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The sparid fishes of Pakistan, with new distribution records

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Abstract

The family sparidae is represented in Pakistan by 14 species belonging to eight genera: the genus *Acanthopagrus* with four species, *A. berda*, *A. arabicus*, *A. sheim*, and *A. catenula*; *Rhabdosargus*, *Sparidentex* and *Diplodus* are each represented by two species, *R. sarba* and *R. haaffara*, *Sparidentex hasta* and *S. jamalensis*, and *Diplodus capensis* and *D. omanensis*, and the remaining four genera are represented by single species, *Crenidens indicus*, *Argyrops spinifer*, *Pagellus affinis*, and *Cheimerius nufar*. Five species, *Acanthopagrus arabicus*, *A. sheim*, *A. catenula*, *Diplodus capensis* and *Rhabdosargus haaffara* are reported for the first time from Pakistani coastal waters. The Arabian Yellowfin Seabream *Acanthopagrus arabicus* and Spotted Yellowfin Seabream *Acanthopagrus sheim* have only recently been described from Pakistani waters, while *Diplodus omanensis* and *Pagellus affinis* are newly identified from Pakistan. *Acanthopagrus catenula* has long been incorrectly identified as *A. bifasciatus*, a species which has not been recorded from Pakistan. All species are briefly described and a key is provided for them.

Key words: *Acanthopagrus*, *Rhabdosargus*, *Sparidentex*, *Diplodus*, *Crenidens*, *Argyrops*, *Pagellus*, *Cheimerius*, Sparidae, Karachi, Pakistan

Introduction

The fishes belonging to family Sparidae, commonly known as porgies and seabreams, are widely distributed in tropical to temperate seas (Froese & Pauly, 2013). They are demersal inhabitants found from shallow coastal waters to relatively deeper waters; a few species also occur in brackish habitats (Randall, 1995). Juveniles of some sparid species are common in creeks and estuaries, sometimes forming schools, while the adults are mostly solitary in deeper waters (Verdiell-Cubedo *et al.*, 2007). Sparids are small to medium-sized fishes, diverse in general form, varying in shape from elongate to deep-bodied, with a dorsal profile from very steep to gentle sloping. They are highly variable in color, from silvery to blackish, yellowish with golden reflections, pinkish to reddish; some species have bars, stripes and spots. Generally, the species of family Sparidae are very important commercially and constitute an important part of the artisanal and industrial fisheries (Al Mamry *et al.*, 2009). Some species are used in aquaculture, and a few are also targeted in sports-fishing. All the sparid fishes are good tasting, and are not only consumed locally in Pakistan but also exported internationally and fetch high prices in local as well as in international markets.

As sparid species are commercially important, their biology and taxonomy have been well studied. Age, growth and reproductive biology of almost all sparid species have been done in many countries by different researchers (e.g. El-Agamy, 1989; Radebe *et al.*, 2002; Kailola *et al.*, 1993; Willis *et al.*, 2003; Hughes *et al.*, 2008; Al Mamry *et al.*, 2009; Kraljević *et al.*, 1996). The taxonomy and phylogeny of the family Sparidae has been revised several times (de la Herran *et al.*, 2001; Chiba *et al.*, 2009; Hanel & Sturmbauer, 2000), but remains controversial. Morphological characters such as body shape, arrangement of fins, color and identification marks (blotches, bars, etc.), dentition, scalation, spinous and soft fin-rays are all used in sparid fish identification. In all, dentition has been a key character to differentiate between different genera and species (Chiba *et al.*, 2009; Orrell *et al.*, 2002; Day, 2002). Molecular techniques have been proved useful in resolving most of the issues of the classification of the species of family sparidae (Chiba *et al.*, 2009).

Currently, more than 139 species in 36 genera of Sparidae are recognized (Eschmeyer, 2013). Many more sparid species have recently been added as a result of new descriptions and resurrecting previously known species (Iwatsuki, 2013): three species in *Crenidens* (Iwatsuki & MacLaine, 2013), six in *Rhabdosargus* (Tanaka & Iwatsuki, 2013), 20 in *Acanthopagrus* (Iwatsuki, 2013) and two in *Sparidentex* (Amir *et al.*, 2014). Nearly all the recently described species are the result of thorough investigation of the complexes within the family. The major complexes are found in *Acanthopagrus*, which has been divided into six morphological forms (Iwatsuki & Carpenter 2009). Recently two of the complexes, the *Acanthopagrus berda* complex and the *Acanthopagrus latus* complex have largely been resolved (Iwatsuki & Heemstra, 2009; Iwatsuki, 2013).

Several studies have been carried out on the taxonomy of fishes of Arabian Sea. Randall (1995) provided comprehensive species accounts and illustrations of 930 fishes, including 17 species of Sparidae. Manilo and Bogorodsky (2003) reported 18 species of Sparidae in 11 genera in their checklist of fishes from the Arabian Sea. However, these authors only provided a generalized checklist for the most common species of the Arabian Sea, and were largely based on the work of Fischer and Bianchi (1984).

Taxonomic work of fishes has remained a neglected subject in Pakistan, especially of marine fishes. Some sporadic work on the fishes of Pakistan has been carried out, mainly in the form of checklists (Qureshi, 1952, 1960, 1965; Jalil & Khalil-Uddin, 1981; Hoda, 1985, 1988). The fish fauna of Pakistan is rich and with high diversity of sparid fishes. Bianchi (1985) reported seven genera and nine species of Sparidae from Pakistan, three in *Acanthopagrus*; *A. berda*, *A. latus* and *A. bifasciatus*, and the remaining six genera with a single species each; *Sparidentex hasta* (Valenciennes in Cuvier & Valenciennes 1830), *Rhabdosargus sarba*, *Crenidens crenidens*, *Argyrops spinifer* (Forsskål 1775), *Diplodus sargus kotschy* (Steindachner 1876) and *Cheimerius nufar* (Valenciennes in Cuvier & Valenciennes, 1830). Hoda (1988) reported 10 species, adding *Rhabdosargus haffara* to the list. Amir *et al.* (2013) reported the first record of *Diplodus omanensis* Bauchot and Bianchi, 1984 and *Pagellus affinis* Boulenger, 1888 from Pakistan. In the present study, 14 sparid species occurring in the coastal waters of Pakistan are discussed along with their morphometric and lepidosis data, with the first records of five species, *Acanthopagrus arabicus*, *A. sheim*, *A. catenula*, *Diplodus capensis* and *Rhabdosargus haffara*.

Material and methods

Fishes were collected from various localities of Pakistani coast (Appendix), and were preserved in crushed ice and transported to the laboratory of Center of Excellence in Marine Biology (CEMB), University of Karachi and Pakistan Museum of Natural History (PMNH) for preservation and curation. Morphometric and meristic data of the specimens is given in Table 1. These data were used in the diagnoses and descriptions of the species. Few specimens of each species were also donated to Yukio Iwatsuki (Y. Iwatsuki) (Miyazaki University, Japan) in 2010 for identification and taxonomic studies. At time the second author was also working to resolve the taxonomy of sparid fishes of Pakistan, several new species were described and re-described by Y. Iwatsuki including *Acanthopagrus arabicus*, *A. sheim* and *Crenidens indicus*.

Counts and measurements follow Amir *et al.* (2013). Standard length is abbreviated as SL. A value was used for the ‘second anal-fin spine/third anal-fin spine length’, abbreviated as 2AS/3AS (Iwatsuki, 2013). Information regarding the current distribution of each sparid fishes was taken from Eschmeyer (2013). A key to the species of family sparidae from the coastal waters of Pakistan is also provided.

Acronyms used are as follow: MUFS, Division of Fisheries Science, Department of Marine Biology & Environmental Sciences, Faculty of Agriculture, University of Miyazaki, Japan; CEMB, Pisces, Centre of Excellence in Marine Biology, University of Karachi, Pakistan; PMNH, Pakistan Museum of Natural History, Islamabad; WWFH, West Wharf Fish Harbor, Karachi.

Results and Discussion

The present work records 14 species of Sparidae in eight genera from the coastal waters of Pakistan. The present work also records *Acanthopagrus arabicus*, *A. sheim*, *A. catenula*, *Diplodus capensis* and *Rhabdosargus haffara* for the first time from Pakistani coastal waters. Furthermore, the Marine Fisheries Department, Pakistan lists one more sparid species, *Boops lineatus*, from coastal waters of Pakistan (pers. comm.), but this needs confirmation.

Genus *Acanthopagrus* Peters, 1855

Peters, 1855: 428–466.

Diagnosis. Body deep and compressed, head large. Mouth slightly oblique. Dorsal fin spines strong, normally graduate, not filamentous. Front of both jaws with 4–6 conical teeth, followed by 3–5 rows of rounded molariform teeth; no single enlarged molar posteriorly. Preopercular flange and interorbital naked. Less than 5 scale rows between 5th dorsal-fin spine base to lateral line. Anal-fin spine strong, 2nd spine usually longer than 3rd spine. Twenty valid species, 4 in Pakistani waters.

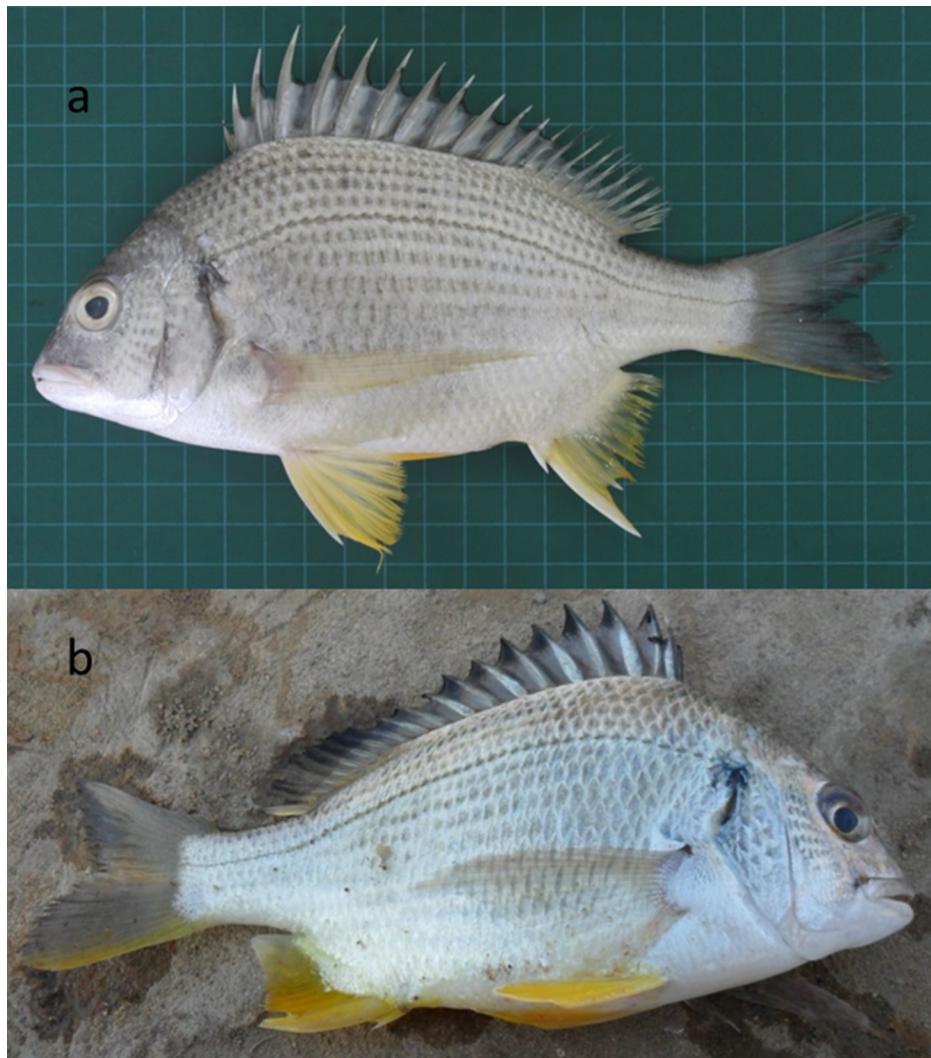


FIGURE 1. a) *Acanthopagrus arabicus*, PMNH 53006, 182 mm SL, WWFH, Karachi, b) Freshly caught *A. arabicus*, 80 mm SL, Manora, Karachi, showing blackish margin on dorsal-fin and more vivid yellow coloration in pelvic and anal fins.

***Acanthopagrus arabicus* Iwatsuki 2013**

Common name: Arabian Yellowfin Seabream

Local names: Dandya, Nehra (Sindh); Tintle (Balochistan)
(Figures 1 A, B & 15 E & F; Table 1)

Acanthopagrus arabicus Iwatsuki, 2013: 83, Fig. 4(b) (West Coast of Qatar, market specimen).

Diagnosis. Distinguished from other *Acanthopagrus* by the following combination of characters: dorsal-fin rays XI, 11 or XII–10; anal-fin rays III, 8; pored lateral line scales 43–45; scale rows above and below lateral line 4½–5½ and 11½–13½; scale rows between the fifth dorsal-fin spine base and lateral line 4½ ; no scales on

preopercular flange; gill rakers 14–18, 8–10 on the lower limb; 2nd anal-fin spine (2AS) longer than 3rd anal-fin spine, its ratio (2AS/3AS) 1.2–1.5 (mean 1.4); least infraorbital depth 4.9–5.5 % of SL; pelvic and anal-fins vivid yellow, fin rays in lower portion of caudal fin lobe yellow; black blotches absent just beneath inter-radial membranes between dorsal-fin rays, upper dorsal-fin membrane usually with darker margin; weak diffuse dark blotch at origin of lateral line.

Description. Body relatively deep and compressed, its depth 39.5–43.4 % of SL; head 32–33% in length; eye moderate in size, orbit diameter 7.3–8.8% of SL; dorsal profile of head steep and convex, ascending gently from just above eye; snout pointed; mouth slightly oblique, lips thick; maxilla reaching vertical at rear edge of pupil, longer than orbit diameter; upper-jaw length 12.6–15% of SL; lower jaw slightly included; six canine-like teeth in upper and lower jaws; three to five rows of well-developed molariform teeth in both jaws, smaller anteriorly and larger posteriorly; six (five to six) transverse rows of scales on cheek; preopercular flange without scales, posterior margin not serrated; low scaly sheath on bases of soft dorsal and anal-fin ray; dorsal-fin spines strong, first one is smaller (7.0–9.0% of SL), fourth one is longer (16.8–20.3% of SL); first anal-fin spine short (5.8–6.6% of SL), 2nd anal-fin spine heavy and long (19.2–21.3% of SL), 3rd anal-fin spine thin and shorter (13.2–15.7% of SL) than 2nd anal-fin spine; pectoral-fin tip reaching first anal-fin spine base, its length greater than head length; first pelvic-fin ray length clearly greater than third anal-fin spine; pelvic-fin spine longer than snout length.

Color of fresh specimens. Body bright silvery with pale greyish; belly whitish silvery; visible streaks along longitudinal rows of body scales; dorsal-fin greyish to hyaline and upper margin blackish; pelvic and anal-fins vivid yellow; fin rays in terminal lower caudal-fin lobe yellowish; pectoral-fins somewhat whitish hyaline, weak blotch at origin of pectoral-fin; conspicuous diffuse dark blotch at origin of lateral line.

Distribution. *Acanthopagrus arabicus* is known from Middle Eastern waters (The Gulf), except the Red Sea, from Duqum, southern Oman to Qatar, off the coasts of Kuwait to Trivandrum, southwestern India. Iwatsuki (2013) included Iran and Pakistan in the probable range of this species. The presence of this species from Pakistan is confirmed and it is likely to be found in India and Bangladesh.

Remarks. According to Iwatsuki (2013), Day's (1875) specimens [AMS B. 8265, 200 mm SL, Madras (=Chennai), India; B. 8280, 124 mm SL, Sind (=Pakistan)], known as *Coius datnia*, have now been determined as *Acanthopagrus longispinus* and *A. arabicus*, respectively. *Acanthopagrus latus*, formerly considered a widely distributed Indo-West Pacific species, has long been known to occur in the coastal waters of Pakistan, but is now recognized with a limited distribution along the Pacific coasts of Honshu, Shikoku and Kyushu Islands, Japan, Southern Korea, Taiwan, China and northern Vietnam. Iwatsuki (2013) reports 43–47 (mode 45) pored lateral line scales in 18 specimens of *A. sheim* and 42–45 scales (mode 43) in 26 specimens of *A. arabicus*. By contrast, we counted 43–45 (44) pored lateral line scales in four specimens of *A. arabicus* and 43–45 (44) in seven specimens of *A. sheim*.

***Acanthopagrus berda* (Forsskål, 1775)**

Common name: Picnic Seabream

Local names: Kala Dandya, Daleri (Sindh Coast); Tintle (Balochistan Coast)

(Figures 2 A, B & 15 C, D; Table 1)

Sparus berda Forsskål, 1775: 32 (Al-Luhayya [Luhaiya], Yemen, Red Sea).

Chrysophrys calamara Valenciennes in Cuvier & Valenciennes, 1830: 117 (Malabar, India).

Sparus calamara Cuvier, 1829: 182 (Vizagapatam, India, based on a drawing by Russell, 1803, pl. 92).

Chrysophrys robinsoni Gilchrist & Thompson, 1908: 170 (KwaZulu-Natal, South Africa, southwestern Indian Ocean).

Diagnosis. Distinguished from all congeners of *Acanthopagrus* by the following combination of characters: dorsal-fin rays XI, 11; anal-fin rays III, 8–9; pored lateral line scales 41–43; scale rows above and below lateral line 3½–4 and 11–12, respectively; scale rows between the fifth dorsal-fin spine base and lateral line 3½; no scales on preopercular flange; total gill rakers 14–16, 8–10 on the lower limb; 2nd anal-fin spine (2AS) longer than 3rd anal-fin spine, its ratio (2AS/3AS) is 1.3–1.5 (mean 1.4); least infraorbital depth 4.2–4.4 % of SL; a strongly curved concavity (more so in fishes >13cm SL) on ventral edge of first two infraorbitals above rear end of maxilla (Fig. 2 A, B); silvery to blackish and sometime dark blackish in color.

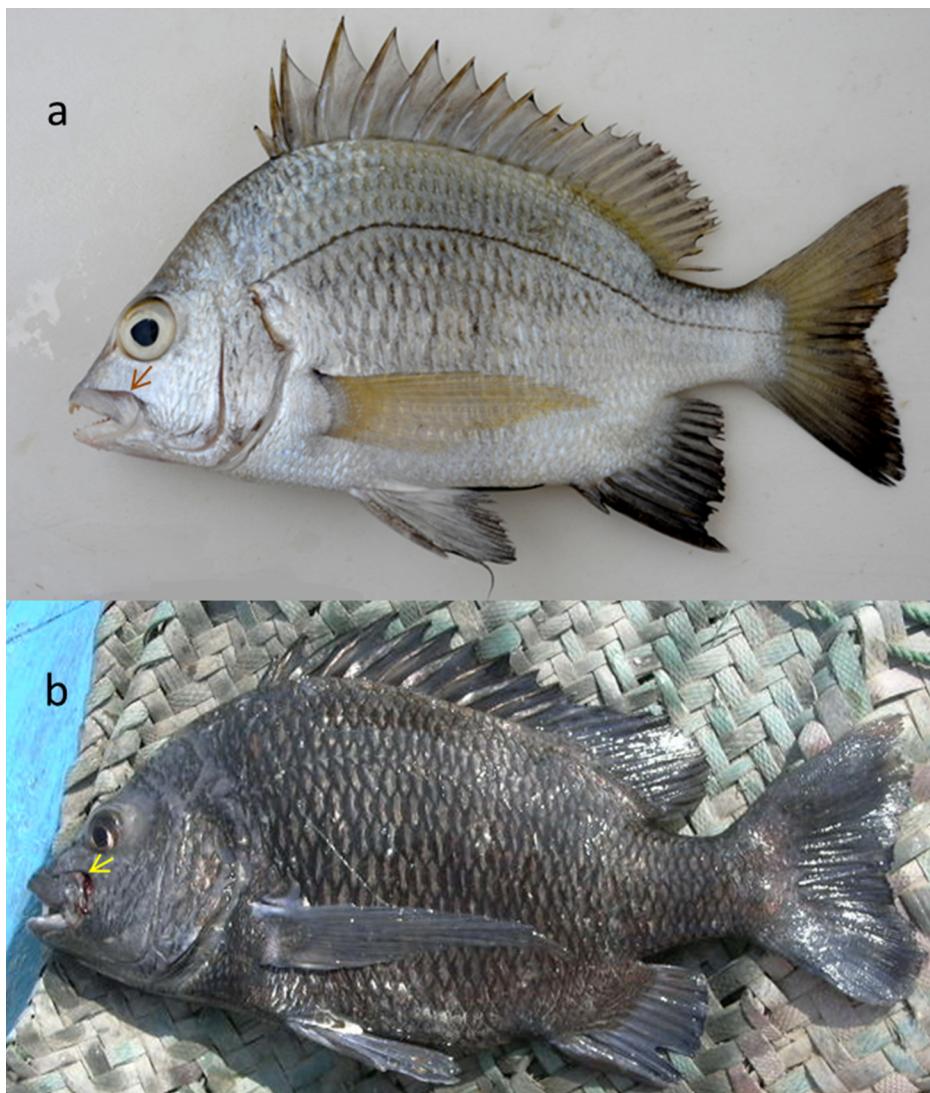


FIGURE 2. a) *Acanthopagrus berda*, MUFS39775 (formerly CEMB- P201200137), 133.6 mm SL, Keti Bunder, Thatta, Sindh. Position of arrow indicates a slight concavity on ventral edge of first two infraorbitals. b) *Acanthopagrus berda*, 330 mm SL, Manora, Karachi, showing black morph. Position of arrow indicates strong curved concavity on ventral edge of first two infraorbitals.

Description. Body compressed and deep, its depth 44–47% of SL; head large 35–36% of SL; anterodorsal profile ascending steeply, occipital profile weakly convex above eye; eye moderate in size, orbit diameter 8.5–10.2% of SL; mouth slightly oblique, lips thick; maxilla reaching to middle of eye; upper jaw length 12–17% of SL; lower jaw slightly short and included; in both jaws, 4 to 6 canine like relatively large, compressed and curved (slightly) teeth in front of each jaws, followed by 3–4 rows of molariform teeth in lower jaw and 4–5 rows of teeth in upper jaw. Molar teeth on posterior portion of each jaw relatively large. No scales between mouth and eye, 5–6 transverse rows of scales on preopercle; dorsal-fin spines hard and asymmetrical, first one is smaller (7.0–9.0% of SL), third, fourth and fifth spines are sub equal (17–21% of SL); first anal-fin spine short (6.0–8.0% of SL), 2nd anal-fin spine heavy and long (21–23% of SL), 3rd anal-fin spine thin and shorter (15–16% of SL) than 2nd anal-fin spine; pectoral-fin ray reaching nearly to the mid of the anal-fin base; pelvic-fin spine thin and hard, longer (19–20% of SL) than snout, first pelvic-fin ray slightly produced, somewhat less than half of head length.

Color of fresh specimens. This fish is locally known “kala-dandya” because it is silvery black (Fig. 2A) to blackish in appearance (Fig. 2B). Color pattern changes according to habitat, sometimes dull dark olive–brown above, dull whitish or dark silver and brazen reflections below; lower part of head pale white, the rear edge of opercle dark; iris dark brownish; posterior membrane of each scale pocket and posterior edge of exposed scale darkest, the former usually more than the latter; dorsal-fin dusky, membrane of spinous dorsal-fin darker, a few,

somewhat longitudinal, bands on membranes of soft dorsal; anal-fin with membranes of spinous portion and proximal half of soft portion usually black; caudal-fin membrane slightly darker brown than body, rear margin often darker; pectoral-fin yellowish to pale brown or dusky, faint dusky blotch at origin and axil; pelvic-fin pale dusky distally, membrane usually blackish.

Distribution. South Africa, Mozambique, the Red Sea, Persian Gulf, India, Pakistan, Phuket, Malaysia and near Singapore.

Remarks. The distributional range of *Acanthopagrus berda* is comparatively wider among other sparid species. This species can be distinguished from its congeners by having high body depth, $3\frac{1}{2}$ scale rows between fifth dorsal-fin base to lateral line and a strongly curved concavity of the ventral edge of the first two infraorbitals above the rear end of the maxilla. According to Iwatsuki and Heemstra (2010), the important diagnostic characters for *Acanthopagrus berda* are still apparent in the holotype (ZMUC-P 50555, approximately 21 cm SL) from the Red Sea off Luhaiya, Yemen, but that holotype now comprises only the head and left side skin. There are striking variations in the color pattern of *A. berda*, two of these are commonly found in Pakistani specimens; Figure 2A with silvery and brassy appearance collected from Keti Bunder, Thatta District and Figure 2B with completely blackish color, collected from Manora, Karachi.

Acanthopagrus catenula (Lacepède, 1801)

Common name: Bridled Seabream

Local names: Daro-Dandya, Daleri (Sindh); Shumala (Balochistan)

(Figures 3 & 15 A, B; Table 1)

Labrus catenula Lacepède, 1801: 426, 468, Pl. 3 (fig. 3) (Grand Gulf of India and seas near gulf [= Mauritius, southwestern Indian Ocean]); Bauchot, 1963:97; Bauchot & Daget, 1972:63.

Sparus mylio Lacepède, 1802: 41, 131 (Mauritius, southwestern Indian Ocean); Bauchot & Daget, 1972: 62–63 (Figure on Pl. 26 (fig. 2) of Lacepède, 1801).

Diagnosis. *Acanthopagrus catenula* is distinguishable from other *Acanthopagrus* species by following combination of characters: two conspicuous vertical black bars across the head, the first anterior one passing through eye and the second posterior bar from nape to operculum; dorsal-fin with black margin, hind margin of caudal fin with narrow and light black edge which usually disappear with the growth; dorsal-fin rays XI, 12; anal-fin rays III, 10; pored lateral line scales 47–48; scale rows above and below lateral line $4\frac{1}{2}$ – $5\frac{1}{2}$ and 12–13 $\frac{1}{2}$, respectively; scale rows between the fifth dorsal-fin spine base and lateral line $4\frac{1}{2}$ – $5\frac{1}{2}$; no scales on preopercular flange; gill rakers 17–19, 8–11 on the lower limb; 2nd anal-fin spine (2AS) slightly longer than 3rd anal-fin spine, its ratio (2AS/3AS) is 1.0–1.3; least infraorbital depth 5.6–6.8% of SL; upper jaw and lower jaws usually with 4–6 distinct incisor-like teeth in juveniles, 4 middle one becoming considerably larger and curved, forming canines in adults; molariform teeth strongly developed along both jaws, first to third rows of outer molar teeth extending to rear end of each side of upper and lower jaws.

Description. Body deep and compressed, its depth ranging 44.6–49.5% of SL; head large, 34–35% of SL; anterodorsal profile ascending gently, occipital profile weakly curved, eye moderate in size, orbit diameter 8–9.5% of SL; mouth somewhat oblique, lips thick; maxilla reaching to vertical below middle of pupil or little beyond; upper jaw length 12–17% of SL, lower jaw slightly included; cheek scales in 6–7 transverse rows; dorsal-fin spines strong, first spine smallest and slightly higher than half-length of 2nd, 2nd clearly shorter than 3rd, 4th and 5th spine longest; first dorsal-fin ray shorter than longest spine; first anal-fin spine short (5.2–6.9% of SL), much less than eye diameter (8.1–9.5 % of SL), 2nd spine longest (13.5–20 % of SL), 3rd anal-fin spine (12.9–15% of SL) less than first anal-fin ray; pectoral-fins (41–43% of SL) longer than head length, tip reaching beyond vertical at second or third anal-fin spine base; pelvic-fin clearly shorter than head, pelvic-fin spine (15.4–19 % of SL) longer than snout.

Colour of fresh specimens. Head and body silvery, sometimes with a black spot at center of each scale showing dotted lines. Interorbital, snout and infraorbital area yellow to orange with blackish. Dorsal, caudal and pectoral-fins yellow to orange shade; dorsal-fin with a wide black margin; caudal fin with a very fine black edge which disappears with age growth over 30 cm SL (Iwatsuki & Heemstra, 2011); pelvic and anal-fin rays dense black.

Distribution. Western Indian Ocean: Pakistan and Oman to South Africa, Madagascar, Mauritius and Rodriguez.



FIGURE 3. *Acanthopagrus catenula*, PMNH 53001, 221 mm SL, WWFH, Karachi, showing black margin on dorsal fin and caudal fin (fine black edges on rear end of upper and lower caudal fin lobes, more apparent in fresh specimens).

Remarks. The sparid species *Acanthopagrus catenula* has recently been resurrected as valid species by Iwatsuki and Heemstra (2011). *Acanthopagrus bifasciatus* is distributed in Red Sea (Israel, Egypt, Eritrea, and Saudi Arabia), Persian Gulf (Bahrain and Kuwait), and off southern Oman (not Gulf of Oman) whereas *A. catenula* is found in east coast of Africa, off the Horn of Africa to off Socotra Island of Somalia, including Kenya, Mozambique, South Africa, Madagascar, Mauritius, Rodriguez, Mascarene Islands and Madrakah, southern Oman. Iwatsuki and Heemstra (2011) believe that the area of southern Oman and Somalia is the zone of contact of *A. catenula* and *A. bifasciatus*. This record of *A. catenula* from Pakistan extends the range of this species and likely represents the northeastern record. The other distribution record for *A. catenula* is provided by Jawad *et al.* (2012) from the Oman Sea (Gulf of Oman). All the earlier workers presumably lumped *A. catenula* into *A. bifasciatus*, which was described from a specimen collected from Jeddah, Saudi Arabia, Red Sea by Forsskål (1775). According to Iwatsuki and Heemstra (2011), this species is not likely to occur in India, but it was reported from Sindh, Pakistan by Day 1875 (fig. 5, plate 34), and also appeared in Bianchi (1985) and Hoda (1988). In the present study, however, we did not find any specimens of *A. bifasciatus*.

In personal communication with Y. Iwatsuki during the review process, he is of the opinion that all the previously referred specimens of *A. bifasciatus* from Pakistan he examined during his visit to Pakistan (May 2012) were *A. catenula*, contrary to his published results (Iwatsuki & Heemstra, 2011) where he stated that *A. catenula* did not enter in Pakistani coastal areas and *A. bifasciatus* does. Furthermore, the historical illustrations in Figure 34-5 (noted as 15 inches) of Day (1875) collected from Sind, Pakistan strongly supports this observation by Y. Iwatsuki by having a clearly black upper margin of spinous dorsal fin, being a same character with growth (*A. bifasciatus* of Figure 2H of Iwatsuki & Heemstra, 2011). *A. bifasciatus* could be highly applied for *A. catenula*, unless true *A. bifasciatus* from Pakistan has been confirmed on practical specimens from Pakistan.

Acanthopagrus sheim Iwatsuki, 2013

Common name: Spotted Yellowfin Seabream

Local names: Dandya, Nehra (Sindh); Tintle (Balochistan)

(Figures 4 & 15 G, H; Table 1)

Acanthopagrus sheim Iwatsuki, 2013: 85, Fig. 4(c) (off Hawar Island, Oatar).

Diagnosis. Distinguished from all congeners of *Acanthopagrus* by the following combination of characters: Body relatively deep and thicker, its depth 42–45% and width at pectoral base 16–20% of SL. Dorsal-fin rays

XI–XII, 10–11 (mostly XI, 11); anal-fin rays III, 8; pored lateral line scales 42–44; scale rows above and below lateral line $4\frac{1}{2}$ – $5\frac{1}{2}$ and $11\frac{1}{2}$ – $12\frac{1}{2}$; scale rows between the fifth dorsal-fin spine base and lateral line $4\frac{1}{2}$; no scales on preopercular flange; gill rakers 16–18 whereas 9–10 on the lower limb; 2nd anal-fin spine (2AS) longer than 3rd anal-fin spine, its ratio (2AS / 3AS) 1.2–1.6 (mean 1.4); least infraorbital depth 4.9–6.9% of SL; two to three black blotches just beneath inter-radial membranes between dorsal-fin rays, upper dorsal-fin membrane usually with darker margin; pelvic and anal-fins yellow; black streaks usually present on inter-radial membranes between yellow anal-fin rays; weak diffuse dark blotch at origin of lateral line.



FIGURE 4. *Acanthopagrus sheim*, PMNH 53008, 196 mm SL, WWFH, Karachi. Faint yellowish color in pelvic and anal fin and whitish lower margin of lower caudal lobe.

Description. Body deep, compressed; head 31–37% of SL, eye moderate in size, orbit diameter 7.9–9.4% of SL; dorsal profile of head steep and convex ascending sharply from just above eye; snout pointed; mouth slightly oblique, lips thick; maxilla reaching vertical at rear edge of pupil, longer than orbit diameter; upper-jaw length 12.8–14.6% of SL; lower jaw slightly included; four to six incisor like teeth (canines like in adults) in upper and lower jaws; three to five rows of well-developed molariform teeth in each side of both jaws, smaller anteriorly and larger posteriorly; four to five transverse rows of scales on cheek; preopercular flange lacking scales, posterior margin weakly serrated; low scaly sheath on bases of soft dorsal and anal-fin ray; dorsal-fin spines strong, first one is smaller (6.5–8% of SL), 4th one is longer (16–20.2% of SL); first anal-fin spine short (5.1–7.3% of SL), 2nd anal-fin spine heavy and long (17.1–22 % of SL), 3rd anal-fin spine thin and shorter (12.6–16.5 % of SL) than 2nd anal-fin spine; pectoral-fin tip nearly reaching level with first anal-fin spine base vertically, its length greater than head length; first pelvic-fin ray length clearly greater than third anal-fin spine; pelvic-fin spine longer than snout length.

Color of fresh specimens. Head and body silvery pale grey. Belly whitish silvery. Faint streaks along longitudinal rows of body scales in comparison to visible streaks in *A. arabicus*. Conspicuous diffused dark blotch at origin of lateral line. Dorsal-fin greyish to hyaline and upper margin of dorsal-fin membrane little blackish, dorsal-fin membrane between spines and soft rays with two to three black spots. Pelvic and anal-fins light yellow, but not bright yellow as in *A. arabicus*. Black streaks on inter-radial membranes between yellow anal-fin rays. Caudal fin blackish with some yellowish to greyish color, fin rays in terminal lower caudal fin lobe whitish. Pectoral-fins somewhat whitish hyaline, pale blotch at origin of pectoral-fin.

Distribution. *Acanthopagrus sheim* is only known from The Gulf and Pakistan. This species is very likely to occur in Iran and India.

Remarks. One of the specimens (AMS B. 8280, 124 mm SL, from Sind, Pakistan) in Iwatsuki (2013) was identified as *A. arabicus* and erroneously listed in the description of *A. sheim* in the “other specimens” in the same publication. *Acanthopagrus sheim* can be easily mistaken for *Acanthopagrus arabicus* for its nearly identical

appearance, sculation and morphometric proportions, but the local fishermen of Sindh coast consider them of different types. *A. sheim* is locally known as Chaann and *A. arabicus* is called Nehra. There are also some color variations in this species compared to the specimens listed by Iwatsuki (2013).

Genus *Argyrops* Swainson, 1839

Argyrops (subgenus of *Chrysophrys*) Swainson, 1839: 171, 221.

Diagnosis. Body deep and strongly compressed, head large. Mouth slightly oblique. First two dorsal-fin spines very short, 3rd to 5th spine or 7th flattened and much elongated, filamentous in juveniles. In front of both jaws, 4–6 conical teeth, followed by 2 rows of molar like teeth in both jaws, those of outer row bluntly conical anteriorly. No single greatly enlarged molar present posteriorly. Preopercular flange naked; interorbital with scales, scales reaching beyond level of vertical diameter of eye. Four valid species, one in Pakistani waters.

Argyrops spinifer (Forsskål, 1775)

Common name: King Soldierbream

Local names: Dhand (Sindh); Malelak (Balochistan)

(Figures 5 & 15 V; Table 1)

Pagrus ciliaris von Bonde, 1923: 19, Pl. 5 (KwaZulu-Natal, South Africa, southwestern Indian Ocean).
Sparus spinifer Forsskål, 1775: 32, xi (Jeddah, Saudi Arabia, Red Sea.)

Diagnosis. This species can be distinguished from other sparid species by the following combination of characters: body deep and compressed, its depth 49.4–53.4% of SL; head large, 30.5–34% of SL. Profile of head very steep, the section between the eyes and the mouth being almost straight, interorbital scaly; first two dorsal spines very short; third to seventh spines flexible, flattened and prolonged into long filaments (these spines elongate and filamentous in juveniles to young, get shorter with age, reaching sometimes beyond caudal fin).

Description. Dorsal rays XII, 10; anal rays III, 8; pectoral rays 15; lateral line scales 49–53; gill rakers small 15–16, ten on lower arch (Figure 15Z); Body deep and compressed, its depth 1.9–2.0 in SL; antero-dorsal profile of head steep with a slight bump before eye (mainly in large adult male, developing a grotesque hump on nape); eye moderate in size, orbit diameter 9.2–10.2% of SL; mouth slightly oblique; upper jaw length 12.1–14.4% of SL; maxilla reaching to vertical through front border of eye; front of upper and lower jaws with four canine teeth; side of each jaws (upper and lower) with two to three rows of molars; the first three teeth in outer row of upper jaw (just after the canine) are blunt conical teeth, becoming molariform posteriorly. Scales on upper part of head extending in a triangular prolongation to between eyes (Figure 5b) cheeks with 5–6 transvers row of scales; preoperculum with 5 transverse rows of scales; first anal spine less than half length of 2nd, which is sub equal to 3rd anal spine and less then snout length. Pectoral-fins length longer than head length; pelvic-fins with the first ray produced and near to head length; caudal fin weakly forked.

Color of fresh specimens. Head and body silvery pink with gold-lines (scales centres golden and pinkish, edges silvery); snout and nape area more pinkish; operculum with silvery and pinkish shade; pectoral, pelvic, anal and caudal fins are light pinkish and hyaline, some black streaks in anal-fins. Diffused red spot in axil of pectoral-fin. Overall the body color is pinkish-red, especially the head, while the flanks and underside are paler or white.

Distribution. Red Sea, Indo-West Pacific: East Africa, Madagascar and western Mascarenes east to Indonesia, north to South China Sea and south to northern Australia. This species has been reported from Pakistan (Bianchi, 1985; Hoda, 1988; Jalil & Khalil-Uddin, 1981) and can presumably be found in wider range in Iran, India, Bangladesh and Sri Lanka.

Remarks. Heemstra and Heemstra (2004) reported XI–XII, 10–11 dorsal-fin rays and 4–6 canine teeth on anterior portions of both jaws in this species. Weber and De Beaufort (1936) recorded XI, 10 dorsal-fin rays, six smaller canines in the lower jaw and 2nd to 5th dorsal spine prolonged into long filaments. Contrary to Weber & Beaufort (1936), our specimens have XII, 10 dorsal-fin rays and 4 canine teeth in both jaws, and third to seventh dorsal spines prolonged into long filaments.



FIGURE 5. a) *Argyrops spinifer*, MUFS39739 (formerly CEMB- P 201200102), 199.4 mm SL, WWFH, Karachi. First two dorsal spines minute, third to sixth somewhat elongated, b) scales on upper part of head, extending in a triangular prolongation to between eyes (*A. spinifer* 218 mm SL, WWFH, Karachi).

Genus *Cheimerius* Smith, 1938

Cheimerius Smith [J. L. B.] 1938: 292.

Diagnosis. Body moderately deep, compressed, head profile gently convex. No molariform teeth, 4–6 caniniform teeth at front of both jaws followed by a narrow band of small villiform teeth, the outer lateral series enlarged. The first two dorsal spines short, 3rd to 7th elongate (relatively shorter in adult). Scales on top of head reaching to beyond a line through middle of eye. Two valid species, one in Pakistani waters.

Cheimerius nufar (Valenciennes, 1830)

Common name: Santer Seabream

Local names: Dandya (Sindh); Shumala, Tintle (Balochistan)

(Figures 6 & 15 W; Table 1)

Dentex albus Gilchrist, 1914: 128, Fig. (KwaZulu-Natal coast, South Africa, southwestern Indian).

Dentex fasciolatus Valenciennes in Cuvier & Valenciennes, 1830:242 (Red Sea); Bauchot & Daget, 1972: 65.

Dentex miles Gilchrist & Thompson, 1908: 155 (KwaZulu-Natal, South Africa, southwestern Indian Ocean).

Dentex nufar Valenciennes in Cuvier & Valenciennes, 1830: 240 (Red Sea; Massawa, Eritrea, Red Sea); Bauchot & Daget, 1972: 49.

Dentex variabilis Valenciennes in Cuvier & Valenciennes, 1830: 241 (Red Sea); Bauchot & Daget, 1972: 67.



FIGURE 6. *Cheimerius nufar*, MUFS39834, 297.5 mm SL, WWFH, Karachi. Pinkish tinge and faint bars on the body, first two dorsal spines are shorter and third to nine are elongated.

Diagnosis. *Cheimerius nufar* has an elongate and almost oval shaped body, arched dorso-ventrally. Body with silvery sheen and five broad reddish/pinkish crossbars, more apparent in juvenile stage and in live specimens. First two dorsal spines very short, third one longest than remaining spines progressively shorter. Dorsal rays XII,10; anal rays III,8; pectoral rays 16, first ray slightly produced; lateral line scales 57–60; scales above lateral line to base of fourth dorsal spine $6\frac{1}{2}$; jaws with caniform teeth; gill rakers long, 21 in number, 15 on lower arch (Figure 15Z1).

Description. Body moderately deep and compressed, its depth 37% of SL; head large, 32% of SL; mouth somewhat oblique; lips thick; snout somewhat pointed, two nostrils just in front of both eyes; upper jaw protruding slightly in front of lower jaw; maxilla reaching to bellow the starting of eye level; at front of upper jaw 4 and in lower jaw 6 canine teeth, outer series of lateral teeth conical and compressed with parallel rows of villiform teeth; third dorsal spine longest and 27–29 % of SL, first anal spine shorter(4.7–7.0% of SL); 2nd and 3rd anal spines sub equal, 9% of SL; pectoral-fins long, 34% of SL, reaching to above first anal-fin base; caudal fin deeply forked.

Color of fresh specimens. Silvery pink with five pink vertical bars on body and a pink through eye, this coloration fade out soon after its death; front of snout and part of upper jaws pink.

Distribution. Red Sea, western Indian Ocean: East Africa south to Cape Province (South Africa), east to Madagascar and western Mascarenes (Réunion, Mauritius). Pakistan is presumably the easternmost distributional record for this species.

Remarks. *Cheimerius nufar* was first described as *Dentex nufar* by Valenciennes (pg. 240, Cuvier & Valenciennes, 1830) from the Red Sea. Heemstra and Heemstra (2004) mentioned XI–XII and 10–11 dorsal-fin rays, 59–63 lateral line scales and 13–16 lower gill rakers. Randall (1995) reported 58–63 lateral line scales and 9 + 13–15 gill rakers for this species. Smith and Smith (1986) recorded 8–11 + 13–16 gill rakers for this species. Our specimens have XII, 10 dorsal-fin rays, 57–60 lateral line scales and 6 + 15 gill rakers, 15 on lower arch. Although, all our characters of dorsal-fin rays, lateral line scales and gill rakers are in conformity to the reported range for these characters but the lowest count of 6 gill rakers on the upper arch in our specimens is worth reporting and will need examination of additional specimens to draw further conclusion as an important character for Arabian Sea population.

Genus *Crenidens* Valenciennes, 1830

Crenidens Valenciennes [A.] in Cuvier & Valenciennes, 1830: 377.

Diagnosis. Body oblong oval to deeper, a little compressed. Head moderate, upper profile of head in juveniles gently convex to dorsal fin origin. Mouth relatively small with two to three series of incisor-like teeth on both jaws,

incisor-like teeth with five points well pointed initially but often worn out to form a flat cutting edge its outer teeth movable with brown edges and several rows of small molars inside of incisor-like teeth at posterior part of jaws (Iwatsuki & MacLaine, 2013). Preopercle flange naked, sculation on top of head not extending beyond vertical diameter of eye. Three valid species, one in Pakistani waters.

***Crenidens indicus* Day, 1873**

Common name: Karanteen seabream

Local names: Kissi, Karo-dandya (Sindh); Nawar (Balochistan)

(Figures 7 & 15 M & N; Table 1)

Crenidens indicus Day, 1873: clxxxvi (Northern Indian Ocean); Menon & Yazdani, 1968:145.

Diagnosis. The species *Crenidens indicus* is distinguished from its congeners with the following combination of characters: dorsal-fin rays XI,11; anal-fin rays III,10; pectoral-fin rays 14; scale rows above lateral line $5\frac{1}{2}$ – $6\frac{1}{2}$, below $13\frac{1}{2}$; pored lateral line scales 49–50; gill rakers $7 + 1 + 10 = 18$; the ratio of 2AS/3AS 1.1–1.3; incisor-like teeth with five points, three middle points large in size, but two outside points much smaller and often worn out (Figure 15 M & N); a dark spot located dorsally in the pectoral-fin axil.



FIGURE 7. *Crenidens indicus*, MUFS 39671 (formerly CEMB- P 2012-00009), 221 mm SL, WWFH, Karachi. A typical *C. Indicus* body, having deep body with $6\frac{1}{2}$ scale rows between dorsal-fin base and lateral line.

Description. Counts and proportional measurements of four specimens of *Crenidens indicus* are given in Table-1. Body deep and compressed, its depth 43.6–47.5% of SL; head length is small 27.3–30.4% of SL rostro–occipital profile of head convex from snout tip to first dorsal-fin spine base but weakly concave just above the interorbital region (Figure 7); orbit diameter subequal to interorbital width; mouth small to moderate and terminal; maxilla naked, posteriorly not reaching vertical at front edge of eye; two to three series of incisor-like teeth on both jaws followed by three to four rows of small molars inside of incisor-like teeth at posterior part of jaws (Figure 15 M & N); gill rakers 18, 10–11 on lower arch, hind margin of preopercle generally rounded and feebly serrated; no scales on preopercle flange; predorsal length less than body depth, and clearly less than dorsal-fin base length; dorsal-fin spines strong, first one is smaller (5.6–7.4% of SL), 3rd to 6th are subequal (15.2–18.7% of SL); first anal-fin spine short (6–8.3% of SL); 2nd and 3rd anal-fin spines are sub equal and 15.7–17.8% and 12.9–16.6% respectively of SL. caudal peduncle deep 12.2–12.9% of SL; caudal fin weakly forked, upper lobe is little longer than the lower lobe.

Color of fresh specimens. Head silvery but anterior portion with more grayish; body silvery with a dusky spot in scale centers, resulting in a striped effect; belly whitish; a blackish diffuse spot dorsally in pectoral-fin axil and extending above pectoral fin base; dorsal and caudal fin dusky distally. Anal-fin and pelvic-fin grayish; pectoral-fin hyaline and a little dusky.

Distribution. Southern Arabian Peninsula (sometimes in Red Sea), through the Persian Gulf, to the coasts of Iran and Pakistan.

Remarks. The genus *Crenidens* had been recognized with a single species and two subspecies (Bauchot & Smith, 1983; Randall, 1995; Manilo & Bogorodsky, 2003): *Crenidens crenidens crenidens* (Forsskål, 1775) and *Crenidens crenidens indicus* Day, 1873. Day (1875) considered *Crenidens macracanthus* Günther, 1874 as a junior synonym of *Crenidens c. indicus*. The recent study of Iwatsuki and Maclaine (2013) revealed three valid species in this genus. *Crenidens crenidens* is distributed from the Red Sea, East Africa along the east coast of Africa to Aliwal Shoal and Algoa Bay in South Africa (Heemstra & Heemstra, 2004). *Crenidens indicus* was reported to occur along the coast of India and Arabian Sea (Bauchot & Smith, 1983). But according to Iwatsuki and Maclaine (2013) *C. indicus* is either not distributed along the coast of India or it might be an extremely rare occurrence in that area. Accordingly, *C. indicus* is distributed from southern Arabian Peninsula (sometimes in Red Sea), through the Persian Gulf, to the coasts of Iran and Pakistan.

Genus *Diplodus* Rafinesque, 1810

Diplodus Rafinesque, 1810: 26, 54.

Diagnosis. Body oval, deep and compressed, head moderate. Mouth small and slightly oblique and somewhat protecile. Dorsal fin spines strong, normally graduate, not filamentous. In front of both jaws more than 6 enlarged incisiform teeth, followed by 1–3 rows of small molars. Preopercle flange and interorbital naked. More than 5 scale rows between 5th dorsal fin spine base to lateral line. Sixteen valid species, two in Pakistani waters.

Diplodus capensis (Smith, 1844)

Common name: Cape Porgy

Local names: Kissi, Kukkidia (Sindh); Tintle (Balochistan)

(Figures 8 & 15 O, P; Table 1)

Sargus capensis Smith, 1844: no pagination, Pl. 23 (fig. 2) (Southeastern coast of South Africa, southwestern Indian Ocean).

Diagnosis. Distinguished from its congeners by the following combination of characters: dorsal-fin rays XII, 13–14; pectoral-fin rays 16; anal-fin rays III, 13; pored lateral line scales 55–58; scale rows above and below lateral line 7½ and 17½; scale rows between the 5th dorsal-fin spine base and lateral line 6½ ; no scales on preopercular flange; gill rakers 17–18, 9–10 on the lower limb; 2nd anal-fin spine (2AS) subequal to 3rd anal-fin spine, its ratio (2AS/3AS) 1.0–1.3 (mean 1.1); least infraorbital depth 8.0–9.3% of SL; ten narrow dusky bars on upper two thirds of body (very visible in juvenile stages), a large black blotch anteriorly on top of caudal peduncle extending to ventral margin.

Description. Counts and proportional measurements of *Diplodus capensis* are shown in Table 1. Body deep and compressed, its depth 44.9–49.5% of SL; head somewhat small 28.9–34.6% of SL; dorsal profile of head slightly convex; mouth small and horizontal; maxilla reaching to below anterior edge of eye completely hidden under suborbitals when mouth closed; scale rows 7 on cheek; gill rakers small and 17–18 in number, nine to ten on lower arch; four pairs of projecting incisor teeth in upper jaw and lower jaw; side of jaws with small rows of molar teeth (three to four pairs in upper jaw and two to three rows in lower jaw); first dorsal spine is smallest (4.4–6.8% of SL) while fourth and fifth (13–15.7% of SL) longest; first anal-fin spine short (6.9–7.8% of SL), 2nd and 3rd anal spines subequal (approx. 10% of SL); caudal fin forked; upper lobe of caudal fin is slightly longer than lower one; pectoral-fins reaching to anal spine.



FIGURE 8. *Diplodus capensis*, MUFS 39677 (formerly CEMB-P 2012-00015), 221 mm SL, WWFH, Karachi. A large dorso-lateral black blotch on anterior portion of caudal peduncle reaching to below the lateral line.

Color of fresh specimens. Head and body silvery to brassy; dorsal, caudal, pelvic and anal-fins are dusky gray, pectoral-fins hyaline, pelvic-fins blackish gray; a small black spot just above the pectoral-fin axil; a diffused blackish spot on the scales where the lateral line begins. Ten narrow dusky bars on upper two-thirds of body (very visible in juvenile stages); a large black blotch anteriorly on caudal peduncle, usually extending to both sides of ventral margin.

Distribution. Southeastern Atlantic: Angola to South Africa; southwestern Indian Ocean: South Africa, Madagascar, Mauritius, Oman, Iran and Pakistan.

Remarks. Bianchi (1985) reported *Diplodus sargus kotschy* from Pakistan. Randall (1995), later on, reported *Diplodus sargus kotschy* (now a synonym of *D. sargus*) from Arabian Gulf to northwestern India and *Diplodus sargus capensis* (now *Diplodus capensis*) from Angola, South Africa, southern Madagascar and Oman. However, *Diplodus sargus* is currently known from Mediterranean Sea, Black Sea and eastern Atlantic (Madeira) whereas *D. capensis* inhabits Angola to South Africa, Madagascar, Mauritius (Mascarenes) and Oman, (Eschmeyer, 2013). Our specimens closely fit the description of *Diplodus capensis* although there are some variations from the nominal taxon. Heemstra and Heemstra (2004) mentioned XII, 14–15 dorsal-fin rays, 16–17 pectoral-fin rays and anal-fin rays III, 13–14. Randall (1995) reported 14–15 soft dorsal rays, 16–17 pectoral rays, 13–14 anal-rays, lateral line scales 62–72, gill rakers 6–8 +8–11 and body depth 2.0–2.25 of SL. In our specimens there are XII, 13–14 dorsal-fin rays, 16 pectoral-fin rays, 13 anal-fin rays, 55–58 pored lateral line scales, gill rakers 17–18, 9–10 on the lower limb and body depth 2–2.25 of SL.

Day (1875) reported *Diplodus noct* (Valenciennes) from Red Sea (very common at Suez) to the coast of Balochistan and Sind. De la Paz (1978) considered *D. noct* and *D. kotschy* from the Red Sea as sister species; however, Bauchot and Smith, in Fischer and Bianchi (1984) treated them as subspecies (Randall, 1995). Apparently, *Diplodus noct* is restricted to the Red Sea whereas *D. capensis* has wider distribution.

Diplodus omanensis Bauchot & Bianchi, 1984

English Name: Oman Porgy

Local names: Kissi (Sindh); Tippuch (Balochistan)
(Figures 9 & 15, Q; Table 1)

Diplodus cervinus omanensis Bauchot & Bianchi, 1984: 103, Fig. A (Kuria Muria Bay, Arabian Sea).

Diagnosis. Distinguished from other *Diplodus* by the following combination of characters: dorsal-fin rays XI, 11–12; anal-fin rays III, 10; pored lateral line scales 52; scale rows above and below lateral line 9½ and 17½; scale rows between the fifth dorsal-fin spine base and lateral line 8(2AS) and third anal-fin spine subequal; least infraorbital depth 8.5% of SL; five broad black bars on head and body; one on head through eyes and four on rest of the body.

Description. Counts and proportional measurements of *Diplodus omanensis* are shown in Table 1. Head and body deep, its depth 37.2% of SL; head large, 37.5% of SL; dorsal profile of head moderately steep; scale rows 5 on cheek; mouth small and horizontal, the maxilla reaching to below anterior margin of eyes and completely hidden under suborbitals when mouth closed; gill rakers small and 14 in number, eight on lower arch; six pairs of projecting incisor teeth in upper jaw and four pairs in lower jaw; posterior part of jaw with three rows of small molars; first dorsal spine is smallest (4.5% of SL) while fourth (14.5% of SL) longest; first anal-fin spine short (4.8% of SL), 2nd and 3rd anal spines subequal (10% of SL); caudal fin forked; upper lobe of caudal fin is slightly longer than lower one; pectoral-fins reaching to anal spine (Amir *et al.*, 2013).

Color of fresh specimens. Head and body with silvery grayish to black tinge; five broad black bars from head to body, first one on head through eyes and four on body, first and second indistinctly bifurcated ventrally; two indistinct short narrow black bars ventrally in first silver interspace on body and one indistinct ventrally after second; snout partly grayish and black; margins of fins are also partly yellow and blackish, anal-fins are more blackish.

Remarks. *Diplodus omanensis* was first recorded from Pakistan by Amir *et al.* (2013). This species was initially considered to be a subspecies *Diplodus cervinus omanensis*, described from Oman. *Diplodus omanensis* was known to be endemic to Oman but its distribution range has been extended up to Iran and Pakistan. The other subspecies *Diplodus cervinus hottentotus* (Smith, 1844) occurs only in southern Mozambique and South Africa (Randall, 1995).



FIGURE 9. *Diplodus omanensis*, CEMB- P 2012-00077 (formerly MUFS 39722), 310 mm SL, WWFH, Karachi. Five transverse black bars from head to body.

Genus *Pagellus* Valenciennes, 1830

Pagellus Valenciennes in Cuvier & Valenciennes. 1830: 169.

Diagnosis. Body mainly pink. Head between eyes scaly, scales reaching to beyond the level of vertical eye diameter. Dorsal-fin spine 12. Six valid species, one in Pakistani waters.

***Pagellus affinis* Boulenger 1888**

Common name: Arabian Pandora
(Figures 10 & 15 X, Y; Table 1)

Pagellus affinis Boulenger 1888: 659 (Muscat, Oman, Arabian Sea).

Diagnosis. Body elongate and slightly compressed, its depth 2.6–3.0 times of SL. Dorsal rays XII, 10; anal rays III, 9–10; pectoral rays 16; lateral line scales 59; scales above lateral line to base of fifth dorsal spine 6½; gill rakers 16, nine on lower arch. Scalation on top of head reaching to beyond vertical diameter of eyes.



FIGURE 10. *Pagellus affinis*, CEMB-P 2012-00078, 183 mm SL, WWFH, Karachi, fusiform, reddish/ pinkish appearance.

Description. Body elongate, somewhat fusiform; head profile convex from upper lip to origin of dorsal-fin; eyes large, mouth terminal and little protrusible; no scales on preopercular flange, nor on soft dorsal and anal-fins; scalation of top of head reaching to beyond vertical diameter of eyes; sharp teeth, small molars in jaws; dorsal spines slender and thin, fifth longest; last dorsal and anal-fin soft rays a little bit longer than penultimate rays; 2nd and 3rd anal spines subequal; caudal fin forked; pectoral-fins long, reaching to anterior origin of anal-fin. Scaly sheath at base of dorsal and anal fins.

Colour in fresh specimen. Overall appearance silvery with reddish tinge in most parts of the body. Reddish colour in snout part of the head; pinkish or reddish and silvery in colour combination with a light blue spotted lines running along the scale-lines above and below the lateral line.

Distribution. Western Indian Ocean including, Persian Gulf to the Gulf of Aden and northern coast of Somalia, as far western coast of India and Pakistan.

Remarks. The species *Pagellus affinis* was first recorded from Pakistan by Amir *et al.* (2013). The single specimen of *P. affinis* (CEMB-P 2012-00078, 183 mm SL) shows nine anal-fin rays, while the comparative Omani specimens of *P. affinis* (MUFS 33502–33506, 33668, 33670–33671, 8 specimens, 188–232 mm SL) and of other workers (Bauchot & Smith, 1983; Randall, 1995) indicated 10 anal-fin rays for this species. The nine counts of anal-fin rays in the Pakistani specimen will require examination of additional specimens from this region to further elaborate on this character as either character variation or the presence of a new isolated population in this region. Lacking additional specimens from our region, we cannot provide a direct comparison of our specimen on the basis of this single character.

Genus *Rhabdosargus* Fowler, 1933

Rhabdosargus (subgenus of *Diplodus*) Fowler, 1933: 175, 178

Diagnosis. Body deep and compressed, head large; mouth slightly oblique. Dorsal-fin spines strong, normally

graduate, not filamentous. In front of both jaws, 4–6 conical teeth, followed by 3–5 to five rows of rounded molar like teeth, one enlarged molar posteriorly on both sides of each jaw. Preopercular flange and interorbital naked. More than 5 scale rows between 5th dorsal-fin spine base to lateral line. Six valid species, two in Pakistani waters.

Rhabdosargus sarba (Forsskål, 1775)

Common name: Gold-lined Seabream

Local names: Kabardan, Dandya (Sindh); Chah (Balochistan)

(Figures 11 & 15 R, S; Table 1)

Chrysophrys aries Temminck & Schlegel, 1843: 67, Pl. 31 (Nagasaki, Japan); Boeseman, 1947:72.

Sargus auriventris Peters, 1855: 435 (Mozambique).

Sparus bufonites Lacepède, 1802: 47, 141, Pl. 2 (fig. 3) (Indo-Pacific).

Chrysophrys chrysargyra Cuvier, 1829: 182 (India).

Chrysophrys chrysargyra: Valenciennes in Cuvier & Valenciennes, 1830:107.

Sparus maurosparus Walbaum, 1792: 301 (Red Sea).

Chrysophrys natalensis Castelnau, 1861: 25 (KwaZulu-Natal, South Africa).

Sparus psittacus Lacepède, 1802: 47, 141 (Indian seas); Bauchot & Daget, 1972: 62).

Sparus sarba Forsskål, 1775: 31, xi, (Jeddah, Red Sea); Nielsen, 1974: 67; Klausewitz & Nielsen 1965: 16.

Roughleyia tarwhine Whitley 1931: 319 (Batchelor, Macleay River, New South Wales, Australia); Stead 1908: 78, Pl. 47.

Diagnosis. Distinguished from all congeners of *Rhabdosargus* by the following combination of characters: dorsal-fin rays XI, 13; anal-fin rays III, 11; scale rows above and below lateral line $6\frac{1}{2}$ – $7\frac{1}{2}$ and $11\frac{1}{2}$ – $12\frac{1}{2}$; scale rows between the fifth dorsal-fin spine base and lateral line $6\frac{1}{2}$ – $7\frac{1}{2}$; pored lateral line scales 57–59; no scales on preopercular flange; gill rakers 13–16, on the lower limb 8; head and body silvery–black; body with yellow or golden longitudinal lines, as well as yellow or yellowish coloration of pelvic and anal-fins.



FIGURE 11. *Rhabdosargus sarba*, MUFS39628, 167.3 mm SL, Ibrahim Heydri, near Korangi Creek, Karachi. Silvery with prominent longitudinal golden-lines.

Description. Body deep, its depth 40.7–44.3% of SL; head large, 30.0–34.3% of SL; anterior profile of head somewhat convex, arched evenly between snout tip and dorsal-fin origin; posterior tip of maxilla reaching beyond vertical at middle of eye; eye moderate in size, orbit diameter 7–10% of SL; mouth slightly oblique, lips thick; upper jaw length 13.2–15.4% of SL; lower jaw slightly short and included; six incisiform teeth at front of upper and lower jaws; molars in 5–6 regular series on each side of upper jaw, and in three irregular series on each side of lower jaw, increasing in size gradually from front to back in each jaw, the posteriormost molar of each jaw on each side greatly enlarged; gill rakers short; 4–5 transverse rows of scales on preopercle, six to seven on cheek; interorbital entirely naked; dorsal spines strong, first spine shortest (4.2–5.9), 4th and 5th spine usually longest; first

dorsal-fin soft ray longest but shorter than longest spine; first anal-fin spine much shorter than orbit diameter; 2nd and 3rd anal-fin spine subequal; dorsal and anal fins with scaly sheath along their base; pectoral-fin tip reaching or little beyond to first anal-fin spine base vertically, and the length of pectoral-fin clearly longer than head; pelvic-fin spine longer than snout; caudal fin weakly forked.

Color of fresh specimens. Head and body silvery-yellowish black; body with yellow or golden longitudinal lines; eye yellow with dark area; operculum silvery; yellow or yellowish coloration of pectoral, pelvic and anal-fins; edges of dorsal and caudal fins are grayish, sometimes golden shade on caudal fin just after the caudal peduncle; pectoral-fins hyaline with light yellowish shade; chin and belly silvery-white.

Distribution. Red Sea, Indo-West Pacific: East Africa, South Africa, Mozambique Channel, Seychelles, Madagascar and Mascarenes, east to Philippines, north to southern Japan, south to northern Australia. This species has been reported from Pakistan (Bianchi, 1985; Hoda, 1988; Jalil & Khalil-Uddin, 1981) and can presumably be found in a wider range in Oman, Iran, India and Bangladesh.

***Rhabdosargus haffara* (Forsskål, 1775)**

Common name: Haffara seabream

Local names: Kabardan, Dandya (Sindh); Chah (Balochistan)
(Figures 12 & 15 T, U; Table 1)

Sparus haffara, Forsskål 1775:33, xi (No locality stated [Red Sea]).

Diagnosis. Distinguished from its congeners by the following combination of characters: Dorsal-fin rays XI,13; anal-fin rays III,11; scale rows between fifth dorsal-fin spine base and the lateral line 5½, scale rows below the lateral line 11½–12½, scale rows between the dorsal-fin spine base and lateral line 5½–7½; pored lateral line scales 55–60; small blackish mark on first few lateral line scales, no scales on preopercular flange; gill rakers 13–16, on the lower limb 8–9; body depth 2.3–2.5 of SL; head and body silvery-black; pelvic, anal and caudal fins dusky gray to blackish, no yellow or golden longitudinal lines on the body.

Description. Body fairly elongate, its depth 40.4–42.9% of SL; head large, 31.4–34.4% of SL; anterior profile of head somewhat convex, gracefully arched between dorsal-fin origin and snout tip, relatively sharp up to mouth; eye region slightly gibbous; posterior tip of maxilla reaching beyond vertical at middle of eye; upper jaw length 13.9–16.0 of SL, lower jaw slightly short and included; six incisors form teeth at front of upper and lower jaws; molars in five rows on each side of upper jaw, and three rows on each side of lower jaw, molars on each side of both jaws bluntly rounded, increasing in size gradually from front to back in each jaw, the posteriomost molar of each jaw significantly enlarged; gill rakers short; 4–5 transverse rows of scales on preopercle, 6–7 on cheek; interorbital entirely naked; dorsal spines strong, first spine shortest (4.5–6.1% of SL), 4th and 5th spine usually longest (11.5–16.3% of SL); first dorsal-fin soft ray longest but shorter than longest spine; first anal-fin spine (3.5–4.1% of SL) much shorter than orbit diameter; 2nd and 3rd anal-fin spine subequal (10.6–12.0% of SL); dorsal and anal-fins with scaly sheath along their base; pectoral-fin tip reaching or little beyond to first anal-fin spine base vertically, and the length of pectoral-fin (38.2–40.8% of SL) clearly longer than head; pelvic-fin spine longer than snout; caudal fin weakly forked.

Color of fresh specimens. The whole body silvery light blakish with some faint longitudinal dusky streaks on the sides; operculum silvery; chin and belly silvery-white; lips whitish-gray; dorsal-fin spines gray to blackish, soft rays hyaline, fin membranes hyaline with dusky gray-olivaceous patches; pectoral and pelvic and anal fins dusky gray; caudal fin dusky to blackish with darker posterior margins; a black blotch at origin of lateral line and axil of pectoral-fin.

Distribution. Red Sea, Western Indian Ocean; Mediterranean Sea; Northwest Arabian Sea

Remarks. *Rhabdosargus haffara* is similar in appearance to the newly described *R. niger* (Tanaka & Iwatsuki, 2013) from southwestern Kalimantan, Indonesia. However, *Rhabdosargus niger*, probably endemic only in western Pacific (according to Y. Iwatsuki) has more dense black body, higher body depth and lower counts of pored lateral line scales (ca. 45% of SL and 53–55 in *R. niger* vs. slender body, ca. 42% of SL, and higher scale counts, 55–60 pored lateral line scales in *R. haffara*), being distinguishable between them. *Rhabdosargus haffara* is very common from Middle East (Bauchot & Smith, 1983).



FIGURE 12. *Rhabdosargus haffara*, PMNH 53010, 283 mm SL, WWFH, Karachi. Silvery with blackish appearance and no longitudinal golden-lines on body.

Rhabdosargus haffara differs from *R. sarba* in having lower counts of $5\frac{1}{2}$ scale rows between the fifth dorsal-fin spine base and lateral line (vs. $6\frac{1}{2}$ – $7\frac{1}{2}$ in *R. sarba*, Table 1). *R. haffara* has silvery-black body without golden longitudinal lines and dusky gray coloration of pelvic and anal fins, while *R. sarba* possesses a silvery gold sheen body with yellow or golden longitudinal lines as well as yellow or yellowish coloration of pelvic and anal fins. Hoda (1988) mentioned *R. haffara* from Pakistan in his checklist but confirmation was lacking in the form of specimens.

Genus *Sparidentex* Munro, 1948

Sparidentex Munro, 1948: 275–280.

Diagnosis. Body compressed and little bit cylindrical. Mouth somewhat oblique. Dorsal-fin spines strong, normally graduate, not filamentous. In front of both jaws, 4–6 conical fang-like teeth, followed by 2–5 rows of villi-form teeth. Molar or molar like teeth lacking. Preopercular flange and interorbital naked. $5\frac{1}{2}$ or less scale rows between 5th dorsal-fin spine base to lateral line. Anal-fin spine moderate to strong. Two valid species, both in Pakistani waters.

Sparidentex hasta (Valenciennes, 1830)

Common name: Sobaity Seabream

Local names: Dathi (Sindh); Nawar (Balochistan)

(Figures 13 & 15 I, J; Table 1)

Chrysophrys cuvieri Day, 1875: 141, Pl. 34 (fig. 3) (Seas of India); Whitehead & Talwar, 1976: 160.

Dentex hasta Valenciennes in Cuvier & Valenciennes, 1830: 255 (Malabar, India); Bauchot & Daget, 1972: 48 (Not the same as *Acanthopagrus hasta* (Bloch & Schneider, 1801)).

Diagnosis. Following combination of characters distinguishes this species: dorsal-fin rays XI, 11–12; anal-fin rays III, 8; scale rows between the 5th dorsal-fin spine base and lateral line $5\frac{1}{2}$, scale rows between the ninth dorsal-fin spine base to lateral line 5– $5\frac{1}{2}$, scale rows below first dorsal spine to the lateral line $5\frac{1}{2}$, scale rows below the

lateral line $12\frac{1}{2}$; pored lateral line scales 47–48; body depth 34–37%, head length 32–33%, snout deep 9–10 %, caudal peduncle length 21–23% in standard length; no molariform teeth in both jaws, 4–6 enlarged fang-like slightly curved conical teeth at anterior portion of both jaws, villi-form teeth rows present in upper and lower jaws; 2nd and 3rd anal-fin spine subequal in length, ratio of 2nd anal-fin spine / 3rd anal-fin spine 1.0–1.2.



FIGURE 13. *Sparidentex hasta*, PMNH 50412, 209 mm SL, WWFH, Karachi. Fusiform shape, second anal spine is subequal to third anal spine.

Description. Body compressed and nearly cylindrical; mouth somewhat oblique, lips thick; snout somewhat pointed, two nostrils just in front of both eyes; upper jaw protruding slightly in front of lower jaw; maxilla reaching to below mid eye level (pupil or center of orbit); at front of each jaw, 4–6 enlarged, fang-like, conical teeth, outer series of lateral teeth conical and compressed with parallel rows of villiform teeth; least suborbital depth is much shorter than eye diameter, 6 (6–7) transvers rows of scales on cheek; anterodorsal profile ascending somewhat gently from mouth to eyes and above; profile of fish body is somewhat arched; Head and eyes moderately large; no scales on preopercular flange; its posterior margin weakly serrated; low scaly sheath on soft dorsal and anal-fin ray bases; dorsal-fin spines strong, first one is smaller (4.5–6.0% of SL), fourth one is longer (13–19% of SL); first anal-fin spine short (4–12% of SL); 2nd and 3rd anal-fin spine subequal (11–14% of SL); pectoral-fin long nearly equal to head length, pelvic-fin spine longer than snout length; caudal fin forked and both lobes are pointed.

Color of fresh specimens. Head and dorsal part of body olive silvery, becoming silvery-white up to belly; scales are with diffused black margins that shows longitudinal and transverse narrow stripes on the body; dorsal and anal-fin rays gray to blackish, soft rays light blackish and hyaline, membranes of the dorsal and anal-fins are dusky grey; pectoral light yellow to whitish and pelvic-fins light grayish to whitish; a black spot in pectoral axilla and a diffuse black spot on beginning of lateral line; caudal fin dusky and posterior margin darker.

Distribution. Western Indian Ocean: Persian Gulf and coasts of India.

***Sparidentex jamalensis* (Amir et al., 2014)**

Common name: Fanged Seabream

Local names: Kukkri (Sindh); Nawar (Balochistan)

(Figures 14 & 15 K, L; Table 1)

Sparidentex jamalensis Amir, Siddiqui & Masroor 2014: 472 (West Wharf fish harbour, Karachi, Pakistan).

Diagnosis. Following combination of characters of *Sparidentex jamalensis* distinguishes it from *Sparidentex hasta*: dorsal-fin rays XI, 11; anal-fin rays III, 8; scale rows between the 5th dorsal-fin spine base and lateral line $3\frac{1}{2}$, scale

rows between the ninth dorsal-fin spine base to lateral line $3\frac{1}{2}$, scale rows below first dorsal spine to the lateral line $4\frac{1}{2}$, scale rows below the lateral line $12\frac{1}{2}$; pored lateral line scales 45–47; body depth 37–41%, head length 33–38%, snout deep 10–12%, caudal peduncle length 18–20% of SL; no molariform teeth in both jaws. Second anal-fin spine distinctly stouter and longer than 3rd anal-fin spine, ratio of 2nd anal-fin spine / 3rd anal-fin spine 1.4.



FIGURE 14. *Sparidentex jamalensis*, PMNH 52062, 186 mm SL, WWFH, Karachi. Showing relatively deeper body than *S. hasta* in Fig. 5, the second anal spine is much longer than third anal-spine.



FIGURE 15. Details of dentition (A–Y) and gill rakers (Z & Z1) in species of family Sparidae from Pakistan; *Acanthopagrus catenula*, A) upper jaw & B) lower jaw; *A. berda*, C) upper jaw & D) lower jaw; *A. arabicus*, E) upper jaw & F) lower jaw; *A. shem*, G) upper jaw & H) lower jaw; *Sparidentex hasta*, I) upper jaw & J) lower jaw; *Sparidentex jamalensis*, K) upper jaw & L) lower jaw; *Crenidens indicus*, M) upper jaw & N) lower jaw; *Diplodus capensis*, O) upper jaw & P) lower jaw; Q) upper and lower jaws of *Diplodus omanensis*; *Rhabdosargus sarba*, R) upper jaw & S) lower jaw; *Rhabdosargus haffara*, T) upper jaw & U) lower jaw; V) upper and lower jaws of *Agryrops spinifer*; W) upper and lower jaws of *Cheimerius nufar*; *Pagellus affinis*, X) upper jaw & Y) lower jaw; Z) *Argyrops spinifer*, showing comparatively small gill rakers; and Z1) *Cheimerius nufar*, showing elongated fan-like gill rakers.

Description. Body relatively deep and compressed; mouth somewhat oblique, lips thick; snout pointed, two nostrils just in front of both eyes, anterior nostril small and rounded and posterior one long oval-like or slit-like; upper jaw protruding slightly in front of lower jaw; maxilla reaching to below mideye level (pupil or center of orbit); at front of each jaw, 6 enlarged fang-like slightly curved conical teeth at anterior portion of both jaws, two or three villiform teeth rows in lower jaw and three to four villiform teeth rows on upper jaw; gill rakers 15–18 (upper + lower limb, 6–7 + 9–11); preopercular flange scale-less, its posterior margin weakly serrated; low scaly sheath on soft dorsal and anal-fin ray bases; dorsal-fin spines strong, first one is smaller (5–7% of SL), 4th and 5th longer (13–16% of SL); first anal-fin spine short (3–6% of SL), 2nd anal-fin spine heavy and long (17–26% of SL), third anal-fin spine thin and shorter (13–15% of SL) than 2nd anal-fin spine; pectoral-fin long, its length slightly greater than head length, tip nearly reaching to anal opening; pelvic-fin spine longer than snout length; first ray of pelvic-fin intruded and clearly longer than 2nd anal-fin spine; caudal fin forked.

Color of fresh specimens. Head and dorsal part of body dull olive silvery, becoming silvery-white up to belly; scales are with diffuse black margins that shows longitudinal and transverse narrow stripes on the body; dorsal-fin and anal rays gray, soft rays hyaline, membranes of the dorsal and anal-fins are dusky grey; pectoral-fins light yellow to whitish and pelvic-fins light grayish to whitish; a black spot in pectoral axilla is always present.

Distribution. Currently known only from Pakistan. It is highly probable that this species may also occur in the coastal waters of northern Arabian Sea, India and Persian Gulf.

TABLE 1. Counts and morphometric data of sparid species occurring in the coastal waters of Pakistan; mean in parenthesis.

	<i>Acanthopagrus catenula</i> (n = 4)	<i>Acanthopagrus berda</i> (n = 4)	<i>Acanthopagrus arabicus</i> (n = 4)	<i>Acanthopagrus sheim</i> (n = 5)	<i>Sparidentex hasta</i> (n = 6)	<i>Sparidentex jamalensis</i> (n = 11)	<i>Crenidens indicus</i> (n = 4)
Dorsal-fin rays	XI, 12	XI, 11	XI–XII, 10–11	XI–XII, 10–11	XI, 11–12	XI, 11	XI, 11
Anal-fin rays	III, 10	III, 9	III, 8	III, 8	III, 8	III, 8	III, 10
Pectoral-fin rays	15	15	15	15	15	15	14
Pelvic-fin rays	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5
Pored lateral-line scales	47–48	42–44	43–45	43–45	47–48	45–47	49
Scale rows between fifth dorsal-fin spine base and lateral-line	4½–5½	3½–4	4½	4½	5½	3½	6½
Scale rows between ninth dorsal-fin spine base and lateral-line	5–5½	3½	4½	4½	5–5½	3½–4	6½
Scale rows above/below lateral-line	4½–5½ / 12½–13½	3½ / 12½	4½–5½ / 11½–12½	4½–5½ / 11½–12½	5½ / 12½	3½–4 / 12½	6½ / 13½–14½
Scale rows on cheek	6–8	5–6	5–6	4–5	6–7	6–7	5
Gill rakers (upper +angle+lower)	6–7+1+8–11	5–7+1+8–11	5–7+1+8–10	6–7+1+9–10	7+1+8–9	6–7+1+8–10	7+1+10
Standard length	160–325	137–213	172–253	127–196	209–290	148–206	163–198
Proportions as % of SL							
Highest body depth	44.6–49.5 (46.9)	43.9–54.0 (48.4)	39.5–43.4 (41.4)	42–45 (43)	34–37 (35)	37–41 (40)	43.6–47.5 (45.8)
Body depth at 1st analspineorigin	36.7–40.5 (38.6)	43.2–43.8 (43.5)	36.0–38.5 (37.3)	36–37 (36.5)	31–33 (32)	32–38 (36)	42.9–42.9 (42.9)
Head length	33.8–35.1 (34.5)	34.3–36.5 (35.4)	32.2–33.0 (32.6)	31.1–37.0 (33.5)	32–33 (32.5)	33–38 (35)	27.3–30.4 (29.1)
Body width at pectoral-fin base	13.6–16.9 (15.8)	16.0–19.0 (17.5)	15.7–18.7 (16.5)	16.1–19.7 (17.7)	15–18 (16)	15–19 (17)	13.8–16. (15.1)

.....continued on the next page

TABLE 1. (Continued)

	<i>Acanthopagrus catenula</i> (n = 4)	<i>Acanthopagrus berda</i> (n = 4)	<i>Acanthopagrus arabicus</i> (n = 4)	<i>Acanthopagrus sheim</i> (n = 5)	<i>Sparidentex hasta</i> (n = 6)	<i>Sparidentex jamalensis</i> (n = 11)	<i>Crenidens indicus</i> (n = 4)
Snout length	12.5–15.4 (13.9)	11.7–14.1 (13.0)	11.0–13.0 (11.9)	10.0–13.7 (12.0)	9.6–10 (10)	10–12 (11)	10.6–12.3 (11.2)
Orbit diameter		8.5–10.2 (9.4)	7.3–8.8 (8.2)	7.9–9.4 (8.7)	6.5–7.8 (7)	8–10 (9)	9.1–10.7 (9.9)
Dermal eye opening	8.6–9.0 (8.8)	0.0	7.1–7.8 (7.5)	7.7–8.2 (7.9)	5–6.4 (5.9)	7–8 (7.5)	9.1–9.3 (9.2)
Bony interorbital	10.0–10.5 (10.3)	9.3–12.4 (10.6)	8.7–9.6 (9.2)	8.2–9.4 (8.8)	7.2–8.5 (8)	8–9 (8.5)	7.4–10.5 (9.4)
Interorbital membrane	10.9–11.3 (11.1)	0.0	(9.7)	9.1–9.7 (9.5)	7.6–9.7 (9)	8–10 (9)	10.8–11.3 (11)
Upper jaw length	14.4–17.8 (15.4)	15.0–15.7 (15.4)	12.6–15.0 (13.7)	12.8–14.6 (13.6)	11–12 (12)	9–14 (13)	8.1–9.5 (8.9)
Caudal peduncle depth	12.7–13.1 (12.9)	12.6–15.3 (13.8)	11.5–13.2 (12.4)	12.4–13.3 (12.8)	11–13 (12)	12–14 (13)	12.2–12.9 (12.6)
Caudal peduncle length	16.9–19.9 (18.5)	17.5–19.2 (18.2)	18.6–20.2 (19.6)	16.6–19.5 (18.3)	21–23 (22)	18–20 (19)	17.1–18.7 (18.0)
Predorsal length	44.8–48.0 (45.8)	43.3–48.9 (45.8)	40.1–42.3 (41.2)	42.0–45.7 (43.7)	37–40 (39)	40–44(42)	44.9–46.6 (45.6)
Preanal length	73.5–75.6 (74.5)	36.2–36.5 (36.3)	70.9–73.3 (72.1)	70.4–75.6 (72.8)	58–71 (65)	64–72 (66)	71–73 (72.4)
Prepelvic length	38.8–41.5 (40.2)	39.9–65.0 (46.5)	37.4–39.9 (38.3)	37.6–40.9 (38.6)	36–37 (36.5)	39–43 (41)	36.9–39.3 (38.2)
Dorsal-fin base	53.8–60.0 (56.5)	55.6–59.9 (57.5)	52.6–56.3 (55.0)	53.9–58.6 (56.7)	49–53 (51)	51–56 (53)	55–58.6 (57.5)
Anal-fin base	17.2–21.3 (19.2)	17.6–20.7 (19.1)	15.8–17.4 (16.9)	15.3–18.4 (16.8)	14–16 (15)	15–18 (16)	18.2–18.7 (18.5)
Caudal fin length	25.2–30.0 (27.7)	26.7–33.6 (29.7)	24.1–26.8 (25.4)	25.8–29.4 (28.1)	24–26 (24)	22–27 (26)	28.2–31.3 (29.2)
Pelvic spine length	15.4–19.0 (17.5)	19.0–20.3 (19.6)	16.7–17.7 (17.2)	16.3–19.7 (18.6)	12–14 (13)	14–18 (15)	15.8–17.2 (16.7)
First pelvic ray length	22.8–27.5 (24.9)	26.8–31.3 (28.0)	24.5–28.0 (26.0)	25.0–29.1 (26.9)	22–24 (23)	22–26 (24)	23.4–25.4 (24.5)
Pectoral-fin length	41.2–43.1 (42.1)	41.2–46.3 (44.8)	37.8–40.7 (39.5)	38.8–48.0 (42.0)	31–34 (32)	30–37 (35)	39.2–40.5 (39.8)
1st dorsal-fin spine (DS) length	5.2–6.9 (6.0)	6.8–8.9 (8.0)	5.9–8.7 (7.6)	6.5–8.0 (7.5)	4.5–5.9 (5.2)	5–7 (6)	5.6–7.4 (6.6)
2nd DS length	7.7–11.9 (10.2)	11.2–15.8 (13.7)	5.7–13.4 (10.2)	11.2–13.9 (12.8)	8–10 (9.5)	9–12 (10)	10.1–12.9 (11.7)
3rd DS length	15.0–15.4 (15.2)	18.2–20.7 (19.5)	16–18.1 (17.2)	14.7–18.7 (16.5)	12–13 (12.8)	12–14 (13)	15.8–16.2 (16.0)
4th DS length	13.5–16.9 (15.6)	16.9–19.7 (18.6)	16.8–20.3 (18.3)	16.0–20.2 (18.4)	13–19 (15)	13–16 (15)	15.2–18.4 (17.0)
5th DS length	13.3–15.6 (14.9)	17.5–19.0 (18.4)	17.0–18.6 (17.9)	15.4–19.2 (17.6)	12–15 (14)	13–16 (15)	15.7–17.8 (17.0)
6th DS length	12.9–15.6 (14.4)	15.3–19.7 (17.8)	17.0–18.0 (17.5)	15.4–18.1 (16.9)	12–14 (13.5)	13–15 (14)	15.2–18.7 (16.7)

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TABLE 1. (Continued)

	<i>Acanthopagrus catenula</i> (n = 4)	<i>Acanthopagrus berda</i> (n = 4)	<i>Acanthopagrus arabicus</i> (n = 4)	<i>Acanthopagrus sheim</i> (n = 5)	<i>Sparidentex hasta</i> (n = 6)	<i>Sparidentex jamalensis</i> (n = 11)	<i>Crenidens indicus</i> (n = 4)
Last DS length	10.9–12.5 (11.5)	12.0–21.2 (14.7)	11.1–12.8 (12.0)	10.9–13.5 (11.9)	10–12 (11)	10–12 (11)	11.6–13.8 (12.6)
1st anal spine length	5.2–6.9 (5.9)	6.1–8.2 (7.5)	5.8–6.6 (6.2)	5.1–7.3 (6.4)	4–12 (6)	3–6 (6)	6.1–8.3 (7.0)
2nd anal spine length	13.5–20.0 (16.5)	21.1–22.6 (22.0)	19.2–21.3 (20.2)	17.1–22.0 (19.9)	12–14 (13)	17–26 (20)	15.7–17.8 (16.5)
3rd anal spine length	12.9–15.0 (13.7)	15.0–16.1 (15.6)	13.2–15.7 (14.3)	12.6–16.5 (14.3)	11–13 (13)	13–15 (14)	12.9–16.6 (14.1)
1st anal ray length	12.9–16.3 (14.2)	16.6–18.6 (17.3)	13.4–14.8 (14.1)	12.2–15.0 (13.4)	12–16 (14)	11–18 (15)	12.9–16.0 (13.9)
Least suborbital width	5.6–6.8 (6.2)	4.2–4.4 (4.3)	4.9–5.5 (5.2)	4.9–6.9 (5.9)	4.9–6 (5.5)	4–5 (4)	4.9–7 (6)
Posteriormost jaw	12.5–12.7 (12.6)	12–13 (12.5)	10.4–11 (10.7)	9.7–11.8 (10.8)	9–11 (10)	10–14 (12)	7.8–8.3 (8)
2AS/3AS	1.0–1.3 (1.2)	1.3–1.5 (1.4)	1.2–1.5 (1.4)	1.2–1.6 (1.4)	1–1.2 (1.1)	1.3–1.7 (1.4)	1.1–1.3 (1.2)

TABLE 1. (Continued)

	<i>Diplodus capensis</i> (n = 6)	<i>Diplodus omanensis</i> (n = 1)	<i>Rhabdosargus sarba</i> (n = 7)	<i>Rhabdosargus haffara</i> (n = 3)	<i>Argyrops spinifer</i> (n = 6)	<i>Cheimerius nufar</i> (n = 2)	<i>Pagellus affinis</i> (n = 1)
Dorsal-fin rays	XII, 13–14	XI, 11–12	XI, 13	XI, 13	XII, 10	XII, 10	XII, 10
Anal-fin rays	III, 13	III, 10	III, 11	III, 11	III, 8	III, 8	III, 10
Pectoral-fin rays	16	15	15	15	15	15	15
Pelvic-fin rays	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5
Pored lateral-line scales	55–58	52	58	60	49–54	55–60	59
Scale rows between fifth dorsal-fin spine base and lateral-line	6½	8½	6½	5½	6½	6½	6½
Scale rows between ninth dorsal-fin spine base and lateral-line	6½	8	6½	5½	6½	6½	5
Scale rows above/below lateral-line	7½ / 18	9½ / 17½	6½–8½ / 12½–14½	6½–7½ / 11½–13½	6½ / 16–18	6½–7 / 14	6½ / 16½
Scale rows on cheek	7	5	6–7	6–7	5–6	12	7
Gill rakers (upper +angle+lower)	7+1+9–10	7+1+9	5–7+1+8	7+1+9	4–5+1+10	5+1+15	6+1+6
Standard length	175–229	310	167–272	245–331	191–218	323–337	183
Proportions as % of SL							
Highest body depth	44.9–49.5 (47.0)	37.2	40.7–44.3 (42.9)	40.4–42.9 (41.7)	49.4–53.4 (51.1)	36.8–37.2 (37.0)	42.4
Body depth at 1st anal spine origin	42.1–42.9 (42.5)	—	37.5–38.2 (37.8)	33.5–35.9 (35.0)	45–48	—	32.8
Head length	28.9–34.6 (32.3)	37.5	30.0–34.3 (32.4)	31.4–34.4 (32.9)	30.5–34.1 (32.5)	32.2–32.4(3) 2.3)	33

.....continued on the next page

TABLE 1. (Continued)

	<i>Diplodus capensis</i> (n = 6)	<i>Diplodus omanensis</i> (n = 1)	<i>Rhabdosargus sarba</i> (n = 7)	<i>Rhabdosargus haffara</i> (n = 3)	<i>Argyrops spinifer</i> (n = 6)	<i>Cheimerius nufar</i> (n = 2)	<i>Pagellus affinis</i> (n = 1)
Body width at pectoral-fin base	14.2–15.9 (15.2)	15.8	13.6–16.6 (15.5)	13.5–16 (15)	13.3–17.7 (16.1)	12.5–14 (13.4)	18
Snout length	12.3–15.4 (13.8)	13.6	14.2–16.8 (15.3)	14.7–16.6 (15.7)	15.7–17.4 (16.7)	13.3–13.9 (13.6)	12.2
Orbit diameter	8.0–9.9 (9.0)	8.5	7.7–10 (9)	8.2–8.8 (8.5)	9.2–10.2 (9.7)	6.8–7.2 (7.0)	9.8
Dermal eye opening	8.2–8.6 (8.4)	7	7.5–8.7 (8.0)	7.3–8.1 (7.6)	9–10	—	8.3
Bony interorbital	9.8–11.2 (10.4)	11.6	8.2–9.3 (8.9)	8.5–9.5 (9.0)	8.7–9.7 (9)	7.1–7.4 (7.3)	8.8
Interorbital membrane	11.4–11.8 (11.6)	—	9.2–9.6 (9.4)	9.8–10.2 (10.0)	—	—	—
Upper jaw length	9.3–12.6 (11.2)	11	13.2–15.4 (14.3)	13.9–16.0 (14.9)	12.1–14.4 (13.3)	13.0–13.4 (13.2)	12
Caudal peduncle depth	10.9–12.1 (11.4)	15.3	10.7–12.1 (11.5)	10.6–11.3 (11.1)	12.3–14.0 (13)	10.2–10.7 (10.4)	9.2
Caudal peduncle length	15.2–18.1 (16.5)	16.8	16.2–18.5 (17.6)	16.3–18.0 (17.4)	18.4–22.6 (20.7)	17.3–21.7 (19.5)	17.4
Predorsal length	44.1–50.0 (47.5)	49.0	43.7–46.7 (45.3)	46.1–47.0 (46.6)	44–46 (45)	38–39.5 (38.9)	40.7
Preanal length	68.5–72.6 (70.6)	65.8	66.3–68.4 (67.4)	66.4–66.9 (66.6)	61–64 (63)	—	61.2
Prepelvic length	37.3–41.2 (39.7)	42.9	34.4–38.8 (36.4)	37.1–37.5 (37.2)	35.9–43 (39)	35.6–36.5 (36.1)	38.2
Dorsal-fin base	55.0–57.0 (55.9)	39	55.5–59.2 (56.9)	56.9–58.8 (58.0)	50–61.8 (57)	51.4–51.6 (51.5)	51.4
Anal-fin base	22.7–25.0 (23.9)	18.7	20.9–22.5 (21.9)	22.1–22.9 (22.4)	20–22.5 (21.7)	18.4–19 (18.8)	26.8
Caudal fin length	28.4–31.5 (29.6)	32.9	27.9–34.2 (31.0)	26.3–31.8 (29.7)	29.8–35 (32.7)	28.8–28.8 (28.8)	29
Pelvic spine length	13.7–17.0 (15.4)	13.9	15.8–18.0 (16.6)	16.3–16.6 (16.4)	15.5–20.2 (18)	11.0–14.0 (13)	15.8
First pelvic ray length	22.0–24.5 (23.1)	22.6	22.5–25.5 (23.8)	22.7–23.0 (22.8)	28–29.5 (27.6)	22.0–23.5 (22.7)	22.9
Pectoral-fin length	38.7–42.1 (40.4)	34.5	35.9–41.8 (39.3)	38.2–40.8 (39.4)	38.4–45.1 (42.0)	32.9–34.6 (33.8)	36.7
1st dorsal-fin spine (DS) length	4.4–6.8 (5.9)	4.5	4.2–5.9 (5.2)	4.5–6.1 (5.1)	—	3.0–3.4 (3.2)	10.7
2nd DS length	7.4–9.6 (8.7)	9.5	7.1–11.3 (9.9)	7.8–11.8 (9.2)	—	4.6–5.0 (4.8)	13.7
3rd DS length	12.6–14.6 (13.6)	12	14.6–16.5 (15.2)	14.5–15.5 (15.2)	38–113	27–29 (28)	17
4th DS length	13.5–15.7 (14.7)	14.5	14.0–16.9 (15.9)	13.3–15.1 (14.3)	36–107	20.4–24.9 (22.7)	15.5
5th DS length	12.6–15.2 (14.0)	13.2	14.5–17.4 (15.5)	11.5–16.3 (13.9)	35–106	15.8–23.1 (19.5)	15.7
6th DS length	12.6–15.7 (14.2)	12.2	13.2–15.6 (14.5)	12.0–16.3 (14.4)	33–100	13.0–14.2 (13.6)	14.7

.....continued on the next page

TABLE 1. (Continued)

	<i>Diplodus capensis</i> (n = 6)	<i>Diplodus omanensis</i> (n = 1)	<i>Rhabdosargus sarba</i> (n = 7)	<i>Rhabdosargus haffara</i> (n = 3)	<i>Argyrops spinifer</i> (n = 6)	<i>Cheimerius nufar</i> (n = 2)	<i>Pagellus affinis</i> (n = 1)
Last DS length	7.9–10.3 (9.5)	9	10.3–12.4 (10.3)	11.7–12 (11.8)	9.2–12.2 (11.2)	9.3–9.5 (9.4)	9
1st anal spine length	6.9–7.8 (7.2)	4.8	4.5–5.3 (4.8)	3.5–4.1 (3.8)	4.0–6.2 (5.5)	4.0–7.7 (5.9)	4.8
2nd anal spine length	10.0–12.5 (11.1)	10.3	10.3–12.6 (11.6)	10.1–12.2 (11.2)	12.2–14.0 (13.5)	9.2–9.6 (9.4)	8.9
3rd anal spine length	8.7–10.3 (9.7)	9.7	10.3–13.2 (11.8)	10.6–12.0 (11.5)	11.2–14.6 (13.)	9.2–9.2 (9.6)	9.3
1st anal ray length	8.8–10.7 (10.0)	10.7	12.1–13.8 (12.8)	11.2–13.1 (12.2)	9.7–14.2 (12.5)	11.6–11.9 (11.7)	9.2
Least suborbital width	6.1–7.0 (6.6)	8.5	8.4–10.3 (9.0)	9.0–9.7 (9.3)	19.5–22.0 (20.6)	9.0–9.2 (9.1)	6.3
Posteriormost jaw	8.0–9.3 (8.6)	15.8	10.8–11.4 (11)	11.8–12.4 (12.2)	9.7–11.8	—	10.7
2AS/3AS	1.0–1.3 (1.1)	1	0.9–1.1 (1.0)	0.9–1.0 (1.0)	1.0–1.1 (1.0)	1.0–1.0 (1.0)	1

Key to the Species of Sparidae from Pakistan

- 1a Molar teeth in jaws present 2
 1b Molar teeth in jaws absent 11
 2a No enlarged teeth at front of jaws; head between eyes scaly (scales reaching to beyond the level of vertical eye diameter); anal fin with 3 spines and 9–10 rays *Pagellus affinis*
 2b Front of jaws with distinct 4–9 enlarged teeth 3
 3a Head between eyes scaly (inter orbital region scaly); front of jaws with 4 to 6 enlarge caniform teeth; first two dorsal spines very short, third to seventh elongate, flattened, filamentous, mainly in juveniles *Argyrops spinifer*
 3b Inter-orbital naked, scales ending at or behind level of vertical eye diameter 4
 4a Incisor-like (incisiform) teeth in front of each jaw more than 6 enlarged 5
 4b Enlarged teeth in front of jaws 4–6 more or less compressed, subequal; molar teeth well-developed 6
 5a Incisor-like teeth in each jaw 7–8; no broad crossbars on sides; juveniles with 8–9 narrow dark crossbars disappearing with age; black blotch on anterior portion of caudal peduncle, reaching both sides bellow lateral line *Diplodus capensis*
 5b Incisor-like teeth in each jaw 10–12; 5 broad transverse black bars on head and body, one on head through eyes and four on rest of body *Diplodus omanensis*
 6a Single enlarged molar teeth in the posterior of each jaw 7
 6b Molar teeth gradually larger from anterior to posterior of each jaw 8
 7a Head and body silvery with golden longitudinal lines on the body; scale rows between the fifth dorsal-fin spine base and lateral line 6½–7½; pelvic and anal fins more or less yellow or brownish-yellow *Rhabdosargus sarb*
 7b Head and body silvery-black, no golden longitudinal lines on the body; scale rows between the fifth dorsal-fin spine base and lateral line 5½; pelvic and anal fins dusky gray *Rhabdosargus haffara*
 8a Dorsal fin soft rays 12–15, two conspicuous black bars on head, dorsal and caudal fins yellow, prominent black margin on dorsal fin and fine black edge on rear margin of caudal fin; scale rows between fifth dorsal-fin spine base and lateral line 4½–5½ *Acanthopagrus catenula*
 8b Dorsal fin soft rays 10–12; no such black bars on head 9
 9a Scale rows between fifth dorsal-fin spine base and lateral line 3½–4; ventral edge of infraorbitals with prominent concavity in fish larger than 15 cm SL; pelvic, anal, and caudal fins dusky to black *Acanthopagrus berda*
 9b Scale rows between fifth dorsal-fin spine base and lateral line 4½; ventral edge of infraorbitals straight or slightly curved; pelvic and anal fins white or yellow 10
 10a Pelvic and anal fins vivid yellow, yellowish in lower caudal lobe; no black blotches on inter-radial membranes between dorsal-fin rays *Acanthopagrus arabicus*
 10b Pelvic and anal fins faint yellow, whitish/ blackish in lower caudal lobe, two to three black blotches on inter-radial membranes between dorsal-fin rays; black streaks near base on anal-fin inter-radial membranes between yellow anal-fin *Acanthopagrus sheim*
 11a Anterior teeth in front of jaws incisiform, compressed, 2 or more series of teeth in each jaw, outer series of incisors with edge crenulate *Crenidens indicus*
 11b Anterior teeth in front of jaws caniniform, some enlarged in front of jaws 12

- 12a First two dorsal spines short, 3rd and 7th elongated, filamentous (especially in juveniles and subadults) *Cheimerius nufar*
 12b Dorsal spines normally graduated, not filamentous; scales on head not reaching forward to level of vertical diameter of eye 13
 13a Scale rows between fifth dorsal-fin spine base and lateral line 5½; 2nd anal-fin is subequal to 3rd anal-fin spine
 *Sparidentex hasta*
 13b Scale rows between fifth dorsal-fin spine base and lateral line 3½; 2nd anal-fin is distinctly stouter and longer than 3rd anal-fin spine *Sparidentex jamalensis*

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Appendix: Comparative material examined

- Acanthopagrus catenula*: PMNH 53001–53002 (2, 200–221 mm SL), WWFH, Karachi; CEMB- P2012–0568 –0569 (2 specimens), 160–325 mm SL, WWFH, Karachi.
- Acanthopagrus berda*: MUFS39775 (formerly CEMB- P201200137) (133.6 mm SL), Keti Bunder, Thatta, Sindh; PMNH 53018–53019 (2, 137–213 mm SL), Keti Bunder, Thatta, Sindh; CEMB- P2012–0570, 183 mm SL, Ibrahim Heydri, Karachi.
- Acanthopagrus arabicus*: PMNH 53006–53007 (2, 172–182 mm SL), WWFH, Karachi; CEMB- P2012–0571–0572 (2 specimens), 183–251 mm SL, WWFH, Karachi
- Acanthopagrus sheim*: PMNH 53008, 196 mm, WWFH, Karachi; CEMB- P2012–0573–0576 (4, 127–174 mm SL), Ibrahim Heydri, Karachi
- Sparidentex hasta*: PMNH 50412–50414 (3, 209–300 mm SL), WWFH, Karachi; CEMB- P2012–0565 to CEMB- P2012–0567 (3 specimens), 224–300 mm SL, Korangi Creek, Karachi.
- Sparidentex jamalensis*: PMNH 52062–52063 (2, 186–206 mm SL), WWFH, Karachi; CEMB- P2012–0555–0563 (9, 148–224 mm SL), Keti Bunder, Sindh.
- Crenidens indicus*: PMNH 53003, 163mm, WWFH, Karachi; CEMB- P2012–0577–0579 (3, 178–198 mm SL), WWFH, Karachi.
- Diplodus capensis*: PMNH 53004–53005 (2, 178–175 mm SL), WWFH, Karachi; CEMB- P2012–0580–0583 (4, 182–229 mm SL), WWFH, Karachi.
- Diplodus omanensis*: CEMB- P.2012–00077 (formerly MUFS 39722) (310 mm SL), WWFH, Karachi.
- Rhabdosargus sarba*: MUFS39628 (167.3 mm SL), Ibrahim Heydri, Karachi; PMNH 53012–53015 (4, 167–240 mm SL), WWFH, Karachi; CEMB- P2012–0584–0585 (2, 229–272 mm SL), WWFH, Karachi
- Rhabdosargus haaffara*: PMNH. 53009–53011 (3, 245–331 mm SL), WWFH, Karachi.
- Argyrops spinifer*: MUFS39739 (formerly CEMB- P201200102) (199.4 mm SL), WWFH, Karachi; PMNH. 50416 –50417 (2, 98 –142 mm SL,) Karachi; CEMB- P2012–0586–0588 (3, 191–218 mm SL), WWFH, Karachi.
- Cheimerius nufar*: MUFS39834 (297.5 mm SL), WWFH, Karachi; CEMB- P2012–0589–0590 (2, 323–337 mm SL), WWFH, Karachi.
- Pagellus affinis*: CEMB- P.2012–00078 (formerly MUFS 39720) (183 mm SL), WWFH, Karachi.