Valenciennes, 1830); Alectis indica (Rüppell, 1830); Carangoides fulvoguttatus (Forsskål, 1775); Parastromateus niger (Bloch, 1795); Selar crumenophthalmus (Bloch, 1793); Uraspis helvola (Forster, 1801); Gerres oblongus (Cuvier, 1830); Etelis coruscans (Valenciennes, 1862); Diplodus omanensis (Bauchot et Bianchi, 1984); Polysteganus coeruleopunctatus (Klunzinger, 1870); Lethrinus crocineus (Smith, 1959); Gymnocranius elongatus Senta, 1973; Gymnocranius sp.; Wattsia mossambica (Smith, 1957); Argyrosomus japonicus (Temminck et Schlegel, 1843); Umbrina robinsoni (Gilchrist et Thompson, 1908); Polydactylyus plebeius (Broussonet, 1782); Histiopterus typus (Temminck et Schlegel, 1844); and Siganus sutor (Valenciennes, 1835). The presence of the following three species are confirmed for Socotra Archipelago: Epinephelus malabaricus (Bloch et Schneider, 1801); Pristipomoides filamentosus (Valenciennes, 1830); and Sphyraena obtusata (Cuvier, 1829). The following species represent the first verified records for the Arabian region: Epinephelus magniscutis, Etelis coruscans, Lethrinus crocineus, Wattsia mossambica, and Gymnocranius sp. Species of two families, Sciaenidae and Polynemidae are reported for Socotra for the first time. Information on each species’ identification and its distribution are provided. Twenty-three commercial species new for the Socotra Archipelago were reported in this study, as a result, a total of about 255 species of fish are considered as exploited in the local small-scale fishery.

Keywords: bony fishes, taxonomy, distribution, fishery, Arabian region

INTRODUCTION

The Socotra Archipelago lies in the north-western corner of the Indian Ocean between 53°0′–54°35′E and 12°5′–12°43′N (Fig. 1). The Archipelago includes the main island of Socotra, three smaller islands Darsa, Samha, Abd al-Kuri, and two islets Sabuniya and Kal Farun. The westernmost island Abd al-Kuri is separated from mainland Africa (Somalia) by the Socotra Passage, a narrow strip of water only 95 km wide, and the eastern tip of Socotra Island is separated by a distance of 330 km from the nearest point at mainland Arabia (Yemen, Ras Fartak). The Archipelago is recognized globally for its outstanding universal values, including unique patterns of biodiversity, which led to the designation of the entire island group as a UNESCO World Heritage Site in 2008 (Scholte et al. 2011). Situated at the junction between the Gulf of Aden and the Arabian Sea, the Archipelago forms the center of a region with relatively poorly known coastal and marine faunas.

In the late 19th century, the Socotra Archipelago was the subject of a series of scientific expeditions, led by

*Correspondence: S.V. Bogorodsky, Station of Naturalists, Omsk, Russia, e-mail: (SVB) ic187196@yandex.ru, (FNS) soc.nmbdpame@gmail.com, (UZ) uzajonz@senckenberg.de, eco-coasts@web.de, ORCID: (SVB) 0000-0002-8679-9735.
Balfour in 1880, by Riebeck and Schweinfurth in 1881, by Forbes and Ogilvie-Grant in 1897–1898, and by Paulay and Simony in 1898. Fishes were sampled for the first time on Socotra Island during the German expedition of Riebeck and Schweinfurth in 1881–1882 (Taschenberg 1883). Zajonz et al. (2019) comprehensively summarized all published and their own data and provided a preliminary list of 682 species recorded for Socotra Archipelago and a working list of additional 51 records referred to as Operational Diversity Units (see Zajonz et al. 2019: 104, Annex 2) requiring further confirmation. The total archipelagic richness was estimated by these authors at up to 875 species of coastal fishes.

Fishing used to be the second-most important source of income and food for the islanders after the pastoralist economy (Cheung and DeVantier 2006, Mehring et al. 2017). There are very productive small-scale and industrial-scale fishing activities around the Archipelago that supply both domestic and commercial demand. The small-scale fishery operates from >80 coastal villages (on Socotra, Samha, and Abd al-Kuri) over the continental slope, using either fiber-glass skiffs called ‘houri’ or larger ‘sambuq’. Socotri fishers target shallow demersal and “reef” fishes, rock lobster, and sea-cucumber inshore, and large pelagic fishes, including sharks, and some deep demersal species offshore. The background and the current status of Socotra’s commercial fisheries are provided by Zajonz et al. (2016).

Recent field works, one in spring 2018 on the main island Socotra, and one in spring 2019 covering Socotra Island and the three outer islands Abd al-Kuri, Samha, and Darsa, and additional efforts by the second, resident author, yielded additional faunistic records. The present article reports twenty-three species of commercial fishes for the first time from the Archipelago, eight species from Abd al-Kuri Island, and fifteen species from Socotra Island, thus expanding the list of commercial fishes of Socotra substantially. In addition, the occurrence of three commercial species was confirmed.

Information on the source of each new record is provided, as well as species-specific characters for identification, photographs of freshly collected specimens or underwater photographs, and information on the record depth (if available) and the known depth range of the species. In addition, detailed information on the general distribution of the species is included, especially with regard to their distribution in the Arabian region. A map of the marine area of the Socotra Archipelago showing main localities is provided in Fig. 1.

**MATERIALS AND METHODS**

The majority of the recorded specimens were observed and/or collected during two survey trips to the Socotra Archipelago conducted for the project ‘Support to the Integrated Programme for the Conservation and Sustainable Development of the Socotra Archipelago, Yemen’, co-executed by the Senckenberg Biodiversity and Climate Research Centre (SBiK-F) and the Environment Protection Authority of Yemen (EPA) for the United Nations Environment Programme (UNEP) based on funds of the Global Environment Facility (GEF #5347). The EPA also issued the research and export permit. The first fieldwork took place from 23 April to 21 May of 2018 and the second from 21 March to 23 April 2019. Additional records were made by the second author (FNS) who is a resident on Socotra and staff of the same project. The bulk of the collected specimens were preserved in 4–6% formalin and examined by authors at the Senckenberg Field Research Station and the project center in Hadibo, where the material is temporarily stored. It has not yet been possible to export the specimens to the Senckenberg Research Institute and Museum of Nature, Frankfurt am
Mugilidae Jarocki, 1822

**Plicomugil labiosus** (Valenciennes, 1836)

Thicklip mullet

(Fig. 2)

*Histiopterus typus* (Forsskål, 1775), sharing a thickened upper lip, but the lip covered with small papillae at edge of lip, no folds on lip, and the lower lip possesses a distinct fringed edge. In addition, *C. crenilabis* has cycloid scales with crenulate membranous edge, 36–42 in longitudinal series; preorbital weakly concave on serrate anterodorsal edge, not kinked; and posterior end of maxilla concealed by preorbital when mouth is closed.

**Distinctive characters.** *Plicomugil labiosus* is characterized by having a robust body covered with finely ctenoid scales, its depth 3.3–3.7 in SL; upper lip very thick, with a deep fold near its ventral edge, splitting it into lobes, lower lip thin, both lips fringed with small ridges of horny epidermal tissue; preorbital very deeply notched, only its rounded ventral edge serrate, posterior end broad and squarish; posterior part of maxilla slender, curved downward, exposed below preorbital when mouth closed; origin of second dorsal fin below posterior one-fourth of anal fin; adipose tissue around eye and pectoral-fin axillary scale absent. Meristic values: dorsal-fin spines and rays IV + 8–9; anal-fin spines and rays III,9; longitudinal scale series 32–37; scales in transverse series 11–12; circumpeduncular scales 16.

**Coloration.** Silvery gray dorsally, shading to silvery on sides and ventrally, with a distinct small black spot at upper base of pectoral fins.

**Distribution.** Ranges from the Arabian region south to Madagascar, east to the Marshall and Samoan Islands (Senou 1999). The original description is based on specimens from the Red Sea and from the eastern part of the Arabian Sea (Mumbai). In addition, it is reported in the Arabian region from Gulf of Tadjoura (Lips et al. 2016), Gulf of Oman (Randall 1995), and the Gulf, United Arab Emirates (UAE) (Froese and Pauly 2019).

**Remarks.** The examined specimen matches the morphological and color description of *Plicomugil labiosus* provided by Senou (1999, as *Oedalechilus labiosus*). Meristic characters fall within the diagnostic range of values for this species: 8 and 9 rays in the second dorsal fin and anal fin, respectively, 35 scales in longitudinal series, 12 scales in transverse series, and 16 circumpeduncular scales. The examined specimen was obtained from Hadibo fish market without precise collection data on locality and habitat. Elsewhere the species is found in shallow coastal marine waters of variable habitat in the depth range 1–25 m. Usually classified in the genus *Oedalechilus* together with the eastern Atlantic Ocean species *O. laboe* (Cuvier, 1829), both species possess a deeply notched preorbital. Ben-Tuvia (1975), who reviewed Red Sea species of the family, placed the species in the monotypic genus *Plicomugil*, supported by molecular data (Durand et al. 2012). Lavergne et al. (2016) reported ten species of mugilids from estuaries and lagoons in Socotra but no *Plicomugil labiosus* was mentioned. Additional observations are needed to elucidate the importance of this species in the commercial and subsistence fisheries of Socotra.

The most similar species to *Plicomugil labiosus* is *Crenimugil crenilabis* (Forsskål, 1775), sharing a thickened upper lip, but the lip covered with small papillae at edge of lip, no folds on lip, and the lower lip possesses a distinct fringed edge. In addition, *C. crenilabis* has cycloid scales with crenulate membranous edge, 36–42 in longitudinal series; preorbital weakly concave on serrate anterodorsal edge, not kinked; and posterior end of maxilla concealed by preorbital when mouth is closed.
Serranidae Swainson, 1839

*Epinephelus magniscuttis* Postel, Fourmanoir et Guézé, 1963

Speckled grouper

(Fig. 3A)


**Material examined.** SMF uncatalogued, 1 specimen, 45 cm SL, Socotra Archipelago, Abd al-Kuri Island, 27 March 2019.

**Distinctive characters.** *Epinephelus magniscuttis* is characterized by having a moderately robust body, its depth 2.7–3.6 in SL; interspinous membranes incised; caudal fin rounded. Meristic values: dorsal-fin spines and rays XI,14–15; anal-fin spines and rays III,8; lateral-line scales 55–62; gill rakers 8–9 + 15–17.

**Coloration.** Pale brown with small black spots on postorbital head, upper part of body, dorsal fin and upper half of caudal fin; a black streak at upper edge of upper jaw.

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**Fig 2.** *Plicomugil labiosus*, SMF uncatalogued, 16.5 cm SL, Hadibo fishmarket, Socotra Island; lateral view (A); head close-up (B)
23 new fish records from Socotra

**Distribution.** Reported from scattered localities, including Socotra Archipelago, South Africa (KwaZulu-Natal), Mozambique, Réunion, Mauritius, southern Japan, the Philippines, New Caledonia and Tonga (summarized by Nakamura et al. 2018, present study). No prior records from the Arabian region are known (Manilo and Bogorodsky 2003).

**Remarks.** A single large grouper was obtained from a fishing boat at Abd al-Kuri Island without collection details. The features of the specimen closely match the diagnostic features of *Epinephelus magniscuttis* given by Heemstra and Randall (1993) and Craig et al. (2011), including body depth 3.0 in SL, 14 soft rays in dorsal fin, and gill rakers 9 + 16, and the coloration. Elsewhere the species inhabits deep rocky reefs and is reported from depths of 50–300 m. *Epinephelus magniscuttis* is rare in taxonomic collections, yet not included in IUCN Red List Assessments.

Smith and Craig (2007) have proposed to elevate the subfamily Epinephelinae to the family level, followed by Ma and Craig (2018) who based on summarized molecular data maintain the Epinephelidae at the family rank, but it is not accepted by some authors (Betancur-R et al. 2017, Parenti and Randall 2020). Until this taxonomic issue is resolved the present authors prefer to follow Parenti and Randall (2020) and Eschmeyer’s Catalogue of Fishes (Fricke et al. 2020) who retain the Epinephelinae as well as Anthiidae and Serraninae within a large family Serranidae. Ma and Craig (2018) also revised the generic classification of groupers based on molecular data and moved several deep-water species of *Epinephelus* in *Mycteroperca*. *Epinephelus magniscuttis* was listed by Ma and Craig (2018) in *Epinephelus*, later Johnson and Worthington Wilmer (2019) demonstrated that *E. magniscuttis* is closely related to *E. epistictus* (Temminck et Schlegel, 1842) and *E. fuscomarginatus* Johnson et Worthington Wilmer, 2019. These three species can be placed in *Mycteroperca* sensu Ma and Craig (2018), but Johnson and Worthington Wilmer (2019) retained these species though in *Epinephelus* until a revision of all deep-water species is available, including those which are suspected to belong to *Mycteroperca*. *Epinephelus epistictus* is reported from Socotra (Zajonz et al. 2019) and very similar to *E. magniscuttis*, whereby Indian Ocean specimens of that species differ from the latter by having white margin of the soft portion of the dorsal and anal fins, and the upper and lower corners of the caudal fin.

*Epinephelus malabaricus* (Bloch et Schneider, 1801)

Malabar grouper

(Fig. 3B)

*Holocentrus malabaricus* Bloch et Schneider, 1801: 319; holotype: ZMB 190; type locality: Tranquebar, now Tharangambadi, India.

**Material examined.** Underwater photograph, Socotra Island, Di Hamri, 5 m depth, 24 April 2018.

**Distinctive characters.** *Epinephelus malabaricus* is characterized by having a moderately elongate body, its depth 3.0–3.6 in SL; interspinous membranes incised; caudal fin rounded. Meristic values: dorsal-fin spines and rays XI,14–15; anal-fin spines and rays III,8; lateral-line scales 54–64; gill rakers 8–11 + 14–18.

**Coloration.** Light grayish brown, with five slightly oblique broad dark brown bars on body that bifurcate ventrally and which contain pale areas colored like body; head, body and fins with many small black spots.

**Distribution.** Reported from the Arabian region, along the east coast of Africa south to Madagascar, east to southern Japan, Australia (South New Wales) and Tonga (Heemstra and Randall 1993). Reported in the wider Arabian region from the Red Sea (Lieske and Myers 2004), Gulf of Tadjoura (Lips et al. 2016), Somalia (Sommer et al. 1996), Arabian Sea coast of Oman and Gulf of Oman (Randall 1995), and Pakistan (Psomadakis et al. 2015). There is a single record from the Gulf in Iraq waters by Al-Mukhtar et al. (2012) based, however, on a photograph of a very low quality which is unsuitable for positive identification.

**Remarks.** Zajonz et al. (2019) tentatively included the species as *Epinephelus cf. malabaricus* based on visual observation. A single large individual was photographed resting on a large patch of silty sand mixed with scattered small stones in a coral-reef area at Di Hamri at a depth of 5 m. The observed individual closely matches the diagnostic features of *E. malabaricus* provided by Heemstra and Randall (1993) and Craig et al. (2011), hence its occurrence on Socotra is now confirmed by the present record. The species usually was found from depths of 2–40 m, with the deepest confirmed record for this species in 250 m depth (Heemstra and Randall 1993). Kohno et al. (1988) noted that this grouper is regarded as highly esteemed food fish and most desirable for aquaculture. *Epinephelus malabaricus* is included in IUCN Red List Assessments and requires conservation management (Samoilys et al. 2018), as underscored by its rarity on Socotra. *Epinephelus coioides* (Hamilton, 1822) is a very similar species but differs by having orange-red and dark brown spots and lacking white blotches within dark bars.

*Epinephelus marginatus* (Lowe, 1834)

Dusky grouper

(Fig. 3C)

*Serranus marginatus* Lowe, 1834: 142; neotype: MMF 3388; type locality: off Madeira.

**Material examined.** 1 specimen, not preserved [sample of tissue SOC18-270], 48 cm SL, Socotra Island, landing site at Hadibo, 7 May 2018; underwater photograph, Socotra Island, Ras Bidou, 14 m depth, 18 April 2019.

**Distinctive characters.** *Epinephelus marginatus* is characterized by having a moderately deep body, its depth 2.6–3.1 in SL; interspinous membranes incised; caudal fin truncate. Meristic values: dorsal-fin spines and rays XI,15–16; anal-fin spines and rays III,8; lateral-line scales 62–73; gill rakers 8–10 + 14–16.

**Coloration.** Grayish brown dorsally, yellow ventrally on head and body, on outer margin of spinous portion of dorsal fin and base of pectoral fin; usually irregular pale gray blotches of variable size on head and body.
Fig 3. *Epinephelus magniscutis*, SMF uncatalogued, 45 cm SL, Abd al-Kuri Island, Socotra Archipelago (A); *Epinephelus malabaricus*, underwater photograph, Di Hamri, Socotra Island, 5 m depth (B); *Epinephelus marginatus*, underwater photograph, Ras Bidou, Socotra Island, 14 m depth (C)
**Distribution.** Occurs in the Atlantic Ocean, Mediterranean Sea and Western Indian Ocean where it is reported from South Africa and Madagascar (Heemstra and Randall 1993). In the Arabian region previously reported only from southern Oman (Randall 1995, Béarez et al. 2020).

**Remarks.** The observed individual closely matched the distinctive characters of *Epinephelus marginatus* provided by Heemstra and Randall (1993) and Craig et al. (2011). Pollard et al. (2018) doubted the record of the species from southern Oman as waifs or misidentification but the record from southern Oman was confirmed by the collection of two specimens from Salalah fish market (Béarez et al. 2020). A sample of tissue was taken from one large specimen obtained on Hadibo fish market, and the molecular analysis places its sequence of the COI gene within other positively identified specimens from the entire distribution range of *E. marginatus* (see B. Victor et al., in prep.), thus confirming the presence of the species in southern Arabia. In addition, one individual of this species was photographed under water in a rocky area at Ras Bidou under a deep overhang at a depth of 14 m. The depth range is given by Heemstra and Randall (1993) from shallow water to depths of 50 m, and by Pollard et al. (2018) from 0 to 300 m. *Epinephelus marginatus* is included in IUCN Red List Assessments as vulnerable species and requires conservation management (Pollard et al. 2018), as underscored by its rarity on Socotra.

Zajonz et al. (2019) listed *Epinephelus* cf. *indistinctus* Randall et Heemstra, 1991 that can be confused with large specimens of *E. marginatus* but the former differs by having a uniform dark brown body and fins, fewer soft dorsal-fin rays (14) and by having bony platelets on gill arches.

**Epinephelus morrhua** (Valenciennes, 1833)

*Comet grouper*  
(Fig. 4A)

*Serranus morrhua* Valenciennes in Cuvier et Valenciennes, 1833: 434; holotype: MNHN 0000-7431; type locality: Mauritius.

**Material examined.** SMF uncatalogued [sample of tissue SOC18-327], 1 specimen, 30 cm SL, Socotra Archipelago, Abd al-Kuri Island, ~80 m depth, 27 March 2019.

**Distinctive characters.** *Epinephelus morrhua* is characterized by having a moderately deep body, its depth 2.9–3.1 in SL; interspinous membranes incised; caudal fin moderately rounded. Meristic values: dorsal-fin spines and rays XI,14–15; anal-fin spines and rays III,8; lateral-line scales 55–64; gill rakers 8–10 + 15–18.

**Coloration.** Grayish brown with a curving dark yellowish brown band on upper half of head and body which divided into branches below the dorsal fin and small dark brown spots in between, and another oblique dark brown band from eye continuing on ventral half of body (sometimes broken into segments); median fins usually yellowish.

**Distribution.** Reported from the Arabian region, the east coast of Africa and islands of the Western Indian Ocean, east to Mariana and Cook Islands (Heemstra and Randall 1993). In the Arabian region reported from the Red Sea (Heemstra and Randall 1993) and Gulf of Tadjoura (Lips et al. 2016). Psomadakis et al. (2015) included the species in their catalog of fishes of Pakistan, yet without photographic evidence.

**Remarks.** The examined specimen matches the morphological and color description of *Epinephelus morrhua* provided by Craig et al. (2011). The single specimen was caught by hook-and-line off Abd al-Kuri Island at a depth of ~80 m on a steep slope. It has a robust body with its depth 2.9 in SL, 14 soft dorsal-fin rays, 61 lateral-line scales and 9 + 16 gill rakers. *Epinephelus morrhua* is included in IUCN Red List Assessments and requires conservation management (Barreiros 2018). The *Epinephelus morrhua* species-complex includes four deep-water groupers that share essentially the same meristic data and general morphology, including also *E. poecilonotus* (Temminck et Schlegel, 1842), *E. radiatus* (Day, 1868) and *E. tuamotensis* Fourmanoir, 1971 (see Craig et al. 2011). The former two species are reported from Socotra Archipelago (Zajonz et al. 2019) and can be distinguished as follows. Large adults of *E. poecilonotus* are grayish brown with two dark brown stripes radiating obliquely behind orbit, outer part of interspinous dorsal-fin membranes yellow and posterior margin of caudal fin pale; smaller adults with a dark brown inverted arc on back below spinous portion of dorsal fin and a series of small dark brown spots forming oblique lines on upper part of body. Adults of *Epinephelus radiatus* are yellowish brown, with five irregular oblique, dark-edged, brown bands that bifurcate ventrally, and small dark brown spots in pale interspaces between bands, and basally on dorsal and caudal fins; head with a dark brown line across upper part of cheek and a faint brown band extending from above middle of upper jaw to margin of opercle.

**Epinephelus rivulatus** (Valenciennes, 1830)

*Halfmoon grouper*  
(Figs. 4B and 4C)

*Serranus rivulatus* Valenciennes in Cuvier et Valenciennes, 1830: 515; holotype: MNHN 0000-7347; type locality: Réunion.

**Material examined.** SMF uncatalogued [sample of tissue SOC19-499], 1 specimen, 16 cm SL, Socotra Island, Mori, 22 April 2019; underwater photograph, Socotra Island, Bidholeh, 6 m depth, 21 April 2019.

**Distinctive characters.** *Epinephelus rivulatus* is characterized by having a moderately deep body, its depth 2.7–3.2 in SL; interspinous membranes incised; caudal fin slightly rounded. Meristic values: dorsal-fin spines and rays XI,16–18; anal-fin spines and rays III,8; lateral-line scales 48–53; gill rakers 6–8 + 14–16.

**Coloration.** Body pale greenish brown with a small pale blue spot on each body scale, and four broad, indistinct, brown bars; head reddish brown with an indistinct brown bar on nape and irregular blue lines and spots; pectoral-fin base with a semicircular dark red or brownish red spot.

**Distribution.**Ranges from the Arabian region south to Madagascar, east to the Marshall and Samoan Islands. In the Arabian region reported from the southern shore...
Fig 4. *Epinephelus morhua*, SMF uncatalogued, 30 cm SL, Abd al-Kuri Island, Socotra Archipelago (A); *Epinephelus rivulatus*: SMF uncatalogued, 16 cm SL, Mori, Socotra Island (B); underwater photograph, Bidholeh, Socotra Island, 6 m depth (C)
of the Arabian Peninsula (Randall 1995); also, was collected from the north-eastern coast of Somalia (e.g., USNM 305326).

**Remarks.** *Epinephelus rivulatus* is a distinctive species characterized by having a high count of soft dorsal-fin rays, low count of lateral-line scales and certain details of coloration. The examined specimen and the visually observed individual match the morphological and color description of that species provided by Heemstra and Randall (1993) and Craig et al. (2011). The single specimen was taken on Hadibo fish market from a fisherman who caught it from the north-western part of Socotra Island (Mori), with no additional collection data available. The specimen has a body depth 3.0 in SL, 16 soft dorsal-fin rays, 51 lateral-line scales and 8 + 15 gill rakers. One individual was photographed under water in algal beds at a depth of 10 m in the southern part of the island. Elsewhere the species occurs in a variety of habitats from coral reefs to algal and seagrass beds at depths of 1–150 m. *Epinephelus rivulatus* is included in IUCN Red List Assessments and requires conservation management (Fennessy 2018).

**Carangidae Rafinesque, 1815**

*Alectis indica* (Rüppell, 1830)  
Indian threadfish  (Fig. 5A)


**Material examined.** Underwater photographs, Socotra Island, Shuab Bay, 14 m depth, 19 May 2018.

**Distinctive characters.** *Alectis indica* is characterized by having a relatively deep body, its depth 2.7–3.2 in FL; scales minute and embedded, the skin appearing naked; suborbital area broad, its depth 0.8–1.0 in length of upper jaw; bands of villiform teeth in jaws; first dorsal fin not visible in adults and subadults; anterior soft rays of dorsal and anal fins of juveniles extremely long and filamentous, progressively shorter with growth; pectoral fins longer than head length. Meristic values: dorsal-fin spines and rays VII + I,18–20; anal-fin spines and rays II + I,15–17; posterior scutes in lateral line 6–11; gill rakers 8–11 + 21–26.

**Coloration.** Dusky blue-green dorsally, shading to silvery below with a small black spot dorsally at posterior end of opercle.

**Distribution.** Ranges from the Arabian region, the east coast of Africa, east to Australia (New South Wales), Japan (Ryukyu Islands), Caroline Islands and New Caledonia. Reported in the wider Arabian region from the Red Sea (Golani and Bogorodsky 2010), Gulf of Tadjoura (Lips et al. 2016), Somalia (Sommer et al. 1996), Oman (Randall 1995), the Gulf (Carpenter et al. 1997), and Pakistan (Psomadakis et al. 2015).

**Remarks.** The collected specimens and visually observed individuals match the description of *Carangoides fulvoguttatus* given by Smith-Vaniz (1999). The larger one of the two collected specimens was examined; it has a body depth 3.6 in FL, 28 soft dorsal-fin rays, 24 soft anal-fin rays, 21 scales + 16 small scutes in straight portion of lateral line, and 6 + 19 gill rakers. A group of individuals was observed in 2018 in midwater over a large sand area in Shuab Bay, western part of Socotra Island, at depths of 6–12 m, and photographed and collected in the same area in 2019. Elsewhere the species is usually seen along outer-reef slopes, and reported from a depth range of 2–100 m (Smith-Vaniz 1999).

*Carangoides gymnostethus* (Cuvier, 1833) is a very similar species and also common on Socotra Archipelago but differs by having a groove before orbit, lower margin of eye at horizontal line through tip of snout, and usually lacking yellow spots on body.
Fig 5. *Alectis indica*, underwater photograph, Shuab Bay, Socotra Island, 14 m depth (A); *Carangoides fulvoguttatus*; underwater photograph, Shuab Bay, Socotra Island, 6–12 m depth (B); SMF uncatalogued, 65 cm FL, Shuab Bay, Socotra Island (C)
**Parastromateus niger** (Bloch, 1795)
Black Pomfret
(Fig. 6A)
*Stromateus niger* Bloch, 1795: 93, Pl. 422; holotype: ZMB 8755; type locality: Tranquebar [Tharangambadi], India.

**Material examined.** 1 specimen, 19 cm FL, Socotra Island, Di Hamd, 10–12 m depth, 14 August 2020.

**Distinctive characters.** *Parastromateus niger* is characterized by having a deep compressed body, its depth 1.9–2.2 in FL; small conical teeth in jaws in one row; dorsal-fin spines very short, embedded in skin in adults; pectoral fins longer than head length; and no pelvic fins in adults. Meristic values: dorsal-fin spines and rays IV–V + I,41–44; anal-fin spines and rays II + I,35–39; straight part of lateral line with 8–19 small scutes; gill rakers 5–6 + 13–14.

**Coloration.** Adults purplish to brownish gray, sometimes with two or three narrow pale bars visible on body; front of head usually paler; outer margin of median fins blackish to black.

**Distribution.** Known from the Arabian region, the east coast of Africa, east to Australia (Queensland), Japan (Ryukyu Islands), and Papua New Guinea. Reported in the wider Arabian region from the southern Red Sea (Bogorodsky et al. 2014), Gulf of Tadjoura (Lips et al. 2016), Somalia (Sommer et al. 1996), Oman (Randall 1995), the Gulf (Carpenter et al. 1997), and Pakistan (Psomadakis et al. 2015).

**Remarks.** The examined specimen matches the description of *Parastromateus niger* given by Smith-Vaniz (1999). The examined specimen has a body depth 2.0 in FL, 41 soft dorsal-fin rays, 37 soft anal-fin rays, 12 small scutes in straight portion of lateral line, and 5 + 14 gill rakers. The specimen was taken by hook-and-line in the area of Di Hamd over rocky-sandy bottom at a depth of 10–12 m. The species typically occurs in groups over sand substrata at depths of 15–49 m.

**Uraspis helvola** (Forster, 1801)
Whitetongue jack
(Fig. 6B)

*Scopem helvola* Forster in Bloch et Schneider, 1801: 35; holotype: BMNH 1963.3.27.4; type locality: Society Islands.

**Material examined.** SMF uncatalogued [sample of tissue SOC19-466], 1 specimen, 38.5 cm FL, Socotra Island, fishmarket in Hadibo, 12 April 2019.

**Distinctive characters.** *Uraspis helvola* is characterized by having an oblong and moderately deep body; its depth 2.4–2.7 in FL; naked area at pectoral-fin base and naked part of chest separated by scaled zone; teeth small and pointed, no teeth on vomer and palatines; first dorsal fin in three times lower than second dorsal fin; pectoral fins slightly longer than head length. Meristic values: dorsal-fin spines and rays VIII + I,25–30; anal-fin spines and rays II + I,19–22; straight part of lateral line with 23–40 small scutes; gill rakers 5–8 + 13–17.

**Coloration.** Adults dull silvery with iridescence, with a diffuse black blotch on opercle; lining of mouth mainly black; subadults with 5–7 pale bars.

**Distribution.** Widely distributed throughout the Indo-Pacific region to the eastern Pacific. Reported in the wider Arabian region from the Red Sea (Golani and Bogorodsky 2010), Gulf of Tadjoura (Lips et al. 2016), Somalia (Sommer et al. 1996), Oman (Randall 1995), the Gulf (Carpenter et al. 1997), and Pakistan (Psomadakis et al. 2015).

**Remarks.** The examined specimen matches the description of *Uraspis helvola* given by Smith-Vaniz (1999). It has a body depth 2.6 in FL, 28 soft dorsal-fin rays, 22 soft anal-fin rays, 31 small scutes in straight portion of lateral line, and 7 + 14 gill rakers. The specimen was taken from
Fig. 6. *Parastromateus niger*; SMF uncatalogued, 19 cm FL, Di Hamd, Socotra Island (A); *Selar crumenophthalmus*; SMF uncatalogued, 20 cm FL, Qalansiyah Bay, Socotra Island (B); *Uraspis helvola*, SMF uncatalogued, 38.5 cm FL, Hadibo fishmarket, Socotra Island (C)
23 new fish records from Socotra

Hadibo fish market, with no additional collection data available. The very similar *Uraspis uraspis* (Günther, 1860) is reported from the Gulf of Aden (Lips et al. 2016). It is distinguished by having the ventral naked zone of the chest extending obliquely to the small naked area at the base of the pectoral fin, without a scaled zone in between.

Lutjanidae Gill, 1861

**Etelis coruscans** Valenciennes, 1862

Deepwater longtail red snapper

(Fig. 7A)

*Etelis coruscans* Valenciennes, 1862: 1166; holotype: MNHN 0000-6991; type locality: Réunion.

**Material examined.** SMF uncatalogued [sample of tissue SOC19-323], 1 specimen, 30 cm SL, Socotra Archipelago, Abd al-Kuri Island, ~150 m depth, 27 March 2019.

**Distinctive characters.** *Etelis coruscans* is characterized by having a moderately elongate body, its depth 3.5–3.8 in SL; premaxilla protracted, not attached to snout by a frenum; dorsal and anal fins without scales; vomerine teeth in a chevron-shaped patch; dorsal fin with a notch between spines and soft portions; distance between orbit and angle of preopercle 9.3–12.5 in SL; last ray of dorsal and anal fin only slightly prolonged; upper caudal-fin lobe 1.8–3.1 in SL. Meristic values: dorsal-fin spines and rays X,11; anal-fin spines and rays III,8; lateral-line scales 47–50; gill rakers including rudiments 8–10 + 15–18.

**Coloration.** Head and body deep pink to red dorsally, shading to silvery pink or white on side and ventrally.

**Distribution.** Ranges from the eastern coast of Africa and islands of the Western Indian Ocean, east to Kermadec Islands, Tonga and Hawaiian Islands. Allen (1985) included the Arabian Sea in the distribution range of the species. No voucher specimens in museum collections or published data with references to specimens or photographs exist though supporting this claim. Therefore, the specimen from Socotra Archipelago is the first specimen-based evidence for the occurrence of the species in the Arabian region.

**Remarks.** Zajonz et al. (2019) listed it as *Pristipomoides cf. filamentosus* with comment "Also observed by the EPA team, sampling desired". The examined specimen matches the description of *P. filamentosus* given by Allen (1985), confirming the record from the Socotra Archipelago. A single specimen was caught by hook-and-line off Abd al-Kuri Island at a depth of 100–120 m on a steep slope. It has a body depth 3.4 in SL, 11 soft dorsal-fin rays, 60 lateral-line scales and 8 +17 gill rakers. *Aphareus furca* (Lacépéde, 1801) and *Aphareus rutilans* Cuvier, 1830, also known from Socotra, are both superficially similar to *P. filamentosus* but can be distinguished by having the premaxilla not protracted, attached to snout at symphysis by a frenum, and by lacking teeth on the vomer.

Gerreididae Bleeker, 1859

**Gerres oblongus** Cuvier, 1830

Oblong mojarra

(Fig. 7C)

*Gerres oblongus* Cuvier in Cuvier et Valenciennes, 1830: 479; lectotype: MNHN 0000-9497; type locality: Sri Lanka.

**Material examined.** underwater photographs, Socotra Island, Roosh, 8 m depth, 5 April 2019.

**Distinctive characters.** *Gerres oblongus* is characterized by having an elongate body, its depth 2.8–3.3 in SL; lower flange of preopercle without scales; second dorsal-fin...
Fig 7. *Etelis coruscans*, SMF uncatalogued, 30 cm SL, Abd al-Kuri Island, Socotra Archipelago (A); *Pristipomoides filamentosus*, SMF uncatalogued, 33 cm SL, Abd al-Kuri Island, Socotra Archipelago (B); *Gerres oblongus*, underwater photograph, Roosh, Socotra Island, 8 m depth (C)
spine elongate but not filamentous, its length 3.9–5.3 in SL; third anal-fin spine shorter than second spine, its length 8.3–11.1 in SL. Meristic values: dorsal-fin spines and rays IX,10; anal-fin spines and rays III,7; lateral-line scales 45–49; scale rows above lateral line to middle of spinous portion of dorsal fin 4.0–4.5.

**Coloration.** Silvery, sometimes 4–9 columns of indistinct ovoid dusky spots present below lateral line; anal and pelvic fins whitish; caudal fin dusky with a dark posterior margin.

**Distribution.** Known from the Arabian region south to South Africa (Kosi Bay, KwaZulu-Natal), east to Japan (Ryukyu Islands), Australia (Queensland), Caroline Islands and Tonga. Reported in the Arabian region previously from the Red Sea only (Iwatsuki et al. 2001).

A single specimen collected from the Gulf of Tadjoura (MNHN IC 1960-0047) should be examined.

**Remarks.** The observed and photographed individuals match the description of *Gerres oblongus* given by Iwatsuki et al. (2001). A small group of individuals was encountered over a large sand patch in Roosh, north-eastern part of Socotra Island, at a depth of 8 m. Three other species are known from Socotra which can be distinguished by a combination of morphological characters and details of coloration. *Gerres infasciatus* Iwatsuki et Kimura, 1998 differs by the second dorsal-fin spine greatly elongate and filamentous, the third anal-fin spine slightly longer than the second spine, a silvery body with indistinct bars and the tips of the second and third dorsal-fin soft ray yellow. *Gerres longirostris* (Lacépède, 1801) differs by having a deeper body, its depth 2.3–2.8 in SL, usually 5.5 scale rows between lateral line and fifth dorsal-fin spine, a silvery body, with 6–9 vertical series of oblong brownish gray spots on side of body, and the pelvic fins and spinous portion of anal fins yellow. *Gerres oyena* (Forsskål, 1775) differs by having the second dorsal-fin spine not elongate, the third anal-fin spine longer than the second spine, 3.5 scale rows above lateral line to middle of spinous portion of dorsal fin, and the elevated part of the dorsal fin broadly black-tipped.

**Sparidae** Rafinesque, 1818

*Diplodus omanensis* Bauchet et Bianchi, 1984

Oman porgy

(Fig. 8A)


**Material examined.** Underwater photographs, Socotra Island, Ras Bidou, 8 m depth, 19 May 2018.

**Distinctive characters.** *Diplodus omanensis* is characterized by having a moderately deep body, its depth 2.0–2.3 in SL; interorbital space scaleless; series of 4–5 pairs of incisiform teeth at front of jaws, side of jaws with 2–3 rows of small molariform teeth; pectoral fins reaching to above third anal-fin spine. Meristic values: dorsal-fin spines and rays XI,12; anal-fin spines and rays III,10–11; lateral-line scales 61–63; scale rows between lateral line and fourth dorsal-fin spine 6.5; gill rakers including rudiments 9–10 + 8–10.

**Coloration.** Body silvery white with four broad black bars and additional four short black bars ventrally; head with a black bar through eye, snout partly yellow; dorsal, anal and pelvic fins black.

**Distribution.** Restricted to the north-western Indian Ocean where it previously was only known from southern Oman (Randall 1995) and Pakistan (Amir et al. 2013).

**Remarks.** The observed individuals match the description of *Diplodus omanensis* given by Randall (1995). A pair of individuals was observed under water in a rocky area with sand bottom at Ras Bidou, western part of the island, at a depth of 12 m. The species is distinctive in coloration and easily distinguished from other sparid fishes in the region. Only one congener is known from Socotra, *Diplodus kotschyi* (Steindachner, 1876) which differs by its entirely silvery body and by having a black spot on the caudal peduncle.

**Polysteganus coeruleopunctatus** (Klunzinger, 1870)

Bluespotted seabream

(Fig. 8B)

*Dentex (Polysteganus) coeruleopunctatus* Klunzinger, 1870: 763, lectotype: ZMB 7989; type locality: El Quseir, Egypt, Red Sea.

**Material examined.** SMF uncatalogued [sample of tissue SOC19-318], 1 specimen, 40.5 cm SL, Socotra Archipelago, Abd al-Kuri Island, 100–120 m depth, 25 March 2019.

**Distinctive characters.** *Polysteganus coeruleopunctatus* is characterized by having a moderately deep body, its depth 2.2–2.3 in SL; interorbital space scaly; series of 2–3 pairs of canine teeth at front of jaws, side of jaws with row of conical teeth; pectoral fins reaching to above spinous portion of anal fin. Meristic values: dorsal-fin spines and rays XII,10; anal-fin spines and rays III,8; lateral-line scales 51–52; scale rows between lateral line and fourth dorsal-fin spine 5.5–6; gill rakers including rudiments 7–8 + 11–13.

**Coloration.** Silvery tan, silvery red to silvery pink dorsally, silvery ventrally, with a small iridescent blue spot on each scale; lateral-line conspicuous.

**Distribution.** Reported from the Arabian region from the Red Sea (Golani and Bogorodsky 2010) and Somalia only (Sommer et al. 1996), also reported from Kenya (Iwatsuki and Heemstra 2015).

**Remarks.** The examined specimen matches the distinctive characters of *Polysteganus coeruleopunctatus* given by Iwatsuki and Heemstra (2015). The large single specimen was caught by hook-and-line off Abd al-Kuri Island at a depth of 100–120 m on a steep slope. It has a body depth of 2.2 in SL, 52 lateral-line scales, 6 scale rows between lateral line and fourth dorsal-fin spine and 7 +12 gill rakers. The species is known as inhabitant of rocky bottoms of deepwater slopes or deep coral areas, in a depth range of 50–450 m.

*Lethrinus crocineus* Smith, 1959

Yellowtail emperor

(Fig. 9A)
Lethrinus crocineus Smith, 1959e: 290; holotype: SAIAB 22; type locality: Pinda, Mozambique.

**Material examined.** SMF uncatalogued [sample of tissue SOC19-442 and 443], 2 specimens, 29 and 30.5 cm SL, Socotra Archipelago, Abd al-Kuri Island, 27 March 2019.

**Distinctive characters.** *Lethrinus crocineus* is characterized by having a moderately deep body, its depth 2.3–2.4 in SL; snout length 1.9–2.1 in head length; numerous small scales on inner surface of pectoral-fin base; cheek without scales; side of jaws with row of rounded or molariform teeth; outer surface of maxilla smooth or with a longitudinal ridge. Meristic values: dorsal-fin spines and rays X,9; anal-fin spines and rays III,8; lateral-line scales 46–47; scale rows between lateral line and fifth dorsal-fin spine 5.5, scale rows between lateral line and anal-fin origin 15–17.

**Coloration.** Body tan or yellowish dorsally with base of scale black, shading to whitish or pale gray on side of body and ventrally; lips pale orange; dorsal, anal, caudal

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**Fig 8.** *Diplodus omanensis*, underwater photograph, Ras Bidou, Socotra Island, 8 m depth (A); *Polystegamus coeruleopunctatus*, SMF uncatalogued, 40.5 cm SL, Abd al-Kuri Island, Socotra Archipelago (B)
and pectoral fins yellow, margin of spinous portion of dorsal fin dark orange, pelvic fins white.

**Distribution.** Ranges from Mozambique, Seychelles, Madagascar and South Africa ( Natal), east to Sri Lanka and Andaman Sea. There are no published data on the occurrence of the species in Arabian region. A single specimen of 183 mm SL (USNM 349335) was collected off the north-eastern coast of Somalia but not mentioned in publications. Therefore, two specimens from the Socotra Archipelago represent the first published record of the species in the Arabian region.

**Remarks.** The collected specimens match the distinctive characters of *Lethrinus crocineus* given by Carpenter and Allen (1989). The larger one of the two collected specimens was examined; it has a body depth 2.3 in SL, 47 lateral-line scales, 15 scales between lateral line and anal-fin origin, and 5.5 scale rows between lateral line and fifth dorsal-fin spine. Two specimens were collected from off Abd al-Kuri Island, with no additional collection details available. Elsewhere the species occurs in coastal areas and coral reefs at depths of 20–150 m. It is distinctive by the combination of morphological characters provided above and its unique coloration, featuring pale orange lips and yellow dorsal, anal, caudal, and pectoral fins, with the margin of the spinous portion of dorsal fin dark orange.

**Gymnocranius elongatus** Senta, 1973

*Elongate emperor* *(Fig. 9B)*


**Material examined.** SMF uncatalogued [sample of tissue SOC19-392], 1 specimen, 27.5 cm SL, Socotra Island, Roosh, 120 m depth, 6 April 2019; underwater photograph, Socotra Island, Medina, 12 m depth, 20 May 2018.

**Distinctive characters.** *Gymnocranius elongatus* is characterized by having a body depth of 2.2–2.4 in SL; no scales on inner surface of pectoral-fin base; cheek with scales; side of jaws with row of conical teeth; outer surface of maxilla smooth; caudal fin distinctly forked. Meristic values: dorsal-fin spines and rays X,10; anal-fin spines and rays III,10; lateral-line scales 46–48.

**Coloration.** Light silvery gray, scales dorsally on body with darker edges, with 5–6 irregular, indistinct, blackish bars on body; cheek sometimes with a blackish bar below eye; caudal fin grayish brown, posterior margin bright reddish orange to reddish.

**Distribution.** Ranges from the Arabian region, the east coast of Africa, east to southern Japan, northern Australia, and Solomon Islands. Known in the Arabian region from the southern Red Sea, based on several specimens trawled off Jizan, southern Saudi Arabia (Bogorodsky et al., in prep.) and from Somalia (Sommer et al. 1996), from the north-eastern coast of which also voucher specimens exist (e.g., USNM 306039) and should be examined.

**Remarks.** The examined specimen matches the distinctive characters of *Gymnocranius elongatus* given by Carpenter and Allen (1989). It was caught by hook-and-line over a shallow slope with moderate current at Roosh, north-eastern part of Socotra Island, at a depth of 120 m. One individual was photographed in midwater over a coral area in Medina, north-western part of the island, at a depth of 12 m. Carpenter and Allen (1989) noted that the species occurs mainly over sandy substrata of lagoons and seaward slopes from depths of 50 to 100 m. The record from Socotra thus extends the known depth range.

**Gymnocranius sp.**

*Plain emperor* *(Fig. 10A)*

**Material examined.** SMF uncatalogued [sample of tissue SOC19-317], 1 specimen, 26.5 cm SL, Socotra Archipelago, Abd al-Kuri Island, 100–120 m depth, 25 March 2019; SMF uncatalogued [sample of tissue SOC19-384], 1 specimen, 27.5 cm SL, Socotra Island, Mori, 80 m depth, 3 April 2019.

**Distinctive characters.** *Gymnocranius* sp. is characterized by having a body depth of 2.5 in SL; no scales on inner surface of pectoral-fin base; cheek with scales; side of jaws with a row of conical teeth; outer surface of maxilla smooth; caudal fin moderately forked. Meristic values: dorsal-fin spines and rays X,10; anal-fin spines and rays III,10; lateral-line scales 48–49. Coloration. Light silvery gray without markings, the scale edges slightly darker; fins grayish.

**Distribution.** Known from few specimens originating from Socotra Archipelago (Abd al-Kuri Island and Socotra Island), Kenya and South Africa.

**Remarks.** The two examined specimens from Socotra Archipelago match generic features of *Gymnocranius*, yet could not be assigned to any described species of the genus. One specimen was caught by hook-and-line off Abd al-Kuri Island at a depth of 100–120 m on a steep slope; the second specimen was caught by hook-and-line off Mori, north-western part of Socotra Island, at a depth of 80 m. Chen and Borsa (2020) investigated the diversity and phylogenetic relation in the Monotaxinae and recognized 15 species in *Gymnocranius*, four of which are undescribed. Sequences of the Socotra specimens were included in a preliminary phylogenetic analysis which revealed them as nesting within *Gymnocranius* sp. F sensu Chen and Borsa (2020). The species is currently being described by the present authors and Philippe Borsa. The species differs from two congeners also known from Socotra by its uniformly gray head, and its body and fins without markings. In contrast, *G. elongatus* possesses a body with 5–6 irregular, indistinct, blackish bars, a cheek usually with a blackish bar below eye and a caudal fin with a reddish posterior margin. *Gymnocranius grandoculis* (Valenciennes, 1830) differs by having a cheek with undulating blue lines, opercle and preopercle with pale blue spots and fins often yellow distally. Another species *G. griseus* (Temminck et Schlegel, 1843) reported from southern Oman by Jawad et al. (2011) exhibits dark bars on body and a bar below eye.
**Wattsia mossambica** (Smith, 1957)
Mozambique seabream
(Fig. 10B)

*Gnathodentex mossambicus* Smith, 1957e: 122; holotype: SAIAB 439; type locality: Mozambique.

**Material examined.** SMF uncatalogued [sample of tissue SOC19-320], 1 specimen, 27 cm SL, Socotra Archipelago, Abd al-Kuri Island, 100–120 m depth, 25 March 2019.

**Distinctive characters.** *Wattsia mossambica* is characterized by having a relatively deep, somewhat rhomboid body, its depth 1.9–2.2 in SL; no scales on inner surface of pectoral-fin base; cheek with scales; side of jaws with a row of conical teeth; outer surface of maxilla with a longitudinal denticulated ridge; caudal fin moderately forked, with broadly rounded lobes. Meristic values: dorsal-fin spines and rays X,10; anal-fin spines and rays III,10; lateral-line scales 48–49.

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*Fig. 9. Lethrinus crocineus*, SMF uncatalogued, 30.5 cm SL, Abd al-Kuri Island, Socotra Archipelago (**A**); *Gymnocranius elongatus*, SMF uncatalogued, 27.5 cm SL, Roosh, Socotra Island (**B**).
**Coloration.** Light silvery gray, the scale edges darker, often with a dark brown spot on scales dorsally on body; cheek with undulating blue lines; opercle and preopercle with pale blue spots; fins yellow distally.

**Distribution.** Ranges from the east coast of Africa, east to southern Japan, northern Australia, and Marshall Islands. The species has not been known from the Arabian region and the present record thus extends its distribution range.

**Remarks.** The examined specimen matches the distinctive characters of *Wattsia mossambica* given by Carpenter and Allen (1989). It was caught by hook-and-line off Abd al-Kuri Island at a depth of 100–120 m on a steep slope. In other areas is the species occurs usually solitary over sandy or rocky substrata of seaward slopes at depths between 100–180 m.

**Fig 10.** *Gymnocranius* sp., SMF uncatalogued, 26.5 cm SL, Abd al-Kuri Island, Socotra Archipelago (A); *Wattsia mossambica*, SMF uncatalogued, 27 cm SL, Abd al-Kuri Island, Socotra Archipelago (B)
Sciaenidae Cuvier, 1829

**Argyrosomus japonicus** (Temminck et Schlegel, 1843)
Japanese mengre
(Figs. 11A and 11B)

*Sciaena japonica* Temminck et Schlegel, 1843: 58; neotype: SAIAB 44704; type locality: Miyazaki Prefecture, Kyushu, Japan.

**Material examined.** 1 specimen, 26 cm SL, Socotra Island, caught at Delisha, 25 m depth, 19 July 2020; underwater photographs, Socotra Island, Ras Bidou, 14 m depth, 18 April 2019.

**Distinctive characters.** *Argyrosomus japonicus* is characterized by having a body depth of 3.3–4.0 in SL; mouth nearly terminal; jaws with small conical teeth in two rows; dorsal profile of head nearly straight; chin with 3 pairs of pores, no barbel. Meristic values: dorsal-fin spines and rays XI,25–30; anal-fin spines and rays III,7; pectoral-fin rays 15–17; lateral-line scales 50–53; gill rakers 4–5 + 10–12.

**Coloration.** Silvery gray, fins colored like body, dorsal-fin spines and rays pale gray; a blackish spot at upper base of pectoral fins.

**Distribution.** Ranges from the Arabian Sea, south to South Africa, east to the Philippines and Japan. Reported from the wider Arabian region from the Gulf of Tadjoura (Lips et al. 2016, as *Argyrosomus regius* (Asso y del Rio, 1801)), Oman (Randall 1995, as *A. hololepidotus* (Lacepède, 1801)), and Pakistan (Psomadakis et al. 2015).

**Remarks.** The observed individuals match the description of *Argyrosomus japonicus* given by Griffiths and Heemstra (1995). A small group of individuals was photographed under a large rock overhang in a sand area mixed with rocks at Ras Bidou, western part of Socotra Island, at a depth of 14 m. The species is known to usually inhabit sand and mud bottoms from depths of 12 to 150 m; it may also occur in estuaries (Fennessy 2020). The single specimen was taken from Hadibo fish market, and caught in the area of Delisha over rocky habitat at 25 m depth according to the fishermen. It matches the species-specific characters given above including the dentition, and by having 27 soft rays in dorsal fin, 51 lateral-line scale, and 5 + 11 gill rakers. Griffiths and Heemstra (1995) stated that *A. hololepidotus* (Lacepède, 1801), reported from Oman (Randall 1995), is an endemic to Madagascar, and differs by having more appendages on the swimbladder (34–36), fewer gill rakers (4–5 + 9), and a broader suborbital distance (8.3–9.1 in SL). However, two specimens from Madagascar nested in a molecular phylogenetic analysis within specimens of *A. japonicus* from its entire distribution range (present authors’ unpublished data). More specimens from Madagascar are needed for an expanded combined molecular and morphological study. Furthermore, specimens from Australia are genetically distinct and may represent another species, and referred to the available name *A. antarcticus* (Castelnau, 1872). Another similar species *Argyrosomus heinii* (Steindachner, 1907) known from Oman differs by having more soft rays in the dorsal fin (32–33) and 9 gill rakers on lower limb, and should be included in forthcoming studies.

The population from Socotra is referred to *A. japonicus* until a revision of the genus. *Argyrosomus japonicus* is included in IUCN Red List Assessments as endangered species and requires conservation management (Fennessy 2020). Populations of the species are greatly reduced in most areas due to overfishing in combination with its very slow reproductive cycle, maturing at age 5–6 years only (Fennessy 2020).

*Argyrosomus japonicus* may be confused with externally similar species of *Otolithes*. For example, Lin et al. (2019) in using an integrative taxonomic approach described *O. arabicus* from the Gulf and recognized two lineages from the Gulf as potentially undescribed species, all previously misidentified as *O. ruber* (Bloch et Schneider, 1801). Species of *Otolithes* might be found on Socotra and can be easily distinguished from *Argyrosomus* by having large canine teeth at front of each jaw.

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**Umbrina robinsoni** Gilchrist et Thompson, 1908
Slender baardman
(Fig. 11C)

*Umbrina robinsoni* Gilchrist et Thompson, 1908: 182; holotype: SAM 9966; type locality: KwaZulu Natal, South Africa.

**Material examined.** underwater photographs, Socotra Island, Ras Bidou, 14 m depth, 17 April 2019.

**Distinctive characters.** *Umbrina robinsoni* is characterized by having a body depth of 2.8–3.8 in SL; mouth inferior; jaws with small villiform teeth; dorsal profile of head evenly convex; chin with 2 pairs of pores, and pored at its tip barbel. Meristic values: dorsal-fin spines and rays XI,22–27; anal-fin spines and rays III,7; pectoral-fin rays 17; lateral-line scales 48–54; gill rakers 4–6 + 6–10.

**Coloration.** Silvery dark gray with irregular short and moderate pale gray vermiculations on head and body; pelvic and median fins blackish.

**Distribution.** Ranges from the Arabian region, south to Madagascar and South Africa. Reported in the wider Arabian region from Oman (Randall 1995, as *U. ronchus*), the Gulf (Eagderi et al. 2019, as *U. ronchus*), and Pakistan (Psomadakis et al. 2015, as *U. canariensis* Valenciennes 1843).

**Remarks.** The observed individuals match the description of *Umbrina robinsoni* given by Hutchings and Griffiths (2005). A pair of individuals was photographed under water above a silty sand bottom in an area mixed with rocks at Ras Bidou, western part of Socotra Island, at a depth of 14 m. The species is known to usually inhabit open sand areas, but also coral and rocky reef areas, at depths of 1–40 m. Hutchings and Griffiths (2005) resurrected *U. robinsoni* from synonymy of *U. ronchus* and noted that the latter can be distinguished by an almost straight dorsal profile of the head between orbit and nape, then steeply convex above preopercle, a longer distance between nostril and anterior margin of orbit (11.8–12.8 in head length versus 14.5–41.5 in head length in *U. robinsoni*) and by lacking a pale vermiculate pattern.
Fig 11. *Argyrosomus japonicus*; underwater photograph, Ras Bidou, Socotra Island, 14 m depth (A and B); *Umbrina robinsoni*, underwater photograph, Ras Bidou, Socotra Island, 14 m depth (B)
Polynemidae Rafinesque, 1815

*Polydactylus plebeius* (Broussonet, 1782)
Striped threadfin
(Fig. 12A)

*Polynemus plebeius* Broussonet, 1782: 35; neotype: FMNH 108655; type locality: Tahiti, Society Islands.

**Material examined.** 2 specimens, 22 and 25 cm SL, Socotra Island, Haleh, 10–15 m depth, 2 July 2020.

**Distinctive characters.** *Polydactylus plebeius* is characterized by having a body depth of 3.1–4.0 in SL; jaws, palatines and vomer with villiform teeth; pectoral fins low on body, distinctly below lateral line; lateral line simple, extending to posterior margin of upper part of lower caudal-fin lobe. Meristic values: dorsal-fin spines and rays VIII + 1.12–13; anal-fin spines and rays III,11–12; pectoral-fin rays and filaments 16–18 + 5; lateral-line scales 60–68; gill rakers 9–14 + 13–18.

**Coloration.** Silvery whitish, with series of longitudinal dusky stripes following the scale rows; first and second dorsal fins blackish distally.

**Distribution.** Ranges from the Arabian region, east coast of Africa and South Africa, east to southern Japan (Miyazaki), eastern Australia (New South Wales), and French Polynesia. Reported in the wider Arabian region from southern Oman and Pakistan (Motomura 2002).

**Remarks.** The examined specimens match diagnostic characters of *Polydactylus plebeius* given by Motomura (2002) and the combination of distinctive characters provided above including coloration, i.e., having dusky stripes along side of body and lacking black blotch anteriorly on lateral line. Both specimens were examined and photographed from Hadibo fish market and caught in the area of Haleh over rocky and sandy habitat at 10–15 m depth according to the fishermen. Specimens from the Arabian Sea slightly differ in some details from elsewhere (H. Motomura, pers. comm.) and additional study involving genetic analysis is needed to determine the status of the populations from the area. As yet no polynemid fishes had been reported, and *P. plebeius* represents the first record of the family for Socotra Archipelago.

Pentacerotidae Bleeker, 1859

*Histiopterus typus* Temminck et Schlegel, 1844
Sailfin Armourhead
(Fig. 12B)

*Histiopterus typus* Temminck et Schlegel, 1844: 86, lectotype: RMNH 422; type locality: Japan.

**Material examined.** 1 specimen, 19 cm SL, Socotra Island, Delisha, 45 m depth, 17 July 2020.

**Distinctive characters.** *Histiopterus typus* is characterized by having a body depth of 1.3–1.9 in SL; head covered with naked, striated bones, except for a broad patch of ctenoid scales on cheek, and a small patch above eye and on opercle; mouth slightly oblique, the upper jaw reaching to below posterior nostril; jaws with a band of short conical teeth, the outer row largest, no teeth on vomer; third dorsal-fin spine longest and much stouter than other spines. Meristic values: dorsal-fin spines and rays IV,23–29; anal-fin spines and rays III,8–10; pectoral-fin rays usually 16–18; lateral-line scales 58–70; gill rakers 3–6 + 14–16.

**Coloration.** Head and body with four broad dark brown bars, the first on nape, second bar narrower than other; lips pinkish; pelvic fins dark brown to black.

**Distribution.** Reported from scattered Indo-Pacific localities, including the Arabian region, South Africa, Comoro Islands, Réunion, New Britain (Papua New Guinea), the Philippines, and Japan. Reported in the wider Arabian region from the Red Sea (Klausewitz 1980), Gulf of Oman (Randall 1995), Iraqi waters of the Gulf (Jawad et al. 2018) and Pakistan (Psomadakis et al. 2015).

**Remarks.** The examined specimen matches the distinctive characters of *Histiopterus typus* given by Hardy (1983), including 25 soft rays in dorsal fin, 16 pectoral-fin rays, 66 scales in lateral line, and 4 + 14 gill rakers. The single specimen was taken from Hadibo fish market, and caught in the area of Delisha over rocky habitat at 45 m depth according to the fishermen. The species is commercial but rare in catches because it occurs solitary and in moderately deep water, making the record from Socotra an interesting finding.

Siganidae Richardson, 1837

*Siganus sutor* Valenciennes, 1835
Shoemaker spinefoot
(Fig. 12C)


**Material examined.** SMF uncatalogued [sample of tissue SOC19-439], 1 specimen, 33 cm SL, Socotra Island, Delisha, 6 m depth, 9 April 2019; SMF uncatalogued [sample of tissue SOC19-475], 1 specimen, 27.5 cm FL, Socotra Island, Delisha, 5 m depth, 13 April 2019.

**Distinctive characters.** *Siganus sutor* is characterized by having a body depth of 2.2–2.6 in standard length; dorsal fin with slender spines, the fourth to eighth longest, 1.6–2.0 times longer than last spine; caudal fin forked. Meristic values: dorsal-fin spines and rays XIII,10; anal-fin spines and rays VII,9; scale rows above lateral line 27–32.

**Coloration.** Usually greenish to sandy brown dorsally, paler ventrally, with scattered small pale blue spots, some about three-fourths to equal orbit diameter; opercular membrane dark brown; dorsal and anal fins dark gray or yellowish-gray marbled with brown.

**Distribution.** Ranges from the Arabian region and the coast of Somalia south to South Africa and Madagascar. Reported in the wider Arabian region from the Gulf of Aden and Oman (Randall 1995), the Gulf (Carpenter et al. 1997), and Pakistan (Psomadakis et al. 2015, as *S. canaliculatus* (Park, 1797)). Woodward (1990) demonstrated that *S. sutor* is restricted to the coast of East Africa and islands of the Western Indian Ocean. But previous records of *S. canaliculatus* from Oman and the Gulf are based on misidentification of *S. sutor*. It is supported by unpublished genetic data, with the inclusion of our own examined material from the Gulf and Socotra which nested in one lineage with positively identified
specimens of *S. sutor* from the Western Indian Ocean (Bogorodsky, Zajonz and Victor, in prep.). The records from the Gulf of Aden require confirmation. Woodland (1990) did not examine specimens and just noted that the species perhaps occurs in the Gulf of Aden. Lips et al. (2016) included four photographs from the Gulf of Tadjoura but their upper photograph represents *Siganus rivulatus* Forsskål et Niebuhr, 1775 which is characterized by having obvious yellow stripes on the ventral side of body, and the lower three photographs represent *S. luridus* (Rüppell, 1829) which is distinguished from other species by having a truncate caudal fin.

**Remarks.** The two examined specimens match distinctive characters of *Siganus sutor* given by Woodland (1990). They were collected in an area of mixed coral, stone and seagrass habitats at Delisha, northern part of the Socotra Island, at a depth of 5–6 m. Zajonz et al. (2019) listed the species as *S. cf. canaliculatus* in Annex 2 with the comment “Tentative, observed visually once”. The species might easily be confused with *S. canaliculatus* which is known from the eastern coast of India to Papua New Guinea and Japan. *Siganus canaliculatus* differs by having 16–26 scales rows above lateral line and numerous small blue spots. Zajonz et al. (2019) also listed *S. rivulatus*, known only from the Red Sea and inner Gulf of Aden, based on visual records. Collected specimens or photographs are needed for positive identification in order to confirm that both species occur on Socotra and to rule out misidentifications of *S. sutor*.

*Sphyraenidae* Rafinesque, 1815

*Sphyraena obtusata* Cuvier, 1829

Pondicherry barracuda

(Fig. 12D)

*Sphyraena obtusata* Cuvier in Cuvier et Valenciennes, 1829a: 350; lectotype: MNHN A-5486; type locality: Pondicherry (now Puducherry) coast of India.

**Material examined.** SMF uncatalogued [sample of tissue SOC18-89], 1 specimen, 6.7 cm SL, Socotra Island, Di Hamri, 3 m depth, 29 April 2018; underwater photography, Socotra Island, Di Hamri, 3 m depth, 29 April 2018.

**Distinctive characters.** *Sphyraena obtusata* is characterized by having a slender body, its depth 6.2–8.3 in SL; maxilla not extending posteriorly to a vertical at anterior margin of eye; a single row of scales in the suborbital groove covered with skin; origin of first dorsal fin posterior to vertical at rear base of pelvic fins; caudal fin forked. Meristic values: dorsal-fin spines and rays V + 1,9; anal-fin spines and rays II,9; lateral-line scales 78–85; scale rows above lateral line 5–7.5; scales on the line from posterior margin of eye to preopercular edge 5–7; gill rakers 1 + 1.

**Coloration.** Dark grayish green dorsally, silvery on side and ventrally, with about 15, vertically-elongated, sometimes obscured, blackish spots along lateral line; an indistinct dusky yellowish stripe from upper pectoral-fin base continuing along side of body at level of dorsal edge of pectoral-fin base joining lateral line about halfway between rear end of second dorsal fin and caudal-fin base.

**Distribution.** Ranges from the Arabian region to South Africa (KwaZulu-Natal), Madagascar and the Mascarene Islands, east to Japan (Shizuoka Prefecture, Honshu), Australia (New South Wales) and Fiji. Reported in the wider Arabian region from the Red Sea (Doiuchi and Nakabo 2005), Gulf of Tadjoura (Lips et al. 2016), Somalia (Sommer et al. 1996), Oman (Randall 1995), Pakistan (Psomadakis et al. 2015), and the Gulf (various records summarized by Eadgeri et al. (2019)). Many previous records in the Arabian region were initially attributed to *Sphyraena flavicauda* Rüppell, 1838, placed in synonymy with *S. obtusata* by Doiuchi and Nakabo (2005) who reviewed the *S. obtusata* species group.

**Remarks.** The examined specimen and observed individuals match the distinctive characters of *Sphyraena obtusata* given by Doiuchi and Nakabo (2005). The small examined specimen has 81 scales in lateral line, 6.5 scales above lateral line, and 1 + 1 gill rakers. A small group of individuals was observed over a large sand patch in a coral-reef area in Di Hamri, the north-eastern part of Socotra Island, at a depth of 3 m. Zajonz et al. (2019) listed the species in Annex 2 as requiring confirmation. *Sphyraena chrysotaenia* Klunzinger, 1884 is a similar species, mistakenly placed in synonymy with *S. pinguis* Günther, 1874 by Doiuchi and Nakabo (2005). It might be found on Socotra because it is also known from the Arabian region. It differs by having smaller scales, lateral-line scales 80–94, scales above lateral line 7.5–9.5, a single row of scales in the suborbital groove not covered with skin, and longitudinal dusky yellow stripe running on body above level of dorsal edge of pectoral-fin base.

**DISCUSSION**

The present article adds 23 bony fish species to the known coastal fish fauna of the Socotra Archipelago (Zajonz et al. 2019). The occurrence of three additional species is confirmed which were listed by these authors as requiring confirmation. The article presents species which are commercially relevant in the local small scale fishery, being marketed locally or regionally or at least consumed domestically. Additional new records and descriptions of new species, unrelated to the local fishery, are subjects of several forthcoming publications by the present authors.

Lavergne et al. (2016) included a comprehensive taxonomic account as part of an ecological study of the estuarine fishes of the Archipelago. Among a total of 65 species in 32 families, they listed 19 species which are highly important and 19 species which are moderately important in the local fishery. Zajonz et al. (2016) provided a comprehensive summary of the current state of knowledge about the diversity and ecology of the fish assemblages, fish biomass productivity, and local fisheries in the Archipelago, using both historical information and the results of field surveys conducted over the past 20 years. During visual underwater counts of the fish communities at permanent monitoring transects, Zajonz et al. (2016) noted that *Lethrinus borbonicus* Valenciennes, 1830 and *Lutjanus*
bohar (Forsskål, 1775) were the most abundant commercial species. The review was considered timely given the severe political and humanitarian crisis in Yemen which has been putting increasing pressure on living marine resources on both the mainland and the Socotra Archipelago over the past decade. It has been especially pivotal in demonstrating severely declining catch trends associated with other clear signs of overfishing and highlighting the root causes for this development, i.e., increased numbers of men turning to fishing as a means to feed their families, weak national fishery and enforcement authorities, and increased, unrecorded regional export of catch production by internal and external players taking advantage of Yemen’s situation as a failed state. Documenting the “fishery biodiversity” is therefore critical to foster the correct identification of commercial species and improve the statistics of catches

Fig 12. *Polydactylus plebeius*, SMF uncatalogued, 25 cm SL, Haleh, Socotra Island (A); *Histiopterus typus*, SMF uncatalogued, 19 cm SL, Delisha, Socotra Island (B); *Siganus sutor*, SMF uncatalogued, 33 cm SL, Delisha, Socotra Island (C); *Sphyraena obtusata*, SMF uncatalogued, 6.7 cm SL, Di Hamri, Socotra Island (D)
and landings as a key prerequisite to close the existing eminent gaps in fishery management. With the twenty-three additional species herein reported a total of about 255 species of fish are considered as exploited in the local small-scale fishery and will be included in the forthcoming book ‘Atlas to the Commercial Fishes of Socotra Archipelago’ (Zajonz et al., in prep.).

Among the newly recorded species all but Carangoides fulvoguttatus are relatively rare species which likely reflects at least in part the high fishing pressure. Five species, Epinephelus transversus, Etelis coruscans, Lethrinus crocineus, Wattsia mossambica, and the undescribed species of Gymnocephalus represent first records for the Arabian region.

All observed groupers (Serranidae) of the genus Epinephelus are targeted species and rare on Socotra Archipelago, largely due to heavy fishing; only E. undulatus (Quoy et Gaimard, 1824) is still moderately common. Among the groupers of the genus Caranx heberi two species are most frequent in catch and landings, C. miniata (Forsskål, 1775) and C. sonnerati (Valenciennes, 1828). The archipelagic species richness of the subfamily Epinephelinae is high, containing at present 34 recorded species, including 24 species of Epinephelus, with the presence of E. indistinctus yet to be corroborated by additional observations. By comparison, there are 27 species (16 species of Epinephelus) in the Red Sea (Golani and Bogorodsky 2010), 34 species (21 species of Epinephelus) in the Gulf of Tadjoura and inner Gulf of Aden (Lips et al. 2016, Zajonz et al. 2019, Zajonz et al. in press’), 32 species (22 species of Epinephelus) in Oman waters (Randall 1995, Zajonz et al. 2019, Zajonz et al. in press’ and 19 species of Epinephelus) in Pakistan waters (Psomadakis et al. 2015).

Jack, amberjacks, trevallies, scads, and allies is another group of fishes of high commercial interest. The recorded species richness of the family Carangidae for the Archipelago is less than in neighboring areas and at present contains 26 species. In contrast, there are 37 species in the Red Sea (Golani and Bogorodsky 2010), 45 species in the Gulf of Tadjoura (Lips et al. 2016), 42 species in Somalia (Sommer et al. 1996), 44 species in Oman (Randall 1995), 42 species in the Gulf (Carpenter et al. 1997), and 53 species in Pakistan (Psomadakis et al. 2015). The relatively low diversity of the family is somewhat surprising, considering the substantially higher species richness of all adjacent regions and given that the Archipelago biogeographically is a sink for fish diversity. Four species are most targeted in the local fishery, Carangoides fulvoguttatus, Carangoides gymnostethus, Caranx heberi, and Caranx sexfasciatus Quoy et Gaimard, 1825.

Snappers of the family Lutjanidae is another group of fishes of high commercial value. The species richness of the family for the Archipelago is high and at present contains 24 recorded species. In contrast, there are 21 species in the Red Sea (Golani and Bogorodsky 2010), 31 species in the Gulf of Tadjoura (Lips et al. 2016), 26 species in Oman (Randall 1995), 15 species in the Gulf (Carpenter et al. 1997), and 33 species in Pakistan (Psomadakis et al. 2015). During the field works in 2018 and 2019 three species of snappers were most common in the catches of fishermen, Aprión virensensis Valenciennes, 1830, Lutjanus bohar and L. rivulatus (Cuvier, 1828).

Emperors of the family Lethrinidae is another group of fishes of high commercial interest and some species are most abundant in catches. Among the 15 species now recorded from the Archipelago, three species Lethrinus borbonicus, L. microdon Valenciennes, 1830, and L. nebulosus (Forsskål, 1775) are most commonly observed on fish markets and landing sites. In adjacent areas, there are fewer species than reported from the Socotra Archipelago, with 13 species in the Red Sea (Golani and Bogorodsky 2010), 14 species in the Gulf of Tadjoura (Lips et al. 2016), 9 species in Oman (Randall 1995), 8 species in the Gulf (Eagderi et al. 2019), and 9 species in Pakistan (Psomadakis et al. 2015). No sciaenid or polynemid fishes had hitherto been observed by the authors during their long-term study of the fishes of Socotra, or reported otherwise. Two species of Sciaenidae and one species of Polynemidae reported in the present article thus represent the first records of these families from the Archipelago. Interestingly, no species of Polynemidae are known from the Red Sea and the Gulf of Aden whereas two species are reported from the Gulf and six species from Pakistan waters (Psomadakis et al. 2015, Eagderi et al. 2019). Among the Sciaenidae, only one deepwater species Atrobuca geniae Ben-Tuvia et Trewavas, 1987 is known from the Red Sea and three species from the Gulf of Aden (Argyrosomus japonicus, Atrobuca alcocki Talwar, 1980 and Otolithes sp.). In contrast, the north-eastern part of the wider Arabian region is richer with 14 species reported from the Gulf and 24 species from Pakistan (Psomadakis et al. 2015, Eagderi et al. 2019).

The Socotra Archipelago lies in a unique zoogeographical area (Kemp 1998, Zajonz et al., in press’), and numerous new and unexpected records of species of fish, including additional commercial species will no doubt be found in the future.

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an annotated and illustrated catalogue of the grouper, rockcod, hind, coral grouper and lyretail species known to date. FAO Species Catalog 16.


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