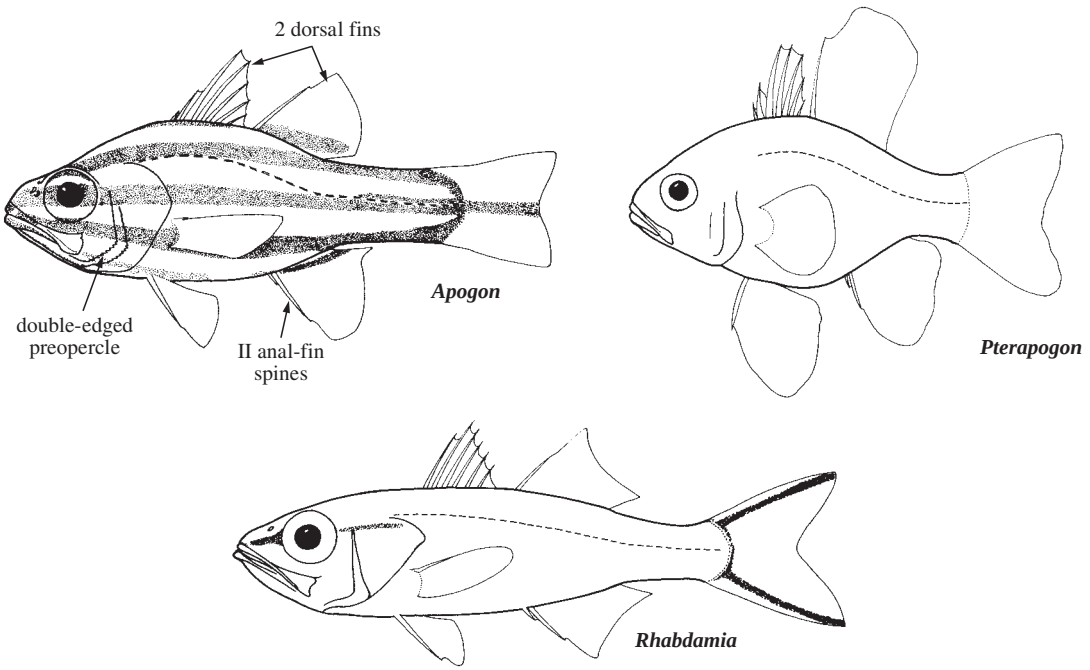
APOGONIDAE

Cardinalfishes

by G.R. Allen

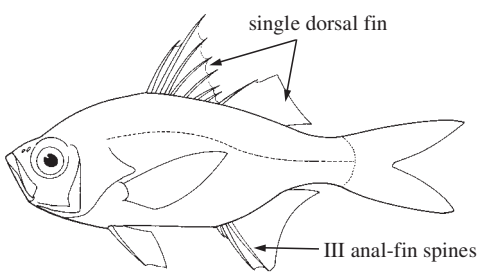
Diagnostic characters: Small (to 20 cm, usually under 12 cm) percoid fishes; body ovate to elongate, moderately compressed. Eyes large, their diameter exceeding snout length. **Rear margin of cheek (preopercle) with characteristic double edge, which is variously serrated or smooth.** Mouth large, lower jaw often protruding. Jaws with bands of small villiform teeth; teeth present on vomer, but palatine teeth may be absent; enlarged canines on premaxillae, dentaries, or vomer in some species. **Two separate dorsal fins, the first consisting of VI to VIII rigid spines, the second with I rigid spine and 8 to 14 soft rays**. Anal fin with II rigid spines and 8 to 18 soft rays. Caudal fin rounded to forked, frequently emarginate or truncate. Pelvic fins with I spine and 5 soft rays. Pectoral fins with 10 to 20 rays. Branchiostegal rays 7. Scales relatively large in marine species, except absent in *Gymnapogon*; scales usually ctenoid, but cycloid in a few species, about 9 to 37 lateral-line scales in most marine species, but absent in at least 1 species of *Siphamia*. **Colour:** highly variable, frequently shades of black, brown, red, or yellow; many species exhibit a pattern of dark bars or stripes on a lighter ground colour.



Habitat, biology, and fisheries: Inhabit coral and rocky reefs and adjacent habitats including sand-rubble patches and seagrass beds; several species frequently shelter among the spines of sea urchins (usually *Diadema*) or Crown-of-thorns starfish (*Acanthaster*). The genus *Glossamia* of Australia and New Guinea is restricted to fresh waters. Cardinalfishes are among the few marine fishes which exhibit oral egg brooding (by males). Generally not important economically, but a few species are seen in the aquarium trade and species of *Rhabdamia* are occasionally used as tuna bait.

Similar families occurring in the area

Ambassidae (= Chandidae): differ from Apogonidae in having a single (although deeply notched) dorsal fin and III anal-fin spines.



Ambassidae

Key to the genera of marine Apogonidae occurring in the area

1a. Jaws without enlarged canine teeth . . . . . → ***2***

1b. Jaws with enlarged canine teeth (Fig. 1) . . . . . → ***13***

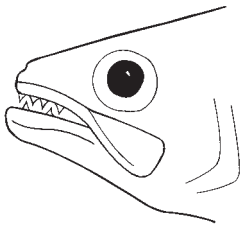


Fig. 1

2a. First dorsal fin with VIII spines (Fig. 2) . . . . . ***Neamia***

2b. First dorsal fin with VI or VII spines . . . . . → ***3***

3a. Lower side of body with silvery, bioluminescent band (Fig. 3) . . . . . ***Siphamia***

3b. Lower side of body without silvery, bioluminescent band . . . . . → ***4***

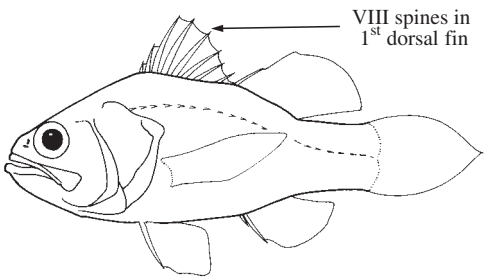


Fig. 2 ***Neamia***

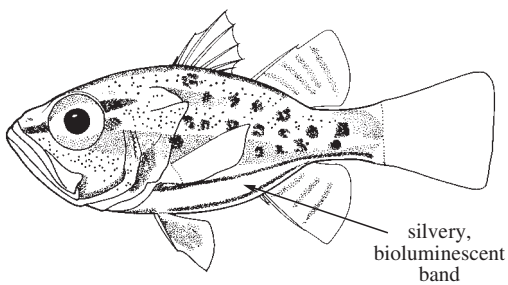


Fig. 3 ***Siphamia***

4a. Body scales entirely cycloid and deciduous; fragile, elongate fishes; semitransparent in life . . . . . → ***5***

4b. Body scales ctenoid; ovate to elongate fishes; not usually semitransparent, except for a few species . . . . . → ***7***

5a. Soft dorsal-fin rays 12 or 13 (Fig. 4) . . . ***Lachneratus***

5b. Soft dorsal-fin rays 9 . . . . . → ***6***

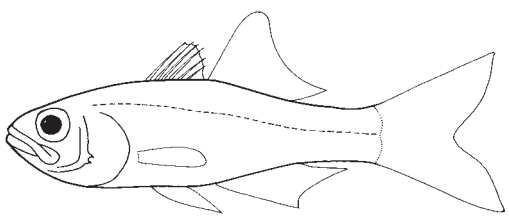


Fig. 4 ***Lachneratus***

6a. Rear edge of preopercle with 1 to 3 small spines near angle (Fig. 5) . . . . . ***Cercamia***

6b. Rear edge of preopercle smooth (Fig. 6) . . . . . ***Rhabdamia***

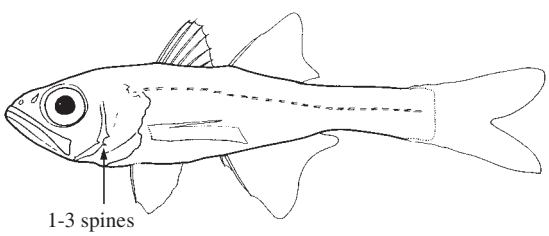


Fig. 5 ***Cercamia***

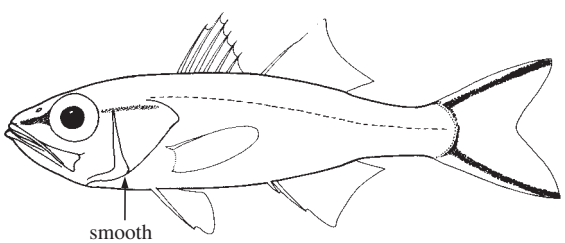


Fig. 6 ***Rhabdamia***

7a. Anal-fin rays 13 to 15 . . . . . → ***8***

7b. Anal-fin rays 8 to 10 . . . . . → ***9***

8a. Soft dorsal-fin rays 14 (Fig. 7) . . . . . ***Pterapogon***
8b. Soft dorsal-fin rays 9 (Fig. 8) . . . . . ***Archamia***

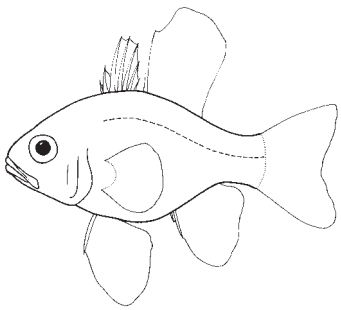


Fig. 7 ***Pterapogon***

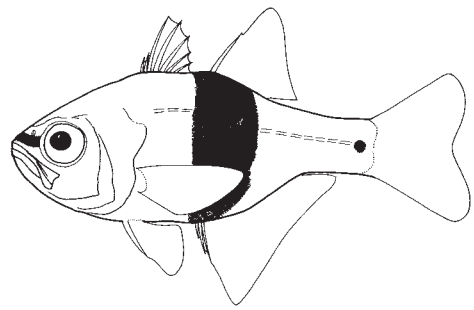


Fig. 8 ***Archamia***

9a. Secondary rays on uppermost and lowermost edge of caudal fin spiny (Fig. 9) . . . ***Sphaeramia***
9b. Secondary rays on uppermost and lowermost edge of caudal fin soft . . . . . → ***10***

10a. Rear edge of preopercle or ridge immediately in front of it, or both edge and ridge serrated (sometimes weakly) (Fig. 10) . . . . ***Apogon***
10b. Rear edge of preopercle and ridge immediately in front of it smooth . . . . . → ***11***

11a. Lateral line complete, extending from upper edge of operculum to base of caudal fin (Fig. 11) . . . . . ***Apogonichthys***
11b. Lateral line incomplete, ending well before base of caudal fin (Figs 12 and 13) . . . . . → ***12***

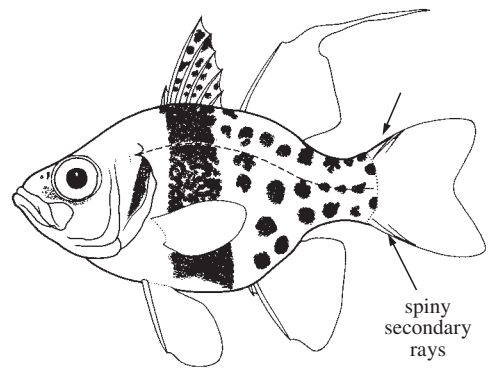


Fig. 9 ***Sphaeramia***

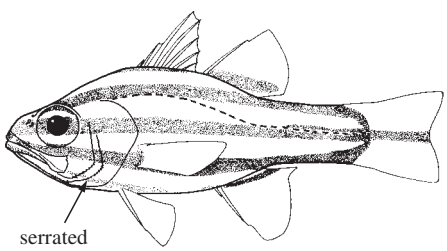


Fig. 10 ***Apogon***

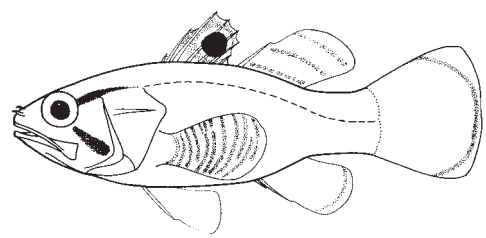


Fig. 11 ***Apogonichthys***

12a. Palatine teeth present (Fig. 12) . . . . . ***Foa***
12b. Palatine teeth absent (Fig. 13) . . . . . ***Fowleria***

Fig. 12 ***Foa***

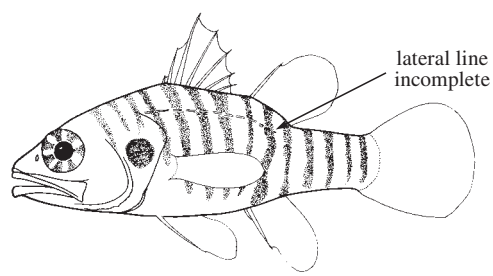


Fig. 13 ***Fowleria***

13a. Scales absent; a distinct spine at angle of preopercle (Fig. 14) . . . . . ***Gymnapogon***
13b. Scales present . . . . . → ***14***

14a. Body covered with strong ctenoid scales; colour pattern usually consisting of conspicuous dark stripes on a light ground (Fig. 15) . . . . . ***Cheilodipterus***
14b. Body covered with deciduous cycloid scales; colour pattern usually lacking conspicuous dark stripes, although series of thin dark lines may be present . . . . . → ***15***

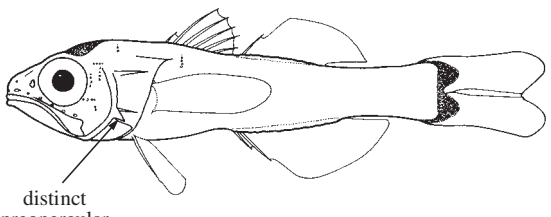


Fig. 14 ***Gymnapogon***

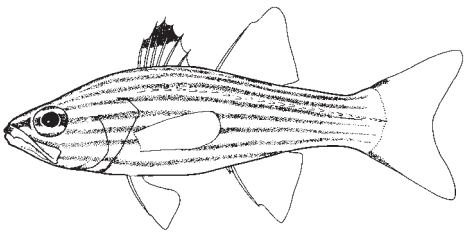


Fig. 15 ***Cheilodipterus***

15a. Rear corner of upper jaw with tiny, downward projecting spine; front nostril lacking skin flap on posterior margin (Fig. 16) . . . . . ***Pseudamiops***
15b. Rear corner of upper jaw without downward projecting spine; front nostril with skin flap on posterior margin (Fig. 17) . . . . . ***Pseudamia***

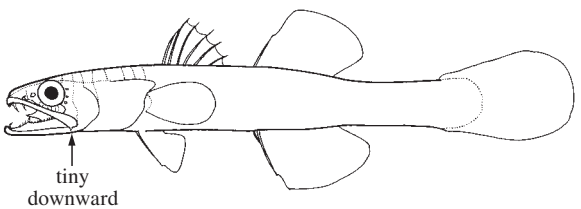


Fig. 16 ***Pseudamiops***

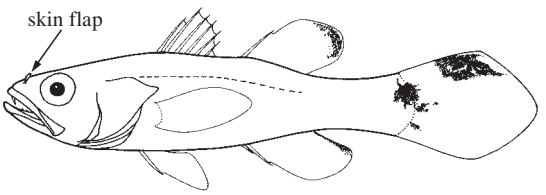


Fig. 17 ***Pseudamia***

List of marine species occurring in the area

The symbol ◄ is given when species accounts are included.

Apogon abogramma Fraser and Lachner, 1985
Apogon albimaculosus Kailola, 1976
Apogon albomarginatus Smith and Radcliffe, 1912
Apogon amboinensis Bleeker, 1853
Apogon angustatus Smith and Radcliffe, 1912
Apogon apogonides (Bleeker, 1856)
Apogon atrogaster (Smith and Radcliffe, 1911)
Apogon aureus (Lacepède, 1803)
Apogon bandanensis Bleeker, 1854
Apogon brevicaudata Weber, 1909
Apogon capricornis Allen and Randall, 1993
Apogon caudicinctus Randall and Smith, 1988
Apogon carinatus Cuvier, 1828
Apogon cavitiensis (Jordan and Seale, 1907)
Apogon ceramensis Bleeker, 1852
Apogon cheni Hayashi, 1990
Apogon chrysopomus Bleeker, 1854
Apogon chrysotaenia Bleeker, 1851
Apogon coccineus Rüppell, 1835
Apogon compressus (Smith and Radcliffe, 1911)
Apogon cookii Macleay, 1881
Apogon crassiceps Garman, 1903
◄ *Apogon cyanosoma* Bleeker, 1853

Apogon dispar Fraser and Randall, 1976
Apogon diversa (Smith and Radcliffe, 1912)
Apogon doederleini Jordan and Snyder, 1901
Apogon doryssa (Jordan and Seale, 1906)
Apogon ellioti Day, 1875
Apogon endekataenia Bleeker, 1852
Apogon evermanni Jordan and Snyder, 1904)
Apogon exostigma (Jordan and Starks, 1906)
Apogon flavus Allen and Randall, 1993
Apogon fleurieu (Lacepède, 1802)
Apogon fraenatus Valenciennes, 1832
Apogon fragilis Smith, 1961
Apogon franssedai Allen, Kuiter, and Randall, 1995
Apogon fuscomaculatus Allen and Morrison, 1996
Apogon fuscus Quoy and Gaimard, 1825
Apogon gilberti Jordan and Seale, 1905
Apogon griffini (Seale, 1910)
Apogon guamensis Valenciennes, 1832
Apogon hartzfeldii Bleeker, 1852
Apogon hyalosoma Bleeker, 1852
Apogon kallopterus Bleeker, 1856
Apogon kiensis Jordan and Snyder, 1901
Apogon komodoensis Allen, 1998
Apogon lateralis Valenciennes, 1832
Apogon leptacanthus Bleeker, 1856
Apogon luteus Randall and Kulbicki, 1998
Apogon margaritophorus Bleeker, 1854
Apogon melanoproctus Fraser and Randall, 1976
Apogon melanopus Weber, 1911
Apogon melas Bleeker, 1848
Apogon moluccensis Valenciennes, 1832
Apogon multilineatus (Bleeker, 1865)
Apogon multitaeniatus Cuvier, 1828
Apogon nanus Allen, Kuiter, and Randall, 1994
Apogon neotes Allen, Kuiter, and Randall, 1994
Apogon niger Doderlein, 1884
Apogon nigripinis Cuvier, 1828
Apogon nigrocinctus (Smith and Radcliffe, 1911)
Apogon nigrofasciatus Lachner, 1953
Apogon notatus (Houttuyn, 1782)
Apogon novemfasciatus Cuvier, 1828
Apogon ocellicaudus Allen, Kuiter, and Randall, 1994
Apogon pallidofasciatus Allen, 1987
Apogon parvulus Smith and Radcliffe, 1912
Apogon perlitus Fraser and Lachner, 1985
Apogon poecilopterus Kuhl and van Hasselt, 1828
Apogon quadrifasciatus Cuvier, 1828
Apogon rhodopterus Bleeker, 1852
Apogon rubrimacula Randall and Kulbicki, 1998
Apogon ruepelli Günther, 1859
Apogon sangiensis Bleeker, 1857
Apogon sealei (Fowler, 1918)
Apogon selas Randall and Hayashi, 1990
Apogon semilineatus Schlegel, 1846
Apogon semiornatus Peters, 1876
Apogon septemstriatus Günther, 1880
Apogon striatus (Smith and Radcliffe, 1912)
Apogon taeniophorus Regan, 1908
Apogon taeniopterus Bennett, 1835

Apogon timorensis Bleeker, 1854
Apogon trimaculatus Cuvier, 1828
Apogon unicolor Doderlein, 1884
Apogon unitaeniatus Allen, 1995
Apogon ventrifasciatus Allen, Kuiter, and Randall, 1994

Apogonichthys ocellatus (Weber, 1913)
Apogonichthys perdix Bleeker, 1854

Archamia biguttata Lachner, 1951
Archamia buruensis (Bleeker, 1856)
Archamia dispilus Lachner, 1951
Archamia fucata (Cantor, 1850)
Archamia leai Waite, 1916
Archamia macroptera (Cuvier, 1828)
Archamia melasma Lachner and Taylor, 1960
Archamia zosterophora (Bleeker, 1856)

Cercamia cladara Randall and Smith, 1988
Cercamia eremia Allen, 1987

Cheilodipterus alleni Gon, 1993
Cheilodipterus artus Smith, 1961
Cheilodipterus intermedius Gon, 1993
Cheilodipterus isostigmus (Schultz, 1940)
Cheilodipterus macrodon (Lacepède, 1801)
Cheilodipterus nigrotaeniatus Smith and Radcliffe, 1912
Cheilodipterus parazonatus Gon, 1993
Cheilodipterus quinquelineatus Cuvier, 1828
Cheilodipterus singapurensis Bleeker, 1859
Cheilodipterus zonatus Smith and Radcliffe, 1912

Foa brachygramma (Jenkins, 1902)
Foa fo (Jordan and Seale, 1906)

Fowleria abocellata Goren and Karplus, 1980
Fowleria aurita (Valenciennes, 1831)
Fowleria flammea Allen, 1993
Fowleria marmorata (Alleyne and Macleay, 1877)
Fowleria punctulata (Rüppell, 1838)
Fowleria variegata (Valenciennes, 1832)

Gymnapogon annona (Whitley, 1936)
Gymnapogon philippinus (Herre, 1939)
Gymnapogon urospilotus Lachner, 1953
Gymnapogon vanderbilti (Fowler, 1938)

Lachneratus phasmaticus Fraser and Struhsaker, 1991

Neamia octospina Smith and Radcliffe, 1912

Pseudamia amblyuropterus (Bleeker, 1856)
Pseudamia gelatinosa Smith, 1955
Pseudamia hayashii Randall, Lachner, and Fraser, 1985
Pseudamia niger Allen, 1992
Pseudamia rubra Randall and Ida, 1993
Pseudamia zonata Randall, Lachner, and Fraser, 1985

Pseudamiops gracilicauda (Lachner, 1953)

Pterapogon kauderni (Koumans, 1933)
Pterapogon mirifica (Mees, 1966)

Rhabdamia cypselura Weber, 1909
Rhabdamia gracilis (Bleeker, 1856)
Rhabdamia spilota Allen and Kuiter, 1994

Siphamia argentea Lachner, 1953
Siphamia argyrogaster (Weber, 1909)
Siphamia corallicola Allen, 1993
Siphamia cuniceps Whitley, 1941
Siphamia cuprea Lachner, 1909
Siphamia elongata Lachner, 1953
Siphamia fistulosa (Weber, 1909)
Siphamia fuscolineata Lachner, 1953
Siphamia guttulatus (Alleyne and Macleay, 1877)
Siphamia jebbi Allen, 1993
Siphamia majimae Matsubara and Iwai, 1958
Siphamia ovalis Lachner, 1953
Siphamia roseigaster (Ramsay and Ogilby, 1886)
Siphamia tubifer (Weber, 1909)
Siphamia tubulata (Weber, 1909)
Siphamia versicolor (Smith and Radcliffe, 1911)
Siphamia woodi (McCulloch, 1921)

Sphaeramia nematoptera (Bleeker, 1856)
Sphaeramia orbicularis (Kuhl and van Hasselt, 1828)

References

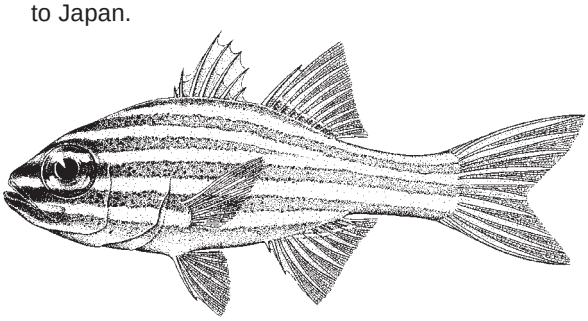
Allen, G.R. 1993. Cardinalfishes (Apogonidae) of Madang Province, Papua New Guinea, with descriptions of three new species. *Revue fr. Aquariol.*, 20(1):9-20.

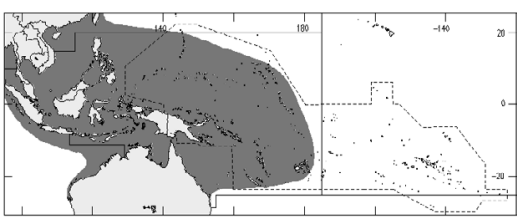
Fowler, H.W. and B.A. Bean. 1930. Contributions to the biology of the Philippine Archipelago and adjacent regions. The fishes of the families Amiidae, Chandidae, Duleidae, and Serranidae, obtained by the United States Bureau of Fisheries steamer "Albatross" in 1907 to 1910, chiefly in the Philippine Islands and adjacent seas. *US Nat. Mus. Bull.*, 100(10):1-388.

Apogon cyanosoma Bleeker, 1853

En - Yellowstriped cardinalfish.

Maximum total length about 6 cm. Coral reefs of lagoons and seaward slopes, usually in clear water at depths to about 20 m. Usually in small to large aggregations that shelter among or near live coral during the day; feeds on small shrimps and crabs. Brooding males incubate up to 1 500 to 2 100 eggs at one time. Sometimes seen in the aquarium trade; captured with hand nets or surround nets. Widespread in the Indo-Pacific from the Red Sea to Australia and the Marshall Islands, northward to Japan.

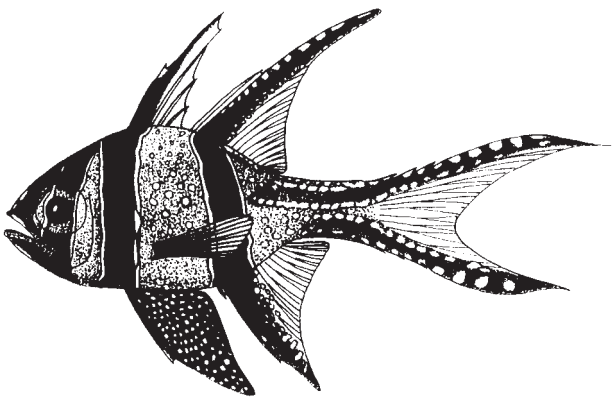


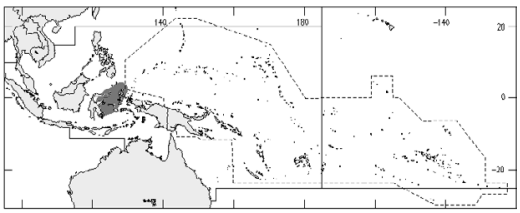


Pterapogon kauderni (Koumans, 1933)

En - Banggai cardinalfish.

Maximum total length about 8 cm. Sheltered inshore sandy areas with seagrass at depths to 16 m. Usually in small to large aggregations. The young shelter among the spines of *Diadema* sea urchins or in sea anemones; feeds on small shrimps and crabs, also zooplankton. Brooding males incubate up to 10 to 15 eggs at one time; lacks a pelagic larval stage and is the only marine fish that orally broods young. A very popular, but high priced, aquarium fish due to its beauty and unusual biology. Has been bred in captivity. Known only from the Banggai Islands off central-eastern Sulawesi.

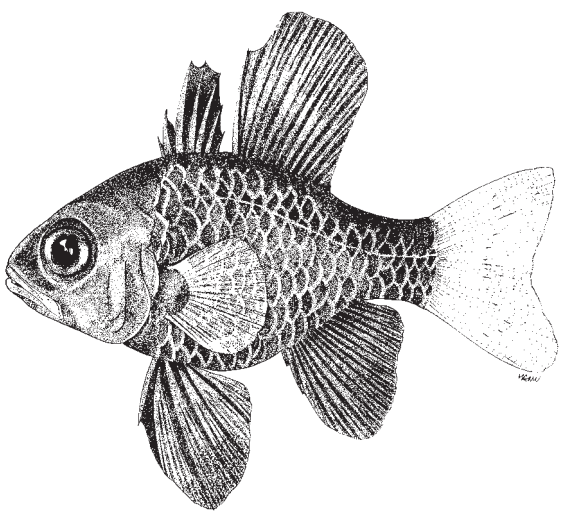


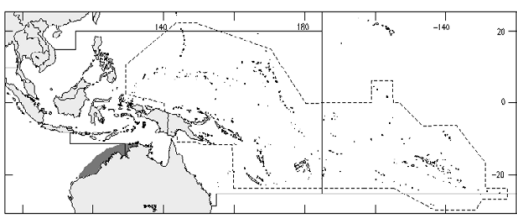


Pterapogon mirifica (Mees, 1966)

En - Sailfin cardinalfish.

Maximum total length about 13 cm. Coral reefs of lagoons and sheltered inshore areas at depths to about 15 m. Occurs solitarily or in pairs; shelters among live coral or reef crevices during the day; feeds on small shrimps and crabs. Sometimes seen in the aquarium trade; captured with hand nets or surround nets. Known only from northwestern Australia.

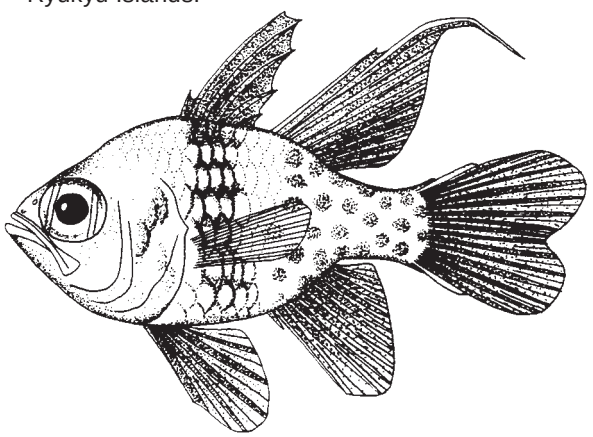


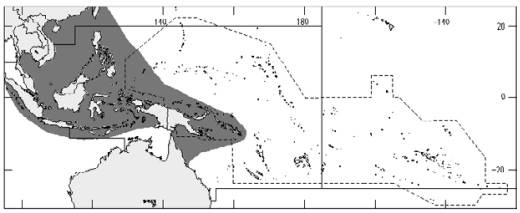


Sphaeramia nematoptera (Bleeker, 1856)

En - Pajama cardinalfish.

Maximum total length about 8 cm. Coral reefs of lagoons and sheltered inshore areas at depths to about 12 m. Usually in small aggregations that shelter among live coral during the day; feeds on small benthic shrimps and crabs, also zooplankton. A popular aquarium fish; captured with hand nets or surround nets. Western Indonesia to the northern Great Barrier Reef and northward to the Ryukyu Islands.

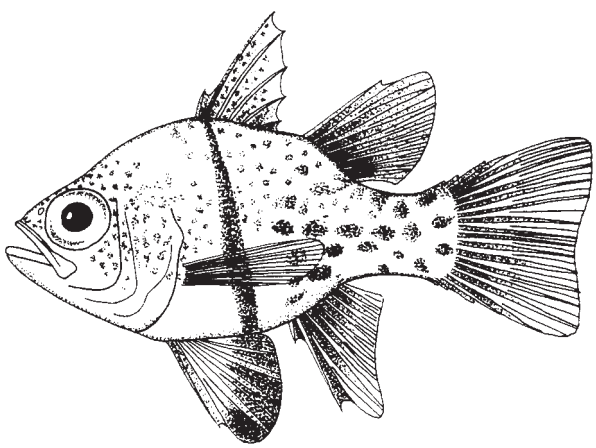


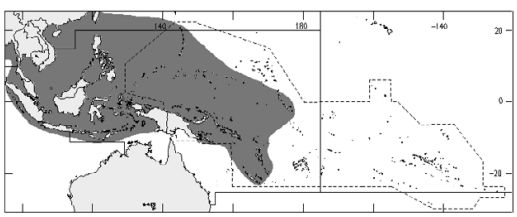


Sphaeramia orbicularis (Kuhl and van Hasselt, 1828)

En - Coral cardinalfish.

Maximum total length about 10 cm. Sheltered inshore areas including mangroves, rock formations, piers, and debris to depths of about 2 or 3 m. Usually in small to large aggregations that shelter in the shade during the day; feeds mainly on crabs, floating insects, and copepods. Brooding males incubate up to 11 000 eggs at one time. Sometimes seen in the aquarium trade; captured with hand nets or surround nets. Widespread in the Indo-Pacific from East Africa to New Caledonia and Kiribati, northward to the Ryukyu Islands.



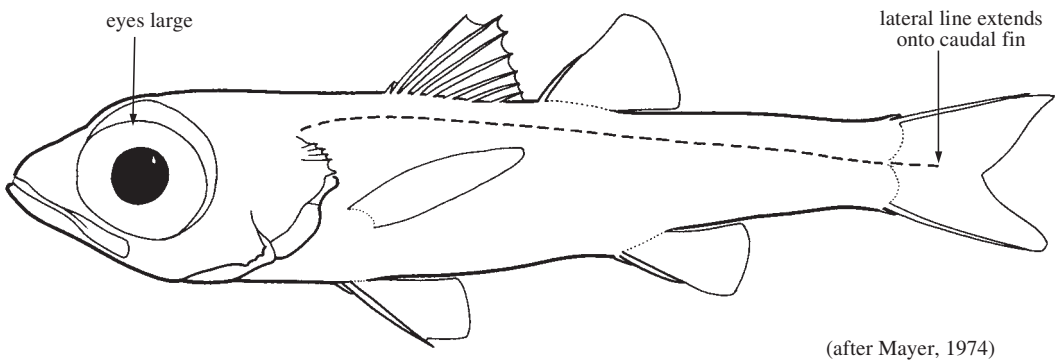


EPIGONIDAE

Deepwater cardinalfishes

by O. Gon

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 in *Sphyraenops*). **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*). **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*). **Two separate dorsal fins, the first with VI to VIII spines, the second with a single spine and 8 to 11 soft rays; anal fin with I to III spines and 7 to 10 soft rays;** caudal fin emarginate to forked; pectoral-fin rays 14 to 23. Branchiostegal rays 7 (or 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 10-11+14-15=25. **Colour:** reddish brown to blackish.



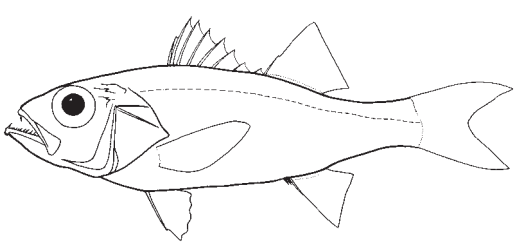
(after Mayer, 1974)

Habitat, biology, and fisheries: Contains 5 or 6 genera with about 30 species. *Epigonus*, with 25 species, is the largest genus. Engybenthic, 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.

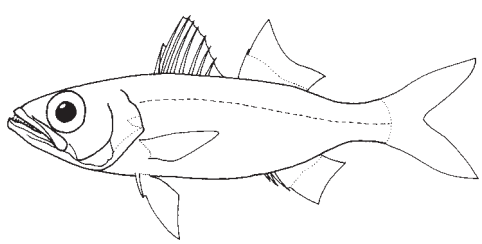
Similar families and genera in the area

Acropomatidae: II or III (never I) anal-fin spines; maxilla wide; lateral line not extending onto caudal fin; canine teeth usually present; opercle usually with 2 spines.

Scombropidae: always III 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.



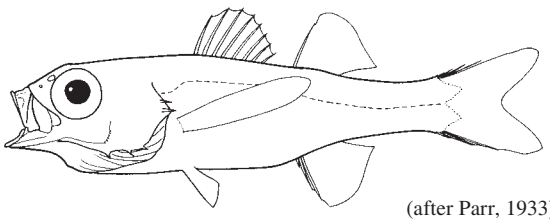
Acropomatidae



Scombropidae

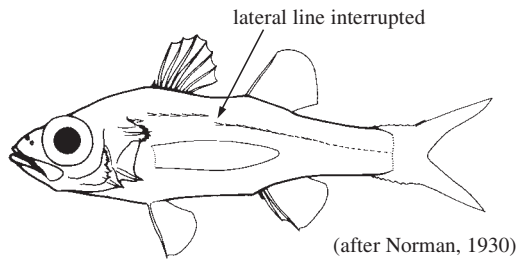
Bathysphyraenops simplex (incertae sedis; provisionally placed in the Acropomatidae): always III anal-fin spines; long pectoral fins, reaching beyond anal-fin origin; 6 branchiostegal rays; 5 pyloric caeca; maxilla wide; opercle with 2 spines; other opercular bones each with a small spine; angle of preopercle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

Howella brodiei (incertae sedis; provisionally placed in the Acropomatidae): always III 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.



(after Parr, 1933)

Bathysphyraenops



(after Norman, 1930)

Howella

Key to the species of Epigonidae occurring in the area

1a. Three strong spines on opercle (Fig. 1); anal fin with III spines and 7 soft rays; orbital edge of infraorbitals 1 to 4 serrate (Fig. 1); branchiostegal rays 6 . . . . . ***Sphyraenops bairdianus***

1b. A single opercular spine, weak to strong; anal fin with II spines and 9 (rarely 8 or 10) soft rays; orbital edge of infraorbitals 1 to 4 smooth; branchiostegal rays 7 . . . . . **(*Epigonus*)** → ***2***

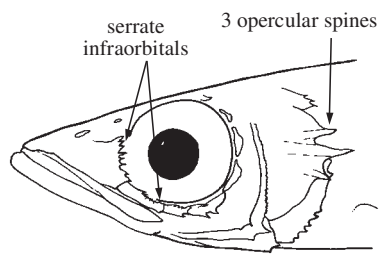


Fig. 1 ***Sphyraenops bairdianus***

(adapted from Suda and Tominaga, 1983)

2a. Opercular spine strong; first dorsal fin with VII spines; total gill rakers on first gill arch 21 to 23; pyloric caeca 9 to 11; greatest body depth 15 to 18.5% standard length; no intestinal light organ . . . . . ***Epigonus atherinoides***

2b. Opercular spine weak; first dorsal fin with VIII spines; total gill rakers on first gill arch 17 to 21; pyloric caeca 7 or 8; greatest body depth 21 to 25.5% standard length; intestinal light organ present . . . . . ***Epigonus macrops***

List of species occurring in the area

The symbol is given when species accounts are included.

Epigonus atherinoides (Gilbert, 1905)
Epigonus macrops (Brauer, 1906)

Sphyraenops bairdianus Poey, 1860

References

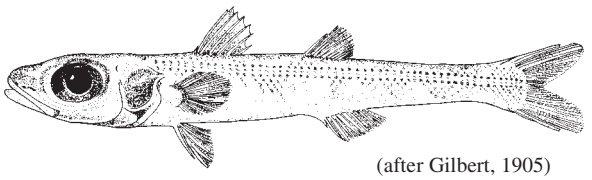
Abramov, A.A. 1992. Species composition and distribution of *Epigonus* (Epigonidae) in the world ocean. *J. Ichthyol.*, 32(5):94-108.

Mayer, G.F. 1974. A revision of the cardinal fish genus *Epigonus* (Perciformes, Apogonidae), with descriptions of two new species. *Bull. Mus. Comp. Zool.*, 146(3):147-203.

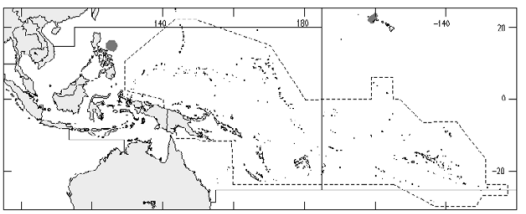
Epigonus atherinoides (Gilbert, 1905)

En - Slender deepwater cardinalfish.

Maximum standard length at least 16 cm. Depth range 410 to 630 m. Occurs near the Philippines (east of Luzon); also known from Hawaii.



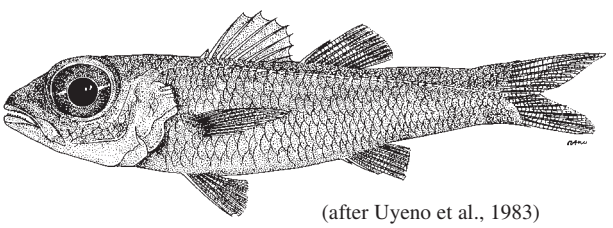
(after Gilbert, 1905)



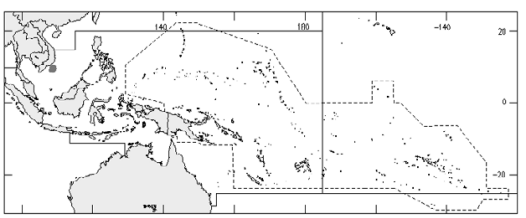
Epigonus macrops (Brauer, 1906)

En - Luminous deepwater cardinalfish.

Maximum standard length at least 21 cm. Depth range 550 to 1 300 m, usually from 640 to 920 m; juveniles pelagic and found at 120 to 550 m. In the area, found off southern Viet Nam.



(after Uyeno et al., 1983)



Sphyraenops bairdianus Poey, 1860

En - Triplespine deepwater cardinalfish.

Maximum standard length at least 9.2 cm standard length. Caught at the surface (juveniles) and between 380 and 1 600 m. Juveniles probably pelagic. Records from the northernmost part of the area, the continental slope of northwestern Australia, and off Vanuatu, Tahiti, and French Polynesia.