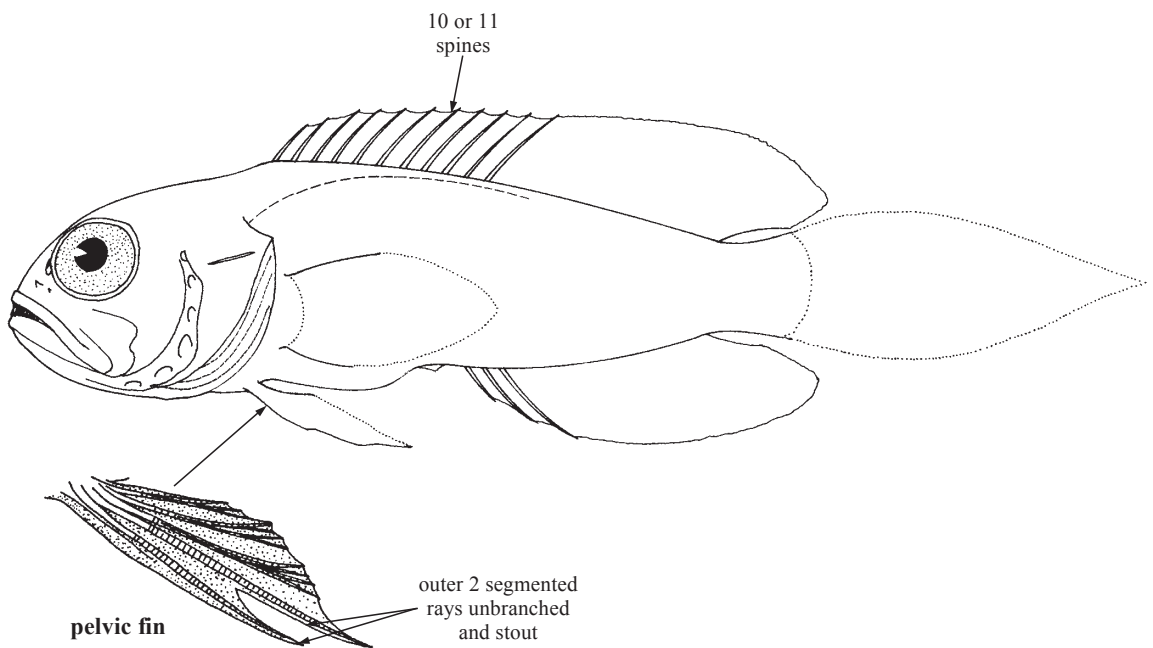


OPISTOGNATHIDAE

Jawfishes

by W.F. Smith-Vaniz, U.S. Geological Survey, Florida, USA

Diagnostic characters: Small, moderately elongate fishes with tapering narrow body; largest species about 19 cm (126 mm standard length), most under 10 cm total length. **Head bulbous, mouth large;** in some species the upper jaw extending to or well beyond posterior margin of gill flap; **eyes relatively large and high on head;** moderate canine-like teeth along sides of jaws (anteriorly several rows of smaller teeth may also be present). Dorsal fin shallowly notched (if at all) between spinous and soft portions, with 10 or 11 usually flexible spines and 12 to 21 segmented (soft) rays; anal fin with 2 or 3 slender spines and 11 to 21 segmented rays; **pelvic fins positioned anterior to pectoral fins, with 1 spine and 5 segmented rays; outer 2 segmented rays unbranched and stout, inner rays branched and weaker;** caudal fin rounded or lanceolate, the middle 6 to 8 rays branched in most species. Lateral line high on body, ending below middle of dorsal fin; lateral-line tubes or canals imbedded in skin, rather than occurring on scales. Scales cycloid (smooth), small, and usually absent from head. **Colour:** some species are colourful, but most are mottled with various shades of brown.



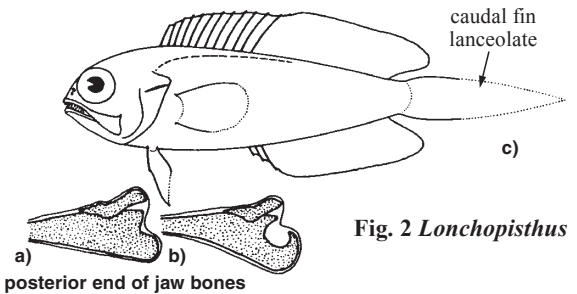
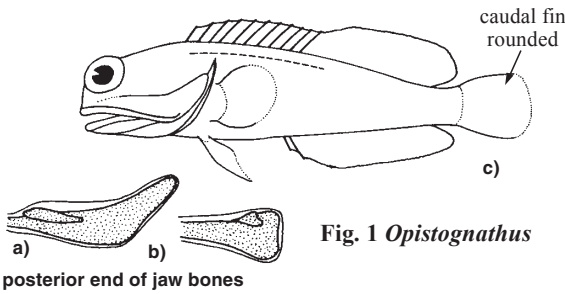
Habitat, biology, and fisheries: Most jawfishes occur in relatively shallow depths (2 to 30 m) on sandy or rubble substrates adjacent to coral reefs but some species have been trawled in 100 to 200 m depths on soft bottoms. Jawfishes live in burrows, which they construct themselves; some species are solitary but most live in colonies. Apparently all jawfishes brood the eggs orally. Not of commercial importance except the yellowhead jawfish, *Opistognathus aurifrons*, which is common in the aquarium trade. Jawfishes are occasionally caught by hook-and-line anglers and in trawls, and reported to be good to eat.

Similar families occurring in the area

The arrangement of the pelvic-fin rays, consisting of 1 spine and 5 segmented rays (the outer 2 unbranched and stout, inner 3 branched and weak), will distinguish the jawfishes from all other families. The Batrachoididae (toadfishes) are superficially similar but have 2 to 4 dorsal-fin spines and fleshy flaps on the head (10 or 11 dorsal-fin spines and no flaps on head in Opistognathidae).

Key to the species of Opistognathidae occurring in the area

- 1a. Bony posterior end of upper jaw straight or rounded (Fig. 1a,b); caudal fin rounded, 18 to 42% standard length (Fig. 1c) (*Opistognathus*) → 2
- 1b. Bony posterior end of upper jaw weakly to strongly concave (Fig. 2a,b); caudal fin lanceolate, 30 to 80% standard length (Fig. 2c) (*Lonchopisthus*) → 15



- 2a. Anterior nostril a short tube without a cirrus → 3
- 2b. Anterior nostril with a fleshy cirrus on posterior rim → 10
- 3a. Opercle with prominent dark blotch; dorsal-fin spines straight distally, with rigid sharp tips; cheeks completely scaly. *Opistognathus leprocarus*
- 3b. Opercle uniformly pigmented; dorsal-fin spines curved distally, with slender flexible tips; cheeks naked (except frequently scaly in *O. megalepis*). → 4
- 4a. Segmented anal- and dorsal-fin rays 11 and 11 or 12, respectively; body with 26 to 42 oblique scale rows in lateral series *Opistognathus megalepis*
- 4b. Segmented anal- and dorsal-fin rays 12 or more, respectively; body with 44 to 87 oblique scale rows in lateral series → 5
- 5a. Dorsal-fin spines 10; vomerine teeth absent; inner lining of upper jaw and adjacent membranes mostly black; total gill rakers on first arch 26 to 32 → 6
- 5b. Dorsal-fin spines typically 11; vomerine teeth typically present; inner lining of upper jaw and adjacent membranes pale; total gill rakers on first arch 34 to 62 → 7
- 6a. Posterior end of upper jaw produced as a thin flexible lamina, coronoid process of articular club-shaped with dorsal margin convex *Opistognathus melachasme*
- 6b. Posterior end of upper jaw rigid, not produced as a thin flexible lamina; coronoid process of articular hatchet-shaped with dorsal margin straight *Opistognathus nothus*
- 7a. Outermost segmented pelvic-fin ray tightly bound to adjacent ray, and interradial membrane not incised distally; dorsal fin with narrow, dark border (in life, blue); segmented anal-fin rays 14 to 17; caudal fin 30 to 41% standard length → 8
- 7b. Outermost segmented pelvic-fin ray not tightly bound to adjacent ray, and interradial membrane incised distally; dorsal fin without narrow, dark border; segmented anal-fin rays 12 to 14 (rarely 14); caudal fin 19 to 30% standard length → 9
- 8a. Head with narrow dark stripe that extends from posteroventral margin of eye and crosses head about 1/2 eye diameter behind margin of orbit; dorsum of head conspicuously bicoloured, abruptly pale anterior to postorbital stripe; gular region crossed by a pale band approximately between second and third mandibular pore positions *Opistognathus n. sp.*
- 8b. Head without narrow dark stripe that extends from posteroventral margin of eye and crosses nape; dorsum of head not conspicuously bicoloured; gular region not crossed by a pale band *Opistognathus aurifrons*

- 9a. Posterior end of upper jaw nearly truncate and noticeably expanded; segmented anal-fin rays 12 to 14 (typically 13); black spot present in spinous dorsal fin of adult males; caudal vertebrae 18 or 19. *Opistognathus gilberti*
- 9b. Posterior end of upper jaw ovate and only slightly expanded; segmented anal-fin rays 12 or 13 (rarely 13); black spot absent in spinous dorsal fin of adult males; caudal vertebrae 16 *Opistognathus lonchurus*

- 10a. Adults with posterior end of the maxilla rigid, not ending as thin flexible lamina; dorsal-fin spines stiff and straight, the skin-covered tips usually with pale, slightly swollen fleshy tabs; segmented dorsal-fin rays 13 to 16, rarely 16; cephalic sensory pores more numerous, the median predorsal region of head completely covered by pores or nearly so → 11
- 10b. Adults with posterior end of maxilla ending as thin flexible lamina (slightly elongate in mature females and very elongate in males); dorsal-fin spines thin and flexible, usually curved distally, the tips without pale, slightly swollen fleshy tabs; segmented dorsal-fin rays 15 to 18, rarely 15; cephalic sensory pores less numerous, most of posterior half of median predorsal region of head without pores → 12

- 11a. Fleshy cirrus on anterior nostril moderately slender; upper margin of subopercle not a broad, fan-like, truncate flap; premaxilla with 1 row of teeth anteriorly; supramaxilla present; area surrounding esophageal opening immaculate; body with 42 to 54 oblique scale rows in longitudinal series; mature males with posteriormost 2 to 4 premaxillary teeth usually stouter and more strongly hooked than adjacent teeth; caudal vertebrae 16 to 18 (typically 17) *Opistognathus whitehursti*
- 11b. Fleshy cirrus on anterior nostril broadly rounded to palmate; upper margin of subopercle a broad, fan-like, truncate flap; premaxilla with 2 or more rows of teeth anteriorly; supramaxilla absent; dark pigment completely surrounding esophageal opening; body with 69 to 85 oblique scale rows in longitudinal series; mature males with posteriormost 2 to 4 premaxillary teeth undifferentiated from adjacent teeth; caudal vertebrae 17 to 19 (typically 18) *Opistognathus maxillosus*

- 12a. Body with 5 or 6 dusky bands midlaterally; oblong black spot present in outer half of spinous dorsal fin, usually between spines 7 to 10; dark pigment surrounding esophageal opening except for pale oblong area below each upper pharyngeal tooth patch (Fig. 3a); inner lining of upper jaw and adjacent membranes of adult males with 2 brown stripes *Opistognathus macrognathus*
- 12b. Body without 5 or 6 dusky bands; prominent ocellus in spinous dorsal fin between spines 3 to 7; dark pigment widely surrounding esophageal opening, including area below each upper pharyngeal tooth patch (Fig. 3b); inner lining of upper jaw and adjacent membranes of adult males with a single black stripe → 13

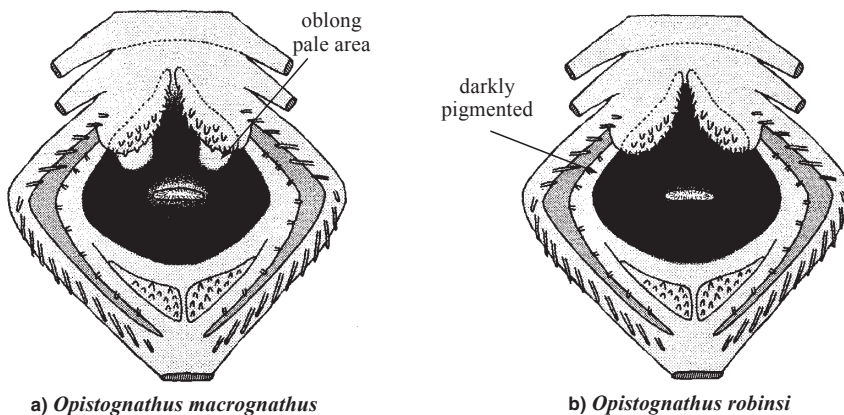


Fig. 3 esophageal opening

- 13a.** Background colour pattern of body typically mottled with shades of brown but without heavily pigmented body scales giving the appearance of isolated dark spots; body with 73 to 88 oblique scale rows in longitudinal series *Opistognathus robinsi*
- 13b.** A few scattered body scales heavily pigmented, each appearing as an isolated, prominent, dark spot; body with 57 to 70 oblique scale rows in longitudinal series *Opistognathus signatus*
- 14a.** Segmented dorsal-fin rays 16 to 19; branched caudal-fin rays 0 to 6; inner membrane connecting dentary and maxilla at rictus with a dark stripe; body with 47 to 59 oblique scale rows in longitudinal series; relatively shallow-dwelling species, typically occurring in depths < 100 m → 15
- 14b.** Segmented dorsal-fin rays 11 to 13; branched caudal-fin rays 10 to 13; inner membrane connecting dentary and maxilla at rictus pale; body with 26 to 39 oblique scale rows in longitudinal series; relatively deep dwelling species, typically occurring in depths >100 m → 16
- 15a.** Bony posterior end of maxilla bluntly notched (Fig. 2a); dorsal and anal fins uniformly dark; opercular blotch conspicuously dark; branched caudal-fin rays 0 to 6 *Lonchopisthus higmani*
- 15b.** Bony posterior end of maxilla distinctly hooked (Fig. 2b); dorsal and anal fins dusky with a narrow pale margin; opercular blotch, if present, not conspicuously dark; no branched caudal-fin rays *Lonchopisthus micrognathus*
- 16a.** Pelvic fins relatively short, 16 to 30% standard length; cheeks scaly; body with 26 to 33 oblique scale rows in longitudinal series *Lonchopisthus lemur*
- 16b.** Pelvic fins relatively long, 39 to 79% standard length; cheeks naked; body with 33 to 39 oblique scale rows in longitudinal series *Lonchopisthus n. sp.*

List of species occurring in the area

Note: This list includes new species that will be described elsewhere by the author.

Lonchopisthus higmani Mead, 1959. 126 mm SL. Central America and N South America.

Lonchopisthus lemur (Myers, 1935). 68 mm SL. Greater Antilles, Central America to S Brazil.

Lonchopisthus micrognathus (Poey, 1860). 87 mm SL. Gulf of Mexico, Caribbean, N South America.

Lonchopisthus n. sp. 89 mm SL. E Gulf of Mexico and off Honduras.

Opistognathus aurifrons (Jordan and Thompson, 1905). 97 mm SL. Bahamas, Florida, Caribbean, and Central America.

Opistognathus gilberti Böhlke, 1967. 54 mm SL. Bahamas, Central America and Greater Antilles.

Opistognathus leprocarus Smith-Vaniz, 1997. 81 mm SL. Bahamas and Lesser Antilles.

Opistognathus lonchurus Jordan and Gilbert, 1882. 122 mm SL. South Carolina to Guyana, including Gulf of Mexico and Greater Antilles.

Opistognathus macrognathus Poey, 1860. 166 mm SL. Bahamas, Florida to N South America.

Opistognathus maxillostus Poey, 1860. 125 mm SL. Bahamas, Florida to N South America (absent Gulf of Mexico).

Opistognathus megalepis Smith-Vaniz, 1972. 43 mm SL. Bahamas, Yucatan and Lesser Antilles.

Opistognathus melachasme Smith-Vaniz, 1972. 77 mm SL. Known only from Yucatan.

Opistognathus nothus Smith-Vaniz, 1997. 79 mm SL. North Carolina, Gulf of Mexico and Cuba.

Opistognathus robinsi Smith-Vaniz, 1997. 131 mm SL. Bahamas, South Carolina to S Florida.

Opistognathus signatus Smith-Vaniz, 1997. 89 mm SL. Central America and N South America.

Opistognathus whitehursti (Longley, 1927). 65 mm SL. Bahamas to S Brazil (absent Gulf of Mexico).

Opistognathus n. sp. 76 mm SL. Tobago to S Brazil.

References

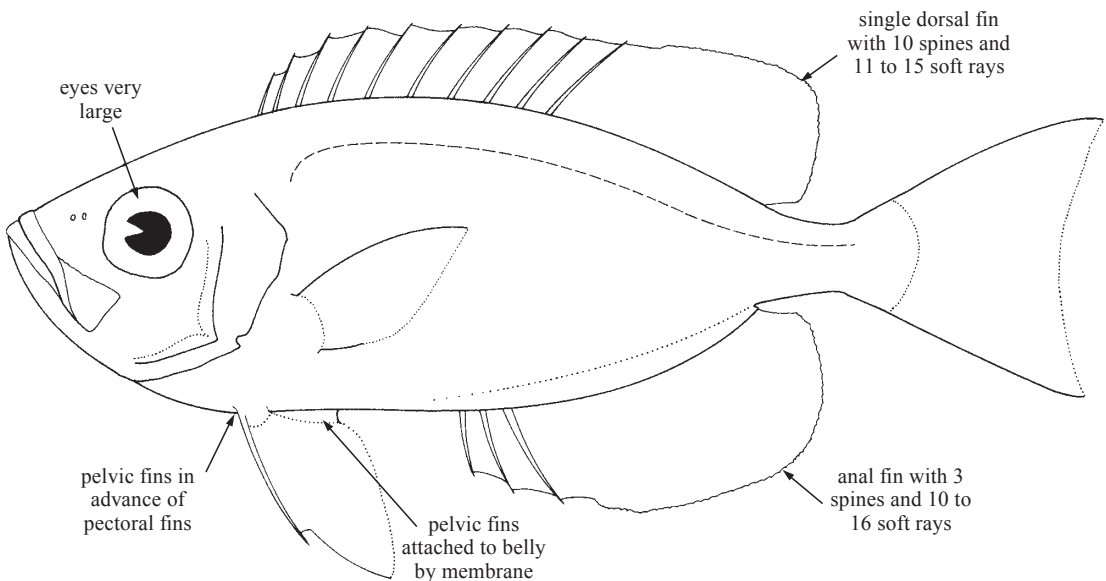
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PRIACANTHIDAE

Bigeyes

By W.C. Starnes, North Carolina State Museum of Natural Sciences, USA

Diagnostic Characters: Medium-sized fishes with maximum total lengths of 25 to 65 cm. Deep-bodied, laterally compressed; **extremely large eyes** (ca. 1/2 of head length); **mouth upturned**. Weak spine on posterior opercle and **prominent to remnant spine at angle of preopercle**. Branchiostegals 6; gill rakers 17 to 32. Spinous and soft-rayed portions of dorsal fin continuous, relatively short to long, soft portion broadly rounded to slightly pointed; 10 spines and 11 to 15 soft rays. Anal-fin rays relatively short to long and broadly rounded to slightly pointed with 3 spines and 10 to 16 soft rays. Caudal fin rounded, emarginate, or lunate, with 16 principal rays. Pectoral fins relatively short with 17 to 21 rays. **Pelvic fins short to very long, broadly attached to belly by membrane** and positioned in advance of pectoral fins with 1 spine and 5 soft rays. Head and body mostly covered with extremely adherent, rough, spiny scales (bearing true spines, which are integral part of scale rather than cteni on individual detachable bases). Scales much modified, varying among genera and species. **Scales on branchiostegal rays. Spinules present on fin spines.** Lateral-line scales, including pored scales on caudal-fin base, 38 to 115. Vertebrae 23. Some species with modifications of skull and swimbladder, including connections between these components. **Colour:** head, iris of eye, and body generally reddish, sometimes with silvery blotches or, in some species, occasionally a pattern of red and silver/white barring. These colours are highly changeable. Fins reddish to dusky or black, occasionally yellowish in some species; some species with dark spots or speckling on fin membranes.

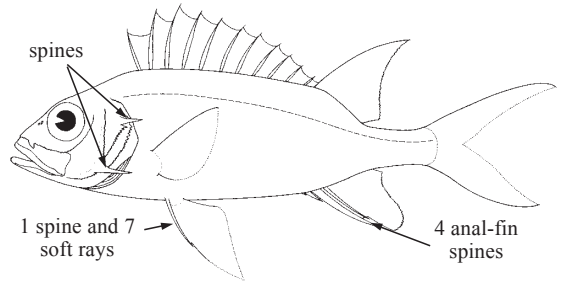


Habitat, biology, and fisheries: Generally epibenthic fishes occurring near coral reefs or rock formations but occasionally in more open areas; occur at depths from 5 to 400 m or more. Probably most active nocturnally but known to feed diurnally as well. Feed primarily on crustaceans, small cephalopods, polychaetes, and small fishes. Eggs, larvae, and early juvenile stages pelagic, transforming on settling to suitable habitats. Occur solitary or in small aggregations, but some Indo-Pacific species may form sizeable aggregations at times as indicated from trawl catches. Not important in most fishery areas but some species occasionally common in trawl catches of southeast Asian waters. Generally incidental in trawls or hook-and-line fisheries elsewhere. Flesh is said to be of excellent quality.

Similar families occurring in the area

While members of the following families are superficially similar to priacanthids, none are particularly close in appearance or likely to be confused after cursory examination.

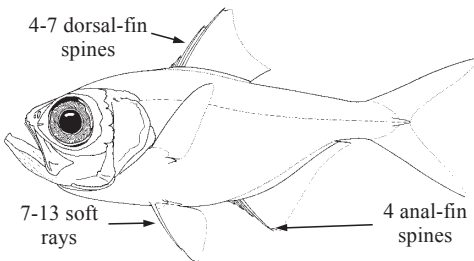
Holocentridae: also with large eyes (particularly in *Myripristis*) and reddish colour; readily distinguishable from bigeyes by spines on opercular margin; spinous and soft-rayed portions of dorsal fin nearly separate; deeply forked caudal fin with 18 or 19 rays; also, pelvic-fin origin is behind pectoral-fin origin, having 1 spine and usually 7 (versus 5) soft rays, pelvic fin not attached to belly by membrane; anal fin with 4 (versus 3) spines.



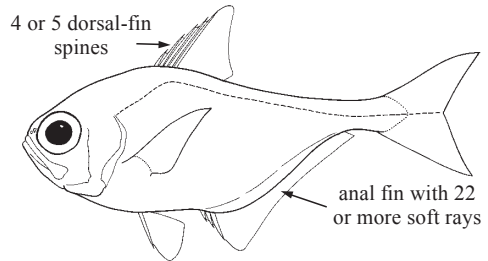
Holocentridae

Berycidae: also with large eyes and reddish coloration but readily distinguishable from bigeyes by short dorsal-fin base with only 4 to 7 spines; anal fin with 4 spines; caudal fin deeply forked; pelvic fin having origin behind pectoral fins and 7 to 13 soft rays.

Pempheridae: also with large eyes and reddish to coppery colour but with dorsal-fin base short, 4 or 5 spines and 8 or 9 soft rays; anal fin with very long base, 3 spines and 22 or more soft rays; attaining small maximum size.



Berycidae



Pempheridae

Key to the species of Priacanthidae occurring in the area

Identification note: Scales in lateral series are counted in straight line at midbody from behind opercle onto caudal fin, joining lateral line on anterior caudal peduncle area and including all pored scales onto caudal-fin base.

- 1a. Body very deep and broadly ovate, depth 1.7 to 1.9 in standard length; anal-fin soft rays 10; dorsal-fin soft rays 11; scales in lateral series 42 to 45 (Fig. 1) *Pristigenys alta*
- 1b. Body less deep, depth 2.0 to 3.1 in standard length; anal-fin soft rays 13 to 16; dorsal-fin soft rays 12 to 15; scales in lateral series 60 to 96 → 2

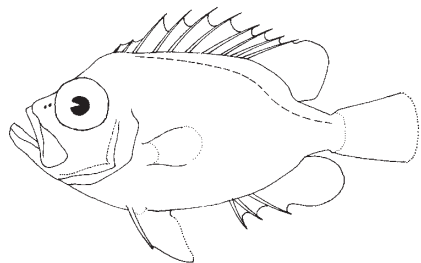


Fig. 1 *Pristigenys alta*

- 2a. Scale rows between dorsal-fin origin and lateral line 16 to 20; pelvic fins very long except in large adults (300+ mm standard length) exceeding head length (Fig. 2); soft dorsal and anal fins long and slightly pointed except in very large specimens. *Cookeolus japonicus*
- 2b. Scale rows between dorsal-fin origin and lateral line fewer than 16; pelvic fins short, less than or equal to head length; soft dorsal and anal fins moderately long, broadly rounded (Fig. 3) → 3

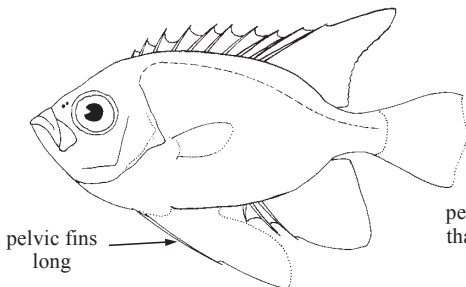


Fig. 2 *Cookeolus japonicus*

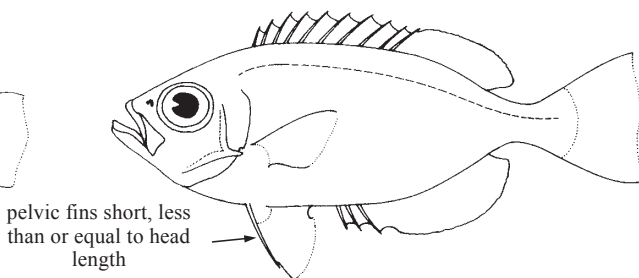


Fig. 3

- 3a. Posterior portion of preopercle lacking scales (Fig. 4a) and notably striate; anterior profile of head nearly symmetrical, extremity of lower jaw when mouth tightly closed about level with midline of body (Fig. 5); soft dorsal, anal, and caudal fins usually with small dark specks in membranes *Heteropriacanthus cruentatus*

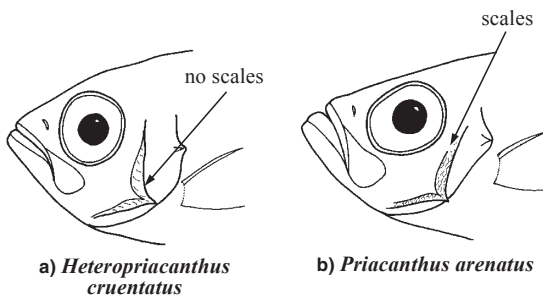


Fig. 4 lateral view of head

- 3b. Posterior portion of preopercle with scales (Fig. 4b); anterior profile of head more asymmetrical, extremity of lower jaw usually above level of midline of body (Fig. 6); fins lacking specks. . . *Priacanthus arenatus*

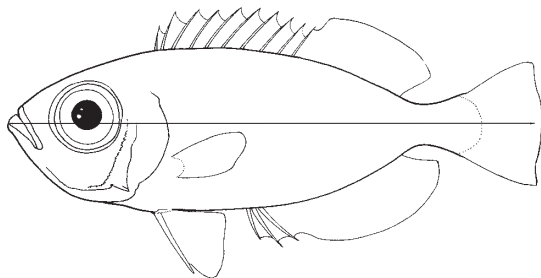


Fig. 5 *Heteropriacanthus cruentatus*

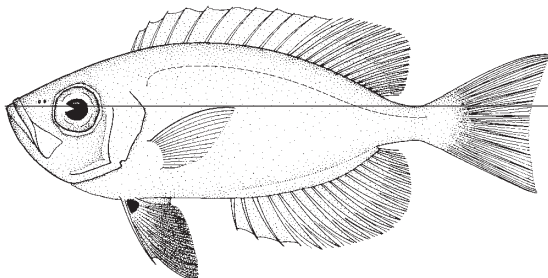




Fig. 6 *Priacanthus arenatus*


List of species occurring in the area

The symbol  is given when species accounts are included.

 *Cookeolus japonicus* (Cuvier, 1829).

 *Heteropriacanthus cruentatus* (Lacepède, 1801).

 *Priacanthus arenatus* Cuvier, 1829.

 *Pristigenys alta* (Gill, 1862).

References

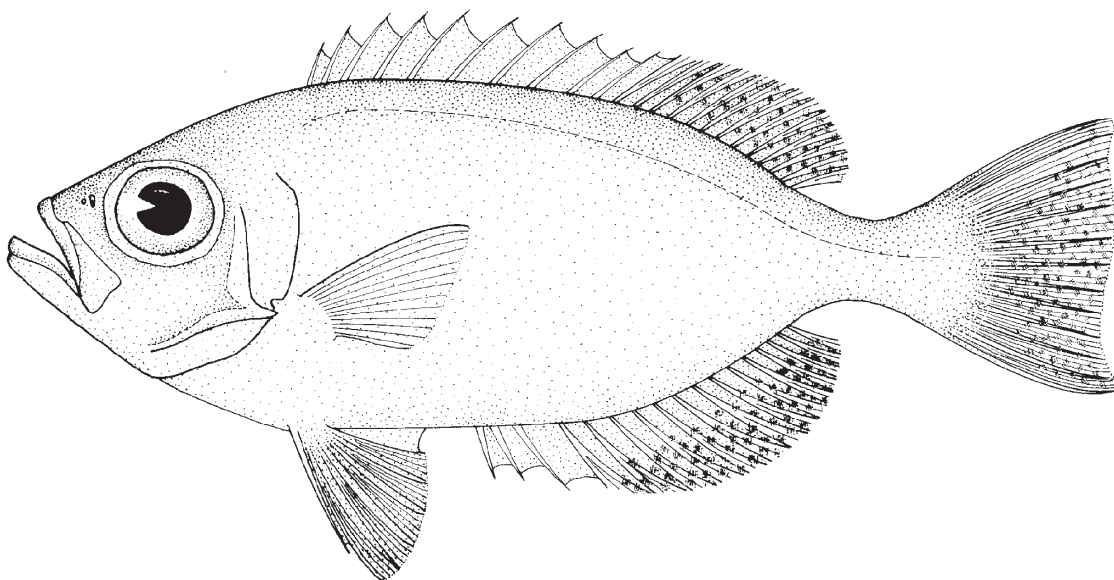
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Heteropriacanthus cruentatus (Lacepède, 1801)

HTU

Frequent synonyms / misidentifications: *Priacanthus cruentatus* (Lacepède, 1801) / None.

FAO Names: En - Glasseye (AFS: Glasseye snapper); Fr - Beauclair de roche; Sp - Catalufa de roca.



Diagnostic characters: Body deep, ovate, laterally compressed. **Anterior profile symmetrical, tip of protruding lower jaw about on level with midline of body** when mouth tightly closed. Small teeth on dentaries, vomer, palatines, and premaxillaries. Well-developed spine at angle of preopercle. Total gill rakers on first arch 21 to 25. Dorsal fin with 10 spines and 11 to 13 soft rays; anal fin with 3 spines and 13 or 14 soft rays. **Caudal fin truncate to slightly convex.** Pectoral fin with 18 or 19 rays. Scales covering most of head and body **but scales lacking on posterior portion of preopercle. Scales modified, those of midlateral area with posterior field elevated as a separate flange, broadly pointed, with spinules confined to posterior margin.** Scales in lateral series 78 to 96; 63 to 81 pored lateral-line scales; vertical scale rows (dorsal-fin origin to anus) 56 to 68. **Swimbladder with pair of posterior extensions only.** **Colour:** entire body and head pinkish red or blotched with red and silver; iris of eye red; fins reddish; membranes of spinous dorsal fin and margin of caudal fin sometimes dusky; **caudal and soft dorsal and anal fins with elliptical dark specks.**

Size: Maximum total length to about 35 cm.

Habitat, biology, and fisheries: Inhabits shallow reef areas, particularly in insular areas, where may be common in both lagoons and seaward areas, usually at depths of 20 m or less. Not common in continental shelf areas. Secretive by day and foraging at night. Feeds on octopi, shrimp, stomatopods, crabs, small fish, and polychaetes. Caught primarily on hook-and-line, spearing, and in traps. Marketed mostly fresh.

Distribution: Circumtropical and into subtropical waters. Young occasionally in temperate waters due to postlarval transport. In western Atlantic, adults uncommon along South American coast to Argentina, common in Caribbean islands, less common in North American continental waters from Central America to Florida; rare in Bermuda. Juveniles have been recorded from as far north as New Jersey.

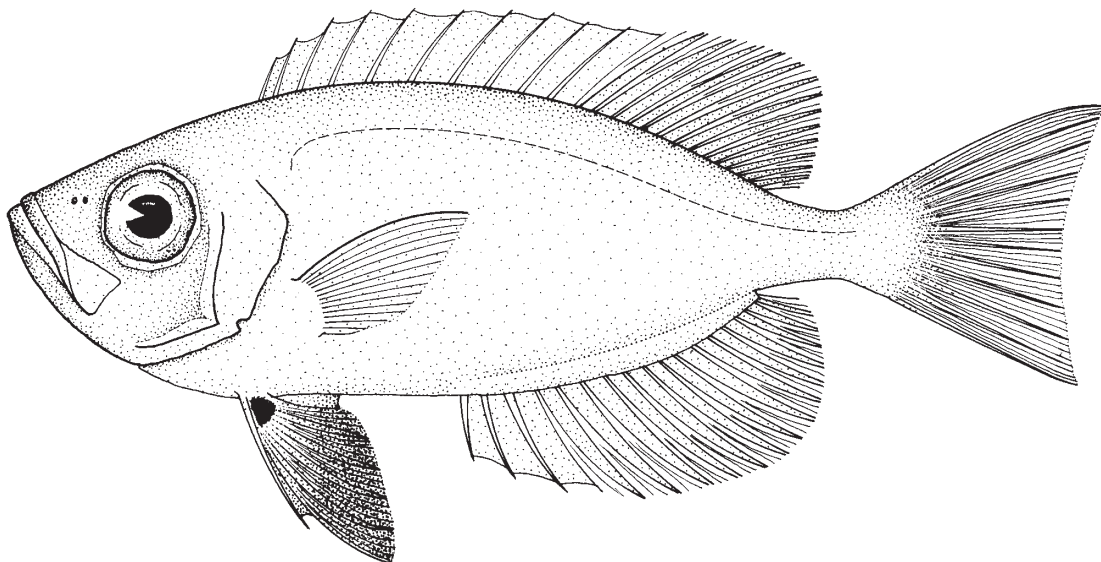


Priacanthus arenatus Cuvier, 1829

PQR

Frequent Synonyms / misidentifications: None / None.

FAO Names: **En** - Atlantic bigeye (AFS: Bigeye); **Fr** - Beauclaire soleil; **Sp** - Catalufa toro.



Diagnostic characters: Body deep, ovate, and laterally compressed. Body depth 2.5 to 3.1 in standard length. **Anterior profile of head slightly asymmetrical, the tip of protruding lower jaw usually above midline of body.** Small teeth on dentaries, vomer, palatines, and premaxillaries. **Spine at angle of preoperculum reduced or nonexistent in specimens over 125 cm total length.** Total gill rakers on first arch 28 to 32. **Dorsal-fin spines 10, soft rays 13 to 15; anal-fin spines 3, soft rays 14 to 16. Caudal fin slightly emarginate to lunate.** Pectoral-fin rays 17 to 19. Scales covering most of head and body onto base of caudal fin. **Scales modified, the posterior field elevated as a separate flange with spinules both on the surface and on posterior margin.** Scales in lateral series 83 to 91; pored lateral-line scales 71 to 84. Vertical scale rows (dorsal-fin origin to anus) 49 to 59. **Swimbladder with pair of anterior and posterior protrusions, the former associated with specialized recesses in posterior of skull.** **Colour:** red on body, head, and iris of eye; may change to silvery white with pattern of broad reddish bars on head and body; row of small dark spots sometimes evident along lateral line; fins red to light pink, with dusky pigment in dorsal-, anal-, and caudal-fin membranes; dark spot at pelvic-fin base.

Size: Maximum total length to about 45 cm.

Habitat, biology, and fisheries: Occurs near reefs and rocky areas at depths ranging from less than 20 to 250 m or more, but probably most common at 30 to 50 m. Shows some evidence of territorial behaviour. Prefers outer reef slopes to more sheltered environments. Moderately common about rock outcrops on continental shelf habitats of 30 m or more. Pelagic juveniles are abundant in West Indies area during February to April. Gravid females have been taken in September. Probably feeds on crustaceans, polychaetes, and small fishes. Occasionally taken in low numbers in trawls, by hook-and-line, and spearing. Marketed mostly fresh.

Distribution: Occurs in tropical and tropically influenced waters of both western and eastern Atlantic. In western Atlantic, occurs from Uruguay northward through Gulf of Mexico and Caribbean to North Carolina and Bermuda. Juveniles are occasionally taken northward of these areas to Nova Scotia as a result of postlarval drift but do not survive over winter.

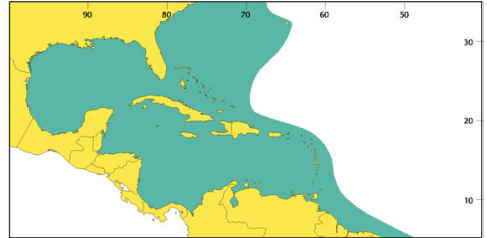
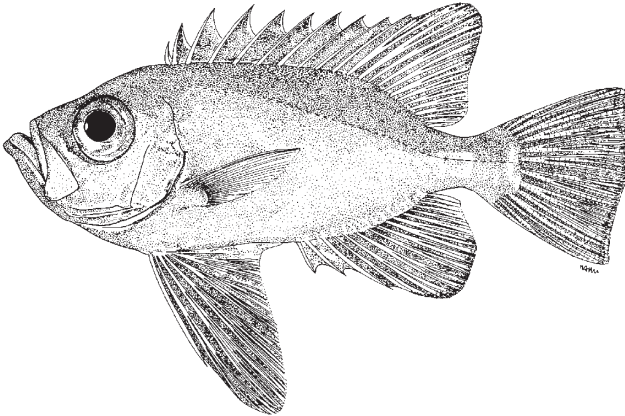


Cookeolus japonicus (Cuvier, 1829)

CJN

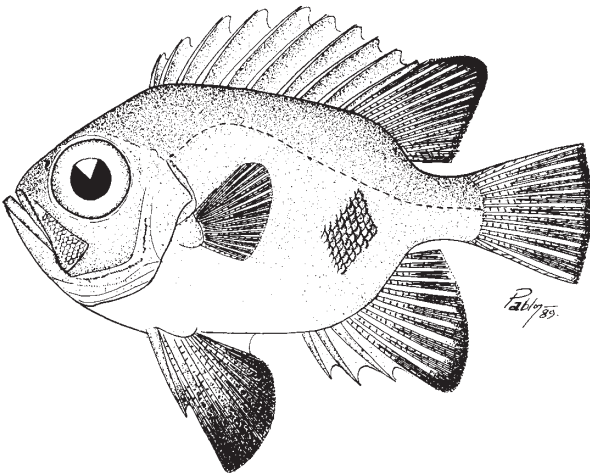
En - Longfin bulleye (AFS: Bulleye); **Fr** - Beauclaire longue aile; **Sp** - Catalufa aleta larga.

Maximum total length to about 65 cm (largest member of family). In deeper waters off rocky coasts or insular areas in association with holes and ledges at depths of 60 to 400 m. Feeds on crustaceans and small fishes. Life span is 9 or more years. Caught incidentally on deep handlines or other rigs; probably rare in markets. Circumtropical and extending into subtropical regions; young occasionally in temperate waters as result of postlarval transport. In western Atlantic from Brazil to Virginia with juveniles recorded northward to Nova Scotia.

***Pristigenys alta*** (Gill, 1862)

En - Short bigeye; **Fr** - Beauclaire du large; **Sp** - Catalana de canto.

Maximum total length to about 33 cm. Occurs mainly solitarily at depths of 5 to 125 m near rocky outcrops. Spawning may occur in shallower habitats from July to September. Occasionally taken by hook-and-line, spearing, and rarely, trawls. Known in western Atlantic from Brazil (Bahia), the Caribbean, and Gulf of Mexico to North Carolina and Bermuda with juveniles occurring northward to Maine. Not recorded from eastern Atlantic.

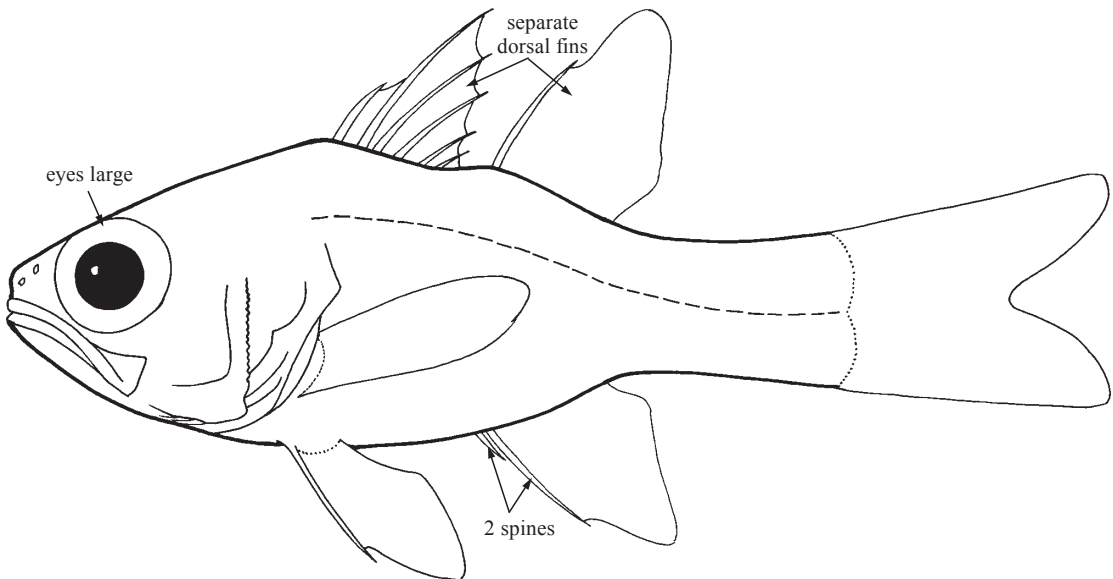


APOGONIDAE

Cardinalfishes

by O. Gon, South African Institute for Aquatic Biodiversity, South Africa

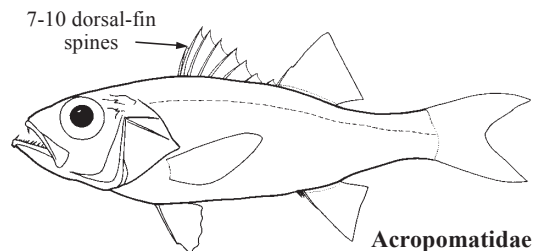
Diagnostic characters: Small fishes attaining 110 mm, but commonly 50 to 70 mm. Body short, oblong and compressed; head and **eyes large**; 2 nostrils; **mouth terminal, large and oblique**; **maxilla naked, its upper part concealed when mouth closed**; **supramaxilla absent**; jaws, vomer, and palatines with small villiform teeth (*Apogon affinis* has several caniniform teeth); 7 branchiostegal rays. **Two separate dorsal fins**; **first dorsal fin with 6 spines**; second dorsal fin with 1 spine and 9 segmented rays; **anal fin with 2 spines and 8 segmented rays** (9 in *Apogon affinis*); pectoral-fin rays 11 to 17; caudal fin emarginate to forked (rounded in *Astrapogon alutus*). Scales large, ctenoid (cycloid in *Astrapogon*); lateral line complete and extending onto caudal-fin base, with 23 to 25 tubular scales (counted to end of hypural plate). Preopercle double-edged; **posterior preopercular edge serrate, ventral edge smooth and sometimes crenulate; preopercular ridge smooth**; opercular spine poorly developed. **Colour:** translucent reddish pink to bright red, usually with dark marks (spots and/or bars) at posterior end of or below second dorsal-fin base and on caudal peduncle; sometimes a dark stripe on head (genus *Apogon*); alternatively, pale to dark brown with varying amount of small dark spots on head and/or body; large, diffuse dark spot may be present posteriorly on caudal peduncle (genus *Astrapogon* and genus *Phaeoptyx*).



Habitat, biology and fisheries: primarily coral-reef species found from shore to about 100 m depth; mostly nocturnal, feeding on small invertebrates and zooplankton; some species live commensally with molluscs and sponges; most if not all species are oral brooders with the male incubating a ball of eggs in its mouth; cardinalfishes are not commercially exploited, but some species occasionally appear in the marine aquarium trade.

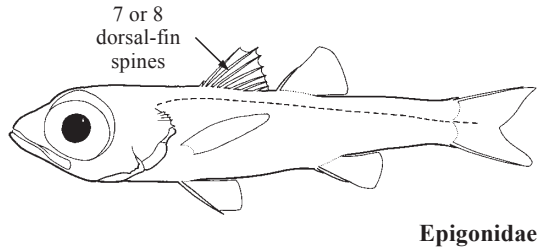
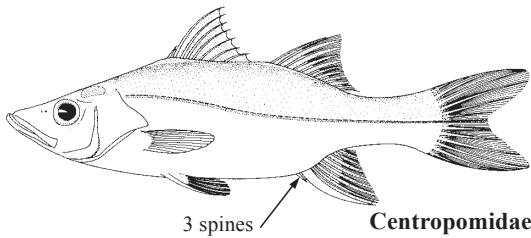
Similar families occurring in the area

Acropomatidae: first dorsal-fin spines 7 to 10; anal-fin spines 3 (2 in most *Synagrops*); lateral line not extending onto caudal fin; caniniform teeth usually present; opercle usually with 2 spines.



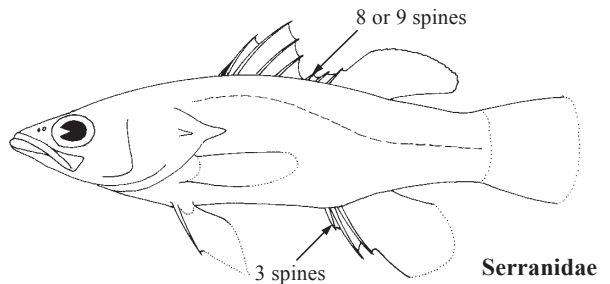
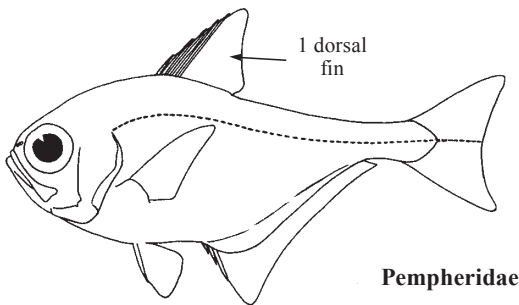
Centropomidae: lateral line extending to rear margin of caudal fin; dorsal fin deeply notched, or divided into 2 separate fins, the first with 7 or 8 spines; anal-fin spines 3.

Epigonidae: first dorsal-fin spines 7 or 8; lateral-line scales 33 to 56; maxilla narrow.



Pempheridae: a single dorsal fin consisting of graded spines and segmented rays; anal fin long, with 3 spines and 23 to 36 segmented rays; lateral-line extending to rear margin of caudal fin or close to it; maxilla exposed when mouth is closed.

Serranidae (tribe Liopropomini): dorsal spines 8 or 9 (seventh spine may be covered by scales if dorsal fin divided into 2 fins); anal-fin spines 3; opercular spines 3; scales small; maxilla scaled, completely exposed when mouth is closed, and with blunt ventral projection at lower posterior corner; supramaxilla present.



Identification note: Pectoral-fin ray counts include the uppermost rudimentary ray. A **caudal spot** is a dark spot posteriorly, and usually midlaterally, on the caudal peduncle at or near the caudal-fin base. A **developed gill raker** is a gill raker longer than the width of its base. A **ventral preopercular flap** is membraneous expansion of the angle and ventral part of the preopercle; flap sometimes extending posteriorly beyond edge of opercle.

Key to the species of Apogonidae occurring in the area

- 1a. Scales on body ctenoid (cycloid to weakly ctenoid in *Apogon affinis*); median predorsal scales present; posterior margin of preopercle serrate; pectoral-fin soft rays 11 or 12 (rarely 13) → 2
- 1b. Scales on body cycloid; median predorsal scales absent; posterior margin of preopercle smooth; pectoral-fin rays 14 to 16 (rarely 13 or 17) (*Astropogon*) → 3
- 2a. Membraneous ventral preopercular flap not extending beyond posterior preopercle edge (except *Apogon leptocaulus*); inner pelvic-fin ray mostly free from body (*Apogon*) → 5
- 2b. Membraneous ventral preopercular flap extending beyond posterior preopercle edge; inner pelvic-fin ray connected by membrane to body along most or all its length . . . (*Phaeoptyx*) → 21

- 3a.** Pectoral-fin soft rays 15 or 16 (rarely 14 or 17); pelvic fins usually black, reaching middle of anal-fin base or beyond. → **4**
- 3b.** Pectoral-fin soft rays 14 (rarely 13 or 15); pelvic fins dusky, sometimes with blackish tip, not reaching beyond anterior third of anal-fin base *Astrapogon alutus*
- 4a.** Total gill rakers on lower limb 10 or 11; upper limb with 1 developed gill raker; pectoral-fin soft rays 15 (rarely 14 or 16) *Astrapogon stellatus*
- 4b.** Total gill rakers on lower limb 12 to 14; upper limb with 2 developed gill rakers; pectoral-fin soft rays 16 (rarely 15 to 17) *Astrapogon puncticulatus*
- 5a.** Segmented anal-fin rays 8; no large caniniform teeth; teeth in both jaws villiform, in a polyserial band of varying width → **6**
- 5b.** Segmented anal-fin rays 9; both jaws with a single series of small conical teeth interspersed with several enlarged caniniform teeth *Apogon affinis*
- 6a.** Body scales and lateral-line scales of similar size; predorsal scales 3 to 8 (rarely 2); scales around caudal peduncle 8 to 20 → **7**
- 6b.** Body scales distinctly smaller than lateral-line scales; predorsal scales 10; scales around caudal peduncle 24 to 28 *Apogon evermanni*
- 7a.** Body with 2 dark markings (large spots or bars/saddles) posteriorly; 1 below or just behind second dorsal fin and another on posterior part of caudal peduncle → **8**
- 7b.** Body unmarked, with dusky stripes, or with small dark saddle followed by white spot (spot may not show in preservative) behind base of last dorsal-fin ray; dusky caudal spot sometimes present, but never together with dark saddle behind base of last dorsal-fin ray → **17**
- 8a.** Dark pupil-size spot below posterior part of second dorsal-fin base; dusky to dark spot or stripe on opercle at level of middle of eye → **9**
- 8b.** Dark bar/saddle below second dorsal-fin base or just behind it; no dark spot or stripe on opercle → **10**
- 9a.** Scales around caudal peduncle 17 to 20; dark caudal spot/saddle large, extending ventrally well below lateral line; dark stripe or spot on opercle edged in white above and below (may not show in preservative) *Apogon maculatus*
- 9b.** Scales around caudal peduncle 14 to 16; dark caudal spot about pupil-size, placed mostly above lateral line; dark spot on opercle not edged in white *Apogon pseudomaculatus*
- 10a.** Membraneous preopercular flap not extending beyond posterior edge of preopercle; scales around caudal peduncle 12 to 16; bars/saddles on body distinct (may fade in preservative) → **11**
- 10b.** Membraneous preopercular flap extending posteriorly almost to edge of opercle; scales around caudal peduncle 8; bars/saddles on body indistinct *Apogon leptocaulus*
- 11a.** At least half of dorsal margin of anterior dark bar/saddle behind second dorsal-fin base → **12**
- 11b.** All or most of dorsal margin of anterior dark bar/saddle below second dorsal-fin base → **14**

- 12a. Gill rakers on lower limb 17 (rarely 16 or 18); upper jaw teeth extending laterally on premaxilla well outside mouth (Fig. 1a); anterior dark bar/saddle not tapering ventrally; caudal-fin lobes pointed *Apogon robinsi*
- 12b. Gill rakers on lower limb 11 to 14; upper jaw teeth not extending laterally on premaxilla (Fig. 1b); caudal-fin lobes rounded. → 13

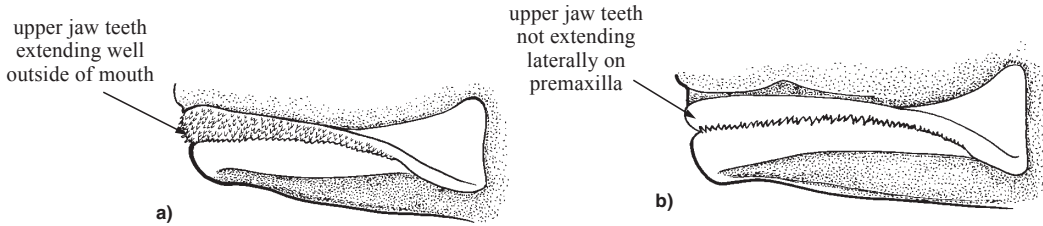


Fig. 1 lateral view of mouth

- 13a. Anterior dark bar/saddle wedge-shaped; dark bar/saddle on caudal peduncle square or slightly deeper than wide; distance between 2 bars/saddles larger than width of posterior bar/saddle *Apogon phenax*
- 13b. Anterior dark bar/saddle not wedge-shaped; dark bar/saddle on caudal peduncle very broad, rectangular; distance between 2 bars/saddles considerably narrower than width of posterior bar/saddle *Apogon pillionatus*
- 14a. Both dark bars/saddles on body square to slightly narrower than deep, or anterior bar/saddle distinctly narrower than peduncular one → 15
- 14b. Both bars/saddles on body narrow, much deeper than wide *Apogon binotatus*
- 15a. Gill rakers on lower limb 14 to 18; fins pale → 16
- 15b. Gill rakers on lower limb 11 or 12; distal part of anterior second dorsal-fin rays, of anterior anal-fin rays and of caudal-fin rays dusky to dark *Apogon gouldi*
- 16a. Scales around caudal peduncle 12; gill rakers on lower limb 17 (rarely 16 or 18); dark bar/saddle on caudal peduncle with black lateral margins. *Apogon townsendi*
- 16b. Scales around caudal peduncle 15 or 16; gill rakers on lower limb 15 (rarely 14 or 16); colour of dark bar/saddle on caudal peduncle uniform *Apogon planifrons*
- 17a. Small dark saddle behind last dorsal-fin ray followed by small median white spot; large dark area on first dorsal fin behind second spine; distal part of at least anterior second dorsal-fin and anal-fin rays dusky to dark *Apogon lachneri*
- 17b. No small dark saddle and white spot behind last dorsal-fin ray; fins pale → 18
- 18a. Gill rakers on lower limb 12 to 16; caudal spot present (sometimes absent in pale specimens of *Apogon quadrisquamatus*); no dark lines radiating from eye. → 19
- 18b. Gill rakers on lower limb 10 or 11; caudal spot absent; 2 to 4 short dark lines radiating from eye usually present *Apogon aurolineatus*
- 19a. No dusky stripes on body; bony interorbital width 8.2 to 10.4% standard length → 20
- 19b. Seven dusky stripes on body; bony interorbital width 7.2 to 8.1% standard length *Apogon robbyi*

- 20a. Gill rakers on lower limb 12 or 13 (rarely 14); caudal spot small, circular, of varying intensity and restricted to middle of caudal peduncle (rarely enlarged dorso-ventrally) *Apogon quadrisquamatus*
- 20b. Gill rakers on lower limb 15 (rarely 14 or 16); caudal spot rectangular to oval bar reaching near dorsal and ventral edges of caudal peduncle *Apogon mosavi*
- 21a. Total gill rakers 15 to 17; no dark pigment along bases of second dorsal and anal fins *Phaeoptyx pigmentaria*
- 21b. Total gill rakers 20 to 22; second dorsal and anal fins with dark basal stripes → 22
- 22a. Basal stripes of second dorsal and anal fins wide and dark (Fig. 2a); gill rakers on lower limb 15 (rarely 14 or 16). *Phaeoptyx conklini*
- 22b. Basal stripes of second dorsal and anal fins narrow and faint, more noticeable posteriorly (Fig. 2b); gill rakers on lower limb 14 (rarely 13 or 15) *Phaeoptyx xenus*

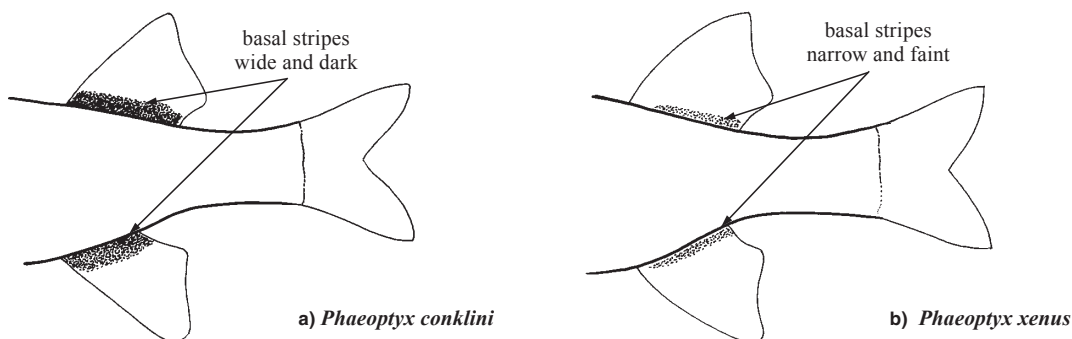


Fig. 2 lateral view of anterior body

List of species occurring in the area

- Apogon affinis* (Poey, 1875). 100 mm. Gulf of Mexico, Florida Keys, and Bahamas to Suriname; tropical E Atlantic.
- Apogon aurolineatus* (Mowbray, 1927). 65 mm. Florida (including Gulf of Mexico) and Bahamas to Venezuela.
- Apogon binotatus* (Poey, 1867). 100 mm. Bermuda, S Florida and the Bahamas to Venezuela.
- Apogon evermanni* Jordan and Snyder, 1904. 98.8 mm. Bahamas to Curaçao.
- Apogon gouldi* Smith-Vaniz, 1977. 49.4 mm SL. Bermuda.
- Apogon lachneri* Böhlke, 1959. 65 mm. S Florida and Bahamas to Belize.
- Apogon leptocaulus* Gilbert, 1972. 60 mm. SE Florida, Bahamas, Belize, and Isla de Providencia.
- Apogon maculatus* (Poey, 1860). 111 mm. Gulf of Mexico, Florida, and Bahamas to Venezuela.
- Apogon mosavi* Dale, 1977. 34 mm SL. Bahamas, Haiti, Jamaica, and Belize.
- Apogon phenax* Böhlke and Randall, 1968. 81 mm. Florida Keys, Bahamas to islands off Venezuela.
- Apogon pillionatus* Böhlke and Randall, 1968. 63 mm. Florida and Bahamas to Venezuela.
- Apogon planifrons* Longley and Hildebrand, 1940. 107 mm. Florida Keys and Bahamas to Venezuela and S Brazil.
- Apogon pseudomaculatus* Longley, 1932. 110 mm. Gulf of Mexico, Florida, Bermuda, and Bahamas to Venezuela and to S Brazil.
- Apogon quadrisquamatus* Longley, 1934. 58.2 mm SL. Florida and Bahamas to S Brazil.
- Apogon robbyi* Gilbert and Tyler, 1997. 36 mm SL. Belize, Isla de Providencia, and Jamaica.
- Apogon robinsi* Böhlke and Randall, 1968. 88.9 mm SL. Bermuda, Bahamas, and Grand Cayman.
- Apogon townsendi* (Breder, 1927). 63.5 mm. Florida and Bahamas to Belize.
- Astrapogon alutus* (Jordan and Gilbert, 1882). 65 mm. North Carolina and Florida to islands off Venezuela, excluding the Bahamas.
- Astrapogon puncticulatus* (Poey, 1867). 63 mm. Florida and Bahamas to Venezuela and Brazil (Isla de Itaparica).
- Astrapogon stellatus* (Cope, 1867). 54 mm. Bermuda, Florida, and Bahamas to Venezuela.

Phaeoptyx conklini (Silvester, 1915). 72 mm. Bermuda, Florida, and Bahamas to Venezuela.

Phaeoptyx pigmentaria (Poey, 1860). 76 mm. Florida and Bahamas to Venezuela and Brazil (Isla de Itaparica); tropical E Atlantic.

Phaeoptyx xenus (Böhlke and Randall, 1968). 63 mm. Florida and Bahamas to Venezuela.

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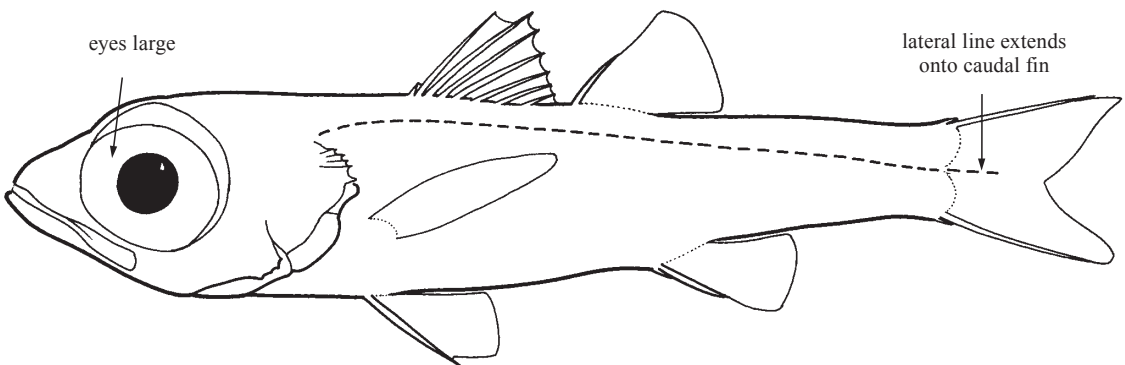
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EPIGONIDAE

Deepwater cardinalfishes

by O. Gon, South African Institute for Aquatic Biodiversity, South Africa

Diagnostic characters: Small to medium-sized fishes (to about 50 cm). Body varies from elongate and subcylindrical or compressed, to short and stocky. **Eyes large**, round to oval; margin of infraorbital bones smooth or infraorbital bones 1 to 4 serrate (*Sphyraenops*). **Mouth large, oblique; maxilla narrow, not reaching beyond level of middle of eye.** Teeth in jaws, vomer, and palatines usually small, conical, in 1 to several series (palatines of *Epigonus parini* toothless); in some species enlarged caniniform teeth protruding forward at tip of lower jaw (*E. glossodontus*) or both jaws (*Florenciella* and *Rosenblattia*). **Opercle with 1 or 3 (*Sphyraenops*) spines**, weak (rarely absent) to stout; posterior edge of opercular bones smooth, rarely poorly ossified, or serrate (*Florenciella*, *Rosenblattia*, and *Sphyraenops*). **Two separate dorsal fins, the first with 6 to 8 spines, the second with a single spine and 8 to 11 soft rays; anal fin with 1 to 3 spines and 7 to 10 soft rays;** caudal fin emarginate to forked; pectoral-fin rays 14 to 23. Branchiostegal rays usually 7 (6 in *Sphyraenops*). Scales weakly to strongly ctenoid, and deciduous to firmly attached; **lateral line complete and extending onto caudal fin**, with 33 to 56 tubular scales (counted to end of hypural plates). Vertebrae: precaudal 10 or 11 and 14 or 15 caudal. **Colour:** reddish brown to blackish.



Habitat, biology, and fisheries: Contains 5 or 6 genera with about 30 species. *Epigonus*, with 25 species, is the largest genus. Engybenitic fishes, found around the world on continental and insular slopes, seamounts, and oceanic rises, from northern cold-temperate to subantarctic waters, at depths of 75 to 3 700 m. Carnivorous, feeding on planktonic organisms, including copepods, euphausiids, shrimps, and small myctophids. Bycatch of trawl fisheries.

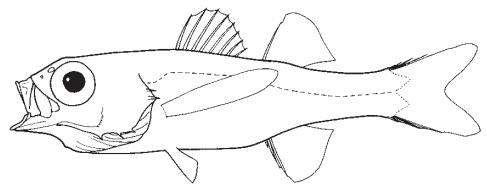
Similar families and genera occurring in the area

Acropomatidae: 2 or 3 anal-fin spines; maxilla wide; lateral line not extending onto caudal fin; canine teeth usually present; opercle usually with 2 spines.

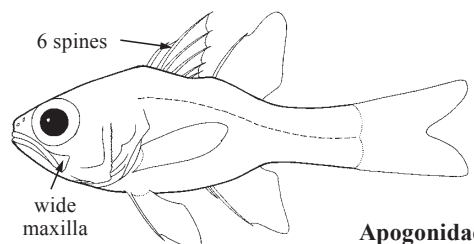
Bathysphyraenops simplex (incertae sedis; provisionally placed in the Acropomatidae): always 3 anal-fin spines; long pectoral fins, reaching beyond anal-fin origin; 6 branchiostegal rays; 5 pyloric caeca; maxilla wide; opercle with 2 spines; other opercular bones each with a small spine; angle of preopercle serrate; lateral line not extending onto caudal fin.

Howella brodiei (incertae sedis; provisionally placed in the Acropomatidae): always 3 anal-fin spines; long pectoral fins, reaching beyond anal-fin origin; maxilla wide; lateral line interrupted, not extending onto caudal fin; opercular bones armed with spines and/or serrae; scales large, ctenoid, and adherent; no caniniform teeth.

Apogonidae: first dorsal-fin spines 6; lateral-line scales 23 to 25; maxilla wide.



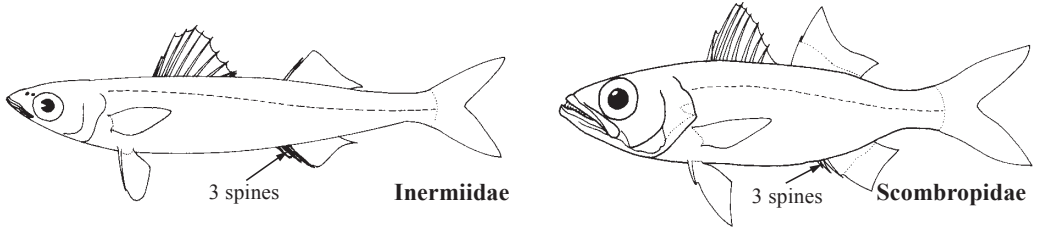
Bathysphyraenops simplex



Apogonidae

Inermiidae (genus *Emmelichthyops*): first dorsal-fin spines 10; second dorsal-fin spines 2; anal-fin spines 3, the first not visible externally; upper jaw highly protrusile; no teeth on vomer and palatines; vertebrae 12+14 or 13+13.

Scombropidae: always 3 anal-fin spines; second dorsal fin and anal fin with 11 to 14 soft rays; maxilla scaly, wide, and with large supramaxilla; jaws with large canines; scales cycloid, deciduous; lateral line not extending onto caudal fin.



Key to the species of Epigonidae occurring in the area

1a. Three strong spines on opercle (Fig. 1); anal fin with 3 spines and 7 soft rays; orbital edge of infraorbitals 1 to 4 serrate *Sphyraenops bairdianus*

1b. One bony or poorly ossified opercular spine (sometimes absent); anal fin with 1 or 2 spines and 9 or 10 (rarely 8) rays; edges of infraorbital bones smooth → 2

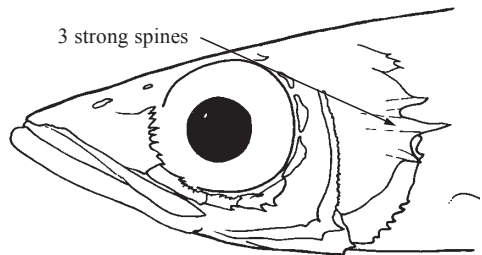


Fig. 1 opercular spines

2a. Anal fin with 1 spine and 10 segmented rays; first dorsal-fin spines 6; maxilla not reaching beyond vertical through anterior margin of eye; gill rakers on lower limb of first arch 11 *Brinkmannella elongata*

2b. Anal fin with 2 spines and 9 segmented rays; first dorsal-fin spines 7 or 8; maxilla reaching well beyond vertical through anterior margin of eye; gill rakers on lower limb of first arch 14 or more (*Epigonus*) → 3

3a. First dorsal-fin spines 8; total gill rakers on first arch 17 to 21; upper jaw teeth visible when mouth closed *Epigonus macrops*

3b. First dorsal-fin spines 7; total gill rakers on first arch 22 to 34; upper jaw teeth not visible when mouth closed → 4

4a. Opercular spine bony and strong → 5

4b. Opercular spine weak, poorly ossified or absent → 6

5a. Pectoral-fin rays 19 to 21; body depth 14.5 to 18.5% standard length; horizontal eye diameter 44.5 to 49.0% head length; pyloric caeca 8 to 13 *Epigonus occidentalis*

5b. Pectoral-fin rays 15 to 18; body depth 20.5 to 24.5% standard length; horizontal eye diameter 38.0 to 41.0% head length; pyloric caeca 5 to 8. *Epigonus pectiniter*

6a. Lateral-line scales 33 to 36; pyloric caeca 8 to 10 *Epigonus oligolepis*

6b. Lateral-line scales 46 to 51; pyloric caeca 10 to 14 → 7

- 7a.** Body depth 22.0 to 30.0% and length of caudal peduncle 22.0 to 27.0% standard length; first dorsal-fin spine long, 5.0 to 8.5% standard length *Epigonus pandionis*
- 7b.** Body depth 16.0 to 24.0% and length of caudal peduncle 26.0 to 32.0% standard length; first dorsal-fin spine short, 2.5 to 4.0% standard length *Epigonus denticulatus*

List of species occurring in the area

- Brinkmannella elongata* Parr, 1933. Single specimen, 3.2 cm SL, off Bahamas; another specimen, 104.5 mm SL, from Indian Ocean (central area 51).
- Epigonus denticulatus* Dieuzeide, 1950. Largest known 18.7 cm SL. Gulf of Mexico and Caribbean; W Mediterranean and Atlantic coast of Africa, off SE Japan, temperate S hemisphere from SW Atlantic to SW Pacific.
- Epigonus macrops* (Brauer, 1906). Largest known 21 cm SL. Gulf of Mexico, Caribbean, off Guyana, off Suriname; tropical W Indian Ocean, off SE Sumatra, off Viet Nam.
- Epigonus occidentalis* Goode and Bean, 1896. To 17.9 cm SL. Gulf of Mexico, Caribbean, off Guyana.
- Epigonus oligolepis* Mayer, 1974. Largest known 12.6 cm SL. Gulf of Mexico, SE Florida, Caribbean.
- Epigonus pandionis* (Goode and Bean), 1881. Largest 19.4 cm SL. Gulf of Mexico, Caribbean, off Guyana, off Suriname; off New Jersey, Guinea-Bissau to Namibia.
- Epigonus pectinifer* Mayer, 1974. Largest known 15.5 cm SL. Gulf of Mexico and Caribbean; off SE Japan, NW Hawaiian Ridge, Tasman Sea.
- Sphyraenops bairdianus* Poey, 1861. Largest known 9.2 cm SL. Cuba and Caribbean; off NW Australia, Ogasawara Islands, tropical S central Pacific.

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