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A Synopsis of the Eastern and Central Atlantic Combers of the Genus *Serranus* (Teleostei: Scorpaeniformes: Serranidae)

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Combers comprise a group of mostly small, shallow-water, tropical to subtropical reef fishes of the genus *Serranus,* subfamily Serraninae. Only a few of the 32 currently known species attain a size exceeding 25 cm TL and few live at depths exceeding 100 m. Three-quarters of the species are found in the Atlantic, with many fewer in the eastern Pacific (6 spp.) and western Indian Ocean (2 spp.). The highest diversity (14 spp.) is in the western Atlantic, with the eastern Atlantic second (10 spp.). No species is found in more than one of these four areas. This synopsis provides a supplement to the treatment of the group by Heemstra and Anderson (2016) in *FAO Species Identification Guide for Fishery Purpose*. We include three additional species: *S. pulcher* Wirtz and Iwamoto, 2016, and two new species herein described: *S. drewesi* Iwamoto, and *S. inexpectatus* Wirtz and Iwamoto. *Serranus drewesi,* known only from the holotype taken by spear in São Tomé, appears most similar to *S. hepatus* but is distinguishable by it cycloid scales, naked interorbital space, pigmentation pattern on the fins and body, gill-raker count of the first arch, and several other characteristics. The type specimens for *Serranus inexpectatus* are from Angola and Gabon, but we suspect that it occurs elsewhere off West Africa. The type specimen from Gabon is that reported by Poll (1954) as *Paracentropristis heterurus*; the excellent illustration in Poll's work has been used erroneously by others as representative of *S. heterurus*. DNA evidence suggests that *S. inexpectatus* is sister to a clade that includes *S. heterurus* and *S. pulcher.* The three are closely similar but each can be distinguished by a combination of pigmentation pattern and meristic and morphometric characteristics. Descriptions, photographs, and a key to the species are provided for the eastern Atlantic species

The genus *Serranus* Cuvier, 1817 has long been a catch-basket for a variety of small to medium-sized fishes in the subfamily Serraninae, family Serranidae. They are frequently referred to as Combers or Dwarf sea basses. Most species are colorful and easily kept in aquariums, thus their popularity among aquarists and divers. Some species are important components of artisanal fisheries. Nelson (2006:346) listed 11 genera as examples of the subfamily, although Meisler (1987), in a comprehensive unpublished revision of the serranines, provided a classification, based on a cladistic analysis, that included only 10 genera, excluding two of the genera Nelson listed and adding *Mentiperca* Gill, 1862. Robins and Starck (1961) in their revision of western Atlantic *Serranus* recognized only two subgenera, *Serranus* and *Paracentropristis* Klunzinger, 1884, but Meisler (1987) recognized four subgenera: *Serranus*, *Paracentropristis, Dules* Cuvier, 1829*,* and *Prionodes* Jenyns, 1842.

Only species of the subgenera *Serranus* and *Paracentropristis* are known from the eastern Atlantic: one species is endemic to the central Atlantic islands of Ascension and St. Helena and nine valid species are known from the eastern Atlantic. Heemstra and Anderson (2016) recorded eight species of *Serranus* in their chapter on the Serranidae in the revised edition of the FAO series *The Living Marine Resources of the Eastern Central Atlantic* (Carpenter and Angelis, 2016), including among them *Serranus africanus* (Cadenat, 1960), which we here treat as a member of the genus *Chelidoperca*. Williams and Carpenter (2015:287), in describing *Chelidoperca santosi* from the Philippines, did not include *C. africana* in their list of the seven nominal species of the genus, noting that "an eighth nominal species from the Atlantic has been reassigned to the genus *Serranus*." That eighth species is presumably *C. africana.* Heemstra and Anderson (2016) did not include *S. pulcher* Wirtz and Iwamoto, 2016, because it was described after their FAO publication. We describe herein one new species from the Gulf of Guinea island of São Tomé and a second from Angola and Gabon. Thus, a total of ten species of *Serranus* is now known from the eastern and central Atlantic. Four of the ten have distributions extending into the Mediterranean Sea, and *S. cabrilla*, with the widest range, is also recorded from the Black Sea, as well as in the Red Sea where it apparently arrived as an invasive species (Norman 1927; Tortonese 1954).

Heemstra and Anderson's (2016) contribution to the FAO *Species Identification Guide to the Marine Resources of the Eastern Central Atlantic* includes descriptions and illustrations of seven *Serranus* species plus *Chelidoperca africana*. We have incorporated information from that work and added additional information based on our findings. For some species, new collections have extended their geographical ranges; extensive diving observations by the second author have increased our knowledge of the life history and habits of the species. Color photographs of living and fresh specimens, of which we provide many, are of particular value in showing the wide variation in color pattern found in some species. *Chelidoperca africana* Cadenat, 1960, is included in the key because it is frequently treated as a member of the genus *Serranus.*

Material and Methods

Specimens examined are deposited in the California Academy of Sciences (CAS and CAS-SU), the National Museum of Natural History (USNM), the Natural History Museum of Los Angeles County (LACM), Royal Belgian Institute of Natural Sciences (RBINS), South African Institute of Aquatic Biodiversity (SAIAB), Stuttgart Natural History Museum (SMNS), the Zoologische Staatssammlung, München (ZSM).

Anatomical terms and abbreviations, and methods for making measurements and counts follow those described in numerous ichthyological texts, including Hubbs and Lagler (1964), Smith and Heemstra (1986), and the various FAO species identification guides for fishery purposes (e.g., Carpenter 2002:603-610; 2016:1513–1518). The last ray of the dorsal and anal fins is usually split to the base and is counted as one ray; almost all eastern Atlantic species have seven soft rays in the anal fin, although *S. atricauda* is an exception with a normal of eight, *S. hepatus* has six or seven, and *S. drewesi* has six. Pectoral-fin ray counts include the small splintlike uppermost ray. Pored lateral-line scales are taken to the caudal-fin base and do not include those on the caudal fin itself; the value of lateral-line and circumpeduncular scale counts as applied to *Serranus* was discussed by Robins and Starck (1961:260). Gill-raker counts are from the first arch and include all rudiments; counts of the upper arm are separated by a plus sign (+) from those of the lower arm, the raker whose root spans both arms is included in the count of the lower arm. Meristic characters provided in the text but not in the tables are ours and do not include counts from the literature that are extralimital to the ranges we recorded. The descriptions of color patterns are based on numer-

ous underwater photographs by the second author and others (see Acknowledgments) as well as freshly captured specimens. The term stripe is used for narrow horizontal to diagonal markings, whereas band, bar, and saddle refer to more-or-less vertical markings. Sizes given in the Specimens Examined sections are in standard length (SL) and head length (HL); those in the text under Size are for total length (TL). We have made liberal use of published descriptions and records for this study and have made an effort to cite all appropriate references. The reader is referred to the *Checklist of the fishes of the eastern tropical Atlantic* (Quéro et al. 1990) for extensive synonymies. Full references for scientific names are provided in Eschmeyer's *Catalog of Fishes* (2018) online at <*http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp*>.

Taxonomy

Genus *Serranus* Cuvier, 1817

Type species *Perca cabrilla* Linnaeus, 1758 (as designated by ICZN, Official List, Opinion 93).

Diagnosis.— D X,12–15; A III,6–8, usually 7; P 12–18; V I,5; BR 7; vertebrae 10+14. Dorsal fin undivided, spinous and soft rays broadly united; caudal fin truncate, emarginate, or moderately forked, with 17 principal rays (15 branched); supramaxilla absent; teeth on vomer and palatines, none on tongue. Opercle with two or (usually) three flattened spines, the lowermost sometimes obscure or undeveloped; central spine largest and directed horizontally. A spinous-edged suprascapular scale present. Scales mostly ctenoid, but some species have cycloid scales on head or trunk and *S. drewesi* n. sp. has all scales cycloid; interorbit, occiput, upper part of postorbital region and interopercle variously scaled or naked; lateral line complete, with pored scales; maxilla naked. Species probably all synchronous hermaphrodites. Most species small, less than 20 cm TL, but a few attain about 40 cm TL (mostly from Robins and Starck, 1961:261).

Remarks.— Members of the genus are found on both sides of the Atlantic (including the Mediterranean and Black Seas, and in the Red Sea as an invasive), in the tropical eastern Pacific, and in the southwestern Indian Ocean off South Africa. The highest diversity is found in the western central Atlantic (14 spp.), followed by the eastern Atlantic (10 spp.), the eastern Pacific (6 spp.), and the Indian Ocean (2 spp.). The species are apparently endemic to each region, as no species is found in more than one region. Kuiter (2004:80) listed 30 described species of *Serranus* and two undescribed species, but one of the described species he listed is *Chelidoperca africana* Cadenat, 1960, which we consider as the only member of *Chelidoperca* in the Atlantic. *Chelidoperca* is otherwise known from 10 other species of the Indo-West Pacific (Matsunuma et al. 2018). Table 1 lists 32 species of *Serranus*, based on Kuiter (loc. cit.) and our findings.

Robins and Starck (1961) comprehensively treated the western Atlantic species of *Serranus* and provided valuable additional information on the genus, its included species, and relationships to other serranines; they also gave excellent descriptions of three eastern Atlantic species for which they had specimens. They considered that the anal fin-ray count of III,7 was the common number, but we found that our two specimens of *S. atricauda* had III,8, as did one of our specimens of *S. scriba* (CAS-SU 20897). Meisler (1987:152) stated that, *S. atricauda* "is the only *Serranus* species to have exclusively eight anal rays." Heemstra and Anderson (2016:2410) gave the anal fin-ray count for *S. hepatus* as III,6 or 7, but seven of our 10 specimens of that species had a count of III,7; the other had III,6. The holotype and only specimen of *S. drewesi* n.sp. has an anal fin-ray count of III,6.

It is regrettable that Martin R. Meisler's Ph.D. dissertation (1987) was never published inasmuch as it is a comprehensive revisionary work on the group, based on study of most of the

species of *Serranus* and *Mentiperca* (as well as numerous other serranid genera) and a phylogenetic analysis using a variety of osteological, myological, and external characters. It contains a wealth of original information not elsewhere available and the bibliography is comprehensive to that time.

***Serranus* (*Paracentropristis*) *accraensis* (Norman, 1931)**

Figure 1

Neanthias accraensis Norman, 1931 (holotype BMNH 1930.8.26.28; Accra, Ghana). Fowler 1936:1292–1293, fig. 550; 1357 (compiled). Poll 1954:78–81, fig. 23 (Gabon to Angola; 50-75 m).

Novanthias accraensis: Whitley 1937:122 (replacement name for genus *Neanthias*, preoccupied by *Neanthias* Rye, 1881).

Serranus sanctae-helenae (non Boulenger 1895): Poll 1948:225.

Serranus accraensis: Robins and Starck 1961:259. Smith 1981:703-704. Heemstra and Anderson 2016:2406.

Diagnosis.— D X,12; A III,7; P 16–17; V III,7; gill rakers 6-8+13–15 (20–23 total); pored lateral-line scales 43–48; circumpeduncular scales 22–23. Upper lobe of caudal fin ending in a short filamentous streamer produced beyond tip of lower lobe. Rim of tube-like anterior nostril elevated to a flap posteriorly and fringed at tip. Two diagonal bluish stripes on side of head, one behind eye, the other below eye running from snout to margin of opercle. A faint broad stripe below lateral line, usually broken into a series of 4–7 bands or blotches, the bands (often indistinct) extending from dorsal profile to a mid-lateral position; the band or blotch below the 7th and 8th dorsal spines usually darkest, although that on caudal peduncle forming a dark blotch in some specimens.

Description.— Body compressed and moderately slender; greatest depth under origin of dorsal fin about one-third SL; head length 35–37% of SL. Snout rather short, its length subequal to orbit diameter; dorsal profile of snout with mouth tightly closed attaining a slope of approximately 45 degrees from the horizontal; the profile leveling off over orbits and rising slightly over body; the ventral profile of body forming a gentle uniform curve from lower jaw to base of caudal fin. Jaws equal, the upper jaw extending almost to vertical through midorbit. Anterior nostril a short tube, the posterior rim with 4–6 slender fingerlike cirri. Three short flat spines on opercle, the uppermost scarcely visible below the overriding scale, the second best developed, the third small and inconspicuous. Preopercle margin armed with small serrations along entire free margin in adults, but reduced or absent ventrally in young; spines at angle usually slightly enlarged.

Premaxillary teeth with two short canines in a cluster of teeth near tip of jaw, followed by smaller conical teeth posteriorly, and flanked medially by a narrow inner band of small teeth. Dentary teeth composed of 4–6 short recurved and spaced canines interspersed with much smaller teeth in one row. Vomer with cluster of small teeth in broadly V-shaped patch. Palatine teeth all small, in an elongated lens-shaped band.

Body scales large, ctenoid, covering most of body; scales absent on top of head, snout, suborbital region, jaws, gular and branchiostegal membranes, interopercle bone, and in larger specimens, broad outer margin of preopercle, a narrow area behind orbit, and lower margin of subopercle. No scales on dorsal and anal fins, but small scales present at bases of pectoral, pelvic, and caudal fins.

First 4–6 spines of dorsal fin graduated, the spines following subequal; the segmented rays slightly higher, forming a slight notch in profile of dorsal fin. Anal-fin spines graduated, the first less than half length of second and third spines; segmented rays longer than spines, the last three or four segmented rays longest. Pectoral fin broad-based, its origin slightly behind that of pelvic fin and about on same vertical as origin of dorsal fin, its distal tip extending close to or over origin of anal fin. Tip of second pelvic-fin ray developed into a short filamentous streamer. Caudal fin lunate, upper caudal lobe with a short filamentous streamer and longer than lower lobe.

***Color in fresh specimens*:** (Fig. 1) Ground color light gold to bronze, overlain dorsally with

FIGURE 1. *Serranus accraensis*. A fresh 14 cm TL specimen from West Africa, taken by the R/V *Dr. Fridtjof Nansen* in 47 m. Photograph by Oddgeir Alvheim.

brownish hue and darker scale outlines; silvery to white below, ivory-white on gular and branchiostegal membranes, chest (including cleithrum and pectoral-fin base), and belly to origin of anal fin. Five to seven indistinct broad olive-green bands descend from dorsum to midlateral line where they become darker and form blotches, the blotch below dorsal spines VI to VIII usually darkest and largest, those more posterior smaller and fainter, although that on caudal peduncle often forming prominent dark blotch. Two characteristic blue stripes on side of head, the upper running at a shallow diagonal from the posteroventral corner of orbit to margin of gill cover between second and third opercular spines, the lower stripe beginning at snout and running below orbit to margin of gill cover. Dorsal fin olive-brown overall, with a clear basal stripe on spinous portion rising posteriorly above a narrow dark base; distally, small clear spots dot darker ground, with a faint orange margin on soft-dorsal portion of fin. Pectoral and pelvic fins faintly yellow; anal fin with golden-yellow stripe midlaterally, clear otherwise; caudal fin olive-brown, darker on ventral lobe; small clear spots along interradial membranes. In preserved specimens: the bluish stripes on head are dark and the midlateral blotches are more prominent; also, three narrow stripes on body become visible: one running along lateral line, ending near where lateral line descends; a second stripe running midlaterally from behind lower margin of fleshy opercular lobe to caudal peduncle; the third running from behind belly at mid-level of pectoral fin and ending above end of anal fin.

***Size*:** To about 20 cm TL.

HABITAT AND DISTRIBUTION.— Muddy and sandy bottoms from 25–150 m. Senegal to Angola, São Tomé Island (first record, based on CAS 231616).

REMARKS.— This is a relatively common species in tropical West Africa at depths of approximately 40 to 80 m. Poll (1954: 78-79) recorded 180 specimens collected at 10 localities between the equator off Gabon and the Congo River in northern Angola. The first author encountered the species infrequently during *R/V Nansen* surveys off Senegal, Ghana, São Tomé e Príncipe, and Angola.

SPECIMENS EXAMINED (9 spec.; 8 from *R/V Dr Fridtjof Nansen* [*DFN*] surveys collected by the first author).— **Senegal:** CAS 234557 (1 spec., 88.6 mm SL); 15°19.1′N, 16°55.5′W; 53–50 m; *DFN* Survey 2012-04-04, sta.98; 28 May 2012. CAS 234896 (1, 129 mm SL); 14°29.09′N, 17°20.2′W; 58–57 m; *DFN* Survey 2012-04-04, sta.89; 27 May 2012. **Ghana**: CAS 231637 (2, 89.5–93.6 mm SL); 5°37.06′N, 0°34.47′E, 45–46 m; *DFN* Survey 2010-04-04, sta 5; 1 May

2010. **São Tomé e Príncipe:** CAS 231616 (1 spec., 101 mm SL); off São Tomé Island, 0°8.46′N, 6°41.42′E, 54-61 m; *DFN* Survey 2010-04-05, sta. 26, 16 May 2010. **Cameroon:** CAS-SU 55584 (1, 118.5 mm SL); Kribi; 2.938408°N, 9.908068°E; collector A.I. Good, 12 Apr. 1940. **Angola:** CAS 222858 (1, 88.5 mm SL); 12°17′S, 13°34′E; 53–57 m; *DFN* sta. 43611, 2 Apr. 2005. CAS 234758 (1, 133.5 mm SL); 12°00.06′S, 13°37.06′E; 73 m; *DFN* sta. 40, 4 Mar. 2007. CAS 224982 (1, 67.6 mm SL); 10°54.91'S, 13°43.7′E; 54–55 m; *DFN* sta. 61, 6 Mar. 2007.

***Serranus* (*Serranus*) *atricauda* (Günther, 1874)**
Figures 2–4

Serranus (*Serranus*) *atricauda* Günther, 1874:230 (Mogador [Essaouira, Morocco]). *Paracentropristis atricauda*: Fowler, 1936:768

Diagnosis.— D X,15–16; P 17; A III,7–8, usually 8; gill rakers 8+14–15(22–23 total); pored lateral-line scales 80-90; circumpeduncular scales about 47. Caudal fin truncate; upper lobe slightly elongated and pointed at tip; lower lobe rounded. Snout, anterior half of suborbital region, top of head, jaws, gular and branchiostegal membranes, most of interorbital, and outer margin of preopercle naked; all fins with small scales on basal portion of rays. Anterior nostril with raised rim, posterior portion of rim elevated into a narrow flap lacking fingerlike fringes. Adults with midlateral series of squarish black blotches, often broken by narrow white vertical bars (but not in yellow morphs, see below). Tips of caudal fin and distal margin of anal fin blackish.

Description.— Head about 2.7–3.0 time in SL; snout pointed, longer than orbit, about 3.8–4.0 in HL; orbit and interorbital space about equal, and about 4–6 times in HL. Body relatively shallow, 3.3–3.5 times in SL, compressed, the dorsal profile gently curved from snout tip to end of tail, ventral profile similarly smooth but less curved. Three flat spines on opercle, the uppermost and lowermost much shorter than middle spine, the narrow opercular flap extending beyond middle spine a distance about equal to length of that spine. Preopercle margin armed with small serrations along entire free margin.

Premaxillary teeth with two or three short canines on outer border of a cluster of teeth near tip of jaw, and one or two larger canines on inner mesial margin of cluster; the anterior cluster tapering to a narrow band posteriorly, flanked by a spaced series of smaller conical teeth. Dentary with moderately wide band of small teeth anteriorly, with two prominent canines at tip; the band narrowing to one or two irregular series of small, spaced canines interspersed with a few large canines near mid-length of jaw. Vomer with small teeth in a broadly V-shaped band; palatine teeth small, in a short narrow band.

First 4–6 spines of dorsal fin graduated, the spines following subequal; 5th or 6th spine longest, their length about equal to distance orbit to angle of preopercle; the soft dorsal slightly higher where it joins spinous dorsal, creating a slight rise but no distinct notch in profile of dorsal fin; longest spine (5th or 6th) about equal to longest segmented ray. Anal-fin spines graduated, the first 44–60% length of second and third spines, which are about equal; segmented rays of anal fin longer than spines, the last three or four segmented rays longest. Pectoral fin broad-based, its origin about on same vertical as origin of dorsal and pelvic fins; distal tips of pectoral and pelvic fins falling well short of anal fin.

***Color*:** Adults (Fig. 2) commonly have a white longitudinal stripe on body over anterior half of lateral line, after which the stripe narrows as it continues its horizontal course to the upper margin of the caudal peduncle, while the lateral line descends to a midlateral position; below this white stripe are four or five large, dark, rectangular blocks, each block alternating with a narrow dark vertical band; about five large dark blotches on dorsum below dorsal fin; small dark spots

FIGURE 2. *Serranus atricauda.* Adult from Faial Island, Azores. Photograph by Peter Wirtz.

FIGURE 3. *Serranus atricauda.* Juvenile from Faial Island, Azores. Photograph by Peter Wirtz.

FIGURE 4. *Serranus atricauda.* Adult yellow morph from Cape Verde Islands. Photograph by Reinhold Hanel.

arrayed along ventral border of longitudinal white stripe from behind gill cover to upper margin of caudal peduncle; median fins with numerous pale blue dots, which extend onto caudal peduncle in three horizontal rows; two or three dark oblique stripes on cheek; tips of anal and caudal fins black. Juveniles (Fig. 3) often differ in having a broad white stripe bordered by two black stripes, the upper black stripe extending from tip of snout to base of upper caudal-fin lobe, the lower extending from below eye to base of lower caudal-fin lobe; caudal fin transparent. A photograph of a yellow morph from the Cape Verde Islands (presumably from deep water) (Fig. 4) shows body overall brownish yellow, the dorsal two-thirds darker, the ventral one-third pale whitish. About 15 vertically elongated darker blotches on sides of body, some partially merged with others. Head with yellow stripes, one stripe running from snout tip through eye and onto upper margin of gill cover; another running below eye and bifurcating into two stripes on preopercle; a third stripe along upper margin of maxilla. One or two broader irregular stripes on nape. Dorsal fin yellow overall with dark distal margin on soft dorsal; pectoral fin yellow; pelvic fin mostly blackish, but base and spine pale whitish; anal spine pale, soft rays yellow near base and blackish over most of distal portion; caudal fin mostly yellow with prominent black tips on upper and lower lobes, posterior margin faintly blackish.

***Size*:** Maximum size about 35 cm TL.

Habitat and distribution.— Over hard bottoms from the shore to about 90 m; from the Bay of Biscay to Guinea Bissau, including the Azores, Madeira, Canary Islands, Cape Verde Islands, and also in the Mediterranean Sea.

Remarks.— This is a common species that supports artisanal fisheries in the off-shore islands of the African coast as well as slong the continental coastline from the Bay of Biscay to Mauritania, and also in the Mediterranean Sea. The only record that we know of from the mainland coast of West Africa south of Mauritania is by (Heemstra and Anderson 2016) from off Guinea-Bissau.

Specimens examined (2 spec.).— **Canary Islands:** CAS-SU 3108 (2, 150–185 mm SL); Canary Is.; collector C.F. Cook.

Serranus (*Serranus*) *cabrilla* (Linnaeus, 1758)

Figures 5–7

Perca cabrilla Linnaeus, 1758 (no locality given).
Paracentropristis cabrilla: Fowler, 1936:1291 (14 spec., 137–325 mm; Madeira, Canaries, Azores).
Serranus cabrilla: Poll 1954:69–72, fig. 19 (17 spec., 79–240 mm; Gabon to s. Angola). Robins and Starck 1961:261–262, figs. 1a, 7c, 8a, 8c (4 spec., Spain and Italy). Quero et al. 1990:704–705 (compiled).

Diagnosis.— D X,13–14; P 14–16; V III,7; gill rakers 6–8+12–16 (18–24 total); pored lateral-line scales 70–77; circumpeduncular scales 36–40. Caudal fin shallowly forked, upper lobe slightly longer than lower lobe, a very short streamer on upper lobe in juveniles, but none developed in adults. Interradial membranes of dorsal and anal fins scaled on basal one-half to one-third. Nape, opercle, cheek, pectoral-fin base and chest scaled.

Description.— Body compressed, width across pectoral fin base about 2 in HL; depth about 3 in SL; head about 2.7–2.8 in SL. Dorsal and ventral profiles gently curved; the snout pointed and longer than orbit diameter; interorbital width (fleshy) slightly greater than orbit diameter; lower jaw projecting beyond upper jaw; maxilla extending to below midorbit. Anterior nostrils with low rims lacking fingerlike fringes or cirri. Opercular spines three, the upper two fairly well developed, the lowermost obscure in adults, but more visible in juveniles. Preopercle margin coarsely serrated, largest spines near angle. Interopercle smooth, (a few imbedded scales in large specimens); snout, interorbit, occiput, suborbit, jaws, gular and branchiostegal membranes naked.

FIGURE 5. *Serranus cabrilla.* Adult from near Hyères, Var, Provence, France. Photograph by Lucas Berenger.

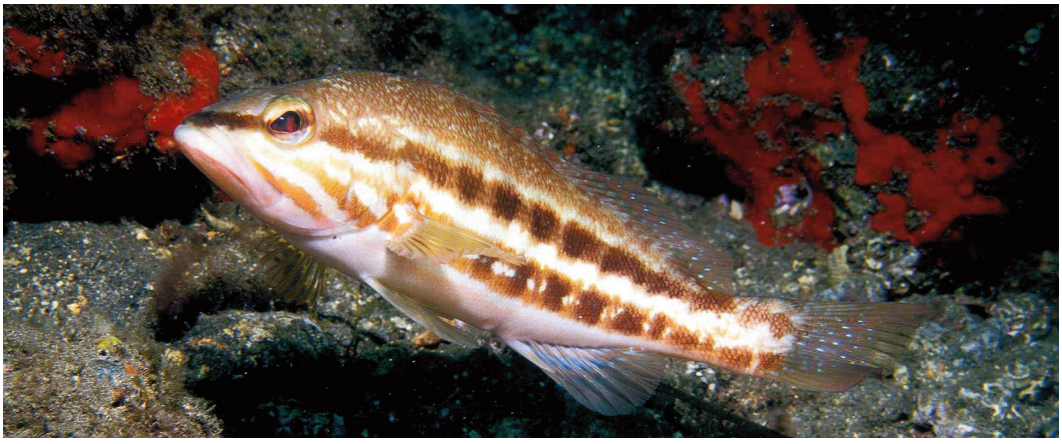

FIGURE 6. *Serranus cabrilla.* Adult from the Canary Islands. Photograph by Rogelio Herrera.

FIGURE 7. *Serranus cabrilla.* Yellow morph from Ivory Coast (4°34′N, 6°37′W), collected by R/V Dr. Fridtjof Nansen by bottom trawl in 81 m. Photograph by Oddgeir Alvheim.

Premaxillary teeth in several irregular rows, the outer enlarged with one or more large canines at anterior end. A single file of enlarged, spaced teeth on dentary, largest teeth midlength on jaw; much smaller teeth interspersed on sides of larger teeth and a cluster of small teeth at anterior end. Vomer broadly V-shaped with small teeth. Palatine teeth all small, in a short to elongate patch.

Scales small, ctenoid, present on sides of head and nape to margin of frontals, but absent on interorbital, snout, suborbital region, jaws, gular and branchiostegal membranes, interopercle bone, outer margin of preopercle, and lower margin of subopercle. Small scales at bases of dorsal, anal, pectoral and caudal fins, and minimally (if at all) on pelvic fins.

First 4–6 spines of dorsal fin graduated, the 6th spine usually longest, the spines following subequal; the soft rays slightly higher, forming a slight rise (but no distinct notch) in profile of dorsal fin. Anal-fin spines much shorter than soft rays, the first spine somewhat more than half length of second and third spines, the last three or four soft rays longest. Pectoral fin broad-based, its origin slightly behind that of pelvic fins and about on same vertical as origin of dorsal fin, its distal tip over anus, slightly behind origin of anal fin. Pelvic fin falling well short of anus. Caudal fin shallowly lunate, almost truncate, upper and lower lobes about equal, but upper lobe with a very short streamer in small juveniles.

***Color*:** (Fig. 5) A series of about nine dark vertical bands along the light brown to reddish body, interrupted in some specimens by two or three white stripes; underside of head and belly mostly white; bands on body reduced to dark lateral blotches in some. Caudal and soft dorsal fins punctated with small bluish dots; in some individuals the basal one-third to one-half of soft dorsal fin dark but distally pale with small bluish spots; tips of caudal fin occasionally reddish (Fig. 6). Posterior margin of caudal fin occasionally blackish but never with black lobes as in *S. atricauda*. Juveniles may be quite different: a white midlateral stripe bordered by two thick black stripes, the upper stripe running from tip of snout through middle of eye to upper margin of operculum onto trunk above midlateral line to upper half of caudal peduncle, the lower stripe from base of pectoral fin to lower half of caudal peduncle; the dark stripes often partially broken into dark blotches. The juvenile color pattern is often very similar to that of *S. atricauda* (compare with Fig. 3), although three juveniles (CAS 234559, 44.4–50.7 mm SL) trawled in 53–50 m off Senegal lacked the prominent dark lateral stripes.

As in many other fish species, *S. cabrilla* specimens from deep water tend to be more yellow (Medioni et al. 2001). In one individual from deeper waters at the Azores (Fig. 7), ground color golden-yellow on flanks, yellowish-orange on head, and brownish to tan on dorsum; four or five metallic-blue longitudinal lines or stripes on body and three diagonal stripes on head, the lowest stripe on head originating on snout and running to preopercle angle onto subopercle; the upper two stripes originating below orbit and terminating at margin of opercle. A fourth diagonal stripe present in some, originating on posterior portion of maxilla and extending a short distance onto preopercle. Fins yellowish; the soft dorsal with dark basal half, the dark bands on body extending onto dorsal-fin rays.

Size: 40 cm TL.

Habitat and distribution.— Over hard bottoms from the shore to 450 m; from the British Isles to Angola, including the Azores, Madeira, the Canary Islands, São Tomé Island (based on photo by the second author) and Príncipe Island (first record based on CAS 234287), apparently here and only in deep water at the Cape Verde Islands (Freitas et al., in prep.); also throughout the Mediterranean and into the Black Sea. Its presence in the Red Sea is attributed to invasion from the Mediterranean Sea after the Suez Canal was opened in 1869 (Norman 1927; Tortonese 1954; Meisler 1988:156). Records of the species from South Africa are apparently of the closely similar *S. knysnaensis* Gilchrist, 1904 (Heemstra and Anderson, 2016).

Specimens examined (14 spec.).— **São Tomé e Príncipe:** CAS 234287 (1, 208 mm SL); Príncipe Is., purchased dockside in São Tomé City from fisherman selling catch taken off Príncipe; 7 Apr. 2012. **Senegal:** CAS 234559 (3, 44.4–50.7 mm SL); 15°19.1′N, 16°55.5′W, 53–50 m; *R/V Dr Fridtjof Nansen* CCLME Survey 2012, sta. 98, 28 May 2012. **Ghana:** CAS 234960 (1, 205 mm SL); 5°54.77′N, 1°16.15′E; 94–95 m; *R/V Dr Fridtjof Nansen* Survey 2010.04.04, sta. 1; 30 Apr. 2010. **Cameroon:** CAS 238009 (1, 195 mm SL); collector A.I. Good; 1940. **Italy**: CAS-SU 20933 (3, 142-216 mm SL); and CAS-SU 20933 (3, 142–175 mm SL); Naples; collector E.C. Starks; ca. 1907. CAS-IU 7545 (1, 162 mm SL); Sicily, Palermo; collector P. Doderlein; 1886. **Spain:** CAS-SU 69064 (1, 171 mm SL); Mediterranean Sea; Gibralter, Gibralter Harbor; collector T.H. Work; 12 Aug. 1947. **Red Sea:** USNM 203668 (4, 60–98 mm SL); "Abu Zueima" [*sic*, possibly Abu Zenima, in Egypt]; coll. H. Steinitz, 22 Sept. 1967.

***Serranus* (*Paracentropristis*) *drewesi* Iwamoto, sp. nov.**
Figure 8

Diagnosis.— D X,11; P 14; A III,6; gill rakers 3+11; scales below 1D origin about 5, below 2D 4+1+8 or 9, pored lateral-line scales 44; circumpeduncular scales 1+9+1+10 (21 total). Anterior nostril tubular, rim greatly elevated posteriorly and bearing about 7 or 8 long cirri at tip. Scales all cycloid (except for a hard, sharply spinulated suprascapular scale bone above the upper opening of the gill cover). Caudal fin weakly emarginate, upper and lower lobes about equal. Interradial membranes of soft dorsal and anal fins scaly on basal one-half to one-third. Nape, opercle, preopercle, interopercle, mandibular ramus, pectoral-fin base, and chest covered with cycloid scales. A bold black spot between last three spines and first soft dorsal ray formed above broad black saddle on dorsal half of body.

Description.— Head and body laterally compressed, greatest width of head 6.3 times in SL, greatest body width 5.9 times in SL. Snout pointed, longer than orbit diameter; interorbital space narrow, bony width about 60% of greatest orbit diameter. Orbit about 4 in HL; pupil sharply egg-shaped with pronounced anterior aphakic (lensless) space. Jaws equal; posterior margin of maxilla below middle of orbit. Two broad, flat, weak opercular spines developed, the dorsal spine partially obscured by skin and scales, lower spine more prominent and forming posterodorsal corner of gill cover. Anterior nostril tubular, rim low anteriorly but elevated into a long flap posteriorly, the flap fringed with 7 or 8 long cirri, a few filaments longer than height of flap. Gill opening ventrally extending forward to about vertical passing through hind edge of orbit. Gill rakers relatively short, stout and recurved, the uppermost on lower limb (ceratobranchial) about 1.5 mm in length, the succeeding rakers gradually shorter with last three or so tubercular. About 11 pseudobranchs.

Spinous dorsal fin with middle spines longest, a prominent dip between spinous and soft-rayed portions of dorsal fin; the longest dorsal spine shorter than longest dorsal soft rays. Size and shape of pectoral fin could not be determined owing to left fin torn off in capture and right fin cut off for tissue sample. Pelvic fin below fourth spine of dorsal fin and behind origin of pectoral fin, its tip when depressed not extending to origin of anal fin. Anal fin with three strong spines, the first about half length of second, which is slightly longer than third spine; six soft rays forming narrow rounded tip to fin. Caudal fin weakly emarginate.

Scales all cycloid (excepting a hard, sharply spinulated suprascapular scale bone above the upper opening of the gill cover). Snout and dorsal surfaces of head naked anterior to a vertical passing through hind margin of preopercle. Interopercle finely scaled anteriorly and dorsally immediately below preopercular margin. Mandibular ramus with tiny thin scales covering most of poste-

rior surfaces and extending forward onto lateral surfaces. Cheeks (viz, preopercle) finely scaled; hind (vertical) margin of preopercle finely serrated, but ventral margin smooth. Opercle and subopercle with large scales in two major rows bordered posteriorly with small scales. Chest and nape fully scaled. Eight scale rows along dorsal crest of nape before origin of first dorsal fin. Small scales at base of second dorsal fin (and sparsely on posterior base of spinous dorsal fin), and on bases of pectoral and caudal fins.

Anterior tip of premaxillary with cluster of small teeth and one enlarged canine more laterally placed; the cluster of teeth followed by a tapered band of small teeth. Dentary teeth consist of a cluster of small, short, conical teeth anteriorly that are rigid along outer margin but depressible inward of outer row. Posterior to these, a series of four larger canine-like teeth, with an outer smaller tooth row, these in turn followed posteriorly by a row of smaller teeth. Vomerine teeth small, in a broad short band. Presence of palatine teeth could not be adequately assessed for fear of damaging specimen; however, there appeared to be a row of small teeth along the bone.

Color (fresh)**:** (Fig. 8) Head with five or six small black spots behind eye, two in interorbital space, one on snout on median line, and diffuse ill-defined spots on sides of snout and head. Dorsal half of body and head darker than ventral half; nape and dorsum posteriorly to below third dorsal spine dark brown; a broad dark saddle below last three spines and first two soft rays of dorsal fin; a second dark saddle below 5th through 9th soft rays, followed by third saddle (partially merged with second) below last two soft rays and anterior one-third or so of caudal peduncle, a fourth saddle on posterior third of caudal peduncle ending sharply at base of caudal fin. Spinous dorsal fin irregularly brown with faint pale blotches, a bold black spot between posterior part of spinous dorsal and anteriormost end of soft dorsal fin; pectoral fin missing on both sides; pelvic fins pale to light yellow; anal fin dark brown overall; caudal fin mostly orangish to pink with darker upper and lower edges. Iris orange.

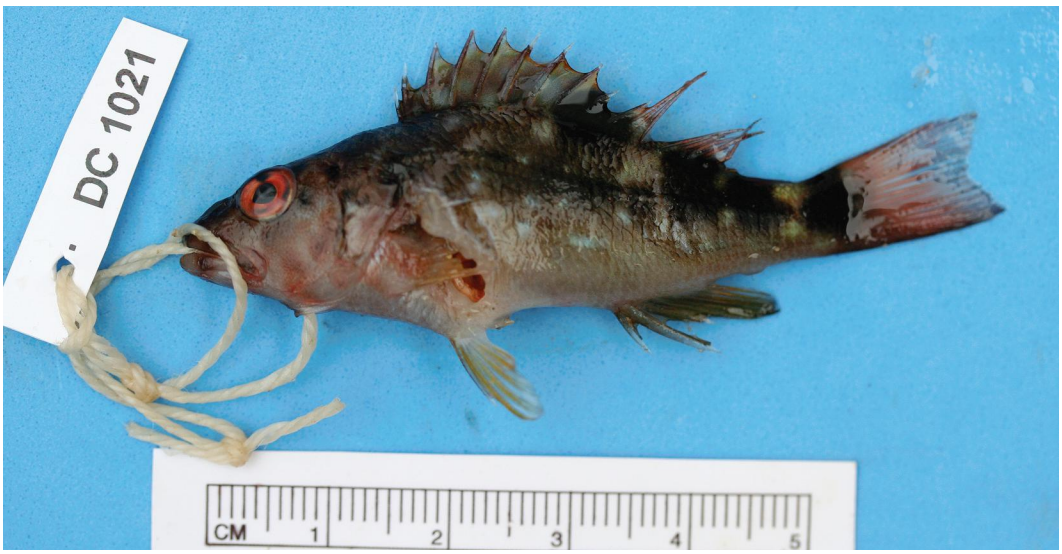

FIGURE 8. *Serranus drewesi* Iwamoto, new species. Holotype (CAS 234050 (53.5 mm SL) from submarine cave on Santana Islet, São Tomé Island. Photograph by David Catania.

Comparisons**:** *Serranus drewesi* is most similar in overall characters to *S. hepatus*, notably in having six anal fin rays and closely similar fin ray counts, somewhat similar body shape, and general color pattern, including a prominent black spot on the dorsal fin. That spot, however, is not

ocellated as in *S. hepatus* and it merges with the broad saddle on the dorsum immediately below. The saddles on the body do not extend to the ventral body margin and do not sharply contrast with a generally pale body as in *S. hepatus*. The pelvic fin is overall yellowish (dusky in preserved specimen) in contrast to black in *S. hepatus* and the anal fin is uniformly dark brown without the pronounced black anterior and clear distal parts so notable in *S. hepatus*. Other differentiating features include: the absence in *S. drewesi* of narrow gold to orange stripes on the head (vs. present in *S. hepatus*); black spots on the head (lacking in *S. hepatus*), two opercular spines in *S. drewesi* (vs. three); snout longer than orbit (vs. about equal to); gill rakers on first arch 14 total (3+1+10) (vs. 19-23); long cirri on flap of anterior nostril 7 or 8 (vs. 1-3 stubby cirri); cycloid scales on body (vs. ctenoid scales); circumpeduncular scale rows 21 (vs. 23-26); scale rows below origin of dorsal fin 5 (vs. 6-8); interorbital space naked (vs. scaled); mandibular ramus finely scaled (vs. naked).

Serranus drewesi is readily differentiated from *S. scriba, S. cabrilla,* and *S. atricauda* by its fewer lateral-line scales and its distinctive color pattern. The combination of relatively low fin-ray counts of soft dorsal, pectoral, and anal fins, and the fewer gill rakers, the absence of ctenoid scales, as well as the color pattern, which includes a large black spot on the dorsal fin, distinguish the new species from the remaining eastern Atlantic species of the genus.

***Size*:** To at least 6.5 cm TL

Distribution.— Known only from the holotype taken by mini-spear in a submarine cave in Santana Islet, Republic of São Tomé e Príncipe.

Etymology.— Named in honor of Dr. Robert C. Drewes of the California Academy of Sciences, for his dedicated efforts in leading 12 separate scientific and educational expeditions to São Tomé e Príncipe to explore and document the diverse fauna and flora of that country and to inspire and educate the country's citizens as to the biological wealth and uniqueness of where they live.

Remarks.— We describe this species with some reluctance owing to the absence of additional specimens and the small size of the only representative. We did not examine the internal organs, notably the gonads, to determine whether it is a juvenile or an adult. If the former, it is likely that the adult pigmentation pattern of this species differs substantially from the holotype. We also did not examine the myological, arthrological, and osteological characters used by Meisler (1987:80) defining the subgenera *Paracentropristis* and *Serranus* (e.g., levator arcus palatini muscle inserts on preopercle and dorsal origin of ethmomaxillary ligament medial on mesethmoid). We await the collection of additional specimens to expand on the description of this obscure little species.

Type specimen.— Holotype, CAS 234050 (53.5 mm SL); São Tomé e Príncipe, São Tomé Is.; Santana Islet (0°14′33.1″N, 6°45′36.1″W); collected by J.E. McCosker and J.-L. Testori in submarine cave at 62 ft [18.9 m] depth; 28 Jan. 2009; mini-hand spear.

Serranus (*Paracentropristis*) *hepatus* (Linnaeus, 1758)

Figures 9–10

Labrus Hepatus Linnaeus, 1758:282 (Mediterranean).
Holocentrus siagonotus Delaroche, 1809:66, fig. 8 (Balearic Islands).
Serranus hepatus: Risso 1826:377. Dalgiç et al. 2013 (Black Sea off Rurkey), Apostolos 2014:142 (Black Sea, off Bulgaria)
Holocentrus adriaticus Nardo, 1827 (Adriatic).
Centropristis hepatus: Günther 1859:84 (Mediterranean).
Paracentropristis hepatus: Jordan and Evermann 1890:395. Fowler 1936:765, fig. 337.

Diagnosis.— D X,11–13; P 13–15, usually 14; A III,6 or 7; gill rakers 6–7+14–15(19–23 total); pored lateral-line scales 44–52; circumpeduncular scales 23–26; scales below origin of first

dorsal fin 6–8. Rim of anterior nostril elevated posteriorly forming a narrow flap bearing 1–4 fingerlike cirri at tip. Caudal fin emarginate, upper and lower lobes about equal. Interradial membranes of dorsal and anal fins scaled on basal one-half to one-third. Nape, interorbital, opercle (except outer margin), preopercle, interopercle, pectoral-fin base, and chest scaled. A prominent, ocellated black oval spot anteriorly on soft dorsal fin; pelvic fins black.

Description.— Body compressed, width across pectoral fin base about 2 in HL; greatest body depth about 2.8–3.0 in SL; head about 2.5–2.6 in SL. Dorsal profile from tip of snout to dorsal fin almost straight, thereafter broadly curved to caudal peduncle where it levels off; ventral profile moderately inclined from lower jaw to chest, leveling off on belly to origin of anal fin, then gently rising to caudal fin. Snout about equal in length to diameter of orbit; interorbital width

Figure 9. *Serranus hepatus*. From near Portimao, Algarve, Portugal. Photograph by Nuno Vasco Rodrigues.

Figure10. *Serranus hepatus* from Croatia, Adriatic Sea. Photo by Robert A. Patzner.

(fleshy) slightly less than orbit diameter; lower jaw projecting slightly beyond upper jaw; maxilla extending to below midorbit. Anterior nostril with raised rim, posteriorly becoming a narrow flap with 2–4 small fingerlike cirri or papillae at tip. Opercular spines three, the uppermost poorly developed and obscure, middle spine long and flat, the lowermost much smaller but evident. Preopercle margin serrated with flattened spines, those at angle largest.

Premaxillary teeth in narrow band, the outer series spaced and slightly enlarged with one or more large canines at anterior end where tooth band is broadest. Dentary teeth in band, with a spaced series of slightly enlarged outer teeth flanking small inner series in band, and largest teeth posteriorly in an irregular series. Vomerine teeth in broadly V-shaped band; a narrow band of small palatine teeth following close behind each end of vomerine band.

Small scales cover most of head (including interorbital space and fully scaled interopercle), body, and basal parts of all fins, but not snout, suborbital, jaws, gular and branchiostegal membranes, and free margin of preopercle, which are naked.

First 4–6 spines of dorsal fin graduated, the 6th through 8th spines usually longest, the spines following subequal; the soft rays about equal to or slightly higher than longest spines. Anal-fin rounded posteriorly; its spines much shorter than soft rays, the first spine somewhat more than half length of second and third spines, the anterior and middle soft rays longest. Pectoral fin broad-based, its origin about on same vertical as that of pelvic and dorsal fins; the pectoral and pelvic fins falling far short of anus. Caudal fin slightly emarginate.

Color (Figs. 9, 10) brownish-yellow or silvery with four or five prominent dark vertical bands; band below soft dorsal fin broadest and darkest, bifurcating dorsally to surround elongated black ocellus on soft dorsal fin, band ventrally entering basal half of anal fin. Band on nape often obscure; a small dark spot often present on caudal peduncle. Three or four narrow copper, gold, or brownish diagonal streaks on cheeks; the lowermost streak running from tip of snout to below orbit to lower corner of gill cover. Soft dorsal and caudal fins pale orange, peppered with small white spots. Pectoral fin clear. Pelvic fins black, sometimes with pale to white base and leading edge. Basal half of anal fin black, distal half dusky to clear.

Size**:** To about 25 cm TL.

Habitat and distribution.— Over seagrass, sand, mud, and rocks from coast to about 100 m. Portugal to Senegal; also Mediterranean Sea and Black Sea.

Remarks.— Meisler (1987:163) reported that the nasal flap is simple, but we found one to four fingerlike cirri on the nasal flap of our larger specimens from CAS 20741; the small specimens from USNM 198923 showed little development of cirri.

Specimens examined (10 spec.).— **Mediterranean Sea**: CAS-SU 20741 (6, 53.8–88.8 mm SL); Italy; Naples; collector E.C. Starks. USNM 198923 (4, 35.4–38.0 mm SL), Lebanon, Antelias; coll. C. J. George, 10 July 1963.

Serranus (*Paracentropristis*) *heterurus* Cadenat, 1937

Figures 11–12

Paracentropristis heterurus Cadenat, 1937:456–457, figs 13–14 (Guinea; 38-65 m). Cadenat and Marchal 1963:1274 (*S. sanctaehelenae* distinguished from *S. heterurus*).

Serranus heterurus: Heemstra and Anderson 2016:2411(in part; descr. and fig. of *S. inexpectatus* n.sp.; coast of Guinea to Congo; 25–30 m). Wirtz and Iwamoto 2016: figs 12–15 (comparison with *S. pulcher*; specimens from Senegal, Cape Verde Is., São Tomé I, and Guinea)

Diagnosis.— D X,12; P 14–15 (rarely 17), usually 14; A III,7; gill rakers 6-8+15–17 (21–25 total); pored lateral-line scales 45–47; circumpeduncular scales 19–23; scales below origin of first dorsal fin 5–6. Caudal fin truncate, the upper lobe slightly pointed and produced, lower lobe round-

ed. Anterior nostril tubelike with high fringed posterior flap. Interradial membranes of dorsal and anal fins scaled on basal one-half to one-third. Nape, opercle, preopercle, pectoral-fin base and chest scaled. Ground color dark red to reddish-orange with seven white vertical bands on body alternating with broad red bands or blocks. A prominent white or blue crescent mark behind orbit in life (dark in preserved specimens); small blue spots ventrally on snout, suborbital and upper lip, and blue to white diagonal streaks on lower part of operculum.

Description.— Body relatively slender and compressed, width over pectoral bases about half of HL, greatest body depth 2.5–3.0 in SL, slightly less than HL, which is about 2.5–2.6 in SL. Dorsal and ventral profiles gently curved from tip of snout to caudal fin. Snout about equal in length to orbit diameter; both somewhat greater than interorbital width. Lower jaw projecting slightly beyond upper jaw; maxilla extending to below midorbit. Anterior nostril with raised rim, posteriorly rising to a high narrow flap with 2–4 long fingerlike papillae or slender cirri at distal tip; posterior nostril lacking raised rim. Opercular spines three, the uppermost poorly developed and obscure, middle spine longest, the lowermost smaller. Preopercle margin serrated with flattened spines, those at angle largest.

Premaxillary teeth in narrow band, the outer series spaced and slightly enlarged; one or more large canines at anterior end. Dentary with a spaced series of slightly enlarged outer teeth flanking band of much smaller teeth, the tooth series becoming larger posteriorly to near end of gape. Vomerine teeth in broad V-shaped band, followed on each arm by a narrow band of small palatine teeth.

Scales cover most of head, body, and basal parts of dorsal, anal, caudal, and pectoral fins, but absent on the following: snout; on dorsal surfaces of head to front of nape; over suborbital region to above hind margin of maxilla; on jaws; along narrow border behind orbits; on gular and branchiostegal membranes; on entire exposed surfaces of interopercle; and along outer margin of preopercle.

First four to six spines of dorsal fin graduated, the 5th to 6th spines longest, the spines following subequal; the soft rays slightly higher than longest spines, the 4th or 5th ray longest; a slight notch in fin profile. Anal fin relatively high, its posterior tip rounded; spines shorter than soft rays, the first spine more than half length of second and third spines, the second spine longer and stouter than the others; the anterior and middle soft rays longest. Pectoral fin broad-based, its origin about on same vertical as that of dorsal fin and slightly behind that of pelvic fin; the posterior tips of pectoral and pelvic fins fall short of anus. Caudal fin truncate to somewhat emarginate; dorsal lobe slightly pointed, ventral lobe rounded at tip.

***Color*:** In a live individual from the Cape Verde Islands (Fig. 11), ground color dark wine-red, five broad red bands across body from caudal peduncle to (and touching) base of pectoral fin, another over nape and onto opercle; forward of that a narrower band on preopercle; seven narrow white bands interspersed between red bands of head and body; behind posterior rim of orbit a prominent narrow blue to white crescent-shaped mark; small blue spots cover head and vertical fins. In a fish from Guinea (CAS 234558) (Fig. 12), ground color light reddish-orange, dorsum somewhat darker, snout darkest; five broad dark vertical bands on body, each extending almost entire depth of body, with the exception of the anterior two which fade into white of belly; dark bands alternate with six pale narrower bands, the last dark band narrowest and on caudal peduncle, followed by narrow pale band at base of caudal fin. Two white streaks on cheek from lower part of preopercle extending diagonally downward to interopercle; a light blue crescent mark along hind border of orbit; small blue spots on head and vertical fins. Soft rays of dorsal and anal fins distally dark with trace of blue and speckled with small yellow to gold spots; posterior margins of dorsal and anal fins blackish. Caudal fin with narrow yellowish bands; upper and lower margins yel-

FIGURE11. *Serranus heterurus.* From Tarrafal, Santiago, Cape Verde Islands. Photograph by Patrick Louisy.

FIGURE 12. *Serranus heterurus.* CAS 234558 (73.2 mm SL) from Guinea in 28–29 m, *R/V Dr. Fridtjof Nansen* station. Photograph by T. Iwamoto.

low; traces of reddish splotches near base of fin. Pectoral fin clear reddish-orange; pelvic fins blackish distally.

***Size*:** 10 cm TL.

HABITAT AND DISTRIBUTION.— On rocky and marl bottoms in 20–65 m. A single specimen from Guinea (CAS 234558) was found amongst a large catch of pen shells, Pinnidae. Senegal, Guinea-Bissau, Guinea, Sierra Leone, Ghana, Cape Verde Islands and São Tomé Island.

REMARKS AND COMPARISONS.— *Serranus heterurus* has been confused with *S. sanctaehelenae*, with which it has sometimes been synonymized (e.g., Robins and Starck 1961: 290; Smith 1981:5; 1990:706). *Serranus heterurus* can be readily distinguished from *S. sanctaehelenae* by its much smaller adult size (10 cm TL cf. 24 cm), and the following characters that are lacking in *S. sanctaehelenae*: color pattern (crescent-shaped marking behind orbit; blue spots below orbit; ground color reddish to orange); presence of cirri or fringes on posterior rim of nostril; dorsal lobe of caudal fin slightly produced. *Serranus heterurus* and the closely related *S. pulcher* are similar in most meristic and morphometric values, but differ notably in color pattern: *S. pulcher* is usually an overall dark grey on the upper half of head, the lower part reddish, then white on the underside,

broken by a moustache-like marking from upper jaw that tapers medially, the markings on each side almost meeting at interopercles; the white chest is marked by a red streak originating at angle of operculum and ending at origin of pelvic fins; no black spot or margin in dorsal fin; no dark spots or whitish crescent marks on head; pelvic fins usually completely white. A common color variant in São Tomé has broad orange to reddish stripes on body, one dorsally from nape to dorsal margin of caudal peduncle, a midlateral stripe from eye to center of caudal fin base, a third from lower part of head to ventral margin of caudal peduncle; juveniles of this variant may have midlateral and lower stripes black. Comparison of *S. heterurus* and *S. inexpectatus* are given in the description of the latter species.

We found much variability in the color patterns, markings, and shape in this species that has led to much confusion as to what species we are dealing with. The original description and illustration of the species by Cadenat (1937) clearly distinguish most specimens from the Cape Verde Islands, Senegal, São Tomé I., Príncipe I., and Guinea.

DNA evidence provided by Benjamin Victor suggests that *S. inexpectatus* is most closely related to *S. pulcher* and together they form a clade that is sister to *S. heterurus.* Victor's DNA sequences for *S. heterurus* came from specimens collected in the Cape Verde Islands; those for *S. inexpectatus* from Angola, Sierra Leone, and Senegal. We have not had the opportunity to examine the voucher specimens.

Specimens examined (12 spec.).— **Guinea:** CAS 234712 (64.8 mm SL); 9°24.8′N, 14°36.6′W; 47–53 m; *R/V Dr Fridtjof Nansen* [*DFN*] CCLME Survey 2012, sta. 7; 11 May 2012. CAS 234711 (80.8 mm SL); 9°46′N, 14°46.1′W; 34–33 m; *R/V DFN* CCLME Survey 2012, sta. 16; 12 May 2012. CAS 234558 (73.2 mm SL); 10°03.7′N, 15°28.5′W; 28–29 m; *R/V DFN* CCLME Survey 2012, sta. 27; 14 May 2012. CAS 234709 (46.6 mm SL); 10.152°N, 15.9284°W; 35 m; *R/V DFN* CCLME Survey 2012; 14 May 2012. **São Tomé e Príncipe:** CAS 231614 (58.2 mm SL); São Tomé Island; 0°04.35′N, 6°38.77′E; 56–60 m; *R/V DFN* Survey 2010-04-05, sta. 23; 15 May 2010. CAS 231627 (66.8 mm SL); São Tomé Island; 65–55 m; *R/V DFN* Survey 2010-04-05, sta. 32; 18 May 2010. **Cape Verde Islands:** USNM 405101 (88.3 mm SL); 15°45′12″N, 23°05′27″W; 73–61m; *R/V DFN* Cape Verde 2011 Exped, sta. 10, coll. K. Wieber, 10 June 2011. USNM 405105 (75 mm SL), between Santiago and Boa Vista islands; 15°40′06″N, 23°11′15″W; 77–79 m; *R/V DFN* Cape Verde 2011 Exped, sta. 12, 10 June 2011. USNM 405181 (69 mm SL); 16°34′36″N, 23°51′24″W; 31–45 m; Cape Verde 2011 Exped., *DFN* sta. 28, coll. K. Wieber, 14 June 2011. ZSM 44703 (78.3 mm SL), ZSM 43730 (39.4 mm SL), ZSM 43051 (36.0 mm SL); Kingfisher Bay at Terrafal on Santiago I.; 15.275522°N, 23.459545°W; 19 m; coll. P. Wirtz, Oct. 2015.

Serranus (*Paracentropristis*) *inexpectatus* Wirtz and Iwamoto, sp. nov.

Figures 13–15

Paracentropristis heterurus: Poll 1954:72–73, fig. 20 (in part, descr. and fig. of *S. inexpectatus*; nw of Mayumba, Gabon). Heemstra and Anderson 2016:2411 (in part, descr. and fig. from Poll 1954, of *S. inexpectatus*).

Diagnosis.— D X,12; P 17; A III,7; gill rakers 5–7+10–11 (15–18 total); pseudobranchial filaments about 22; pored lateral-line scales 46; circumpeduncular scales 21; scales below origin of first dorsal fin 4, below first segmented dorsal ray 3–3.5. Caudal fin truncate, the upper lobe slightly pointed, lower lobe somewhat rounded. Dorsal, anal, and pectoral fins scaly near base. Anterior nostril tubelike, rim low anteriorly but rising to a high narrow flap posteriorly, with 4–6 long cirri at distal tip; posterior nostril a simple opening lacking a raised rim. Prominent black blotch distally between dorsal fin spines 1 and 4. Five broad bands on body and another over nape;

the band under 5th to 10th spines descends to belly well removed from pectoral-fin base and to front of anal fin; band below anterior rays of soft dorsal fin descends to middle of anal-fin base.

Description.— Body relatively slender, width over pectoral bases about half of HL, 18–20% SL, greatest body depth below fifth or sixth dorsal spine about 2.9–3.1 in SL and less than HL, which is about 2.6 in SL. Dorsal profile (excluding eye) rising in a relatively straight line to origin of dorsal fin, then leveling off to about fifth or sixth spine before descending in a gentle curve to base of caudal fin; ventral profile gently curved from lower jaw to caudal fin; orbit diameter about 4 into HL, longer than snout length, both substantially more than interorbital width. Lower jaw projecting slightly beyond upper jaw; maxilla extending to below posterior half of pupil. Anterior nostril tubular, the rim posteriorly elevated into a high narrow flap with 4–6 long slender cirri at distal tip; posterior nostril lacking raised rim. Opercular spines three, the uppermost small and obscure, middle spine longest. Preopercle margin serrated with flattened spines, those at angle largest; vertical portion of margin slightly inflected to form shallow lobe at angle.

Premaxillary teeth in narrow band, the outer series spaced and slightly enlarged; one or more large canines at anterior end. Dentary with a band of small teeth flanked by a series of slightly enlarged outer teeth that become larger posteriorly. Vomerine tooth band broadly V-shaped, teeth along posterior edge of bone slightly larger; each arm of vomerine teeth followed by narrow band of small palatine teeth.

First four spines of dorsal fin graduated, the middle 4th to 6th spines longest, the spines following subequal; the soft rays slightly higher than longest spines, the 3rd to 5th soft ray longest; a slight notch in fin profile. Anal fin relatively high, spines shorter than soft rays, the first spine more than half length of second and third spines, the second spine longer and stouter than the others. Pectoral fin broad-based, its origin about on same vertical as that of dorsal and pelvic fins; middle of fin (7th to 8th rays) longest, extending to base of first or second anal spine; pelvic fin falls short of anus. Caudal fin emarginate; dorsal lobe weakly pointed, ventral lobe somewhat rounded at tip.

Scales ctenoid, body fully covered; head naked over snout, interorbital, suborbital region, outer margin of preopercle and over subopercle. Small scales on interradial membranes of dorsal fin, mostly confined to basal one-fourth to one-half of soft rays, but a few on membrane between spines. Anal and caudal fins also with small scales at base, but on caudal fin, scales extending more distally. Scales on pectoral fin limited to immediate base of fin.

Pigmentation pattern (Figs. 13, 14) of preserved type specimens from Angolan and Gabon**:** Six or seven vertical bands on body from nape to base of caudal fin. Bands originate along dorsal outline of body and descend ventrally before fading on abdomen or near ventral outline; pigmentation of bands under dorsal fin extend onto base of dorsal fin rays. Anteriormost band faint, beginning over nape and extending posteriorly to below 3rd or 4th dorsal spine; ventrally, band descends onto opercle and subopercle. Second band below 5th to 10th spines descending to behind posterior half of pectoral fin, gradually fading over abdomen. That band, as in *S. pulcher,* does not abut against the pectoral-fin base. Third band below 1st to 6th soft dorsal rays, descending to ventral outline over anterior anal soft rays. Fourth band below last four or five soft dorsal rays and extending slightly onto caudal peduncle. A fifth band at middle of caudal peduncle, followed by a sixth band over end of peduncle and partly onto base of caudal fin. Angolan specimens have characteristic dark spots on snout and suborbital, and a faint dark crescent mark on hind border of orbit; tiny, irregular (in shape, size and distribution) black speckles on posterior one-half of interorbital space—these absent on Gabon specimen, which is faded. However, a small dark dot present on both sides of head just behind upper margin of orbit in all three specimens. Dorsal, anal and lower half of caudal fins dusky with faint diagonal streaks. Anal fin overall dark dusky but faintly whitish

FIGURE 13. *Serranus inexpectatus* Wirtz & Iwamoto, new species. (a) Holotype, ZSM 45041 (72.4 mm SL) from Angola, 35-36 m; (b) Paratype, ZSM 32516 (75.1 mm SL), same data as for holotype. Photographs by Peter Wirtz.

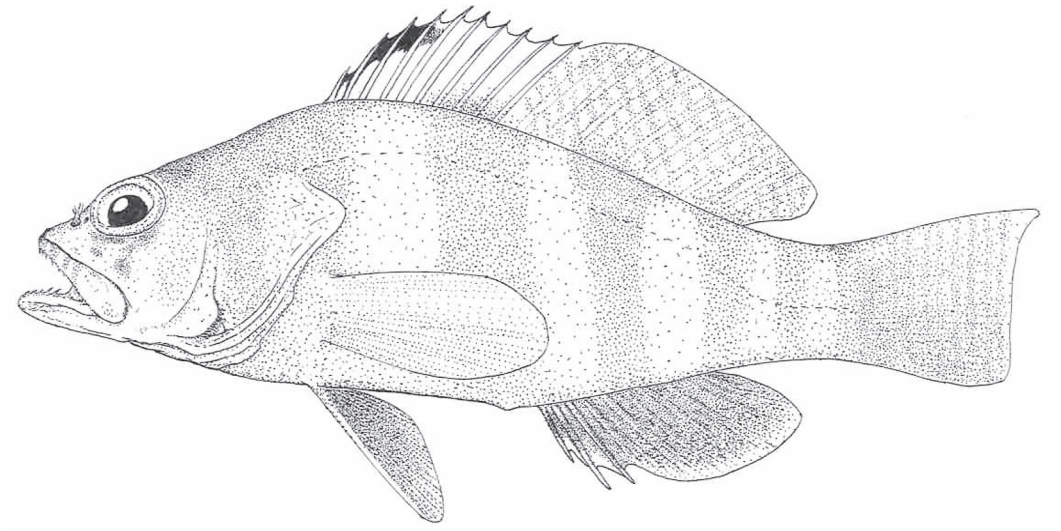

FIGURE14. *Serranus inexpectatus* Wirtz & Iwamoto, new species. Lateral view of holotype (ZSM 45041) showing markings on fins, body, and head. Markings have been slightly exaggerated.Drawing by Tomio Iwamoto.

FIGURE 15. *Serranus inexpectatus* Wirtz & Iwamoto, new species. A freshly collected specimen from Senegal. Photograph by Pascal Pépé Sjamajee Rommelaere.

FIGURE 16. *Serranus* sp. (possibly *inexpectatus*) living specimen collected in Sierra Leone. Photograph by Peter Wirtz.

FIGURE 17. *Serranus* sp. (possibly *inexpectatus*) preserved specimen collected in Sierra Leone. Photograph by Peter Wirtz.

along distal margin. Pelvic fins dark dusky except along leading ray, which is pale. Pectoral fin pale. Caudal fin dusky on ventral half, pale dorsally. Coloration in life from a photograph (Fig. 15) provided by Pascal Pépé Sjamajee Rommelaere of a specimen from Senegal shows the overall dark reddish to orange basic banding pattern (as described above for preserved specimens), but with the broad second band below the spinous dorsal fin splitting in two below the lateral line, and the band at caudal-fin base narrow and separated by a narrow pale band from the caudal rays. The black spot on the first three dorsal spines is quite prominent, as are the dusky pelvic and anal fins. Narrow reddish to orange streaks run along the dorsal and caudal fins and possibly the anal fin, although those on the anal are obscured by the overall dark-dusky fin coloration. Figures 16 and 17 show what are probably the new species taken off Sierra Leone. The coloration of fish from this country was quite different from those from Senegal. Rather than the overall pinkish to red of the Senegal specimens (Fig. 15), the Sierra Leone fish (Figs. 16 and 17) had a whitish to yellowish ground and dark reddish-brown bands and prominent red-orange blotches on top of head. A black mid-lateral stripe, faint anteriorly but dark posteriorly, extends from opercle to base of caudal fin, and merges with the black ventral surfaces of the lower caudal lobe.

***Size*:** To at least 92 mm TL.

HABITAT AND DISTRIBUTION.— Rocky bottoms in 25–36 m. So far known only from Senegal, Gabon, and Angola (and possibly Sierra Leone).

ETYMOLOGY.— From the Latin *inexpectatus*, meaning unexpected, surprising; in reference to

PW's surprising find of two specimens of an undescribed species in the collection of the Zoologische Staatssammlung, when looking at comparative material for the description of *Serranus pulcher*.

Remarks and comparisons.— PW initially examined the two Angolan specimens of this species and noted the slight shape differences between them and specimens of *S. heterurus*. However, almost all other morphological, meristic, and pigmentation characters appeared to fall within the range of variation we found in *S. heterurus,* lending doubt as to the distinctness of the two specimens. Poll's (1954: 72–73, fig. 20) description and accurate illustration of his single specimen from Gabon, which he called *Paracentropristis heterurus*, appeared to be exactly the same as the Angolan specimens, adding to the confusion. Ultimately, we are confident that Poll's specimen and our two Angolan specimens are the same undescribed species. Examination of many other specimens that agreed closely with Cadenat's (1937) original description and illustration of *S. heterurus* brought to light several key features that distinguish *S. inexpectatus* from *S. heterurus*. Most notable are the counts of pectoral-fin rays, gill rakers, and scale rows below the origin of dorsal fin (see Table 2). A one-ray difference in the count of pectoral-fin rays may seem rather insignificant, but the count of 17 rays (including the splintlike uppermost ray) in *S. inexpectatus* is consistent in the type specimens and not found in any of the 12 specimens of *S. heterurus* we examined. Meisler (1987: fig. 3) did record a count of 17 rays in 4 fins (of 22 fins total) in 11 specimens of *S. heterurus* he examined (see Table 2). We were not able to examine his material. Some proportional measurements (Table 3) appear to show differences between the two species, but with data from only three specimens of the new species, the significance of these differences must be substantiated with measurements of many more specimens. A distinct black blotch between the anteriormost three or four dorsal-fin spines in *S. inexpectatus* contrasts with the lack of such blotch in *S. heterurus* (although the distal margin of the spines may be blackish in some individuals of that species). In *S. inexpectatus* the broad band below the last four or five spines falls well behind the base of the pectoral fin and leaves a broad pale (or white) band or gap between the fin base and the dark band. In contrast, in *S. heterurus* the dark band below the middle of the spinous dorsal falls immediately behind the pelvic-fin base without a pale gap.

Type specimens.— **Angola.** Holotype: ZSM 45041 (75 mm SL) and paratype**:** ZSM 32516 (79 mm SL); 10°49′S, 13°43′E; 35–36 m; *R/V Dr Fridtjof Nansen* sta. 30147; 9 March 2003; coll. Reinhold Hanel. **Gabon.** Paratype: RBINS 9534 **(**73.8 mm TL), 30 miles NW of Mayumba, 3°11′S, 10°14′E; 25-30 m; Expédition Océanographique Belge sta. 164; collected with a small trawl over rocky bottom (catch included skates); 17 March 1940.

Serranus (*Paracentropristis*) *pulcher* Wirtz and Iwamoto, 2016

Figures 18–21

Serranus sp. Kuiter, 2004:162 figs. A–D (São Tomé Comber; photographs taken by Peter Wirtz in São Tomé)
Serranus pulcher Wirtz and Iwamoto, 2016:192–199, figs. 1–15 (São Tomé e Príncipe; 1–30 m).

Diagnosis.— D X,12; P 15, rarely 14 or16; A III,7; gill rakers 6–9+12–14 (19–23 total); pored lateral-line scales 42–49; circumpeduncular scales 22–24; scales below origin of first dorsal fin 5–6. Caudal fin truncate, the upper lobe slightly produced, lower lobe rounded. Dorsal, anal, and pectoral fins scaly near base. Anterior nostril tubelike, rim low anteriorly but rising to a high narrow flap posteriorly, with 4–6 long cirri at distal tip; posterior nostril a simple opening lacking a raised rim. Seven or eight transverse bands on body; lips red with dark bands; a short moustache-like red streak behind end of maxillary, running across hind margin of dentary and almost meeting opposite streak at midventral line and enclosing ivory-white of mandibular rami; another red diag-

onal streak running from upper edge of maxillary, across lower edge of preopercle, across interopercle and branchiostegal rays, to base of pelvic fin, and enclosing white of preopercle, interopercle and chest.

Description.— Body relatively slender to moderately deep and compressed, width over pectoral bases about half of HL, greatest body depth about 2.7–3.2 in SL and less than HL, which is about 2.4–2.6 in SL. Dorsal and ventral profiles gently curved from tip of snout to caudal fin. Snout shorter in length than orbit diameter; both substantially more than interorbital width. Lower jaw projecting slightly beyond upper jaw; maxilla extending to below posterior half of pupil. Anterior nostril tubular, the rim posteriorly elevated into a high narrow flap with 4–6 long slender cirri at distal tip; posterior nostril lacking raised rim. Opercular spines three, the uppermost small and often obscure, middle spine longest. Preopercle margin serrated with flattened spines, those at angle largest.

Premaxillary teeth in narrow band, the outer series spaced and slightly enlarged; one or more large canines at anterior end. Dentary with a band of small teeth flanked by a series of slightly enlarged outer teeth that become larger posteriorly. Vomerine tooth band broadly V-shaped, each arm followed by narrow band of small palatine teeth. First four to five spines of dorsal fin graduated, the 3rd to 5th spines longest, the spines following subequal; the soft rays slightly higher than longest spines, the 3rd to 5th ray longest; a slight notch in fin profile. Anal fin relatively high, its posterior tip somewhat pointed; spines shorter than soft rays, the first spine more than half length of second and third spines, the second spine longer and stouter than the others. Pectoral fin broad-based, its origin about on same vertical as that of dorsal and pelvic fins; the tip of pectoral fin extends to, or almost to, anus, that of pelvic fin falls short of anus, both fins falling well short of anal-fin origin. Caudal fin truncate; dorsal lobe slightly pointed, ventral lobe rounded at tip.

Scales ctenoid, body fully covered; head naked over snout, interorbital, suborbital region, outer margin of preopercle and over subopercle. Small scales on interradial membranes of dorsal fin, mostly confined to basal one-fourth to one-half of soft rays, but a few on membrane between spines. Anal and caudal fins also with small scales at base, but on caudal fin, scales extending more distally. Scales on pectoral fin limited to immediate base of fin.

***Color highly variable*:** in a fresh specimen from São Tomé Island (CAS 227751, 56.6 mm SL) dorsal aspects of head and body grayish brown to olive, this color extending down sides of head onto entire surface of opercle and most of preopercle but not interopercle and jaws; on body the ground color extends to mid-lateral line, below which the color becomes whitish to reddish and is dissected by seven or eight broad, red or brownish vertical bands that originate along dorsal outline of body and extend dorsally onto base of dorsal fin and ventrally to, or near, ventral outline. A faint brownish longitudinal stripe runs from upper lobe of opercle just above mid-lateral line to caudal fin base. Upper and lower lips deep red, but marked with dark bluish-gray bands and spots; lower lip with few faint bands or spots. A prominent red diagonal stripe from upper edge of maxillary, across interopercle, branchiostegal rays, and chest to base of pelvic fin. A short tapered moustache-like red streak behind end of maxilla, running across hind margin of dentary and almost meeting opposite streak at median-ventral line (see Fig. 18). Two other diffuse diagonal red streaks behind lower half of opercle extend onto pectoral-fin base. Branchiostegal rays, gular membrane, ramus of lower jaw, chest, and antero-ventral parts of belly white except where marked by red streaks. Soft dorsal and anal fins dark grey-brown with small orange spots that form narrow, broken, diagonal to horizontal lines on fins. Pectoral fin clear with orange tint. Pelvic fins dusky with small orange spots; caudal fin yellow on upper and lower lobes, membrane between rays clear with small orange spots that form vertical lines on tail.

In a photograph of a 35.3 mm SL specimen (CAS 227758) (Fig. 19) from Príncipe (Isla

FIGURE 18. *Serranus pulcher* from São Tomé Island showing color pattern on chin and throat. Photo by Peter Wirtz.

FIGURE19. *Serranus pulcher* A freshly collected specimen (paratype, CAS 227758, 36.3 mm SL) from Santana Islet, São Tomé. Photograph by David Catania.

Santana), brownish color of sides of head interrupted by four or five thin, horizontal to slightly diagonal, reddish to orange lines; orange spots scattered on top of head and on snout. Vertical bands on body with dark squarish blocks mid-laterally. Anal and soft dorsal fins dark; spinous dorsal paler with red spots at base where body bands meet fin; tips of spines red. Ivory-white of gular and branchiostegal membranes, interopercle, and chest bordered by prominent dark-red streaks. Pelvic fins overall clear to light dusky with brownish-yellow rays.

A fish from Príncipe (Fig. 20) shows a prominent, broad, brownish–red, broken midlateral stripe extending from midorbit to middle of caudal fin, bordered above and below by irregular

FIGURE 20. *Serranus pulcher* from Príncipe Island. Photograph by by Luiz Rocha.

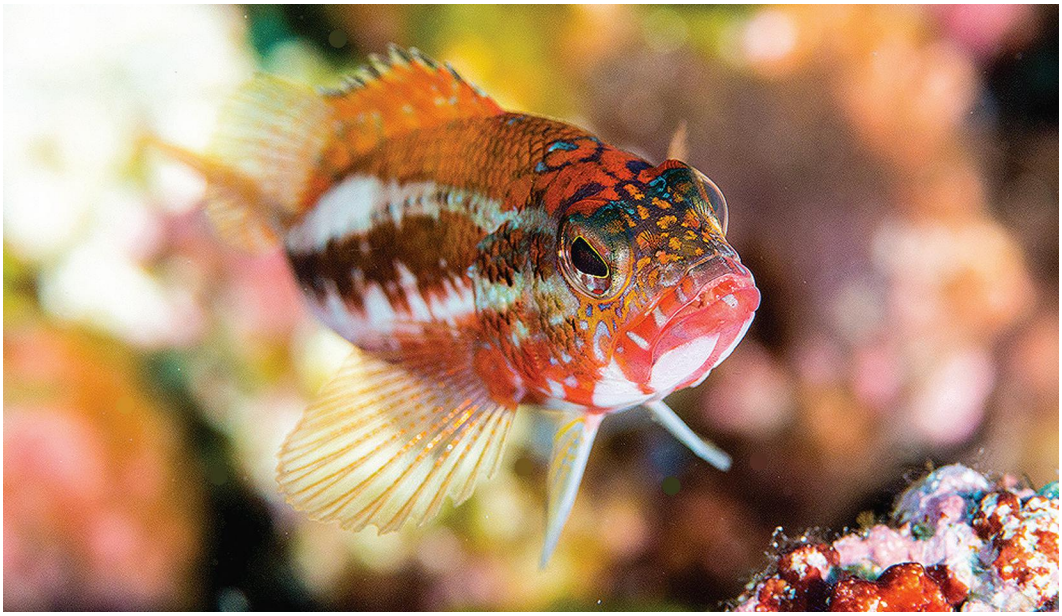

FIGURE 21. *Serranus pulcher*. A different-colored morph from Príncipe Island. Photograph by Luiz Rocha.

white stripes, the dorsum with broad brownish patches between white patches, and the ventral aspects of the body a solid dark red.

In a photograph (Fig. 21) of an individual from Príncipe, ground color orange with bold white stripes bordering a dark midlateral stripe that originates behind eye and extends to base of caudal fin; top of head, suborbital region, and snout dark gray with orange spots and vermiculations. In preserved specimens < 40 mm SL, midlateral stripe most prominent and other markings rather obscure. This color morph appears to predominate in Príncipe, where the species is quite common (Luiz Rocha, pers. comm. 2015).

***Size*:** To 9 cm TL.

HABITAT AND DISTRIBUTION.— Hard bottoms (rock, gravel, coral rubble, or marl) from about 1 m depth (juveniles) to at least 30 m. São Tomé e Príncipe, off Ghana and Gabon, and probably more widely along Gulf of Guinea mainland.

SPECIMENS EXAMINED (9 spec.).— **São Tomé e Príncipe:** CAS 227754 (4, 37.2–60.2 mm SL);

Príncipe Is., nw side of Bom Bom Is.; 1°41′44″N, 7°24′0.3″E; 48 ft [14.6 m]; collectors J.E. McCosker, D. Catania; 20 Jan. 2009. CAS 227753 (1, 58.5 mm SL); 1°41′09.3″N, 7°28′07.6″E; 40 ft [12.2 m]; collectors J.E. McCosker, D. Catania; 23 Jan. 2009. CAS 227751 (1, 56.6 mm SL); Kia Reef; 0°25′0.01″N, 6°48′E; 25–40 ft [7.6–12.2 m]; collectors J.E. McCosker, D. Catania, J-L. Testori; 11 Jan. 2009. CAS 227755 (1, 54.8 mm SL); Kia Reef; 0°21′37.1″N, 6°43′08.5″E; 45–72 ft [13.7–21.9 m]; collectors J.E. McCosker, D. Catania, J-L. Testori; 11 Jan. 2009. CAS 227756 (2, 59.3–60.4 mm SL); São Tomé Is., Batalleo; 0°22′05.7″N, 6°45′41.6″E; collectors J.E. McCosker, D. Catania, E. Milson; 13 Jan. 2009.

Serranus sanctaehelenae Boulenger, 1895

Figure 22

Centropristis brasiliensis (not of Brisout): Günther 1859:85. Melliss 1875:102.
Serranus sanctae-helenae Boulenger, 1895:289, pl. XI (St. Helena). Cadenat and Marchal 1963:1273-1275 (descr.; numerous specimens from 100 m depth)
Paracentropristis sanctae-helenae: Fowler 1936:766.
Serranus sanctaehelenae: Edwards and Glass 1987:637. Heemstra and Anderson 2016:2412.

Diagnosis.— D X,12; P 18; A III,7; gill rakers 20–21 total, 14 or 15 on lower limb; lateral-line scales 46–52; circumpeduncular scales 32–34; scales below origin of first dorsal fin 5. Anterior nostril a simple tube lacking cirri or flaps. Snout about equal to or less than orbit diameter; upper jaw extends to below midorbit. Body depth about 3.5–4.0 into SL; head about 2.5–2.7 into SL. Caudal fin emarginate. Six broad brown bands on body: one on nape, four below dorsal fin, one on caudal peduncle; color overall buff, paler below; fins faintly yellow, without prominent markings.

Description (partially adapted from Boulenger 1895:289 and Heemstra and Anderson 2016:2412).— Body compressed, width across pectoral fin bases about 2.1–2.3 in HL; depth about 3.1–4.0 times in SL; head about 2.6 in SL. Dorsal and ventral profiles gently curved; snout pointed and equal to or longer than diameter of orbit, which goes 3.3–3.8 times in HL; fleshy interorbital width 1.3–1.6 times into orbit diameter. Lower jaw slightly projecting beyond upper jaw; maxilla extending to below middle of orbit. Anterior nostril with low anterior rim and short flap-like posterior rim without fringes. Posterior nostril lacking rim. Opercular spines three, middle spine well developed, upper and lower spines rudimentary. Preopercular margins finely serrated.

A broad tapered band of small pointed premaxilla teeth, flanked by outer series of spaced slightly enlarged teeth; a few enlarged teeth at anterior end along inner edge of band. Dentary teeth in single series laterally and a cluster of teeth at anterior end. Vomerine teeth in a V-shaped band; palatine teeth in a single series.

Scales large, ctenoid and present on all of body and most of head, but absent on lower jaws, gular and branchiostegal membranes, snout, top of head, anterior half of suborbital region, and a narrow naked strip along outer margin of preopercle; opercle, subopercle, and interopercle scaly, the scales in six to eight series on cheek. Scales absent on fins except near base of pectoral and caudal fins.

Dorsal fin originating above base of pectoral fin; spines increasing in size to the 4th through 6th spines, which are slightly short of half length of head, and exceeding longest soft rays; a notch between spinous and soft portions of fin. Pectoral fin obtusely pointed, somewhat longer than pelvic fin, its length about 75% of HL. Second anal spine about equal to or slightly shorter but stronger than 3rd spine. Caudal fin feebly emarginate.

Color (based on photograph of fresh specimen from St. Helena in Fig. 22): Body light buff to pale greenish-yellow becoming whitish ventrally; six brown bands or vertical blotches, the first

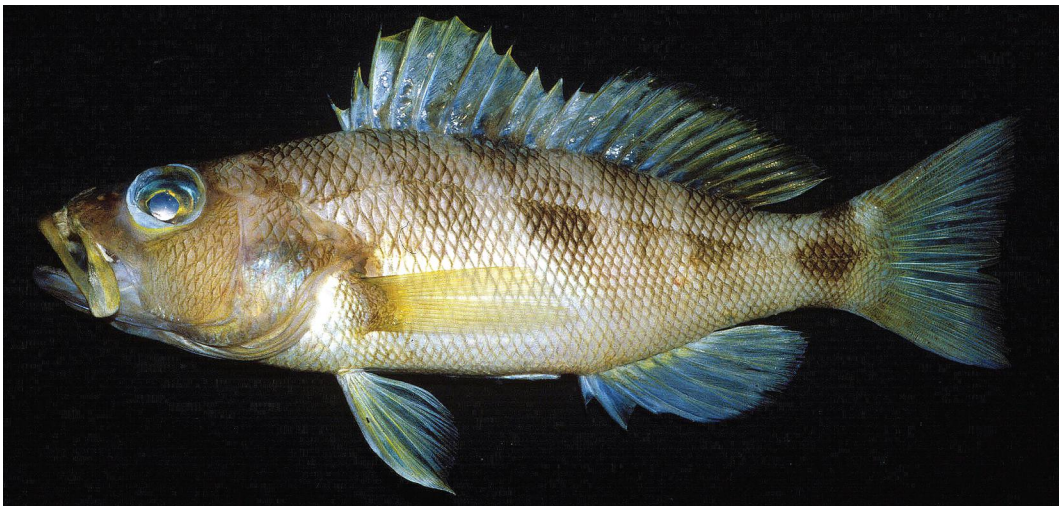

FIGURE 22. *Serranus sanctaehelenae* from Saint Helena Island. Photograph by Alasdair Edwards.

across nape extending to behind operculum, the second below first four or five spines, the third much darker and below last four or five spines; the fourth below third to fifth dorsal soft rays, the fifth below posterior half of soft dorsal, and the sixth on caudal peduncle forming a mid-lateral dark, oval, brown blotch; first four bands notably inclined. Head rather uniformly buff; operculum darker dorsally with a broad, diffuse, dark longitudinal stripe running from hind margin of preopercle to posterior edge of opercle; upper jaw light yellowish-brown. Fins mostly clear and faintly yellowish-green, but pectoral fin yellow with buff base.

Size: To about 24 cm TL.

HABITAT AND DISTRIBUTION.— Taken in about 100–110 m; endemic to St. Helena and Ascension Islands, where it is occasionally taken in the artisanal fisheries of those islands.

REMARKS.— Meisler (1987:144) was unable to assign this species to a subgenus owing to inadequate material.

SPECIMENS EXAMINED.— USNM 267902 (2, 178–180 mm SL); St. Helena Island; caught by fishermen on hook and line in deepwater (about 70–80 m); 9 July 1983; coll. Alasdair Edwards, field no. AE3-15.

Serranus (*Serranus*) *scriba* (Linnaeus, 1758)

Figures 23– 24

Perca Scriba Linnaeus, 1758 (no locality)
Holocentrus argus Spinola, 1807.
Serranus scriba: Risso 1827:374.
Serranellus scriba: Jordan and Eigenmann 1890.
Paracentropristis scriba: Fowler 1936:766-768.

DIAGNOSIS.— D X,14–16; P 13–16; A III,7–8; gill rakers usually 7+12–14 (15–19 total); pored lateral-line scales 61–69 (60–73); circumpeduncular scales 36–41; scales below origin of first dorsal fin 6–9, below first branched ray 7–9. Scales on chest and cheek cycloid; all fins scaly along basal quarter or more. Caudal fin truncate or emarginate. Anterior nostril tube-like, with rim posteriorly developed into a tall fringed flap; posterior nostril with low, fringed anterior rim. Usually two (and often more) broad dark bands on body, a large white to bluish blotch on abdomen

FIGURE 23. *Serranus scriba* from El Cabrón dive site near Arinaga, Grande Canary Is., Canary Islands. Photograph by Rogelio Herrera.

FIGURE 24. *Serranus scriba* from Ibiza Island, western Mediterranean Sea. Photograph by Robert Patzner.

(in life); prominent reticulate to vermiform lines on head, and black horizontal stripe on snout, usually extending through eye onto dorsal margin of gill cover.

DESCRIPTION.— Body deep, about 33–37% SL; head low, profile of nape rises steeply into prominent arch; length of head 35–40% of SL; snout sharply pointed, 3.7–4.1 times in HL, orbit 5–6 times in HL, upper jaw slightly shorter than lower jaw. Dorsal profile of head rises in gentle curve, then abruptly ascends behind orbits to form a high, arched nape; profile peaking under middle of spinous dorsal before descending to caudal peduncle.

Premaxillary teeth canine-like in outer series, with narrow inner band of smaller teeth; dentary teeth in narrow band in front, band tapering to one row posteriorly; teeth at anterior and posterior ends largest. Teeth on vomer in narrow V-shaped band; those on palatines in one or two irregular series.

Margins of spinous dorsal fin moderately incised; spines increase gradually in height to peak at 4th or 5th spine, becoming shorter thereafter; in adults, no notch or indentation in fin outline where spinous and soft rays join, but juveniles have a slight indentation. Anal fin high, longest ray about equal to or higher than longest ray of dorsal fin; first anal spine 1.5–1.9 into second and third spines, which are more or less of equal length. Pectoral fin broad based, slightly pointed at tip; pectoral and pelvic fins fall short of anal-fin origin, a short streamer developed in pelvic fins between first and second rays in larger specimens.

Body fully covered with small ctenoid scales except on chest where scales cycloid; naked areas on head include snout, infraorbital bones, lower jaws, gular and branchiostegal membranes, and top of head posteriorly to beginning of nape; all opercular bones, pectoral-fin base, and chest scaled. Branchiostegal membrane and maxilla partially scaled in some specimens.

Color of live specimens (Figs. 23, 24)**:** Head with vermiform to reticulate pattern of light and dark lines; body with two to five broad to narrow brown to black bands that extend onto dorsal fin; the pattern with two broad dark bands appears to be typical in the eastern Atlantic and parts of the southwestern Mediterranean, the pattern with more, and often paired, narrower bands typical in the Mediterranean; the last band, caudal peduncle, and caudal fin often orange or yellow; tips of dorsal spines reddish-brown to scarlet; often a large bright-blue spot on sides of belly.

Color of preserved specimen**:** Dark brownish overall, underside of head and chest paler, dorsal surfaces of head and all of nape dark, a horizontal dark stripe running from tip of upper jaw onto snout, through middle of eye onto dorsal margin of preopercle and opercle; a broad dark band below 5th to 9th dorsal spines; a darker band from base of 3rd dorsal soft ray to end of dorsal fin, narrowing ventrally and terminating at posterior half of anal-fin base onto anterior one-third or so of caudal peduncle. Head with irregular pale reticulate lines; upper jaw with blackish tip and series of four or more dark bands on maxillary; lower lip marked with dark bands; mandibular ramus with bold dark spots. Dorsal fin generally dark above the two broad body bands, the distal margin of soft dorsal fin with irregular speckling of small clear spots arranged in vertical to diagonal lines; anal fin with prominent sharp stripes distally; caudal fin relatively pale and lacking prominent markings; pectoral fin dusky with paler outer margins; pelvic fin blackish.

Size**:** To 36 cm TL.

Habitat and distribution.— Over rocky bottoms from the shore to 150 m. Known from the Bay of Biscay to Senegal, including the Canary Islands but not the Azores, Madeira and the Cape Verde Islands; also in the Mediterranean and Black seas.

Specimens examined (9 spec.).— **France:** CAS 238841 (ex. IU 7078) (3, 90.5–139 mm SL); Paris Market; collector D.S. Jordan. **Italy:** CAS 238072 (1, 131 mm SL); Mediterranean; Sicily; collector P. Doderlein, 1886. CAS-SU 20897 (2, 90.5–143.5 mm SL); Mediterranean; Naples; collector E.C. Starks. **Mauritania:** CAS 235486 (1, 161 mm SL); 18°36.93′N, 16°36.9′W; 30 m; *R/V Dr Fridtjof Nansen* CCLME Survey 2012, sta. 139, 3 June 2012. **Senegal:** CAS 15905 (2, 174–187 mm SL); Dakar; collector A.I. Good, 10 Nov. 1938.

Figure 25. *Chelidoperca africana.* A specimen 15 cm TL, taken off the Ivory Coast in 150 m depth. Photograph by Oddgeir Alvheim.

Key to species of *Serranus and Chelidoperca* in the eastern Atlantic

We have included the species *Chelidoperca africana* Cadenat, 1960 because it is frequently called *Serranus africanus* in the literature and is so treated by Smith (1990:704, CLOFETA], Williams and Carpenter (2015), and Heemstra and Anderson (2016).

1a) A III,6; D X,10–11, last two soft rays longest; pelvic-fin origin well in front of pectoral-fin base; body subcylindrical . . . . . *Chelidoperca africana* Cadenat, 1960 (Fig. 25)
1b) A III,7–8 (rarely 6); D X, 12–16 (rarely 11); middle rays of soft dorsal fin longest; pelvic-fin origin below or only slightly in front of pectoral-fin base; body laterally compressed 2

2a) Lateral line scales 60–90 3
2b) Lateral line scales 40–52 5

3a) Nape distinctly arched; prominent vermiform or reticulate markings on head; lateral line scales 62–75; scales on cheeks and thoracic region cycloid; sensory canal system does not extend onto opercle; profile of dorsal fin not indented in adults . . . . . *Serranus scriba* (Linnaeus, 1758)
3b) Nape not highly arched; no reticulate markings on head; lateral line scales 69–90; scales on cheeks and thoracic region ctenoid; sensory canal system extends onto opercle; profile of dorsal fin slightly indented. 4

4a) D X,13–15 (rarely 12); A III,7–8, usually 7; circumpeduncular scales fewer than 47; caudal fin lacking black tips . . . . . *Serranus cabrilla* (Linnaeus, 1758)
4b) D X,14–16; A III,7–8, usually 8; circumpeduncular scales 47 or more; caudal fin with black tips . . . . . *Serranus atricauda* Günther, 1874

5a) A prominent black ocellated spot at beginning of soft dorsal fin; pelvic fins mostly black, but sometimes with white spine and pale basal section; interorbital space scaly. . . . . *Serranus hepatus* (Linnaeus, 1766)
5b) No black ocellated spot on soft dorsal fin; pelvic fins pale to dark dusky; interorbital space naked 6

6a) A III,6; GR 14; scales all cycloid; a large black spot on dorsal fin between last 3 spines and first branched ray, the spot merging with black saddle on body; mandibular rami partially covered with small thin scales . . . . . ***Serranus drewesi* Iwamoto, sp. nov.**
6b) A III,7 or 8; GR 19–26; scales ctenoid; no black spot on dorsal fin between last 3 spines and first branched ray; mandibular rami naked 7

7a) Scales present on interopercle; anterior nostril with a short elevated posterior flap that lacks cirri at distal tip . . . . . *Serranus sanctaehelenae* Boulenger, 1895
7b) Interopercle naked; anterior nostril bearing cirri at tip of elevated posterior rim 8

8a) Caudal fin lunate to shallowly forked, often with a short streamer at tip of upper lobe; two blue stripes on head, one originating on snout and passing below orbit to end on lower margin of opercle, the other from posterior margin of orbit across gill cover and ending below middle opercular spine, last three anal-fin rays usually longer than those anteriorly . . . . . *Serranus accraensis* (Norman, 1931)

8b) Caudal fin truncate or emarginated, lacking streamer at tip of upper lobe; no blue stripes on sides of head, last three anal-fin rays usually shorter than those anteriorly 9

9a) Anteriormost body band below spinous dorsal fin descends onto belly immediately behind base of pectoral fin; a bright light blue or white crescent mark behind orbit. . . . . *Serranus heterurus* (Cadenat, 1937)

9b) Anteriormost body band below spinous dorsal fin descends onto belly well removed from base of pectoral fin and separated from same by a broad white (pale) band; no prominent white (pale) crescent mark behind orbit 10

10a) Anterior margin of spinous dorsal fin blackish or with a black blotch; pectoral-fin rays i16; gill rakers on first arch 15-18 . . . . . ***Serranus inexpectatus* Wirtz and Iwamoto, sp. nov.**

10b) Distal margin of spinous dorsal fin lacking black margin or blotch; pectoral-fin rays i14-i15; gill rakers on first arch 19-22 . . . . . *Serranus pulcher* Wirtz and Iwamoto, 2016

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Appendix

Table 1. List of species of *Serranus*

An asterisk (*) preceding the scientific name indicates that Meisler (1987:144) excludes the species from *Serranus*; despite their uncertain affinities, he states that "they appear to share more synapomorphies with *Diplectrum* than with *Serranus*." Subgeneric categories are those of Meisler

***Serranus* spp [14] from western Atlantic** (primarily from Heemstra, Anderson, and Lobel 2002:1308–1369. FAO Species Identification Guide for Fishery Purposes):

Serranus aliceae Carvalho-Filho & Ferreira. 2013. Size: 7 cm SL. Distribution: Brazil (between 8°N and 28°S).

Serranus (*Prionodes*) *annularis* (Günther, 1880). Size: 7 cm SL. Distribution: Georgia to Brazil, including Bermuda, nw Gulf of Mexico, and WI.

**Serranus atrobranchus* (Cuvier, 1829). Size: 9 cm SL. Distribution: Florida, n Gulf of Mexico to s Brazil (Santa Catarina).

Serranus (*Prionodes*) *baldwini* (Evermann & Marsh, 1900). Size: 6 cm SL. Distribution: s Florida, WI, Venezuela, Suriname, s Brazil (Santa Catarina; see Anderson et al. 2015).

Serranus (*Prionodes*) *chionaraia* Robins & Starck, 1961. Size: 5 cm SL. Distribution: Florida Keys, Honduras, Puerto Rico.

Serranus flaviventris (Cuvier, 1829). Size: 8 cm SL. Distribution: Venezuela, Brazil, Uruguay.

Serranus (*Mentiperca*) *luciopercanus* Poey, 1852. Size: 12 cm SL. Distribution: WI, Honduras.

**Serranus maytagi* Robins & Starck, 1961. Size: 9 cm SL. Distribution: central Caribbean.

**Serranus notospilus* Longley, 1935. Size: 8 cm SL. Distribution: Georgia, Florida Keys, Gulf of Mexico to Suriname.

**Serranus phoebe* Poey, 1851. Size: 15 cm SL. Distribution: Bermuda, North Carolina to Florida Keys, nw Gulf of Mexico, WI, Venezuela, Guyana, s Brazil (São Paulo).

Serranus subligarius (Cope, 1870). Size: 7 cm SL. Distribution: North Carolina to Texas.

Serranus (*Mentiperca*) *tabacarius* (Cuvier, 1829). Size: 17 cm SL. Distribution: Bermuda, Georgia, Florida, Gulf of Mexico, WI, Venezuela to Brazil.

Serranus (*Prionodes*) *tigrinus* (Bloch, 1790). Size: 10 cm SL. Distribution: Bermuda, s Florida, WI, Curaçao, Venezuela.

Serranus (*Mentiperca*) *tortugarum* Longley, 1935. Size: 8 cm SL. Distribution: s Florida, WI, Honduras, Panama, Venezuela.

***Serranus* spp [6] from eastern tropical Pacific** (from Robertson and Allen. 2015. Shorefishes of the Tropical Eastern Pacific: online information system. Version 2.0. Smithsonian Tropical Reserach Institute, Balboa, Panama. <*http://biogeodb.stri.si.edu/sfetp/*>):

***Serranus aequidens* Gilbert, 1890. (Deepwater serrano). Size: 24.5 cm. Distribution: s California to w Gulf of California; central Mexico to w Panama, Galapagos Islands, Cocos Island. Depth: 75–265 m.

**Serranus huascarii* Steindachner, 1900. (Peruvian serrano, Flag serrano). Size: 20 cm. Distribution: central Gulf of California to Chile. Depth: 80–200 m.

Serranus (*Prionodes*) *psittacinus* Valenciennes, 1846. (Bandred serrano, Banded serrano). Size: 18 cm. Distribution: central Baja to Gulf of California to Peru, the Galapagos. Depth: 2–60 m.

Serranus socorroensis Allen & Robertson, 1992. (Socorro serrano). Size: 8 cm. Distribution: Socorro Island (Revillagigedos Group). Depth: 5–20 m.

Serranus stilbostigma (Jordan & Bollmann, 1890). (Side-blotch serrano). Size: 14.5 cm. Distribution: Galapagos and Ecuador. Depth: 80–200 m.

Serranus tico Allen & Robertson, 1998. (Cocos serrano). Size: 8.5 cm. Distribution: Cocos and Malpelo Islands. Depth: 10–43 m.

***Serranus* spp. (10) from eastern Atlantic**:

Serranus (*Paracentropristis*) *accraensis* (Norman, 1931). Size: 20 cm TL. Distribution: Guinea Bissau to Angola, São Tomé Island

Serranus (*Serranus*) *atricauda* (Günther, 1874). Size: 35 cm TL. Distribution: Bay of Biscay to Guinea Bissau, including Azores, Madeira, Canary Islands., Cape Verde Islands, Mediterranean Sea.

Serranus (*Serranus*) *cabrilla* (Linnaeus, 1758). Size: 40 cm TL. Distribution: British Isles to South Africa (into Indian Ocean off Natal), including Azores, Madeira, Canary Islands, Príncipe Island, Mediterranean Sea and Black Sea; also Red Sea invasive.

Serranus (*Paracentropristis*) *drewesi* Iwamoto, new species. Size: 6.5 cm TL Distribution: São Tomé I.

Serranus (*Paracentropristis*) *hepatus* (Linnaeus, 1758). Size: 25 cm TL. Distribution: Portugal to Senegal; also Mediterranean Sea and Black Sea.

Serranus (*Paracentropristis*) *heterurus* Cadenat, 1937. Size: 14 cm TL. Distribution: Senegal to Angola, including São Tomé e Príncipe.

Serranus (*Paracentropristis*) *inexpectatus* Wirtz & Iwamoto, new species. Size: 9.6 cm TL. Distribution: Angola, Gabon, and Senegal (probably from Senegal south to Sierra Leone and east along African continental coast to Angola).

Serranus (*Paracentropristis*) *pulcher* Wirtz & Iwamoto, 2016. Size: 9 cm TL. Distribution: São Tomé and Príncipe; Ghana.

Serranus sanctaehelenae Boulenger, 1895. Size: 24 cm TL. Distribution: Saint Helena and Ascension islands

Serranus (*Serranus*) *scriba* (Linnaeus, 1758). Size: 36 cm TL. Distribution: Bay of Biscay south to Senegal, Canary Islands, Mediterranean Sea and Black Sea.

***Serranus* spp. (2) from the Indian Ocean**:

Serranus (*Serranus*) *knysnaensis* (Gilchrist, 1904). Distribution: South Africa (Cape of Good Hope to Natal).

Serranus (*Serranus*) *novemcinctus* Kner, 1865. Size: 32 cm. Distribution: Amsterdam and St. Paul Islands; Walters Shoals. Record from Cape of Good Hope probably erroneous (*fide* Heemstra and Randall 1986:537).

TABLE 2. Comparison of proportional measurements (in % head length) of *Serranus heterurus*, *S. pulcher,* and *S. inexpectatus*

Snout length

	20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**n**	**mean**
heterurus	0	2	0	2	4	1	2	0	0	0	11	23.73
pulcher	0	2	2	4	0	3	0	1	0	1	13	23.70
inexpectatus	1	1	0	1	0	0	0	0	0	0	3	21.33

Orbit diameter

	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**n**	**mean**
heterurus	1	0	1	1	5	2	0	1	1	12	26.17
pulcher	1	0	2	2	1	1	3	0	2	12	26.42
inexpectatus	0	1	1	1	0	0	0	0	0	3	24.00

Interorbital width

	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**n**	**mean**
heterurus	0	0	1	1	1	2	3	1	2	11	20.45
pulcher	3	3	3	2	1	0	0	0	0	12	16.58
inexpectatus	1	2	0	0	0	0	0	0	0	3	15.67

Orbit-preopercle length

	33	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**n**	**mean**
heterurus	0	1	1	3	0	3	0	2	0	1	11	37.55
pulcher	0	1	4	1	2	2	0	2	0	0	12	36.67
inexpectatus	1	1	0	1	0	0	0	0	0	0	3	34.33

Length upper jaw

	43	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**n**	**mean**
heterurus	0	0	1	1	1	2	4	2	0	0	11	48.18
pulcher	0	0	1	1	3	1	1	3	0	1	11	48.27
inexpectatus	1	1	1	0	0	0	0	0	0	0	3	44.00

Length 2nd anal spine

	24	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**n**	**mean**
heterurus	1	1	1	2	2	1	0	2	0	0	0	0	0	10	27.60
pulcher	0	0	0	2	2	1	3	2	1	0	0	0	1	12	29.90
inexpectatus	0	0	0	0	0	0	1	0	2	0	0	0	0	3	31.33

TABLE 3. Comparison of fin-ray and gill-raker counts of *Serranus* spp. from the eastern Atlantic. (* denotes Meisler's [1987: figs. 3-4] counts included.)

Dorsal soft rays

	11	**12**	**13**	**14**	**15**	**n**	**mean**
accraensis		14*				14	12.00
atricauda				2	19*	21	14.90
cabrilla		1	11*	24*	1	37	13.68
drewesi	1					1	11.00
hepatus	1	19*				20	11.95
heterurus	1	20*				21	11.95
inexpectatus		3				3	12.00
pulcher		11				11	12.00
sanctaehelenae		5*				7	12.00
scriba				3*	26*	29	14.90

Anal rays

	6	**7**	**8**
accraensis		14*	
atricauda			19*
cabrilla	1	39*	1
drewesi	6		
hepatus	2	17*	
heterurus		20*	
inexpectatus		2	
pulcher		9	
sanctaehelenae		10*	
scriba		28*	1

Pectoral rays (uncertain if Meisler [1987: fig. 3] included small splintlike ray)

	13	**14**	**15**	**16**	**17**	**18**	**n**	**mean**
accraensis					25*	5*	30	17.17
atricauda			1	38*	3		42	15.81
cabrilla			41*	28*	2		41	15.45
drewesi		2					2	14.00
hepatus		2*	28*	2			32	16.00
heterurus			9*	23*	4*		36	15.86
inexpectatus					4		6	17.00
pulcher			2	21			23	15.91
sanctaehelenae					4*	6*	18	17.56
scriba	8	36*	1	11*	2		58	14.36

TABLE 3 (continued). Comparison of fin-ray and gill-raker of *Serranus* spp. from the eastern Atlantic. (* denotes Meisler's [1987: figs. 3-4] counts included.)

	Gillraker counts (total)														
	14	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**n**	**mean**
accraensis					1*	1*	2*	1*						5	19.60
atricauda							7*	5*	5*	1*	1*			19	21.16
cabrilla					3*		1*	13*	2*	4*	1*	2*		26	21.42
drewesi	1													1	14.00
hepatus						1*		2*	5*	1*	1*			10	21.80
heterurus				1*			1	3*	3	2	5*	5	1*	21	23.00
inexpectatus		1			1									3	16.67
pulcher						1	5	2	2					10	20.50
sanctaehelenae							1*	2*	1*					4	21.00
scriba		1*		3*	8*	8*								20	18.10