

skull crests to the midline of the frontals. And Johnson and Keener (1984) noted that small juveniles of *C. panamensis* show bifurcate spinelets at the base of the pelvic-fin spines similar to the distinctive spination of *C. cruentata*.

*Serranus nigrliculus* Valenciennes was assigned to the synonymy of *Epinephelus adscensionis* by C.L. Smith (1971), but the dorsal- and anal-fin ray counts of Valenciennes' syntypes (dorsal fin with IX spines and 14 rays; anal fin with III spines and 8 rays) would preclude such assignment. In the original description, Valenciennes (1828) says that the numbers of fin rays for *E. nigrliculus* are the same as for *Serranus catus* (= *E. guttatus*), which he had just described; but this species has XI dorsal-fin spines. So it appears that Valenciennes had miscounted the dorsal-fin spines of his syntypes.

*Cephalopholis cyanostigma* (Valenciennes, 1828)

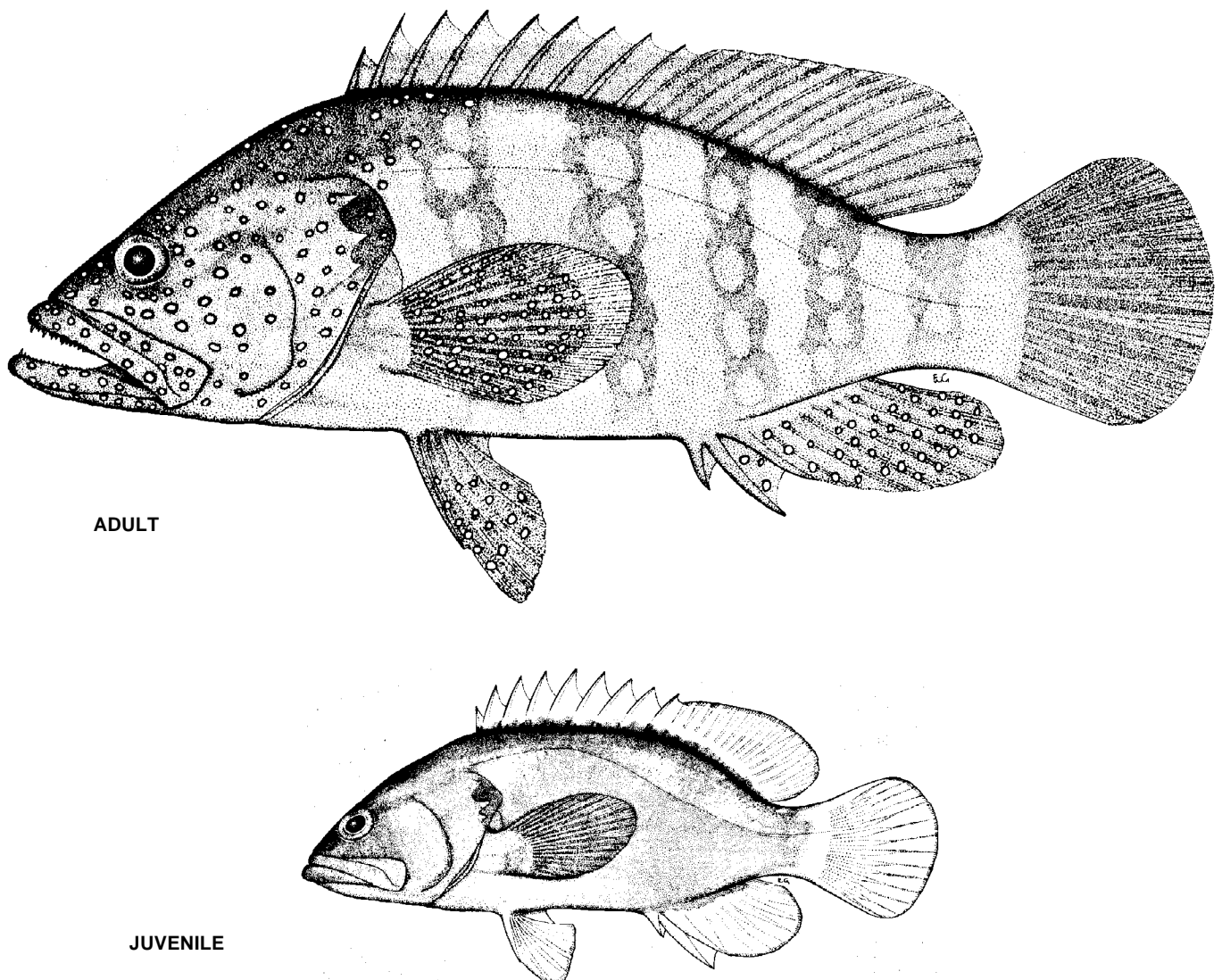
Fig. 79; Pl. IIC,D

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*Serranus cyanostigma* Valenciennes in Cuv. and Val., 1828:359 (type locality: Java).

**Synonyms:** *Cephalopholis kendalli* Evermann and Seale, 1907a:76, fig. 11 (type locality: Bacon, Luzon, Philippines). *Cephalopholis xanthopterus* Allen and Starck, 1975:246, fig. 1 (type locality: Alite Reef, Solomon Islands).

**FAO Names:** En - Bluespotted hind; Fr - Vielle étoiles bleues; Sp - Cherna de pintas azules.



ADULT

JUVENILE

**Fig. 79** *Cephalopholis cyanostigma*  
(adult 190 mm standard length, juvenile 93 mm standard length)

**Diagnostic Features:** Body somewhat compressed, the width contained 2.0 to 2.3 times in the depth; depth less than head length, contained 2.6 to 3.0 times in standard length (for fish 8 to 23 cm standard length). Head length 2.3 to 2.6 times in standard length; interorbital area flat to slightly convex, its width subequal to eye diameter and maxilla width; preopercle rounded, finely serrate, the lower edge fleshy; subopercle and interopercle smooth or with a few serrae; upper edge of operculum very convex, the rear edge almost vertical; maxilla scaly, reaching well past eye. Gill rakers 7 to 9 on upper limb, 14 to 18 on lower limb. Dorsal fin with IX spines and 15 to 17 rays, the fin membrane indented between the spines; anal fin with III spines and 8 rays; pectoral-fin rays 15 to 18; pectoral fins distinctly longer than pelvic fins, pectoral-fin length contained 1.5 to 1.8 times in head length; pelvic fins usually not reaching anus, their length contained 1.8 to 2.1 times in head length; caudal fin well rounded. Body scales ctenoid, with a few auxiliary scales in adults: lateral-line scales 46 to 50; lateral-scale series 92 to 106. **Colour:** Adults brown to brownish red, with numerous small black-edged blue ocelli on head, body, and fins, those on head and chest larger and more distinctly black-edged than those on upper part of body, those on fins smaller (except basally on pectoral fins) and also distinctly black-edged (spots entirely dark in preservative, the ones on body faint); body often with dark chain-like bars; proximal half of pectoral fins coloured like body, the distal part orange-yellow with a blackish edge or white edge and black submarginal line; proximal two-thirds of pectoral fins with blue ocelli becoming smaller distally; median fins darker than body, the posterior margin bluish white with a submarginal blackish band. Juveniles with head, body, and pectoral fins dark brown, the other fins bright yellow; blue ocelli on head and front of body indistinct or absent.

**Geographical Distribution:** Tropical western Pacific, including Philippines, Thailand, Indonesia, Papua New Guinea, Palau, New Britain, Solomon Islands, and north coast of Australia from the Dampier Islands off Western Australia to the Capricorn Islands of the southern Great Barrier Reef (Fig. 80).

**Habitat and Biology:** *C. cyanostigma* occurs on coral reefs and seagrass or algal beds at depths of 1 to 50 m. Like most groupers, it feeds on crustaceans and fishes.

**Size:** Maximum total length 30 cm.

**Interest to Fisheries:** Probably of importance to artisanal fisheries, Caught with hook-and-line, spear, and in traps.

**Local Names:** AUSTRALIA: Bluespotted rock cod.

**Literature:** Marshall (1964); Grant (1975); Schroeder (1980, as *C. argus*); Coleman (1981); Randall and Heemstra (1991).

**Remarks:** The report of *C. cyanostigma* from Reunion Island in the Indian Ocean (Postel et al., 1963) is based on a misidentification of *C. miniata*. And the record from the South China Sea (Tan et al., 1982) is illustrated with a photograph of *C. argus*. The colour pattern of juveniles is quite different from that of adults, and this led Allen and Starck (1975) to describe the juvenile as a new species. Randall found a transitional specimen (with yellow fins and blue spots) and initially thought it might be a new species. Sometime later, he was photographing what he thought was *C. xanthopterus*, and when the photographs were developed, the characteristic blue spots of *C. cyanostigma* which were not seen on the fish underwater, were apparent on the photographs (revealed by the flash used for the photographs).

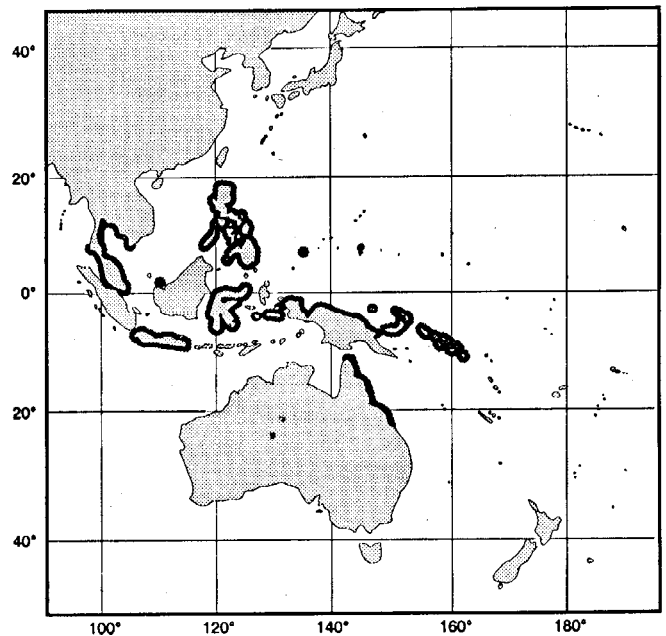


Fig. 80

*Cephalopholis formosa* (Shaw and Nodder, 1812)

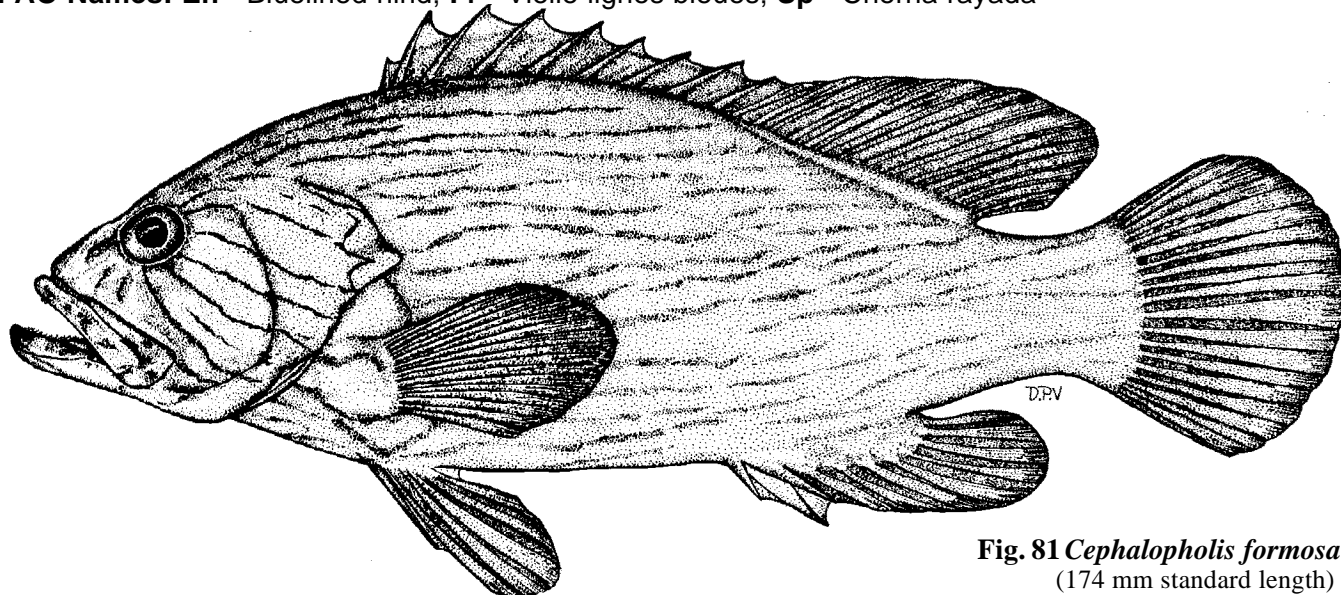
Fig. 81; Pl. IIE

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*Sciaena formosa* Shaw and Nodder, 1812:23, pl. 1007 (type locality: Vizagapatam, Coromandel coast of India, after "Rahtee Bontoo" of Russell, 1803:22, pl. 129).

**Synonyms:** None.

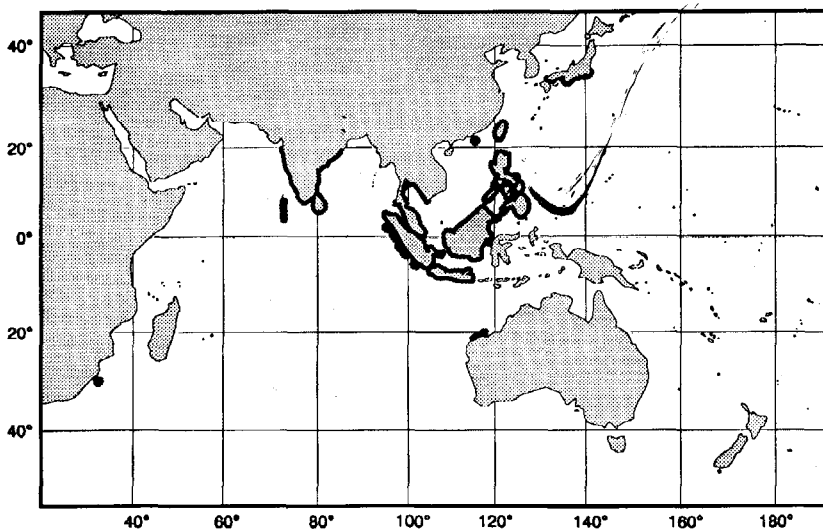
**FAO Names:** En - Bluelined hind; Fr - Vielle lignes bleues; Sp - Cherna rayada



**Fig. 81** *Cephalopholis formosa*  
(174 mm standard length)

**Diagnostic Features:** Body depth contained 2.5 to 2.9 times in standard length (for fish 10 to 26 cm standard length). Head length contained 2.4 to 2.6 times in standard length; preorbital depth 3.6 to 4.3% of standard length, more than half maxilla width; interorbital area convex; preopercle rounded, finely serrate, the lower edge fleshy; subopercle and interopercle smooth; maxilla naked, reaching to or just past vertical at rear edge of eye. Gill rakers 8 to 10 on upper limb, 14 to 18 on lower limb. Dorsal fin with IX spines and 15 to 17 rays, the membranes indented between the spines; anal fin with III spines and 8 (rarely 7) rays, the second spine 12.0 to 14.6% of standard length, not reaching past tip of third spine; pectoral-fin rays 16 to 18; pectoral fins usually longer than pelvic fins, pectoral-fin length contained 1.5 to 1.8 times in head length; pelvic fins reaching about to anus, their length contained 1.6 to 2.0 times in head length; caudal fin well rounded. Body scales ctenoid, without auxiliary scales; lateral-line scales 47 to 51; lateral-scale series 91 to 109. **Colour:** Dark brown to yellowish brown, with slightly irregular dark blue lines on head, body, and fins (those on body and fins sometimes absent); snout, lips, and ventral part of head and chest with small dark blue spots (blue markings become black in preservative, and may be lost on some specimens, especially older museum material).

**Geographical Distribution:** Like *C. boenak*, the distribution of *C. formosa* is primarily continental, and it seems to avoid atolls or oceanic islands. Reports of "*Epinephelus formosus*" from Madagascar (Sauvage, 1875), or Reunion and Mauritius (Bleeker, 1875) are probably based on misidentifications of *Cephalopholis polleni*. It is known from Sri Lanka, and the Lakshadweep Islands; but there are no other reports from islands in the western Indian Ocean. It occurs from western India to Thailand, Indonesia, Philippines, China, Taiwan, Japan (Honshu), and northern Australia (Fig. 82).



**Fig. 82**

**Habitat and Biology:** Also like *C. boenak*, the preferred habitat of *C. formosa* is shallow dead or silty reefs. And this may account for the primarily continental distributions of these two species.

**Size:** Maximum total length 34 cm.

**Interest to Fisheries:** *C. formosa* is too small to be of commercial importance as a food fish. Caught with hook-and-line, traps, and in trawls.

**Local Names:** INDIA: Bontoo (Telugu), Verri-cullawah (Tamil), Varianchamman (Lakshadweep islands); JAPAN: Aosujihata; SRI LANKA: Kangan kossa.

**Literature:** Heemstra and Randall (1984, 1986); Randall and Heemstra (1991).

**Remarks:** Following Boulenger (1895) most authors have confused *C. formosa* with *C. boenak* (e.g., Fowler and Bean, 1930; Munro, 1955; Katayama, 1988; Talwar and Kacker, 1984; Shen, 1984). These two species are distinguished in the account of *C. boenak* above.

*Cephalopholis fulva* (Linnaeus, 1758)

Fig. 83; Pls IIF, IIIA,B

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*Labrus fulvus* Linnaeus, 1758:287 (type locality: America, after Catesby).

**Synonyms:** *Perca punctata* Linnaeus, 1758:291 (type locality: America, after Catesby). *Holocentrus auratus* Bloch, 1790:75 (type locality given erroneously as "East Indies"). *Bodianus guativere* Bloch and Schneider, 1801:336 (type locality: Cuba, after Parra). *Gymnocephalus ruber* Bloch and Schneider, 1801:346, pl. 67 (after Marcgrave, type locality: probably Brazil). *Serranus ouatalibi* Valenciennes in Cuv. and Val., 1828:381 (type locality: West Indies). *Serranus carauna* Valenciennes in Cuv. and Val., 1828:384 (after Marcgrave, type locality: probably Brazil).

**FAO Names:** En - Coney; Fr - Cone ouatalibi; Sp - Cherna cabrilla.

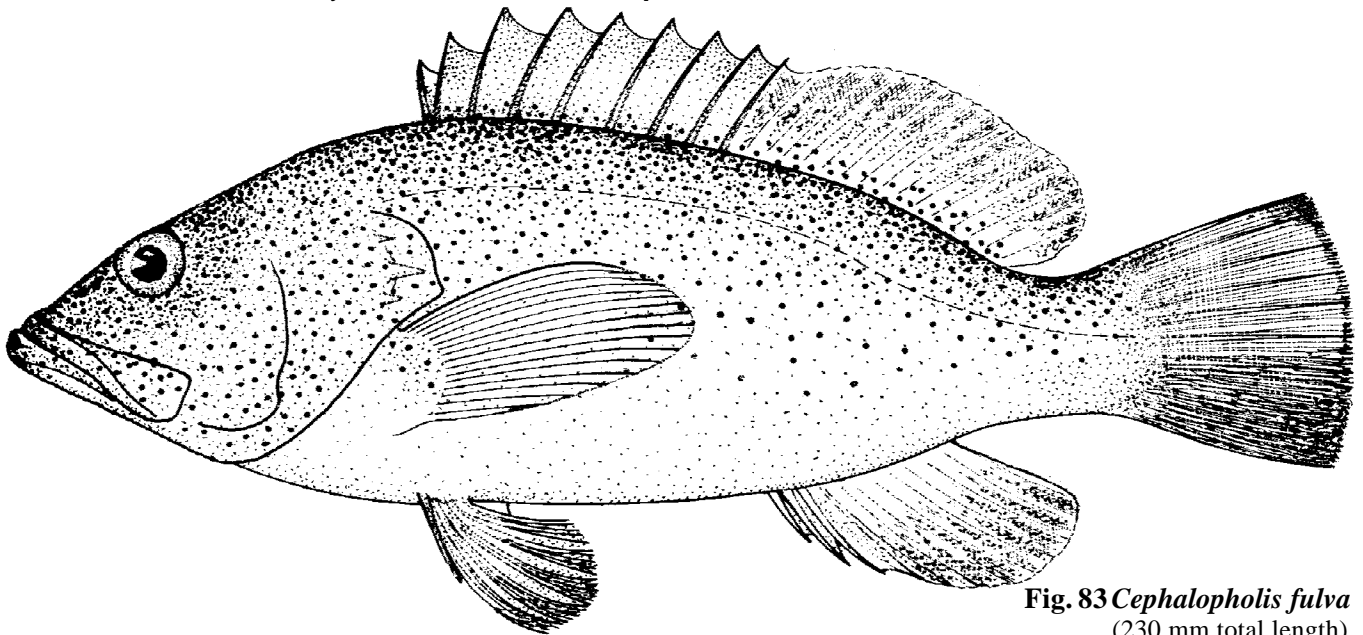


Fig. 83 *Cephalopholis fulva*  
(230 mm total length)

**Diagnostic Features:** Body depth distinctly less than head length, depth contained 2.6 to 2.9 times in standard length (for fish 10 to 25 cm standard length). Head length contained 2.3 to 2.5 times in standard length; interorbital area flat; preopercle rounded, with a shallow notch above the angle; upper limb finely serrate, the serrae at angle moderately enlarged, the lower edge fleshy; subopercle and interopercle smooth; nostrils small, subequal; maxilla scaly, reaching to or beyond vertical at rear edge of eye. Gill rakers 7 to 9 on upper limb, 16 to 18 on lower limb, 23 to 27 total. Dorsal fin with IX spines and 14 to 16 rays, the membranes distinctly notched between the spines: anal fin with III spines and 9 rays: pectoral-fin rays 17 to 19; caudal fin convex posteriorly, but the corners are angular. Lateral-body scales ctenoid; lateral-line scales 46 to 54; lateral-scale series 90 to 97. **Colour:** There are three colour phases in this species: 1) red (deep water), 2) orange-brown or bicoloured with the upper part of the fish [above a line from tip of snout to posterior dorsal-fin rays] of normal colour and the lower part abruptly pale (shallow water) and 3) xanthic (a yellow morph that may be found in shallow or deep water). In the first two colour morphs, the head and body is covered with small dark-edged pale blue spots; in the xanthic form, these spots are fewer and confined to the head and front part of the body. In all three morphs, there are two small black spots on top of caudal peduncle and another two at tip of lower jaw. The bicoloured pattern of the shallow-water morph is apparently an excitement pattern, and it can be turned on or off in a few seconds. The night pattern is generally pale, with irregular vertical bars and a dark tuning-fork mark on interorbital region like that of *Epinephelus striatus*. The nuptial male has a horizontal dark brown band from lower end of pectoral-fin base

to end of caudal fin, margin of soft dorsal fin black, dark stripe through eye, and a white spot on body near middle of dorsal-fin base.

**Geographical Distribution:** Tropical and subtropical western Atlantic from Bermuda and South Carolina to southern Brazil, including Atol das Rocas (Fig. 84).

**Habitat and Biology:** The Coney prefers coral reefs and clear water. In the Gulf of Mexico it occurs on deep-water reefs (at a depth of at least 45 m) where the water is clear, but it is not seen on the more silty shallow-water reefs. At Bermuda and in the West Indies, the species is common in shallow water, but it usually hides in caves or under ledges during the day.

*C. fulva* is a protogynous species: females mature at 16 cm total length and transform to males at a length of about 20 cm. Males are territorial. Spawning occurs just before sunset over several days, and a male will spawn daily with each of the several females in his harem (P.L. Colin, personal communication). The spawning season begins at Bermuda in May and lasts until at least early August; the spawning season in the Bahamas is December-January, while in Jamaican waters the peak spawning period is from January to March. The eggs are typical grouper eggs, 0.95 mm in diameter, with a single oil globule. Fecundity estimates range from about 150 000 to 282 000 eggs per female. A few specimens that appear to be hybrids of *C. fulva* and *Paranthias furcifer* have been described by C.L. Smith (1966) and Thompson and Munro (1978). The Coney feeds mainly on small fishes (46% by volume) and crustaceans. It occasionally follows morays and snake eels in order to feed on the normally inaccessible small fishes and invertebrates that are flushed from the interstices of the reef by the foraging eels.

**Size:** Maximum total length 33 cm (37 cm at Bermuda).

**Interest to Fisheries:** Although the small size of this species precludes it from being of commercial importance, it is abundant in the West Indies and often sold for food in the local markets. Caught with hook-and-line and in traps.

**Local names:** CUBA: Guativere (red phase), Canario (yellow phase); VENEZUELA: Corruncha.

**Literature:** Randall (1967); Smith (1971); Thompson and Munro (1978); Bullock and Smith (1991).

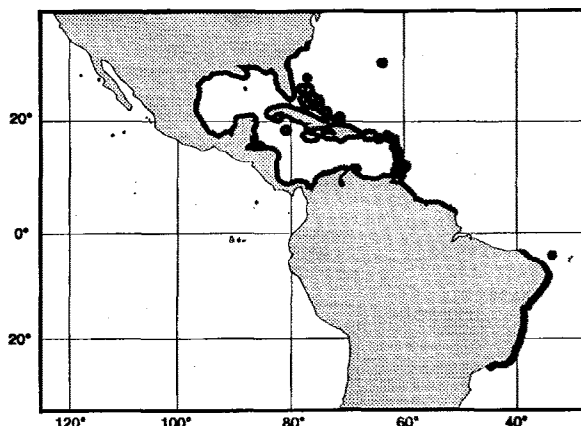


Fig. 84

*Cephalopholis hemistiktos* (Rüppell, 1830)

Fig. 85; Pl. IIC

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*Serranus hemistiktos* Rüppell, 1830:109, pl. 27, fig. 3 (type locality: Massaua, Red Sea).

**Synonyms:** None.

**FAO Names:** En - Yellowfin hind; Fr - vielle d'Arabie; Sp - Cherna arábiga.

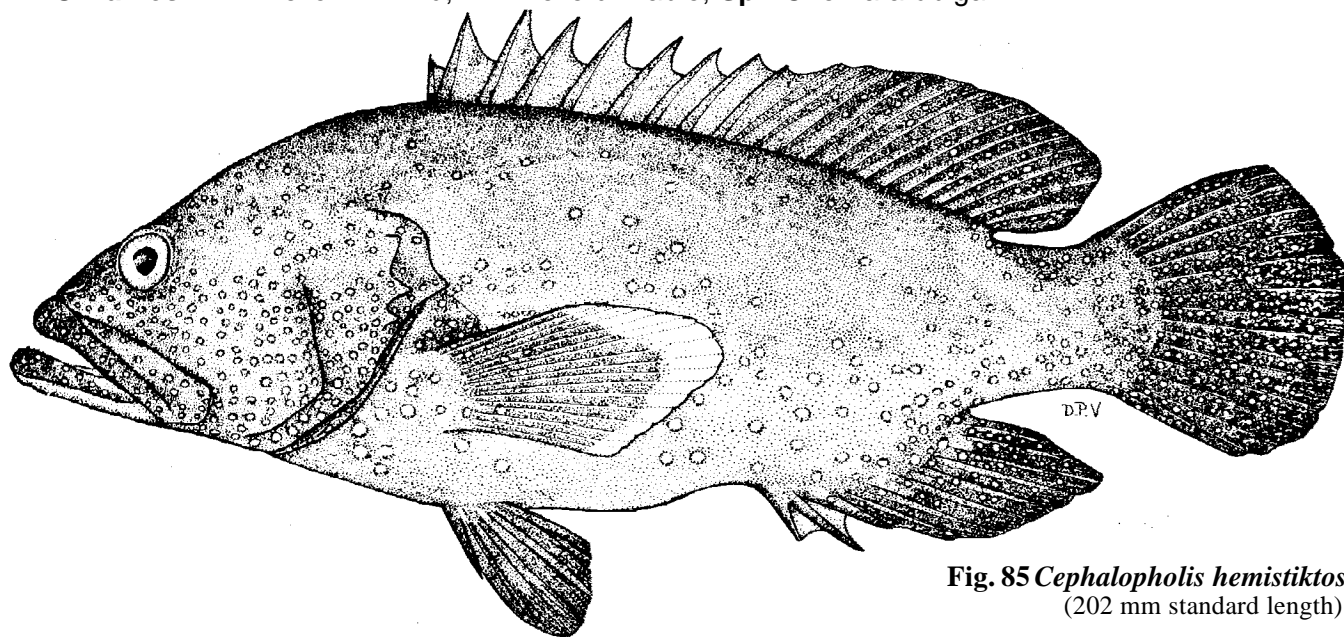


Fig. 85 *Cephalopholis hemistiktos*  
(202 mm standard length)

**Diagnostic Features:** Body depth less than head length, the depth contained 2.7 to 3.0 times in standard length (for fish 10 to 20 cm standard length). Head length contained 2.4 to 2.6 times in standard length; interorbital area flat; preopercle rounded, finely serrate, the lower edge fleshy; upper edge of operculum distinctly convex; maxilla scaly, reaching to or somewhat beyond vertical at rear edge of eye. Gill rakers 6 to 8 on upper limb, 13 to 15 on lower limb. Dorsal fin with IX spines and 14 or rarely 15 rays, the membranes distinctly indented between the spines; anal fin with III spines and 8 to 10 rays, the posterior margin of the fin pointed in adults; pectoral-fin rays 16 to 18; pectoral fins pointed, distinctly longer than pelvic fins, pectoral-fin length contained 1.4 to 1.6 times in head length; pelvic fins nearly or just reaching anus, pelvic-fin length contained 1.7 to 2.0 times in head length; caudal fin well rounded. Body scales ctenoid; no auxiliary scales; lateral-line scales 47 to 52; lateral-scale series 95 to 121. **Colour:** The ground colour of specimens from shallow water is brownish, those from 15 to 20 m are brownish red, and fish from deep water are primarily reddish; dark-edged blue, ocelli on head (more numerous ventrally) and on lower part of body; caudal fin and rear part of dorsal and anal fins darker than body, covered with small blue ocelli and their margins with a pale blue line; triangular membrane at tip of each dorsal-fin spine orange; pectoral fins mostly brown to reddish brown, with a few small blue ocelli at the base, the outer margin broadly and abruptly yellow; pelvic fins dark red to reddish brown, the rays darker than the membranes. Some fish with a large yellow or buff area below soft dorsal fin or alternating dark and pale bars on body (more distinct dorsally) with dark blotches on the head.

**Geographic Distribution:** Known with certainty only from the northern end of the Red Sea to the Persian Gulf and coast of Pakistan; records from elsewhere are apparently based on mis-identifications of other species (Fig. 86).

**Habitat and Biology:** In the Red Sea, *C. hemistiktos* is more often found on patchy open reef areas rather than on well developed coral reefs; depths range from 4 to at least 55 m. It is a diurnal, ambush predator feeding throughout the day on fishes (64%, mostly pomacentrids) and crustaceans (36%). *C. hemistiktos* is a monogamous species and each pair jointly defends a common territory of up to 62 m<sup>2</sup> (Shpigel and Fishelson, 1991).

Van Bertalanffy growth parameters were calculated by Matthews and Samuel (1987 [reported as *C. miniatus*]) from a sample of 36 specimens collected in the Persian Gulf: age range = 6 to 26 years;  $L_{\infty} = 34.11$ ;  $K = 0.1102$ ;  $t_0 = -2.4160$ ; where  $L_{\infty}$  is theoretical maximum length,  $K$  is growth coefficient, and  $t_0$  is theoretical age at zero length.

**Size:** Maximum total length 35 cm.

**Interest to Fisheries:** The small size of this species precludes it being of significant commercial importance. It probably is of some importance in local subsistence fisheries. Caught with handlines, traps, and spear.

**Local Names:** KUWAIT Shnenu:

**Literature:** Randall and Ben-Tuvia (1983); Heemstra and Randall (1984,1986); Kuronuma and Abe (1986); Shpigel and Fishelson (1989a and b).

**Remarks:** *C. hemistiktos* is the most common species of *Cephalopholis* in the Red Sea. The species that Kuronuma and Abe (1986) described and illustrated in colour as "*Cephalopholis miniatus*" from Kuwait is *C. hemistiktos*. *C. miniata* does not occur in the Persian Gulf, but these two species and *C. sexmaculata* are sympatric in the Red Sea.

Randall and Heemstra (1991) found slight differences in Red Sea specimens compared with those from the Gulf of Oman and Persian Gulf: pectoral-fin of Red Sea fishes modally 17 ( $n = 36$ ) versus 18 ( $n = 18$ ); lateral-scale series of Red Sea fish 95 to 104, versus 109 to 121; and the Red Sea *C. hemistiktos* are smaller (the largest of 75 specimens is only 167 mm standard length; versus 265 mm standard length for a fish from Iran).

*C. hemistiktos* is closely related to *C. miniata* and *C. sexmaculata*. These three differ slightly in colour pattern: in *C. hemistiktos*, there are no small blue spots on the dorsal part of the body,, but in the other two species the entire body is covered with blue spots; the caudal fin and posterior parts of the dorsal and anal fins are distinctly darker than the rest of the body in *C. hemistiktos*, but these fins are not darker in the other species; and the outer margin of the pectoral fins is abruptly yellow in *C. hemistiktos*, but gradually orange-yellow distally in *C. miniata* and uniformly coloured (orange-red, like the body) in *C. sexmaculata*. Another minor

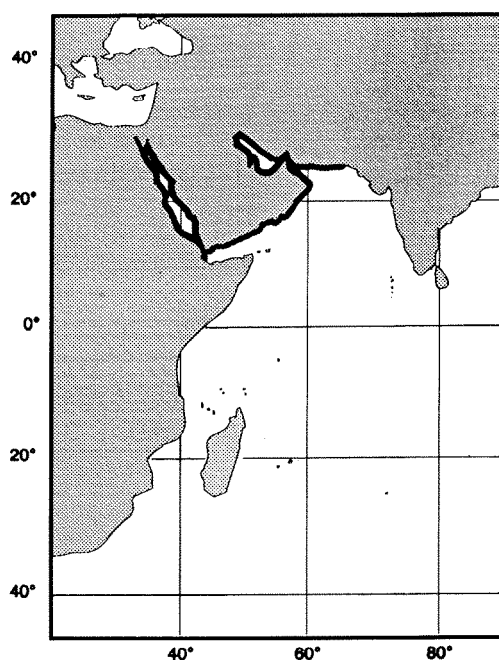


Fig. 86

difference is that in adults of *C. hemistiktos*, the anal fin is pointed posteriorly, and reaches past a vertical at the caudal-fin base, but in the other species it is evenly rounded and does not extend past the caudal-fin base. And *C. hemistiktos* usually has 14 dorsal-fin rays, while in the other species the usual count is 15.

*Cephalopholis igarashiensis* Katayama, 1957

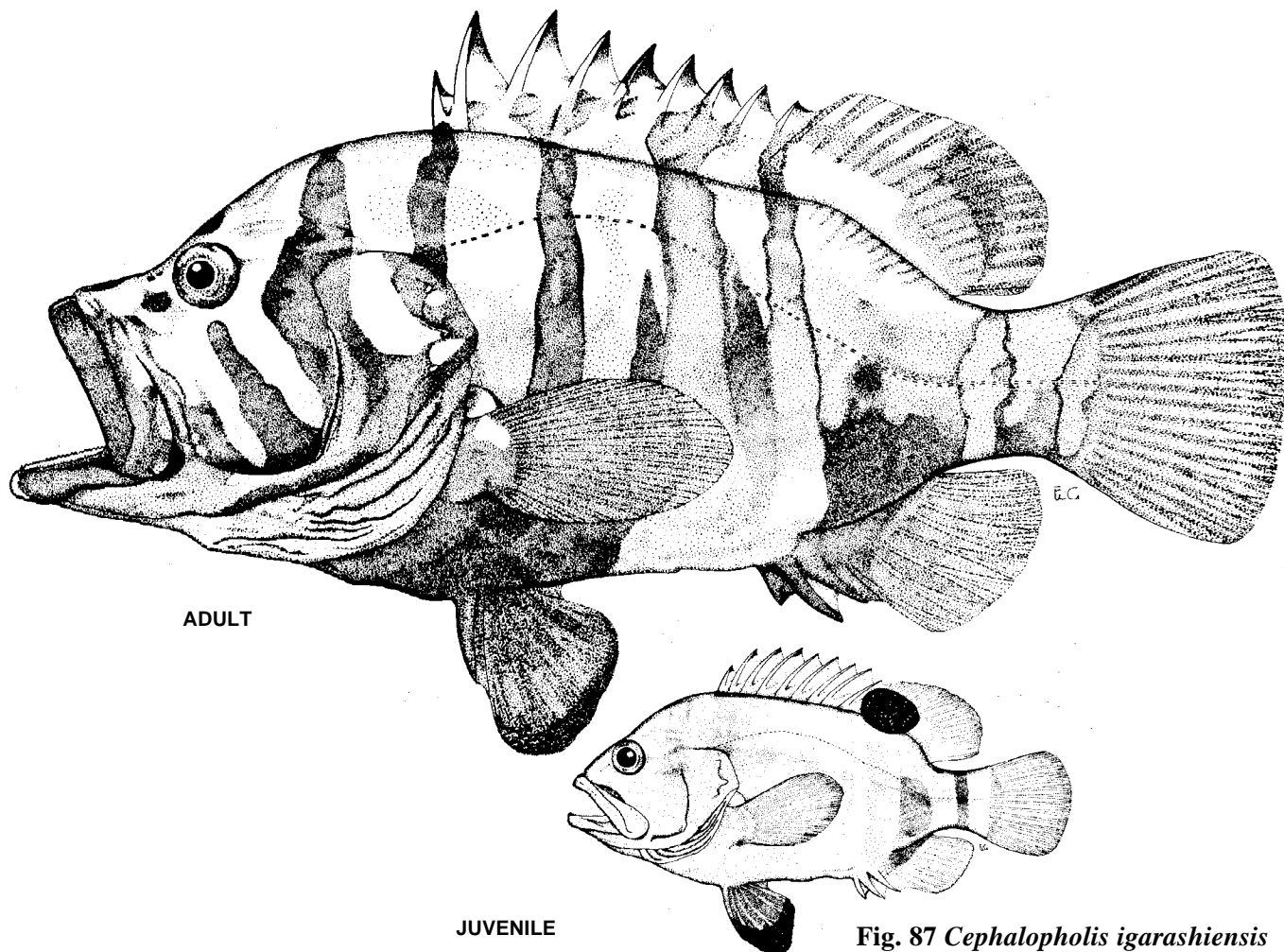
Fig. 87; Pl. IIID

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*Cephalopholis igarashiensis* Katayama, 1957:156, fig. 3 (type locality: Sumisu-tu, Izu Islands).

**Synonyms:** *Cephalopholis swanius* Tsai, 1960:188, fig. (type locality: Hua-lien, Taiwan).

**FAO Names:** En - Garish hind; Fr - Vielle voyant; Sp - Cherna chillona.



**Fig. 87** *Cephalopholis igarashiensis*

(adult 264 mm standard length, juvenile 139 mm standard length)

**Diagnostic Features:** Body depth greater than head length, the depth contained 2.0 to 2.4 times in standard length (for fish 13 to 29 cm standard length); body width contained 2.3 to 2.6 times in the depth; caudal-peduncle depth equal to or greater than its length. Head length contained 2.3 to 2.5 times in standard length; dorsal head profile straight or slightly concave to above eye, the nape markedly convex; interorbital area flat; preopercle rounded, finely serrate, the ventral serrae slightly enlarged, the lower edge irregular but hidden by skin; subopercle and interopercle finely serrate; upper edge of operculum distinctly convex; maxilla naked, reaching vertical at rear edge of eye; a prominent knob on the ventral rear corner. Gill rakers 8 or 9 on upper limb, 16 or 17 on lower limb. Dorsal fin with IX spines and 14 rays, the membranes distinctly indented between the spines; anal fin with III spines and 9 rays; pectoral-fin length contained 1.6 to 1.8 times in head length; pectoral-fin rays 18 or 19; pelvic fins reach to or beyond anus, their length contained 1.7 to 2.0 times in head length; caudal fin rounded. Lateral line noticeably arched over pectoral fin. Body scales ctenoid, without auxiliaries; lateral-line scales 60 to 65; lateral-scale series 101 to 117. **Colour:** Head, body, and fins reddish orange: 7 lemon yellow bars on dorsal part of body, extending onto dorsal fin; 3 broad yellow bands radiating from eye: fins red, except for extension of yellow bars from body into dorsal fin and membranes at tips of dorsal-fin spines, which are orange. Juveniles more yellowish, with a large black spot in dorsal fin, pelvic fins and tips of interspinous dorsal-fin membranes blackish: tips of pelvic fins blackish in large juveniles or small adults.

**Geographic Distribution:** Tropical western Pacific: southern Japan, Taiwan, Guam, Philippines, South China Sea, Samoa, and Tahiti (Fig. 88).

**Habitat and Biology:** *C. igarashiensis* is a rare, deep-water grouper; Schroeder (1980) gives the depth range as "down to 80 m," and the specimen from Tahiti was taken in 250 m. Like most groupers, it is said to feed on fishes and crustaceans (Schroeder, 1980).

**Size:** Maximum total length about 43 cm.

**Interest to Fisheries:** This species seems too rare to be of commercial importance.

**Local Names:** JAPAN: Shima-hata; PHILIPPINES: Kubing (Visayan), Bulang (Cuyonin).

**Literature:** Randall and Heemstra (1991).

**Remarks:** This distinctive species differs from all other species of *Cephalopholis* in its greater body depth and unique colour pattern. The species name is an adjectival patronym in honour of Mr Igarashi, who collected the holotype.

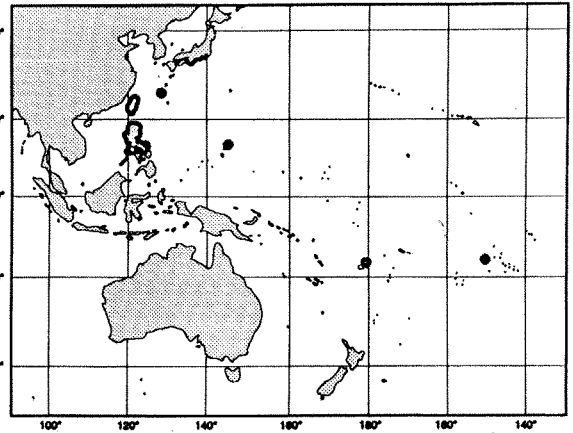


Fig. 88

*Cephalopholis leopardus* (Lacepède, 1801)

Fig. 89; Pl. III E

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*Labrus leopardus* Lacepède, 1801:450,517, pl. 30, fig. 1 (type locality: Indian Ocean).

**Synonyms:** *Serranus spilurus* Valenciennes in Cuv. and Val., 1833:433 (type locality: Mauritius). *Serranus homfrayi* Day, 1870:678 (type locality: Port Blair, Andaman Islands). *Epinephelus urodelops* Schultz, 1943:105, fig. 8 (type locality: Canton Island, Phoenix Islands).

**FAO Names:** En - Leopard hind; Fr - Vielle léopard; Sp - Cherna leopardo.

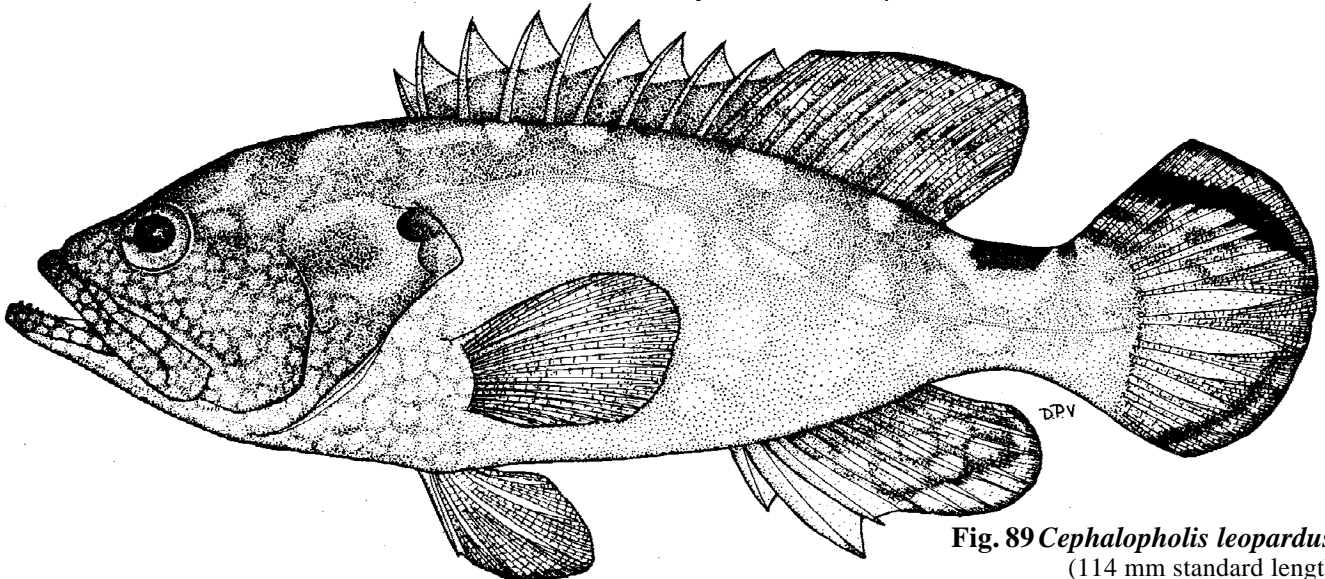


Fig. 89 *Cephalopholis leopardus*  
(114 mm standard length)

**Diagnostic Features:** Body depth less than head length, contained 2.5 to 2.8 times in standard length (for fish 5 to 14 cm standard length). Head length contained 2.2 to 2.4 times in standard length; interorbital area flat; preopercle rounded, finely serrate, the lower edge fleshy; subopercle and interopercle smooth; upper edge of operculum distinctly convex; maxilla extends past eye. Gill rakers 7 to 9 on upper limb, 15 to 17 on lower limb. Dorsal fin with IX spines and 13 to 15 rays; anal fin with III spines and 9 or 10 rays; pectoral-fin rays 16 to 18; pectoral-fin length contained 1.4 to 1.6 times in head length; pelvic fins not reaching anus, their length contained 2.0 to 2.3 times in head length; caudal fin well rounded. Body scales ctenoid, no auxiliary scales; lateral-line scales 47 to 50; lateral-scale series 79 to 88. **Colour:** Head and body mottled reddish brown, paler ventrally with numerous red-orange or pinkish red spots; dark brown saddle on caudal peduncle and a similar, but much smaller spot just behind; dark brown or reddish submarginal streak on upper part of caudal fin and a fainter reddish streak on lower part of fin; dark brown spot at rear end of operculum; pectoral fins yellowish on some fish.