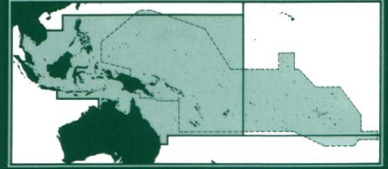




THE LIVING MARINE RESOURCES OF THE
**WESTERN CENTRAL
 PACIFIC**



Volume 4 Bony fishes part 2 (Mugilidae to Carangidae)



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FAO SPECIES IDENTIFICATION GUIDE FOR FISHERY PURPOSES

THE LIVING MARINE RESOURCES OF THE
WESTERN CENTRAL PACIFIC

VOLUME 4

Bony fishes part 2 (Mugilidae to Carangidae)

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with the support of the

South Pacific Forum Fisheries Agency (FFA)

and the

Norwegian Agency for International Development (NORAD)

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M-40
ISBN 92-5-104301-9

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Carpenter, K.E.; Niem, V.H. (eds)

FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 4. Bony fishes part 2 (Mugilidae to Carangidae).

Rome, FAO. 1999. pp. 2069-2790.

SUMMARY

This multivolume field guide covers the species of interest to fisheries of the major marine resource groups exploited in the Western Central Pacific. The area of coverage includes FAO Fishing Area 71 and the southwestern portion of Fishing Area 77 corresponding to the South Pacific Commission mandate area. The marine resource groups included are seaweeds, corals, bivalves, gastropods, cephalopods, stomatopods, shrimps, lobsters, crabs, holothurians, sharks, batoid fishes, chimaeras, bony fishes, estuarine crocodiles, sea turtles, sea snakes, and marine mammals. The introductory chapter outlines the environmental, ecological, and biogeographical factors influencing the marine biota, and the basic components of the fisheries in the Western Central Pacific. Within the field guide, the sections on the resource groups are arranged phylogenetically according to higher taxonomic levels such as class, order, and family. Each resource group is introduced by general remarks on the group, an illustrated section on technical terms and measurements, and a key or guide to orders or families. Each family generally has an account summarizing family diagnostic characters, biological and fisheries information, notes on similar families occurring in the area, a key to species, a checklist of species, and a short list of relevant literature. Families that are less important to fisheries include an abbreviated family account and no detailed species information. Species in the important families are treated in detail (arranged alphabetically by genus and species) and include the species name, frequent synonyms and names of similar species, an illustration, FAO common name(s), diagnostic characters, biology and fisheries information, notes on geographical distribution, and a distribution map. For less important species, abbreviated accounts are used. Generally, this includes the species name, FAO common name(s), an illustration, a distribution map, and notes on biology, fisheries, and distribution. Each volume concludes with its own index of scientific and common names.

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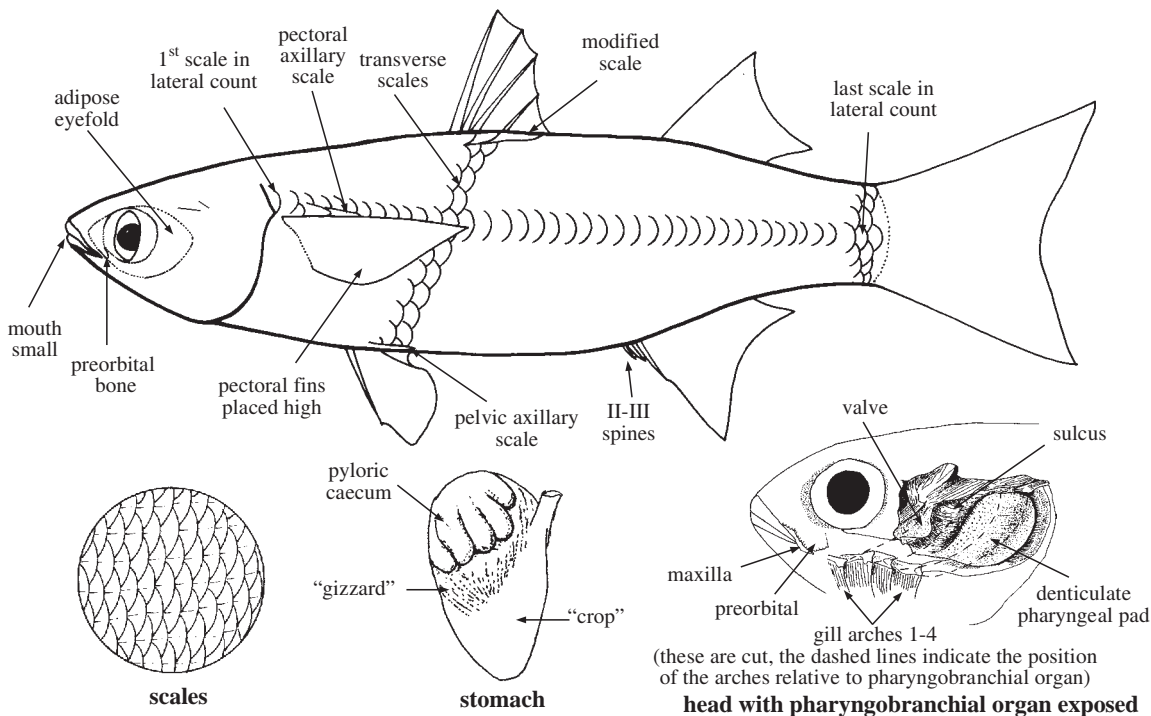
Order MUGILIFORMES

MUGILIDAE

Mullet

by I.J. Harrison and H. Senou

D **Diagnostic characters:** Medium- to large-sized fishes; elongate with subcylindrical body. **Head often broad and flattened dorsally** (except *Aldrichetta* and *Cestraeus*). **Eyes often partly covered by adipose "eyefold" tissue.** **Mouth small or moderate in size, terminal or inferior;** premaxillae protractile; teeth relatively small, hidden or absent. **Two short dorsal fins, well separated; first with IV slender spines;** second dorsal fin usually with 9 or 10 soft rays; anal fin short with II or III spines and 7 to 12 soft rays in adults; caudal fin emarginate or forked; **pectoral fins inserted high on body;** dorsal ray of pectoral fins developed as a short spur or 'spine' (not a true spine); pelvic fins with I spine and 5 soft rays, **inserted about equidistant between origins of pectoral fins and first dorsal fin.** **Lateral line absent.** Scales large to moderate size, cycloid or ctenoid on head and body, with 1 or more longitudinal rows of striae (grooves); with membranous hind margin in *Valamugil*; 24 to 64 scales in longitudinal series on midline, counted from just behind head (behind operculum), above pectoral fins, to point of caudal flexure (i.e. not including scales on caudal fin); 18 to 16 transverse scales, counted from origin of pelvic fins to origin of first dorsal fin; 15 to 27 scales in transverse series entirely around caudal peduncle; **large, modified scales may be present above pectoral and pelvic fins (axillary scales) and below first dorsal fin.** Oral and branchial filter-feeding mechanism involving gill rakers and a **specialized "pharyngobranchial organ" comprising large, denticulate "pharyngeal pad" and pharyngeal "sulcus" on each side of pharyngobranchial chamber** (less evident in *Aldrichetta* and *Cestraeus*). Pharyngobranchial organ may be seen by lifting operculum and pulling first 3 gill arches forward from fourth arch. The pharyngeal pad is a large, rounded structure with numerous, fine denticulate teeth giving an apparently "furry" surface. The sulcus is the deep groove anterior to the denticulate pad. Anterior wall of sulcus may bear 1 or 2 "valves" which can be difficult to see but, when present, are small to moderate flaps of tissue on lower or midpart of sulcus and lying back against sulcus wall. Sulcus and valves best seen by pulling first 2 gill arches forward from third and fourth arches. **Stomach with muscular gizzard** (except in *Aldrichetta* and *Cestraeus*) and pyloric caeca positioned ventrally. Stomach and caeca can be seen by cutting the fish along the abdomen and removing the liver, lying ventral to the alimentary tract. **Intestine elongate and elaborately coiled** (less so in *Aldrichetta*, *Cestraeus*, and *Myxus*). Vertebrae 24 to 26. **Colour:** dark blue, dark olive, greenish, or greyish dorsally; **flanks silvery**, often with more or less distinct dark stripes (about 3 to 9) following rows of scales; ventral parts of body also silvery, or pale/yellowish; fins dusky or pale yellowish (particularly pelvic fins) perhaps with margins dusky; dark bar or spot sometimes dorsally at base of pectoral fins.



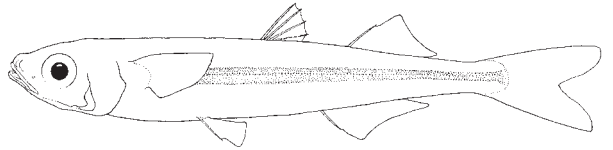
head with pharyngobranchial organ exposed

Habitat, biology, and fisheries: Most species are euryhaline; inhabiting coastal marine waters, brackish water lagoons, estuaries, and may enter fresh waters (particularly at young stages); usually to depths of 20 m, but will go deeper. Some species more typically inhabit fresh water but can be found in brackish waters. Coastal species usually spawn offshore; fresh-water species spawn in brackish waters. Feeding: browsing on submerged surfaces and filtering large quantities of benthic detritus; ingesting microalgae, detritus, small invertebrates, micro-organisms, and particulate organic material. Several species are of moderate to major importance to fisheries and are caught with diverse net types. From 1990 to 1995, the FAO Yearbook of Fishery Statistics reports a range of yearly catch of Mugilidae of around 41 900 to 55 100 t from the Western Central Pacific. Small-scale and subsistence fisheries are probably also relatively large. The hardiness, simple diet, and rapid growth of mullets has made some species the object of aquaculture.

Remarks: Mugilidae are most speciose in the Indo-West Pacific region; many species are morphologically very similar (e.g. *Liza* and *Valamugil*). Several nominal species appear to be conspecific and others show a degree of morphological or meristic variability which makes straightforward diagnoses almost impossible. The taxonomy of Mugilidae in this region is therefore very confused and parts of the following key and diagnoses are provisional pending forthcoming revision.

Similar families occurring in the area

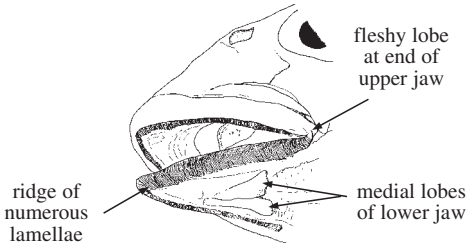
Atherinidae: body more slender, a prominent silvery stripe along flanks; eyes larger; anal-fin rays usually more than 10 (usually, but not always, less than 10 in Mugilidae).



Atherinidae

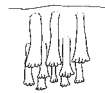
Key to the species of Mugilidae occurring in the area

- 1a. Lower jaw bordered ventrally by a ridge of numerous lamellae (Fig. 1a); upper and lower jaws ending posteriorly in fleshy lobes (Figs 1a and 3) (*Cestraeus*) → 2
- 1b. No such ridges of lamellae or fleshy lobes associated with jaws (Fig. 2) → 4



a) ventrolateral view of head

Fig. 1 *Cestraeus oxyrhynchus*



b) upper jaw teeth



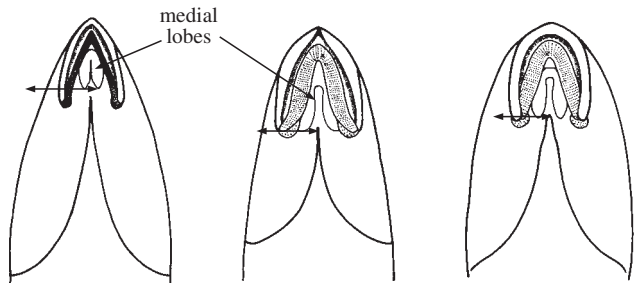
ventrolateral view of head

Fig. 2 *Liza*

- 2a. Medial lobes on lower jaw not reaching corner of mouth (Figs 1a and 3a); teeth in upper jaw multicuspid and close-packed (Fig. 1b) *Cestraeus oxyrhynchus*
- 2b. Medial lobes on lower jaw reaching corner of mouth (Fig. 3b and c); teeth in upper jaw bicuspid or unicuspid → 3

- 3a. Pectoral fins as long as or longer than head; usually distinct tooth patches on vomer; interorbit strongly convex (Fig. 4) and dentary symphysis pointed (Fig. 3b) *Cestraeus goldiei*

- 3b. Pectoral fins shorter than head; vomer usually edentate; interorbit only moderately convex and dentary symphysis more rounded than pointed (Fig. 3c) *Cestraeus plicatilis*



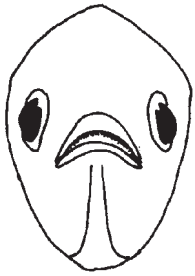
a) *Cestraeus oxyrhynchus*

b) *Cestraeus goldiei*

c) *Cestraeus plicatilis*

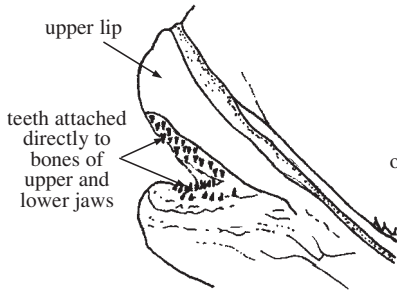
Fig. 3 ventral view of head

- 4a. Scales in longitudinal series 55 or more; several rows of teeth directly attached to jaw bones (Fig. 5) *Aldrichetta forsteri*
- 4b. Scales in longitudinal series less than 50; teeth borne on edges of lips (Fig. 6), often minute or absent →5



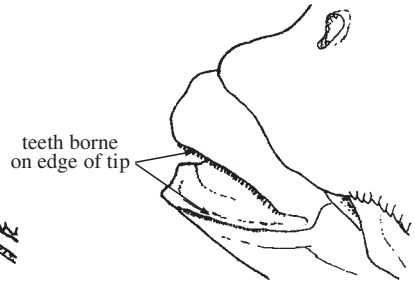
frontal view of head

Fig. 4 *Cestraeus goldiei*



lateral view of head

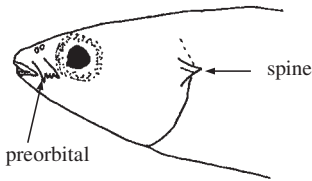
Fig. 5 *Aldrichetta forsteri*



lateral view of head

Fig. 6 *Liza* sp.

- 5a. Posteroventral edge of preorbital very strongly serrate, forming large spurs (Fig. 7a, b); opercle with short spine at dorsoposterior corner, above pectoral-fin base (Fig. 7a) *Sicamugil hamiltoni*
(fresh-water and brackish estuaries of Myanmar; not yet recorded from the area)
- 5b. Posteroventral edge of preorbital serrate, but not distinctly so, and not forming large spurs (Fig. 8a, b); opercle lacking short spine at dorsoposterior corner (Fig. 8a) → 6

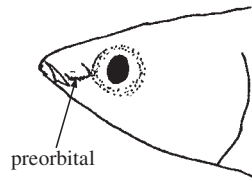


a) lateral view of head

Fig. 7 *Sicamugil hamiltoni*



b) posteroventral edge of preorbital



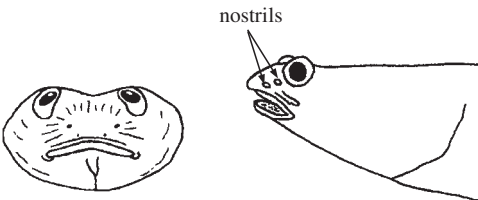
a) lateral view of head

Fig. 8 *Liza* sp.



b) posteroventral edge of preorbital

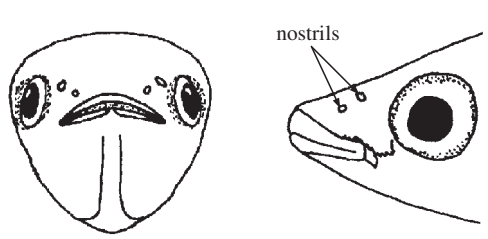
- 6a. Head very distinctly flattened and concave between eyes (Fig. 9a); anterior nostril positioned low on snout and eyes dorsolateral, high on head; snout projecting beyond inferior, upper lip (Fig. 9b) *Rhinomugil nasutus*
- 6b. Head moderately flattened and more or less convex between eyes (Fig. 10a); nostrils positioned high on snout and eyes lateral on head; upper lip not inferior to snout (Fig. 10b) → 7



a) frontal view of head

b) lateral view of head

Fig. 9 *Rhinomugil nasutus*



a) frontal view of head

b) lateral view of head

Fig. 10 *Liza* sp.

- 7a. Upper lip usually distinctly thickened, its depth at point of snout 5 to 11 times in head length (usually less than 10 times in head length); lower part of upper lip with rugose fringe or bearing distinct crenulations or papillae (Fig. 11a-c); (thickening of lip and papillae may be less distinct in small specimens) (*Crenimugil*, *Oedalechilus*) → 8
- 7b. Upper lip not distinctly thickened, its depth at point of snout greater than 12 times in head length (usually about 15 to 20 times in head length); upper lip not rugose nor bearing distinct crenulations or papillae (Fig. 11d) → 10

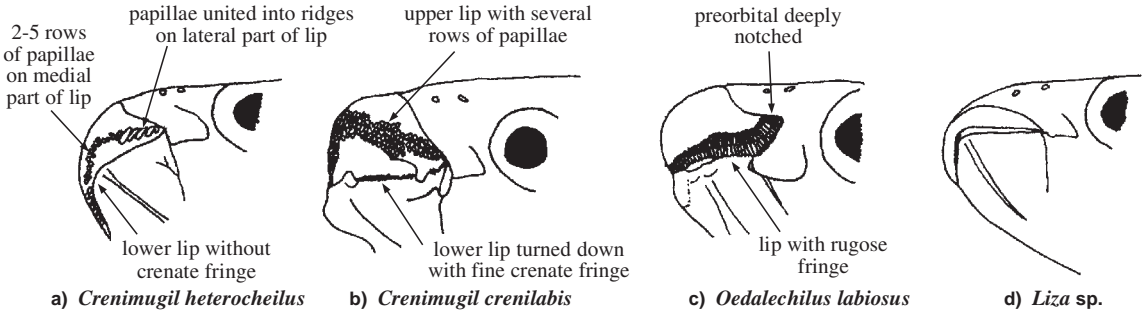


Fig. 11 mouth

- 8a. Preorbital deeply notched; lips with distinct rugose fringe (Fig. 11c); upper lip thickened, split into longitudinal lobes (Fig. 12); lips deeply folded into preorbital notch at corner of mouth (Fig. 11c); 3 or 4 pyloric caeca *Oedalechilus labiosus*
- 8b. Preorbital only slightly or not notched; upper lip not split into longitudinal lobes but thickened with lower part bearing rows of papillae; lips not deeply folded into corners of mouth (Fig. 11a, b); 6 to 10 pyloric caeca (*Crenimugil*) → 9
- 9a. Upper lip with 1 to 10 rows of papillae on medial and lateral parts; upper lip thickness 5.2 to 9.5 times in head length; anterior edge of lower lip turned slightly out and down, with fine crenate fringe on inner part (Fig. 11b) *Crenimugil crenilabis*
- 9b. Upper lip with 2 to 5 rows of papillae, these rows united into file-like ridges on lateral parts of lip; upper lip thickness 6 to 11 times in head length; lower lip thin, without crenate fringe (Fig. 11a) *Crenimugil heterocheilus*
- 10a. Lower lip thick-edged, deflected downwards; teeth on lower lip directed down, with trifid tips, and in 2 or more rows (Fig. 13a and b) *Neomyxus leuciscus*
- 10b. Lower lip thin, directed forwards; teeth on lower lip directed forwards or upwards, without trifid tips, or teeth absent (Fig. 14) → 11

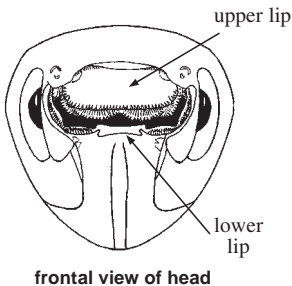


Fig. 12 *Oedalechilus labiosus*

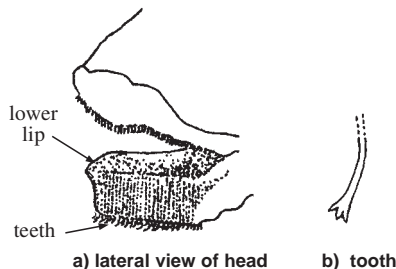


Fig. 13 *Neomyxus leuciscus*

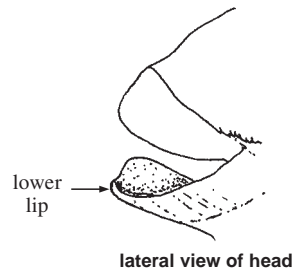


Fig. 14 *Liza* sp.

11a. Maxilla straight, posterior tip not curved down (Fig. 15a); preorbital slender with straight anteroventral edge and a pointed posteroventral end (Fig. 15a); adipose eyefold always extensive in adults (Fig. 16a); dentary symphysis pointed, usually less than 90° (Fig. 17a); in adults, anal fin with III spines and 8 or 9 soft rays (if 8, then this character in combination with longitudinal series scale count of 36 to 44); (anal fin with II spines and 9 or 10 soft rays in juveniles about 30 mm standard length or less) (*Mugil*) → 12

11b. Maxilla with posterior tip slightly curved down (less distinct in *Myxus*) or more distinctly sigmoidally curved (Fig. 15b, c); preorbital with a slightly concave or distinctly kinked anteroventral edge and a blunt (*Valamugil*; Fig. 15b) or broad squarish (*Liza*, *Myxus*) posteroventral end (Figs 15c and 20); adipose eyefold often marginal or absent in adults (Fig. 16b, c), rarely as extensive as in *Mugil* (never extensive in species with more than 43 scales in longitudinal series); dentary symphysis usually blunt, more than 90° (Fig. 17b); in adults, anal fins usually with III spines and 9 (rarely 8) soft rays (correspondingly II spines and 10 or 9 soft rays in juveniles about 30 mm standard length or less), except typically III spines and 8 soft rays in adult *Liza vaigiensis* with less than 30 scales in longitudinal series (cf. *Mugil*) (*Myxus*, *Liza*, *Valamugil*) → 13

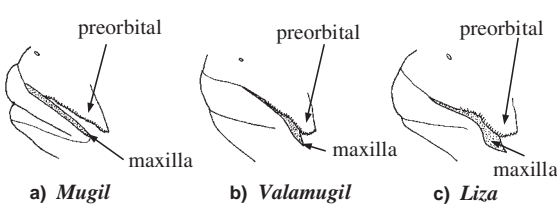


Fig. 15 lateral view of mouth (maxilla shaded)

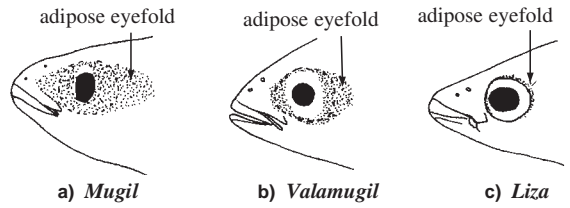


Fig. 16 lateral view of head

12a. Anal fin usually with 8 (rarely 9) soft rays in adults; second dorsal and anal fins with scales only on anterior and basal parts of fins *Mugil cephalus*

12b. Anal fin with 9 soft rays in adults; second dorsal and anal fins with scales on all parts of fins . . . *Mugil broussonetti*

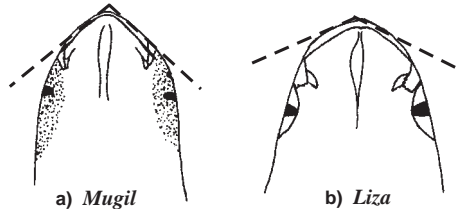


Fig. 17 ventral view of head

13a. Scales in longitudinal series 43 or more; predorsal scales never keeled, and ventral valve of pharyngobranchial organ appears as papilla covered pad (Fig. 18a); (2 pyloric caeca - specimen must be dissected to see this) (*Myxus*) → 14

13b. Scales in longitudinal series 43 or less; predorsal scales with or without keel; in species with more than 40 scales in longitudinal series the pharyngobranchial organ either lacks valves (Fig. 18b) and predorsal keel, or if valves present, then they are not papillose and predorsal keel also present (Fig. 19); (4 or more pyloric caeca, except in *Liza argentea* with 2 caeca but also less than 40 scales in longitudinal series, cf. *Myxus*) (*Liza*, *Valamugil*) → 15

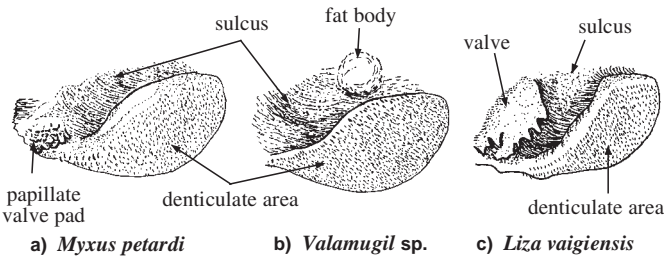


Fig. 18 lateral view of pharyngobranchial organs

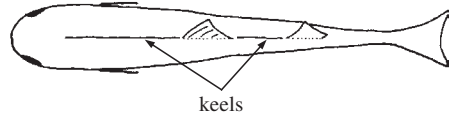


Fig. 19 *Liza affinis* (dorsal view)

- 14a. Scales in longitudinal series 47 to 52; teeth in upper lip small and ciliiform or absent; gill rakers on first arch 1/2 length of longest gill filaments *Myxus petardi*
- 14b. Scales in longitudinal series 43 to 46; teeth in upper lip spatulate with constricted tips (Fig. 20a, b); gill rakers on first gill arch as long as longest gill filaments *Myxus elongatus*

- 15a. Preorbital with a kink (often distinct) on the serrate anteroventral edge and a broad, squarish, posteroventral tip (Figs 15c and 16c); maxilla stocky and curved sigmoidally near posterior tip, which is often visible posteroventral to corner of closed mouth (Figs 15c and 16c); scales ctenoid but lacking a membranous, digitated hind margin (Fig. 21a); pharyngobranchial organ with 1 or usually 2 valves (Fig. 18c) (*Liza*) → 16
- 15b. Preorbital with a more or less concave (rather than kinked) serrate anteroventral edge and a narrow posteroventral tip (Figs 15b and 16b); maxilla slender and weakly curved down at posterior tip, which is usually not clearly visible posteroventral to corner of closed mouth (exposed when mouth opened) (Figs 15b and 16b); scales with a membranous, digitated hind margin (Fig. 21b) or appearing cycloid where membrane poorly developed (*Valamugil georgii*); pharyngobranchial organ with a broad sulcus and lacking valves (Fig. 18b) (*Valamugil*) → 25

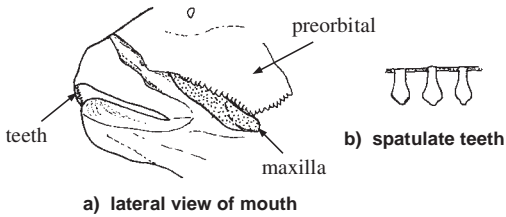


Fig. 20 *Myxus elongatus*

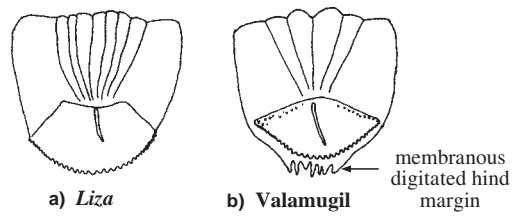


Fig. 21 scales

- 16a. Anal fin with 8 soft rays in adults; caudal fin squarish, its posterior margin nearly straight; pectoral fins black (lower section yellowish in adults) (Fig. 22); (10 or more pyloric caeca - specimen must be dissected to see this) . . . *Liza vaigiensis*
- 16b. Anal fin with 9, or less frequently 8, soft rays in adults; caudal fin clearly emarginate or forked; pectoral fins perhaps dusky but never black; (less than 10 pyloric caeca - specimen must be dissected to see this) □ 17

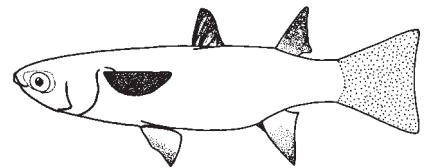


Fig. 22 *Liza vaigiensis*

- 17a. Predorsal scales with keel (Fig. 19) *Liza affinis*
- 17b. Predorsal scales lacking keel → 18

- 18a. Scales in transverse series 13 to 15 1/2 (Fig. 23); usually 10 or more anal-fin rays in adults; gill rakers on lower limb of first gill arch 100 or more and very long (equal to or longer than longest gill filaments) → 19
- 18b. Scales in transverse series less than 13 (Fig. 24); usually less than 10 anal-fin rays in adults; gill rakers on lower limb of first gill arch less than 100 and of moderate or short length □ 20

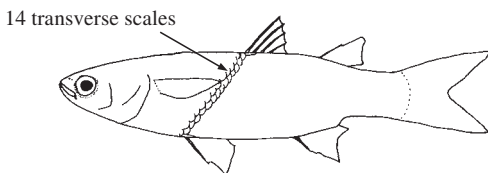


Fig. 23 *Liza argentea*

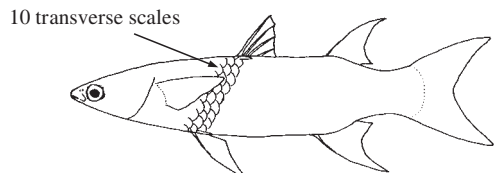


Fig. 24 *Liza alata*

- 19a. Adults usually with 10 anal-fin rays *Liza argentea*
- 19b. Adults with 11 anal-fin rays *Liza ramsayi*

20a. All fins long and falcate; pelvic and pectoral fins longer than length of head minus snout (Fig. 24); scale margins dark, giving reticulate appearance to flank pigmentation *Liza alata*

20b. Fins less distinctly falcate and shorter, particularly pelvic, second dorsal, and anal fins (Figs 25 and 26); pelvic fins shorter than length of head minus snout, and pectoral fins usually shorter than or equal to head minus snout; flank pigmentation less obviously reticulate. → 21

21a. Body slender and elongate (body depth at origin of first dorsal fin 22% or less of standard length, and at anal-fin origin 20% or less of standard length); head depressed and pointed (Fig. 26); eye diameter usually less than 20% of head length; 5 to 7 indistinct stripes sometimes present on upper flanks of larger specimens *Liza planiceps*

21b. Body more robust (body depth at origin of first dorsal fin 22% or more of standard length, and at anal-fin origin greater than 20% of standard length); head not markedly depressed or pointed (Fig. 25); eye diameter 21% or more of head length; stripes on flanks absent (except in *Liza subviridis* with 3 to 6 indistinct stripes) → 22

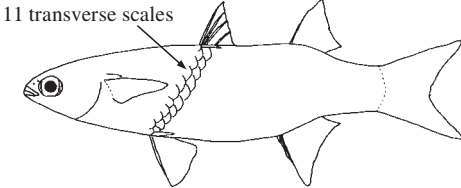


Fig. 25 *Liza macrolepis*

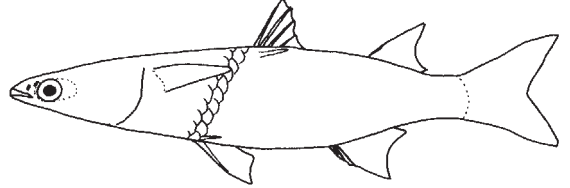


Fig. 26 *Liza planiceps*

22a. Upper lip with an outer row of short, yet distinct, peg-like setiform teeth which are very close-set in a fine “comb”, and 1 or 2 inner rows of finer, more wide-set teeth (Fig. 27a); 31 to 35 (commonly 32 or 33) scales in longitudinal series, and 10 or 11 in transverse series (Fig. 25); adipose eyefold marginal (Fig. 28a), or absent *Liza macrolepis*

22b. Upper lip with an outer row of short, fine teeth which can be wide-set or moderately close-set, but do not appear peg-like or form a distinct fine-set “comb” (cf. *Liza macrolepis*); 1 or 2 inner rows of smaller ciliform or setiform teeth may be present, but these are small and irregularly spaced (Fig. 27b) (cf. more regular arrangement in *Liza macrolepis*); 25 to 32 (rarely 33; usually 30 or less) scales in longitudinal series, and 9 to 11 (rarely 12) in transverse series; adipose eyefold either marginal or partly developed over eye and side of head (Fig. 28b) → 23

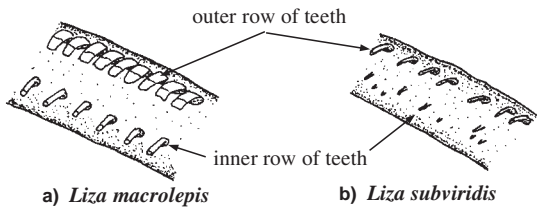


Fig. 27 inner surface of upper lip

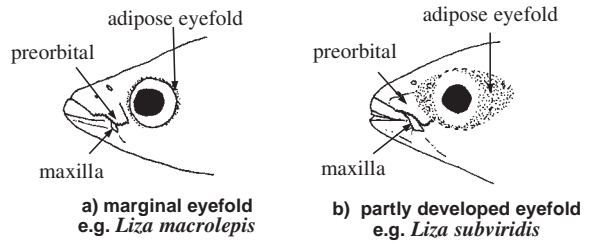


Fig. 28 *Liza* spp.

23a. Lower limb of first gill arch with 30 to 45 gill rakers; body depth at origin of anal fin 29 to 33% of standard length; pectoral fins usually extend to ninth or tenth (rarely eighth or eleventh) scale in longitudinal series *Liza parmata*

23b. Lower limb of first gill arch usually with 45 to 68 or more gill rakers (rarely 41 to 44 in *Liza subviridis*); body depth at origin of anal fin 21 to 29% of standard length; pectoral fins extend to seventh or eighth (rarely ninth) scale in longitudinal series → 24

- 24a. Adipose eyefold covering about 1/3 to 1/2 of iris (in specimens about 10 cm standard length or larger) (Fig. 28b; body appears fusiform or not distinctly deep in profile (Fig. 29a), body depth at origin of first dorsal fin usually 22 to 26% of standard length (sometimes attaining 27 to 30%); caudal fin bluish with dark pigmentation restricted to margins *Liza subviridis*
- 24b. Adipose eyefold marginal, not extending over iris (Fig. 28a); body appears more distinctly "robust" or deep in profile (Fig. 29b), body depth at origin of first dorsal fin 27 to 31% (rarely to 34%) of standard length; dark pigmentation over entire caudal fin *Liza melinoptera*

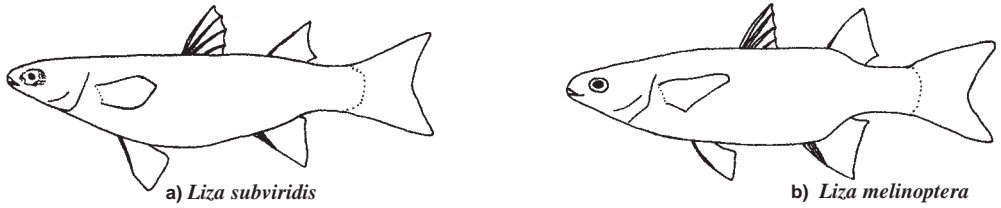


Fig. 29 lateral view

- 25a. Eighteen or more (usually 19 or 20) scales in transverse series entirely around caudal peduncle (i.e. inclusive of both sides of body); origin of fully erected second dorsal fin on vertical through anal-fin origin, or only just behind it (Fig. 30a, b) → 26
- 25b. Eighteen or less (usually 16) scales in transverse series entirely around caudal peduncle (i.e. inclusive of both sides of body); origin of fully erected second dorsal fin on vertical through about third soft ray of anal fin, i.e. behind anterior quarter or more of anal fin (Fig. 31a, b) → 27

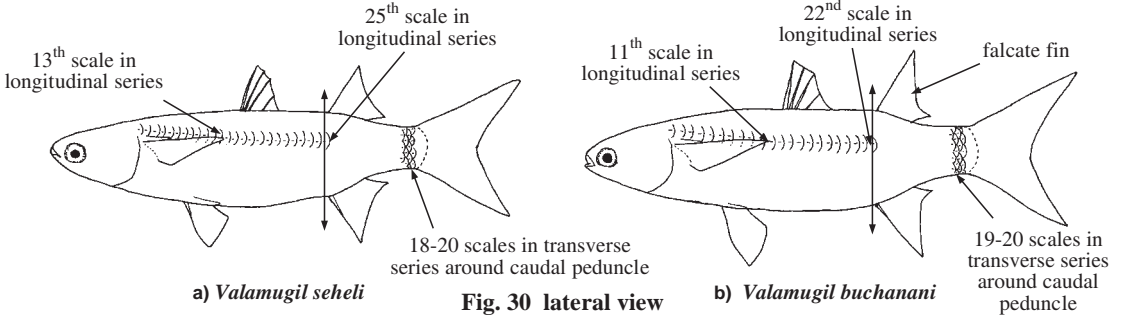


Fig. 30 lateral view

- 26a. Scales in longitudinal series 36 or more; second dorsal and anal fins not strongly falcate; at least 23 (usually 24) scales in longitudinal series anterior to origin of second dorsal fin (Fig. 30a); pectoral fins 84 to 104% of head length, but not often longer than head; snout usually 18% or more of head length (rarely 17%) *Valamugil seheli*
- 26b. Scales in longitudinal series 32 to 36 (rarely 37); second dorsal and anal fins falcate; usually less than 24 scales in longitudinal series anterior to origin of second dorsal fin (Fig. 30b); pectoral fins 90 to 139% of head length, often longer than head; snout 14 to 19% of head length *Valamugil buchanani*

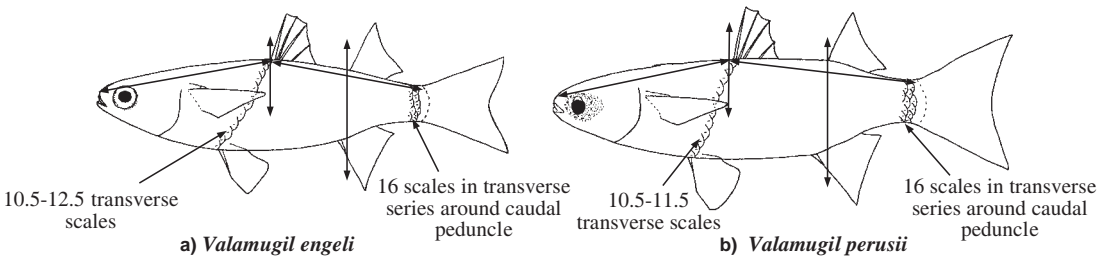


Fig. 31 lateral view

- 27a Scales in longitudinal series 37 to 43 → 28
- 27b. Scales in longitudinal series 30 to 36 → 29

- 28a.** Second dorsal and anal fins weakly scaled, with scales only on anterior and basal parts; 62 to 75 gill rakers on lower limb of first gill arch; maxilla slightly curved downwards and anterior edge of preorbital weakly concave (Fig. 32a) *Valamugil cunnesius*
- 28b.** Second dorsal and anal fins well scaled on all parts; 35 to 45 gill rakers on lower limb of first gill arch; maxilla and anterior edge of preorbital almost straight (Fig. 32b) *Valamugil speigleri*

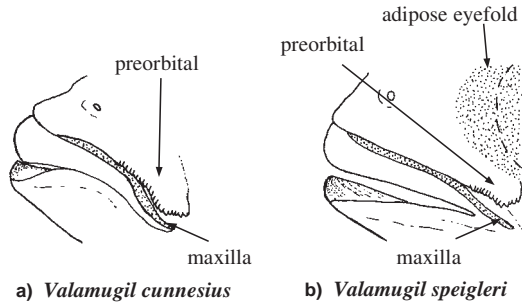


Fig. 32

- 29a.** Tip of pectoral fins distinctly anterior to level of first dorsal fin (Fig. 33); 12 or 13 (11 1/2) scales in transverse series; pyloric caeca extensively branched, up to 22 in total (Fig. 34a) *Valamugil georgii*
- 29b.** Pectoral fins just reaching level of origin of first dorsal fin or extending beyond this (Fig. 31); 10 or 11 (rarely 12) scales in transverse series; 5 to 7 pyloric caeca (Fig. 34b) → 30

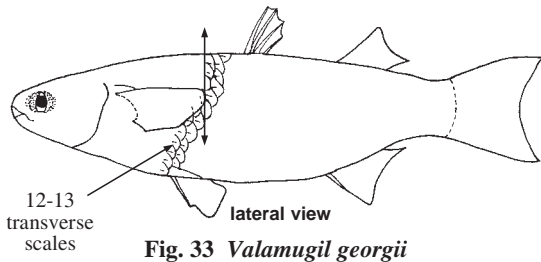


Fig. 33 *Valamugil georgii*

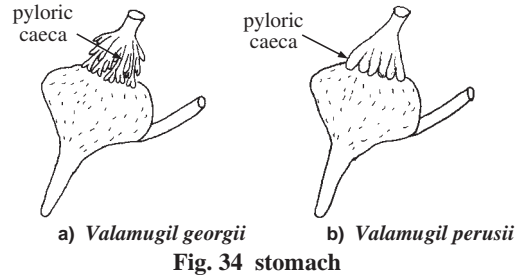


Fig. 34 stomach

- 30a.** Second dorsal and anal fins with scales only on anterior and basal parts; adipose eyefold rudimentary; origin of first dorsal fin usually nearer base of caudal fin than anterior tip of snout (Fig. 31); predorsal scales extending to tip of snout (Fig. 35a) *Valamugil engeli*
- 30b.** Second dorsal and anal fins moderately or well scaled on all parts; adipose eyefold reasonably developed, covering up to 1/2 of iris; origin of first dorsal fin usually equidistant between anterior tip of snout and base of caudal fin (Fig. 31); predorsal scales extending to posterior nostril (Fig. 35b) *Valamugil perusii*

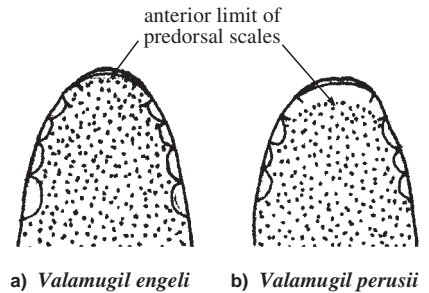


Fig. 35 dorsal view of heads

List of species occurring in the area

The symbol ➡ is given when species accounts are included.

- ➡ *Aldrichetta forsteri* (Valenciennes, 1836)
- ➡ *Cestraeus goldiei* Macleay, 1883
- ➡ *Cestraeus oxyrhynchus* Valenciennes, 1836
- ➡ *Cestraeus plicatilis* Valenciennes, 1836
- ➡ *Crenimugil crenilabis* (Forsskål, 1775)
- ➡ *Crenimugil heterocheilus* (Bleeker, 1855)
- ➡ *Liza affinis* (Günther, 1861)
- ➡ *Liza alata* (Steindachner, 1892)
- ➡ *Liza argentea* (Quoy and Gaimard, 1825)

- ✦ *Liza macrolepis* (Smith, 1846)
- ✦ *Liza melinoptera* (Valenciennes, 1836)
- ✦ *Liza parmata* (Cantor, 1850)
- ✦ *Liza planiceps* (Valenciennes, 1836)
- ✦ *Liza ramsayi* (Macleay, 1883)
- ✦ *Liza subviridis* (Valenciennes, 1836)
- ✦ *Liza vaigiensis* (Quoy and Gaimard, 1825)
- ✦ *Mugil broussonneti* Valenciennes, 1836
- ✦ *Mugil cephalus* Linnaeus, 1758
- ✦ *Myxus elongatus* Günther, 1861
- ✦ *Myxus petardi* (Castelnau, 1875)
- ✦ *Neomyxus leuciscus* (Günther, 1871)
- ✦ *Oedalechilus labiosus* (Valenciennes, 1836)
- ✦ *Rhinomugil nasutus* (DeVis, 1883)
- ? *Sicamugil hamiltoni* (Day, 1869)^{1/}
- ✦ *Valamugil buchanani* (Bleeker, 1853)
- ✦ *Valamugil cunnesius* (Valenciennes, 1836)
- ✦ *Valamugil engeli* (Bleeker, 1858)
- ✦ *Valamugil georgii* (Ogilby, 1897)
- ✦ *Valamugil perusii* (Valenciennes, 1836)
- ✦ *Valamugil seheli* (Forsskål, 1775)
- ✦ *Valamugil speigleri* (Bleeker, 1859)

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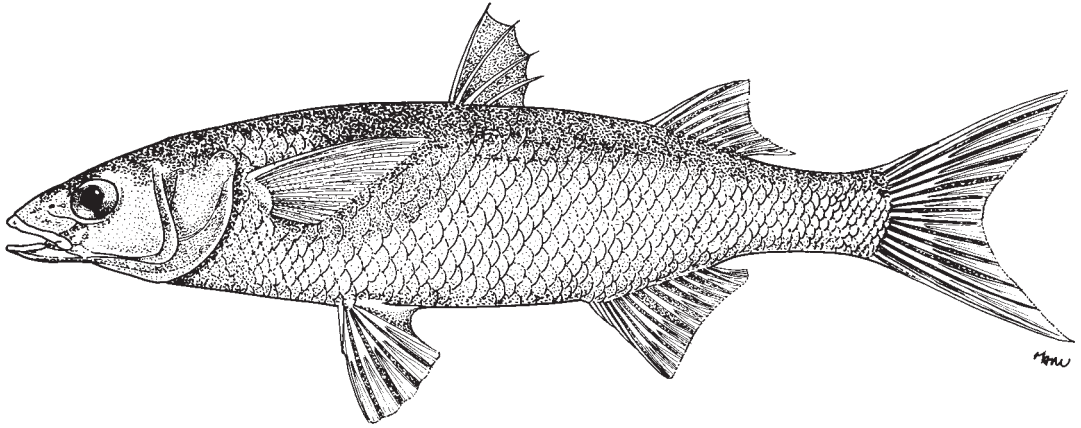
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^{1/} Known from Sittang and Irrawaddy rivers and estuaries of Myanmar. Not yet recorded from the area, but might occur along the Malay Peninsula.

Aldrichetta forsteri (Valenciennes, 1836)

Frequent synonyms / misidentifications: *Agonostomus forsteri* (Valenciennes, 1836); *Agonostoma diemensis* (Richardson, 1840) / None.

FAO names: En - Yelloweye mullet.

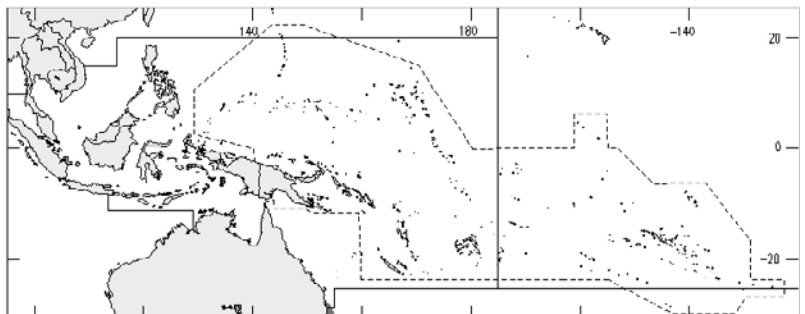


Diagnostic characters: A small to medium-sized species; body slender. Interorbit not strongly convex. **Snout longer than eye diameter and moderately pointed. Dentary symphysis acutely pointed.** Lips thin, without papillae; lower lip directed forwards. No lobes associated with mouth. **Teeth small, attached directly to jaw bones**, in 2 or 3 rows in each jaw, perhaps indistinct in large specimens. Sparse, movable, ciliiform teeth attached on lower lip. Vomer well toothed. Maxilla and serrate anteroventral edge of preorbital straight; posteroventral tip of preorbital broad and squarish. Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. Adipose eyefold absent or very rudimentary anteriorly. Gill rakers on lower limb of first gill arch 24 to 48. Origin of first dorsal fin midway between tip of snout and base of caudal fin, or slightly nearer latter. Origin of fully erected second dorsal fin on vertical through anterior half of anal fin; both fins scaled only anterobasally. **Anal fin with III spines and 12 (rarely 13) soft rays** in adults (usually II spines and 13 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 15 soft rays, not reaching level of origin of first dorsal fin; pectoral fins 19 to 23% standard length, 73 to 93% head length. Scales strongly ctenoid on abdomen, weakly ctenoid or cycloid on other parts of body; **53 to 64 scales in longitudinal series; 14 or 15 in transverse series; 22 or more (perhaps up to 27) scales in transverse series entirely around caudal peduncle. Pharyngobranchial organ not well developed; sulcus V-shaped, shallow dorsally, a deep furrow ventrally; tissue anterior to sulcus papillose; anterior and medial pharyngobranchial teeth stout, directly attached to bones; posterior and lateral teeth loosely attached to denticulate pads.** Pyloric caeca 2. **Colour:** olive-brown dorsally, silvery to yellowish white on flanks and abdomen; eyes with yellow iris; fins with brownish margin.

Size: Maximum reported total length 40 cm; commonly between 15 and 20 cm total length, rarely above 32 cm total length.

Habitat, biology, and fisheries: Inhabits coastal waters, bays, estuaries, and may ascend rivers into fresh water. Usually found from the surface to a depth of 10 m, over sandy-muddy bottoms and seagrass meadows. Frequently schooling. Probably spawns near the mouths of estuaries. Omnivorous, feeding on benthic detritus, algae, and worms. Constitutes an important fishery; caught in beach and seine nets and can be taken by hook.

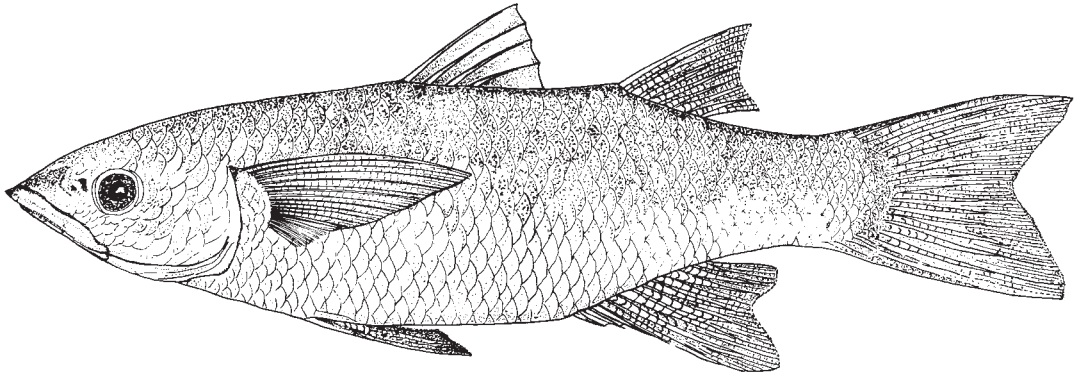
Distribution: Generally restricted to temperate waters of Australia and New Zealand. Specimens might be found at the southern extreme of the area, in northern New South Wales.



Cestraeus goldiei (Macleay, 1883)

Frequent synonyms / misidentifications: *Aeschrichthys goldiei* Macleay, 1883 / None.

FAO names: En - Goldie river mullet.

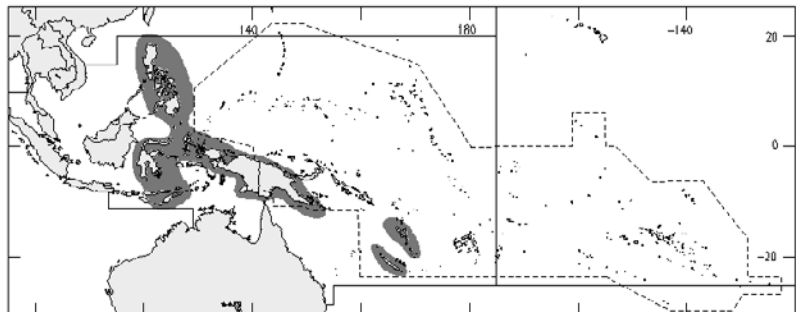


Diagnostic characters: A small to medium-sized species; body relatively deep and robust. Eye diameter 14 to 22% head length. **Interorbit convex. Snout longer than eye diameter but rather blunt in profile.** Dentary symphysis acutely pointed. **Small fleshy lobes at ends of upper and lower jaws, in each corner of mouth. Lower jaw also with lobes positioned medially in the gular region and extending posteriorly as far as or beyond level of corner of mouth.** Upper lip moderately thick, not papillate. **Lower lip thick-edged, directed forwards, and bordered ventrally by a ridge of numerous lamellae.** **Teeth attached directly to jaw bones. Upper jaw with outer row of bicuspid or unicuspid teeth which are not very close-packed; inner row of smaller, unicuspid teeth present or absent.** Small teeth scarce on lower jaw or absent in large specimens (about 30 cm standard length). **Vomer usually with distinct tooth patches on each lateral part.** Maxilla and serrate anteroventral edge of preorbital straight; posteroventral tip of preorbital broad and squarish. Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. Adipose eyefold absent or very rudimentary. Gill rakers on lower limb of first gill arch 50 to 65. Origin of first dorsal fin midway between tip of snout and base of caudal fin, or slightly closer to snout. Origin of fully erected second dorsal fin on vertical posterior to origin of anal fin; both fins scaled only anteriorly and basally. Anal fin with III spines and 9 soft rays in adults (II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' dorsally, 13 or more soft rays enclosed in fin membrane and, ventrally, **about 12 or more soft rays free from fin membrane; pectoral fins reaching level of origin of first dorsal fin or beyond; pectoral fins almost always as long as head or longer, 23 to 30% standard length.** **Ctenoid scales in longitudinal series 36 to 43; 12 to 14 in transverse series; about 23 to 26 scales in longitudinal series anterior to origin of second dorsal fin; 22 in transverse series entirely around caudal peduncle.** **Rudimentary pharyngobranchial organ with narrow, shallow sulcus and 2 small denticulate pads bearing stout, sessile teeth.** Pyloric caeca 2. **Colour:** greyish dorsally, silvery on flanks and white ventrally; dorsal fins and caudal fin dark with paler, speckled distal margins; dark spot or bar at base of caudal fin; anal fin and pectoral fins darkish, but may have basal or distal margins paler; pelvic fins pale but with some dark pigment on midportion of fin.

Size: Maximum reported fork length 40 cm, perhaps commonly reaching about 20 cm total length.

Habitat, biology, and fisheries: Fresh and brackish waters; adults ascending some way up rivers, reported to 350 m above sea-level. Probably taken incidentally or as part of subsistence fisheries in rivers.

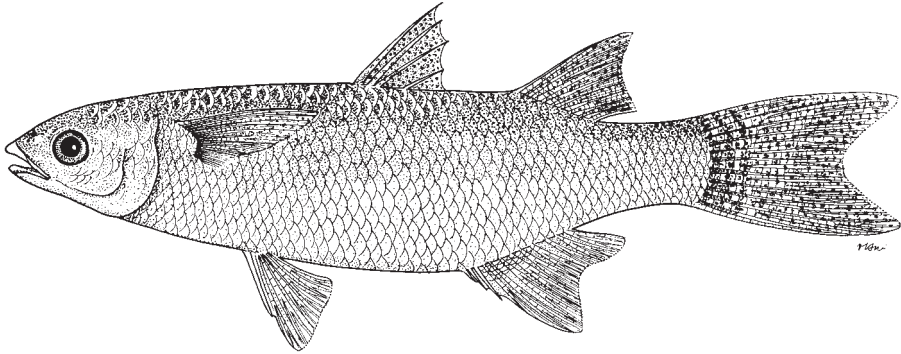
Distribution: Indo-West Pacific from Philippines to New Caledonia. New Guinean reports are commonly from Port Moresby district.



Cestraeus oxyrhynchus Valenciennes, 1836

Frequent synonyms / misidentifications: None / None.

FAO names: En - Sharpnosed river mullet.

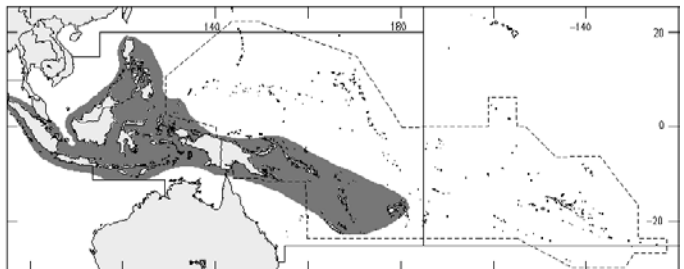


Diagnostic characters: A small to medium-sized species; body relatively deep and robust. Eye diameter 22 to 29% head length. **Interorbit convex. Snout longer than eye diameter and pointed, in profile, in adults.** Dentary symphysis acutely pointed. **Small fleshy lobes at ends of upper and lower jaws, in each corner of mouth. Lower jaw also with lobes positioned medially in the gular region and not extending posteriorly to level of corner of mouth.** Upper lip moderately thick, not papillate. **Lower lip thick-edged, directed forwards, and bordered ventrally by a ridge of numerous lamellae. Teeth attached directly to jaw bones. Upper jaw with outer row of close-packed, multicuspid teeth, and 1 to 3 inner rows of close-packed, spade-like teeth.** Caniniform teeth sparse or absent on lower jaw. Vomer with sparse teeth, in small patches on lateral parts of bone. Maxilla and serrate anteroventral edge of preorbital straight; posteroventral tip of preorbital broad and squarish. Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. Adipose eyefold absent or very rudimentary. Gill rakers on lower limb of first gill arch 36 to 54. Origin of first dorsal fin midway between tip of snout and base of caudal fin. Origin of fully erected second dorsal fin on vertical posterior to origin of anal fin; both fins scaled only anteriorly and basally. Anal fin with III spines and 9 (rarely 10) soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and about 18 to 20 soft rays, **ventral 4 or 5 soft rays free from fin membrane; pectoral fins not reaching level of origin of first dorsal fin; pectoral fins 18 to 20% standard length, 75 to 85% head length. Ctenoid scales in longitudinal series 41 to 47; 12 to 14 in transverse series; 26 to 29 scales in longitudinal series anterior to origin of second dorsal fin; 22 in transverse series entirely around caudal peduncle. Rudimentary pharyngobranchial organ with narrow, shallow sulcus and 2 small denticulate pads bearing stout, sessile teeth.** Pyloric caeca 2. **Colour:** olivaceous dorsally, silvery ventrally; dorsal fins and caudal fin uniformly speckled brown or black; vertical dark bar at base of caudal fin; anal fin paler, speckled brown distally; pectoral fins weakly speckled and pelvic fins pale.

Size: Maximum reported total length 39 cm, perhaps commonly reaching about 20 cm total length.

Habitat, biology, and fisheries: Very little available data. Probably found in both fresh and brackish waters, possibly ascending some way up rivers. Probably taken incidentally or as part of subsistence fisheries in rivers.

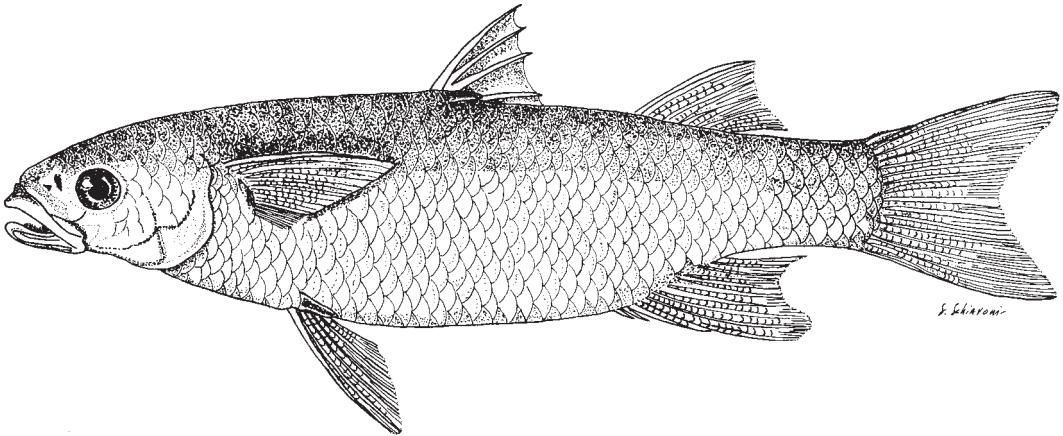
Distribution: Indo-West Pacific from Indonesia to Fiji; north to Philippines, south to New Caledonia.



Cestraeus plicatilis Valenciennes, 1836

Frequent synonyms / misidentifications: None / None.

FAO names: En - Lobed river mullet.

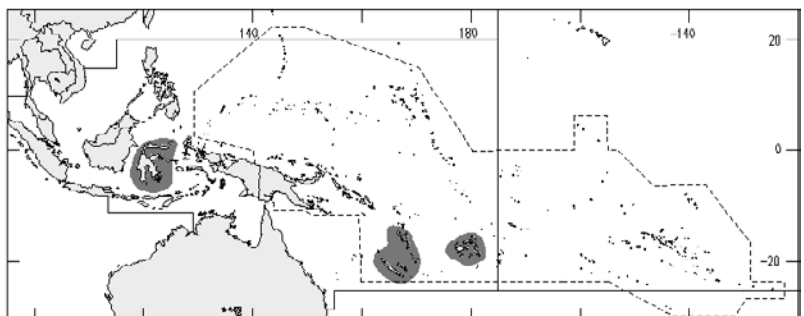


Diagnostic characters: A small to medium-sized species; body relatively deep and robust. Eye diameter 21 to 25% head length. **Interorbit only moderately convex. Snout longer than eye diameter but moderately blunt in profile. Dentary symphysis more rounded than pointed. Small fleshy lobes at ends of upper and lower jaws, in each corner of mouth. Lower jaw also with lobes positioned medially in the gular region and extending posteriorly as far as level of corner of mouth. Upper lip moderately thick, not papillate. Lower lip thick-edged, directed forwards, and bordered ventrally by a ridge of numerous lamellae. Teeth attached directly to jaw bones. Upper jaw with outer row of bicuspid or unicuspid teeth which are not very close-packed; inner row of smaller, unicuspid teeth present or absent. Small teeth scarce or absent on lower jaw. Vomer may be toothed, but usually edentate.** Maxilla and serrate anteroventral edge of preorbital straight; posteroventral tip of preorbital broad and squarish. Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. Adipose eyefold absent or very rudimentary. Gill rakers on lower limb of first gill arch 52 to 66. Origin of first dorsal fin midway between tip of snout and base of caudal fin, or slightly closer to snout. Origin of fully erected second dorsal fin on vertical posterior to origin of anal fin; both fins scaled only anteriorly and basally. Anal fin with III spines and 9 soft rays in adults (II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and about 18 or 19 soft rays, **ventral 4 or 5 soft rays free from fin membrane; pectoral fins not reaching level of origin of first dorsal fin; pectoral fins 19 to 21% standard length, shorter than head (83 to 95% head length).** **Ctenoid scales in longitudinal series 40 to 45; 13 or 14 in transverse series; about 25 or 26 scales in longitudinal series anterior to origin of second dorsal fin; 22 or 23 in transverse series entirely around caudal peduncle. Rudimentary pharyngobranchial organ with narrow, shallow sulcus and 2 small denticulate pads bearing stout, sessile teeth.** Pyloric caeca 2. **Colour:** dark greenish dorsally, flanks greyish, white ventrally; all fins well speckled brown or black except anterobasal part of anal fin and basal part of pelvic fins, which are less speckled; dark spot or vertical bar at base of caudal fin.

Size: Maximum reported total length 32.5 cm, perhaps commonly reaching about 20 cm total length.

Habitat, biology, and fisheries: Very little available data. Probably found in both fresh and brackish waters, possibly ascending some way up rivers. Probably taken incidentally or as part of subsistence fisheries in rivers.

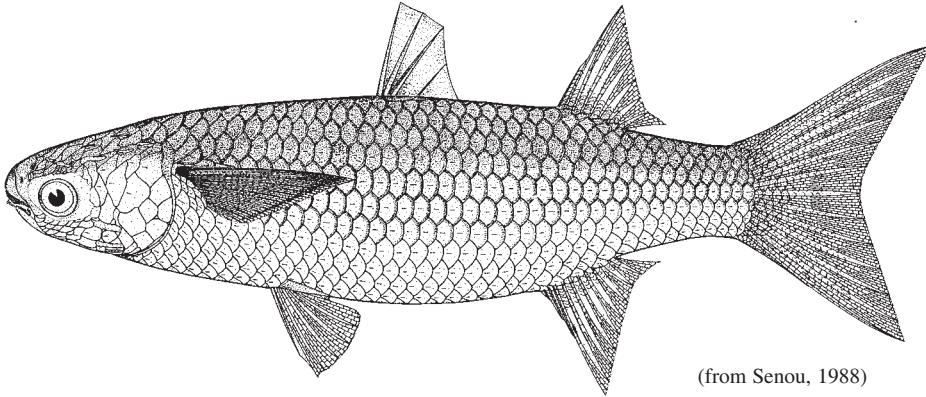
Distribution: Celebes, New Caledonia, Vanuatu, and Fiji.



Crenimugil crenilabis (Forsskål, 1775)

Frequent synonyms / misidentifications: *Mugil cirrhostomus* Valenciennes, 1836; *M. macrocheilos* Bleeker, 1854 / None.

FAO names: En - Fringelip mullet; Fr - Mulet boxeur; Sp - Lisa labride.



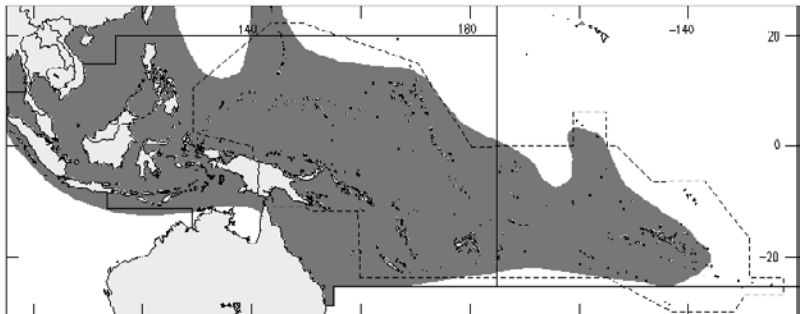
(from Senou, 1988)

Diagnostic characters: A medium-sized species; body moderately deep. Head relatively flattened dorsally. Snout shorter than eye diameter and blunt in profile. Dentary symphysis obtuse (blunt). **Upper lip very thick; lip thickness at point of snout 5.2 to 9.5 times in head length. Ventral quarter to half of upper lip with 1 to 10 rows of papillae medially and laterally; papillae in lower rows are larger than those in upper rows, flask-shaped, and may have bifid tips; papillae first appear in fish of about 6 cm standard length. Lower lip thin, with anterior margin turned out and downwards; 1 or 2 rows of papillae on inner part of lower lip, giving a fine crenate fringe. Lips and vomer edentate.** Maxilla curved down, weakly sigmoid near posterior tip. Preorbital weakly concave (**not kinked**) on serrate anteroventral edge and slightly expanded into squarish, posteroventral tip. Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. Adipose eyefold forms narrow rim around eye. Gill rakers on lower limb of first gill arch 50 to 78. Origin of first dorsal fin midway between tip of snout and base of caudal fin, or slightly closer to latter. Origin of fully erected second dorsal fin just posterior to vertical level of origin of anal fin; both fins at least moderately scaled (on anterior and basal parts) or well scaled on all parts. Anal fin with III spines and 9 (rarely 8 or 10) soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 15 to 18 (usually 16) soft rays, falcate, **reaching origin of first dorsal fin**; pectoral fins 20 to 27% standard length, 76 to 109% head length (usually more than 90%). Scales cycloid or very weakly ctenoid; **36 to 42 (usually 37 to 40) scales in longitudinal series; 12 to 14 in transverse series**; 24 to 26 scales in longitudinal series anterior to origin of second dorsal fin; **19 or 20 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with broad sulcus, small papillose anterior valve and longer-based, low posterior valve. Pyloric caeca 7 to 10. **Colour:** olive-green dorsally, flanks silvery and abdomen whitish; fins greyish except pectoral fins which is yellowish and has distinct dark purplish spot at upper part of base.

Size: Maximum reported standard length 50 cm; commonly to 26 cm standard length.

Habitat, biology, and fisheries: Found in coastal waters, in sandy or muddy areas of lagoons, reef flats and tidepools; entering harbours. Forms large schools before spawning, at beginning of ebb tide (in June), over shallow, open areas of the lagoon slope. Important food-fish in Polynesia; caught in gill nets and taken as a bycatch with seines. Marketed fresh. Also used as live bait in pole-and-line tuna fishing.

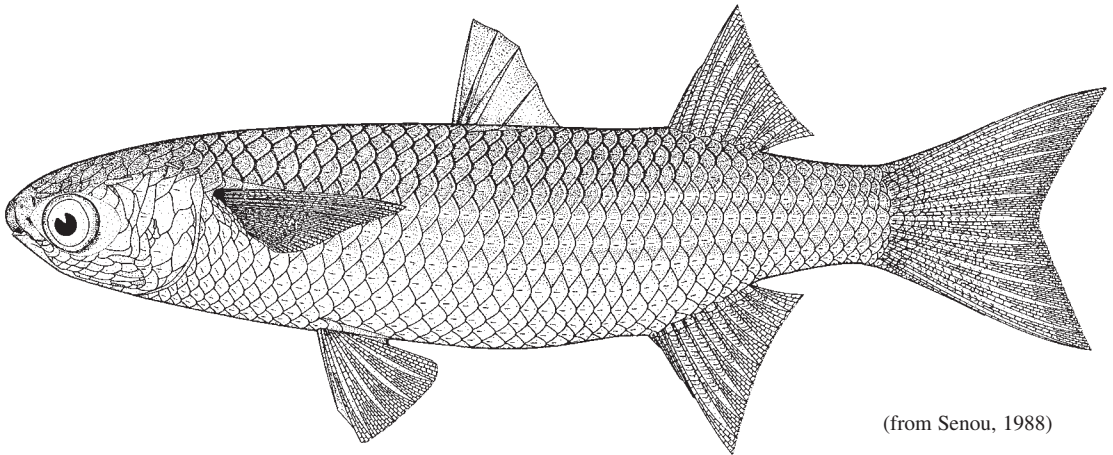
Distribution: Widespread throughout tropical Indo-Pacific, from Red Sea and Madagascar to Tuamotu Islands; south to Lord Howe Island and north to southern Japan and, perhaps, Hawaii.



Crenimugil heterocheilus (Bleeker, 1855)

Frequent synonyms / misidentifications: None / *Crenimugil crenilabis* (Forsskål, 1755).

FAO names: En - Half fringelip mullet.



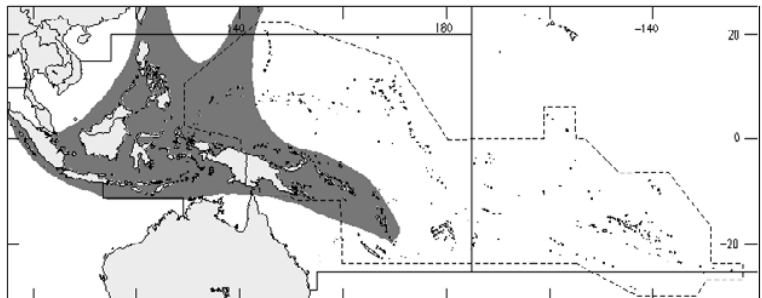
(from Senou, 1988)

Diagnostic characters: Gross morphology very similar to *C. crenilabis*. A medium-sized species; body moderately deep. Head relatively flattened dorsally. Snout equal to or shorter than eye diameter, blunt in profile. Dentary symphysis obtuse (blunt). **Upper lip thick; lip thickness at point of snout 6 to 11 times in head length. Ventral part of upper lip with 2 to 5 rows of papillae medially; papillae rows united into file-like ridges on lateral parts of lip. Papillae not distinct in fish less than about 10 cm standard length. Lower lip thin, not papillate or crenate. Lips edentate.** Maxilla curved down, weakly sigmoid near posterior tip. Preorbital weakly concave (**not kinked**) on serrate anteroventral edge and slightly expanded into squarish, posteroventral tip. Anterior and posterior nostrils close together. Adipose eyefold forms narrow rim around eye. Gill rakers on lower limb of first gill arch 37 to 57. Origin of first dorsal fin midway between tip of snout and base of caudal fin, or slightly closer to latter. Origin of fully erected second dorsal fin just posterior to vertical level of origin of anal fin; both fins lightly to moderately scaled. Anal fin with III spines and 9 (rarely 8) soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 15 to 17 (usually 16) soft rays, falcate, **reaching origin of first dorsal fin**; 21 to 27% standard length, 91 to 100% head length. Scales cycloid or very weakly ctenoid; **35 to 41 (rarely 32) scales in longitudinal series; 11 or 12 (perhaps up to 14) in transverse series**; 24 or 25 scales in longitudinal series anterior to origin of second dorsal fin. Pyloric caeca 6 to 8. **Colour:** olivaceous dorsally, flanks and abdomen silvery or white; dorsal fins blackish, second dorsal with orange tip; anal fin whitish with yellow tip; caudal fin pale bluish with tips of lobes orange-yellow; pectoral fins bluish black with orange-yellow tip and dark spot at upper part of base.

Size: Maximum reported standard length 50 cm, perhaps commonly to 23 cm standard length.

Habitat, biology, and fisheries: Found in coastal waters and ascending rivers into fresh water, penetrating far upstream from river mouth. Found in turbid channels and over gravel-bottoms. No fisheries data, but recorded as a food fish.

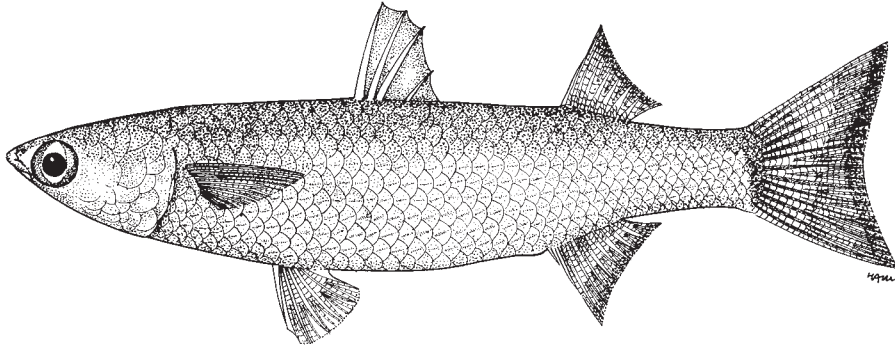
Distribution: Tropical Indo-Pacific from Indonesia and Philippines to Vanuatu. North to southern Japanese islands.



Liza affinis (Günther, 1861)

Frequent synonyms / misidentifications: None / *Liza carinata* (Valenciennes, 1836); *L. klunzingeri* (Day, 1888).

FAO names: En - Eastern keelback mullet.

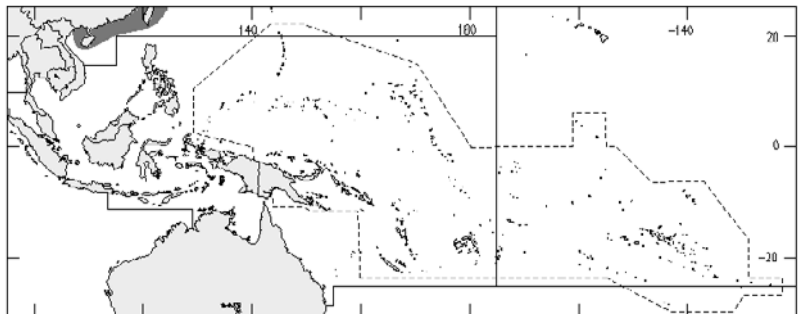


Diagnostic characters: A medium-sized species. Body rather elongate; depth at first dorsal fin 19 to 27% standard length; depth at anal fin 17 to 22% standard length. **Mid-dorsal line more or less sharply keeled on scales anterior to first dorsal fin (keel weaker in small specimens); keel between first and second dorsal fins weak or absent.** Head deeper than wide, only weakly convex interorbitally. Eye diameter 22 to 32% head length. Snout shorter than or equal to eye diameter and slightly pointed. Dentary symphysis 90° or more obtuse. Upper lip thin or slightly thickened; **outer row of close-set, fine, recurved, unicuspid teeth; inner row of smaller teeth** (sometimes indistinct). **Lower lip thin, directed forwards, no teeth present.** Vomer edentate. **Maxilla more or less sigmoidally curved near posterior tip, which is visible posteroventral to corner of closed mouth.** **Serrate anteroventral edge of preorbital with distinct kink; posteroventral tip broad and squarish.** Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. **Adipose eyefold relatively well developed, covering about 1 and 2 of iris.** Gill rakers on lower limb of first gill arch 43 to 60, shorter than longest filaments. Origin of first dorsal fin nearer tip of snout than base of caudal fin. Origin of fully erected second dorsal fin on vertical through anterior third of anal fin; **both fins moderately scaled (i.e. basally but not distally) or well scaled (on all parts).** **Anal fin with III spines and 9 (rarely 8 or 10) soft rays in adults** (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 15 to 18 soft rays; short, not reaching origin of first dorsal fin; pectoral fins 14 to 18% standard length, 67 to 76% head length; pectoral axillary scale rudimentary. Pectoral and pelvic fins shorter than head minus snout. Scales weakly ctenoid on flanks, strongly ctenoid ventrally; **33 to 43 (usually 35 to 40) scales in longitudinal series, 11 to 13 in transverse series;** 7 to 10 scales in longitudinal series anterior to tip of pectoral fins and 23 or 24 anterior to origin of second dorsal fin; **17 to 20 in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with wide sulcus and **2 large, flap-like valves, the lower (anterior) one fimbriate.** Pyloric caeca 4 to 6 (usually 5). **Colour:** bluish or greenish dark dorsally, silver laterally and ventrally; several longitudinal dark stripes along scale rows on middle part of trunk; upper part of iris orange; dorsal fins darkish; caudal fin with broad, dark margin and dark at origin, but pale in middle part; anal fin partially darkish; pectoral fins darkish, basal part of uppermost soft ray black but not forming distinctive spot; pelvic fins white.

Size: Maximum reported standard length 30 cm.

Habitat, biology, and fisheries: Inhabits inlet waters and estuaries of rivers. Used as a food fish in Japan but perhaps not commercially fished in the Western Central Pacific.

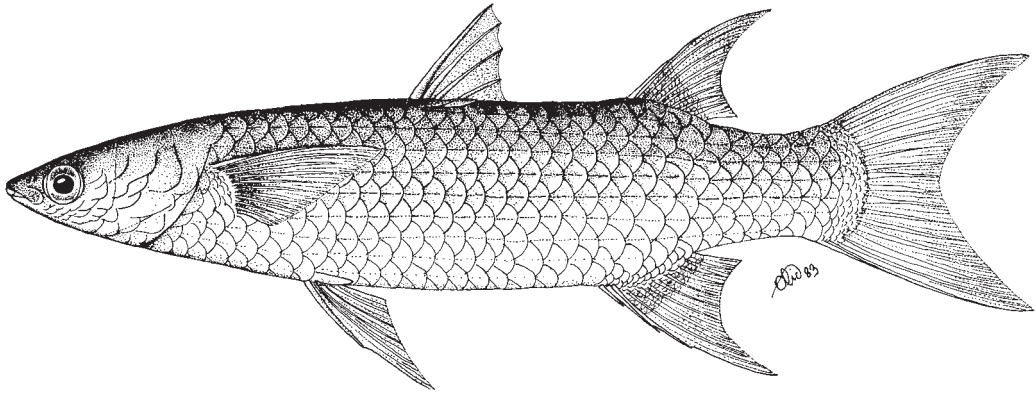
Distribution: From Japan (except northern Hokkaido) through to Ryukyu Islands and Taiwan Province of China, and coasts from Shanghai to Peihar and Hainan Island. Might occur as a very rare visitor to the northern extreme of the area.



Liza alata (Steindachner, 1892)

Frequent synonyms / misidentifications: *Mugil diadema* Gilchrist and Thompson, 1911; *Pteromugil diadema* (Gilchrist and Thompson, 1911); *Moolgarda (Planiliza) ordensis* Whitley, 1945 / ?*Liza melinoptera* (Valenciennes, 1836).

FAO names: En - Diamond mullet; Fr - Mulet diamant; Sp - Lisa diamante.

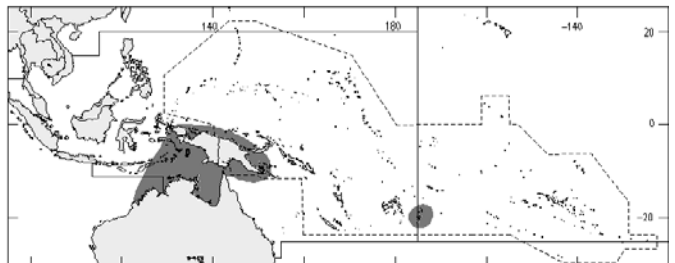


Diagnostic characters: A medium to large species. **Body moderately deep, but elongate, and compressed at caudal peduncle;** body depth at first dorsal fin 20 to 25% standard length; depth at anal fin 21 to 22% standard length. Head usually as wide as deep, dorsally flattened. Eye diameter 16 to 20% head length. Snout longer than eye diameter and more or less pointed. Dentary symphysis obtuse (blunt). Lips thin. **Upper lip with outer row of very small, close-set, unicuspid teeth and an inner band of up to 5 irregular rows of smaller teeth; inner band well spaced from outer row.** Lower lip directed forwards with minute ciliiform teeth present or absent. Vomer edentate. **Maxilla sigmoidally curved near posterior tip, which is visible posteroventral to corner of closed mouth. Serrate anteroventral edge of preorbital with weak kink; posteroventral tip broad and squarish.** Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. Adipose eyefold poorly developed as rim around eye. Gill rakers on lower limb of first gill arch 64 to 79, shorter than longest filaments. Origin of first dorsal fin more or less midway between tip of snout and base of caudal fin, or slightly nearer snout. Origin of fully erected second dorsal fin on vertical through anterior one-third to two-thirds of anal fin; **both fins well scaled on all parts and falcate. Anal fin with III spines and 9 soft rays in adults** (II spines and 10 soft rays in juveniles about 30 mm standard length or less). **Caudal fin deeply forked.** Pectoral fins with I 'spine' and 16 soft rays; not reaching origin of first dorsal fin; pectoral fins 18 to 20% standard length, 78 to 95% head length, **falcate, greater than length of head minus snout;** pectoral axillary scale absent. **Pelvic fins almost equal to pectoral-fin length, longer than head minus snout, falcate. Ctenoid scales in longitudinal series 29 to 32; 10 to 12 in transverse series;** 7 scales in longitudinal series anterior to tip of pectoral fins and 19 to 22 (usually 19 or 20) anterior to origin of second dorsal fin; **16 scales in transverse series entirely around caudal peduncle. Pharyngobranchial organ with anterior valve a fleshy swelling, posterior valve a shallow fold.** Pyloric caeca 5. **Colour:** light brown dorsally, flanks silvery, abdomen whitish; **scales on flanks, especially upper part of body, with dark margins giving reticulate appearance, and with dark horizontal streak;** first dorsal fin hyaline with olive spines; second dorsal and pectoral fins grey; anal and caudal fins dusky with yellow or orange margin; pelvic fins bright yellow or orange.

Size: Maximum reported total length 75 cm; commonly to 35 cm total length.

Habitat, biology, and fisheries: Inhabits coastal waters, estuaries; sometimes ascending rivers into fresh water. Preferring slow moving waters or still lagoons. Water often turbid, over muddy substrate, and with well-substantiated aquatic vegetation; water temperature in range 25° to 35°C. Feeds on microalgae, detritus, terrestrial plant material, and aquatic insects. Perhaps catadromous.

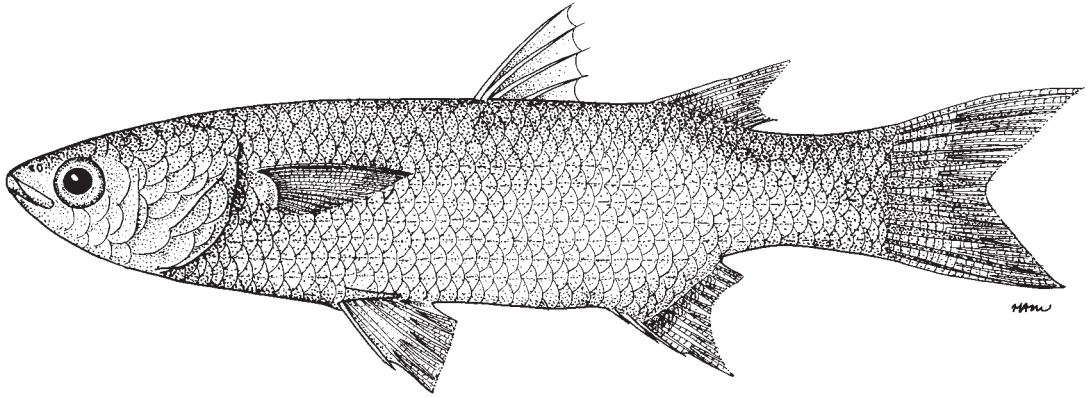
Distribution: Reported from South and East Africa, Madagascar, northern Australia (Timor Sea), New Guinea, and Tonga.



Liza argentea (Quoy and Gaimard, 1825)

Frequent synonyms / misidentifications: *Mugil australis* Steindachner, 1879; *M. ferrandi* Cuvier, 1929; *M. peronii* Valenciennes, 1836 / *Liza ramsayi* (Macleay, 1883); *Aldrichetta forsteri* (Valenciennes, 1836).

FAO names: En - Flat-tail mullet.

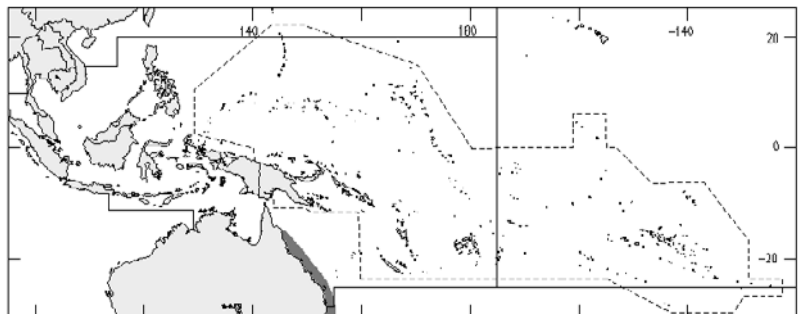


Diagnostic characters: A small to medium-sized species. Body rather slender but with deep, moderately compressed caudal peduncle. Head deeper than wide, somewhat flattened dorsally. Eye diameter 21 to 31% head length. Snout length approximately equals eye diameter and is more or less pointed. Dentary symphysis 90° or more obtuse. Lips thin, **each with a single row of minute setiform teeth** (almost invisible to naked eye). Vomer toothed. **Maxilla sigmoidally curved near posterior tip, which is visible posteroventral to corner of closed mouth.** Preorbital relatively large; **serrate anteroventral edge slightly kinked; posteroventral tip broad and squarish.** Anterior and posterior nostrils close together. Adipose eyefold rudimentary, forming narrow rim around eye. **Gill rakers on lower limb of first gill arch 100 to 150, very long, equal to or longer than longest filament.** Origin of first dorsal fin usually nearer base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through anterior quarter to half of anal fin; **both fins moderately scaled on anterior and basal parts.** Second dorsal fin with 9 or 10 soft rays. **Anal fin with III spines and 10 soft rays in adults** (II spines and 11 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 14 to 16 soft rays; not reaching origin of first dorsal fin; 19 to 23% standard length, 71 to 78% head length; pectoral axillary scale absent. Scales weakly ctenoid; **34 to 38 in longitudinal series, 13 to 15 ½ in transverse series;** 10 to 12 scales in longitudinal series anterior to tip of pectoral fins and 23 to 25 scales anterior to origin of second dorsal fin; **18 to 20 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with broad, deep, sulcus and 2 valves. Pyloric caeca 2. **Colour:** dorsally steely-blue or light brown; flanks silvery with dark longitudinal stripes formed by alternating silver and dark on scales; abdomen silvery; gold patch on posteroventral corner of operculum; iris purple with gold flecks; dorsal, caudal and, to a lesser extent, anal fins dusky, but may have golden-yellow margins; origin of pectoral fins dark.

Size: Maximum total length perhaps 45 cm; commonly between 15 and 22 cm.

Habitat, biology, and fisheries: Adults inhabit brackish waters. Abundant in estuaries; also found in shallows, bogs, and saline lagoons. Fish younger than one year can be found in fresh waters, but not when older. Forms schools and often jumps at surface. Spawning probably occurs at sea. Feeds on benthic microscopic plants and animals. Fished from shallow, coastal waters and estuaries using gill nets and beach seines. Marketed fresh and filleted.

Distribution: Southern Australia from Geraldton (Western Australia) to Cooktown (Queensland).

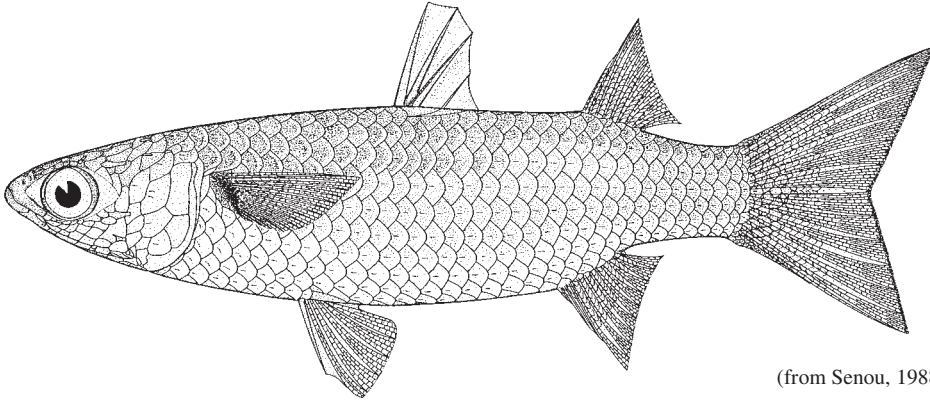


Liza macrolepis (Smith, 1846)

LZM

Frequent synonyms / misidentifications: *Mugil borneensis* Bleeker, 1851; *M. troscheli* Bleeker, 1858 / *Liza alata* (Steindachner, 1892); *L. melinoptera* (Valenciennes, 1836); *L. parsia* (Hamilton Buchanan, 1822); *L. subviridis* (Valenciennes, 1836).

FAO names: **En** - Largescale mullet; **Fr** - Mulet à grandes écailles; **Sp** - Lisa godeya.



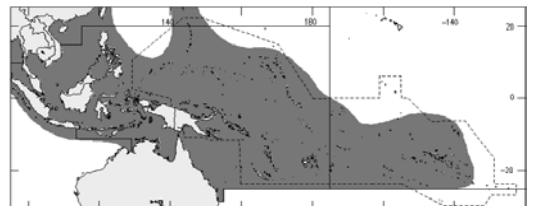
(from Senou, 1988)

Diagnostic characters: A medium to large species; body moderately robust; depth at first dorsal fin 26 to 31% standard length; depth at anal fin 23 to 25% standard length. Head depth equal to or greater than width; head flattened dorsally. Eye diameter 21 to 30% head length. Snout length less than or equal to eye diameter, moderately pointed. Dentary symphysis obtuse. Lips thin. **Upper lip with outer row of very close-set, small, peg-like unicuspid teeth, forming fine comb; 1 or 2 irregular rows of smaller, more wide-set teeth; inner rows well spaced from outer row.** Lower lip directed forwards with small ciliiform teeth present or absent. Vomer toothed (sometimes not evident). **Maxilla stocky and sigmoidally curved near posterior tip, which is visible posteroventral to corner of closed mouth. Serrate anteroventral edge of preorbital with moderate to distinct kink; posteroventral tip broad and squarish.** Distance between anterior and posterior nostril less than or equal to maximum diameter of posterior nostril. Adipose eyefold poorly developed as rim around eye or absent. Gill rakers on lower limb of first gill arch 35 to 78, shorter than longest filament. Origin of first dorsal fin closer to base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through anterior quarter to half of anal fin; **both fins scaled on anterobasal parts and often well scaled on all parts. Anal fin with III spines and 9 (rarely 8 or 10) soft rays in adults** (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I spine and 15 to 18 (usually 16, rarely 14) soft rays; not reaching origin of first dorsal fin; pectoral fins 17 to 23% (usually 20%) standard length, 65 to 85% (usually 75 to 80%) head length; less than length of head minus snout; pectoral axillary scale rudimentary or absent. **Ctenoid scales in longitudinal series 31 to 35 (usually 32 or 33); 10 or 11 in transverse series;** 7 to 9 scales in longitudinal series anterior to tip of pectoral fins and 19 to 23 (usually 21 or 22) anterior to origin of second dorsal fin; **16 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; broad sulcus with teeth on anterior border slightly larger than other teeth; **anterior and posterior valves are large flaps.** Pyloric caeca 4 to 6. **Colour:** greenish grey dorsally; flanks and abdomen silvery; fins grey or bluish with dusky margins and may appear yellowish at base; pectoral fins with golden base, and perhaps a dark spot.

Size: Maximum reported total length about 60 cm; commonly to 26 cm total length.

Habitat, biology, and fisheries: Schools in shallow coastal waters, estuaries, and backwaters. Can survive in ponds at 87% salinity; also sometimes enters fresh water. Juveniles might be found in shallow inundated areas along coast. Forms large schools during spawning at sea. Feeds on small algae, diatoms, foraminifera, benthic polychaets, crustacea, molluscs, organic matter and detritus; fry take copepods and floating algae. Fished throughout its range; taken with gill nets, cast nets, stake nets, barrier nets, lift nets, beach seines, and pouch nets during spawning. Marketed fresh; roe also marketed.

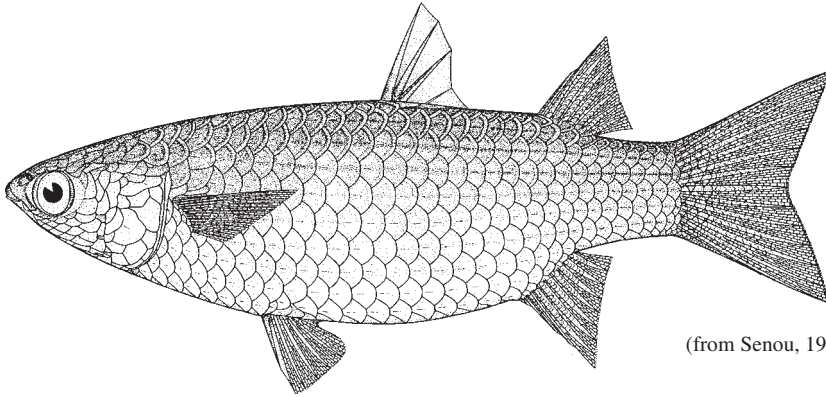
Distribution: Common throughout most of Indo-Pacific from East Africa and Red Sea to Marquesas and Tuamotu islands; north to Japan and Marianas Islands.



Liza melinoptera (Valenciennes, 1836)

Frequent synonyms / misidentifications: *Mugil ceramensis* Bleeker, 1852; *M. oligolepis* (of Smith, 1935) / *Liza alata* (Steindachner, 1892); *L. macrolepis* (Smith, 1846); *L. parmata* (Cantor, 1850); *L. subviridis* (Valenciennes, 1836); *L. vaigiensis* (Quoy and Gaimard, 1825).

FAO names: **En** - Otomebora mullet; **Fr** - Mulet otomebora; **Sp** - Lisa otomebora.



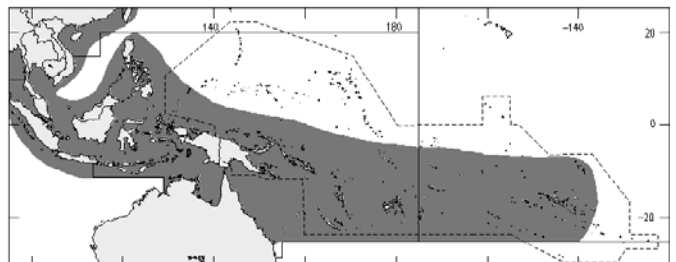
(from Senou, 1988)

Diagnostic characters: A small to medium-sized species; body distinctly robust or deep in profile; **caudal peduncle compressed; body depth at origin of first dorsal fin 27 to 31% (perhaps up to 34%) standard length; depth at origin of anal fin 23 to 29% standard length.** Head wider than deep and depressed. Eye diameter 24 to 28% head length. Snout shorter than eye diameter, blunt in profile. Dentary symphysis obtuse. Lips thin. **Upper lip with outer row of close-set, small setiform teeth and inner row of more sparse teeth, well embedded in lip tissue.** Lower lip directed forwards with small ciliiform teeth present or absent. Vomer edentate. **Maxilla stocky and sigmoidally curved near posterior tip, which is often visible posteroventral to corner of closed mouth. Serrate anteroventral edge of preorbital with moderate to distinct kink; posteroventral tip broad and squarish.** Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. **Adipose eyefold usually only a narrow rim around eye. Gill rakers on lower limb of first gill arch 45 to 59 (perhaps more),** shorter than longest filaments. Origin of first dorsal fin distinctly closer to base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through anterior half to three-quarters of anal fin; **both fins moderately scaled (i.e. on all but distal parts) or well scaled on all parts. Anal fin with III spines and 9 (rarely 8 or 10) soft rays in adults** (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 14 or 15 (infrequently 16) soft rays; not reaching origin of first dorsal fin; pectoral fins 18 to 23% standard length, 67 to 80% (infrequently up to 89%) head length, less than or equal to length of head minus snout; pectoral axillary scale rudimentary or absent. Scales ctenoid, **usually 26 to 29 (perhaps up to 31) in longitudinal series; 9 to 11 in transverse series; 7 scales in longitudinal series anterior to tip of pectoral fins** and 18 to 20 anterior to origin of second dorsal fin; **16 in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; **anterior valve a small finger-like process, posterior valve a large fold with papillate margin.** Pyloric caeca 5 or 6. **Colour:** olive-brown dorsally, silvery or white ventrally; distal margins of dorsal fins and **entire caudal fin dusky.**

Size: Maximum reported standard length 30 cm; commonly to 18 cm total length.

Habitat, biology, and fisheries: Schools in shallow coastal waters; enters lagoons, estuaries and rivers, to feed; fry may be found in shallower areas of these regions. Feeds on plant detritus, microalgae, minute bottom-living organisms, and organic matter contained in sand and mud; juveniles take planktonic algae. Fished from shallow coastal waters, estuaries, backwaters, and lagoons using cast nets, stake nets, beach seines, and gill nets. Marketed fresh.

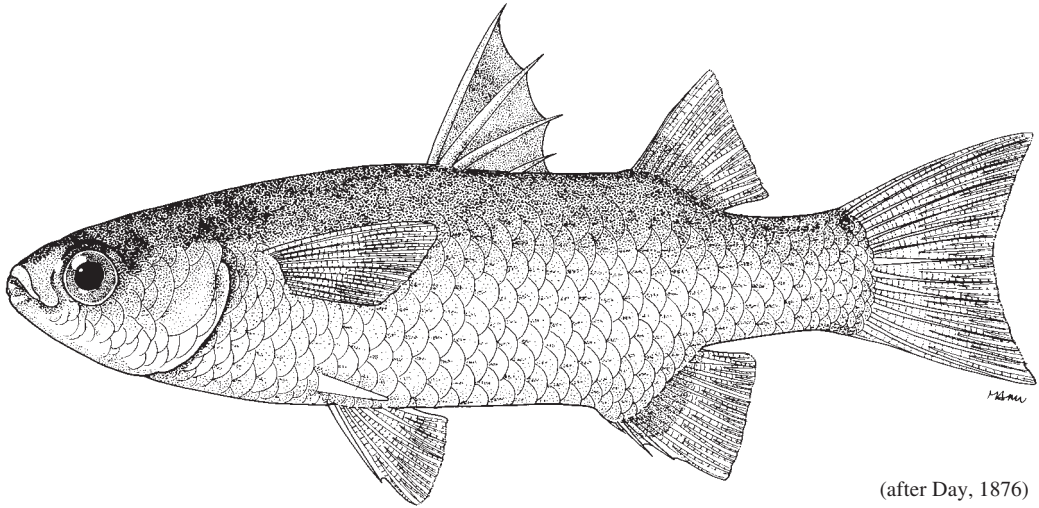
Distribution: Indo-Pacific from East Africa to the Marquesas Islands; north to South China Sea and south to tropical Australia and Tonga.



Liza parmata (Cantor, 1850)

Frequent synonyms / misidentifications: *Liza oligolepis* (Bleeker, 1859) / *Liza macrolepis* (Smith, 1846); *L. melinoptera* (Valenciennes, 1836); *L. subviridis* (Valenciennes, 1836).

FAO names: En - Broadmouthed mullet.



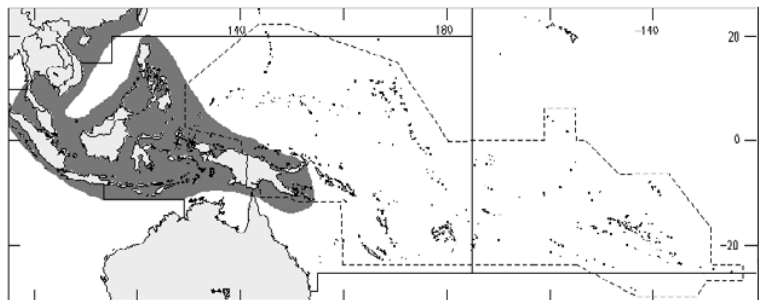
(after Day, 1876)

Diagnostic characters: A medium-sized species. **Deep bodied and compressed at caudal peduncle; body depth at first dorsal fin 30 to 37% standard length; depth at anal fin 29 to 33% standard length.** Head deeper than wide and flat dorsally. Eye diameter 24 to 29% head length. Snout length less than or equal to eye diameter, and moderately blunt in profile. Dentary symphysis very obtuse (blunt); **mouth appearing transverse in ventral view.** Lips thin. **Upper lip with 1 row of small, setiform teeth.** Lower lip directed forwards and **lacking teeth.** Vomer edentate. **Maxilla sigmoidally curved near posterior tip, which is visible posteroventral to corner of closed mouth.** **Serrate anteroventral edge of preorbital with distinct kink; posteroventral tip broad and squarish.** Distance between anterior and posterior nostril usually less than or equal to maximum diameter of posterior nostril. Adipose eyefold poorly developed as rim around eye or absent. **Gill rakers on lower limb of first gill arch 30 to 45,** shorter than longest filaments. Origin of first dorsal fin distinctly closer to base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through anterior quarter to half of anal fin; **both fins scaled on anterobasal parts and may be scaled distally.** **Anal fin with III spines and 9 soft rays in adults** (II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I spine and 14 or 15 (rarely 13) soft rays; almost reaching origin of first dorsal fin; pectoral fins 20 to 26% standard length, 83 to 91% head length; pectoral axillary scale rudimentary or absent. Scales cycloid or ctenoid (thoracic and abdominal scales ctenoid); **23 to 32 (usually 25 to 28) scales in longitudinal series, 9 or 10 (rarely 11) in transverse series; 9 or 10 (rarely 8 or 11) scales in longitudinal series anterior to tip of pectoral fins and 19 to 22 anterior to origin of second dorsal fin; 15 or 16 in transverse series entirely around caudal peduncle.** **Pharyngobranchial organ with anterior valve a long, low fold with a small ventral finger-like process, and posterior valve a moderate size, more or less fimbriate flap.** Pyloric caeca 5 to 9. **Colour:** greenish dorsally, silvery ventrally.

Size: Maximum reported total length 30 cm.

Habitat, biology, and fisheries: Found in seas, estuaries, and rivers. No other available data.

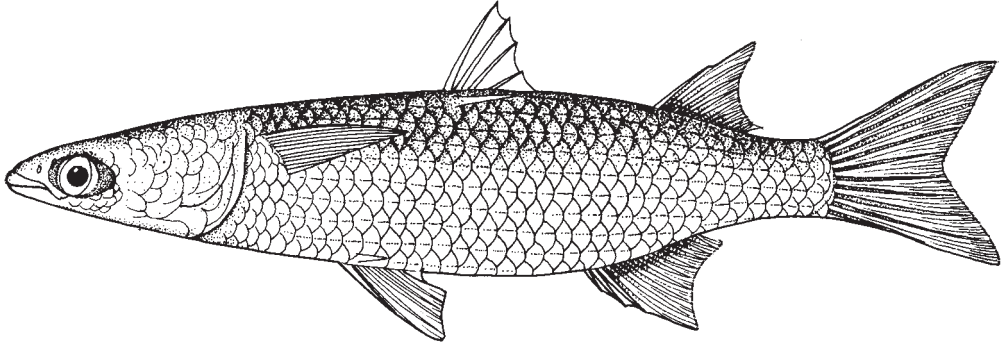
Distribution: Malaysia, Indonesia, New Guinea, Philippines, and South China Sea.



Liza planiceps (Valenciennes, 1836)

Frequent synonyms / misidentifications: *Mugil belanak* Bleeker, 1857; *M. tade* Forsskål, 1775; *Liza tade* (Forsskål, 1775) / *Liza parsia* (Hamilton Buchanan, 1822); *L. subviridis* (Valenciennes, 1836); *L. vaigiensis* (Quoy and Garmard, 1825).

FAO names: En - Tade mullet; Fr - Mulet tade; Sp - Lisa tade.

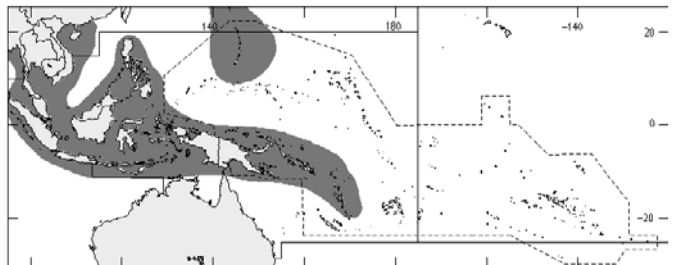


Diagnostic characters: A medium to large species. **Body elongate; depth at first dorsal fin 20 to 22% standard length; depth at anal fin 19 to 20% standard length. Head broad, depressed, pointed; head width greater than or equal to depth; head may appear somewhat bulging laterally. Eye diameter 14 to 33% head length, usually less than 20%. Snout length greater than or equal to eye diameter; pointed in profile. Dentary symphysis distinctly obtuse (blunt). Lips thin. Upper lip with outer row of fine, unicuspid, setiform teeth; inner band of 2 to 4 (perhaps 8) rows of smaller, finer, unicuspid setiform teeth. Lower lip directed forwards with 1 row of sparse ciliiform teeth present or absent. Vomer toothed. Maxilla sigmoidally curved near posterior tip, which is often visible posteroventral to corner of closed mouth. Serrate anteroventral edge of preorbital with distinct kink; posteroventral tip broad and squarish. Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. Adipose eyefold more or less developed, covering up to 1 and 2 of iris. Gill rakers on lower limb of first gill arch 48 to 70. Origin of first dorsal fin midway between tip of snout and base of caudal fin or slightly nearer the latter. Origin of fully erected second dorsal fin on vertical through anterior third to half of anal fin; both fins well scaled basally but distal parts are sometimes weakly scaled. Anal fin with III spines and 9 soft rays in adults (II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 15 to 16 soft rays; short, not reaching origin of first dorsal fin; pectoral fins 16 to 20% standard length, 70 to 80% head length, less than length of head minus snout; pectoral axillary scale rudimentary or absent. Pelvic fins shorter than head minus snout. Scales ctenoid, sometimes very weakly so; 30 to 35 in longitudinal series; 10 or 11 in transverse series; 8 or 9 scales in longitudinal series anterior to tip of pectoral fins and 21 to 23 anterior to origin of second dorsal fin; 16 scales in transverse series entirely around caudal peduncle. Pharyngobranchial organ with reduced denticulate area; broad sulcus; anterior valve a low fold and posterior valve a small, thin flap. Pyloric caeca 5. **Colour:** greenish brown dorsally, whitish ventrally; flanks with 5 to 7 indistinct longitudinal lines along scale rows.**

Size: Maximum reported total length 70 cm; commonly to 33 cm standard length.

Habitat, biology, and fisheries: Usually marine, found in schools in shallow coastal waters and lagoons. Also enters estuaries and rivers to feed. Juveniles might be found in rice fields and mangrove swamps. Spawning occurs at sea. Feeds on floating algae, minute benthic organisms, and organic material in sand and mud. Fished in shallow coastal waters, estuaries, and backwaters using gill nets, stake nets, beach seines, and cast nets. Marketed fresh, salted; perhaps also boiled (Thailand), canned or frozen (Australia). Roe marketed salted.

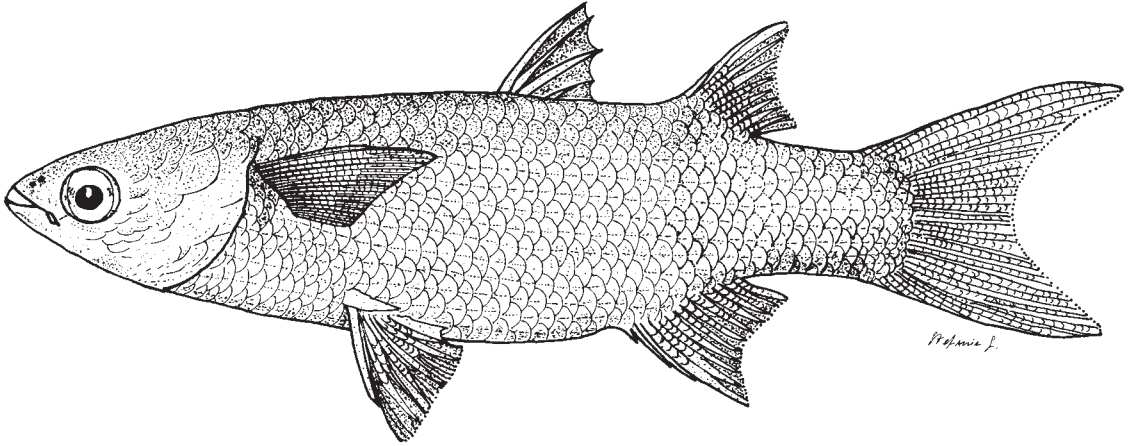
Distribution: Indo-Pacific; from Red Sea in west to China and Marianas Islands in north, and Vanuatu in south. Reports from tropical Australia might be misidentifications of other species.



Liza ramsayi (Macleay, 1883)

Frequent synonyms / misidentifications: *Gracimugil ramsayi* (Macleay, 1883); *Trachystoma ramsayi* (Macleay, 1883) / *Liza argentea* (Quoy and Gaimard, 1825).

FAO names: En - Ramsay's mullet.

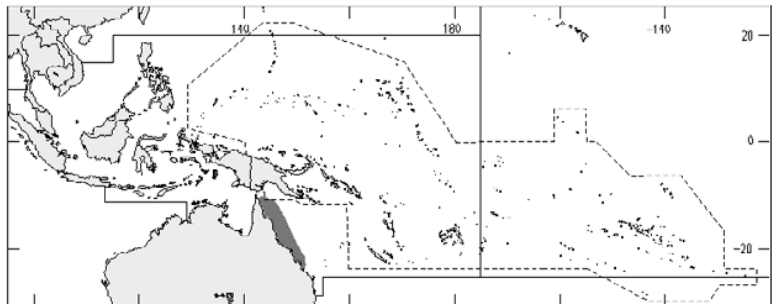


Diagnostic characters: A small to medium-sized species; morphologically very similar to *Liza argentea*, hence considered by some biologists as conspecific. Body moderately deep. Eye diameter 25% head length. Snout length more or less equals eye diameter and is pointed. Dentary symphysis 90° or more obtuse. Upper lip perhaps slightly thickened; lower lip thin. **Each lip with a single row of minute setiform teeth** (almost invisible to naked eye). Vomer toothed. **Maxilla sigmoidally curved near posterior tip, which is visible posteroventral to corner of closed mouth.** Preorbital relatively large; **serrate anteroventral edge slightly kinked; posteroventral tip broad and squarish.** Anterior and posterior nostrils close together. Adipose eyefold rudimentary, forming narrow rim around eye. **Gill rakers on lower limb of first gill arch extremely numerous and as long as gill filaments.** Origin of first dorsal fin nearer base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through anterior half of anal fin; **both fins moderately scaled. Second dorsal fin with 9 or 10 soft rays. Anal fin with III spines and 11 (rarely 10) soft rays in adults** (usually II, 12 in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 15 soft rays, not reaching origin of first dorsal fin; pectoral fins 21 to 25% standard length, 77 to 91% head length; pectoral axillary scale very small or absent. Scales cycloid dorsally, weakly ctenoid laterally and more distinctly ctenoid ventrally; **36 or 37 in longitudinal series, about 12 to 15 in transverse series; 10 scales in longitudinal series anterior to tip of pectoral fins and 23 anterior to origin of second dorsal fin.** **Colour:** bluish dorsally, silvery on flanks and abdomen; dark spot at origin of pectoral fins.

Size: Maximum reported fork length 26.1 cm.

Habitat, biology, and fisheries: Brackish waters. No fisheries data.

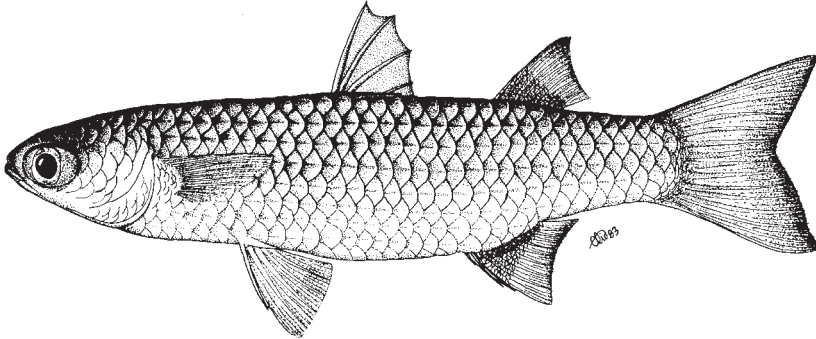
Distribution: Tropical Australia; all records coming from Queensland.



Liza subviridis (Valenciennes, 1836)

Frequent synonyms & misidentifications: *Mugil alcocki* Ogilby, 1908; *M. dussumieri* Valenciennes, 1836; *M. javanicus* Bleeker, 1852; *M. jerdoni* Day, 1876; *M. sudanensis* Bleeker, 1853 / *Liza macrolepis* (Smith, 1846); *L. parmata* (Cantor, 1850); *L. parsia* (Hamilton Buchanan, 1822); *L. planiceps* (Valenciennes, 1836); *L. vaigiensis* (Quoy and Gaimard, 1825).

FAO names: **En** - Greenback mullet; **Fr** - Mulet dos vert; **Sp** - Lisa lomo verde.

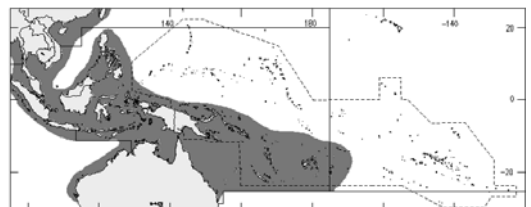


Diagnostic characters: A medium-sized species; body fusiform or not distinctly deep; **depth at first dorsal fin usually 22 to 26% standard length (but may reach 27 to 30%)**; **depth at anal fin 21 to 24% standard length (perhaps up to 26%)**. Head broad, but head depth usually equal to or greater than width; head dorsally flattened. Eye diameter 21 to 30% head length. Snout short and blunt, usually shorter than eye diameter. Dentary symphysis obtuse (blunt). Lips thin. **Upper lip with an outer row of very small, close-set unicuspid teeth and 1 or 2 irregular, inner rows of smaller, ciliiform teeth**. Lower lip directed forwards with 1 row of fine ciliiform teeth present or absent. Vomer edentate. **Maxilla sigmoidally curved near posterior tip, which is often visible posteroventral to corner of closed mouth. Serrate anteroventral edge of preorbital with moderate to distinct kink; posteroventral tip broad and squarish**. Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. **Adipose eyefold moderately developed, covering up to 1 and 2 of iris** (less distinct in specimens smaller than about 10 cm standard length). **Gill rakers on lower limb of first gill arch 40 to 68 (rarely 41 to 44)**, shorter than longest filaments. Origin of first dorsal fin midway between tip of snout and base of caudal fin, or just closer to latter. Origin of fully erected second dorsal fin on vertical through anterior one to two-thirds of anal fin; **both fins well scaled on all parts. Anal fin with III spines and 9 (rarely 8) soft rays in adults** (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 14 to 16 (usually 14 or 15) soft rays; short, not reaching origin of first dorsal fin; pectoral fins 16 to 22% standard length, 70 to 78% head length, less than length of head minus snout; pectoral axillary scale rudimentary or absent. **Ctenoid scales in longitudinal series 28 to 32 (rarely 26, 27, or 33); 9 to 11 (rarely 12) in transverse series; 7 or 8 (rarely 9) scales in longitudinal series anterior to tip of pectoral fins and 18 to 21 (usually 19 or 20) anterior to origin of second dorsal fin; 16 or 17 (rarely 15) in transverse series entirely around caudal peduncle.** **Pharyngobranchial organ usually with anterior valve as one or more small, finger-like processes, and posterior valve a small fold; but some putatively conspecific specimens have both valves developed as moderate size flaps.** Pyloric caeca 4 to 6. **Colour:** dark greenish dorsally, brownish over head, white ventrally; 3 to 6 indistinct, dark stripes along upper rows of scales; first dorsal fin greyish; second dorsal fin yellowish grey, with dusky margin; anal fin also with dusky margin; **caudal fin bluish with black margin**; pectoral fins yellowish and may have a blue spot at fin origin.

Size: Maximum reported standard length 40 cm; commonly to 25 cm total length.

Habitat, biology, and fisheries: Schools in shallow coastal waters and enters lagoons, estuaries, and fresh waters to feed. Juveniles might be found in rice fields and mangroves. Adults feed on microalgae, filamentous algae, diatoms, and benthic detrital material taken in with sand and mud; fry take zooplankton, diatoms, detrital material, and inorganic sediment. Fished using gill nets, cast nets, stake nets, lift nets, and beach seines. Marketed fresh and salted; perhaps also boiled (Thailand), canned or frozen (Australia). Roe marketed salted. Also used as a bait-fish.

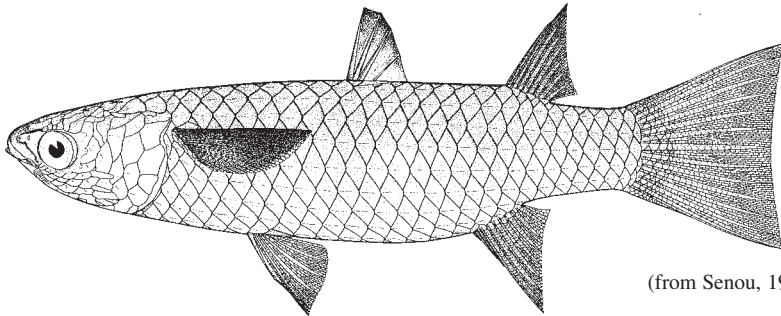
Distribution: Indo-Pacific from Red Sea to Samoa; north to Japan, where it is rare.



Liza vaigiensis (Quoy and Gaimard, 1825)

Frequent synonyms / misidentifications: *Liza waigiensis* (Quoy and Gaimard, 1825); *Ellochelon vaigiensis* (Quoy and Gaimard, 1824) / *Liza melinoptera* (Valenciennes, 1836); *L. parmata* (Cantor, 1850).

FAO names: **En** - Squartail mullet (= Diamond-scale mullet, Fishing Areas 57 and 71); **Fr** - Mulet mopiropi; **Sp** - Lisa mopiropi.

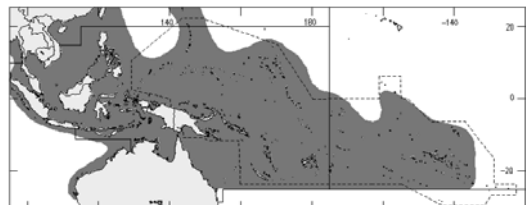


Diagnostic characters: A medium to large species. Body robust; depth at first dorsal fin 20 to 27% standard length; depth at anal fin 23 to 25% standard length. Caudal peduncle deep. **Head broad, wider than deep (except in young)** and dorsally flattened. Eye diameter 17 to 33% head length. Snout longer than eye diameter in adults but shorter in juveniles. Dentary symphysis obtuse (blunt). Lips thin. **Upper lip with 1 or 2 rows of very short, unicuspid, setiform teeth** (absent in specimens over about 25 cm standard length). **Lower lip directed forwards with 1 row of fine ciliiform teeth** (absent in specimens over 10 cm standard length). Vomer edentate. **Maxilla slightly sigmoidally curved near posterior tip, which is visible posteroventral to corner of closed mouth. Serrate anteroventral edge of preorbital with weak kink; posteroventral tip broad and squarish.** Distance between anterior and posterior nostril less than or equal to maximum diameter of posterior nostril. Adipose eyefold poorly developed as rim around eye. Gill rakers on lower limb of first gill arch 40 to 67, shorter than longest filaments. Origin of first dorsal fin distinctly closer to base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through anterior third to half of anal fin in advance of second dorsal fin; **both fins always well scaled basally, and more or less heavily scaled on distal parts. Anal fin with III spines and 8 soft rays (rarely 7 or 9) in adults** (usually II spines and 9 soft rays in juveniles about 30 mm standard length or less). **Caudal fin square.** Pectoral fins with I 'spine' and 15 to 18 (usually 15) soft rays; short, just reaching origin of first dorsal fin; pectoral fins 19 to 26% standard length, 77 to 92% head length; greater than length of head minus snout; pectoral axillary scale absent. Scales weakly ctenoid (cycloid in juveniles), **25 to 29 (commonly 26) in longitudinal series, 8 to 10 in transverse series**; 7 to 9 scales in longitudinal series anterior to tip of pectoral fins and 17 to 20 (usually 17 or 18) anterior to origin of second dorsal fin; **16 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with broad sulcus; **anterior valve a large fleshy lobe and posterior valve a small papilla. Pyloric caeca much divided; up to 23 in about 2 bunches.** **Colour:** olive-brown dorsally, flanks silvery, abdomen white or suffused pale yellow; **about 6 longitudinal stripes on flanks formed by longitudinal marks on scales**; scales also with darkened margins giving slight chequered appearance to flanks; iris with yellow patches; margins of fins dusky, otherwise yellowish white; pelvic fins pale except for darker margins; **caudal fin distinctly yellow; pectoral fins completely black in small fish; lower section yellowish in adults.**

Size: Maximum reported total length about 60 cm; commonly to 35 cm total length.

Habitat, biology, and fisheries: Common along shallow coastal areas and protected sandy shores in lagoons, reef flats, estuaries, and coastal creeks. Usually within tidal influence, but may enter fresh water, ascending up to about 10 km into rivers. Juveniles might be found in rice fields and mangroves. Forms shoals. Spawning probably occurs at sea. Feeds on small algae, diatoms, benthic polychaets, molluscs, crustaceans, as well as living and detrital organic matter; fry take copepods and floating algae. Caught in cast nets, stake nets, beach seines, and gill nets. Marketed fresh and salted; perhaps also boiled (Thailand), canned or frozen (Australia). Roe marketed salted. Juveniles used as bait fish.

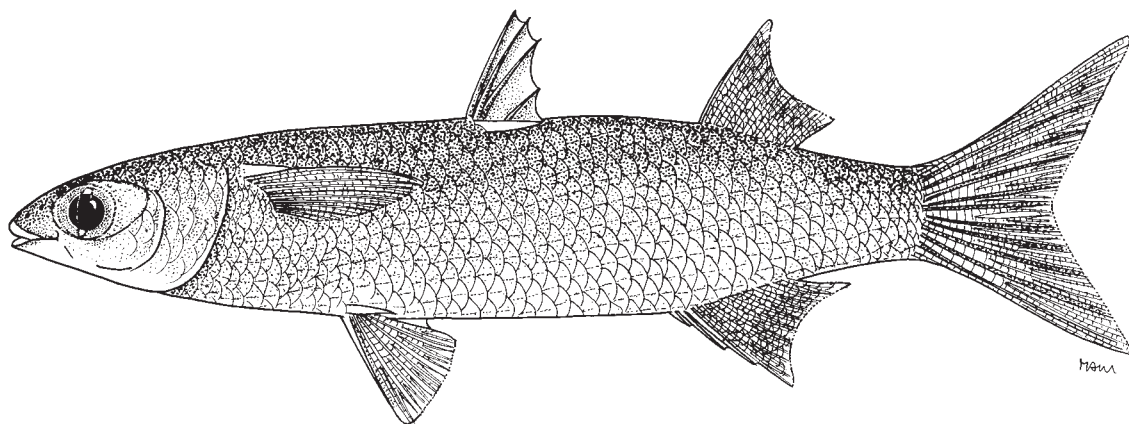
Distribution: Throughout the Indo-Pacific from East Africa to Tuamotu Islands; north to southern Japan, south to southern Great Barrier Reef and New Caledonia.



Mugil broussonneti Valenciennes, 1836

Frequent synonyms / misidentifications: *Mugil macrolepidotus* of Richardson, 1846; *?Myxus malayanus* Herre, 1936 / *?Mugil cephalus* Linnaeus, 1758; *?Valamugil speigleri* (Bleeker, 1859).

FAO names: En - Broussonnet's mullet.



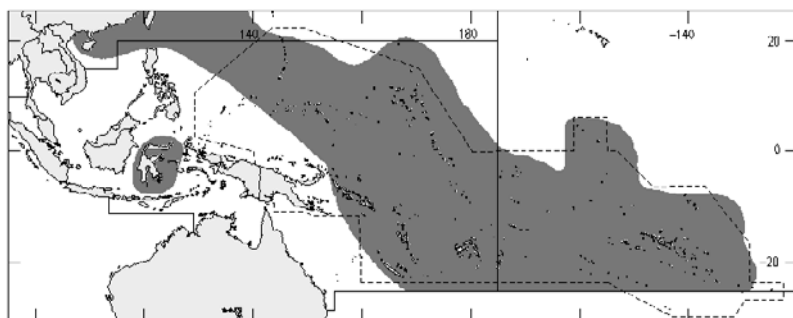
Diagnostic characters: Apparently a small species, but may grow larger than reported. Head dorsally broad and flat, but deeper than wide. Snout length equal to or less than eye diameter; snout more or less blunt in profile. **Dentary symphysis acute (pointed)**. Lips thin, lower lip directed forwards. **Upper lip with 2 rows of small, close-set, unicuspid, setiform teeth; tips of teeth in outer row recurved. Lower lip with 1 row of small, unicuspid, setiform teeth.** Vomer edentate. **Maxilla and serrate anteroventral edge of preorbital straight. Preorbital posteroventrally slender with pointed tip.** Distance between anterior and posterior nostril equal to or greater than maximum diameter of posterior nostril. **Adipose eyefold extensive over iris (except in specimens about 30 mm standard length or less).** Gill rakers on lower limb of first gill arch 32 to 68. Origin of fully erected second dorsal fin on vertical through anterior third of anal fin; **both fins moderately or well scaled on all parts.** Second dorsal fin with 9 or 10 soft rays. **Anal fin with III spines and 9 soft rays in adults** (II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 16 soft rays, not reaching origin of first dorsal fin; pectoral fins 18 to 21% standard length, 68 to 80% head length. **Moderately long pectoral axillary scale.** Scales ctenoid, not covered by minute secondary, cycloid scales. **Scales in longitudinal series 37 to 39; about 12 or 13 in transverse series; 24 or 25 scales in longitudinal series anterior to origin of second dorsal fin; 18 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; broad, deep, sulcus; **single, large valve**, often shorter than depth of its base. Pyloric caeca 2. **Colour:** dark dorsally, flanks silvery, whitish ventrally.

Size: Maximum reported standard length 19.4 cm.

Habitat, biology, and fisheries: Apparently a rare species with little or no available data.

Distribution: Very difficult to determine due to paucity of records. Perhaps ranging from south China through south Pacific. Possibly from Celebes, but no confirmed reports from Indonesia.

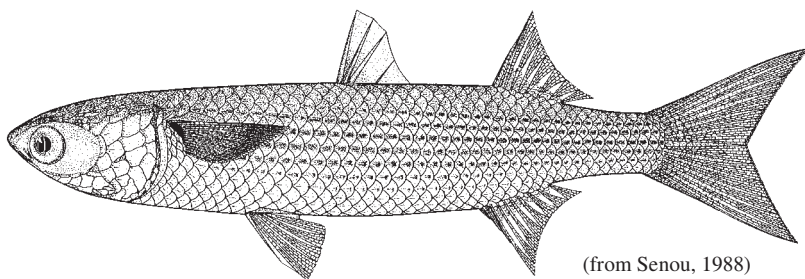
Remarks: Considered by some biologists as conspecific with *Mugil cephalus* because of the close morphological similarity.



***Mugil cephalus* Linnaeus, 1758**

Frequent synonyms / misidentifications: *Mugil cephalotus* Valenciennes, 1836; *M. chaptalii* Eydoux and Souleyet, 1841; *M. dobula* Günther, 1861; *M. japonicus* Temminck and Schlegel, 1845; *M. oeur* Forsskål, 1775; *M. öur* Forsskål, 1775 / None.

FAO names: En - Flathead mullet; Fr - Mulet à grosse tête; Sp - Lisa pardete.



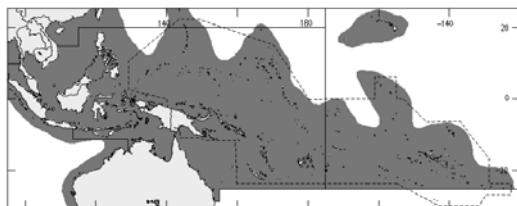
(from Senou, 1988)

Diagnostic characters: Medium to large species. Head dorsally broad and flat, but deeper than wide. Snout length equal to or less than eye diameter; snout more or less blunt in profile. **Dentary symphysis 90° or more acute.** Lips thin, lower lip directed forwards. **Upper lip with 1 or 2 outer rows of moderately close-set, unicuspid teeth and 1 to 5 inner rows of smaller, bicuspid teeth; inner, bicuspid teeth well spaced from outer, unicuspid teeth. Lower lip with outer row of moderately close-set unicuspid teeth; 1 or more inner rows of smaller, bicuspid teeth present or absent.** Vomer edentate. **Maxilla and serrate anteroventral edge of preorbital straight. Preorbital posteroventrally slender with pointed tip.** Distance between anterior and posterior nostril equal to or greater than maximum diameter of posterior nostril. **Adipose eyefold extensive over iris (except in specimens about 30 mm standard length or less).** Gill rakers on lower limb of first gill arch 50 to 90. Origin of fully erected second dorsal fin just posterior to vertical level of origin of anal fin; **both fins scaled only anterobasally.** Second dorsal fin with 9 soft rays. **Anal fin with III spines and 8 (rarely 9) soft rays in adults** (usually II spines and 9 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 15 to 17 soft rays, not reaching origin of first dorsal fin; pectoral fins 16 to 21% standard length, 61 to 83% head length. **Long pectoral axillary scale.** Scales very weakly ctenoid; **minute cycloid scales superimposed on main body scales, particularly on occipital region.** Longitudinal series scale count can vary from 36 to 44 in *Mugil cephalus*, but **usually in range 38 to 42** for specimens from the area; **13 to 15 (rarely 16) in transverse series;** 25 or 26 in longitudinal series anterior to origin of second dorsal fin; **19 to 21 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; broad, deep, sulcus; **single, large valve,** often shorter than depth of its base. Pyloric caeca 2. **Colour:** specimens caught from sea olive-green dorsally, flanks silvery and abdomen off-white; **about 7 longitudinal dark stripes along flanks, following rows of scales; these stripes less conspicuous ventrally;** fish from estuarine waters have duller flanks and suffused deep blue or dirty brown dorsally; fins dusky; dorsal fins perhaps greyish blue; anal and caudal fin may be yellowish green; pectoral fins have whitish margin and distinct, dark purple spot at origin; pelvic fins pale yellow.

Size: Maximum reported total length 91 cm; commonly to 35 cm total length.

Habitat, biology, and fisheries: Inhabits inshore marine waters, estuaries, lagoons, and rivers; tolerant of water temperatures from 12° to 25°C and salinities from hypersaline to fresh water. Adults roaming; forming schools and sometimes jumping; but fish forage singly. First spawning in third year; mature fish group in estuaries, form shoals, and move out to sea to spawn in surface waters. Spent fish return to brackish and fresh waters of estuaries, rivers, or lakes. Newly hatched fry migrate to estuaries and swim upstream. Juveniles found in sheltered lagoons and bays. Immature "hardgut" fish make preliminary migrations out to sea but do not spawn, and return without feeding (hence "hardgut"). Adults feed on fine particulate material, detritus, microscopic algae, and animals. Major commercial fishery; represents 1/2 to the entire mullet landings in eastern Australia and Tonga. Caught from beaches and estuaries using gill nets, cast nets, stake nets (barrier nets), lift nets, beach seines, fish corrals. Also used in aquaculture. Marketed fresh, salted, and frozen; roe sold fresh or smoked.

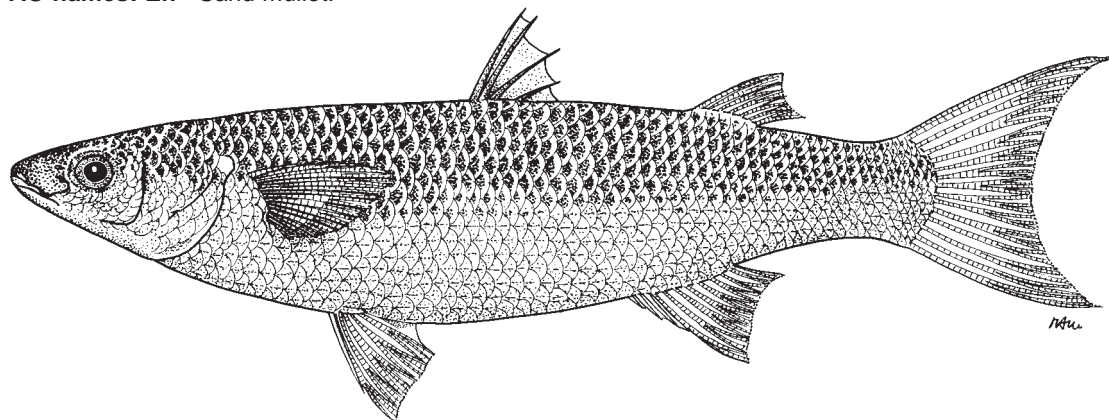
Distribution: Worldwide in tropical, subtropical, and warm temperate waters, although less abundant in tropics and apparently rare in Indonesia.



Myxus elongatus Günther, 1861

Frequent synonyms / misidentifications: None / None.

FAO names: En - Sand mullet.

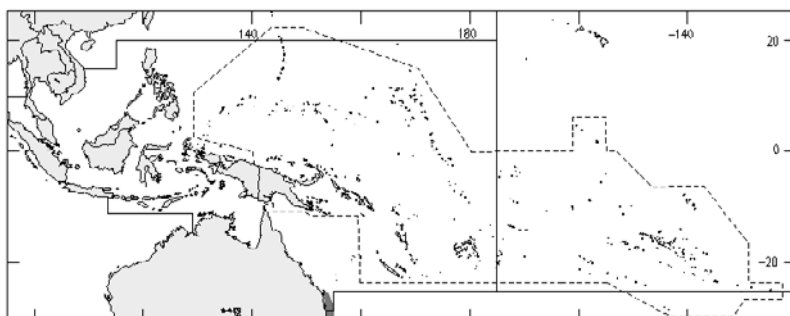


Diagnostic characters: A small to medium-sized species; body moderately slender. Head relatively flattened dorsally. **Snout long, longer than eye diameter, pointed in profile.** Dentary symphysis obtuse (blunt) in large specimens (less so in small specimens). Lips thin. **Upper lip with 1 row of spatulate teeth with constricted tips.** Lower lip with 1 row of fine ciliiform teeth at edge of lip; a few, scattered teeth sometimes present behind these. Vomer toothed. **Maxilla stocky, only slightly sigmoidally curved near posterior tip. Preorbital large; serrate anteroventral edge weakly concave; posteroventral tip blunt or squarish.** Anterior and posterior nostrils close. **Adipose eyefold absent. Gill rakers on first gill arch as long as longest gill filaments.** Origin of first dorsal fin approximately midway between tip of snout and base of caudal fin, or nearer the latter. Origin of fully erected second dorsal fin on vertical through anterior third of anal fin; both fins scaled only anterobasally. Anal fin with III spines and 9 soft rays in adults (II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 15 or 16 soft rays, short, not reaching origin of first dorsal fin; pectoral fins 17 to 19% standard length, **67 to 71% head length; pectoral axillary scale absent. Scales cycloid except for those on breast, which are ctenoid. Scales in longitudinal series 43 to 46; 13 ½ to 16 in transverse series; 29 or 30 scales in longitudinal series anterior to origin of second dorsal fin; 19 or 20 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; wide sulcus; **valve as ventrally placed, double papillose pad.** Pyloric caeca 2. **Colour:** dark olive-green or reddish brown dorsally, greenish wash on upper flanks, lower flanks silvery; gold blotch on operculum; golden-yellow iris around dark eye; fins greenish brown, except anal fin with white margin; black spot at base of pectoral fins.

Size: Maximum reported total length 40 cm, but this is unusual; certainly commonly to 20 cm total length, and specimens up to 28 cm total length might not be rare.

Habitat, biology, and fisheries: Inhabits open coastline and bays. Common in brackish water, over shallow-water sand bars, river mouths, ocean inlets, offshore island lagoons, and seagrass meadows; preferring cleaner conditions than other estuarine mullets. Found at depths of 1 to 10 m, forming schools. Perhaps spawning near estuary mouths or in sea. First year fish found in fresh water, but seldom thereafter. Feeds during the day, sifting sand and ingesting small crustacea, molluscs, and microscopic algae. Fished in shallow coastal waters and estuaries; caught using gill nets, seines, and on lines. Marketed fresh or filleted, with other rare mullets.

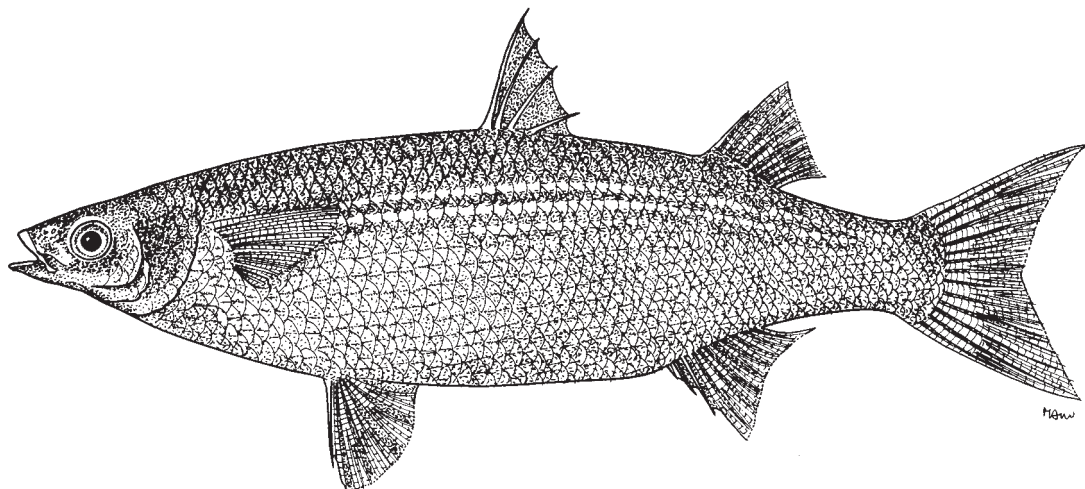
Distribution: Generally restricted to temperate waters of Australia, Lord Howe Island, and Norfolk Island. Specimens might be found at the southern extreme of the area, in coastal waters of southern Queensland.



Myxus petardi (Castelnau, 1875)

Frequent synonyms / misidentifications: *Trachystoma petardi* (Castelnau, 1875); *Mugil breviceps* Steindachner, 1866 / None.

FAO names: En - Freshwater mullet.

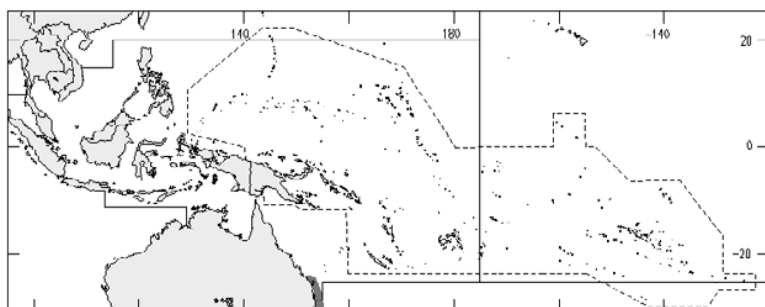


Diagnostic characters: A medium to large species; moderately deep-bodied. **Snout long, longer than eye diameter, pointed in profile.** Dentary symphysis more or less obtuse (blunt). Upper lip very slightly thickened, lower lip thin. **Lips with 1 or more rows of fine, ciliiform teeth, or teeth absent.** Vomer toothed. **Maxilla stocky, only slightly sigmoidally curved near posterior tip.** **Preorbital large; serrate anteroventral edge straight or only weakly concave; posteroventral tip broad and squarish.** Distance between anterior and posterior nostril more or less equal to maximum diameter of posterior nostril. **Adipose eyefold absent.** **Gill rakers on first gill arch 1/2 length of longest gill filaments.** Origin of first dorsal fin nearer base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through anterior half of anal fin; both fins scaled only on anterobasal parts. Anal fin with III spines and 9 (rarely 8) soft rays in adults (usually II 'spines' and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I spine and 14 or 15 soft rays, short, not reaching origin of first dorsal fin; pectoral fins 16 to 20% standard length, **74 to 85% head length; pectoral axillary scale rudimentary or absent.** **Ctenoid scales in longitudinal series 47 to 52; 15 or 16 in transverse series; 32 to 34 scales in longitudinal series anterior to origin of second dorsal fin; 22 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; wide sulcus; **valve as ventrally placed, double papillose pad.** Pyloric caeca 2. **Colour:** greenish black dorsally, lighter on flanks and silvery white ventrally; eye yellow-orange to pink; upper edge of operculum golden; fins pale yellow.

Size: Maximum reported total length 81 cm; commonly to 40 cm total length or less.

Habitat, biology, and fisheries: In fresh and brackish waters of streams and lagoons at 9° to 27°C; may be found in sea after heavy floods. Active surface and midwater fish; small groups may be found in deep pools where stream flow is slow. Mature after about 4 years and perhaps spawning in estuaries at low salinities, during late summer and early autumn. Feeds on filamentous algae, microscopic plants and animals, and detritus. Commercially netted after heavy rain, but not an important species; caught by anglers. Flesh edible but may have muddy taste.

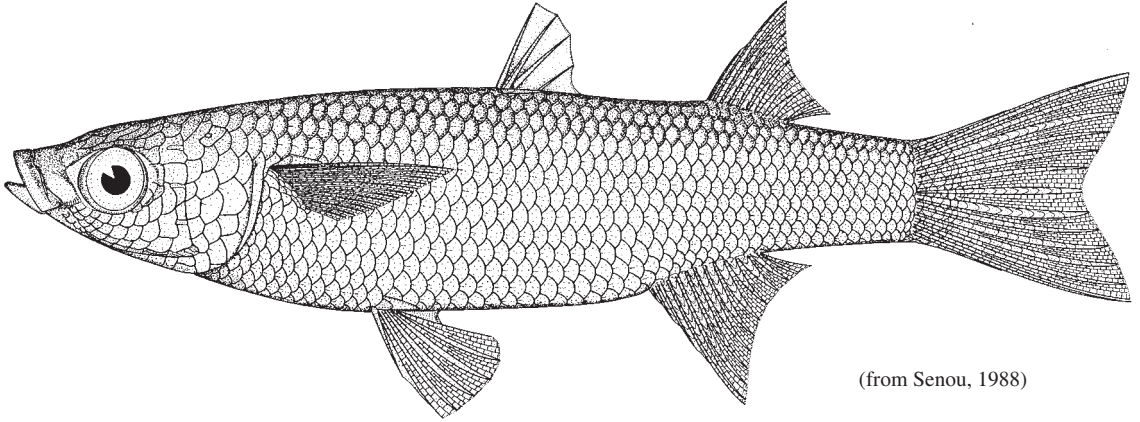
Distribution: East coast of Australia, in New South Wales and extending north to Burnett River, southern Queensland.



Neomyxus leuciscus (Günther, 1871)

Frequent synonyms / misidentifications: *Chaenomugil nauticus* Bryon and Herre, 1903; *C. leuciscus* (Günther, 1871); *Neomyxus sclateri* (Steindachner, 1878) / *Neomyxus chaptalii* Eydoux and Souleyet, 1841.

FAO names: En - Acute-jawed mullet.



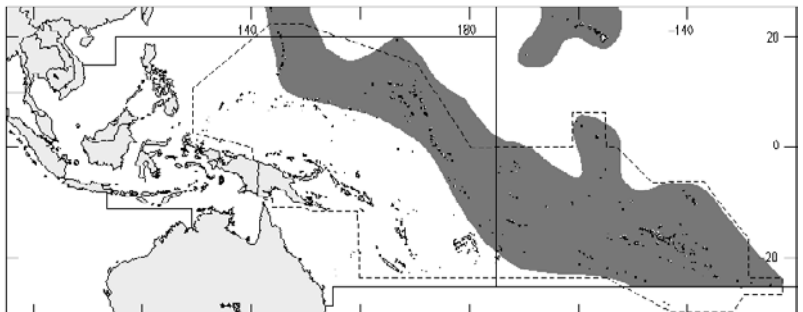
(from Senou, 1988)

Diagnostic characters: A medium-sized species; body elongate. Head relatively flattened dorsally. **Snout long, longer than eye diameter, pointed in profile. Dentary symphysis acute (pointed). Both lips thick, but upper lip not rugose nor bearing crenulations or papillae, and upper lip thickness at point of snout usually 12 or more times in head length. Lips bearing 2 or 3 irregular rows of long teeth which are slightly curved and tricuspid at their tips; lower lip with outer edge folded downwards. Lower jaw fits snugly under upper jaw. Vomer edentate. Maxilla more or less straight. Serrate anteroventral edge of preorbital straight; posteroventral tip broad and squarish. Distance between anterior and posterior nostril more or less equal to maximum diameter of posterior nostril. Adipose eyefold marginal. Gill rakers on lower limb of first gill arch 33 to 64, (usually 50 or more). Origin of first dorsal fin nearer base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through anterior half to three-quarters of anal fin; both fins scaled only anterobasally. **Anal fin with II spines and 10 or 11 soft rays in adults** (I spine and 11 or 12 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I spine and 15 or 16 soft rays, not reaching origin of first dorsal fin; pectoral fins 20 to 23% standard length, 80 to 95% head length. **Cycloid scales in longitudinal series 43 to 49; 13 or 14 in transverse series; 28 or 29 scales in longitudinal series anterior to origin of second dorsal fin; 21 or 22 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with deep sulcus; denticulate cushion with long setiform teeth; **anterior valve tripartite; small digitate fold posterior to anterior valve.** Pyloric caeca 2. **Colour:** grey dorsally, silvery flanks, white ventrally; pectoral fins darkish but with bright yellow spot at origin.**

Size: Maximum reported standard length 46 cm.

Habitat, biology, and fisheries: In shallow coastal waters (up to a depth of about 4 m), around reef flats, tidepools, lagoons, drainage ditches, and docks. At night tending to move inshore to surface waters and shallows close to beaches; attracted to lights. Forms schools. Can be caught at night by dazzling with strong light and scooping up with hand nets.

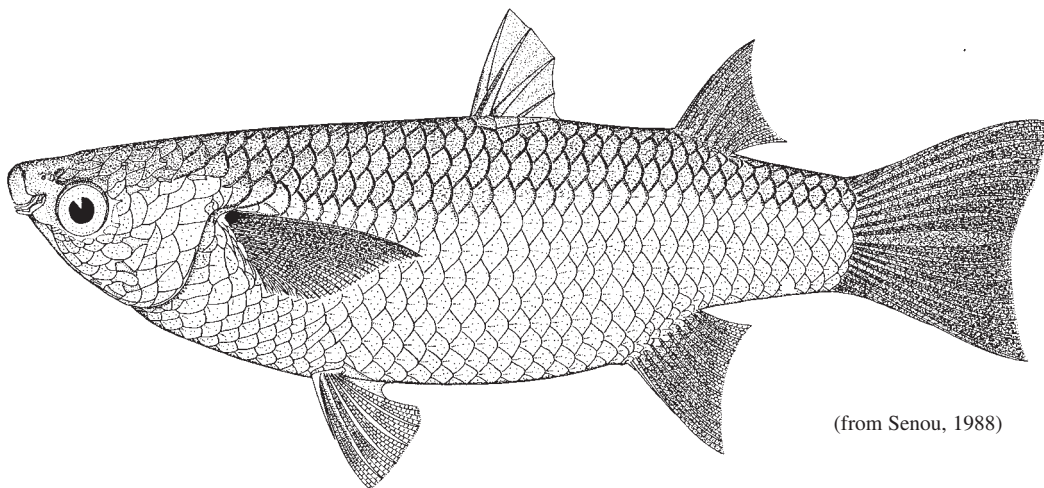
Distribution: Central Pacific, from southern Japanese and Hawaiian islands in north; south to Tubai and Ducie Islands; rare in Marianas Islands.



Oedalechilus labiosus (Valenciennes, 1836)

Frequent synonyms / misidentifications: *Crenimugil labiosus* (Valenciennes, 1836); *Plicomugil labiosus* (Valenciennes, 1836) / None.

FAO names: En - Hornlip mullet; Fr - Mulet labéon; Sp - Lisa morruda.



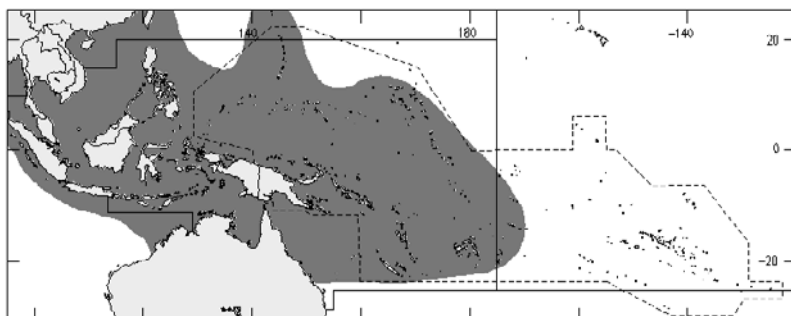
(from Senou, 1988)

Diagnostic characters: A small to medium-sized species; body moderately deep. Head relatively flattened dorsally. Snout shorter than eye diameter and blunt in profile. Dentary symphysis very obtuse; mouth may appear transverse in ventral view. **Upper lip very thick, lip thickness at point of snout about 7 to 10 times in head length. Upper lip with deep longitudinal fold near its ventral edge, splitting it into upper and lower lobes; these lobes fringed with ridges of horny epidermis; ridges small and appear as papillae on upper lobe (but different from papillae of *Crenimugil*); ridges on lower lobe better developed. Lower lip thin, directed forwards, also fringed with ridges of horny epidermis except at medial part. Both lips form folds tucked under preorbital at corners of mouth. Lips and vomer edentate.** Maxilla curved down posteriorly. **Preorbital deeply notched midway along anteroventral edge and expanded into a broad, squarish, posteroventral tip.** Distance between anterior and posterior nostril less than maximum diameter of posterior nostril. Adipose eyefold absent. Gill rakers on lower limb of first gill arch 30 to 41, shorter than gill filaments. Origin of first dorsal fin slightly nearer base of caudal fin than tip of snout. **Origin of fully erected second dorsal fin on vertical through anterior half to three-quarters of anal fin;** both fins usually well scaled on all parts. Anal fin with III spines and 9 soft rays in adults (II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 15 to 18 soft rays, **ventral 1 or 2 soft rays more or less free from fin membrane; pectoral fins not reaching origin of first dorsal fin;** pectoral fins 23 to 28% standard length, 94 to 112% head length. Scales cycloid or weakly ctenoid; **32 to 37 scales in longitudinal series; 11 or 12 in transverse series;** 23 to 25 scales in longitudinal series anterior to origin of second dorsal fin; **16 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with broad sulcus; small anterior valve and longer-based posterior valve. **Pyloric caeca 3 to 4.** **Colour:** olive dorsally, silvery ventrally.

Size: Maximum standard length 40 cm or more; commonly to 20 cm total length.

Habitat, biology, and fisheries: Found in shallow coastal waters, around coral reefs, and in harbours. Caught with gill nets, lift nets, and seines; also used as live bait in pole-and-line tuna fishing.

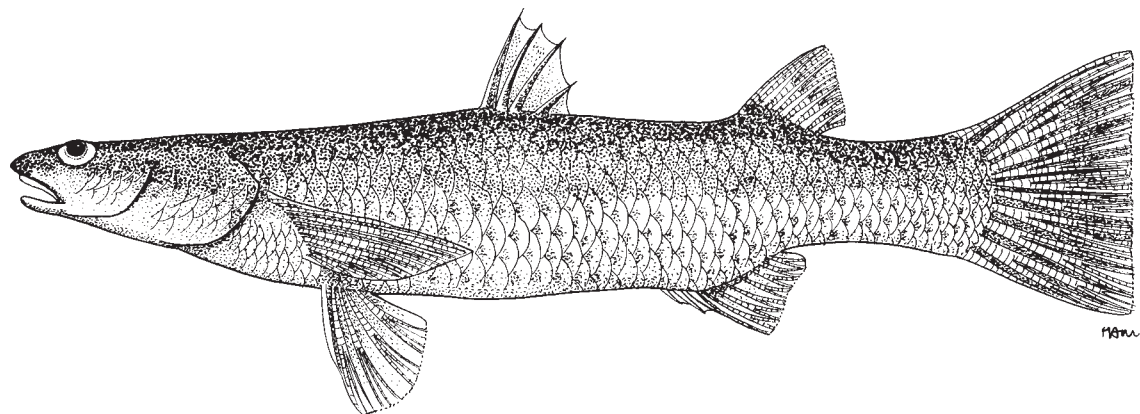
Distribution: Widespread throughout tropical Indo-Pacific, from the Red Sea and Madagascar to Samoa; north to southern Japan and south to the Great Barrier Reef.



Rhinomugil nasutus (DeVis, 1883)

Frequent synonyms / misidentifications: *Squalomugil nasutus* (DeVis, 1883) / None.

FAO names: En - Shark mullet.

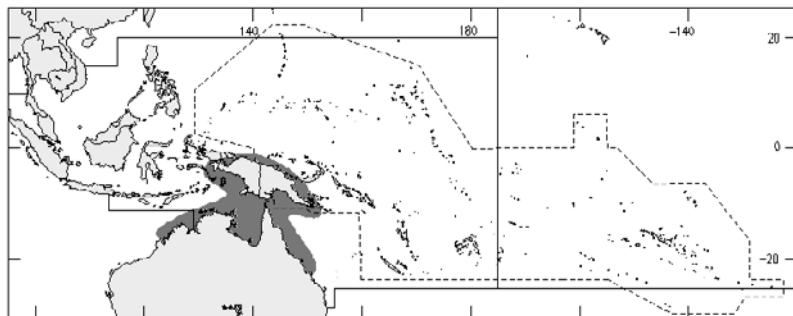


Diagnostic characters: A medium-sized species; body elongate. **Head noticeably wider than deep, flattened dorsally and concave between eyes; eyes positioned dorsolaterally high on head.** Eye diameter 14 to 20% head length. **Snout short, less than or equal to eye diameter, but projecting beyond upper lip.** Dentary symphysis about 90° or only slightly obtuse (blunt). Lips thin; lower lip directed forwards. **Teeth small, fine and spatulate on both lips, often not easily discernable.** Vomer edentate. Maxilla straight. Serrate anteroventral edge of preorbital very weakly concave; posteroventral tip narrow. **Nostrils set low on snout;** distance between anterior and posterior nostril greater than maximum diameter of posterior nostril. **Adipose eyefold developed posteroventral to eye and not overlying iris.** Gill rakers on lower limb of first gill arch 45 to 55 (perhaps more). Origin of first dorsal fin nearer base of caudal fin than tip of snout. **Origin of fully erected second dorsal fin on vertical through posterior half of anal fin, or behind anal fin;** both fins scaled basally but not distally. **Anal fin with III spines and 8 soft rays in adults** (II spines and 9 soft rays in juveniles about 30 mm standard length or less). **Caudal fin truncate.** Pectoral fins with I 'spine' and 13 soft rays, long, just reaching origin of first dorsal fin; pectoral fins 25 to 26% standard length, 95 to 100% head length. **Ctenoid scales in longitudinal series 28 to 30; 9 ½ or 10 in transverse series;** 21 or 22 scales in longitudinal series anterior to origin of second dorsal fin; 16 scales in transverse series entirely around caudal peduncle. Pharyngobranchial organ with broad sulcus, small valve ventrally and finger like processes in sulcal groove. Pyloric caeca 2. **Colour:** dark slaty-grey dorsally, silvery on flanks and abdomen; fins yellowish.

Size: Maximum fork length at least 32 cm.

Habitat, biology, and fisheries: Usually found in small schools in muddy fresh waters and coastal waters (e.g. mangroves). Swimming at the surface with eyes and snout exposed. Perhaps feeding on surface algae and insects which alight on surface; also feeding on muddy banks and bottoms. Capable of breathing air and wriggling over mudbanks for short distances. No reported fisheries data.

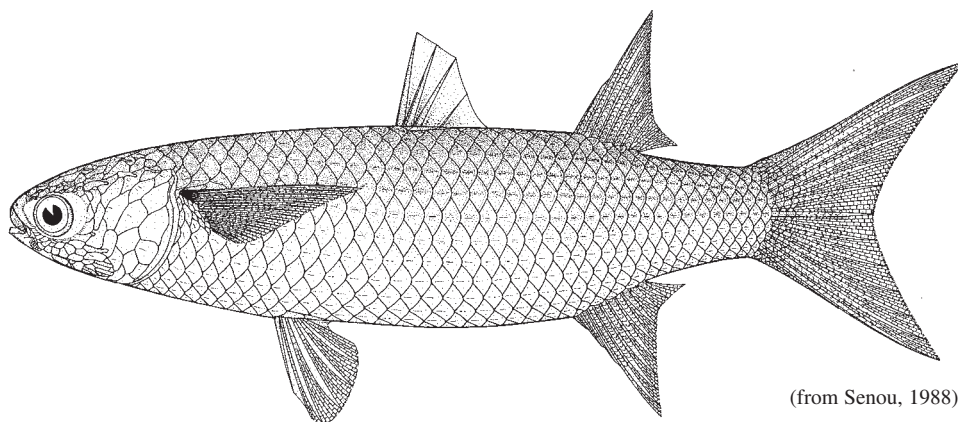
Distribution: Tropical Australia and New Guinea.



Valamugil buchhanani (Bleeker, 1853)

Frequent synonyms / misidentifications: *Mugil ceylonensis* Günther, 1861 / *Valamugil cunnesius* (Valenciennes, 1836); *V. engeli* (Bleeker, 1859); *V. seheli* (Forsskål, 1775).

FAO names: En - Bluetail mullet; Fr - Mulet à queue bleue; Sp - Lisa rabo azul.



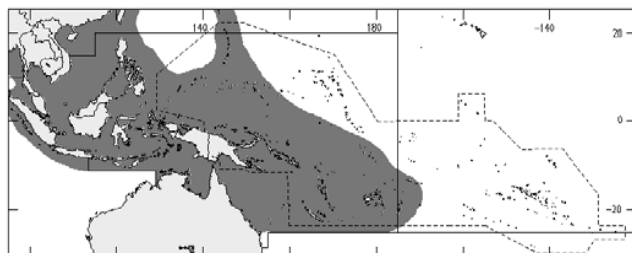
(from Senou, 1988)

Diagnostic characters: A medium-sized species; body moderately robust. Head dorsally flattened. **Snout short and blunt, 14 to 18% head length;** shorter than eye diameter. Dentary symphysis obtuse (blunt). Lips thin, lower directed forwards. **Teeth on both lips minute and ciliiform in 1 row or absent.** Vomer edentate. **Maxilla slender and weakly curved down at posterior tip, which is only just posteroventral to corner of mouth and partially or completely concealed.** **Serrate anteroventral edge of preorbital very weakly concave, not kinked; posteroventral tip narrow but not pointed.** Distance between anterior and posterior nostril less than or equal to maximum diameter of posterior nostril. Adipose eyefold poorly developed as rim around eye. Gill rakers on lower limb of first gill arch 37 to 67. Relative position of origin of first dorsal fin may vary during ontogeny, but is usually midway between tip of snout and base of caudal fin, or slightly nearer latter. **Origin of fully erected second dorsal fin on vertical through anal-fin origin, or only just posterior to it; both fins always well scaled basally and medially, and more or less scaled on distal parts; both fins falcate (more noticeable in specimens over 12 cm standard length).** Anal fin with III spines and 9 soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). **Caudal fin deeply forked.** Pectoral fins with I 'spine' and 17 to 19 (rarely 16) soft rays; **long and falcate, reaching level of origin of first dorsal fin;** pectoral fins 22 to 27% standard length, **90 to 139% head length; greater than length of head minus snout, and often greater than head length;** pectoral axillary scale moderately long. **Scales with a membranous, digitated hind margin; 32 to 36 (rarely 37) in longitudinal series; 11 to 13 in transverse series;** 10 to 14 scales in longitudinal series anterior to tip of pectoral fins and **19 to 24 scales anterior to origin of second dorsal fin; 19 to 20 (rarely 18) in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; **broad sulcus; no valves.** Pyloric caeca 6 or 7. **Colour:** greenish dorsally; flanks and abdomen silvery; small gold patch on upper operculum and on iris; **caudal fin distinctive bright blue** (dusky when preserved); dorsal fins dusky; anal fin dusky at margins; **pectoral fins yellow with dark blue spot dorsally at origin.**

Size: Usually reported to a maximum standard length of 50 cm (100 cm reported for South African specimens); commonly to 20 to 30 cm standard length.

Habitat, biology, and fisheries: Inhabits shallow coastal waters. Young enter estuaries, lagoons, and backwaters. Feeds on algae, diatoms, detritus, and crustacea. Caught in coastal waters using gill nets, cast nets, stake nets, barrier nets, lift nets, beach seines, and pouch nets during the spawning run. Marketed fresh.

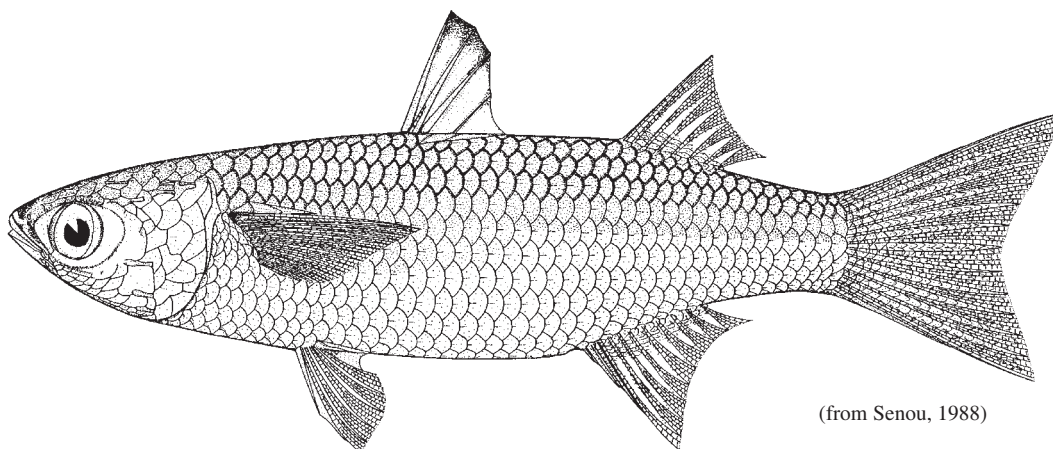
Distribution: Indo-Pacific from South Africa through parts of Indonesia to parts of Melanesia and Micronesia; north to the Marianas Islands and southern Japan.



Valamugil cunnesius (Valenciennes, 1836)

Frequent synonyms / misidentifications: *Mugil ophuysenii* Bleeker, 1859 / See **Remarks**.

FAO names: **En** - Longarm mullet (= Longfin mullet, Fishing Area 57/71); **Fr** - Mulet longue aile; **Sp** - Lisa de aleta larga.



(from Senou, 1988)

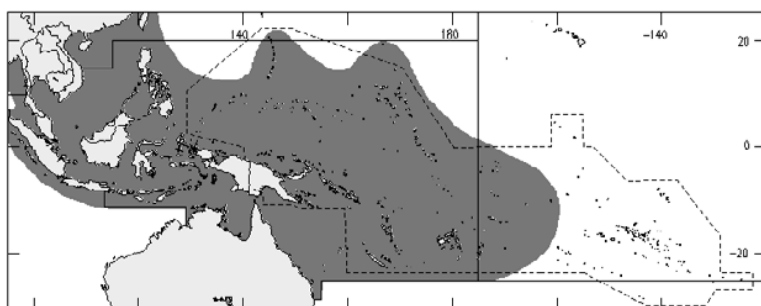
Diagnostic characters: A small species; body somewhat fusiform. Head deeper than wide and dorsally flattened. Snout moderately long and more or less pointed in profile, 20 to 25% head length. Dentary symphysis obtuse (blunt). Lips thin, lower directed forwards. **Teeth minute and cilliiform on both lips.** Vomer edentate. **Maxilla slender and weakly curved down at posterior tip, which is only just posteroventral to corner of mouth and partially or completely concealed. Serrate anteroventral edge of preorbital very weakly concave, not kinked; posteroventral tip narrow but not pointed.** Distance between anterior and posterior nostril more or less equal to maximum diameter of posterior nostril. **Adipose eyefold poorly developed, usually as rim around eye.** **Gill rakers on lower limb of first gill arch 62 to 75.** Relative position of origin of first dorsal fin variable, usually midway between tip of snout and base of caudal fin, or slightly nearer former. **Origin of fully erected second dorsal fin on vertical through anterior quarter to half of anal fin; both fins scaled only on anterior and basal parts.** Anal fin with III spines and 9 soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 14 to 16 soft rays; reaching level of origin of first dorsal fin; pectoral fins 23 to 25% standard length, 86 to 97% head length; greater than length of head minus snout; pectoral axillary scale moderately long. **Scales with a membranous, digitated hind margin; 37 to 43 (usually 38 or 39) in longitudinal series, 11 or 12 in transverse series; 12 or 13 scales in longitudinal series anterior to tip of pectoral fins and 23 to 26 anterior to origin of second dorsal fin; 17 or 18 (rarely 15 or 16) scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; **broad sulcus; no valves.** Pyloric caeca 5 to 7. **Colour:** greenish grey dorsally; flanks and abdomen silvery; second dorsal and anal fins with black margins.

Size: Largest observed specimen 14 cm standard length, but probably grows larger.

Habitat, biology, and fisheries: Very little reliable data due to earlier taxonomic confusion for this species (see below). Probably similar to other *Valamugil* species, inhabiting shallow coastal waters and browsing on benthic substrates.

Distribution: Reliable reports are very rare due to earlier taxonomic confusion. Perhaps widespread from Red Sea to West Pacific.

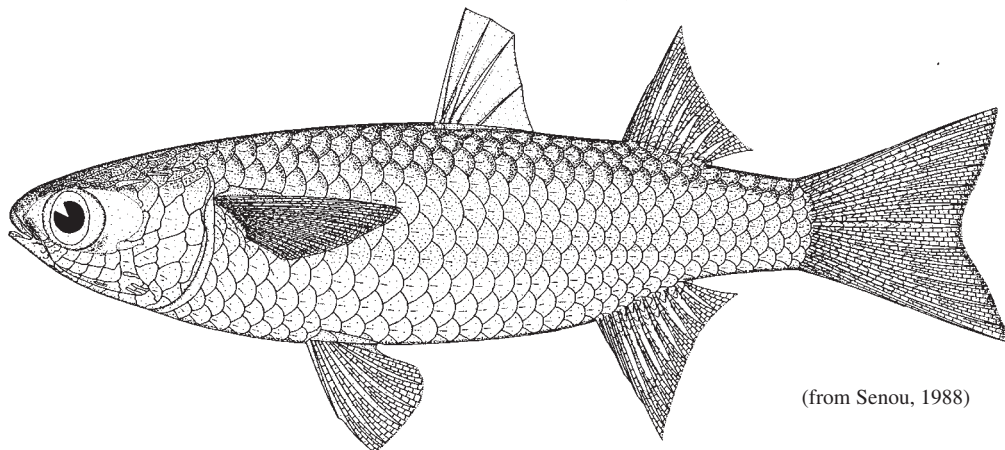
Remarks: The type-series specimens of *V. cunnesius* are non-conspecific and the putative holotype has frequently been overlooked. This has resulted in frequent, earlier, taxonomic confusion of other species with *V. cunnesius*.



Valamugil engeli (Bleeker, 1859)

Frequent synonyms / misidentifications: *Mugil kandavensis* Günther, 1877 / *Valamugil cunnesius* (Valenciennes, 1836); *V. perusii* (Valenciennes, 1836).

FAO names: En - Kanda; Fr - Mulet oeil de perdrix; Sp - Lisa ojo de perdiz.



(from Senou, 1988)

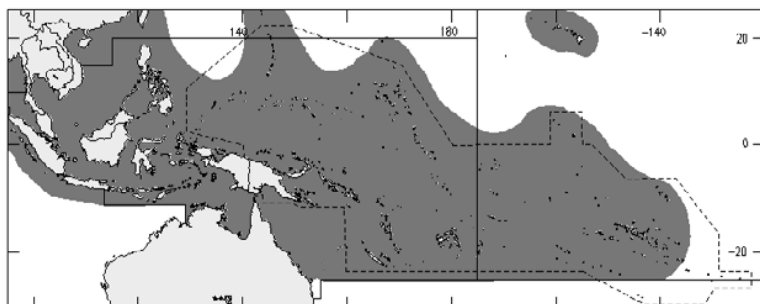
Diagnostic characters: A small to medium-sized species; body more or less fusiform; depth at origin of first dorsal fin 25 to 29% standard length. Head deeper than wide and dorsally flattened. Snout short and blunt, **17 to 21% head length**; shorter than eye diameter. Dentary symphysis about 90° or slightly obtuse. Lips thin, lower directed forwards. **Teeth on both lips minute and ciliiform or absent.** Vomer toothed or edentate. **Maxilla slender and weakly curved down at posterior tip which is only just posteroventral to corner of mouth and partially or completely concealed. Serrate anteroventral edge of preorbital very weakly concave, not kinked; posteroventral tip narrow but not pointed.** Distance between anterior and posterior nostril more or less equal to maximum diameter of posterior nostril. **Adipose eyefold weakly developed, only slightly overlying iris.** Gill rakers on lower limb of first gill arch 44 to 52. **Origin of first dorsal fin nearer base of caudal fin than tip of snout. Origin of fully erected second dorsal fin on vertical through about third soft ray of anal fin, i.e. behind anterior quarter or more of anal fin; anal fin scaled basally, second dorsal fin only scaled anterobasally.** Anal fin with III spines and 9 (rarely 8) soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 14 to 17 (commonly 14 or 15) soft rays; moderately long, **just reaching level of origin of first dorsal fin or extending beyond this;** pectoral fins 23 to 26% standard length, 80 to 95% head length; greater than length of head minus snout; pectoral axillary scale long. **Scales with a membranous, digitated hind margin; thoracic and abdominal scales more distinctly ctenoid; 32 to 36 in longitudinal series; 10 ½ to 12 ½ in transverse series; 10 to 12 scales in longitudinal series anterior to tip of pectoral fins and 19 to 23 (commonly 21 or 22) anterior to origin of second dorsal fin; 16 scales in transverse series entirely around caudal peduncle; predorsal scales to tip of snout.** Pharyngobranchial organ with large denticulate area; **broad sulcus; no valves.** **Pyloric caeca 5 or 6.** **Colour:** olive dorsally; flanks and abdomen silvery; fins hyaline; **pectoral fins with dark spot dorsally at origin.**

Size: Maximum reported total length 30 cm; commonly to about 15 cm total length.

Habitat, biology, and fisheries: Inhabits coastal waters, shallow lagoons, protected inlets, and over sandy to muddy areas of reef flats.

Juveniles may enter rivers and have been found in tide-pools at 40°C. Caught with seines and lift nets. Marketed fresh; also used as live bait in pole-and-line fishing for tuna.

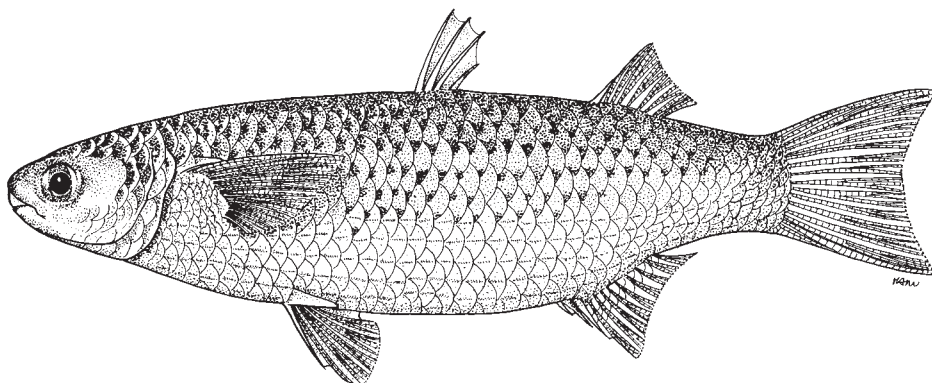
Distribution: Widespread across Indo-Pacific, from Africa to Marquesas and Tuamotu Islands; north to southern Japan; introduced to Hawaii.



Valamugil georgii (Ogilby, 1897)

Frequent synonyms / misidentifications: *Mugil nortoni* Ogilby, 1908 / ?*Valamugil cunnesius* (Valenciennes, 1836); ?*V. engeli* (Bleeker, 1859); ?*V. perusii* (Valenciennes, 1836).

FAO names: En - Fantail mullet.



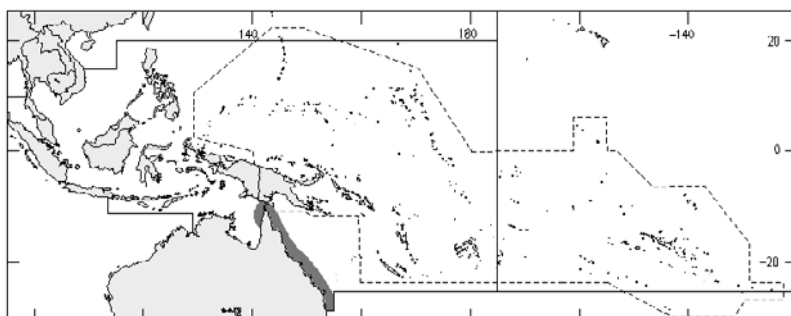
Diagnostic characters: A small to medium-sized species; body moderately robust; depth at origin of first dorsal fin about 30% standard length (ranges include 25 to 39%). **Snout short and blunt, 19 to 24% head length;** shorter than eye diameter. **Upper lip perhaps slightly thickened, with fine, ciliiform teeth;** lower lip thin, directed forwards, **without teeth.** Vomer edentate. **Maxilla slender and very weakly curved down at posterior tip, which is only just posteroventral to corner of mouth and partially or completely concealed.** **Serrate anteroventral edge of preorbital more or less straight;** posteroventral part of preorbital broadened into a squarish end. Anterior and posterior nostrils close-set. **Adipose eyefold usually well developed, covering most of iris posteriorly and partly anteriorly.** Gill rakers on lower limb of first gill arch 55 or 56. Origin of first dorsal fin nearer base of caudal fin than tip of snout. **Origin of fully erected second dorsal fin on vertical through anterior third to half of anal fin;** both fins scaled **only on anterior or basal parts.** Anal fin with III spines and 9 soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 14 or 15 soft rays; relatively short, **tip distinctly anterior to level of origin of first dorsal fin;** pectoral fins about 21% standard length, 92% head length; greater than length of head minus snout; pectoral axillary scale long. **Scales appear cycloid or only very weakly ctenoid (membranous, digitated hind margin of scale not distinct; thoracic and abdominal scales more distinctly ctenoid; 31 or 32 (rarely 30) in longitudinal series, (11 ½) 12 or 13 in transverse series; (9) 10 or 11 scales in longitudinal series anterior to tip of pectoral fins and 23 anterior to origin of second dorsal fin; about 16 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; **broad sulcus; no distinct valves but small valve-like swelling or fold of tissue at anteroventral part of sulcus.** **Pyloric caeca extensively branched, about 22 in total.** **Colour:** greenish brown dorsally; flanks silvery; abdomen off-white; gold spots on dorsal and ventral parts of iris; second dorsal, anal, and caudal fins with dusky margins and second dorsal speckled brown; **pectoral fins with purplish spot dorsally at origin.**

Size: Maximum reported total length 30 cm; rarely above 25 cm total length.

Habitat, biology, and fisheries: Inhabits coastal waters, estuaries and bays; young may enter fresh water. Forms schools, shoaling over shallow-water sand flats, particularly on rising tide at dusk. Fish tend to roll on their sides and flick a column of water into air. Taken as a bycatch; used as baitfish for crabs and snapper.

Distribution: Tropical Australia, along coasts of Queensland and New South Wales.

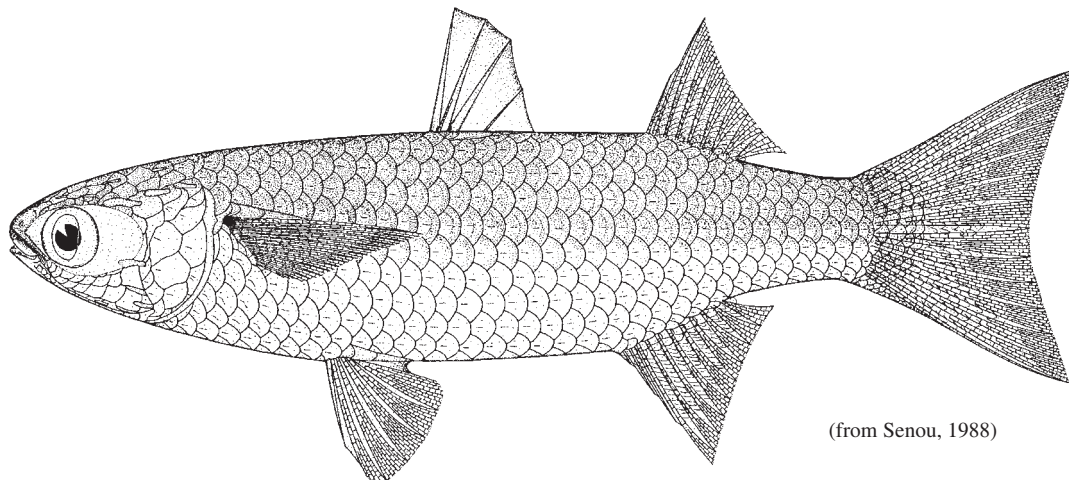
Remarks: Very similar to *V. engeli* and *V. perusii*, with which it has previously been synonymized.



Valamugil perusii (Valenciennes, 1836)

Frequent synonyms / misidentifications: ?*Mugil amarulus* Valenciennes, 1836; *M. kelaartii* Günther, 1861; *M. longimanus* Günther, 1861; *M. strongylocephalus* Richardson, 1846 / *Valamugil cunnesius* (Valenciennes, 1836); *V. engeli* (Bleeker, 1859).

FAO names: En - Longfinned mullet (from *Mugil strongylocephalus*).



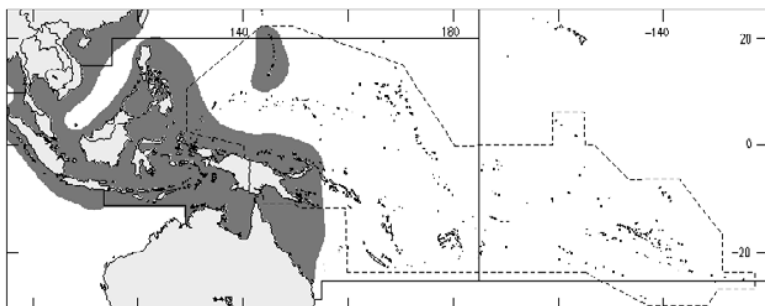
(from Senou, 1988)

Diagnostic characters: A small species; body moderately robust; depth at origin of first dorsal fin 24 to 35% (often less than 30%) standard length. Head deeper than wide and dorsally flattened. Snout short and blunt, **17 to 21% head length**; shorter than eye diameter. Dentary symphysis about 90° or slightly obtuse. Lips thin, lower directed forwards. **Teeth on both lips minute and ciliiform or absent.** Vomer usually edentate. **Maxilla slender and weakly curved down at posterior tip, which is only just posteroventral to corner of mouth and partially or completely concealed.** **Serrate anteroventral edge of preorbital very weakly concave, not kinked; posteroventral tip narrow but not pointed.** Distance between anterior and posterior nostril more or less equal to maximum diameter of posterior nostril. **Adipose eyefold reasonably developed, covering most of iris posteriorly and partly anteriorly.** Gill rakers on lower limb of first gill arch 40 to 51. **Origin of first dorsal fin midway between tip of snout and base of caudal fin, or slightly nearer latter.** **Origin of fully erected second dorsal fin on vertical through about third soft ray of anal fin, i.e. behind anterior quarter or more of anal fin; both fins moderately to well scaled on all parts.** Anal fin with III spines and 9 (rarely 8 or 10) soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin emarginate. Pectoral fins with I 'spine' and 14 or 15 (rarely 16) soft rays; long, **just reaching level of origin of first dorsal fin or extending beyond this**; pectoral fins 21 to 27% standard length, 90 to 110% head length; greater than length of head minus snout; pectoral axillary scale long. **Scales with a membranous, digitated hind margin; thoracic and abdominal scales more distinctly ctenoid; 31 to 34 (rarely 35) in longitudinal series, 10 ½ to 11 ½ in transverse series; 11 to 14 (rarely 10) scales in longitudinal series anterior to tip of pectoral fins and 19 to 22 anterior to origin of second dorsal fin; 16 scales in transverse series entirely around caudal peduncle; predorsal scales to level of posterior nostril.** Pharyngobranchial organ with large denticulate area; **broad sulcus; no valves.** **Pyloric caeca 5 to 7.** **Colour:** greenish dorsally; flanks and abdomen silvery; gold opercular spot; fins dusky, particularly at margins; **pectoral fins with dark spot dorsally at origin.**

Size: Maximum reported total length 25 cm; perhaps commonly to 15 cm total length.

Habitat, biology, and fisheries: Inhabits coastal waters and estuaries. Shoaling over mudflats. Netted for bait.

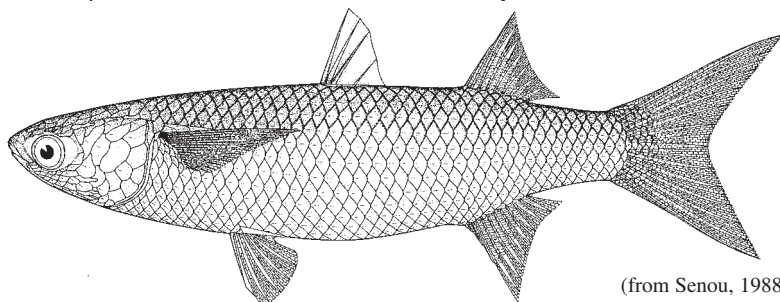
Distribution: Indo-West Pacific from Africa to Marianas Islands.



Valamugil seheli (Forsskål, 1775)

Frequent synonyms / misidentifications: *Mugil axillaris* Valenciennes, 1836; *M. borbonicus* Cantor, 1850; *M. caeruleomaculatus* Lacepède, 1803; *M. cylindricus* Valenciennes, 1836 / *Valamugil buchanani* (Bleeker, 1853); *V. cunnesius* (Valenciennes, 1836); *V. speigleri* (Bleeker, 1859).

FAO names: En - Bluespot mullet; Fr - Mulet à tache bleue; Sp - Lisa de mancha azul.



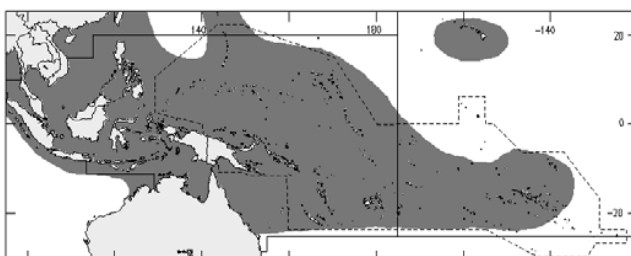
(from Senou, 1988)

Diagnostic characters: A medium-sized species; body moderately robust. Head as wide as deep or slightly wider and dorsally flattened. **Snout short and blunt, 18 to 22% (rarely 17%) head length;** shorter than eye diameter. Dentary symphysis obtuse (blunt). Upper lip thin or slightly thickened; lower lip thin and directed forwards. **Teeth on both lips minute and ciliiform in 1 row or absent.** Vomerine teeth present or absent. **Maxilla slender and weakly curved down at posterior tip, which is only just posteroventral to corner of mouth and partially or completely concealed. Serrate anteroventral edge of preorbital very weakly concave, not kinked; posteroventral tip narrow but not pointed.** Distance between anterior and posterior nostril less than or equal to maximum diameter of posterior nostril. Adipose eyefold poorly developed as rim around eye. Gill rakers on lower limb of first gill arch 39 to 73, usually more than 50. Relative position of origin of first dorsal fin may vary during ontogeny, but is usually midway between tip of snout and base of caudal fin, or slightly nearer snout. **Origin of fully erected second dorsal fin on vertical through anal-fin origin, or only just posterior to it; both fins always well scaled basally and medially, and more or less scaled on distal parts;** both fins mildly falcate but not as strongly as pectoral fins or fins of *Valamugil buchanani*. Anal fin with III spines and 9 (rarely 8 or 10) soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 16 to 18 (rarely 15 or 19) soft rays; **long and falcate, usually reaching level of origin of first dorsal fin;** pectoral fins 18 to 25% standard length, 84 to 104% head length (perhaps more, although this would be uncommon); often greater than length of head minus snout, not usually greater than length of head; pectoral axillary scale moderately long. **Scales with a membranous, digitated hind margin; 36 to 42 (usually 38 to 40) in longitudinal series; 12 to 14 in transverse series;** 10 to 14 scales in longitudinal series anterior to tip of pectoral fins and **23 to 26 (usually 24 or 25) anterior to origin of second dorsal fin; 18 to (commonly) 20 scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; **broad sulcus; no valves.** Pyloric caeca 6 to 9. **Colour:** bluish brown or green dorsally; flanks and abdomen silvery; dusky spots on upper rows of scales, giving indistinct longitudinal stripes; dorsal and caudal fins bluish, also dusky in second dorsal and caudal; anal, pelvic, and particularly pectoral fins yellowish; pectoral fins also with dark blue spot dorsally at origin.

Size: Maximum reported standard length 50 cm; commonly between 20 and 30 cm standard length.

Habitat, biology, and fisheries: Inhabits shallow coastal waters; enters lagoons, estuaries, brackish tidal creeks and fresh-water parts of rivers, where it feeds. Juveniles might be found in rice fields and mangrove swamps. Forms schools; larger shoals occur during spawning, which takes place at sea. Feeds on microalgae, filamentous algae, diatoms, foraminifera, and detritus associated with sand and mud. Caught using gill nets, cast nets, stake nets, barrier nets, lift nets, beach seines, and pouch nets during the spawning run; also taken as a bycatch with other fishes. Marketed fresh and perhaps salted, boiled (Thailand), canned or frozen (Australia). Roe marketed salted.

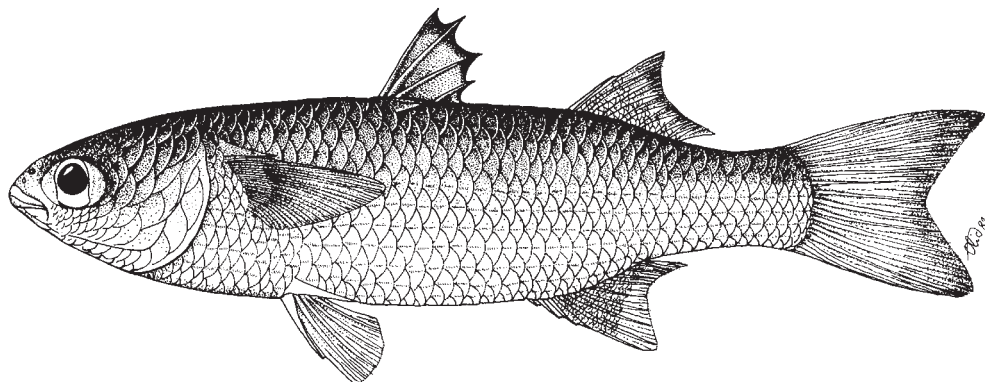
Distribution: Widespread throughout Indo-Pacific, from East Africa and Red Sea to the Marquesas Islands; north to Japan and Hawaii, and south to southern Queensland and New Caledonia.



Valamugil speigleri (Bleeker, 1859)

Frequent synonyms / misidentifications: *Mugil suppositus* of Day, 1865 / *Valamugil cunnesius* (Valenciennes, 1836).

FAO names: En - Speigler's mullet; Fr - Mulet chiraya; Sp - Lisa chiraya.

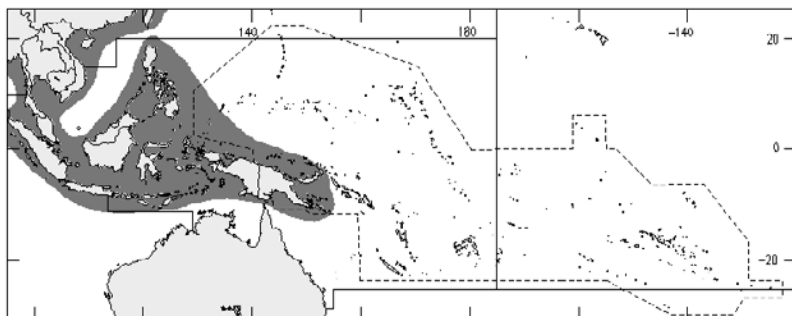


Diagnostic characters: A small to medium-sized species; body fusiform. Head deeper than wide and dorsally flattened. Snout short and blunt, 17 to 22% head length. Dentary symphysis more or less obtuse (blunt). Lips thin, lower directed forwards. **Teeth on upper lip minute and ciliiform; those on lower lip also ciliiform but slightly larger and more numerous.** Vomer edentate. **Maxilla slender and more or less straight; posterior tip only just posteroventral to corner of mouth and partially or completely concealed.** **Serrate anteroventral edge of preorbital straight; posteroventral tip narrow but not pointed.** Distance between anterior and posterior nostril more or less equal to maximum diameter of posterior nostril. **Adipose eyefold varying from a narrow rim around eye to a well-developed structure covering iris posteriorly and partly anteriorly.** **Gill rakers on lower limb of first gill arch 35 to 45.** Origin of first dorsal fin usually nearer tip of snout than base of caudal fin. **Origin of fully erected second dorsal fin on vertical through anterior third to half of anal fin; both fins well scaled on all parts.** Anal fin with III spines and 9 soft rays in adults (usually II spines and 10 soft rays in juveniles about 30 mm standard length or less). Caudal fin forked. Pectoral fins with I 'spine' and 15 or 16 (rarely 17) soft rays; reaching level of origin of first dorsal fin; pectoral fins 20 to 24% standard length, 82 to 100% head length; greater than length of head minus snout; pectoral axillary scale long. **Scales with a membranous, digitated hind margin; 37 to 41 in longitudinal series; 11 or 12 in transverse series; 12 or 13 scales in longitudinal series anterior to tip of pectoral fins and 23 to 26 (usually 24 or 25) anterior to origin of second dorsal fin; 16 (less commonly 17) scales in transverse series entirely around caudal peduncle.** Pharyngobranchial organ with large denticulate area; **broad sulcus; no valves.** Pyloric caeca 4. **Colour:** greenish dorsally; flanks and abdomen silvery; first dorsal fin with black margin, other fins dusky; pectoral fins with dark spot dorsally at origin.

Size: Maximum reported total length 35 cm; commonly between 15 and 20 cm total length.

Habitat, biology, and fisheries: Schools in shallow coastal waters, estuaries, and backwaters; found in shallow, inundated areas along coast after heavy rains; enters fresh water. Spawns in sea. Juveniles might be found in rice fields and mangrove swamps. Feeds on small algae, diatoms, and other organic matter taken in with sand and mud; fry feed on copepods and floating algae. Caught using gill nets, cast nets, stake nets, barrier nets, lift nets, beach seines, pouch nets, and trawls. Marketed fresh and perhaps salted, boiled (Thailand), canned or frozen (Australia). Roe marketed salted.

Distribution: Indo-West Pacific, from Baluchistan to Borneo and New Guinea; north up to the Chinese coast, perhaps not reaching south to Australia.



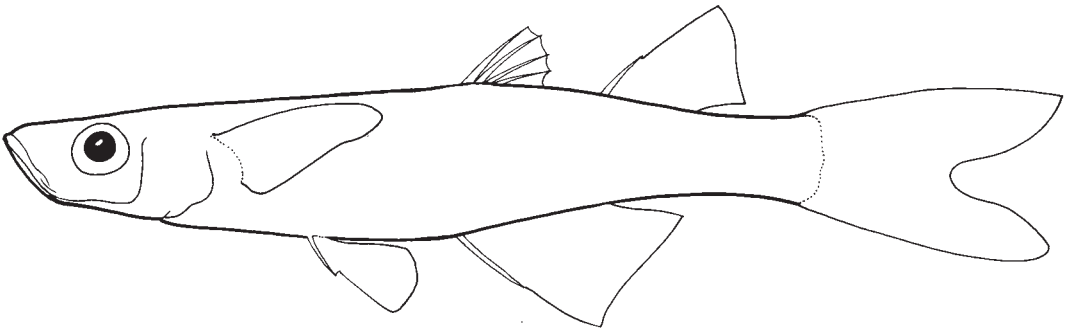
Order ATHERINIFORMES

PSEUDOMUGILIDAE

Blue eyes

by W. Ivantsoff

Diagnostic characters: Body small, elongate, moderately compressed. Mouth terminal, oblique. Maxilla extending posteriorly to about vertical through anterior border of orbit or slightly beyond. Upper jaw strongly curved and slightly protrusible. Villiform teeth in upper jaw; teeth on lower jaw small, curved, and either restricted to first third or half, or present on all of dentary toothed surface. Gill rakers small to very small and widely spaced. Two separate dorsal fins; spines usually absent in second dorsal fin and pectoral fin. **Pectoral fins always set high on body above midlateral line.** Body scales cycloid, dorsoventrally elongated, with 22 to 34 (usually less than 31) scales in midlateral line. Scales on head and cheeks varying from few large to many small scales. Species of this family **often exhibiting sexual dimorphism** with males characterized by **extremely elongated fin rays and different coloration.**



Habitat, biology, and fisheries: A mostly fresh-water family, predominantly restricted to coastal regions of Australia and Papua New Guinea. Three species are considered to be marine or estuarine and are found in coastal regions.

Similar families occurring the area


Pseudomugilids are distinct from other atheriniform families in the area by the absence of the mesethmoid and by having the single infraorbital (lacrimal) articular as high as the dentary (always lower than dentary in other atheriniform fishes).




Juveniles of the family Mugilidae (mulletts) could be mistaken for pseudomugilids.

Key to the estuarine species of Pseudomugilidae

- 1a. Gill rakers on lower limb of first gill arch 14 *Pseudomugil majusculus*
- 1b. Gill rakers on lower limb of first gill arch 12 or less → 2
- 2a. Premaxilla without postmaxillary process, metapterygoid fused to symplectic
 *Pseudomugil cyanodorsalis*
- 2b. Premaxilla with pungent postmaxillary process; metapterygoid not fused to symplectic
 *Pseudomugil inconspicuus*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Pseudomugil cyanodorsalis* Allen and Sarti, 1983
-  *Pseudomugil inconspicuus* Roberts, 1978
-  *Pseudomugil majusculus* Ivantsoff and Allen, 1984

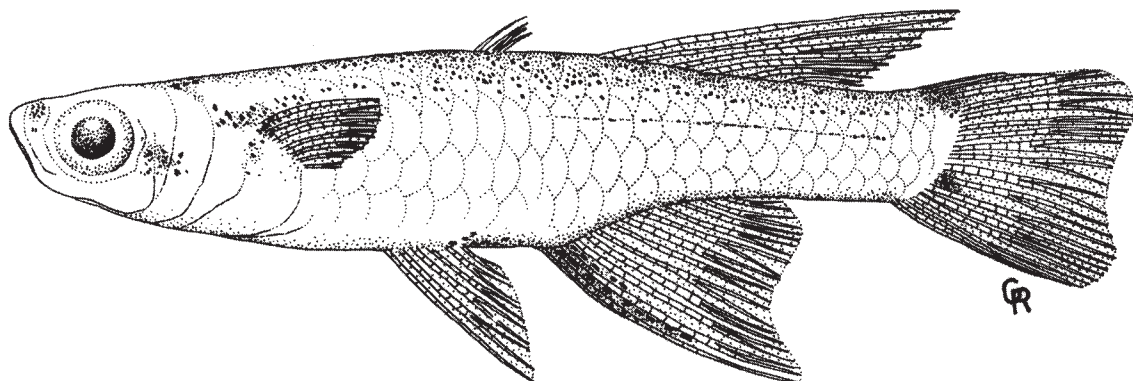
Reference

Saeed, B. and W. Ivantsoff. 1989. Systematic revision of the blue-eyes (family Pseudomugilidae). *Aust. J. Mar. Freshwater Res.*, 40:719-87.

Pseudomugil cyanodorsalis Allen and Sarti, 1983

Frequent synonyms / misidentifications: None / *Pseudomugil inconspicuus* Roberts, 1978.

FAO names: En - Blueback blue-eye.

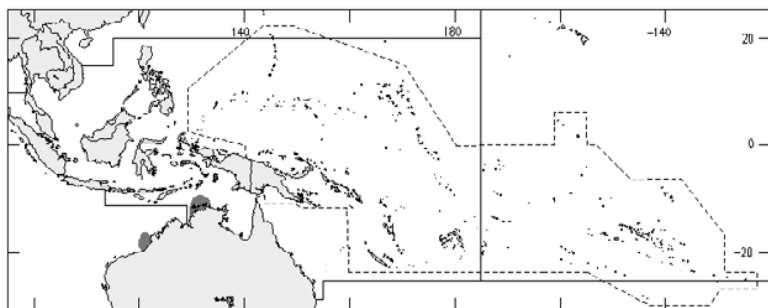


Diagnostic characters: Body very small, elongate, moderately compressed. Mouth small, subvertical. Teeth in jaws small anteriorly, enlarged, pungent on posterior part of premaxilla and exposed when mouth closed. **Premaxilla wide, its ascending process short, lateral process absent. Vomer wide and slightly curved. Mesethmoid absent.** Gill rakers on lower limb of first gill arch 7 to 10. First dorsal fin with III to V weak spines, its origin at or near vertical through tips of pelvic fins. **Second dorsal fin without spines and 4 to 7 soft rays.** Anal fin with I spine and 9 to 13 soft rays. **Pectoral fins without spines** and 9 to 11 soft rays. Body scales large; **22 to 26 midlateral scales**; 5 scales in transverse rows along side of body. Predorsal scales 10 to 14; interdorsal scales 3 or 4. Ventromedian scales between cleithrum and origin of pelvic fins 7 to 10 (usually about 8). **Colour:** semitransparent dorsal half of males metallic blue, lower half yellowish; first dorsal fin translucent, its posterior border blackish with small yellowish patch in basal part near last spine; **elongated rays and base of second dorsal fin black**, remainder of fin creamy; pectorals translucent or yellowish; body of females semitransparent, with translucent fins and white abdomen.

Size: Maximum length 3.5 cm.

Habitat, biology, and fisheries: Inhabits mangrove swamps and highly saline creeks flowing into estuaries, usually swimming over muddy bottom. Often congregate in large numbers. May be found in hypersaline waters (range 28 to 40‰) and in relatively high temperatures (22 to 31°C). This species is small but attractive and may have appeal to aquarium trade.

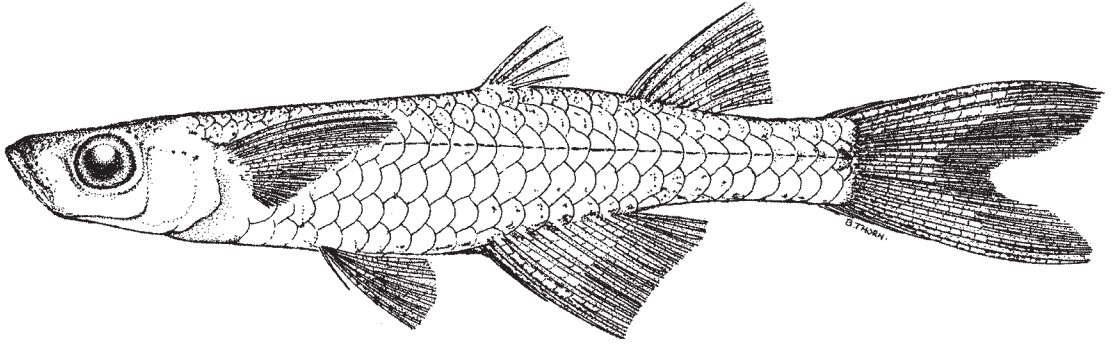
Distribution: Northwestern Australia near Broome and between Darwin and Wyndham in the Northern Territory, Australia.



***Pseudomugil inconspicuus* Roberts, 1978**

Frequent synonyms / misidentifications: None / *Pseudomugil cyanodorsalis* Allen and Sarti, 1983.

FAO names: En - Inconspicuous blue-eye.

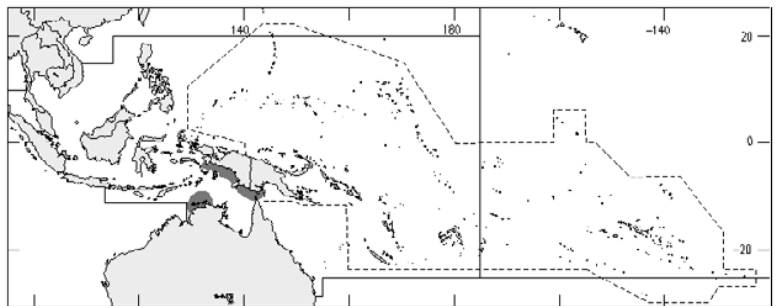


Diagnostic characters: Body elongate, moderately compressed. Mouth fairly narrow with partially restricted gape. Posterior premaxillary teeth enlarged and exposed when mouth closed; posterior two-thirds of dentary toothless. Premaxilla with pungent narrow ascending process; **postmaxillary process also long, 1/2 length of ascending process, and pungent.** Vomer narrow and slightly curved. Mesethmoid absent. Gill rakers on lower limb of first gill arch 10 to 12. First dorsal fin with III or IV spines, its origin behind vertical through tips of pelvic fins. Second dorsal fin without spine and with 5 soft rays. Anal fin with I spine and 10 to 12 soft rays. Pectoral fins with 11 or 12 soft rays. Midlateral scales 26 to 28; 5 scales in transverse rows along side of body. **Predorsal scales 14 to 17;** interdorsal scales 4 to 7. Ventromedian scales between cleithrum and origin of pelvic fins 6 to 8. **Colour:** semitransparent in life; both males and females yellowish with some scattered melanophores on body; dark midlateral line along side of body; fins clear their bases dark; **sexual dimorphism not apparent in this species.**

Size: Maximum length not exceeding 3.5 cm.

Habitat, biology, and fisheries: Found in mangrove swamps and saline creeks. A planktivorous species which adapts well to fresh-water environment. May occur in large schools, frequently in muddy waters. Sympatric with *Pseudomugil cyanodorsalis* over part of its range. Of no commercial value.

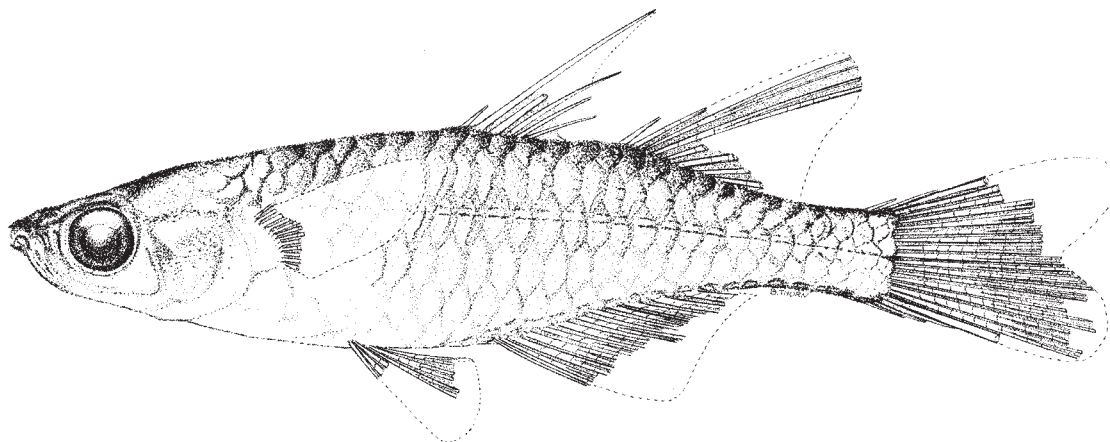
Distribution: Known from several sites but probably extends from Toro Pass near the mouth of the Fly River (Papua New Guinea) to Vogelkop Peninsula (Irian Jaya) and from Woods Inlet in Darwin Harbour (Australia).



Pseudomugil majusculus Ivantsoff and Allen, 1984

Frequent synonyms / misidentifications: None / *Pseudomugil signifer* (Kner, 1866).

FAO names: En - Cape blue-eye.

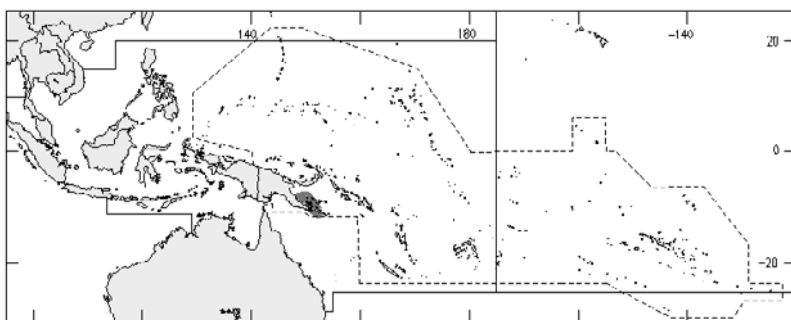


Diagnostic characters: Body elongate, moderately compressed. Mouth subvertical and small, gape unrestricted by labial ligament. Posterior premaxillary teeth enlarged and exposed when mouth closed; teeth on lower jaw strong, though small, villiform, pointing backwards and extending at least half-way along dentary. Premaxilla broad, with short ascending process and no postmaxillary process. **Gill rakers on lower limb of first gill arch 14 or 15, less than 1/2 diameter of pupil but longer than in other species of this genus.** First dorsal fin with IV or V spines, its origin about 2 scales in front of vertical through tips of pelvic fins. Second dorsal fin without spine and 7 to 9 soft rays. Anal fin without spine and 12 or 13 soft rays. Pectoral fins without spine and about 10 to 12 soft rays. Body scales dorsoventrally elongated; 26 to 28 midlateral scales; 5 or 6 scales in transverse rows along side of body. Predorsal scales 12; interdorsal scales 4 or 5. Ventromedian scales between cleithrum and origin of pelvic fins 9 or 10. **Colour:** preserved specimen yellow-green with upper part of head and eyes dark; sides of snout and opercular bones with scattered melanophores; edges of caudal-fin rays pigmented with scattered melanophores; no reticulate pattern apparent on upper body scales above thin midlateral band.

Size: Maximum length about 5 cm.

Habitat, biology, and fisheries: Found in mangrove swamps and may provide food for young of commercially important species. Nothing is known of the biology of this species of which only 2 specimens are presently known.

Distribution: Known from Cape Ward Hunt (north-eastern Papua New Guinea) and from Fergusson Island in the D'Entrecasteaux Group.

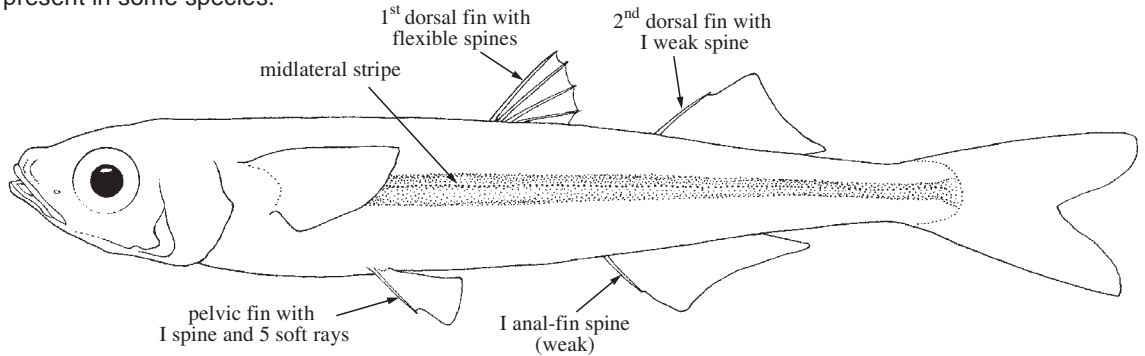


ATHERINIDAE

Silversides (or hardyheads)

by W. Ivantsoff and L.E.L.M. Crowley

Diagnostic characters: Elongate and somewhat compressed silvery fishes (rarely exceeding 12 cm total length). **Mouth generally small, oblique, and terminally placed;** premaxilla with ascending process of variable length, with lateral process present or absent; ramus of dentary bone elevated posteriorly or indistinct from anterior part of lower jaw, protrusibility of jaws variable; teeth present or absent in jaws, palatines, pterygoids (roof of mouth) or on outside of mouth; gill rakers variable, from short and stubby to long and slender, **ranging in number from few to numerous (10 to 26)** on lower arm of first gill arch. **Dorsal fins widely separated,** first with a variable number of small, flexible spines, originating in front of, or behind, vertical through tips of pelvic fins; **second dorsal fin and anal fin with I weak spine,** 1 unbranched soft ray and a variable number of branched soft rays; anal fin always originating slightly in advance of second dorsal fin; **pectoral fins set high on body,** directly behind posterior rim of gill cover, with spine greatly reduced and first ray much thicker than those following. Pelvic fins with I spine and 5 soft rays; caudal fin moderately forked. Anus in front or behind tips of pelvic fins. Lateral line absent. **Scales cycloid** (smooth to touch), moderately large; midlateral scales usually with pore or pit; axillary pelvic scales often present. **Colour:** in life, blue-green, green, or olive on back, translucent with scales delineated by small chromatophores above midlateral band; sides of head and body, as well as abdomen silvery; **midlateral band usually distinct and running from upper margin of pectoral fin to base of caudal fin,** but sometimes blending with silvery abdomen anteriorly; fins clear or dusky; blotch on pectoral fin present in some species.

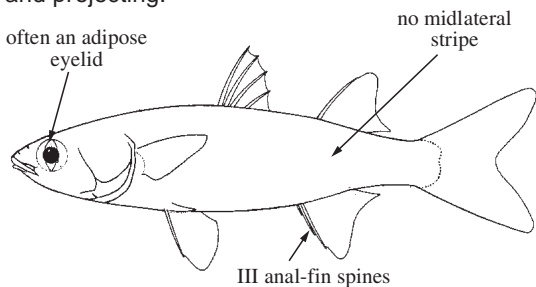


Habitat, biology, and fisheries: Mostly close inshore, near the surface, to a depth of about 1 to 2 m. Some species schooling in large numbers; some preferring to stay in small schools. Breeding either annual or opportunistic. Eggs moderately large (up to about 1 mm) with filaments present. Only 2 Old World species (*Atherina breviceps*, *Atherinomorus lacunosus*) are large enough to be valuable as human food; other species are important as forage for commercial fishes and used as bait and dried cat food.

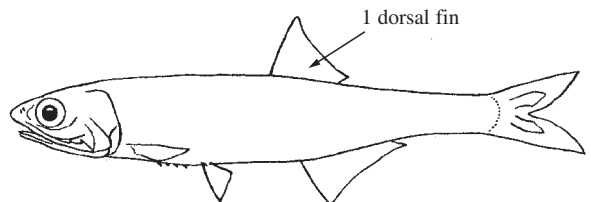
Similar families occurring in the area

Mugilidae: head broader and flattened, snout blunt; first dorsal fin with IV slender spines, anal fin with up to III spines (I in Atherinidae); eyes often covered with adipose lids; scales frequently ctenoid (rough to touch) on sides of head; no midlateral band on body.

Engraulidae: a single dorsal fin; no spines in fins; pectoral fins low on body; mouth very large; snout blunt and projecting.



Mugilidae



Engraulidae

Identification note

In the keys and throughout the following descriptions all soft rays, including the first unbranched ray, have been included in the ray count.

Key to the genera of Atherinidae occurring in the area

Note: there has been much confusion with atherinid species, possibly due to their small size, with lack of commercial importance leading to insufficient attention to this group. They are small silvery fishes which are superficially similar in size, coloration, and external morphology. Distinct differences, however, do occur in some measurements, counts, and in osteology. Mouthparts are frequently diagnostic of species.

1a. Preopercular notch present (Fig. 1a) → 2

1b. Preopercular notch absent (Fig. 1b) → 3

2a. Ascending process of premaxilla short and broad, (Fig. 2a) its length about 1/3 diameter of eye; lateral process of premaxilla broad and flat; mandibular ramus not elevated (Fig. 3a); slight elevation at distal end of dentary present or absent . . . *Atherinomorus*

2b. Ascending process of premaxilla moderately long and narrow, its length about 1/3 to 1/2 diameter of eye; lateral process of premaxilla short and conical (Fig. 2b); lower jaw distinctly elevated posteriorly (Fig. 3b) *Hypoatherina*

2c. Ascending process of premaxilla long, almost equal to diameter of eye; lateral process narrow and pungent (Fig. 2c); lower jaw elevated; whole of mandibular ramus elevated posteriorly (Fig. 3c) *Stenatherina*
(a single species, *S. panatela*, in the area)

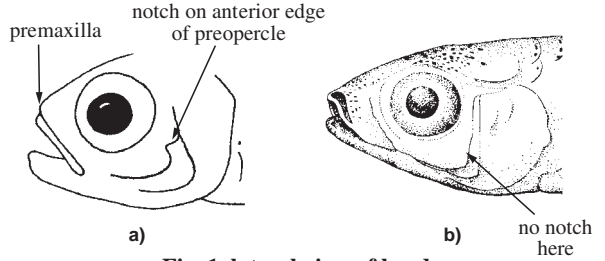


Fig. 1 lateral view of head

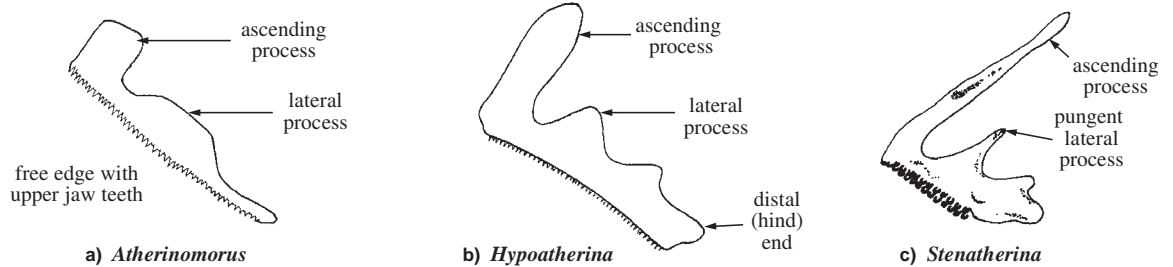


Fig. 2 premaxilla

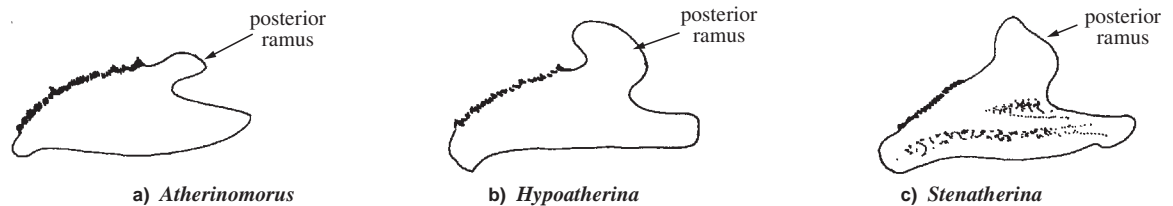
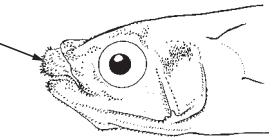


Fig. 3 dentary

3a. Shagreen denticles present outside of mouth (Fig. 4a); origin of first dorsal fin always behind vertical through tips of pelvic fins; anal-fin rays always 12 or more; midlateral scale count always 40 or more *Atherion*

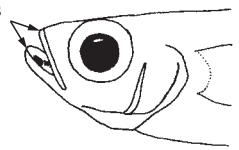
(a single species. *A. elymus*, in the area)

shagreen denticles



a) *Atherion*

no denticles outside mouth



b) *Craterocephalus*

Fig. 4 lateral view of head

3b. Shagreen denticles absent (Fig. 4b); origin of first dorsal fin either in front or behind tips of pelvic fins; anal-fin rays 12 or less, never more; midlateral scale count always less than 40 *Craterocephalus*

Key to the species of *Atherinomorus* occurring in the area

- 1a. Anus always behind tips of pelvic fins; premaxilla very long, extending well past vertical through anterior border of eye *Atherinomorus capricornensis*
- 1b. Anus always at or in front of tips of pelvic fins; premaxilla long, but not usually extending well past vertical through anterior border of eye → 2
- 2a. Midlateral scales never more than 39, with means from 34 to 37 → 6
- 2b. Midlateral scales may be less than 39, but with mean always greater than 39 → 3
- 3a. Midlateral scales 44 to 47; 2 anteriormost predorsal scales on either side of midline and in line with vertical through anterior border of eye *Atherinomorus insularum*
- 3b. Midlateral scales 38 to 44; anteriormost predorsal scales single in midline and almost in front of vertical through anterior border of eye → 4
- 4a. Midlateral band narrow, restricted to third transverse scale row; origin of first dorsal fin from 1 scale in front to 4 scales behind vertical through tips of pelvic fins . . . *Atherinomorus ogilbyi*
- 4b. Midlateral band not restricted to and always wider than third scale row; origin of first dorsal fin never in front of vertical through tips of pelvic fins. → 5
- 5a. Midlateral scales 39 to 41; midlateral band wider than single scale but not as wide as in following species; predorsal scales (18 or 19) with well defined point posteriorly; dentary slightly elevated posteriorly with tubercle at distal end; ramus of premaxilla just reaching past vertical through anterior border of eye *Atherinomorus cylindricus*
- 5b. Midlateral scales 39 to 44; midlateral band very wide; predorsal scales (17 to 22) rounded posteriorly; dentary without tubercle and not elevated; ramus of premaxilla reaching well past vertical through anterior border of eye *Atherinomorus lacunosus*
- 6a. Anal fin with 10 to 12 soft rays; midlateral scales 33 to 37; series of dots on scales extending as lines below midlateral band. *Atherinomorus lineatus*
- 6b. Anal fin always with 11 or more soft rays; midlateral scales always 34 or more; series of dots not extending as lines below midlateral band. → 7
- 7a. Gill rakers never less than 21 and up to 25 on lower limb of first gill arch; tubercle-like elevation present or absent at distal end of dentary; dentary may be slightly elevated. → 8
- 7b. Gill rakers on lower limb of first gill arch 18 to 22 (usually about 20); small tubercle-like elevation often present at distal end of dentary; dentary never elevated. *Atherinomorus endrachtensis*
- 8a. Lower jaw protruding, forming anteriormost part of head; origin of second dorsal fin only slightly behind vertical through origin of anal fin *Atherinomorus balabacensis*
- 8b. Lower jaw not protruding to form anteriormost part of head; origin of second dorsal fin well behind vertical through origin of anal fin → 9

- 9a.** Position of anus never more than 2 scales in front of tips of pelvic fins; origin of first dorsal fin always at or up to 2 scales in front of vertical through tips of pelvic fins, never behind; predorsal scales 14 to 18; width of midlateral band 2.9 to 3.6 times in body depth *Atherinomorus reginae*
- 9b.** Position of anus 1.5 to 3 scales in front of tips of pelvic fins; origin of first dorsal fin from 1 scale behind to 1.5 scales in front of vertical through tips of pelvic fins; predorsal scales 17 to 19; width of midlateral band 4.8 to 6.6 times in body depth. *Atherinomorus duodecimalis*

Key to the species of *Craterocephalus* occurring in the area

- 1a.** Midlateral scales always 33 or more; 12 to 17 gill rakers on lower limb of first gill arch; gill rakers moderately long and slender, about 1/2 diameter of pupil; body depth 4.5 to 7.2 times in standard length, with mean never less than 5.2 → 2
- 1b.** Midlateral scales always 33 or less; gill rakers never more than 13 on lower limb of first gill arch; gill rakers always less than 1/2 diameter of pupil; body depth never more than 5.4 times in standard length, with mean never more than 4.9 → 3
- 2a.** Single black spot at base of pectoral fin; gill rakers equal to diameter of pupil; dentary lateral fossa for insertion of labial ligament immediately adjacent to dentary symphysis *Craterocephalus mugiloides*
- 2b.** No black spot at base of pectoral fin; gill rakers long but slightly less than diameter of pupil; dentary lateral fossa for insertion of labial ligament never adjacent to dentary symphysis *Craterocephalus honoriae*
- 3a.** Transverse scales 6 to 8; anus always at or behind tips of pelvic fins; midlateral scales 26 to 29 (mean 27); needle-like teeth in 2 rows in upper jaw, in single row in lower jaw *Craterocephalus munroi*
- 3b.** Transverse scales 5 to 5 ½; anus always in front of tips of pelvic fins; midlateral scales 29 to 33 (mean 30.8); small teeth in both jaws in 2 rows *Craterocephalus capreoli*

Key to the species of *Hypoatherina* occurring in the area

- 1a.** Body scales distinctly crenulated on posterior edge; body robust, its depth never more than 5.9 times in standard length → 2
- 1b.** Body scales not crenulated; body slender, its depth never less than 5.5 times in standard length → 3
- 2a.** Midlateral scales 39 to 45; anal-fin rays 9 to 12 (mean 11.4); body depth 4.8 to 5.9 (mean 5.6) times in standard length *Hypoatherina valenciennesi*
- 2b.** Midlateral scales 33 to 35; anal-fin rays 8 or 9; body depth 4.1 to 5.2 (mean 4.5) times in standard length *Hypoatherina crenolepis*
- 3a.** Midlateral band wide, its width 2.3 to 3.2 (mean 2.7) times in body depth; pectoral-fin rays 11 to 14; 15 to 18 (mean 16.7) gill rakers on lower limb of first gill arch; anus always behind tips of pelvic fins *Hypoatherina barnesi*
- 3b.** Midlateral band narrow, its width 2.8 to 7.1 times in body depth; pectoral-fin rays 14 to 18; 18 to 25 gill rakers on lower limb of first gill arch; anus in front or behind tips of pelvic fins → 4
- 4a.** Dorsal process of premaxilla long and narrow, 1.3 to 1.8 times in diameter of eye; anal fin with 8 to 11 (mean 9) soft rays; midlateral band very narrow, its width 4 to 7 times in body depth; anus always in front of tips of pelvic fins *Hypoatherina ovalaua*
- 4b.** Dorsal process of premaxilla short or moderately long, but never less than 1.7 times in diameter of eye; anal fin always with 10 or more soft rays; lateral band moderately wide, its width never more than 5.1 times in body depth; anus in front or behind tips of pelvic fins → 5

- 5a. Gill rakers on lower limb of first gill arch 21 to 25 (mean 22.9); predorsal scales 16 to 18; dorsal process of premaxilla of moderate length, 1.7 to 2.5 (mean 2) times in diameter of eye; origin of pelvic fins either behind or in front of tips of pectoral fins *Hypoatherina temminckii*
- 5b. Gill rakers on lower limb of first gill arch 18 to 22 (mean 20.3); predorsal scales 17 to 22; dorsal process of premaxilla short, 2.2 to 3.7 (mean 2.9) times in diameter of eye; origin of pelvic fins always in front of tips of pectoral fins *Hypoatherina tropicalis*

List of species occurring in the area

The symbol ➤ is given when species accounts are included.

- *Atherion elymus* Jordan and Starks, 1901
- *Atherinomorus balabacensis* (Seale, 1910)
- *Atherinomorus capricornensis* (Woodland, 1961)
- *Atherinomorus cylindricus* (Valenciennes, 1835)
- *Atherinomorus duodecimalis* (Valenciennes, 1835)
- *Atherinomorus endrachtensis* (Quoy and Gaimard, 1824)
- *Atherinomorus insularum* (Jordan and Evermann, 1903)
- *Atherinomorus lacunosus* (Forster and Schneider, 1801)
- *Atherinomorus lineatus* (Günther, 1872)
- *Atherinomorus ogilbyi* (Whitley, 1930)
- *Atherinomorus reginae* (Seale, 1909)
- *Craterocephalus capreoli* Rendahl, 1922
- *Craterocephalus honoriae* (Ogilby, 1912)
- *Craterocephalus mugiloides* (McCulloch, 1913)
- *Craterocephalus munroi* Crowley and Ivantsoff, 1988
- *Hypoatherina barnesi* Schultz, 1953
- *Hypoatherina crenolepis* Schultz, 1953
- *Hypoatherina ovalaua* (Herre, 1935)
- *Hypoatherina temminckii* (Bleeker, 1853)
- *Hypoatherina tropicalis* (Whitley, 1948)
- *Hypoatherina valenciennei* (Bleeker, 1853)
- *Stenatherina panatela* (Jordan and Richardson, 1908)

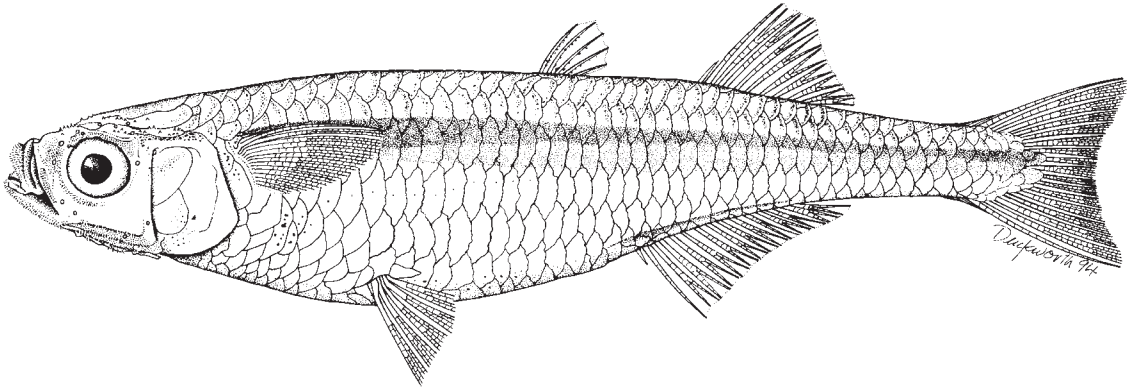
References

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- Ivantsoff, W. and L.E.L.M. Crowley. 1991. Review of the Australian silverside fishes of the genus *Atherinomorus* (Atherinidae). *Aust. J. Mar. Freshwater Res.*, 46(6):479-505.
- Ivantsoff, W. and L.E.L.M. Crowley. 1992. Redefinition of the freshwater genus *Craterocephalus* (Teleostei: Atherinidae) of Australia and New Guinea, with an analysis of three species. *Ichthyol. Explor., Freshwaters*, 3(3):1-15.

Atherion elymus Jordan and Starks, 1901

Frequent synonyms / misidentifications: *Atherion elymus freyi* Schultz, 1953; *A. e. asper* Schultz, 1953; *A. e. aphrozoicus* Schultz, 1953 / *Atherion maccullochi* (Ogilby, 1915).

FAO names: En - Bearded silverside.

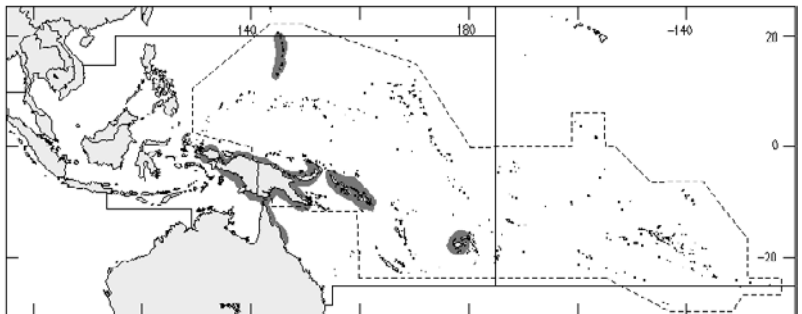


Diagnostic characters: Body slender. Mouth smallish, strongly oblique to horizontal, barely protractile, with thin lips. **No notch present on anterior border of preopercle. Shagreen denticles present outside mouth.** Upper jaw well toothed, dentary with patches of small teeth anteriorly. Rest of dentition variable, with teeth present or absent on vomer, rarely present on palatines, but usually found on basihyal and mesopterygoids. Free edge of premaxilla rounded and heavily toothed with notch well behind ascending process, then becoming straight or slightly concave towards corner of mouth. Ascending process of premaxilla blunt, short, and wide; **no lateral processes of premaxilla present. Distal end of maxilla blunt and truncate.** Gill rakers on lower limb of first gill arch 10 to 14, moderately slender and short, less than diameter of pupil. **First dorsal fin with III to V spines**, its origin about 6 to 10 scales behind vertical through tips of pectoral fins. Second dorsal fin with I spine and 8 to 13 soft rays, its origin behind vertical through anal-fin origin. Anal fin with I spine and 13 to 15 soft rays. Pectoral fins with I spine and 11 to 14 soft rays. Body scales moderately large, dorsoventrally elongated with circuli restricted to anterior half of scale; 40 to 44 midlateral scales; 5 or 5 ½ scales in transverse rows along side of body. Predorsal scales 16 to 19; interdorsal scales 5 to 8. Anus well behind tips of pelvic fins. **Colour:** variable in preserved specimens, from light brown with upper half of midlateral band extremely dark; heavy pigmentation around snout, dorsum of head, and lower jaw; cheeks lighter with fewer chromatophores; in live specimens, abdomen, lower half of midlateral band, and opercle silvery; spots on middorsal line large and silvery blue.

Size: Maximum length about 5 cm.

Habitat, biology, and fisheries: Can be collected in tide pools, surge channels, and coralline ridges of outer reefs. Eggs large. No known commercial value.

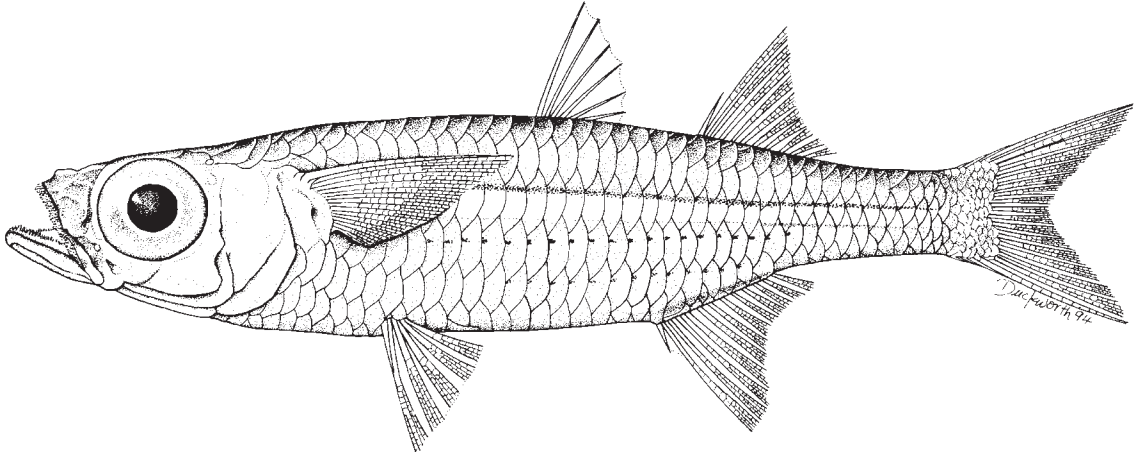
Distribution: Wide-ranging in the Pacific, extending from about 18° south along the eastern Australian coast to about 30° north in Japan. Seems to be restricted to the western Pacific Ocean and has been collected close to the islands in Micronesia, Melanesia, Fiji, and New Guinea.



Atherinomorus balabacensis (Seale, 1910)

Frequent synonyms / misidentifications: None / *Atherinomorus endrachtensis* (Quoy and Gaimard, 1824); *A. duodecimalis* (Valenciennes, 1835).

FAO names: En - Balabac Island silverside.

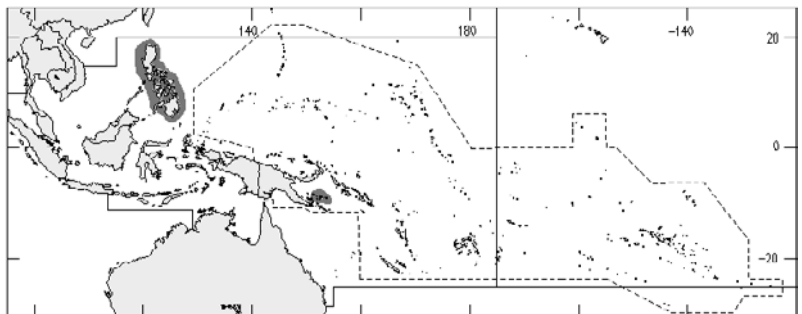


Diagnostic characters: Body elongate and deep, slightly compressed. Head conical, with depth greater than width. Mouth large and oblique, just reaching past anterior margin of orbit. **Lower jaw protruding, terminal.** Teeth in jaws small; teeth also present on vomer, mesopterygoid, ectopterygoid, and on back of tongue but absent on palatines. Gill rakers on lower limb of first gill arch 21 to 24, long and slender. First dorsal fin with IV to VI flexible spines, its origin 1 or 2 scales behind tips of pectoral fins. Second dorsal fin with I spine and 8 to 11 soft rays, its origin slightly behind vertical through anal-fin origin. Anal fin with I spine and 12 to 14 soft rays. Pectoral fins with I spine and 14 to 18 soft rays. Body scales large with smooth margins; scales apparently deciduous on head; **36 to 38 midlateral scales**; 5 or 5 ½ scales in transverse rows along side of body. Predorsal scales 16 to 18; interdorsal scales 6 or 7. Anus 1 ½ to 4 scales in front of tips of pelvic fins. **Colour:** preserved specimens uniformly yellow-green with **thin silvery midlateral band**; midlateral band with very fine, blue-black edge above; scales above midlateral band with sprinkling of fine melanophores; row of scales below with small black dot on each, forming continuous line along body; scale rows below with indistinct, incomplete line of dots; dark line along middorsal contour from back of head to base of caudal fin; fins mostly uniformly yellowish with dusky patch at base of pectoral fins; caudal fin with slight dusky tinge; eye with darker markings on top.

Size: Maximum length about 6 to 7 cm.

Habitat, biology, and fisheries: Generally found close inshore sometimes close to mouth of streams. Nothing is known of the biology of this species. Of no commercial value but may be taken as food by larger commercial species.

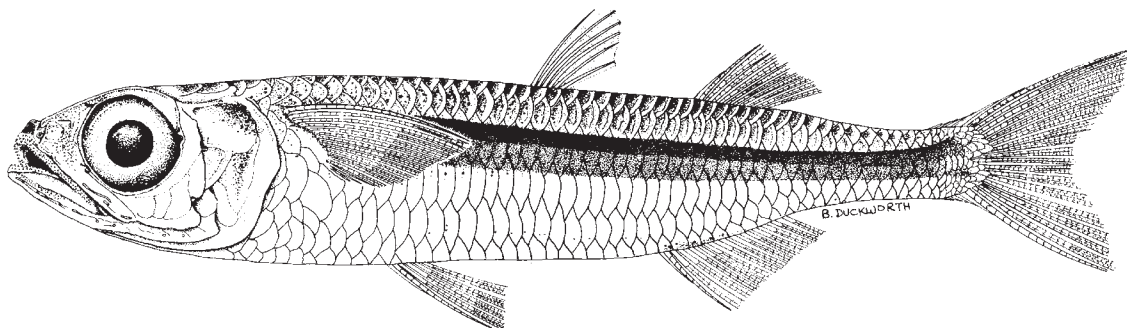
Distribution: Philippines (Balabac, Samar, Cebu, Siquijor, Mindanao, Palawan, Culion, Samar Islands); also Trobriand Islands.



Atherinomorus capricornensis (Woodland, 1961)

Frequent synonyms / misidentifications: *Pranesus capricornensis* Woodland, 1961 / *Pranesus ogilbyi* Whitley, 1930; *P. pinguis* (Lacepède, 1803).

FAO names: En - Capricorn silverside.

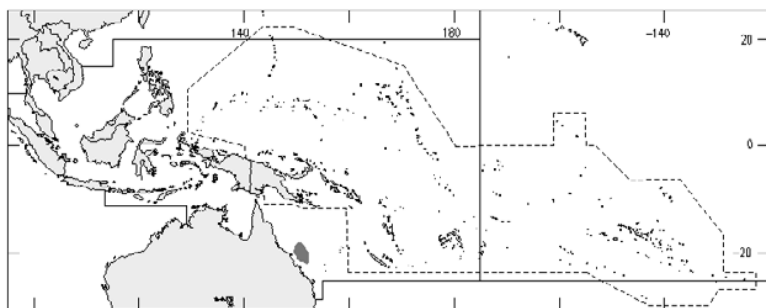


Diagnostic characters: Body small and slender, somewhat compressed. Small shagreen denticles present on lips of upper and lower jaws. Teeth in both jaws small, villiform, and in more than 1 row on premaxilla, often extending to outer surface. Teeth on other bones variable in size, **often long and pungent on vomer** and either forming a strong ridge or scattered over mesopterygoid; teeth also present on palatines, ectopterygoids, and tongue; free edge of lower jaw sloping backwards and upwards without distinctly elevating at posterior end. **Ramus of premaxilla long, extending past vertical through anterior border of pupil**, anterior process short, lateral process absent. Gill rakers on lower limb of first gill arch 20 to 24 (usually 22 or 23). First dorsal fin with III to VII spines; second dorsal fin with I spine and 9 or 10 soft rays; anal fin with I spine and 12 to 15 soft rays; pectoral fins with 14 to 17 soft rays. Midlateral scales 41 to 45 (usually 43 to 45); always 5 scales in transverse rows along side of body. Predorsal scales 19 to 22; interdorsal scales 7 to 9. Anus up to 3 scales behind tips of pelvic fins. **Colour:** blue-green, light or dark grey and silvery below; midlateral band wide, covered by third and part of fourth row of midlateral scales; flesh translucent above wide midlateral band, its upper edge iridescent blue; green chromatophores forming middorsal line. Pectoral blotch present or absent; ventral surface often iridescent; snout and opercle silvery; fins dusky but pectoral fins sometimes yellowish; posterior half of scales above midlateral band heavily pigmented, often with C-shaped or diamond-shaped mark on each scale; eyes iridescent blue-green.

Size: Maximum length about 12 cm.

Habitat, biology, and fisheries: An island species of the Great Barrier Reef. Schools in numbers ranging from several hundred to schools of more than 100 m long and 20 m wide, lying close inshore in depths of about 1 m, generally about from 15 cm below surface to bottom. Feeding occurs mostly at night when schools disperse. Food comprises a variety of planktonic crustaceans. Subject to predation by sharks, tunas, long toms, and amberjacks, also by terns, gannets, seagulls, and herons. May be caught with seines in large numbers but seem to be of little commercial value.

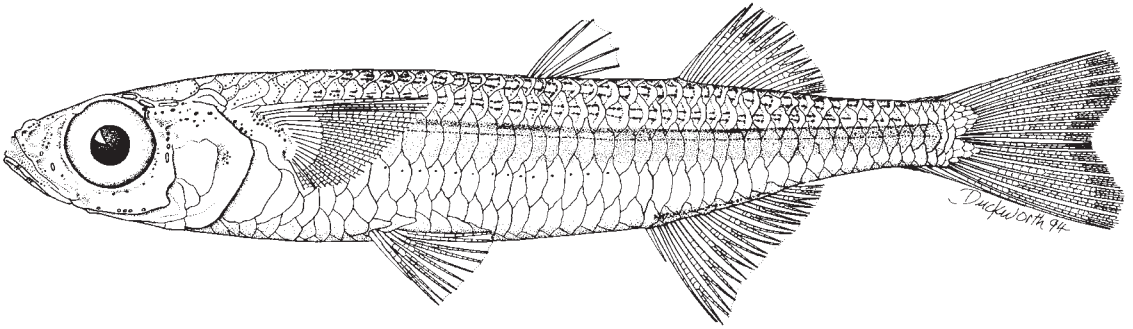
Distribution: From the Capricorn Group (e.g. Heron Island (23°27'S, 151°55'E) and some islands closer to the mainland, as far north as Borth Barnard Island, 17°40'S, 146°10'E). It is potentially sympatric with 3 other species of *Atherinomorus*: *A. lacunosus*, *A. endrachtensis* and *A. ogilbyi*. Species of *Hypoatherina* also co-occur.



Atherinomorus cylindricus (Valenciennes, 1835)

Frequent synonyms / misidentifications: None / *Atherinomorus duodecimalis* (Valenciennes, 1835); *A. endrachtensis* (Quoy and Gaimard, 1824).

FAO names: En - Waigeo silverside.

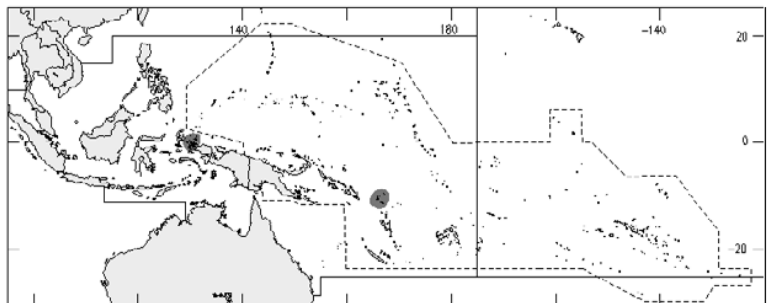


Diagnostic characters: Body slender, slightly compressed. Mouth moderately large. Teeth in lower jaw minute, sparse, but evenly spaced; in upper jaw minute and with some fine shagreen denticles on lips. Teeth also present on vomer, tongue, mesopterygoids, and ectopterygoids, but may be difficult to see in last 3. Ascending process of premaxilla short and moderately broad; lateral process broadly rounded. Dentary slightly elevated posteriorly. **Gill rakers** on lower limb of first gill arch **20 to 22**, long and slender, about equal to diameter of pupil, with fine spinules along length. First dorsal fin with V or VI weak spines, its origin 2 to 6 scales behind vertical through tips of pectoral fins. Second dorsal fin with I spine and 10 or 11 soft rays; anal fin with I spine and 12 to 14 soft rays. Pectoral fins with I small spine and 15 or 16 soft rays. Body scales dorsoventrally elongated and rounded posteriorly; **39 to 41 midlateral scales**; 5 scales in transverse rows along side of body. **Predorsal scales 18 or 19, forming well defined point posteriorly; interdorsal scales 6 to 8. Anus 2 to 4 scales in front of pelvic-fin tips.** **Colour:** preserved specimens yellowish with silvery-brown midlateral band; dark, thick reticulate pattern present on dorsal scales; single row of melanophores present (1 on each scale) below midlateral band from origin of pectoral fin as far as vertical through anal-fin origin; eye and opercle silvery; snout and dorsum of head dark.

Size: Maximum length about 6.5 cm.

Habitat, biology, and fisheries: Like other members of this genus found close inshore around islands. Nothing is known of its biology. Of no commercial value but probably preyed upon by larger species.

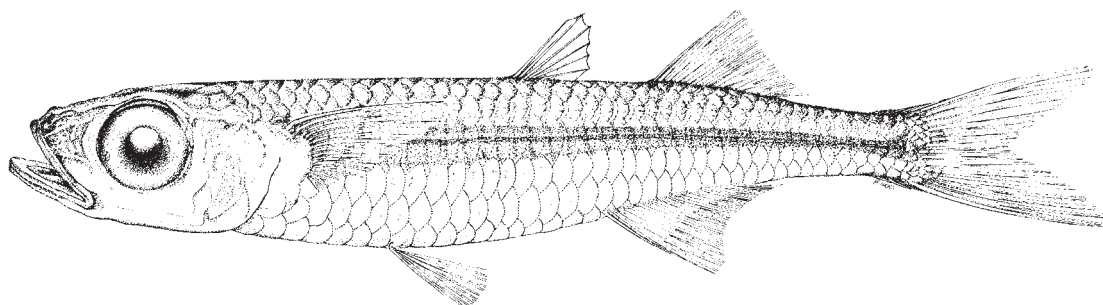
Distribution: Waigeo Island; Utupua Island, Santa Cruz Group.



Atherinomorus duodecimalis (Valenciennes, 1835)

Frequent synonyms / misidentifications: *Pranesus duodecimalis* (Valenciennes, 1835); *Allanetta duodecimalis* (Valenciennes, 1835) / *Atherinomorus endrachtensis* (Quoy and Gaimard, 1824); *A. cylindricus* (Valenciennes, 1835).

FAO names: **En** - Tropical silverside; **Fr** - Athérine tropicale; **Sp** - Pejerrey tropical.

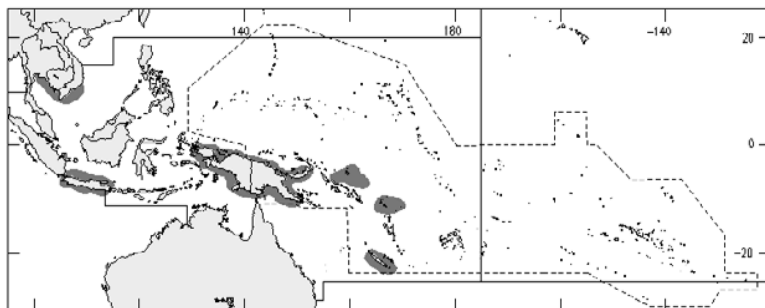


Diagnostic characters: Body small, robust, subcylindrical, and laterally compressed. Head and eyes moderately large. Posterior edge of preopercle more or less straight and not projected into a lobe. **Distal end of upper jaw extending slightly backward slightly beyond vertical through anterior border of orbit**, its ascending process moderately short and wide. Outer surface of premaxilla frequently covered with fine denticles scarcely visible to naked eye, but no shagreen denticles elsewhere on head. Teeth in several rows in both jaws. On roof of mouth, teeth usually distinctly visible (but may be weak or lacking) on palatines, ectopterygoids, or mesopterygoids; teeth also present around edge of tongue. **Dentary bone sloping backward and upward, with distinct tubercle-like elevation at its distal end.** Gill rakers moderately long, slightly less than diameter of pupil, 21 to 25 on lower limb of first gill arch. First dorsal fin with IV to VI spines; second dorsal fin with I spine and 9 or 10 soft rays; anal fin with I spine and 12 or 13 soft rays; pectoral fins with I spine and 14 to 17 soft rays. Body scales large; **33 to 38 midlateral scales**; about 5 scales in transverse rows along side of body. Predorsal scales 17 to 19; interdorsal scales 6 or 7. **Anus 2 to 4 (rarely more than 3) scales in front of pelvic-fin tips.** **Colour:** greenish above, whitish below when alive, with silvery midlateral band; preserved specimens brown-green with black midlateral band; edges of scales on back with numerous small chromatophores; rows of spots on third and fourth row of scales extending from about tips of pectoral fins to origin of anal fin or slightly beyond.

Size: Maximum length about 8.5 cm.

Habitat, biology, and fisheries: Nothing is known of the biology of this species except that it inhabits shallow coastal waters. It can be caught with seines but is probably only of use as a forage fish for larger commercial species. It may also be used as bait.

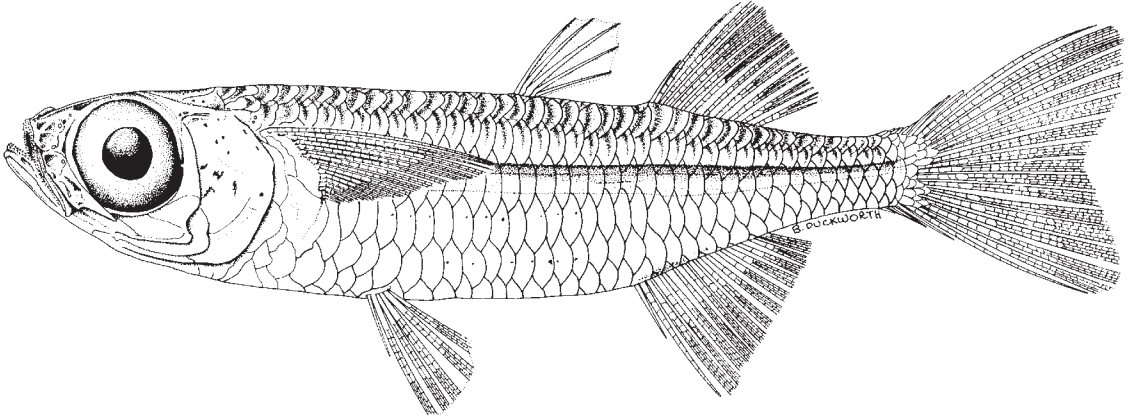
Distribution: This species extends well beyond the area into the Indian Ocean. Found off the coast of Java, Thailand, Viet Nam, Papua New Guinea, New Britain, Solomon Islands, New Caledonia, and Utupa Island (Santa Cruz Group).



Atherinomorus endrachtensis (Quoy and Gaimard, 1824)

Frequent synonyms / misidentifications: *Pranesus endrachtensis* (Valenciennes, 1835); *Atherinomorus eendrachtensis* (Quoy and Gaimard, 1824) (misspelling) / *Atherinomorus ogilbyi* (Whitley, 1930); *A. duodecimalis* (Valenciennes, 1835); *A. lineatus* (Günther, 1872).

FAO names: En - Endracht land silverside.

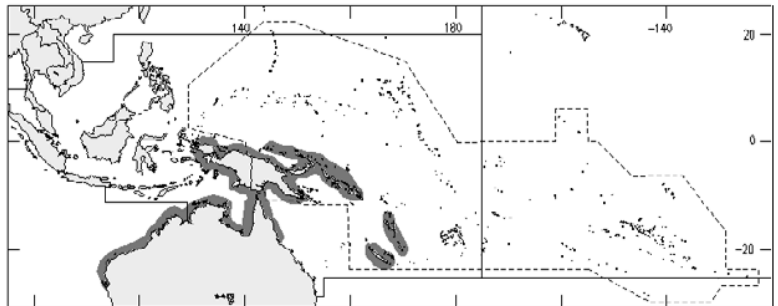


Diagnostic characters: Body moderately small, subcylindrical. Mouth barely protractile, large, and moderately oblique. **Teeth in both jaws small**, premaxilla covered with fine shagreen denticles, occasionally also on snout; teeth always present on vomer, but present or absent on palatines and ectopterygoids; **strong ridge of teeth always present on mesopterygoids**. **Free edge of premaxilla moderately short, not extending past vertical through anterior border of pupil**; dorsal process of premaxilla broad, lateral process absent. **Small tubercular elevation often present at distal end of dentary**, but dentaries never elevated. **Gill rakers** on lower limb of first gill arch 18 to 22 (usually about 20), relatively long, **equal to or greater than diameter of pupil**. First dorsal fin with IV to VI weak spines; second dorsal fin with I spine and 8 to 10 soft rays; anal fin with I spine and 11 to 14 soft rays; pectoral fins with 12 to 16 soft rays. **Midlateral scales 34 to 39 (usually 36 to 37)**; 5 or 5 ½ scales in transverse rows along side of body. Predorsal scales 16 to 19; interdorsal scales 5 or 7. Anus 2 to 4 scales in front of pelvic-fin tips, usually close to origin of pelvic fins. **Colour:** live specimens from Western Australia brown-yellow with distinct chromatophores on edges of scales; eye, preopercle, and midlateral band silvery; snout and all fins slightly dusky; pectoral blotch, if present, distinct but not intense. Silvery peritoneum and posterior end of swimbladder visible through translucent flesh; preserved specimens light yellow, yellow-brown, or yellow-green; upper half of body darker; midlateral silvery black band edged by narrow black line above; blotch on pectoral fins present or absent.

Size: Maximum standard length about 8.4 cm.

Habitat, biology, and fisheries: Inhabits shallow coastal waters. Nothing is known of the biology of this species other than that it schools together in shallow waters with *Atherinomorus lacunosus*, *A. ogilbyi*, *Craterocephalus mugiloides*, and *Hypoatherina temminckii* in coastal areas of northern Australia. Potentially sympatric with *Atherinomorus duodecimalis* in New Guinea, New Britain, and the Solomon Islands. May be collected with seines but has no commercial value.

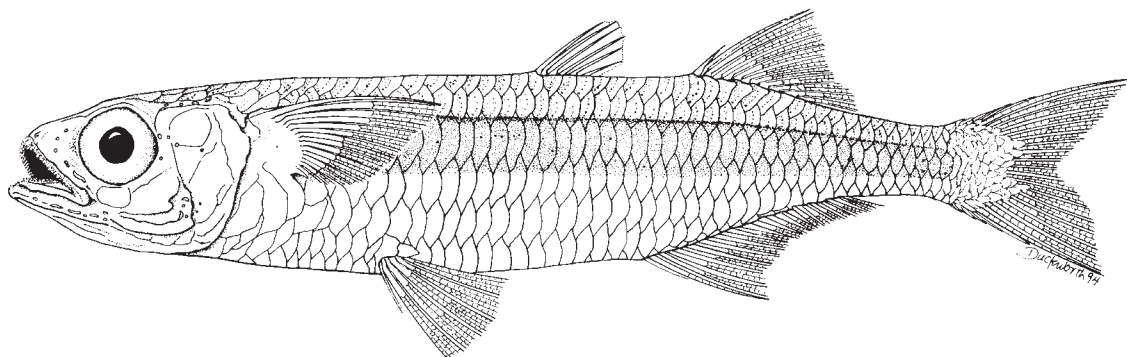
Distribution: Northern waters of Australia; Vanuatu, Papua New Guinea, Admiralty Islands, New Britain, Solomon Islands, and New Caledonia. Sold in small quantities at some markets in the Philippines.



Atherinomorus insularum (Jordan and Evermann, 1903)

Frequent synonyms / misidentifications: *Atherina insularum* (Jordan and Evermann, 1903) / *Atherinomorus lacunosus* (Forster and Schneider, 1801); *Pranesus pinguis* (Lacepède, 1803).

FAO names: En - Hawaiian silverside.

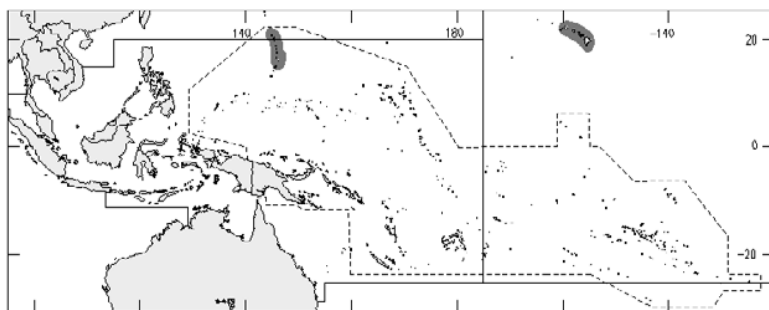


Diagnostic characters: **Body slender, moderately compressed.** Head and eyes not particularly large (when compared with *Atherinomorus duodecimalis*). Outer surface of mouth frequently covered by fine shagreen denticles; labial ligament long and fleshy, reaching to 2/3 way along lower jaw. Teeth in jaws small, needle-like, and usually in single row. Teeth also present on posterior part but absent from front of basihyal; single ridge of teeth on mesopterygoid and ectopterygoid; **teeth on vomer very small and difficult to see.** Free edge of premaxilla reaching past vertical through anterior border of orbit, its ascending process short and blunt and lateral process broadly rounded. Dentary gently sloping upward and backward. **Gill rakers** with spinules, slender and **longer than diameter of pupil**, 19 to 23 on lower limb of first gill arch. First dorsal fin with V to VII weak spines, its origin 4 to 7 scales behind tips of pectoral fins. Second dorsal fin with I spine and 10 or 11 soft rays, its origin behind vertical through origin of anal fin. Anal fin with I spine and 15 to 18 soft rays. Pectoral fins with I small spine and 14 to 17 soft rays. Midlateral body scales 44 to 47, moderately large, dorsoventrally elongated; 5 or 5 ½ scales in transverse rows along side of body. **Predorsal scales 20 to 23**; 2 predorsal scales on dorsum of head, on either side of centre line and almost in front of vertical through orbit; interdorsal scales 6 to 9. Anus at, or only slightly (1 scale) in front of tips of pelvic fins. **Colour:** preserved specimens yellowish with fine blue-black line above diffuse but broad silvery midlateral band; opercle silvery; eye mostly silvery with a dark section at the top; dorsum of head dark; snout dark above lips; scales above midlateral band outlined with melanophores forming a reticulate pattern; fins clear.

Size: Maximum length about 9 cm.

Habitat, biology, and fisheries: The species lays eggs of about 1 to 1.5 mm diameter which have long tendrils attached to chorion. Larvae hatch at 4 mm. Fully mature at about 15 mm. This silverside swims in small schools during daylight hours close to the shore line and disperses at night spreading over the reef. A nocturnal plankton eater, its gut content containing mostly crustaceans and foraminiferans. Like other species of this family, it is of no commercial value but may be taken by larger species as food.

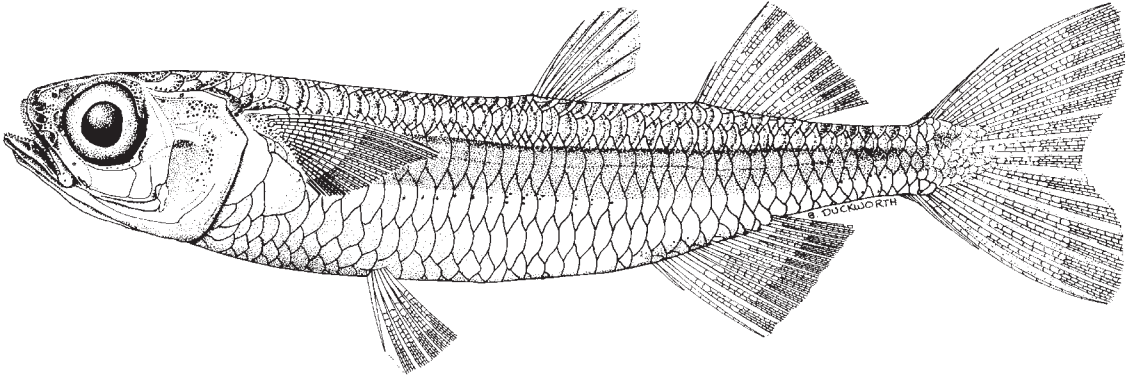
Distribution: Found in the waters of Hawaii. A population identified as its subspecies, occurs off the south coast of Molokai Island, 22°N 3°08'E. Saipan, Mariana Islands.



Atherinomorus lacunosus (Forster and Schneider 1801)

Frequent synonyms / misidentifications: *Pranesus pinguis* (Lacepède, 1803); *P. vaigiensis* (Quoy and Gaimard, 1825); *P. maculatus* Taylor, 1964); *Atherina forskalii* (Rüppell, 1838); *A. morrissi* Jordan and Starks, 1906 / *Atherinomorus ogilbyi* (Whitley, 1930), *A. capricornensis* (Woodland, 1961).

FAO names: **En** - Hardyhead silverside; **Fr** - Atherin tête; **Sp** - Pejerrey cabezón.

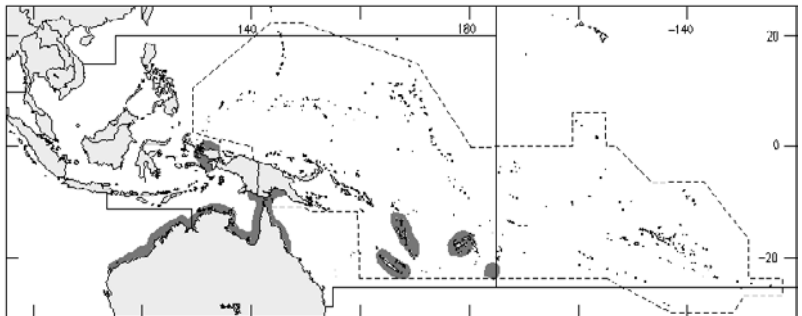


Diagnostic characters: Body subcylindrical, laterally compressed. Head and eyes moderately large. **Distal end of upper jaw extending backward to vertical through anterior border of pupil**, its ascending process short and blunt, lateral process low and broad. Outer surface of premaxilla frequently covered with fine denticles, scarcely visible to naked eye; no shagreen denticles elsewhere on head. Teeth in jaws small, villiform, usually in more than 1 row on premaxilla. Teeth also present on roof of mouth (palatines, vomer, sometimes also ectopterygoids). **Free edge of dentary bone almost flat, with no posterior elevation.** Gill rakers long and slender, equal to or longer than diameter of pupil, 18 to 25 on lower limb of first gill arch. First dorsal fin with IV to VII spines; second dorsal fin with I spine and 8 to 11 soft rays; anal fin with I spine and 12 to 17 soft rays; pectoral fins with 14 to 18 soft rays. Body scales large; **39 to 44 midlateral scales**; 5 or 5 ½ transverse scales rows along side of body. Predorsal scales 17 to 22; interdorsal scales 6 to 9. Anus at, or slightly in front of, tips of pelvic fins. **Colour:** blue-green and translucent with silvery parts of abdomen and head frequently iridescent; midlateral band wider than 1 scale row along side, silvery and often merging with silvery abdomen on anterior part of body; opercle and iris silvery; upper surface of head heavily pigmented; scales on back usually outlined with small chromatophores; fins clear to dusky, pectoral fins frequently with blackish blotch.

Size: Maximum length about 11 cm.

Habitat, biology, and fisheries: During the day, this species aggregates in large, relatively inactive schools, close inshore. The fish disperse over reefs at sunset, keeping about 2 to 4 m apart. Feeding occurs at night and food includes planktonic eggs, crustaceans, foraminiferans, amphipods, ostracods, calenoid copepods, and caridean shrimp larvae (most plankton less than 0.5 mm in size). Small fish such as *Clupea* and *Sardinella* species are also taken as food. The schools reform in the early morning and move back closer to shore. Small individuals, less than 3.5 cm standard length, form small schools also relatively close to the shore and feed actively during daylight hours. *Atherinomorus lacunosus* is one of the largest and most robust of silversides occurring in the area. It is known to be sold at fish markets in various parts of the world.

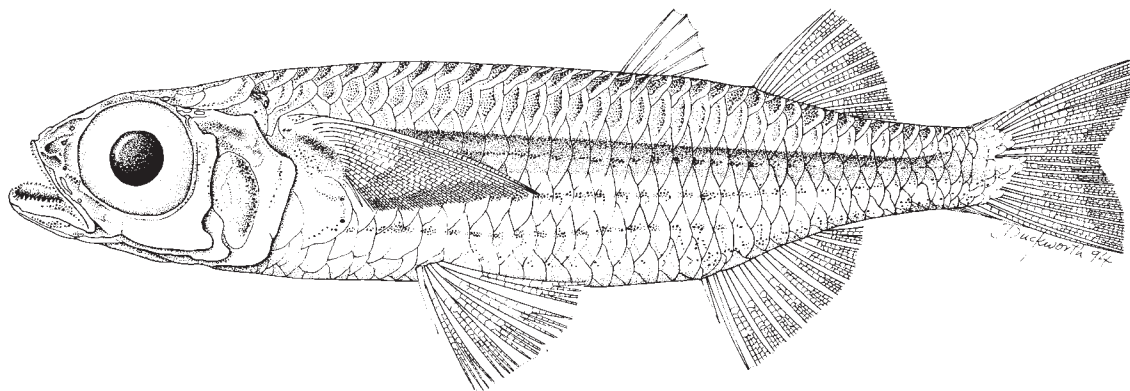
Distribution: Ambon Island (Indonesia), Waigeo Island (West Irian), New Guinea, Vanuatu; northern Australia, Fiji, New Caledonia, and Tonga. Outside the area also found in the eastern Mediterranean, Indian Ocean, and in the Pacific as far north as Japan.



Atherinomorus lineatus (Günther, 1872)

Frequent synonyms / misidentifications: *Atherina lineata* Günther, 1872 / *Atherinomorus endrachtensis* (Quoy and Gaimard, 1824).

FAO names: En - Lined silverside.

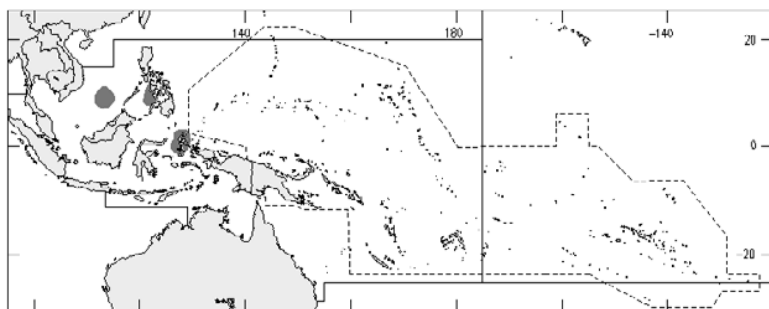


Diagnostic characters: Body slender. **Eyes large, their diameter equal to interorbital space.** Snout very short. Lips thin, fusing at junction of premaxilla and maxilla. Teeth in upper and lower jaws in several rows; shagreen denticles present on lips; teeth also present on palatines, vomer, and mesopterygoids. Premaxilla extending just past vertical through anterior margin of orbit; ascending process of premaxilla blunt, short, and broad based. Gill rakers on lower limb of first gill arch 20 to 23. First dorsal fin with IV or V weak spines, its origin at, or up to 2 ½ scales behind, vertical through tips of pelvic fins. Second dorsal fin with I spine and 7 to 9 soft rays. Anal fin with I spine and 10 to 12 soft rays. Pectoral fins long and pointed. Body scales dorsoventrally elongated; **33 to 37 midlateral scales**; 5 scales in transverse rows along side of body. Predorsal scales 17 to 19; interdorsal scales 6 or 7. Anus 2 ½ to 5 scales in front of pelvic-fin tips. **Colour:** in preserved specimens, only narrow **upper edge of midlateral band visible as lighter yellow-gold or black; series of black dots on scale rows extending as lines** below midlateral band; eye silvery black.

Size: Maximum length about 7.5 cm.

Habitat, biology, and fisheries: Appears to live in shallow waters in cays or close to shore. Nothing is known of the biology. The species is not well known and is unlikely to have any commercial value.

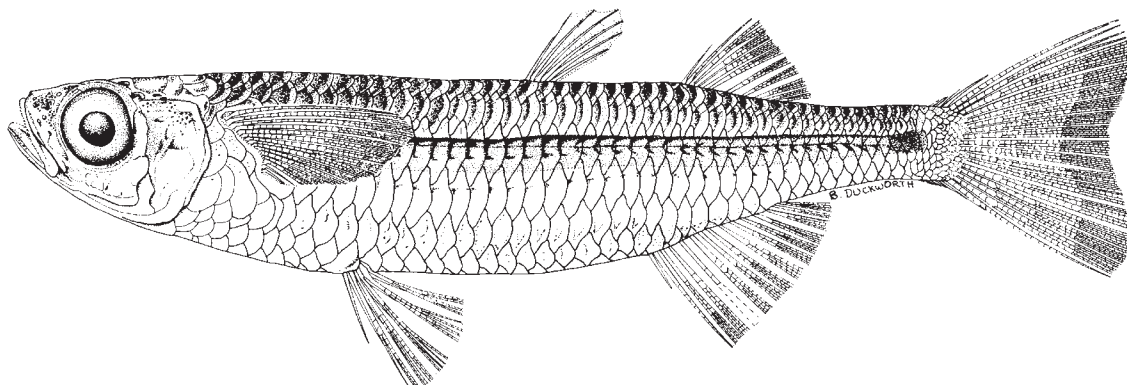
Distribution: Amboyna Cay (Spratly Islands), Halmahera Island (Indonesia), and Cebu (Philippines).



Atherinomorus ogilbyi (Whitley, 1930)

Frequent synonyms / misidentifications: *Pranesus ogilbyi* Whitley, 1930 / *Pranesus endrachtensis* (Quoy and Gaimard, 1824); *Atherinomorus lacunosus* (Forster and Schneider, 1801); *Pranesus pinguis* (Lacepède, 1803).

FAO names: En - Ogilby's silverside.

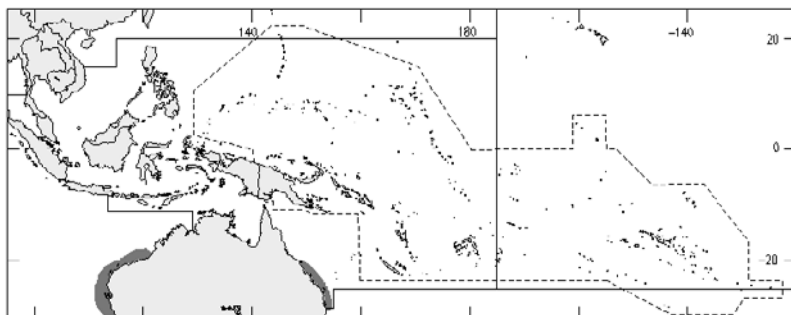


Diagnostic characters: Body large, robust, slightly compressed. **Free edge of premaxilla extending to just beyond anterior margin of orbit.** Mouth relatively large and oblique; lips thin, with teeth in both jaws small and barely visible; anterior surface of premaxilla covered by fine shagreen denticles, often extending onto surface of snout. Teeth always present on vomer and palatines, present or absent on ectopterygoids and forming strong ridge on mesopterygoids. Ascending process of premaxilla short, lateral process low and broad. Free edge of dentary flat but distal end slightly elevated. **Gill rakers on lower limb of first gill arch 22 to 28 (usually 24 to 26)**, long, usually equal to or longer than diameter of pupil. First dorsal fin with IV to VII weak spines; second dorsal fin with I spine and 8 to 11 soft rays; anal fin with I spine and 11 to 16 soft rays; pectoral fins with 15 to 18 soft rays. Midlateral scales 38 to 43; 5 or 5 ½ scales in transverse rows along side of body. Predorsal scales 16 to 21; interdorsal scales 6 to 9. Anus 1/2 to 4 scales in front of tips of pelvic fins. **Colour:** live specimens bluish green and translucent; **midlateral band narrow, restricted to third transverse scale;** abdomen, opercle, and preopercle usually with iridescent sheen; upper half of midlateral band bright blue; iris silvery and with black spot on its dorsal half; iris also frequently with red spots (superficial capillaries) on ventral half.

Size: Maximum standard length about 12.4 cm.

Habitat, biology, and fisheries: Found mostly in marine or estuarine habitats and can survive in water with salinity as low as 3‰. The life history of this species has been extensively studied in its southern ranges. Its diet comprises amphipods, copepods, isopods, crab and barnacle larvae, gastropods, polychaetes, chironomid midges, hymenopterans ants, and plant matter, but the main diet appears to consist of crustaceans and polychaete worms. Gut content varies from season to season indicating that they are opportunistic feeders. Life span is 2 years with sexual maturity and breeding occurring during the second year during the southern hemisphere late winter and spring, from August to October. Breeding may take place both in marine and estuarine environments. They can be collected with seines and are taken by commercial fishermen in eastern Australia, probably for bait or fishmeal.

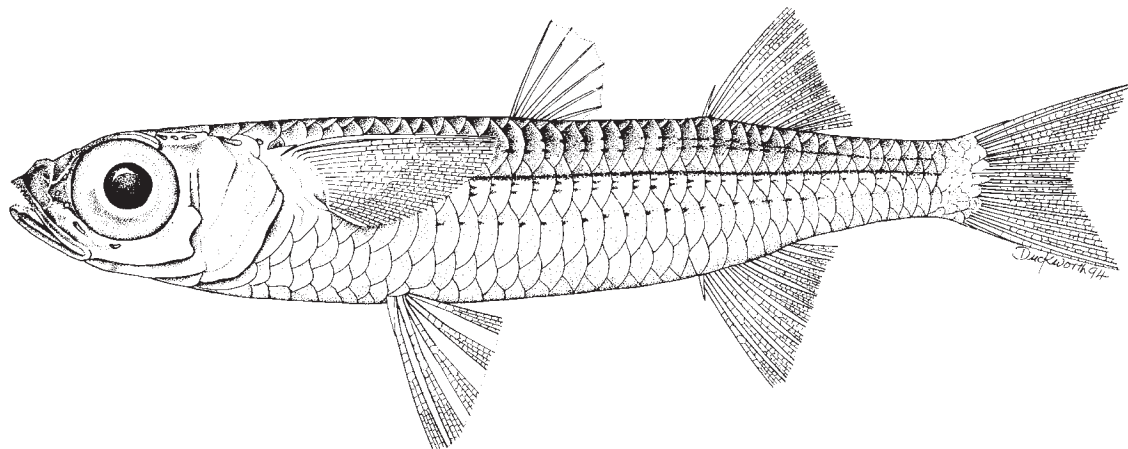
Distribution: Common silverside in southeastern and southwestern Australia, with range extending into the area to Rockhampton on the eastern coast.



Atherinomorus reginae (Seale, 1910)

Frequent synonyms / misidentifications: *Atherina regina* (Seale, 1910); *Allanetta regina* (Seale, 1910) / *Atherinomorus duodecimalis* (Valenciennes, 1835); *A. balabacensis* (Seale, 1910).

FAO names: En - Culion silverside.

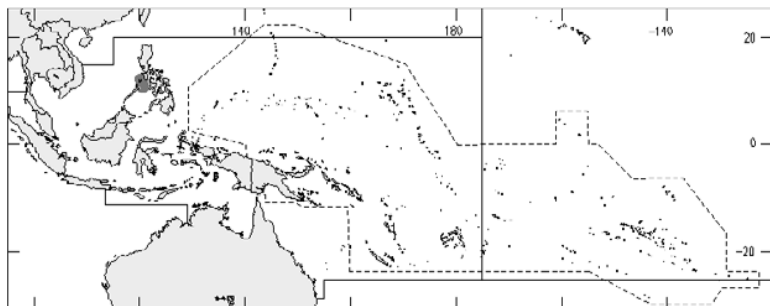


Diagnostic characters: Body slender. Preopercular notch present. Mouth small. Teeth in both jaws minute with shagreen denticles present on outside of mouth. Teeth on vomer also minute; **no teeth present on palatines**. Ascending process of premaxilla short and broad. Gill rakers on lower limb of first gill arch (22 to 24) long and slender, about 3/4 diameter of pupil. First dorsal fin with V to VII slender spines; **first dorsal-fin origin at, or up to 2 scales in front of, vertical through pelvic-fin tips**. Second dorsal fin with I spine and 9 or 10 soft rays, its origin behind vertical through origin of anal fin. Anal fin with I spine and 10 to 12 soft rays. Body scales large, posterior margin smooth; 36 to 38 midlateral scales; 5 or 6 scales in transverse rows along side of body. Predorsal scales 14 to 18; interdorsal scales 6 to 8. Anus 1 ½ or 2 scales in front of pelvic-fin tips. **Colour:** preserved specimens yellowish with posterior margins of dorsal rows of scales; sides of dentary, snout, dorsal part of gill cover, and upper surface of eye with dark pigmentation; silvery midlateral band covering midlateral scale row; line of small dark dots above midlateral band and minute black dots on row of scales below silvery band; snout and lower jaw dusky; upper part of eye also dark; fins clear to yellowish, but caudal fin dusky, with 2 or more distinct blotches on base.

Size: Maximum length about 7 cm.

Habitat, biology, and fisheries: Like other atherinids, this species is usually found in close inshore habitats. Nothing is known of its biology and it has no known commercial value. Probably taken by commercial fish species as food.

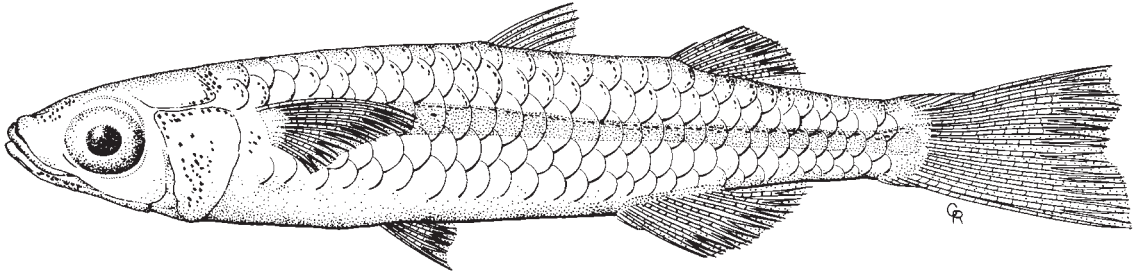
Distribution: Known from Culion and Busuanga islands in the Philippines.



Craterocephalus capreoli Rendahl, 1922

Frequent synonyms / misidentifications: *Craterocephalus anticanus* Whitley, 1955 / *Craterocephalus pauciradiatus* (Günther, 1861).

FAO names: En - Rendahl's hardyhead.

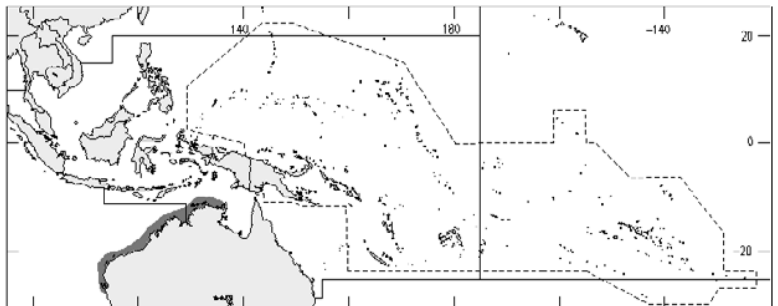


Diagnostic characters: Body small, robust, subcylindrical. Teeth in both jaws small and conspicuous, all other bones in mouth without teeth. Premaxilla with long ascending process, just reaching into interorbital space; lateral process strongly reduced. Free edge of premaxilla reaching vertical through anterior margin of orbit. Coronoid of dentary highly elevated. **Gill rakers short, with spinules, 10 to 13 on lower limb of first gill arch.** First dorsal fin with IV to VI spines, its origin 0 to 2 ½ scales in front of vertical through pelvic-fin tips. **Second dorsal fin with I spine and 6 to 8 soft rays; anal fin with I spine and 7 to 10 soft rays;** pectoral fins with I spine and 11 to 14 soft rays. Body scales dorsoventrally elongated, posterior edge irregular in larger fish; **29 to 33 midlateral scales;** 5 or 6 scales in transverse rows along side of body. Predorsal scales 12 to 15; interdorsal scales 5 to 7. **Anus** 3 to 5 scales in front of tips of pelvic fins, **very close to pelvic-fin origin.** **Colour:** live specimens pale green or yellow, with silvery abdomen and midlateral band; opercles and preopercles iridescent; body often with silver iridescent sheen; dorsum of head dark; dorsal fins dusky, caudal fin dusky yellow, and pelvic fins creamy.

Size: Maximum length about 8.5 cm.

Habitat, biology, and fisheries: Essentially an estuarine and coastal species, co-occurring with *Craterocephalus pauciradiatus*, *C. mugiloides*, and *Atherinomorus endrachtensis*. Nothing is known of its biology except that this species is capable of withstanding the very high salinities found in Shark Bay, Western Australia. Can be collected with seines but has no commercial value. It is possibly taken as food by larger commercial species.

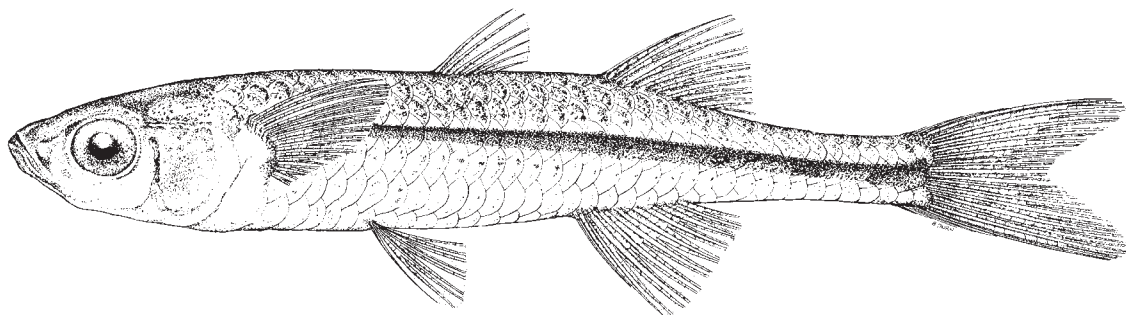
Distribution: From the Arolhos Islands in Western Australia northwards to the Gulf of Carpentaria (Northern Territory, Australia).



Craterocephalus honoriae (Ogilby, 1912)

Frequent synonyms / misidentifications: *Atherina honoriae* Ogilby, 1912; *Stenatherina honoriae* (Ogilby, 1912) / *Atherinosoma microstoma* (Günther, 1861).

FAO names: En - Estuarine hardyhead.

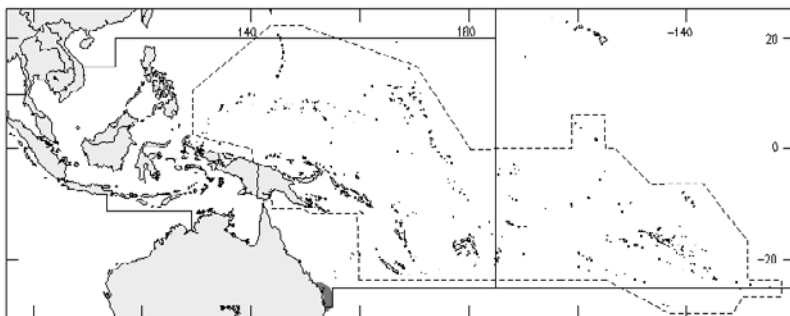


Diagnostic characters: Body slender, subcylindrical. Mouth small, with gape restricted by labial ligament. Teeth in both jaws well developed, always present on mesopterygoid and frequently on vomer; edentulous otherwise. Premaxilla with long ascending process, just reaching into interorbital space; lateral process reduced. Free edge of premaxilla reaching vertical through anterior edge of orbit. Coronoid of dentary highly elevated. **Gill rakers on lower limb of first gill arch 12 to 15**, moderately long, but less than 1/2 diameter of pupil. First dorsal fin with V or VI spines; second dorsal fin with I spine and 7 or 8 soft rays, its origin 1 1/2 to 5 scales in front of tips of pelvic fins; anal fin with I spine and 9 to 12 soft rays; pectoral fins with I spine and 12 or 13 soft rays. Body scales ovate; **33 to 36 midlateral scales**; 4 1/2 to 6 scales in transverse rows along side of body. Predorsal scales 12 to 15; interdorsal scales 6 to 8. Anus at or up to 2 scales in front of tips of pelvic fins. **Colour:** live specimens dark yellow to greenish brown; edges of scales above midlateral band outlined by chromatophores; bases of unpaired fins dusky; opercle, eye, and abdomen often silvery; midlateral band silvery or gold; silvery peritoneum over abdominal cavity visible through skin; silvery sheen lost soon after death.

Size: Maximum about 7 cm.

Habitat, biology, and fisheries: Estuarine or enclosed marine habitat. *Craterocephalus honoriae* breeds in midsummer (January) in southeastern waters of Australia and has a 1 year life cycle. Like many other atherinids, it is predominantly carnivorous. Frequently caught in estuaries and enclosed coastal lakes, but of no known commercial value. Likely to be forage for larger juvenile commercial species which occur in estuarine nursery habitats.

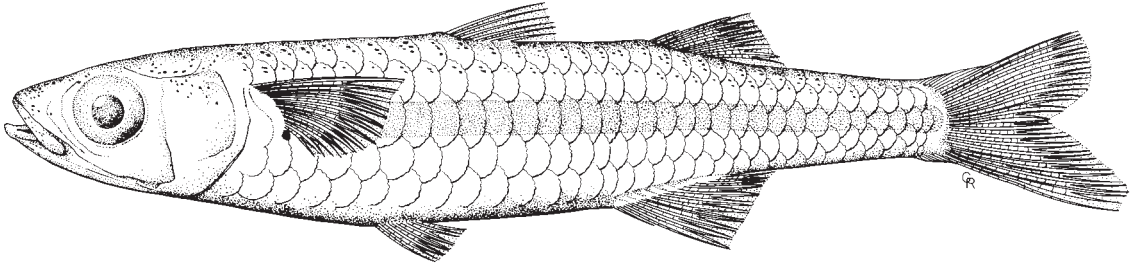
Distribution: Mostly south-eastern Australia as far north as Tewantin in southeastern Queensland.



Craterocephalus mugiloides (McCulloch, 1913)

Frequent synonyms / misidentifications: *Atherinichthys punctatus* De Vis, 1885; *Allanetta mugiloides* (McCulloch, 1913) / *Craterocephalus honoriae* (Ogilby, 1912); *C. pauciradiatus* (Günther, 1861); *C. capreoli* Rendahl, 1922.

FAO names: En - Spotted hardyhead.

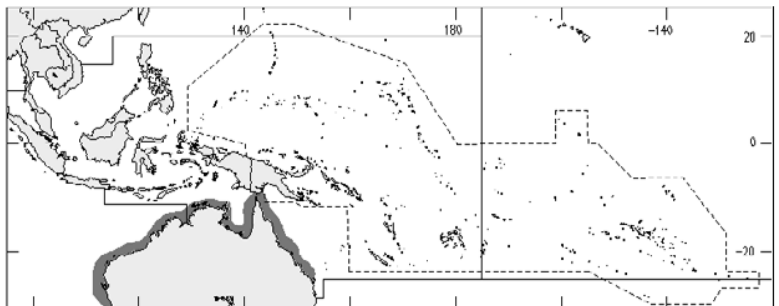


Diagnostic characters: Body robust, subcylindrical. Mouth moderately large, **labial ligament inserting adjacent to symphysis of dentary**. Teeth in both jaws of medium size, in 2 rows. Teeth usually present on mesopterygoid and vomer, otherwise edentulous. Premaxilla with long ascending process, just reaching into interorbital space; **lateral process pungent**. Free edge of premaxilla reaching vertical through anterior edge of orbit or just beyond. Coronoid of dentary highly elevated. **Gill rakers on lower limb of first gill arch 13 to 17**, their length about 1/2 diameter of pupil, relatively longer than in other species of *Craterocephalus*. First dorsal fin with V to VII spines, its origin 1/2 to 5 scales in front of vertical through tips of pelvic fins. Second dorsal fin with I spine and 7 to 10 soft rays; anal fin with I spine and 9 to 13 soft rays; pectoral fins with I spine and 12 to 15 soft rays. **Body scales on large specimens usually crenulated; 33 to 37 midlateral scales**; 4 1/2 to 6 scales in transverse rows along side of body. Predorsal scales 11 to 13; interdorsal scales 6 to 9. Anus 1 to 4 scales in front of tips of pelvic fins. **Colour:** live specimens almost translucent, dorsal surface dusky to greenish yellow with chromatophores at margins of scales; distinct concentration of pigment along middorsal line, from dorsum of head to caudal fin; snout, eye, opercle, preopercle, and abdomen iridescent or silvery; midlateral band wide, either silvery or olive to golden with narrow orange stripe above it, extending from origin of pectoral fin to base of caudal fin; **black spot often present at base of pectoral fins**.

Size: Maximum length about 7 cm.

Habitat, biology, and fisheries: A mainly coastal and estuarine hardyhead, which often schools together with *Craterocephalus capreoli*, *Atherinomorus endrachtensis*, and *A. ogilbyi*. Diet includes crustaceans and diatoms. It has an extended breeding period throughout southern hemisphere summer months (December to March). Its life span appears to be 1 year. May be collected with seines but has no known commercial value. May be useful as food for larger commercially important fish.

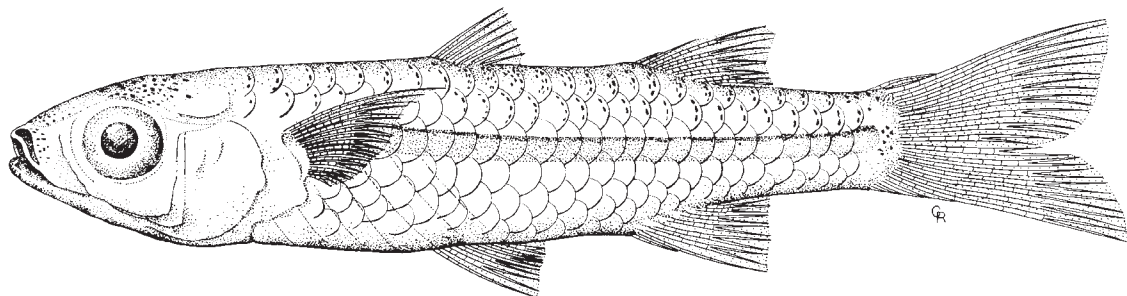
Distribution: The range of this species extends from the southwest of Western Australia to Fraser Island on the eastern coast. Also found around the islands in the Gulf of Carpentaria and northeastern Queensland.



Craterocephalus munroi Crowley and Ivantsoff, 1988

Frequent synonyms / misidentifications: None / *Craterocephalus marjoriae* Whitley, 1948.

FAO names: En - Munro's hardyhead.

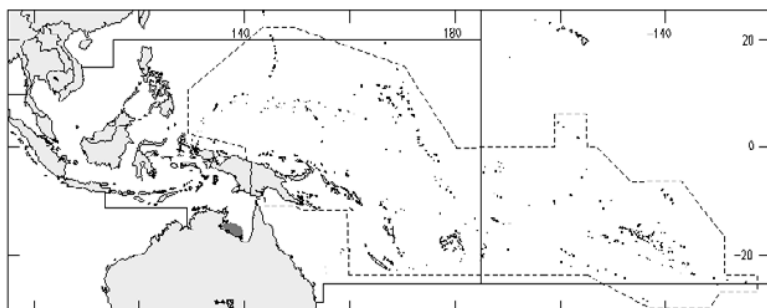


Diagnostic characters: Body robust. Mouth moderately large, protractile. Lips somewhat fleshy and gape restricted by ligament about half-way along free edge of premaxilla. Needle-like teeth in 2 rows in both jaws, otherwise edentulous. Ascending process of premaxilla moderately long but barely reaching interorbital space; lateral process small, conical, lying on posterior expansion of ramus. Coronoid of dentary highly elevated. **Gill rakers on lower limb of first gill arch 10 to 12, with small spinules, short, stumpy, less than 1/2 diameter of pupil.** First dorsal fin with V to VII spines; **origin of first dorsal fin 4 to 6 scales in front of vertical through tips of pelvic fins.** **Second dorsal fin with I spine and 5 to 7 soft rays.** **Anal fin with I spine and 6 or 7 soft rays.** Pectoral fins with I spine and 13 to 15 soft rays. Body scales rounded, not crenulated; **26 to 29 midlateral scales**; 6 to 8 scales in transverse rows along side of body. Predorsal scales 10 to 12; interdorsal scales 5 to 7. **Anus from 0 to 2 scales behind tips of pelvic fins.** **Colour:** variable in live specimens, with abdomen, opercle, and eye silvery to dull brown; midlateral band either distinct or merging with silvery abdomen; intensity of chromatophores over dorsal half of the body variable; fins clear.

Size: Maximum length about 5 cm.

Habitat, biology, and fisheries: Found in fluvial and estuarine habitats, but nothing is known of the biology of this species. Unlike many of the marine and estuarine species of atherinids, it does not appear to school in large numbers nor does it seem to be abundant. Of no known commercial value.

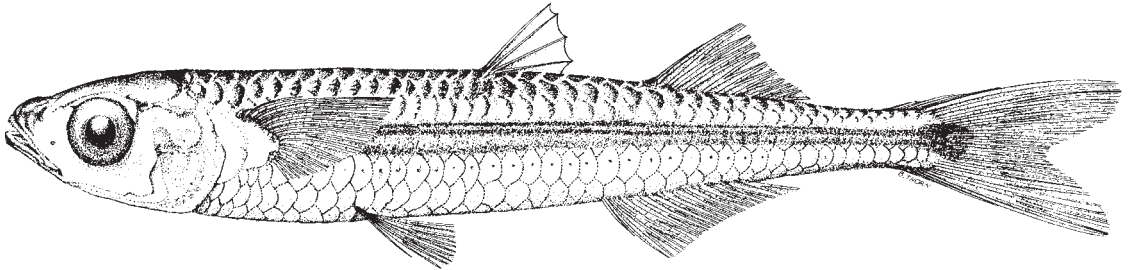
Distribution: Estuarine reaches of the Bynoe, Nicholson, and Norman rivers in the lower Gulf of Carpentaria.



Hypoatherina barnesi Schultz, 1953

Frequent synonyms / misidentifications: *Allanetta klunzingeri* Smith, 1965 / *Hypoatherina uislla* (Jordan and Seale, 1906); *H. temminckii* (Bleeker, 1853).

FAO names: **En** - Barnes' silverside; **Fr** - Atherine de Barnes; **Sp** - Pejerry de Barnes.

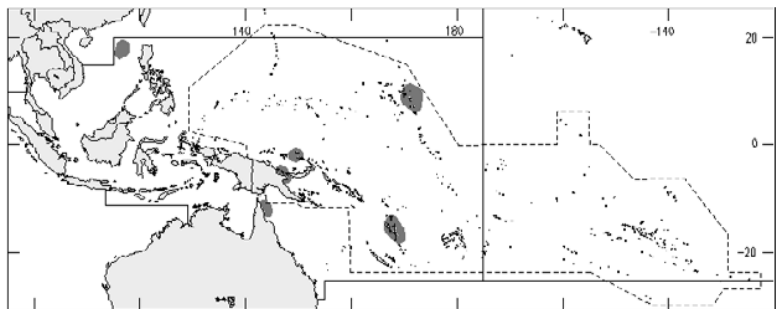


Diagnostic characters: Body small, slender, subcylindrical, and somewhat compressed. Preopercular notch present (as in all *Hypoatherina* species). No shagreen denticles on outer surfaces of jaws or other parts of the head. Fine teeth in both jaws; teeth usually also present on roof of mouth (palatine and pterygoids) and on tongue. Premaxilla extending backwards to, or just past, vertical through anterior margin of orbit, **its ascending process long and slender** (its length, at least twice width); lateral process well defined, although short and wide at base; second lateral process also present but not visible without dissection. **Ramus of dentary highly elevated posteriorly.** Gill rakers moderately long, but less than diameter of pupil, **15 to 19 on lower limb of first gill arch.** First dorsal fin with V to VII spines, its origin from 1/2 scales in front to 3 scales behind vertical through tips of pelvic fins. Second dorsal fin with I spine and 8 to 12 soft rays. Anal fin with I spine and 12 to 17 soft rays. Pectoral fins with 12 to 15 soft rays. Body scales large; 40 to 45 midlateral scales; 5 scales in transverse rows along side of body. Predorsal scales 16 to 19; interdorsal scales 6 to 9. Anus 1 1/2 to 3 scales behind pelvic-fin tips. **Colour:** live specimens green and translucent, midlateral band and abdomen silvery; preserved specimens brown, green-brown or grey; edges of scales above midlateral band usually outlined by chromatophores; black middorsal line running from head to end of caudal peduncle, **midlateral band wide, broadest between anus and anal fin** and extending onto caudal fin as triangular blotch on upper half of fin base; upper fifth of band distinctly darker than rest; rows of spots on lower sides occasionally present, usually merging with strip above origin of anal fin; bases of all fins pigmented; all fins dusky, especially caudal fin; upper surface of head dark; opercles and preopercles silvery or dark brown.

Size: Maximum length 6.5 cm.

Habitat, biology, and fisheries: Commonly found in large numbers in lagoons. During daylight, schooling fish may be periodically seen to jump out of the water to avoid predators. They are also easily attracted to light. The fish are gravid at about 4 to 4.5 cm standard length by July in the northern hemisphere. Like other species of atherinids, they may be caught by seines but have no known commercial value. Because the species occurs in larger numbers, it is probably important as forage food for larger fishes.

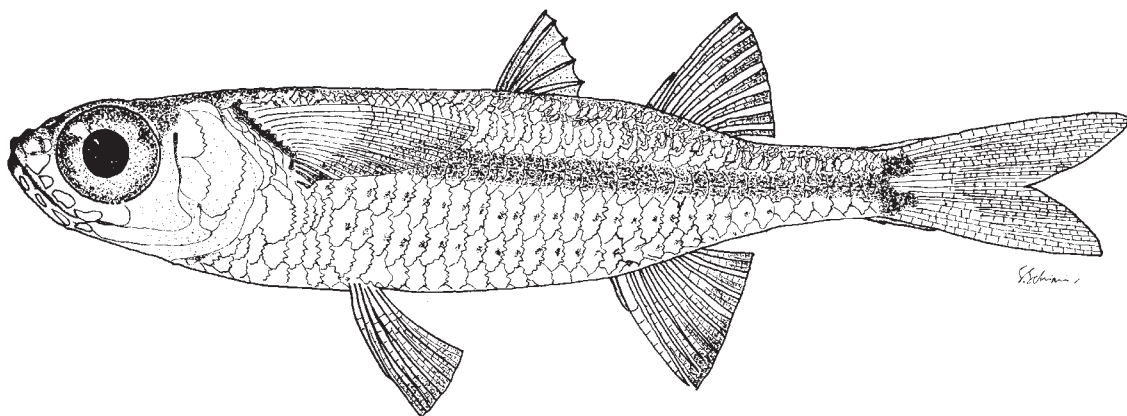
Distribution: This species has a very wide distribution throughout the Pacific Ocean: Praton Reef (west of Philippines), Marshall Islands, Tami Island (New Guinea), Lizard Island (Australia), Vila (Vanuatu), Emirau Island (St. Mathias Group). Outside the area, also known from the western Indian Ocean.



Hypoatherina crenolepis (Schultz, 1953)

Frequent synonyms / misidentifications: *Allanetta crenolepis* Schultz, 1953 / *Hypoatherina valencienni* (Bleeker, 1851); *H. woodwardi* (Jordan and Starks, 1961).

FAO names: En - Crenulated silverside.

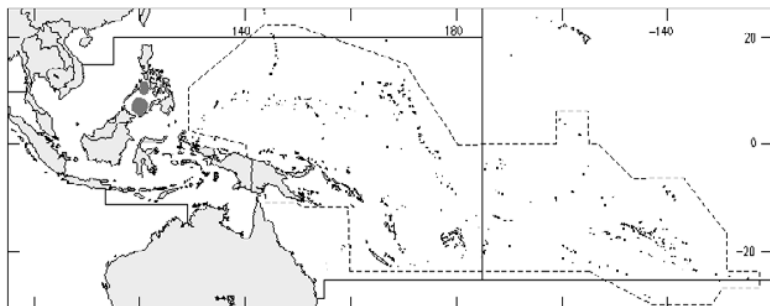


Diagnostic characters: Body small but more robust than in other members of *Hypoatherina*, slightly compressed. Eyes large. Mouth oblique to horizontal. Teeth in upper and lower jaws minute; shagreen denticles along narrow outer margin of premaxilla. **A few minute teeth present on vomer and mesopterygoid, but none on palatines. Ascending dorsal process of premaxilla short, broad and not entering interorbital space;** lateral process scarcely differentiated. Gill rakers on lower limb of first gill arch 19 to 21, moderately long and slender, a little shorter than pupil of eye. First dorsal fin with V or VI spines; **origin of first dorsal fin 1/2 to 3 scales in front of vertical through tips of pelvic fins.** Second dorsal fin with I spine and 7 to 9 soft rays. **Anal fin with I spine and 9 or 10 soft rays. Pectoral fins longer than in other species of *Hypoatherina*, 3.4 to 3.9 times in standard length (c.f. 5 to 6), with I spine and 14 to 16 soft rays. Body scales with very crenulate posterior edge; 33 to 35 midlateral scales; 5 or 6 scales in transverse rows along side of body. Predorsal scales 15 to 17; interdorsal scales 6 or 7. Anus 1/2 to 2 scales in front of pelvic-fin tips. Colour:** preserved specimens with darkish pigment at margins of dorsal scales; 2 distinct rows of spots below silvery lateral band; snout, lower jaw, and dorsal surface of head with dark pigmentation; eye, opercle, and preopercle silvery.

Size: Maximum length about 5.7 cm.

Habitat, biology, and fisheries: Inhabit close inshore waters around islands. Nothing is known of their biology. They have no known commercial value but may be taken as forage fish by larger commercial species; they may also be used as dried pet food or as bait.

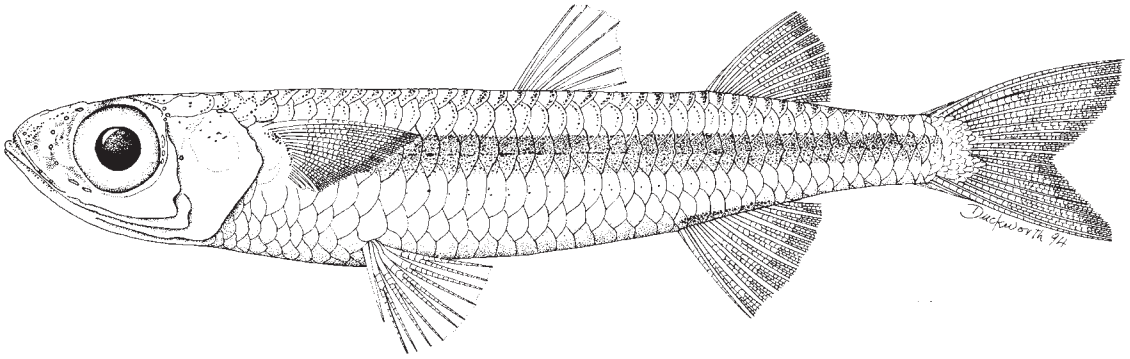
Distribution: Tara and Papatog islands (Philippines).



Hypoatherina ovalaua (Herre, 1935)

Frequent synonyms / misidentifications: *Allanetta ovalaua* (Herre, 1935); *Pranesus ovalauus* (Herre, 1935) / None.

FAO names: En - Fijian silverside.

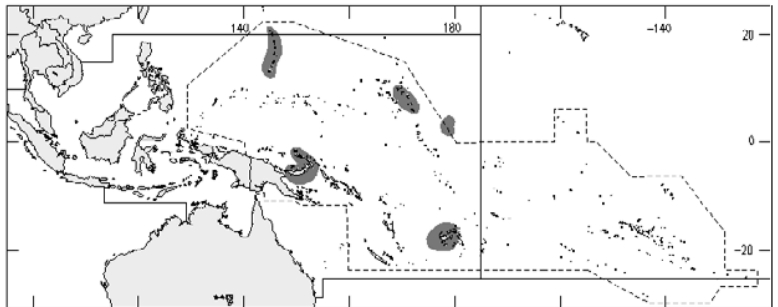


Diagnostic characters: Body slender, slightly compressed. Head large, conical. Mouth large, protractile, and oblique to horizontal. No shagreen denticle on outside of mouth. Lips thin with loose flap of skin lying along side of dentary. Teeth sparse in lower jaw in many specimens, free edge of premaxilla covered by fine teeth. Teeth present on vomer and may extend backwards along midline of roof of mouth. Palatine teeth large and prominent. Teeth always present on mesopterygoids, usually present on tongue present or absent on ectopterygoids. **Premaxilla with long ascending process and 2 lateral processes. Gill rakers on lower limb of first gill arch 22 to 25.** First dorsal fin with IV to VIII spines, its origin 0 to 1 scales in front of vertical through tips of pelvic fins. Second dorsal fin with I spine and 8 to 10 soft rays. Anal fin with I spine and 9 to 12 soft rays. Pectoral fins with I spine and 15 to 17 soft rays. Body scales dorsoventrally elongated and rounded posteriorly; 38 to 42 midlateral scales; 5 scales in transverse rows along side of body. Predorsal scales 15 to 19; interdorsal scales 7 to 10. Anus from 0 to 2 scales in front of tips of pelvic fins. **Colour:** brownish white with dark scales on back, a silvery midlateral band with dots below it; abdomen pale; dorsum of head very dark; large dark spot on opercle.

Size: Maximum total length about 7 cm.

Habitat, biology, and fisheries: Inhabits close inshore waters; nothing is known of its biology. Attracted to light at night in lagoons. Not found in the rougher waters over reefs. Can be collected with seines but has no commercial value.

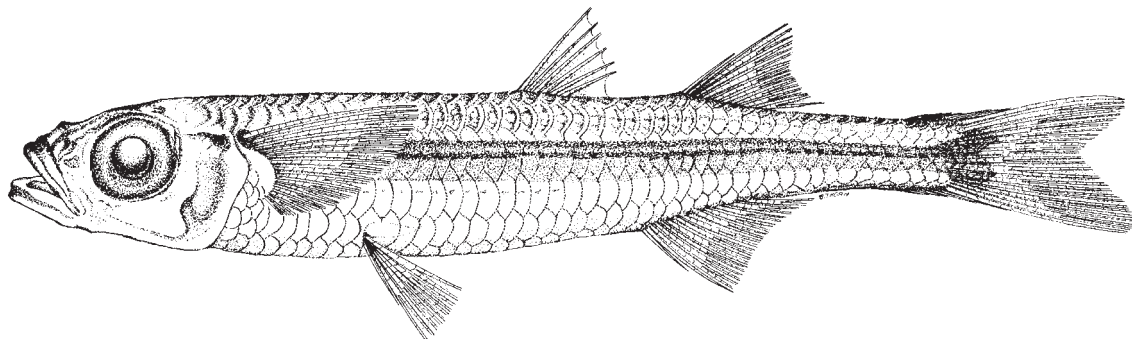
Distribution: Ovalau Island, Fiji, Canton, Hull, Phoenix, Gilbert, Marshall, Marianas, and Hermit islands; New Britain, and New Ireland.



Hypoatherina temminckii (Bleeker, 1853)

Frequent synonyms / misidentifications: *Stenatherina temminckii* (Bleeker, 1853); *Hypoatherina uisila* (Jordan and Seale, 1906); *H. gobio* (Klunzinger, 1884); *Allanetta afra* (Peter, 1855) / None.

FAO names: **En** - Samoan silverside; **Fr** - Athérine samoan; **Sp** - Pejerrey samoano.

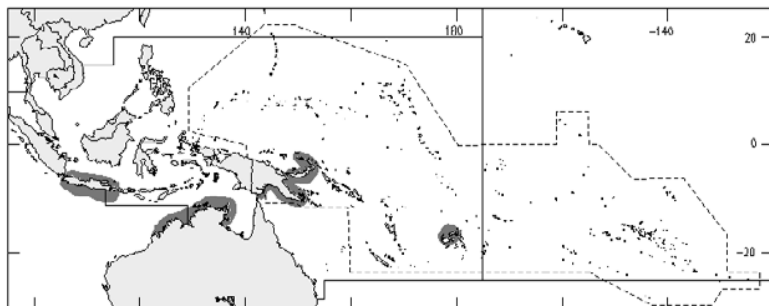


Diagnostic characters: Body fusiform. No shagreen denticles on external surfaces of jaws. Fine teeth on dentary and premaxilla. Teeth present on palatines and mesopterygoids; tongue sometimes covered with small tooth-like papillae. Premaxilla extending to vertical through anterior margin of orbit; **ascending process moderately long and narrow** (always longer than twice width); **lateral process short and wide. Ramus of dentary highly elevated posteriorly. Gill rakers on lower limb of first gill arch 21 to 25**, moderately long, but usually less than diameter of pupil. First dorsal fin with V to VII spines, its origin from 2 scales in front to 3 scales behind tips of pelvic fins. Second dorsal fin with I spine and 8 to 10 soft rays. Anal fin with I spine and 11 to 14 soft rays. **Pectoral fins with 15 to 18 soft rays.** Body scales large; 38 to 44 midlateral scales; 5 scales in transverse rows along side of body. Predorsal scales 16 to 18, interdorsal scales 7 to 9. Anus from 1 scale in front to 3 scales behind pelvic-fin tips. **Colour:** live specimens blue-green and translucent; preserved specimens green-brown, brown, or yellow-green; scales above midlateral band heavily pigmented with edges outlined with chromatophores; chromatophores often forming pattern resembling incomplete circles along middorsal line; **midlateral band narrow**, extending onto caudal fin and forming triangular blotch on upper half of fin base; body below midlateral band pale; rows of spots often present along third and fourth scale rows along side of body; fin bases pigmented; fins clear or dusky, pectoral fins frequently with dark blotch.

Size: Maximum length 11 cm.

Habitat, biology, and fisheries: Usually found in coastal waters and harbours within its range. Caught with seines. Could be of value at subsistence level although not known to be abundant. As with other silversides and small fishes in general, it can be dried before eating. Can be used as bait fish and is important as forage species for larger commercial fish.

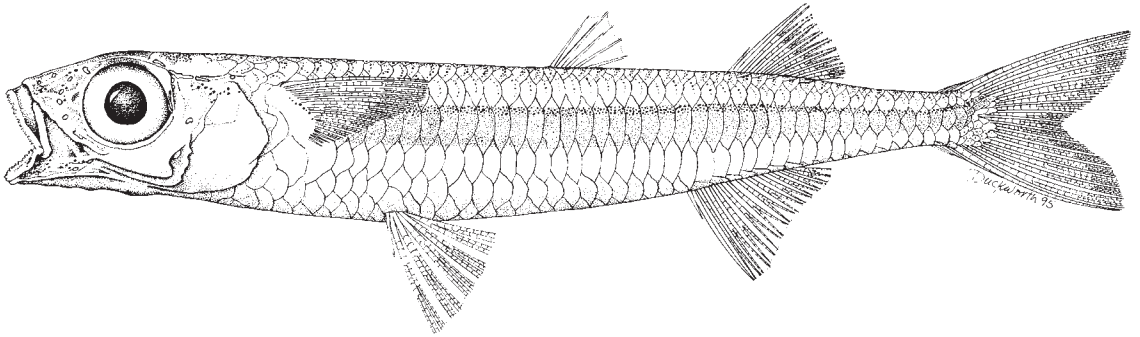
Distribution: A very widely distributed species occurring throughout the Red Sea, Indian Ocean, and the South and Central Pacific Ocean.



Hypoatherina tropicalis (Whitley, 1948)

Frequent synonyms / misidentifications: *Atherinosoma tropicalis* (Whitley, 1948); *Taeniomembras tropicalis* (Whitley, 1948) / *Atherinomorus lacunosus* (Forster, 1801).

FAO names: En - Whitley's silverside.

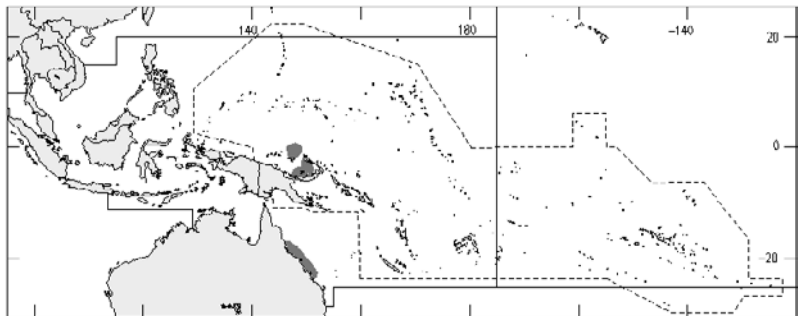


Diagnostic characters: Body slender, slightly compressed. Head almost conical. Mouth large, moderately oblique to horizontal. Loose flap of skin extending from anterolateral edge of dentary to corner of mouth; apart from flap of skin, **lips absent**. Fine teeth present in both jaws, no shagreen denticles on outer surface of jaws. Teeth usually present on palatines but frequently absent on ectopterygoids; vomerine teeth small but clearly visible; strong ridge of teeth on mesopterygoids. Tongue with teeth-like papillae in Australian specimens, those from Madang and Maron islands with distinct teeth; neither teeth nor papillae in specimens from Numa Numa. **Ascending process of premaxilla short and broad**, its length usually less than twice its width; lateral process not well defined. Rami of dentary highly elevated posteriorly, sloping obliquely towards symphysis. **Gill rakers on lower limb of first gill arch 18 to 22**, moderately long and slender, but always slightly shorter than diameter of pupil. First dorsal fin with V to VIII spines, its origin from 1 scale in front to 4 scales behind vertical through tips of pelvic fins. Second dorsal fin with I spine and 8 to 11 soft rays. Anal fin with I spine and 11 to 14 soft rays. Pectoral fins with I spine and 15 to 18 soft rays. Body scales dorsoventrally elongated, rounded posteriorly; **39 to 46 midlateral scales**; 5 scales in transverse rows along side of body. **Predorsal scales 17 to 22**; interdorsal scales 7 to 9. Anus from 1/2 scale in front, to 3 scales behind, tips of pelvic fins. **Colour:** live fish translucent with silvery blue sheen; scales above midlateral band frequently heavily pigmented with inverted C-shaped or diamond-shaped mark present on each predorsal scale; midlateral band series of large chromatophores with upper fifth darker continuous line; 2 rows of spots present below midlateral band; bases of fins pigmented, especially pectoral, anal, and second dorsal fins; fins either clear or dusky; caudal fin usually heavily pigmented.

Size: Maximum length about 12.5 cm.

Habitat, biology, and fisheries: Inhabits waters close inshore. Often seen to jump out the water, especially after sunset when they appear as fluorescent streaks. At night it appears to aggregate with *Atherinomorus capricornensis* around One Tree Island (eastern Australia). Probably eaten by larger commercial species.

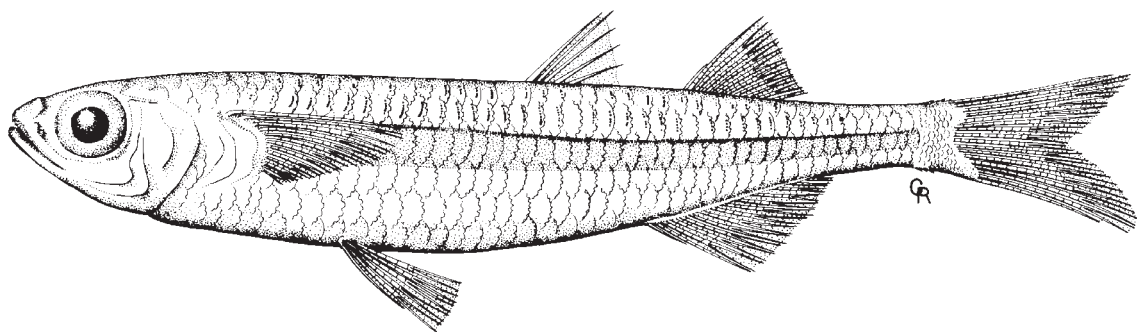
Distribution: New Guinea, northeastern Australia, Madang, Maron, and Bouganville islands. Possibly present over a wide range in Melanesian waters. Also found around Lord Howe Island.



Hypoatherina valenciennei (Bleeker, 1853)

Frequent synonyms / misidentifications: *Atherina valenciennei* Bleeker, 1853; *A. bleekeri* Günther, 1861; *Allanetta valenciennei* (Bleeker, 1853); *Pranesus valenciennei* (Bleeker, 1853) / *Hypoatherina woodwardi* (Jordan and Starks, 1901); *Haplocheilus argyrotaenia* (Tirant, 1883).

FAO names: En - Sumatran silverside.

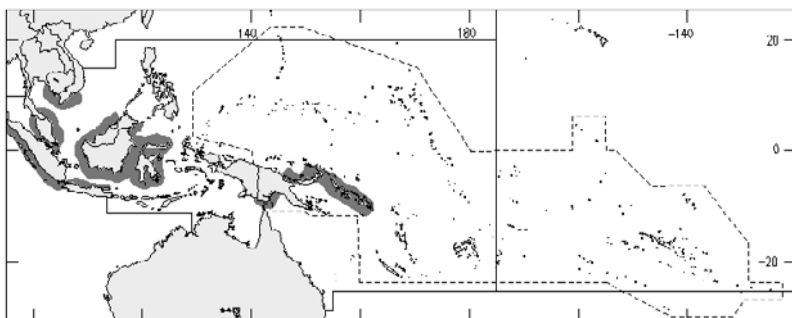


Diagnostic characters: Body moderately robust, subcylindrical, and slightly compressed. **Free edge of premaxilla densely covered with minute shagreen denticles;** teeth present on vomer, palatines, ectopterygoids; a strong ridge of teeth on mesopterygoids; tongue often with teeth around edge. Premaxilla long and obliquely directed, extending past vertical through anterior margin of orbit. Ascending process of premaxilla moderately wide and long, lateral process short and wide at base. **Coronoid process of dentary highly elevated but not rounded as in other *Hypoatherina* species.** Gill rakers long and slender, about diameter of pupil, 20 to 26 on lower limb of first gill arch. First dorsal fin with IV to VII spines, its origin 2 to 5 scales behind vertical through tips of pelvic fins. Second dorsal fin with I spine and 8 to 10 soft rays. Anal fin with I spine and 10 to 13 soft rays. Pectoral fins with I small spine and 14 to 16 soft rays. Body scales large and dorsoventrally elongated; 40 to 46 midlateral scales; 5 or 6 scales in transverse rows along side of body. Predorsal scales 17 to 23; interdorsal scales 6 to 8. Anus 1 to 4 scales in front of tips of pelvic fins. **Colour:** live specimens blue-green above, whitish below, and with dark tip to snout; preserved specimens usually brown with golden sheen; scales probably covered with fine melanophores in life; scales above midlateral band edged with black; fins clear but with small traces of pigment; head, eye, opercle, and preopercle silvery gold.

Size: Maximum length about 12 cm.

Habitat, biology, and fisheries: Probably important as forage fish. Nothing is known about the biology of this species.

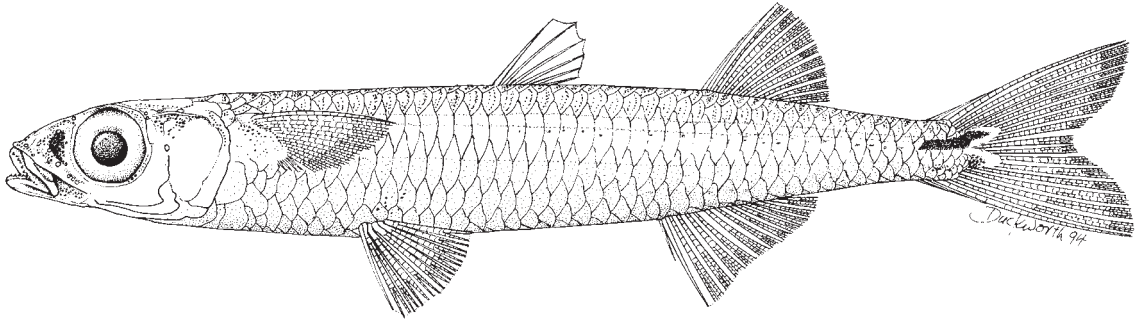
Distribution: Wide distribution throughout the southwestern Pacific including Java, Borneo, Sumatra, Sulawesi, Viet Nam, Singapore, New Britain, Hermit Island Group, Papua New Guinea, Solomon Islands, Hong Kong, and as far north as Japan.



Stenatherina panatela (Jordan and Richardson, 1908)

Frequent synonyms / misidentifications: *Atherina panatela* (Jordan and Richardson, 1908); *Hypoatherina panatela* (Jordan and Richardson, 1908) / *Stenatherina temminckii* (Bleeker, 1853).

FAO names: En - Panatela silverside.

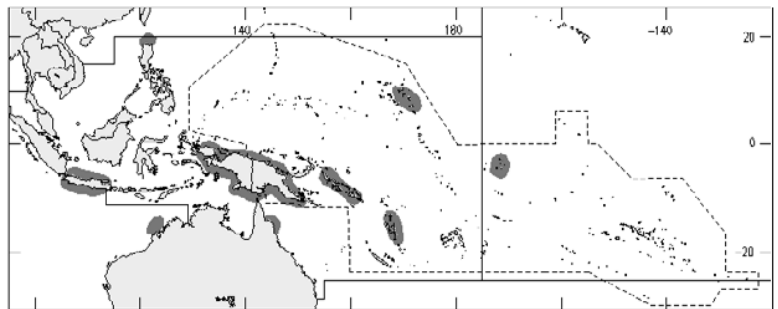


Diagnostic characters: Body slender, slightly compressed. Lips thin, mouth large and extremely protractile with lips fusing near corners of mouth. Teeth villiform; those on vomer forming **characteristic T-pattern**. Palatines and mesopterygoids also with teeth. Free edge of premaxilla convex anteriorly, becoming more or less straight towards angle of mouth. **Ascending process of premaxilla long, extending past orbit into interorbital space; lateral process very long and pungent. Gill rakers** on lower limb of first gill arch 21 to 25, **long and slender, longer than 1/2 diameter of pupil**. First dorsal fin with IV to VII spines, its origin from 1 scale behind to 2 scales in front of vertical through tips of pelvic fins. Second dorsal fin with I spine and 8 to 10 soft rays. Anal fin with I spine and 9 to 12 soft rays. Pectoral fins with I spine and 16 to 18 soft rays. Body scales dorsoventrally elongated with ridges restricted to anterior part of scale; 38 to 45 midlateral scales; 5 scales in transverse rows along side of body. **Interdorsal scales 8 to 10; predorsal scales 17 to 20. Colour:** live specimens blue-green above and silvery below; **distinct crescentic mark present on snout immediately in front of eye; upper part of midlateral band terminating as half crescent on upper lobe of caudal fin;** preserved specimens yellow below wide and dark midlateral band; upper edge of midlateral band edged by narrower bluish stripe; scales above midlateral band heavily pigmented, with C-shaped pattern at edge of each scale; middorsal scales with concentration of pigment forming narrow band from nape and extending through dorsal fins to caudal fin; bases of pectoral and anal fins dark; caudal fin dusky; opercle and dorsum of head almost black; distinct black ridge extending from lateral margin of snout to upper edge of orbit.

Size: Maximum length 11 cm.

Habitat, biology, and fisheries: One of the largest and most frequently encountered atherinids in the deeper lagoon waters of the Marshall Islands; also common in coastal waters, lagoons, atolls, and harbours. May gather in schools at night when attracted to light but generally not found in very large numbers. Preferred habitat appears to be deeper enclosed atoll lagoons, reefs, coastal waters, and harbours. May be taken as food by larger commercial species.

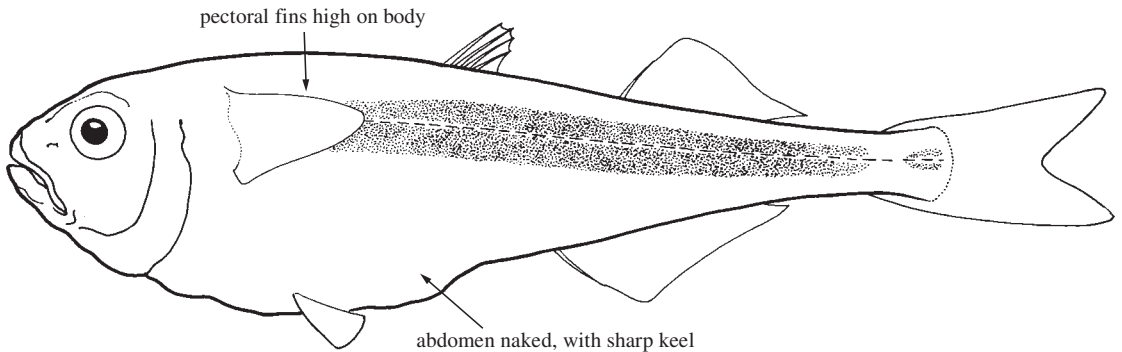
Distribution: Wide range throughout the tropical western Pacific Ocean. It is known from the Malaita, Malekula, and Calayan islands; also Marshall and Phoenix islands, Philippines, Solomon Islands, Vanuatu, New Guinea, and northwestern and northeastern Australia.



ISONIDAE**Surf sardines**

by W. Ivantsoff

Diagnostic characters: Characterized by **highly compressed body, deepest at vertical through of pectoral-fin origin, tapering rapidly towards caudal fin. Ventral edge of abdomen reduced to sharp keel.** Head small, truncated posteriorly. Snout rounded. Mouth strongly oblique to horizontal, with premaxilla extending beyond vertical through anterior margin of orbit. Teeth in jaws small but well defined and curving backward into mouth, those on premaxilla extending outward onto free surface but diminishing in size. Teeth also present on vomer and palatines. Gill rakers moderately long and well developed, greater than diameter of pupil. Two dorsal fins present, with first dorsal fin originating about middle of body, second dorsal fin always originating behind vertical through anal-fin origin. **Pectoral fins short and wide, always set high on body. Body scales cycloid, small, thin, and highly deciduous; area between head and first dorsal fin, sides of head, and anterior part of abdomen naked.** Anus always close to anal fin. **Colour:** usually slightly translucent, very bright silvery in life; midlateral band broad and also silvery but distinctly visible.



Habitat, biology, and fisheries: Frequently found in relatively rough surf along beaches or around rocky headlands; occasionally also found in tidal inlets and river mouths. Seemingly delicate fishes, unable to survive where oxygen concentrations are low. There is some evidence that *Iso* spp. hybridize in some parts of their range. They have no commercial value but are probably taken as forage by larger commercial species.

Similar families occurring in the area




The Isonidae is distinct by the combination of characters in boldface (see above).

Key to the species of Isonidae occurring in the area

- 1a. Midlateral scales always 42 or more; gill rakers on lower limb of first gill arch 9 to 14 *Iso rathophilus*
 1b. Midlateral scales always less than 41; gill rakers on lower limb of first gill arch 12 or less → 2
- 2a. Midlateral scales 34 to 39 (mean 37.4); opercular notch absent on upper part of operculum *Iso hawaiiensis*
 2b. Midlateral scales 35 to 41 (mean 38.2); opercular notch present on upper part of operculum *Iso nesiotus*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Iso hawaiiensis* (Gosline, 1952)
 *Iso nesiotus* Saeed, Ivantsoff, and Crowley, 1993
 *Iso rathophilus* (Ogilby, 1895)

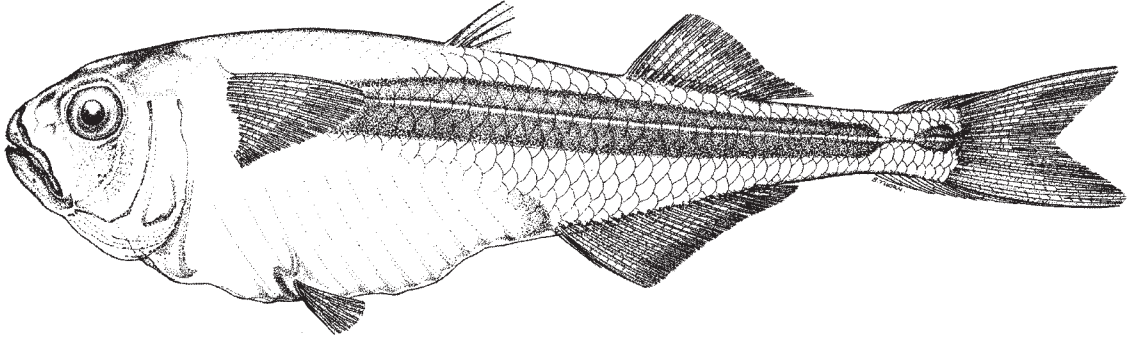
Reference

Ivantsoff, W. 1984. Notocheiridae. In *FAO species identification sheets for fishery purposes*. Western Indian Ocean (Fishing Area 51), edited by W. Fischer and G. Bianchi. Vol.3. Rome, FAO (unpaginated).

Iso rhotophilus (Ogilby, 1895)

Frequent synonyms / misidentifications: *Tropidostethus rhotophilus* Ogilby, 1895; *Tropidostethops rhotophilus* (Ogilby, 1895) / *Iso flosmaris* (Jordan and Starks, 1901).

FAO names: **En** - Surf sardine; **Fr** - Surfette commune; **Sp** - Rompeolas.

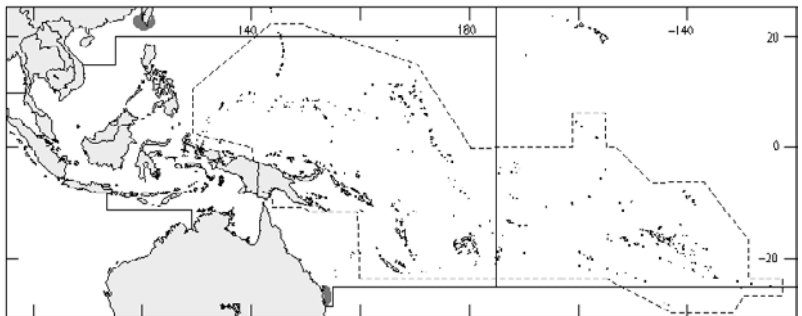


Diagnostic characters: Body small, laterally compressed. Head short. Dorsal edge of opercle with notch and small process above it. Mouth small, oblique. **Teeth in jaws** in single row, covering about half free edge of premaxilla. Teeth present or absent on vomer, always present on basihyal, but absent on palatines. Ascending process of premaxilla short and pointed, **2 postmaxillary processes scarcely developed**. Dentary highly elevated. Gill slit present behind last gill arch; gill rakers on lower limb of first gill arch 9 to 14. First dorsal fin with III to VI small, weak spines, its origin well behind vertical through tips of pelvic fins. Second dorsal fin with I spine and 10 to 17 soft rays. Anal fin with I spine and 20 to 28 soft rays. Pectoral fins with I spine and 12 to 15 soft rays. Body scales small, cycloid; area between head and first dorsal fin, sides of head, and abdomen naked. **Midlateral scales 42 to 55**. Predorsal scales absent, interdorsal scales 8 to 11. **Colour:** live fish translucent with side of body silvery; broad silvery midlateral band terminating in small oval spot before caudal-fin base.

Size: Maximum length about 7.5 cm.

Habitat, biology, and fisheries: Most commonly found in surf around rocky headlands and along the shore line, occasionally also in the more still waters of river mouths. The fish are very delicate and do not survive handling. Appears to be able to hybridize with congeners, *Iso flosmaris* and *I. hawaiiensis*. Nothing else is known about this species. Unlikely to have any commercial value.

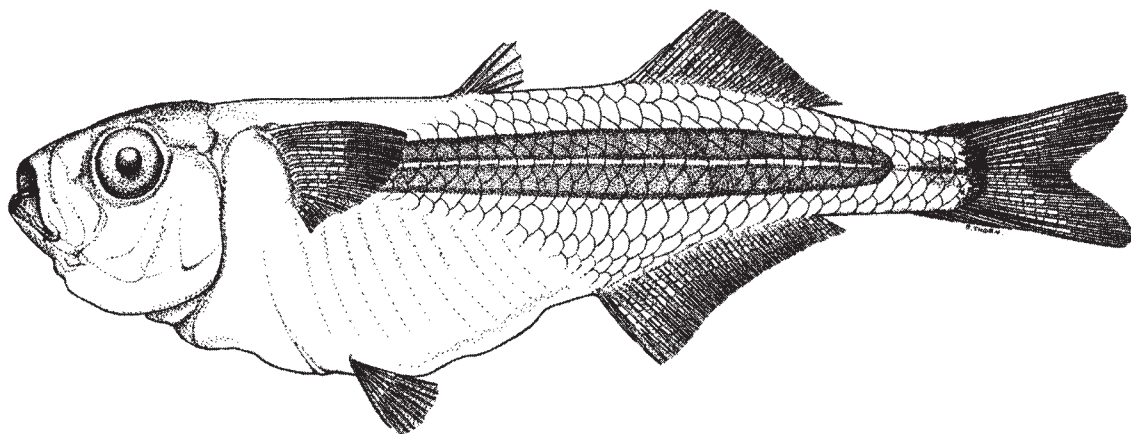
Distribution: Around the coasts of Australia, probably throughout the Pacific Ocean as it has been collected as far north as Taiwan Province of China and Japan.



Iso hawaiiensis Gosline, 1952

Frequent synonyms / misidentifications: None / None.

FAO names: En - Hawaiian surf sardine.

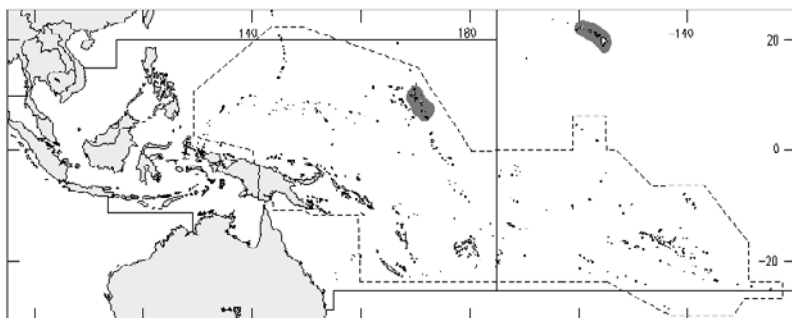


Diagnostic characters: Body small, highly compressed laterally. **Dorsal edge of opercle without notch and process.** Mouth small, oblique. **Teeth** in jaws **restricted to first third along free edge of premaxilla;** teeth absent on vomer, palatine, and basihyal. Ascending process of premaxilla short and pointed, dorsal surface of ramus with slight elevation towards middle. Dentary highly elevated. Gill rakers on lower limb of first gill arch 9 to 12. First dorsal fin with IV to VI weak spines; second dorsal fin with I spine and 14 to 16 soft rays; anal fin with I spine and 20 to 25 soft rays; pectoral fins with I spine and 12 to 14 soft rays. Body scales small, deciduous. Midlateral scale count 34 to 39. Predorsal scales absent; interdorsal scales about 8. **Colour:** silvery translucent with broad silver midlateral band terminating in oval spot before origin of caudal fin.

Size: Maximum length about 5 cm.

Habitat, biology, and fisheries: Inhabits rough surf and waves around rocky headlands and reefs. Nothing is known of the biology of this species. It has no commercial value.

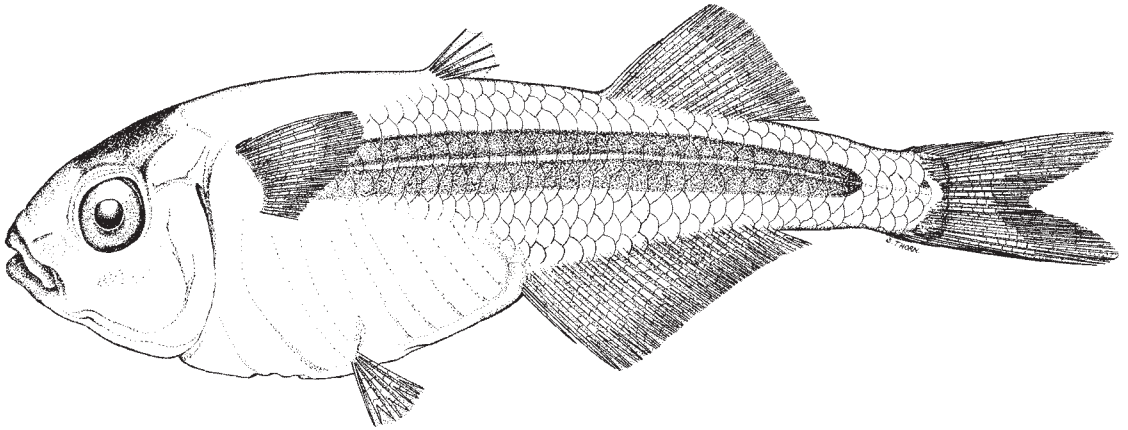
Distribution: Presently known from Hawaii, and the Marshall and Rapa islands in the Pacific Ocean.



Iso nesiotēs Saeed, Ivantsoff, and Crowley, 1993

Frequent synonyms / misidentifications: None / *Iso hawaiiensis* (Gosline, 1952).

FAO names: En - Samoan surf sardine.

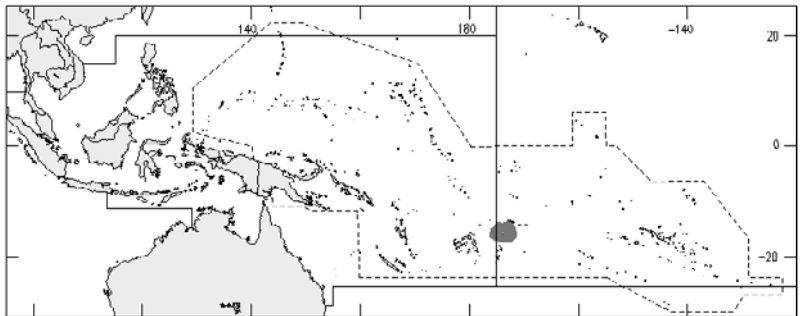


Diagnostic characters: Body highly compressed. Head small, with rounded snout. **Dorsal edge of opercle with notch but no process above it.** Mouth small, oblique to horizontal; upper jaw not protractile, lower jaw deeply elevated posteriorly. Teeth on jaws small, curving backwards into mouth. Teeth restricted to anterior fifth of free edge of premaxilla. Teeth absent on vomer and palatines, but present on basihyal. Ascending process of premaxilla short and pointed; its ramus with **slightly rounded elevation representing postmaxillary process.** Dentary highly elevated. Gill rakers on lower limb of first gill arch 9 to 12, moderately long, equal to diameter of pupil. First dorsal fin with IV to VI weak spines, its origin about in line with vertical through tips of pelvic fins. Second dorsal fin with I spine and 13 to 17 soft rays. Anal fin with I spine and 20 to 25 soft rays; pectoral fins with I spine and 12 to 14 soft rays. Body scales small, cycloid, and highly deciduous; sides of head and anterior part of abdomen naked. Midlateral scales 35 to 41. **Colour:** preserved specimens whitish with silvery midlateral band or brownish with darker brown midlateral band; **band ending about half-way along caudal peduncle with no oval spot near base of caudal fin.**

Size: Maximum total length about 4 cm.

Habitat, biology, and fisheries: Inhabits surf and waves around rocky headlands and reefs. Nothing is known of the biology of this species. It has no commercial value.

Distribution: Presently known only from American Samoa and Pitcairn Island.



TELMATHERINIDAE

Sailfin silversides

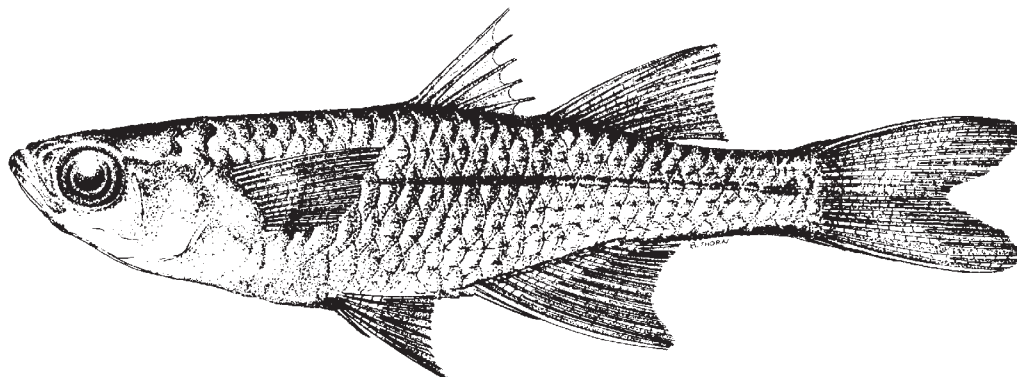
by W. Ivantsoff

A single species occurring in the area.

Kalyptatherina helodes (Ivantsoff and Allen, 1984)

Frequent synonyms / misidentifications: *Pseudomugil helodes* Ivantsoff and Allen, 1984 / None.

FAO names: En - Marine sailfin silverside.



Diagnostic characters: Body small, laterally compressed. Eyes large. Mouth slightly protrusible and oblique, with free edge of premaxilla reaching just past anterior border of orbit. Teeth in upper jaw large, distribution extending almost to distal end of premaxilla. Teeth in lower jaw curved, villiform, and restricted to medial third, smaller than those in upper jaw. Teeth frequently present on vomer, palatine, mesopterygoid, and basihyal. Ascending process of premaxilla relatively short and broad, lateral process broadly rounded, about 1/2 height of ascending process. Coronoid process of dentary highly elevated. Gill rakers on lower limb of first gill arch 16 to 18, moderately long and slender, but less than 1/2 diameter of pupil. First dorsal fin with III to V weak spines, its origin 1 to 3 scales in front of tips of pelvic fins. **Second dorsal fin lacking spine**, with 7 to 9 soft rays. Anal fin with I spine and 12 to 14 soft rays. Pectoral fins with I spine and 11 or 12 soft rays. Body scales dorsoventrally elongated; 28 to 30 midlateral scales; 5 or 6 scales in transverse rows along side of body. Predorsal scales 11 to 13; interdorsal scales 4 or 5. **Colour:** body translucent with posterior end of swimbladder clearly visible through body wall; preserved specimens yellow-green; eye black; head dark dorsally; lower edge of eye outlined with melanophores; sides of snout, chin, and opercle heavily peppered with large and small melanophores; narrow but well defined middorsal band originating on dorsum of head and extending through bases of dorsal fins to origin of caudal fin; scale pockets on side of body outlined with melanophores; midlateral band originating as single narrow dark line at upper edge of pectoral fin and continuing as 2 narrow bands to caudal-fin base.

Similar families occurring in the area

Pseudomugilidae: *Pseudomugil majusculus* looks superficially similar to *Kalyptatherina helodes*, but lacks a spine in the anal and pectoral fins.

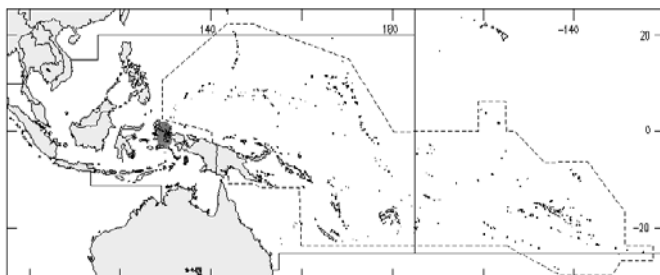
Size: Maximum total length not exceeding 4.5 cm.

Habitat, biology, and fisheries: Inhabits mangrove swamps close inshore. While the biology of some telmatherinids may be known, nothing is known of the biology of the monotypic *Kalyptatherina helodes*. This species is too small to have commercial value but may be taken as food by young of commercial fish species.

Distribution: Misool and Bantana islands northwest Irian Jaya.

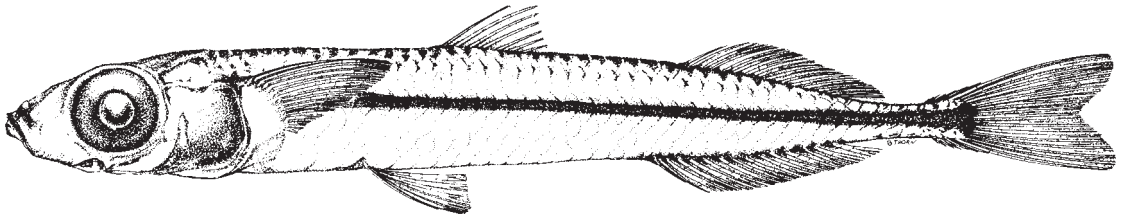
Reference

Aarn, W. Ivantsoff, and M. Kottelat. (in press). A new telmatherinid genus from Sulawesi, and a phylogenetic analysis of Telmatherinidae (Teleostei: Atherinomorpha). *Ichthyol. Explor. Freshwaters*.



DENTATHERINIDAE**Tusked silversides**

by W. Ivantsoff

A single species occurring in the area.*Dentatherina merceri* Patten and Ivantsoff, 1983**Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Mercer's tusked silverside.

Diagnostic characters: Body very small, slender, subcylindrical; **caudal peduncle very slender**. Eye and orbit large. Mouth small. **Labial ligament to about half-way along premaxilla forming cylindrical pouch lateral to ramus of dentary and just below edge of premaxilla**. Premaxilla broad and long, extending just past vertical through anterior border of eye but with anterior two-thirds obscured by anterior process of maxilla and labial pouch. **Premaxilla with ventrally directed tusk-like process**. Gill rakers on lower limb of first gill arch 10 to 12, slender, their length less than 1/2 diameter of pupil. First dorsal fin with V to VIII spines, its origin 1 to 4 scales in front of vertical through tips of pelvic fins. Second dorsal fin with I spine and 12 to 14 soft rays; anal fin with I spine and 14 to 16 soft rays, pectoral fins with I spine and 12 to 14 soft rays. Body scales small, thin, and highly deciduous; lateral body scales ellipsoid or irregular; **40 to 43 midlateral scales; 7 to 9 scales in transverse rows along side of body**. Predorsal scales 14 to 17; **interdorsal scales 8 to 12**. **Colour:** preserved specimens yellow-brown to green-brown; middorsal band extending over width of 1 scale from head to origin of first dorsal fin, wider at this point with this part of line frequently broken into 2 or 3 rows of melanophores, then extending as thin irregular line to origin of caudal fin; caudal fin usually dusky, with 2 triangular marks at its base; midlateral band originating above upper edge of opercle.

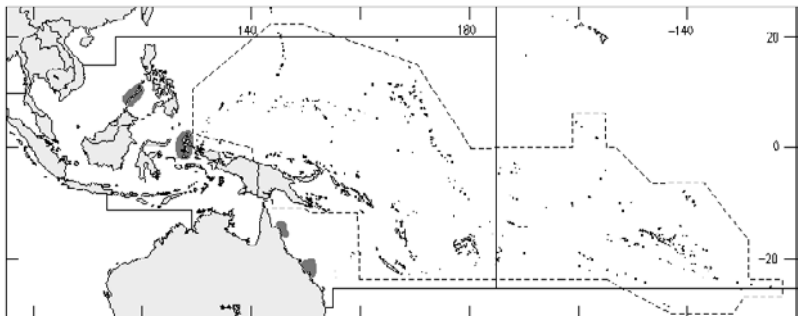
Similar families occurring in the area

Dentatherina merceri is distinguished from other atheriniform families in the area by the combination of the characters in boldface (see above).

Size: Maximum length not exceeding 5 cm, but usually much smaller.

Habitat, biology, and fisheries: Found close inshore around islands and over coral reefs. Except for larval biology, little is known about this species. It has no commercial value but may be taken by commercial fishes as food.

Distribution: Philippines, New Guinea, Moluccas, and other parts of Indonesia; also around islands of the Barrier Reef in northeastern Australia.

**Reference**

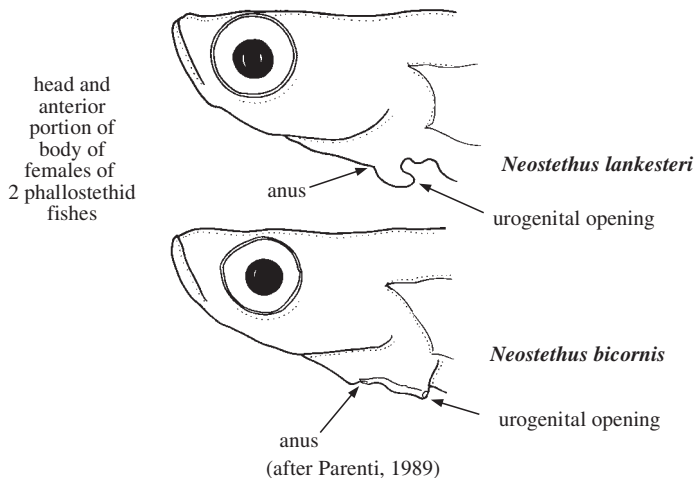
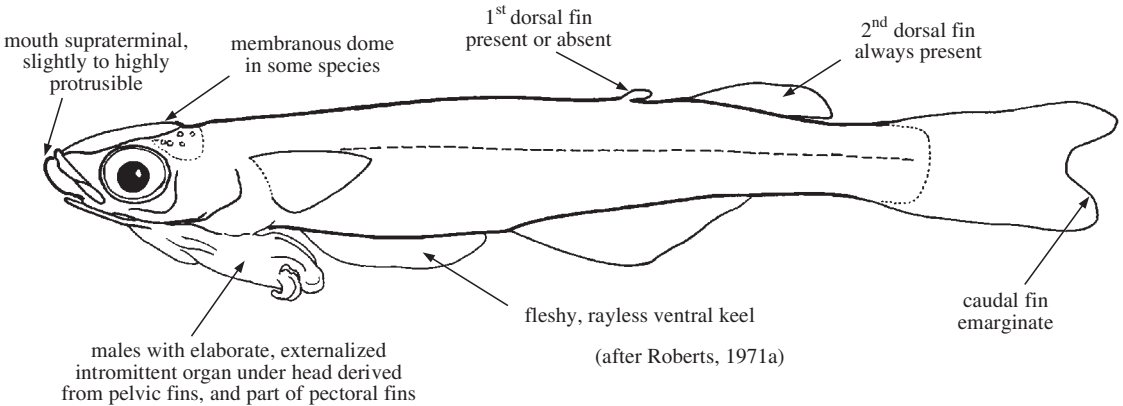
Patten, J.M and W. Ivantsoff. 1983. A new genus and species of atherinid fish from western Pacific. *Japan. J. Ichthyol.*, 29(4):329-339.

PHALLOSTETHIDAE

Priapium fishes

by L.R. Parenti

Diagnostic characters: Small (to 3.7 cm standard length), laterally compressed, atherinomorph fishes. Eyes large. Mouth supraterminal, moderate gape, slightly to highly protrusible. Dentition variously reduced; small, unicuspid teeth in single row in outer jaw; enlarged teeth on distal portion of premaxilla in some species. **Single row of small, unicuspid teeth on paradentary bone in some species. Pectoral fins falcate. Caudal fin emarginate, forming incipient lobes. Anus and urogenital openings anterior, under head, may be covered by fleshy hood or papilla in females. Fleshy, rayless keel on ventral surface of body from point perpendicular to pectoral-fin base to beginning of anal fin. Males bilaterally asymmetric; elaborate bony, externalized intromittent organ, priapium, under head with seminal papilla offset to one (aproctal) side of body and anus offset to opposite (proctal) side. First dorsal fin with I or II short spines or thickened rays, or fin absent; second dorsal fin with 5 to 10 soft rays; anal fin with 14 to 28 soft rays; pectoral fins with 9 to 13 soft rays; pelvic-fin rays modified into portion of priapium in males, vestigial or absent in females. Scales cycloid, small to moderate, deciduous; no lateral line. **Colour:** nearly translucent in life with orange blotch on caudal peduncle in some species; scattered minute dark brown to black melanophores on head and body that may be concentrated at base of priapium.**



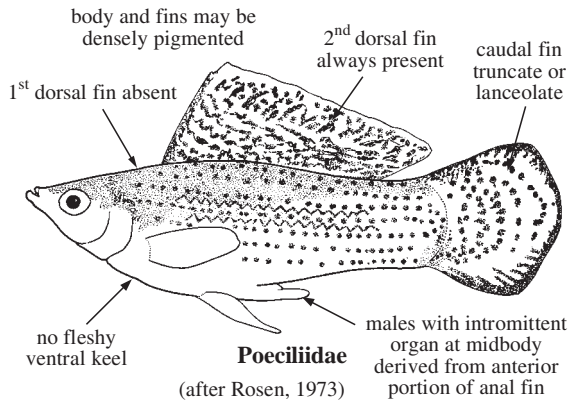
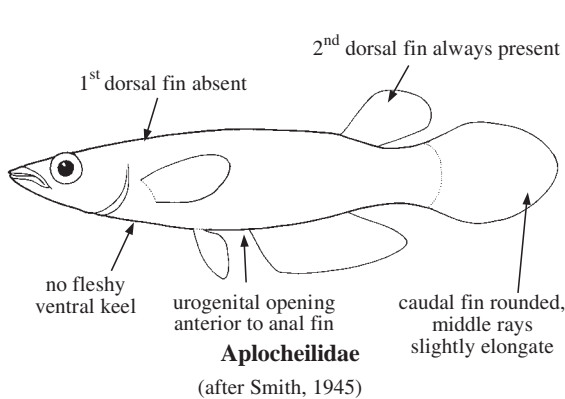
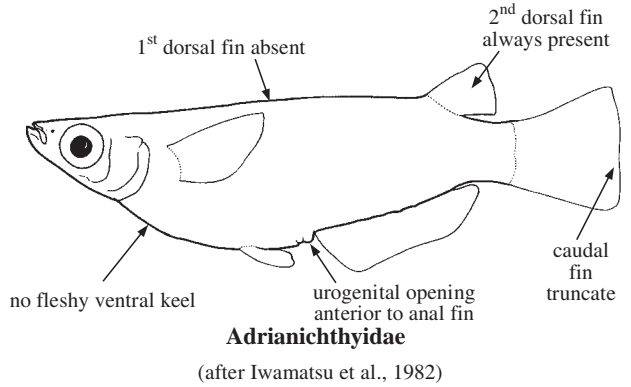
Habitat, biology, and fisheries: Fresh to brackish water, species in the area in tidal portions of rivers, including estuaries, and mangroves. Small, surface-feeding, schooling fishes, may be seen in groups near shore. Omnivorous, but feed principally on copepods and mollusc larvae. Oviparous, internal fertilization followed by female laying fertilized eggs.

Similar families occurring in area

Adrianichthyidae: readily distinguished from male priapium fishes by the absence of a bony externalized intromittent organ, urogenital opening just anterior to anal fin (not under head), caudal fin truncate, and first dorsal fin absent; in addition, the mouth in adrianichthyids is small, terminal, and non-protrusible, whereas it may be highly protrusible in priapium fishes.

Apocheilidae: readily distinguished from male priapium fishes by absence of a bony, externalized intromittent organ, with urogenital opening just anterior to anal fin, not under head, caudal fin rounded, no first dorsal fin, and black blotch on middle portions of anterior dorsal-fin rays.

Poeciliidae: livebearers of this family in the area may be confused with priapium fishes because of a superficially similar intromittent organ which, in male priapium fishes, is under the head and derived from pectoral and pelvic fins; in male livebearers, the anal-fin rays are modified into an intromittent organ, the gonopodium; livebearing poeciliids bear live young, while priapium fishes lay fertilized eggs; also, livebearing poeciliid species may be more brightly coloured and densely pigmented than priapium fishes which are nearly transparent in life and have sparse pigmentation; finally, livebearers have a rounded or truncate caudal fin and lack the first dorsal fin.



Key to the genera of Phallostethidae

- 1a. No pulvinulus; outer jaws somewhat protrusible; perforated gular flap of skin through which anterior end of first ctenactinium may pass; aproctal axial bone projects beyond ventral body profile (Fig. 1) *Gulaphallus*
- 1b. Shield-like pulvinulus present (Fig. 2); outer jaws highly protrusible; no perforation of skin in gular region; aproctal axial bone does not project beyond ventral body profile → 2

- 2a. Main externalized bone of priapium a toxactinium that curves to right or to left under head of male (Fig. 2); large, fleshy, smooth, or ruffled seminal papilla (Fig. 2); translucent, membranous dome on dorsal surface of head → 3
- 2b. Main externalized bone of priapium a ctenactinium; seminal papilla small; no translucent, membranous dome on dorsal surface of head *Neostethus*

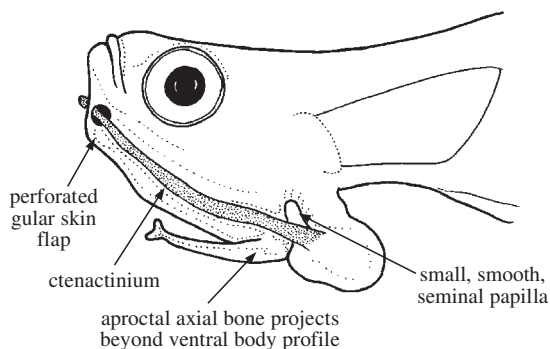


Fig. 1 *Gulaphallus* male (lateral view)
(after Parenti, 1989)

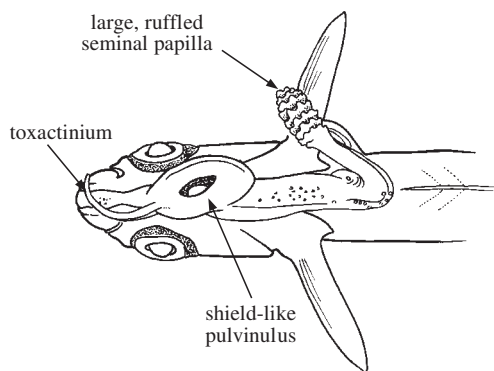


Fig. 2 *Phenacostethus* male (ventral view)
(after Roberts, 1971a)

- 3a. Anal-fin rays 26 to 28, vertebrae 40; second ctenactinium serrated; outer jaws equal; no first dorsal fin; second dorsal-fin rays 8 to 10 *Phallostethus*
- 3b. Anal-fin rays 14 or 15; vertebrae 33 to 35; second ctenactinium greatly reduced and not serrated; lower jaw projects beyond upper jaw; first dorsal fin present, a single ray; second dorsal-fin rays 5 to 7 *Phenacostethus*

List of species occurring in the area

- Gulaphallus panayensis* (Herre, 1942)
- Neostethus amaricola* (Villadolid and Manacop, 1935)
- Neostethus bicornis* Regan, 1916
- Neostethus borneensis* Herre, 1939
- Neostethus ctenophorus* (Aurich, 1937)
- Neostethus djajaorum* Parenti and Louie, 1998
- Neostethus lankesteri* Regan, 1916
- Neostethus palawanensis* (Myers, 1935)
- Neostethus robertsi* Parenti, 1989
- Neostethus thessa* (Aurich, 1937)
- Neostethus villadolidi* Herre, 1942
- Neostethus zamboangae* Herre, 1942
- Phallostethus lehi* Parenti, 1996
- Phenacostethus smithi* Myers, 1928
- Phenacostethus trewasae* Parenti, 1986

References

Parenti, L.R. 1989. A phylogenetic revision of the phallostethid fishes (Atherinomorpha, Phallostethidae). *Proc. Calif. Acad. Sci.*, 46:243-277.

Parenti, L.R. 1996. Phylogenetic systematics and biogeography of phallostethid fishes (Atherinomorpha, Phallostethidae) of northwestern Borneo, with description of a new species. *Copeia*, 1996(3):703-712.

Roberts, T.R. 1971a. The fishes of the Malaysian family Phallostethidae (Atheriniformes). *Breviora*, 374:1-27.

Roberts, T.R. 1971b. Osteology of the Malaysian phallostethid fish *Ceratostethus bicornis*, with a discussion of the evolution of remarkable structural novelties, in its jaws and external genitalia. *Bull. Mus. Comp. Zool.*, 142:393-418.

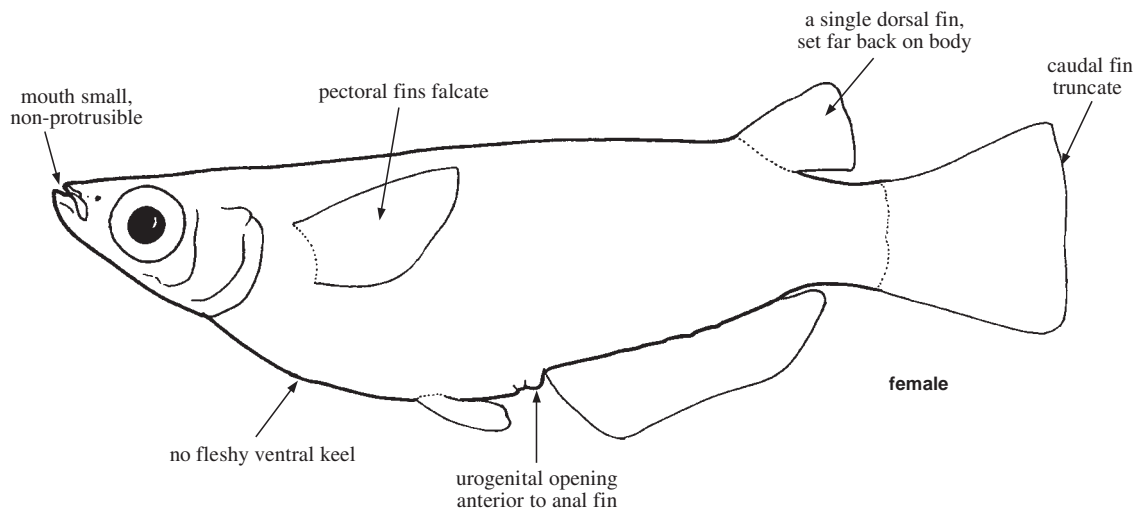
Order BELONIFORMES

ADRIANICHTHYIDAE

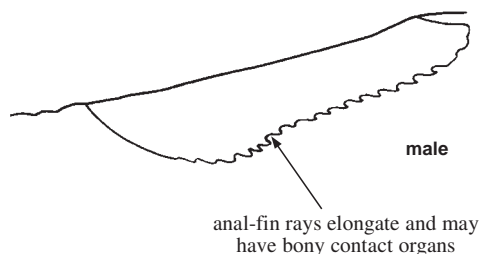
Ricefishes

by L.R. Parenti

Diagnostic characters: Small to medium-sized, laterally compressed beloniform fishes (to about 18 cm standard length, but most species mature at under 3 cm standard length). Eyes large. **Mouth terminal, small to large, not protrusible.** Small, unicuspid teeth in single or multiple rows on premaxilla and dentary. Males, and also females of several species in the area may have several enlarged teeth on distal portion of premaxilla and dentary. Pectoral fins falcate, set relatively high on side of body. Caudal fin truncate or lanceolate, forming incipient lobes. Single dorsal fin set posteriorly, with 5 to 17 soft rays; anal fin with 16 to 32 soft rays; caudal fin asymmetrical, with 4 or 5 upper and 5 or 6 lower branched rays; pectoral fins with 6 to 16 soft rays; pelvic fins with 5 to 7 soft rays. Scales moderate to minute, cycloid, 24 to 85 in lateral series; no lateral line. **Dorsal- and anal-fin rays of male longer and thicker than those of female and often with bony contact organs on distal segments of anal-fin rays.** **Colour:** smaller ricefish species nearly translucent in life, a black line from dorsal surface of head to dorsal-fin origin, a midlateral black line from head to base of caudal fin, a black line along anal-fin base, a black submarginal line on dorsal and on ventral portion of caudal fin, body may be covered with scattered, tiny melanophores concentrated at pectoral-fin base; males may be more darkly coloured than females.



(after Iwamatsu et al., 1982)



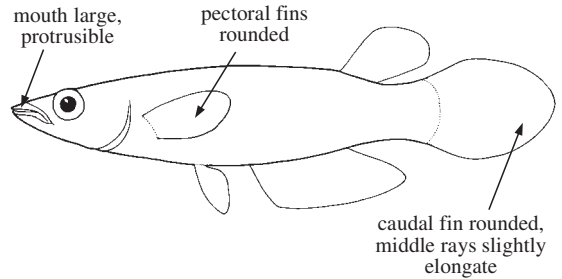
Habitat, biology, and fisheries: Fresh to brackish water, the species listed in the area principally in brackish water, estuaries, and mangroves. Small to moderate, surface-feeding, schooling fishes. Omnivorous, but reported to feed principally on copepods, insects, and mollusc and crustacean larvae. Oviparous, females may carry a cluster of fertilized eggs near urogenital opening prior to hatching or to depositing eggs on plants.

Similar families occurring in area

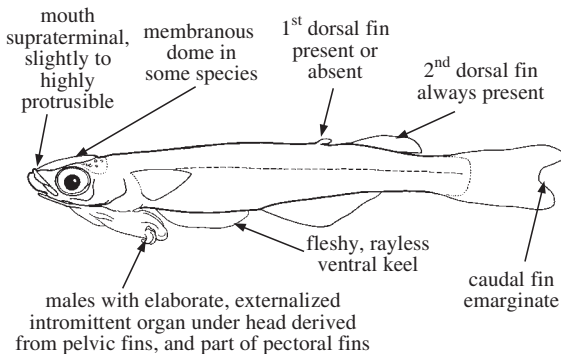
Aplocheilidae: superficially similar to *Oryzias* species with which it is often confused, but differing most notably by having a protrusible mouth, teeth on vomer, and silvery, "pineal" spot on dorsal surface of head; a large, black spot on middle portions of dorsal-fin rays; and may have thin, black horizontal line from tip of lower jaw through eye.

Phallostethidae: male phallostethids readily distinguished from ricefishes by the presence of a bony, externalized intromittent organ that may also have a large, fleshy seminal papilla. Female phallostethids superficially similar to ricefishes but with highly protrusible mouths and urogenital openings under the head.

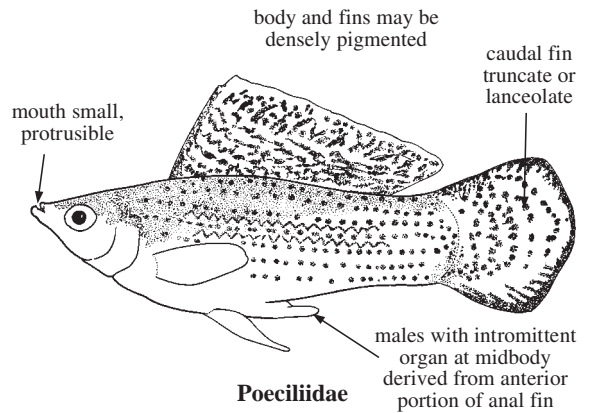
Poeciliidae: superficially similar to ricefishes, but with a protrusible rather than non-protrusible mouth and males with an intromittent organ derived from the anterior anal-fin rays.



Aplocheilidae
(after Smith, 1945)



Phallostethidae
(after Roberts, 1971a)



Poeciliidae
(after Rosen, 1973)

List of species occurring in the area

- Oryzias celebensis* (Weber, 1894)
- Oryzias dancena* (Hamilton, 1822)
- Oryzias haugiensis* Roberts, 1998
- Oryzias hubbsi* Roberts, 1998
- Oryzias javanicus* (Bleeker, 1854)

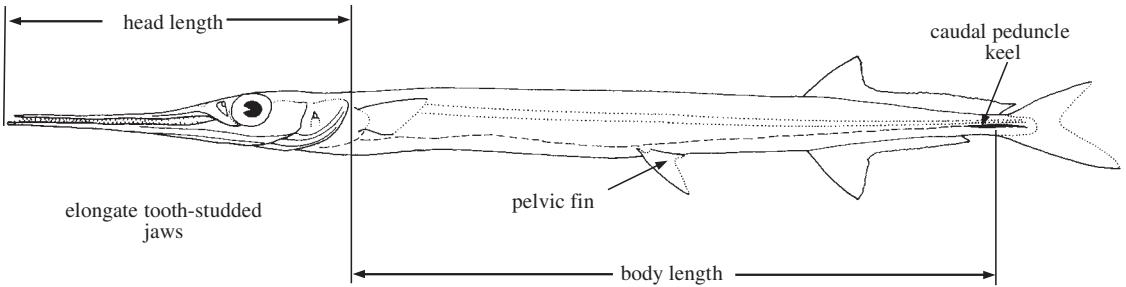
References

- Iwamatsu, T., A. Imaki, A. Kawamoto, and A. Inden. 1982. On *Oryzias javanicus* collected at Jakarta, Singapore and West Kalimantan. *Ann.Zool. Japon.*, 55(3):190-198.
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- Rosen, D.E. and L.R. Parenti. 1981. Relationships of *Oryzias*, and the groups of atherinomorph fishes. *Amer. Mus. Novitat.*, (2719):25 p.

BELONIDAE**Needlefishes**

by B.B. Collette

Diagnostic characters: Elongate fishes with **both upper and lower jaws extended into long beaks filled with sharp teeth**; nostrils in a pit anterior to eyes. No spines in fins; dorsal and anal fins posterior in position; pelvic fins located in abdominal position and with 6 soft rays; pectoral fins short. Lateral line running down from pectoral-fin origin and then along ventral margin of body. Scales small, cycloid (smooth), easily detached. **Colour:** these fishes live at the surface and are protectively coloured for this mode of life by being green or blue on back and silvery white on lower sides and belly; usually, a dusky or dark blue stripe along sides; tip of lower jaw frequently red or orange.

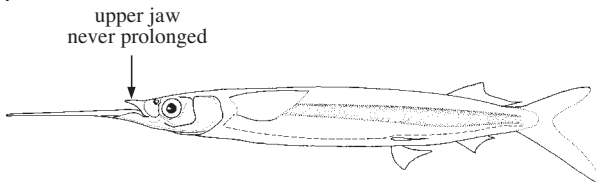
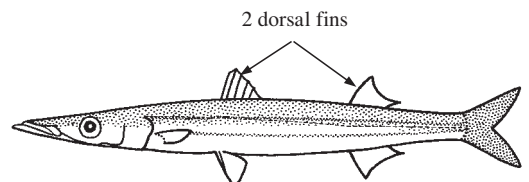


Habitat, biology, and fisheries: Most species are marine, but some occur in fresh water. Carnivorous, feeding largely on small fishes which they catch sideways in their beaks. Needlefishes tend to leap and skitter at the surface and some people have been injured when accidentally struck by them, particularly at night when the fishes are attracted by lights. Caught by casting or trolling surface or near-surface lures. Flesh excellent in flavour although some people have misgivings about eating it due to the green colour of the bones. From 1990 to 1995, FAO's Yearbook of Fishery Statistics reports a range of yearly catch of needlefishes of around 32 900 to 39 400 t from the Western Central Pacific (Philippines, Indonesia). Some fresh-water needlefishes reach only 6 to 7 cm in total length while some marine species may attain 2 m.

Similar families occurring in the area

Hemiramphidae (halfbeaks): only the lower jaw prolonged or neither jaw prolonged and lacking the needle-sharp teeth that stud the upper and lower jaws of needlefishes.

Sphyraenidae (barracudas): jaws pointed but not prolonged into a beak; 2 dorsal fins, the first spiny; pelvic fins in thoracic position.

**Hemiramphidae****Sphyraenidae**

Key to the species of Belonidae occurring in the area

Note: out of 10 genera and about 32 species in the family, only 10 marine species belonging to 4 genera occur in the Western Central Pacific.

- 1a. Body strongly laterally compressed and marked with a series of vertical bars (Fig. 1); anal-fin rays 24 to 28 *Ablennes hians*
- 1b. Body rounded or squarish in cross-section; no vertical bars present; anal-fin rays 13 to 23 (rarely 24) → 2
- 2a. Caudal peduncle strongly depressed (flattened dorsoventrally) and with well-developed lateral keels, least depth of caudal peduncle about 1/2 the width (Fig. 2); gill rakers present *Platybelone argalus platyura*
- 2b. Caudal peduncle not strongly depressed, a small lateral keel on caudal peduncle or no keel at all, caudal peduncle deeper than wide; gill rakers absent → 3

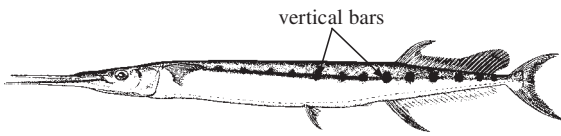
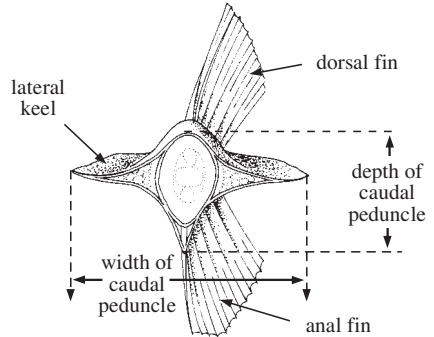


Fig. 1 *Ablennes hians*



cross-section through caudal peduncle

Fig. 2 *Platybelone argalus platyura*

- 3a. Caudal fin rounded or truncate; no keels on caudal peduncle (Fig. 3); no posterior black dorsal-fin lobe at any size; dorsal-fin rays 12 to 21 (*Strongylura*) → 4
- 3b. Caudal fin distinctly forked, with lower lobe longer than upper lobe; narrow raised dark lateral keel on each side of caudal peduncle (Fig. 4); juveniles with an expanded black lobe in the posterior part of the dorsal fin (Fig. 5); dorsal-fin rays 19 to 27 (*Tylosurus*) → 7

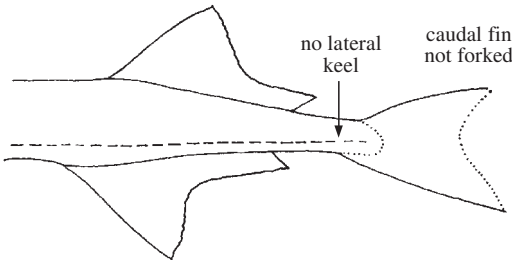


Fig. 3 *Strongylura*

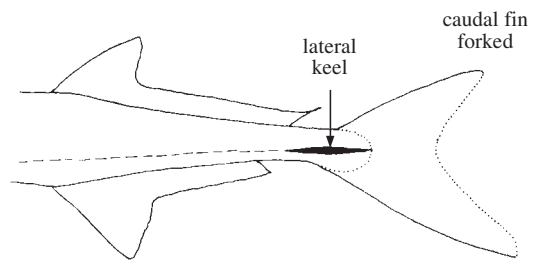


Fig. 4 *Tylosurus*

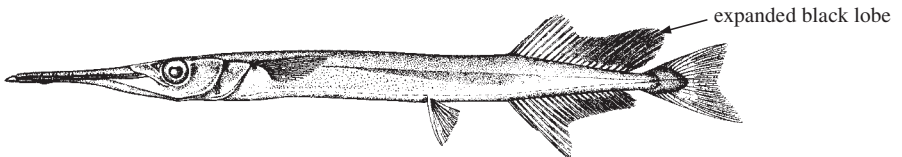


Fig. 5 *Tylosurus* (juvenile)

- 4a. Dorsal-fin rays 12 to 15; anal-fin rays 15 to 18; bases of dorsal and anal fins covered with scales → 5
- 4b. Dorsal-fin rays 17 to 21; anal-fin rays 21 to 27; bases of dorsal and anal fins without scales → 6

- 5a. Prominent black spot at base of caudal fin; predorsal scales 100 to 130. *Strongylura strongylura*
- 5b. No black spot at base of caudal fin; predorsal scales about 80 *Strongylura urvillii*

- 6a. Predorsal scales 100 to 125; dorsal-fin origin over anal-fin rays 4 to 6 *Strongylura incisa*
- 6b. Predorsal scales 130 to 180; dorsal-fin origin over anal-fin rays 7 to 10 *Strongylura leiura*

- 7a. Lower jaw slightly curved upward anteriorly, ending in a thick fleshy formation (Fig. 6); predorsal scales 165 to 225; no teeth on tongue *Tylosurus punctulatus*
- 7b. Lower jaw not curved upward anteriorly, not ending in a thick fleshy formation; predorsal scales 270 to 340; teeth present on tongue → 8



Fig. 6 *Tylosurus punctulatus*

- 8a. Dorsal-fin rays 24 to 27; anal-fin rays 22 to 24; upper jaw curved producing a gap between upper and lower jaws *Tylosurus acus melanotus*
- 8b. Dorsal-fin rays 20 to 25; anal-fin rays 19 to 22; upper jaw straight so there is no appreciable gap between the jaws → 9

- 9a. Dorsal-fin rays 21 to 25 (usually 22 or 23); predorsal scales 271 to 340; vertebrae 82 to 86 *Tylosurus crocodilus crocodilus*
- 9b. Dorsal-fin rays 20 to 22; predorsal scales 185 to 252; vertebrae 78 to 81 *Tylosurus gavialoides*

List of species occurring in the area

The symbol is given when species accounts are included.

- Ablennes hians* (Valenciennes, 1846)
- Platybelone argalus platyura* (Bennett, 1832)
- Strongylura incisa* (Valenciennes, 1846)
- Strongylura leiura* (Bleeker, 1850)
- Strongylura strongylura* (van Hasselt, 1823)
- Strongylura urvillii* (Valenciennes, 1846)

- Tylosurus acus melanotus* (Bleeker, 1850)
- Tylosurus crocodilus crocodilus* (Peron and LeSueur, 1821)
- Tylosurus gavialoides* (Castelnau, 1873)
- Tylosurus punctulatus* (Günther, 1872)

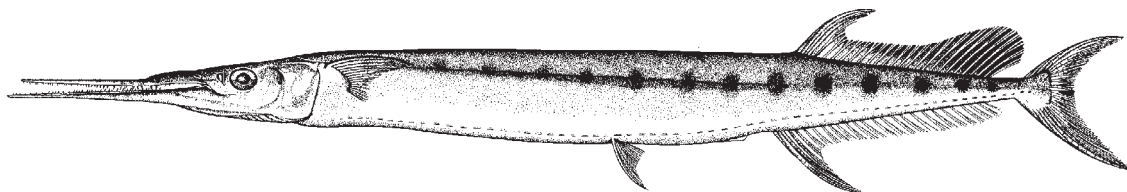
Reference

Parin, N.V. 1967. Review of the marine Belonidae of the western Pacific and Indian oceans. *Trudy Inst. Okean.*, 84:3-83. [In Russian, English translation in Natl. Mar. Fish. Serv. Syst. Lab. Trans. No.68]

Ablennes hians (Valenciennes, 1846)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Flat needlefish; Fr - Orphie plate; Sp - Agujón sable.



Gulf of Guinea, 41.8 cm body length

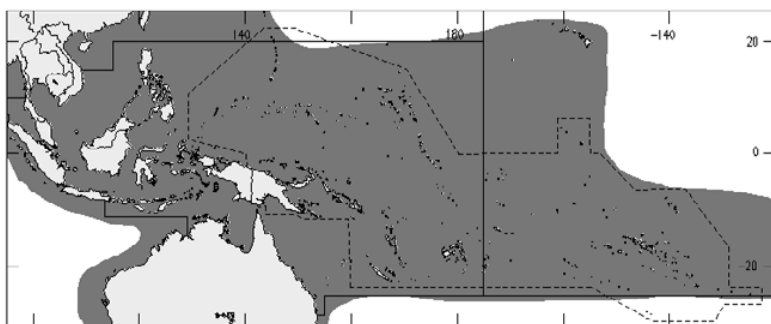
(from Collette and Parin, 1970)

Diagnostic characters: Body elongate and greatly compressed laterally. Upper and lower jaws greatly elongate and studded with small sharp teeth. Gill rakers absent. **Anterior parts of dorsal and anal fins with high falcate lobes;** dorsal-fin rays numerous, 23 to 26 (usually 24 or 25); posterior part of dorsal fin with a prominent dark lobe; **anal-fin rays numerous, 24 to 28** (usually 26 or 27); **pectoral fins falcate;** pectoral-fin rays 13 to 15; caudal peduncle without lateral keels, caudal fin deeply forked, lower lobe much longer than upper. Right gonad absent in females; absent or greatly reduced in males. Total number of vertebrae 87 to 93. **Colour:** bluish green above, silvery white below; a broad dark blue stripe along sides and **about 12 to 14 prominent dark vertical bars on body;** tip of lower jaw red; **juveniles and adults with elevated black lobe in posterior part of dorsal fin;** scales and bones green.

Size: Maximum total length at least 120 cm; maximum body length (without head and caudal fin) 90 cm, commonly to 70 cm.

Habitat, biology, and fisheries: A pelagic species inhabiting offshore surface waters; inshore occurrences seem to be more frequent around islands than along the mainland coast. Carnivorous, feeding mainly on small fishes. Caught mainly by casting or trolling surface or near surface lures; also with seines and drift nets. Marketed mostly fresh.

Distribution: A worldwide species of tropical and warm-temperate waters. Found off coasts and islands throughout the area from southern Japan through Indonesia to Australia.



Platybelone argalus platyura (Bennett, 1832)

Frequent synonyms / misidentifications: *Belone platyura* Bennett, 1832 / None.

FAO names: En - Keeltail needlefish; Fr - Orphie carène; Sp - Agujón de quilla.



Belize, 16.8 cm body length (figure of *Platybelone argalus argalus*)

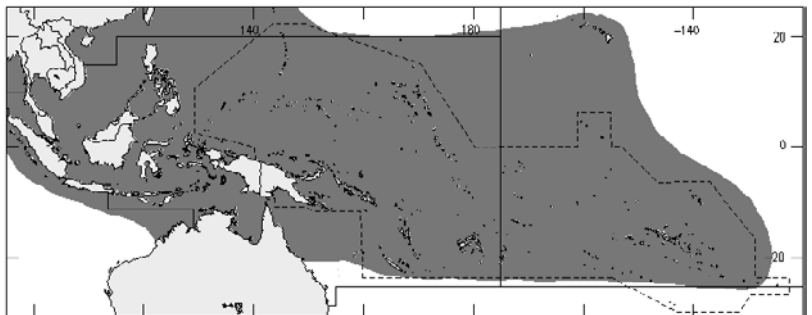
(from Collette, 1977)

Diagnostic characters: Body elongate, rounded in cross-section. Upper and especially lower jaws greatly elongate and studded with fine teeth. **Gill rakers present.** Anterior parts of dorsal and anal fins not forming prominent lobes; **dorsal-fin rays few, 12 to 15**; anal-fin rays 15 to 20; pectoral fin not falcate, pectoral-fin rays 10 to 12 (usually 11); **caudal peduncle greatly depressed with very large lateral keels**; caudal fin forked, upper and lower lobes of about equal length. Predorsal scales (in front of dorsal fin) comparatively few and large, 108 to 120. Both right and left gonads present, right longer than left. Total vertebrae 62 to 75. **Colour:** bluish green above, silvery below; a dark blue stripe along sides; fins unpigmented; scales and bones green.

Size: Maximum standard length (without caudal fin) at least 38.2 cm, commonly to 30 cm; maximum body length 25.6 cm (without head and caudal fin).

Habitat, biology, and fisheries: A pelagic species inhabiting offshore surface waters but particularly abundant about islands. Carnivorous, feeding mainly on small fishes. Caught mainly by casting or trolling surface or near-surface lures; also with seines and trammel nets, often using lights. Marketed fresh.

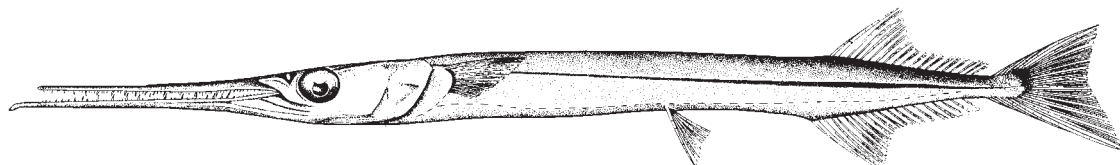
Distribution: In the Western Pacific Ocean, known from many island groups extending into the Central and South Pacific. Other subspecies are found worldwide in tropical and warm temperate waters.



Strongylura incisa (Valenciennes, 1846)

Frequent synonyms / misidentifications: *Rhaphiobelone robusta* Schultz, 1953; *Belone leiuroides* Bleeker, 1851 / None.

FAO names: En - Reef needlefish.



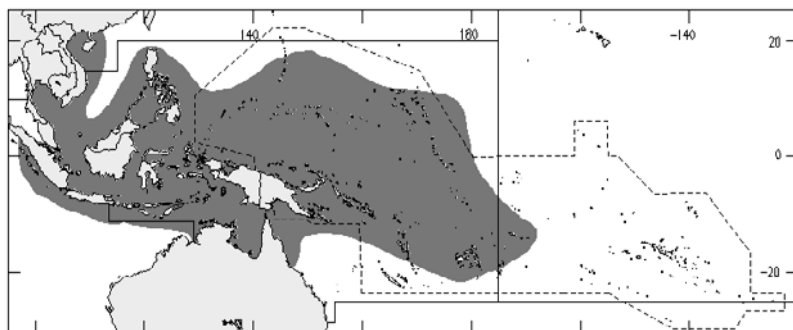
Australia, 21 cm body length

Diagnostic characters: Body elongate, slightly compressed, almost rectangular in cross-section. Head large, about 2.5 times in body length; upper and lower jaws greatly elongate and studded with sharp teeth; **upper surface of head with prominent ridges**; gill rakers absent. Anterior parts of dorsal and anal fins forming well-developed lobes; **origin of dorsal fin over fourth to sixth ray of anal fin**; dorsal-fin rays 18 to 20; anal-fin rays 21 to 24; pectoral fins not falcate; pectoral-fin rays 11 to 13. Caudal peduncle without lateral keels; caudal fin emarginate, not deeply forked. **Predorsal scales** (in front of dorsal fin) **moderately large, 100 to 125, crowded just posterior to head**; bases of dorsal and anal fins without scales. **Colour:** body dark grey with narrow silver lateral stripe, ventral surface white; prominent elongate spot between opercle and preopercle above level with pectoral-fin origin; cheeks with clumped patches of melanophores; fins clear with scattered melanophores, pectoral fin with a slight yellow tinge.

Size: Maximum standard length (without caudal fin) 75 cm, commonly to 60 cm; maximum body length 50 cm (without head and caudal fin).

Habitat, biology, and fisheries: Inhabits coastal areas, particularly near coral reefs. Carnivorous, feeding mainly on small fishes. Taken with drift nets and shore seines. Marketed fresh.

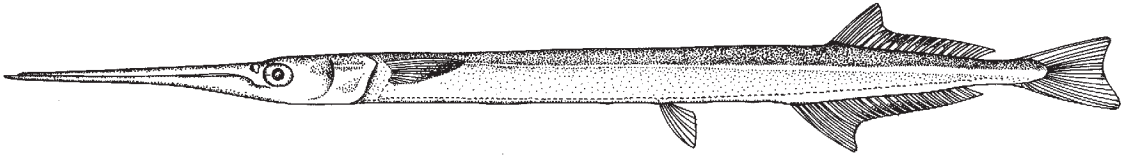
Distribution: Indo-West Pacific from the Maldive and Nicobar islands in the Indian Ocean through Indonesia, New Guinea, and northern Australia; north to the Philippines and South China Sea and east into Oceania (Samoa, Fiji, Marianas, Marshall, and Caroline islands).



Strongylura leiura (Bleeker, 1850)

Frequent synonyms / misidentifications: *Belone ciconia* Richardson, 1846; *B. leiurus* Bleeker, 1850 / None.

FAO names: En - Yellowfin needlefish.

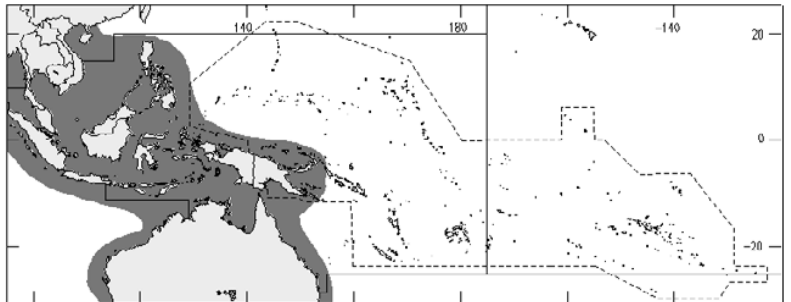


Diagnostic characters: Body elongate, **laterally compressed**, almost rectangular in cross-section. Upper and lower jaws greatly elongate and studded with sharp teeth; gill rakers absent. Anterior parts of dorsal and anal fins forming distinct lobes; **origin of dorsal fin over seventh to tenth ray of anal fin; dorsal-fin rays 17 to 21; anal-fin rays 23 to 25**; pectoral fins not falcate; pectoral-fin rays 10 or 11. **Caudal peduncle without lateral keels; caudal fin emarginate**, not deeply forked. **Predorsal scales** (in front of dorsal fin) **moderately small, 130 to 180**; bases of dorsal and anal fins covered with scales. **Colour:** top of head and back greenish; a silver stripe along sides widening posteriorly, lower sides and ventral surface white; pelvic fins whitish; pectoral fins with a distal dark spot, **tip of fins yellow when fresh**; tips of dorsal and anal-fin lobes yellowish, some black pigmentation along middle of fins; caudal fin dark with a yellowish tinge to upper lobe.

Size: Maximum total length 73 cm; maximum body length (without head and caudal fin) 46 cm, commonly to 35 cm.

Habitat, biology, and fisheries: Inhabits coastal areas and estuaries. Carnivorous, feeding mainly on small fishes. Taken with drift nets, shore seines, and purse seines. Marketed fresh.

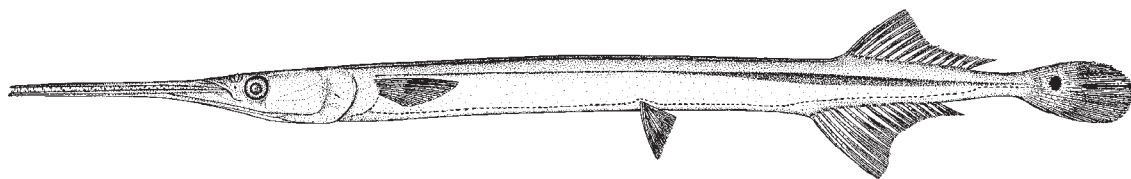
Distribution: Widespread within the Indo-West Pacific from South Africa east along the coasts of Africa, Pakistan, India, and Sri Lanka to the western Central Pacific. In the area, from southeast Asia to New Guinea, Australia, and the Philippines.



Strongylura strongylura (van Hasselt, 1823)

Frequent synonyms / misidentifications: *Tylosurus strongylura* van Hasselt, 1823 / None.

FAO names: En - Spottail needlefish; Fr - Aiguillette ocelée; Sp - Agujón ocelado.

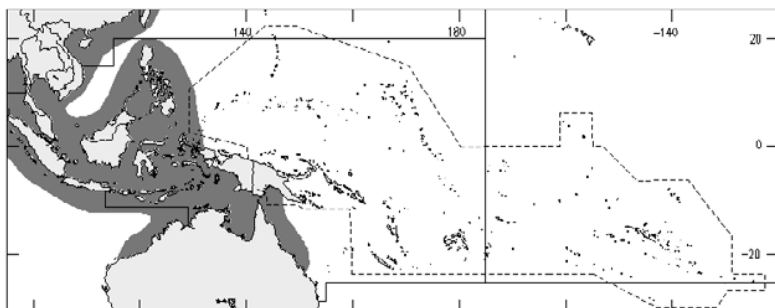


Diagnostic characters: Body elongate, **rounded in cross-section**. Upper and lower jaws greatly elongate and studded with sharp teeth; gill rakers absent. No spines in fins; anterior parts of dorsal and anal fins forming moderate lobes; **dorsal-fin rays 12 to 15; anal-fin rays 15 to 18**; pectoral fins not falcate; pectoral-fin rays 10 to 12 (usually 11). **Caudal peduncle without lateral keels; caudal fin rounded or truncate**, not emarginate or forked. **Predorsal scales** (in front of dorsal fin) **few and relatively large, 100 to 130**; bases of dorsal and anal fins covered with scales. Total number of vertebrae 59 to 65. **Colour:** greenish above, silvery laterally, white ventrally; pectoral, pelvic, and anal fins light; dorsal and anal fins with some pigmentation along middle of the rays; **caudal fin light with a prominent round black spot near its base**; dorsal-fin lobe and distal margin of caudal fin yellow in live adults, anterior margin of anal fin orange.

Size: Maximum standard length (without caudal fin) 40 cm, commonly to 22 cm; maximum body length 26 cm (without head and caudal fin).

Habitat, biology, and fisheries: Inhabits coastal areas and mangrove-lined lagoons, where it is common (especially small specimens) and also enters fresh water. Carnivorous, feeding mainly on small fishes, especially clupeoids. Caught by casting or trolling surface or near-surface lures; also with seines, often using lights and with cast nets in mangrove-lined lagoons. Marketed fresh.

Distribution: Indo-West Pacific from the Persian Gulf along the coasts of Pakistan, India, and Sri Lanka to the western Central Pacific. Within the area, north to the Philippines and southern China, south to northern Australia.



Tylosurus acus melanotus (Bleeker, 1850)

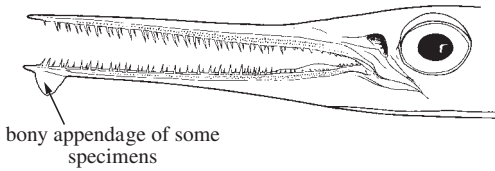
Frequent synonyms / misidentifications: *Belone appendiculatus* Klunzinger, 1871 / None.

FAO names: **En** - Agujon needlefish; **Fr** - Aiguille voyeuse; **Sp** - Marao ojón (= Aguja imperial).



Puerto Rico, 38.2 cm body length (figure of *Tylosurus acus acus*)

(from Collette, 1977)



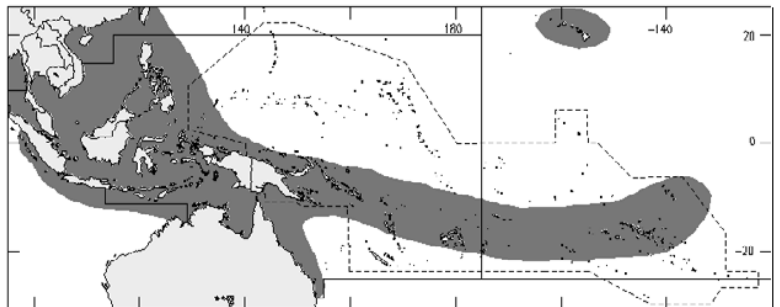
lateral view of head

Diagnostic characters: Body elongate, rounded in cross-section. Upper and lower jaws greatly elongate and studded with sharp teeth; a conspicuous appendage sometimes present at tip of lower jaw; gill rakers absent. **Anterior part of dorsal fin with a low lobe, contained 10.5 to 13.3 times in body length; dorsal-fin rays numerous, 24 to 27;** anal-fin lobe low, contained 9.7 to 11.7 times in body length; **anal-fin rays numerous, 22 to 24** (usually 23); pectoral and pelvic fins relatively short, 8 to 12.4 and 10 to 14.1 times in body length, respectively; pectoral-fin rays 13 or 14; **a distinct black lateral keel on caudal peduncle; caudal fin deeply forked**, lower lobe much longer than upper. Predorsal scales (in front of dorsal fin) very numerous and tiny, 280 to 340. Left gonad absent or greatly reduced in both sexes. Total number of vertebrae 90 to 95. **Colour:** dark bluish above, silvery white below; **juveniles with elevated black lobe in posterior part of dorsal fin** which is lost with growth.

Size: Maximum total length 90 cm; maximum body length (without head and caudal fin) 60 cm, commonly to 50 cm.

Habitat, biology, and fisheries: Pelagic, inhabiting more offshore waters than *Tylosurus crocodilus*, but also found in coastal waters. Carnivorous, feeding mainly on small fishes. Caught by casting or trolling surface or near-surface lures; also with seines and gill nets, often using lights. Marketed mostly fresh. The flesh is of good quality.

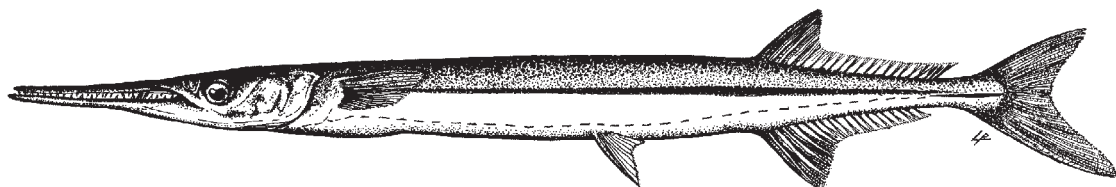
Distribution: Worldwide in tropical and warm temperate waters. This subspecies extends from South Africa through the Central and South Pacific. Other subspecies are found in the Atlantic and eastern Pacific.



Tylosurus crocodilus crocodilus (Peron and LeSueur, 1821)

Frequent synonyms / misidentifications: *Tylosurus raphidoma* (Ranzani, 1842) / None.

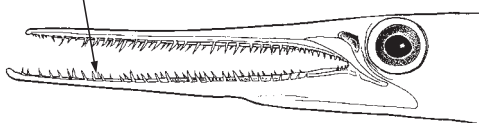
FAO names: En - Hound needlefish; Fr - Aiguille crocodile; Sp - Marao lisero.



Jamaica, 48 cm body length

(from Collette, 1977)

teeth point forward



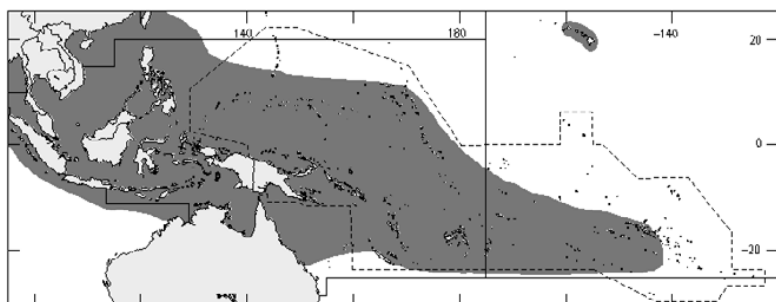
head of juvenile (32 cm body length)

Diagnostic characters: Body elongate, rounded in cross-section. Upper and lower jaws greatly elongate and studded with sharp teeth jaw teeth point anteriorly in juveniles (to 40 cm body length) but are straight at all sizes in other species of *Tylosurus*; gill rakers absent. Anterior part of dorsal and anal fins with relatively high lobes, contained 5.4 to 10.6 and 5.5 to 8 times in body length, respectively; **dorsal-fin rays 21 to 25** (usually 22 or 23); **anal-fin rays 19 to 22** (usually 21 or 22); pectoral and pelvic fins long, contained 6.6 to 8.3 and 7.3 to 10.6 times in body length, respectively; pectoral-fin rays 13 to 15 (usually 14 or 15); **a distinct black lateral keel on caudal peduncle; caudal fin deeply forked**, lower lobe much longer than upper. Predorsal scales numerous and tiny, 271 to 340. Both right and left gonads present, right longer than left. Total number of vertebrae 82 to 86. **Colour:** dark bluish green above, silvery below; a dark blue stripe along sides; **juveniles** (to 20 cm body length) **with elevated black lobe in posterior part of dorsal fin** which is lost with growth; scales and bones green.

Size: Maximum standard length (without caudal fin) at least 124 cm, commonly to 90 cm; maximum body length (without head and caudal fin) 82.5 cm; unverified reports give up to 150 cm total length.

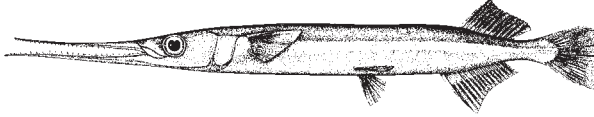
Habitat, biology, and fisheries: A pelagic species inhabiting more coastal waters than *Tylosurus acus*, but also found in offshore waters. Carnivorous, feeding mainly on small fishes. Large individuals may be dangerous when leaping out of the water. Caught by casting or trolling surface or near-surface lures; also with purse seines and drift nets. Marketed mostly fresh.

Distribution: A worldwide species in tropical and warm-temperate waters (replaced by *T. crocodilus fodiator* in the eastern Pacific). Throughout the area, from southern Japan through the Philippines and Indonesia to northern Australia.

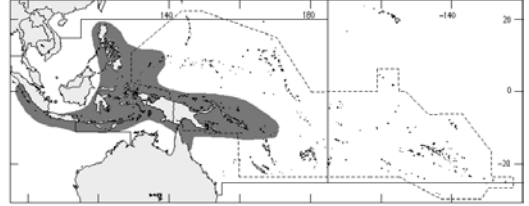


Strongylura urvillii (Valenciennes, 1846)**En** - Urville's needlefish.

Maximum body length 26.3 cm; maximum standard length 43.8 cm, commonly to 35 cm. A coastal species, sometimes entering brackish water. Found only in the waters of Indonesia, Philippines, and New Guinea, and east to the Solomon and Santa Cruz islands.



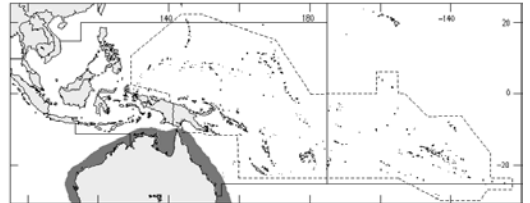
(after Bleeker, 1866-72)

***Tylosurus gavialoides*** (Castelnau, 1873)**En** - Stour longtom.

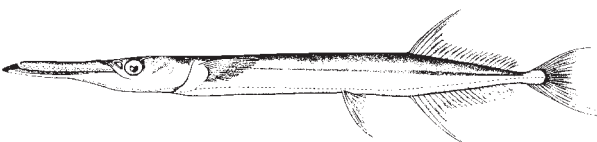
Maximum body length 75 cm; maximum standard length 10.5 cm, commonly to 80 cm. A coastal species. Restricted to the northern three-quarters of Australia.



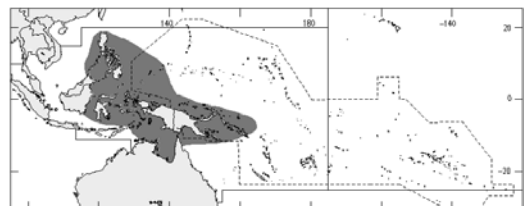
Australia, 45 cm body length

***Tylosurus punctulatus*** (Günther, 1872)**En** - Spongyjawed needlefish.

Maximum body length 39.5 cm; maximum standard length 58.3 cm, commonly to 50 cm. A coastal species. Restricted to the western Central Pacific, north to the Philippines and east to the Solomon islands.



Philippines, 34 cm body length

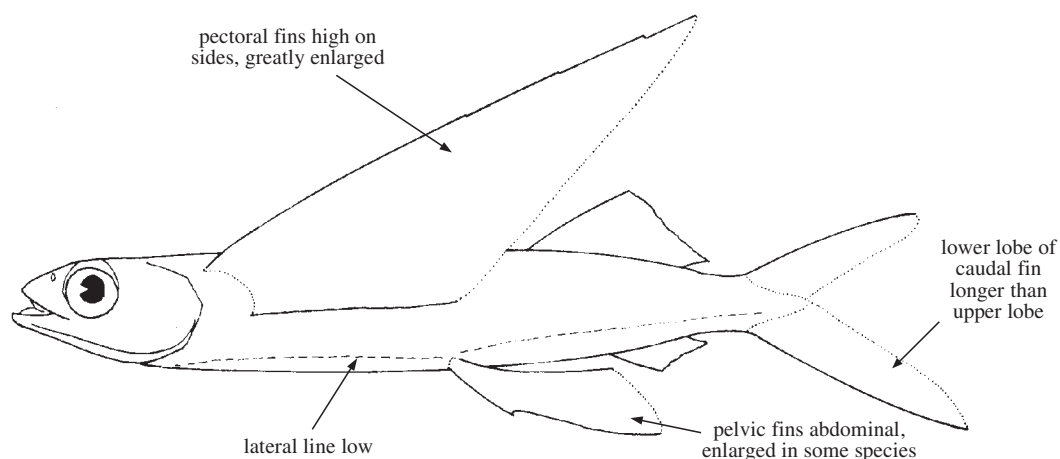


EXOCOETIDAE

Flyingfishes

by N.V. Parin

Diagnostic characters: Elongate fishes, their bodies broadly cylindrical (round or elliptical in cross-section), flattened ventrally in some species. Head short. Snout blunt, shorter than eye in all Western Central Pacific species. Mouth small. Jaws of equal size. Jaw teeth absent or very small. Gill rakers well developed. Upper pharyngeal bones of third gill arches close together, but not fused into a single plate. **No spines in fins.** Dorsal and anal fins set equally far back on body, their bases short and opposed. **Pectoral fins high on sides, strikingly long, always extending beyond dorsal-fin origin.** Pelvic fins abdominal in position, and greatly enlarged in many, but not all, species. Caudal fin deeply forked, its lower lobe longer than the upper. **Lateral line low on body.** Scales large, cycloid (smooth to touch), easily shed. Swimbladder large, extending posteriorly beyond body cavity. Young stages (to about 10 cm) quite different in appearance from adults, with pectoral fins shorter, dorsal fin often higher than in adults, colour patterns variable, and spots and bars often developed; single or paired chin barbels conspicuous in many species. **Colour:** dark above, pale below; dark colours usually iridescent blue or green in life; pectoral fins in some species with dark spots or pale stripes; dorsal fin in some species with black pigment.



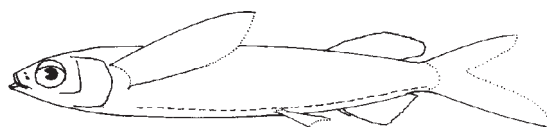
Habitat, biology, and fisheries: Inhabit surface waters of the open ocean as well as neritic and inshore areas. Well known for their habit of leaping out of the water and gliding over long distances. Schooling, do not undertake extensive migrations. Feed on zooplankton, larger species also on small fishes. Very abundant in most tropical seas but are objects of only small-scale fisheries in Philippines, Indonesia, Viet Nam, Thailand, Kiribati, and some other regions of the world. From 1990 to 1995, FAO's Yearbook of Fishery Statistics reports a range of yearly catch of Exocoetidae (and Hemiramphidae) of around 25 900 to 67 200 t from the Western Central Pacific. Main fishing gears are traps, gill nets, and purse seines. Marketed mostly fresh and dried salted, also as fermented fish paste.

Similar families occurring in the area

Hemiramphidae: pectoral fins short to medium length, never reaching dorsal-fin origin; lower jaw much longer than upper jaw, except in adult *Oxyporhamphus*, *Melapedalion*, and *Arrhamphus*; body more elongate, except in *Oxyporhamphus*; upper pharyngeals of third arch fused, forming a single plate; swimbladder not extending posteriorly beyond body cavity.



Hemiramphus
(a typical representative)



Oxyporhamphus
(a representative without prolonged lower jaw)

Hemiramphidae

Key to the genera and species of Exocoetidae occurring in the area

- 1a. Pectoral fins moderately long, not reaching beyond posterior part of anal-fin base; pectoral branch of lateral line present (Fig. 1); upper jaw protrusible (Fig. 2) . . . (*Parexocoetus*) → 2
- 1b. Pectoral fins very long, reaching beyond anal-fin base to, or almost to, caudal-fin base; pectoral branch of lateral line absent; upper jaw not protrusible → 3

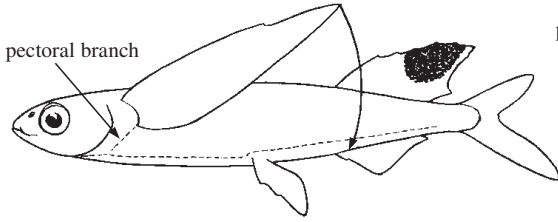


Fig. 1 *Parexocoetus*

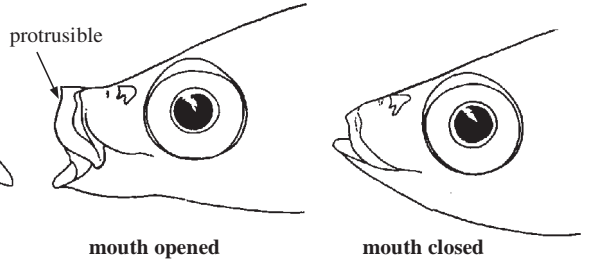
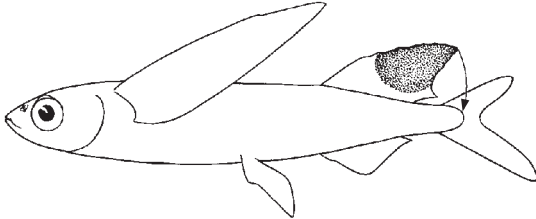
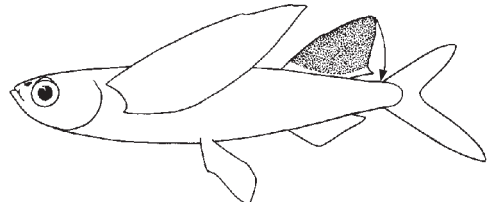


Fig. 2 *Parexocoetus*

- 2a. Anal-fin rays 12 to 14; longest dorsal-fin rays reaching beyond origin of upper caudal-fin lobe (Fig. 3a); predorsal scales 20 to 24 *Parexocoetus brachypterus*
- 2b. Anal-fin rays 10 to 12; longest dorsal-fin rays scarcely reaching origin of upper caudal-fin lobe (Fig. 3b); predorsal scales 16 to 21 *Parexocoetus mento*



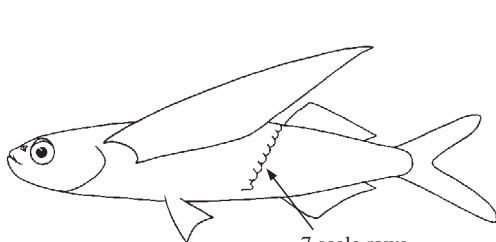
a) *Parexocoetus brachypterus*



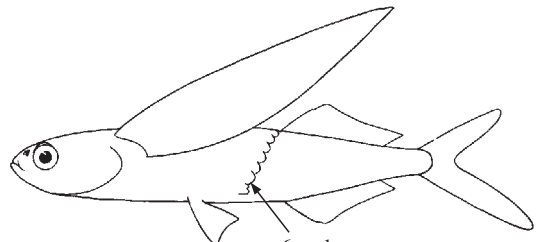
b) *Parexocoetus mento*

Fig. 3

- 3a. Pelvic fins short, not reaching anal-fin origin (barely reaching in juveniles), inserted nearer to pectoral-fin insertion than to anal-fin origin (Fig. 4) (*Exocoetus*) → 4
- 3b. Pelvic fins long, reaching well beyond anal-fin origin, inserted nearer to anal-fin origin than to pectoral-fin insertion (Fig. 6) → 6
- 4a. Gill rakers on first gill arch 29 to 37 (usually 32 to 34); as a rule 6 transverse rows of scales between dorsal-fin origin and lateral line (Fig. 4b) *Exocoetus volitans*
- 4b. Gill rakers on first gill arch 21 to 29 (usually 24 to 27); as a rule 7 transverse rows of scales between dorsal-fin origin and lateral line (Fig. 4a) → 5



a) *Exocoetus monocirrhus*



b) *Exocoetus volitans*

Fig. 4

- 5a. Juveniles less than 10 cm standard length with a single chin barbel (Fig. 5a); distributed north of 10°S latitude *Exocoetus monocirrhus*
- 5b. Juveniles unbarbelled (Fig. 5b); distributed south of 10°S latitude *Exocoetus obtusirostris*

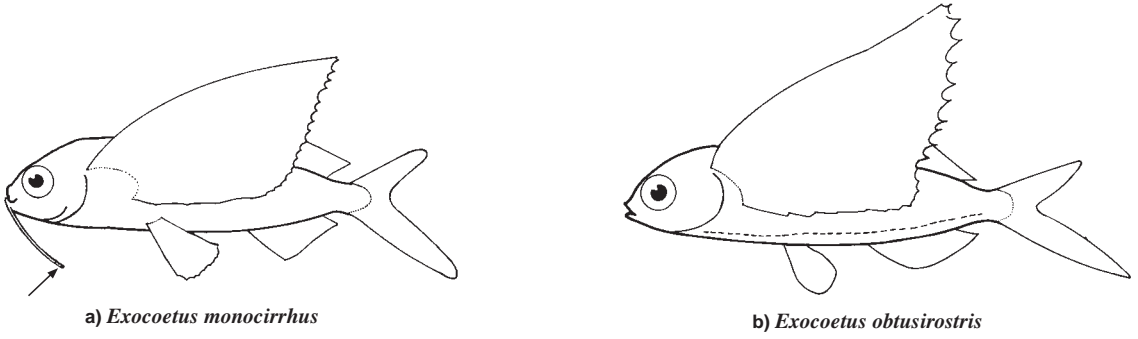


Fig. 5 juveniles

- 6a. Origin of anal fin slightly before, under or not more than 2 rays behind origin of dorsal fin (Fig. 6b); dorsal fin usually with less, or equal number of rays than anal fin; juveniles not barbelled (*Hirundichthys*) → 29
- 6b. Origin of anal fin 3 rays or more behind origin of dorsal fin (Fig. 6a); dorsal fin usually with 2 to 5 rays more than anal fin; juveniles barbelled or not barbelled → 7

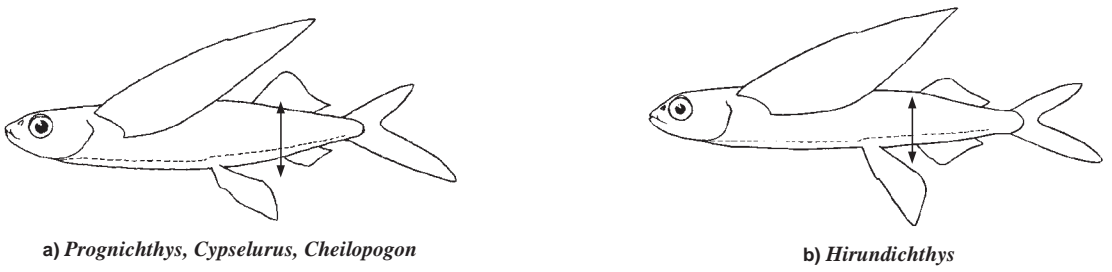
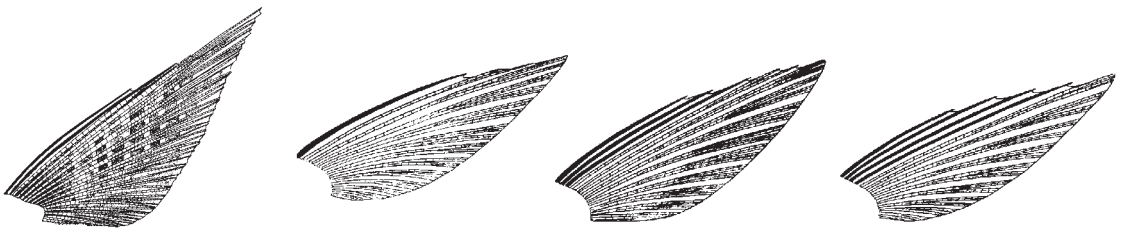


Fig. 6

- 7a. First 3 or 4 pectoral-fin rays unbranched; juveniles not barbelled (*Prognichthys*) → 8
- 7b. First 1 or 2 pectoral-fin rays unbranched (Fig. 7a, b); juveniles barbelled or not barbelled → 9
- 8a. First 3 pectoral-fin rays unbranched (Fig. 7c) *Prognichthys brevipinnis*
- 8b. First 4 pectoral-fin rays unbranched (Fig. 7d) *Prognichthys sealei*



a) *Cheilopogon rapanouiensis* b) *Cypselurus, Cheilopogon* c) *Prognichthys brevipinnis* d) *Prognichthys sealei*

Fig. 7

- 9a. Lower jaw a little shorter than upper jaw and included beneath the latter (Fig. 8a); juveniles with a single barbel or not barbelled. (*Cypselurus*) → 10
- 9b. Both jaws of equal length, or lower jaw a little longer than upper jaw (Fig. 8b, c); juveniles with paired barbels (*Cheilopogon*) → 16

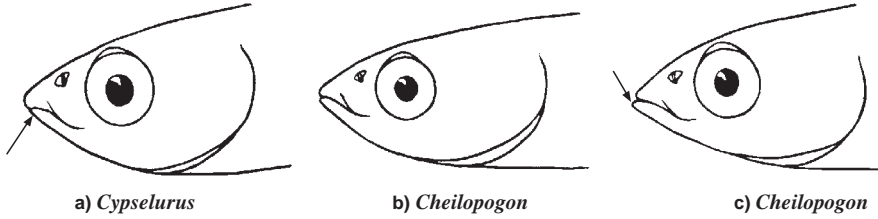


Fig. 8 lateral view of head

- 10a. Jaw teeth not tricuspid (Fig. 9a); juveniles not barbelled, with dark cross bars on body *Cypselurus hexazona*
- 10b. At least some of jaw teeth tricuspid (Fig. 9b); juveniles barbelled or not barbelled, without dark cross bars on body → 11

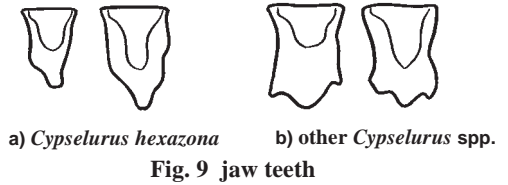


Fig. 9 jaw teeth

- 11a. Pelvic fins inserted much nearer to head than origin of lower caudal-fin lobe (distance between pelvic fins and caudal fin 0.7 to 0.9 times in distance between head and pelvic fins) (Fig. 10a); pectoral fins spotted or not spotted; juveniles without barbels → 12
- 11b. Pelvic fins inserted about midway between head and origin of lower caudal-fin lobe, or nearer to the latter (distance between pelvic fins and caudal fin 0.85 to 1.3 times in distance between head and pelvic fins) (Fig. 10 b, c); pectoral fins not spotted; juveniles with single barbel → 14

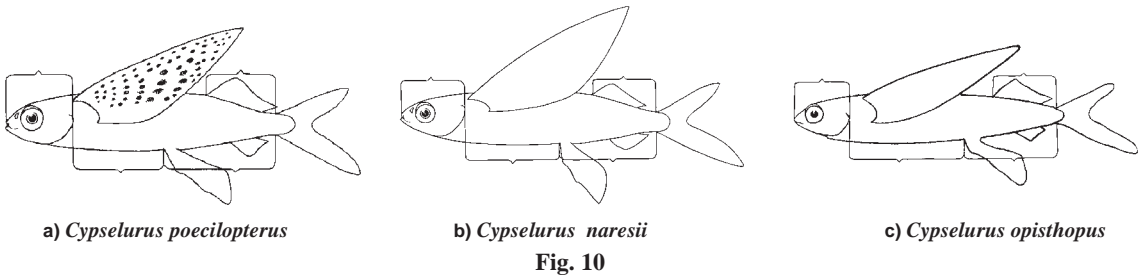


Fig. 10

- 12a. Pectoral fins without dark spots, their tip light (Fig. 11a) *Cypselurus oligolepis*
- 12b. Pectoral fins with dark spots, their tip not light (Fig. 11b, c) → 13
- 13a. Predorsal scales 28 to 34; pectoral fins with varying number of dark spots not arranged in regular transverse bands (Fig. 11b) *Cypselurus simus*
- 13b. Predorsal scales 24 to 28; pectoral fins with numerous dark spots arranged in regular transverse bands (Fig. 11c). *Cypselurus poecilopterus*

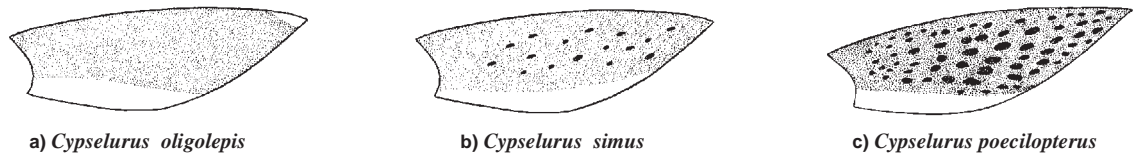


Fig. 11

- 14a. Pelvic fins inserted much nearer origin of lower caudal-fin lobe than head (distance between pelvic fins and caudal fin 1.1 to 1.3 times in distance between head and pelvic fins) (Fig. 10c) *Cypselurus opisthopus*
- 14b. Pelvic fins inserted about midway between head and origin of lower caudal-fin lobe (distance between pelvic fins and caudal fin 0.85 to 1.1 times in distance between head and pelvic fins) (Fig. 10b) → 15
- 15a. Predorsal scales 28 to 32; dorsal-fin rays 10 to 12; head 0.95 to 1.1 times in origin of dorsal fin to origin of upper caudal-fin lobe distance *Cypselurus naresii*
- 15b. Predorsal scales 24 to 30; dorsal-fin rays 12 to 14; head 1.1 to 1.25 times in origin of dorsal fin to origin of upper caudal-fin lobe distance *Cypselurus angusticeps*

16a. Dorsal fin moderately high (longest ray usually less than 10 times in standard length), often bearing grey or black spot (Fig. 12a); jaw teeth noticeable (conspicuous to the touch); juveniles with a pair of short or long, rounded or tapering barbels → 17

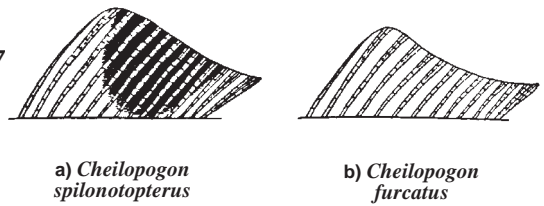


Fig. 12 dorsal fin

16b. Dorsal fin moderately low (longest ray usually more than 10 times in standard length), without black or grey spot (Fig. 12b) (may be present in *Cheilopogon intermedius*); jaw teeth minute (not conspicuous to the touch); juveniles with a pair of short (long in *Cheilopogon antoncichi*) tapering barbels → 25

17a. First 2 pectoral-fin rays unbranched (Fig. 7a); juveniles with a pair of short and flattened rounded barbels *Cheilopogon rapanouiensis*

17b. Only the first pectoral-fin ray unbranched (Fig. 7b) → 18

18a. Pectoral fins without dark spots → 19

18b. Pectoral fins with varying number of small dark spots (Fig. 13a); juveniles with a pair of elongated and flattened rounded barbels → 23

19a. Pectoral fins without pale cross band (Fig. 13c); predorsal scales 28 to 41; juveniles with a pair of very long tapering barbels → 20

19b. Pectoral fins with pale oblique cross band (Fig. 13b); predorsal scales 23 to 29; juveniles with a pair of short tapering barbels bearing proximal flap-like appendage → 21

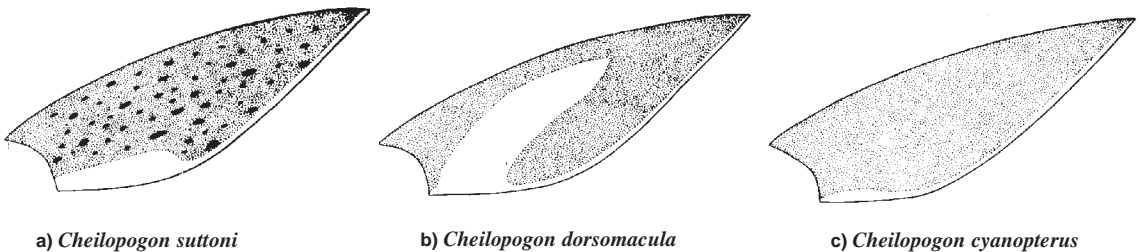


Fig. 13 pectoral fin

20a. Predorsal scales 28 to 35; pectoral fins dark brown *Cheilopogon spilonotopterus*

20b. Predorsal scales 33 to 41; pectoral fins dark blue *Cheilopogon cyanopterus*

- 21a. Pelvic fins with a prominent black spot; cross band of pectoral fins usually yellow *Cheilopogon abei*
- 21b. Pelvic fins without black spot; cross band of pectoral fins not yellow. → 22

- 22a. Dorsal fin usually with a greyish or blackish spot; predorsal scales 25 to 29 *Cheilopogon dorsomacula*
- 22b. Dorsal fin uniformly pale; predorsal scales 23 to 26 *Cheilopogon katoptron*

- 23a. Predorsal scales 28 to 34; dorsal fin usually without black spot *Cheilopogon spilopterus*
- 23b. Predorsal scales 33 to 42; dorsal fin with black spot → 24

- 24a. Pelvic fins inserted nearer head than origin of lower caudal-fin lobe; head shorter than distance from dorsal-fin origin to origin of upper caudal-fin lobe (Fig. 14a) *Cheilopogon atrisignis*
- 24b. Pelvic fins inserted about midway between head and origin of lower caudal-fin lobe; head subequal to distance from dorsal-fin origin to origin of upper caudal-fin lobe (Fig. 4b) *Cheilopogon suttoni*

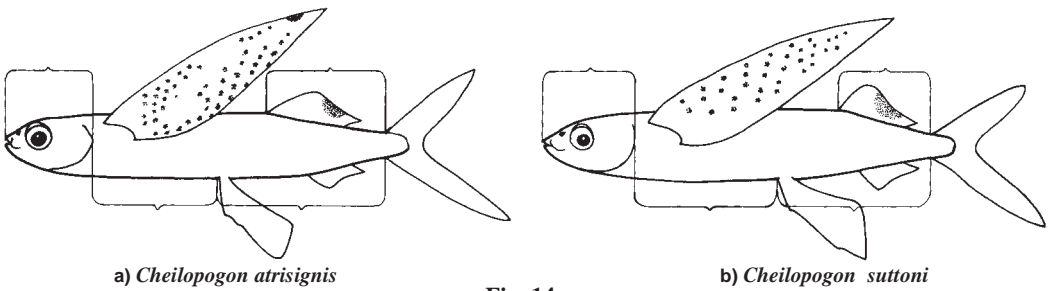


Fig. 14

- 25a. Jaws subequal (Fig. 8b); palatine teeth usually present; pelvic fins inserted about midway between head and origin of lower caudal-fin lobe *Cheilopogon intermedius*
- 25b. Lower jaw a little longer than upper jaw (Fig. 8c); no palatine teeth; pelvic fins inserted nearer head than origin of lower caudal-fin lobe. → 26

- 26a. Pectoral fins usually with varying number of scattered dark dots; 8 or 9 transverse rows of scales between dorsal-fin origin and lateral line *Cheilopogon pitcairnensis*
- 26b. Pectoral fins without dark dots; 7 or 8 transverse rows of scales between dorsal-fin origin and lateral line → 27

- 27a. Anal-fin rays 8 or 9; predorsal scales 26 to 29 *Cheilopogon arcticeps*
- 27b. Anal-fin rays 9 to 11; predorsal scales usually 29 to 33 → 28

- 28a. Pectoral fins light or dark grey with pale oblique cross band (Fig. 15a) *Cheilopogon furcatus*
- 28b. Pectoral fins transparent (Fig. 15b) *Cheilopogon unicolor*

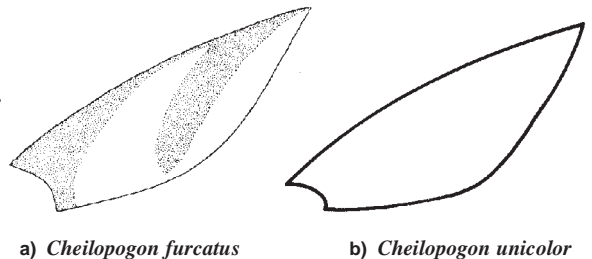
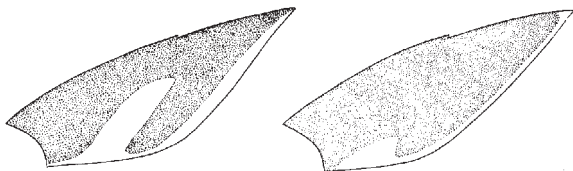


Fig. 15 pectoral fin

- 29a. First 2 pectoral-fin rays unbranched *Hirundichthys albimaculatus*
 29b. Only the first pectoral-fin ray unbranched → 30
- 30a. Palatine teeth present; pectoral fin with distinct pale oblique cross band (Fig. 16a)
 *Hirundichthys speculiger*
- 30b. No palatine teeth; pectoral fin without distinct cross band (Fig. 16b) . . . *Hirundichthys oxycephalus*






















a) *Hirundichthys speculiger* b) *Hirundichthys oxycephalus*

Fig. 16 pectoral fin

List of species occurring in the area

The symbol  is given when species accounts are included.

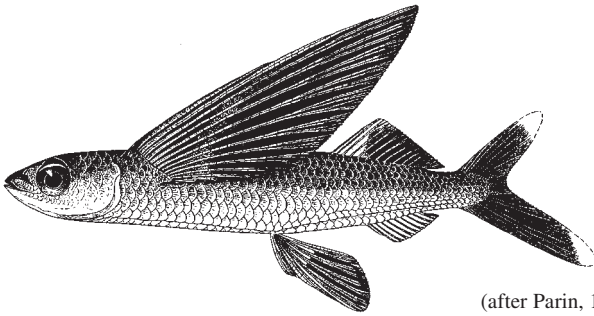
-  *Cheilopogon abei* Parin, 1996
-  *Cheilopogon arcticeps* (Günther, 1866)
-  *Cheilopogon atrisignis* (Jenkins, 1904)
-  *Cheilopogon cyanopterus* (Valenciennes, 1846)
-  *Cheilopogon dorsomacula* (Fowler, 1944)
-  *Cheilopogon furcatus* (Mitchill, 1815)
-  *Cheilopogon intermedius* Parin, 1961
-  *Cheilopogon katoptron* (Bleeker, 1866)
-  *Cheilopogon pitcairimensis* (Nichols and Breder, 1935)
-  *Cheilopogon rapanouiensis* Parin, 1961
-  *Cheilopogon spilonotopterus* (Bleeker, 1866)
-  *Cheilopogon spilopterus* (Valenciennes, 1846)
-  *Cheilopogon suttoni* (Whitley and Colefax, 1938)
-  *Cheilopogon unicolor* (Valenciennes, 1846)
-  *Cypselurus angusticeps* Nichols and Breder, 1935
-  *Cypselurus hexazona* (Bleeker, 1853)
-  *Cypselurus naresii* (Günther, 1889)
-  *Cypselurus oligolepis* (Bleeker, 1866)
-  *Cypselurus opisthopus* (Bleeker, 1866)
-  *Cypselurus poecilopterus* (Valenciennes, 1846)
-  *Cypselurus simus* (Valenciennes, 1846)
-  *Exocoetus monocirrhus* Richardson, 1846
-  *Exocoetus obtusirostris* Günther, 1866
-  *Exocoetus volitans* Linnaeus, 1758
-  *Hirundichthys albimaculatus* (Fowler, 1934)
-  *Hirundichthys oxycephalus* (Bleeker, 1852)
-  *Hirundichthys speculiger* (Valenciennes, 1846)
-  *Parexocoetus brachypterus* (Richardson, 1846)
-  *Parexocoetus mento* (Valenciennes, 1846)
-  *Prognichthys brevipinnis* (Valenciennes, 1846)
-  *Prognichthys sealei* Abe, 1955

Reference

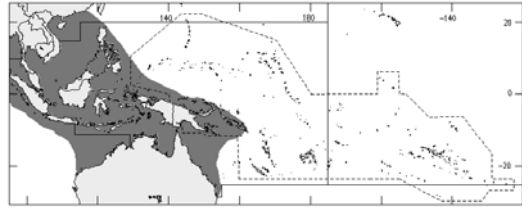
Parin, N.V. 1996. On the flying fish species (Exocoetidae) in the western and central pacific Ocean. *Voprosy Ikhtiologii*, 36(3):300-307 (English transl. in *J. Ichthyol.*, 36(5):357-364).

Cheilopogon abei* Parin, 1996*En** - Abe's flyingfish.

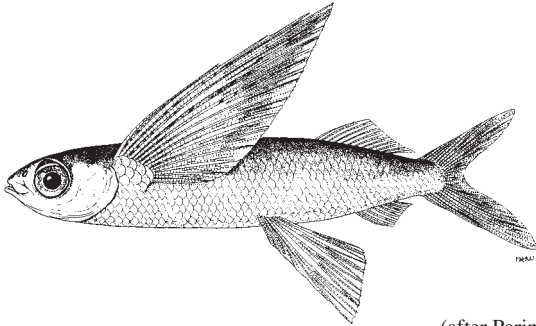
Maximum standard length about 22 cm. Pelagic in neritic surface waters. No importance in fisheries. Distributed in the northern Indian and western Pacific oceans from East Africa to Solomon Islands.



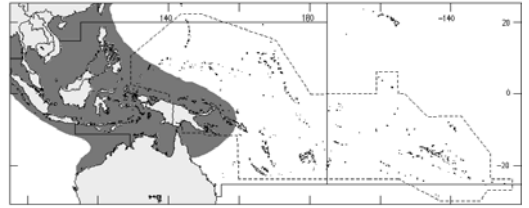
(after Parin, 1996)

***Cheilopogon arcticeps* (Günther, 1866)****En** - Bearhead flyingfish.

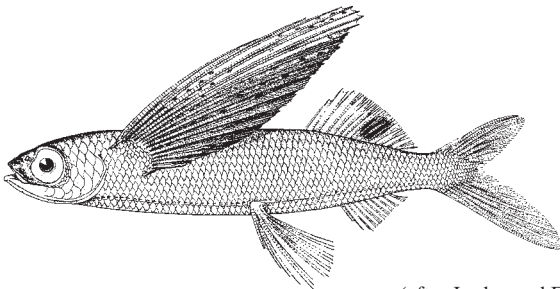
Maximum standard length about 21 cm. Pelagic in nearshore and neritic surface waters, never spread to open sea. No importance in fisheries. Distributed in the western Pacific Ocean (southern China, Viet Nam, Thailand, Indonesia, New Guinea, Solomon Islands).



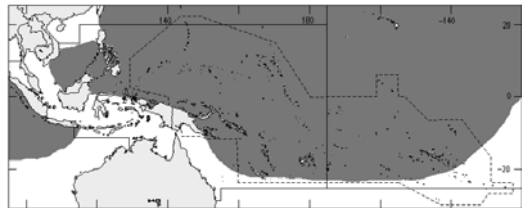
(after Parin, 1961)

***Cheilopogon atrisignis* (Jenkins, 1904)****En** - Glider flyingfish; **Fr** - Exocet planeur; **Sp** - Volador planeador.

Maximum standard length about 33 cm. Pelagic in open ocean and neritic surface waters. Minor importance to fisheries in Polynesia. Distributed in the Indian and Pacific oceans from Somalia and Madagascar to Revillagigedos and Galapagos islands in the eastern Pacific.



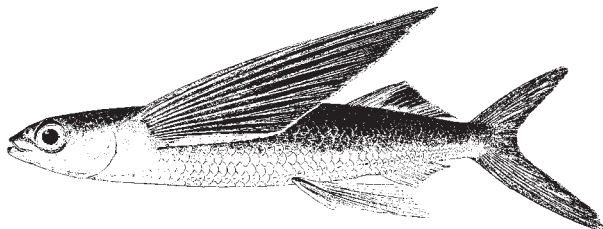
(after Jordan and Evermann, 1905)



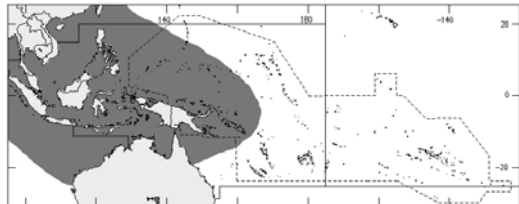
Cheilopogon cyanopterus (Valenciennes, 1846)

En - Margined flyingfish; **Fr** - Exocet codène; **Sp** - Volador bordiblanco.

Maximum standard length about 34 cm. Pelagic in open ocean and neritic surface waters. No importance in fisheries. Distributed in the Atlantic, Indian, and western Pacific oceans eastward to southern Japan, Taiwan Province of China, Queensland (Australia), and the Mariana, Caroline, and Solomon islands.



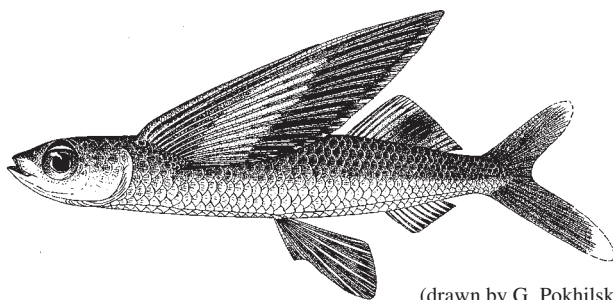
(after Bruun, 1935)



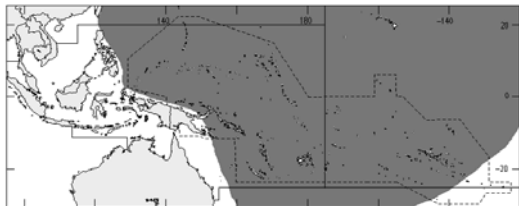
Cheilopogon dorsomacula (Fowler, 1944)

En - Backspot flyingfish; **Fr** - Exocet à dos tacheté; **Sp** - Volador de dorso manchado.

Maximum standard length about 23 cm. Pelagic in open ocean surface waters. No importance in fisheries. Distributed in the tropical Pacific Ocean, not found in inland seas of Southeast Asia.



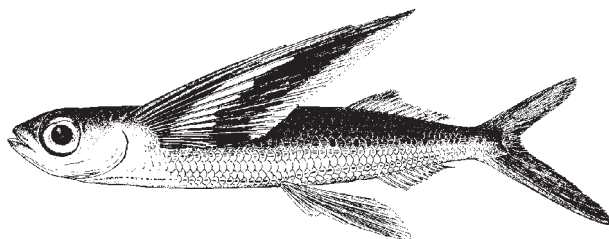
(drawn by G. Pokhilskaya)



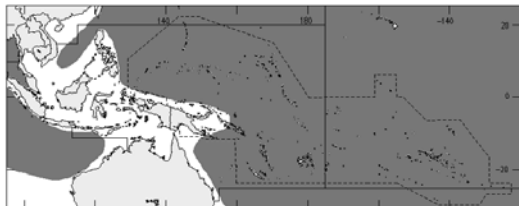
Cheilopogon furcatus (Mitchill, 1815)

En - Spotfin flyingfish; **Fr** - Exocet tacheté; **Sp** - Volador manchado.

Maximum standard length about 30 cm. Pelagic in open ocean surface waters. No importance in fisheries. Widespread in tropical zone of all oceans, absent in inland seas of Southeast Asia.

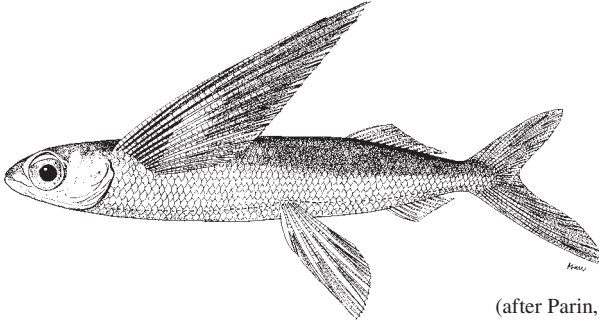


(after Bruun, 1935)

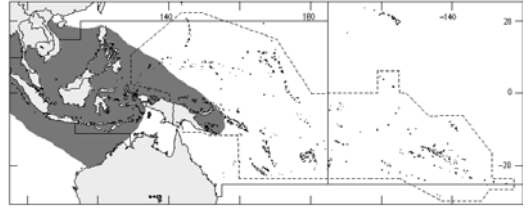


Cheilopogo intermedius* Parin, 1961*En** - Intermediate flyingfish.

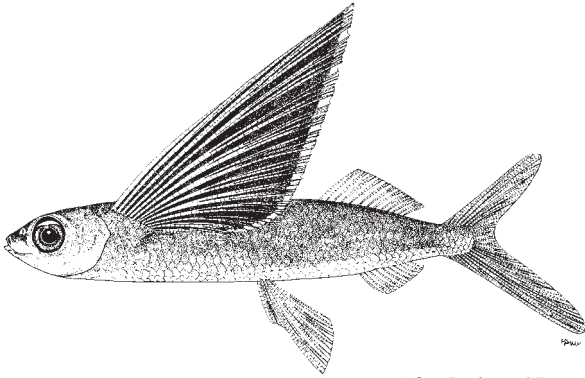
Maximum standard length about 22 cm. Pelagic in nearshore and neritic surface waters. Minor importance in fisheries (Thailand). Distributed in the Indian and western Pacific oceans from western India to Palau and Solomon islands.



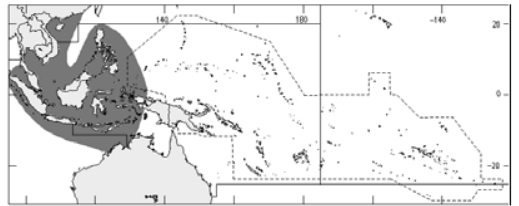
(after Parin, 1961)

***Cheilopogon katoptron* (Bleeker, 1866)****En** - Indonesian flyingfish.

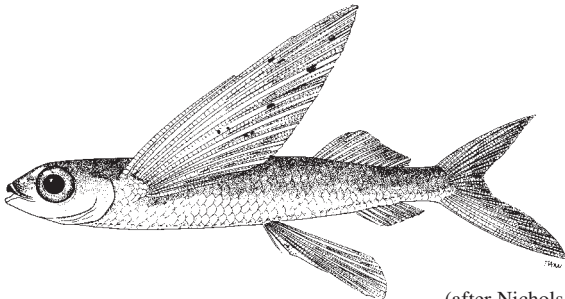
Maximum standard length about 18 cm. Pelagic in nearshore surface waters, never spread to open sea. Minor importance in fisheries in Viet Nam and Philippines. Distributed in the western Pacific Ocean (Viet Nam, Thailand, Indonesia, Philippines, and northern Australia).



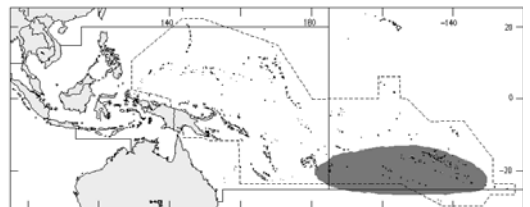
(after Parin and Besednov, 1965)

***Cheilopogon pitcairnensis* (Nichols and Breder, 1935)****En** - Pitcairn flyingfish.

Maximum standard length about 24 cm. Pelagic in nearshore and neritic surface waters. Minor importance to fisheries in Polynesia. Distributed in southern tropical Pacific from Tonga to Pitcairn Islands.



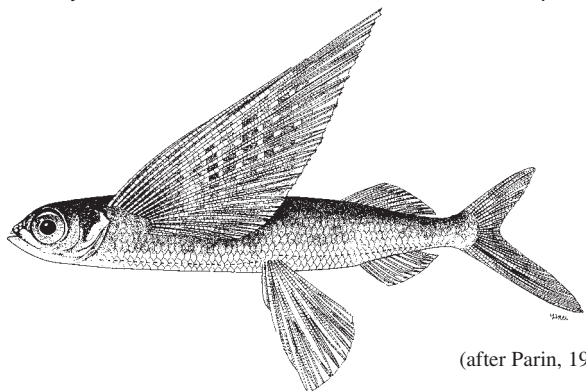
(after Nichols and Breder, 1935)



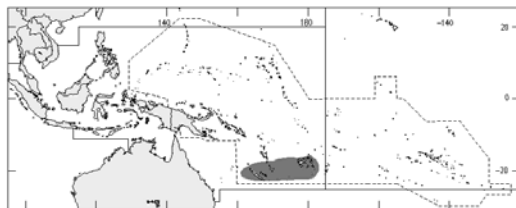
***Cheilopogon rapanouiensis* Parin, 1962**

En - Rapanoui flyingfish.

Maximum standard length about 30 cm. Pelagic in neritic surface waters. No importance in fisheries. Distributed in southern tropical Pacific Ocean from New Caledonia, Fiji, and Easter Island; a single stray collected in eastern Pacific north of the equator.



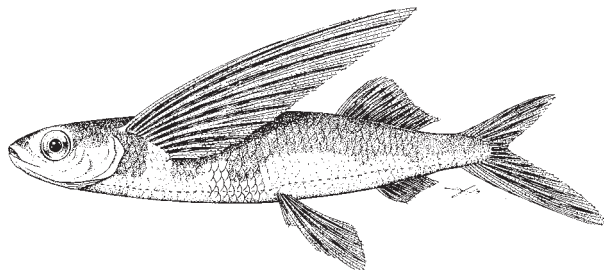
(after Parin, 1961)



***Cheilopogon spilonotus* (Bleeker, 1866)**

En - Stained flyingfish; **Fr** - Exocet marbré; **Sp** - Volador jaspeado.

Maximum standard length about 38 cm. Pelagic in open ocean and neritic surface waters. Minor importance to fisheries in Polynesia. Distributed in the Indian and Pacific oceans eastward to Revillagigedo, Malpelo, and Galapagos islands.



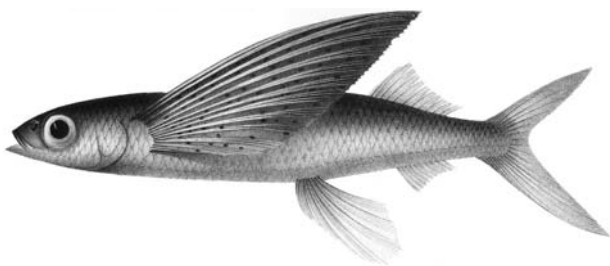
(after Parin, 1960)



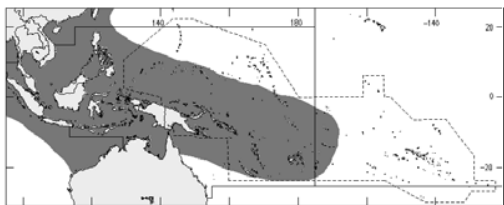
***Cheilopogon spilopterus* (Valenciennes, 1846)**

En - Manyspotted flyingfish.

Maximum standard length to about 25 cm. Pelagic in nearshore and neritic surface waters. Minor importance in fisheries (Thailand). Distributed in the eastern Indian and western Pacific oceans from Andaman Sea to Samoa.



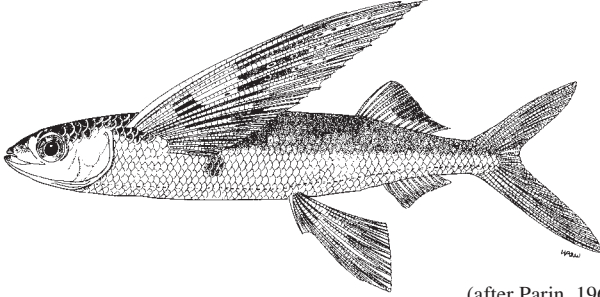
(from Bleeker, 1866-72)



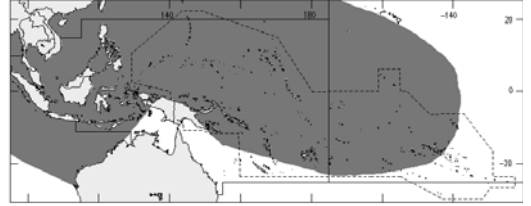
Cheilopogon suttoni (Whitley and Colefax, 1938)

En - Sutton's flyingfish; **Fr** - Exocet de Sutton; **Sp** - Volador de Sutton.

Maximum standard length about 29 cm. Pelagic in open ocean and neritic surface waters. Minor importance to fisheries in Polynesia. Distributed in the Indian and western Pacific oceans from Gulf of Aden to 140°E.

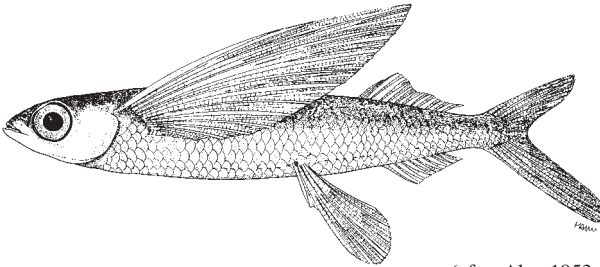


(after Parin, 1960)

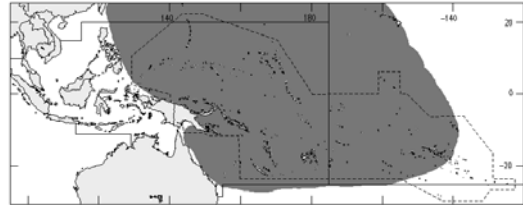
***Cheilopogon unicolor*** (Valenciennes, 1846)

En - Limpidwing flyingfish.

Maximum standard length about 31 cm. Pelagic in open ocean and neritic surface waters. Minor importance in fisheries (Polynesia). Distributed in the Pacific Ocean from southern Japan, Philippines, and Queensland (Australia) to Hawaii and Tahiti.

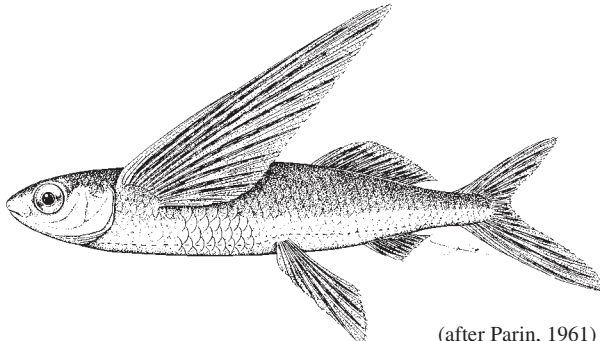


(after Abe, 1953-56)

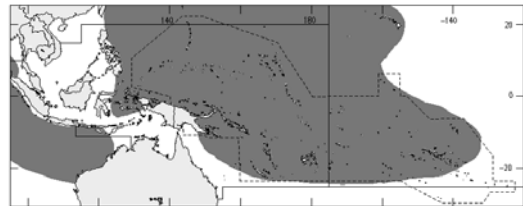
***Cypselurus angusticeps*** Nichols and Breder, 1935

En - Narrowhead flyingfish; **Fr** - Exocet bécune; **Sp** - Volador picudo.

Maximum standard length about 24 cm. Pelagic in open ocean and neritic surface waters, most abundant off oceanic islands. Minor object of fisheries in Polynesia, caught by dip net and lights at night. Widespread in the Indian and Pacific oceans, from East Africa to Hawaii and Tuamotu Islands; separate population in the eastern tropical Pacific at Soccora Island (Mexico).

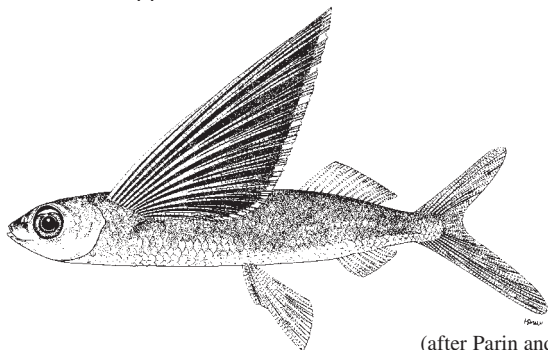


(after Parin, 1961)

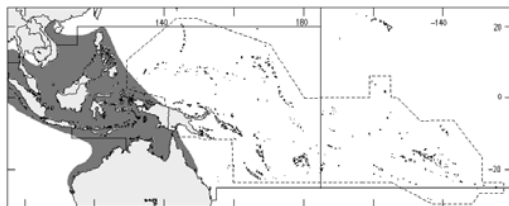


Cypselurus hexazona (Bleeker, 1853)**En** - Darkbar flyingfish.

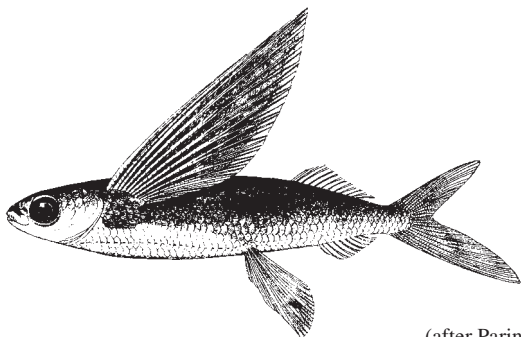
Maximum standard length about 18 cm. Pelagic in nearshore surface waters, never spread to open sea. No importance to fisheries. Distributed in the Indian and western Pacific oceans from the Red Sea to Philippines, New Guinea, and Queensland (Australia).



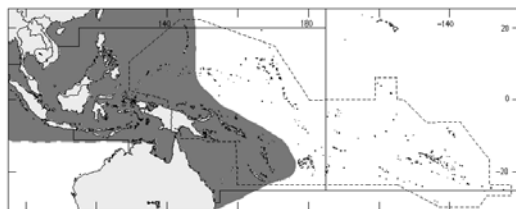
(after Parin and Besednov, 1961)

***Cypselurus naresii*** (Günther, 1889)**En** - Pharaoh flyingfish; **Fr** - Exocet pharaon; **Sp** - Volador farsón.

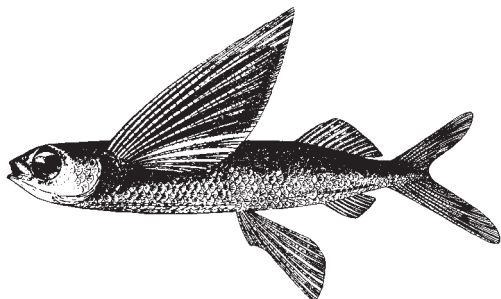
Maximum standard length about 21 cm. Pelagic in open ocean and neritic surface waters. Minor importance to fisheries (Viet Nam), caught by gill nets. Distributed in the Indian and western Pacific oceans from Gulf of Aden and Madagascar to southern Japan, New South Wales (Australia), and Fiji.



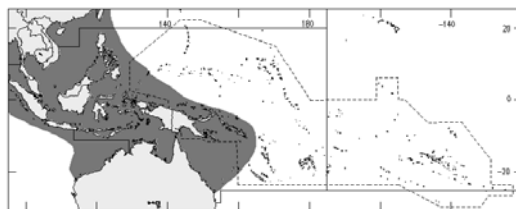
(after Parin, 1961)

***Cypselurus oligolepis*** (Bleeker, 1866)**En** - Largescale flyingfish; **Fr** - Exocet à grandes écailles; **Sp** - Volador escamudo.

Maximum standard length about 18 cm. Pelagic in nearshore surface waters, never spread to open sea. Limited importance to fisheries in Thailand, Indonesia, and Philippines, caught by purse seines, traps, and gill nets. Widespread in the tropical Indian and western Pacific oceans from East Africa to southern China, Solomon islands, and Queensland (Australia).

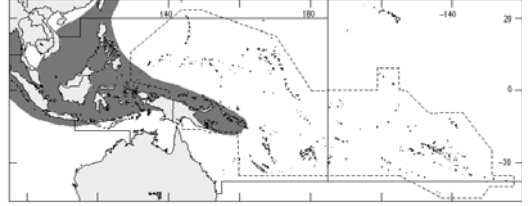
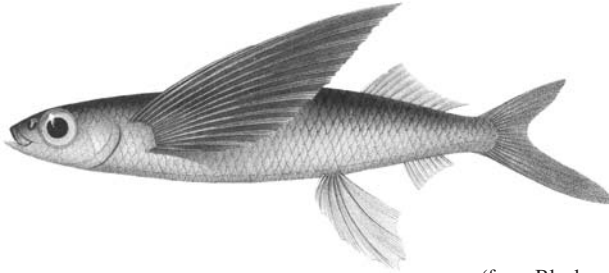


(after Parin and Besednov, 1965)



Cypselurus opisthopus (Bleeker, 1866)**En** - Rearfin flyingfish.

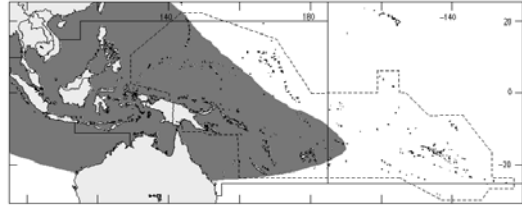
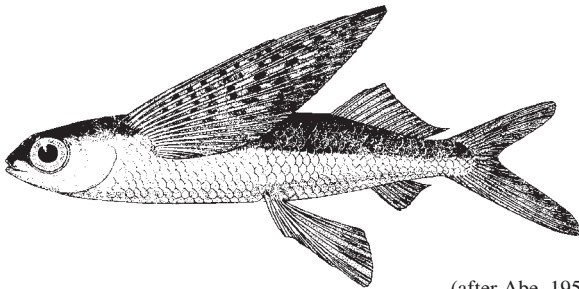
Maximum standard length about 18 cm. Pelagic in nearshore surface waters, juveniles spread to open sea with floating seaweed. Minor importance to fisheries in Philippines and, probably, Indonesia. Distributed in the eastern Indian and western Pacific oceans from Bay of Bengal to Okinawa (Japan), and Solomon Islands.



(from Bleeker, 1866-72)

Cypselurus poecilopterus (Valenciennes, 1846)**En** - Yellowing flyingfish; **Fr** - Exocet aile jaune; **Sp** - Volador de ala amarilla.

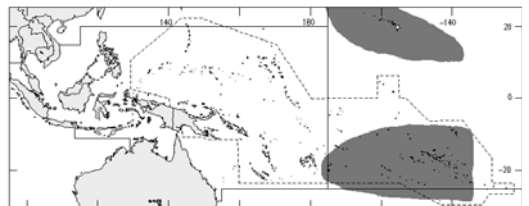
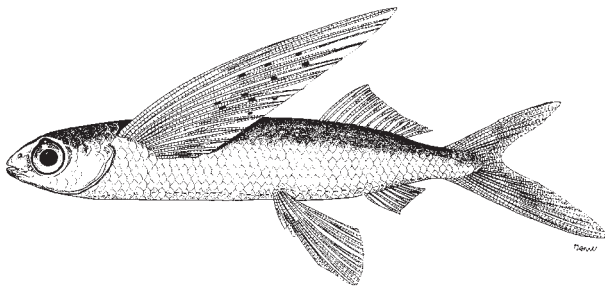
Maximum standard length about 21 cm. Pelagic, mostly in neritic surface waters. Minor importance to fisheries in Viet Nam, Thailand, and Indonesia. Widespread in the tropical Indian and western Pacific oceans from East Africa to southern Japan and Queensland (Australia).



(after Abe, 1953-56)

Cypselurus simus (Valenciennes, 1846)**En** - Ficklespotted flyingfish.

Maximum standard length about 26 cm. Pelagic in neritic surface waters, most abundant off oceanic islands. Minor importance to fisheries in Polynesia. Distributed in central Pacific Ocean (Hawaii, Johnston Island, Tonga, Samoa, Rarotonga, Tahiti, Marquesas and Easter islands). Southern "population" may represent a closely related undescribed species.

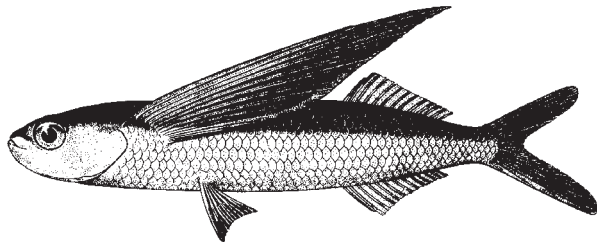


(after Parin, 1961)

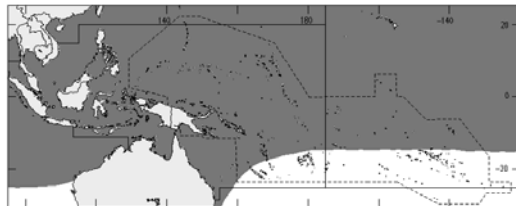
Exocoetus monocirrhus (Richardson, 1846)

En - Barbel flyingfish; **Fr** - Exocet barbu; **Sp** - Volador barbudo.

Maximum standard length about 20 cm. Pelagic in open ocean and neritic surface waters. Minor importance to fisheries, caught by gill nets (Viet Nam). Widespread in the Indian and Pacific oceans from East Africa to Central America.



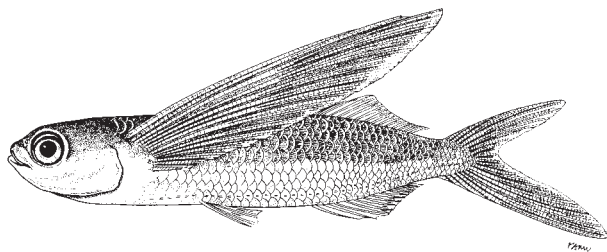
(after Abe, 1953-56)



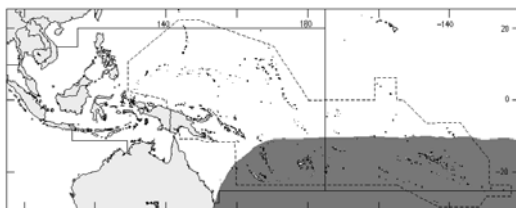
Exocoetus obtusirostris (Günther, 1866)

En - Oceanic two-wing flyingfish; **Fr** - Exocet bouledogue; **Sp** - Volador ñato.

Maximum standard length about 20 cm. Pelagic in open ocean surface waters. No importance to fisheries. Distributed in the Atlantic Ocean and southern subtropical Pacific, between 10° and 30°S latitude, from Australia to Peru.



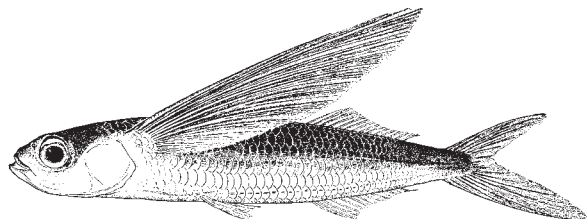
(after Bruun, 1935)



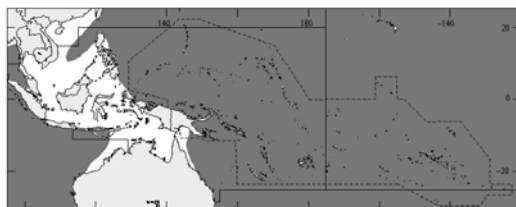
Exocoetus volitans Linnaeus, 1758

En - Tropical two-wing flyingfish; **Fr** - Exocet volant; **Sp** - Volador.

Maximum standard length about 18 cm. Pelagic in open ocean surface waters. The most abundant flying fish of the open sea but has no importance to fisheries. Widespread in tropical and subtropical zone of all oceans, probably absent in the inland seas of Southeast Asia.



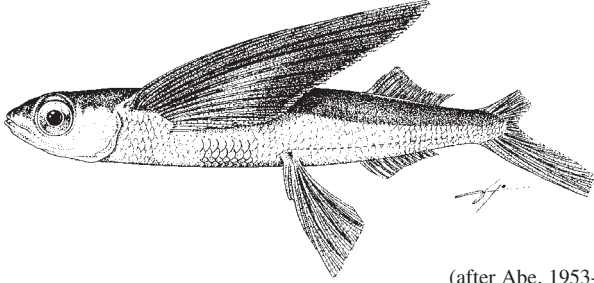
(after Bruun, 1935)



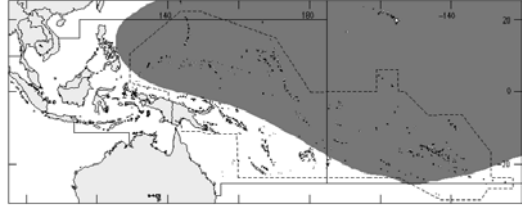
Hirundichthys albimaculatus (Fowler, 1934)

En - Whitespot flyingfish; **Fr** - Exocet à tache blanche; **Sp** - Volador de mancha blanca.

Maximum standard length about 23 cm. Pelagic in open ocean surface waters. No importance to fisheries. Distributed in central Pacific Ocean.

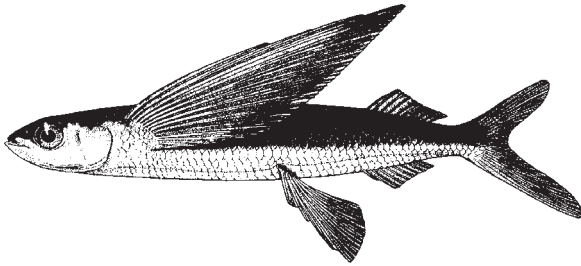


(after Abe, 1953-56)

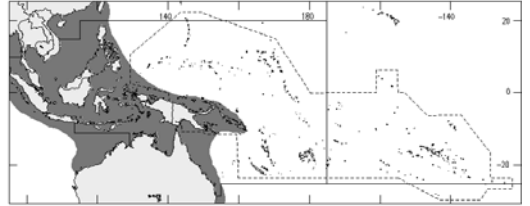
***Hirundichthys oxycephalus*** (Bleeker, 1852)

En - Bony flyingfish; **Fr** - Exocet casque; **Sp** - Volador casquete.

Maximum standard length about 18 cm. Pelagic in nearshore and neritic surface waters. Minor importance to fisheries in Viet Nam, Indonesia, and the Philippines. Distributed in the Indian and western Pacific oceans from the Arabian Sea to southern Solomon Islands, and New South Wales (Australia).

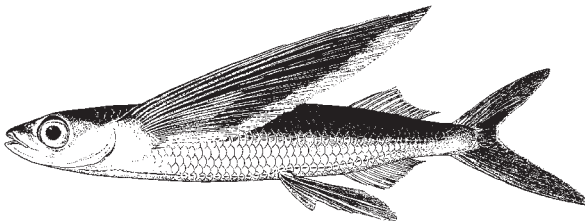


(after Abe, 1953-1956)

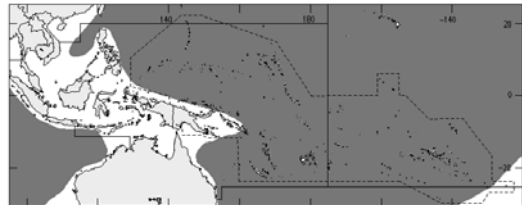
***Hirundichthys speculiger*** (Valenciennes, 1846)

En - Mirroring flyingfish; **Fr** - Exocet miroir; **Sp** - Volador espejo.

Maximum standard length about 25 cm. Pelagic in open ocean surface waters. No importance to fisheries. Widespread in tropical zone of all oceans, probably absent in the inland seas of Southeast Asia.



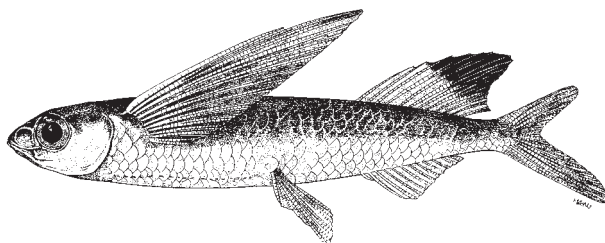
(after Abe, 1953-56)



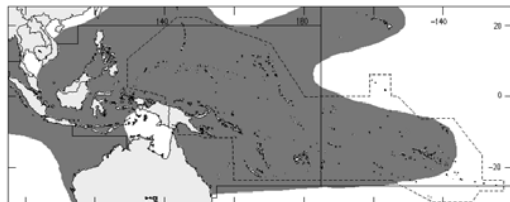
Parexocoetus brachypterus (Richardson, 1846)

En - Sailfin flyingfish; **Fr** - Exocet voilier; **Sp** - Volador aletón.

Maximum standard length about 14 cm. Pelagic in neritic surface waters, rare in the open ocean. Not important as food fish, but occasionally taken by fisheries. Widespread in the Indian and Pacific oceans from East Africa to southern Japan, Hawaii, Queensland (Australia), and Marquesas Islands; separate population in the eastern tropical Pacific (Bay of Panama).



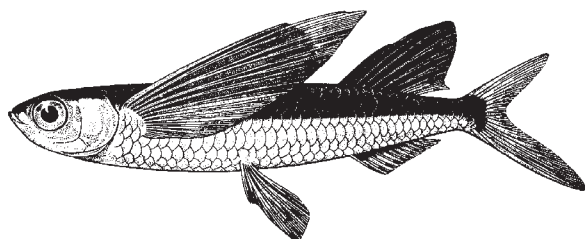
(after Abe, 1953-56)



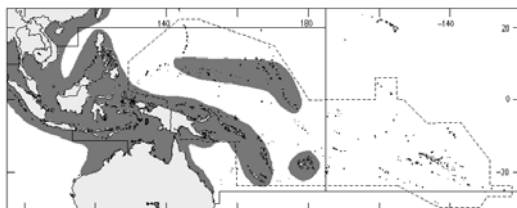
Parexocoetus mento (Valenciennes, 1846)

En - African sailfin flyingfish; **Fr** - Exocet voilier africain; **Sp** - Volador aletón africano.

Maximum standard length 10 cm. Pelagic in neritic surface waters, never spread to the open sea. Minor importance in coastal fisheries. Widespread in the Indian and Pacific oceans from East Africa, including the Red Sea and the Persian Gulf, to southern Japan, Marshall Islands, Fiji, and Queensland (Australia).



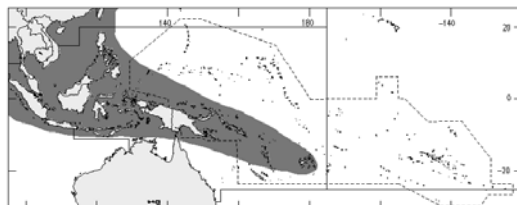
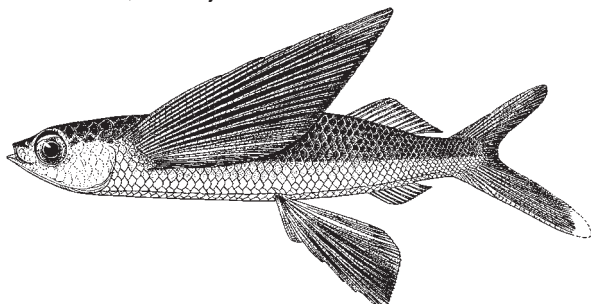
(after Abe, 1953-56)



Prognichthys brevipinnis (Valenciennes, 1846)

En - Shortfin flyingfish; **Fr** - Exocet alle courte; **Sp** - Volador de ala corta.

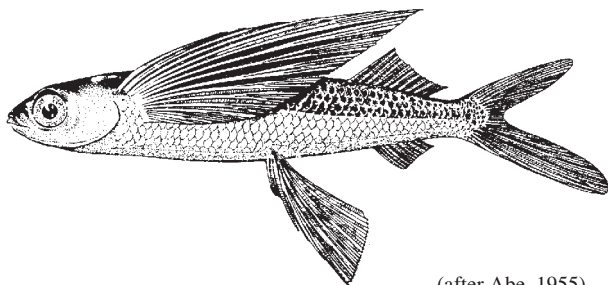
Maximum standard length about 19 cm. Pelagic, usually in neritic surface waters. Minor importance to coastal fisheries in Viet Nam. Widespread in the Indian and Pacific oceans from East Africa to Okinawa, and Fiji.



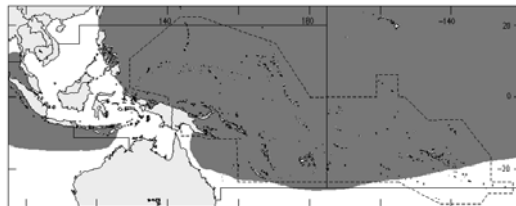
Prognichthys sealei Abe, 1955

En - Sailor flyingfish; **Fr** - Exocet matelot; **Sp** - Volador marintero.

Maximum standard length about 19 cm. Pelagic in open ocean surface waters. No importance in fisheries. Widespread in the Indian and Pacific oceans from East Africa to Central America, probably absent in inland seas of Southeast Asia.



(after Abe, 1955)

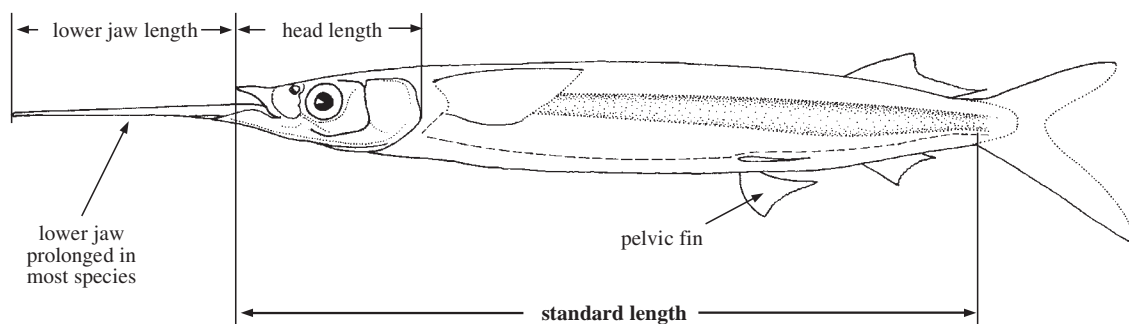


HEMIRAMPHIDAE

Halfbeaks

by B.B. Collette

Diagnostic characters: Elongate fishes with **prolonged lower jaw** (except in *Oxyporhamphus*, *Arrhamphus*, and *Melapedalion*) and **short triangular upper jaw** (except in *Oxyporhamphus*). Nostrils in pit anterior to eyes. No spines in fins; dorsal and anal fins posterior in position; pelvic fins abdominal in position, with 6 soft rays; pectoral fins usually short. Lateral line running down from pectoral-fin origin and then backwards along ventral margin of body. Scales moderately large, cycloid (smooth), easily detached. **Colour:** these fishes live near the surface and are protectively coloured for this mode of life by being green or blue on the back and silvery white on the sides and ventrally; tip of lower jaw bright red or orange in most species.

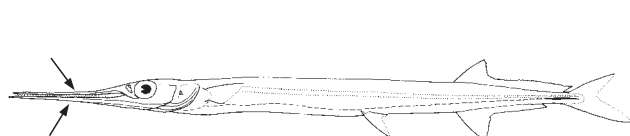


Habitat, biology, and fisheries: Most species are marine, but some inhabit fresh waters. Omnivorous, feeding on floating sea grass, crustaceans, and small fishes. They are prone to leap and skitter at the surface and 3 offshore species, *Euleptorhamphus viridis* and *Oxyporhamphus* spp. leap out of the water and glide like a flyingfish. Although at present these fishes are not of great commercial importance, many species are regularly found in local markets. The flesh is excellent and halfbeaks are utilized as food in many parts of the world. From 1990 to 1995, FAO's Yearbook of Fishery Statistics reports a range of yearly catch of Hemiramphidae (and Exocoetidae) of around 25 900 to 67 200 t from the Western Central Pacific. They are mainly caught with seines and pelagic trawls, and dipnetted under lights at night. They are utilized fresh, dried salted, or smoked.

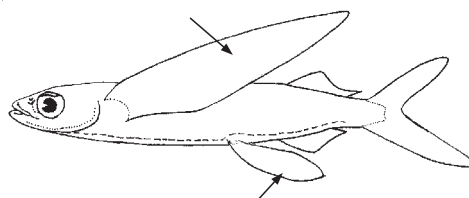
Similar families occurring in the area

Belonidae (needlefishes): both upper and lower jaws elongate and armed with needle-sharp teeth.

Exocoetidae (flyingfishes): lack the prolonged lower jaw characteristic of most halfbeaks; pectoral fin or both pectoral and pelvic fins enlarged and used for aerial gliding.



Belonidae



Exocoetidae

Key to the species of Hemiramphidae occurring in the area

Note: out of about 12 genera and 100 species in the family, 20 species belonging to 7 genera, occur in the marine waters of the Western Central Pacific. The small species of the fresh-water and estuarine genera *Dermogenys*, *Nomorhamphus*, *Hemirhamphodon*, and *Zenarchopterus* are not included in the following key.

- 1a. Lower jaw not noticeably elongate in adults (Fig.1); anterior margin of upper jaw straight, not forming a prominent triangular anterior projection; pectoral fins long, 30 to 35% of standard length (*Oxyporhamphus*) → 2
- 1b. Lower jaw elongate (Fig. 2) or not; anterior margin of upper jaw forming a prominent triangular anterior projection; pectoral fins not more than 28% of standard length → 3

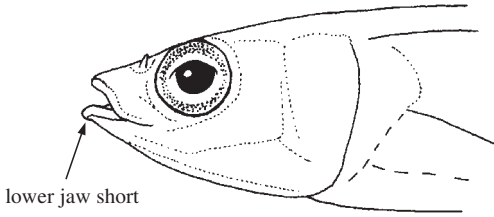


Fig. 1 *Oxyporhamphus*

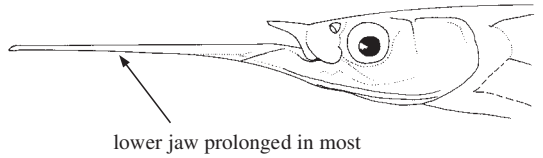


Fig. 2 lateral view of head

- 2a. Swimbladder cellular (multi-chambered) in specimens longer than 12 cm; pelvic fins in juveniles (3 to 9 cm standard length) intensely pigmented on distal margins; distance from pelvic-fin origin to caudal-fin base contained 1.05 to 1.35 times in distance from pectoral-fin origin to pelvic-fin origin *Oxyporhamphus convexus convexus*
- 2b. Swimbladder simple (single-chambered) at all sizes; pelvic fins in juveniles unpigmented or with slight pigmentation on outer rays; distance from pelvic-fin origin to caudal-fin base contained 0.9 to 1.2 times in distance from pectoral-fin origin to pelvic-fin origin *Oxyporhamphus micropterus micropterus*
- 3a. Nasal papilla rounded, fan-shaped, or fimbriate; not projecting far beyond nasal fossa (Fig. 3a, b); caudal fin emarginate or forked, frequently with an elongate lower lobe; anal fin of males not different from those of females → 4
- 3b. Nasal papilla elongate and pointed, not fimbriate; projecting well beyond nasal fossa (Fig. 3c); caudal fin rounded or truncate, with the longest rays in middle of fin; anal fin of males modified, some rays widened and elongate **freshwater and estuarine genera**

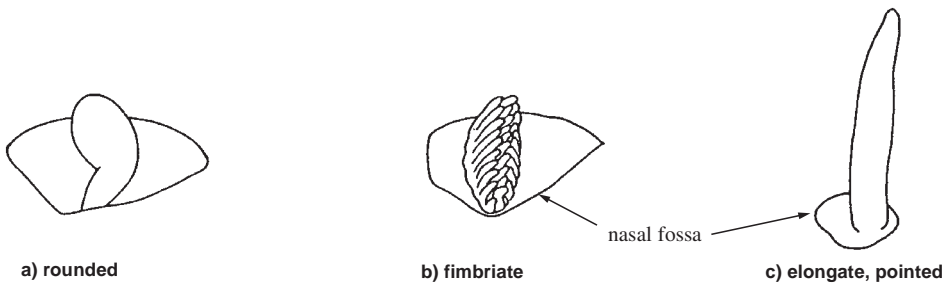


Fig. 3 nasal papilla

- 4a. Body compressed and ribbon-shaped; dorsal-fin rays 20 to 25; anal-fin rays 20 to 25 (Fig. 4a); pectoral fins long, 25 to 28% of standard length; pectoral-fin rays usually 7 to 9 *Euleptorhamphus viridis*
- 4b. Body not ribbon-shaped; dorsal-fin rays 12 to 18; anal-fin rays 10 to 19 (Fig. 4b); pectoral fins short, less than 20% of standard length; pectoral-fin rays 10 to 14 → 5

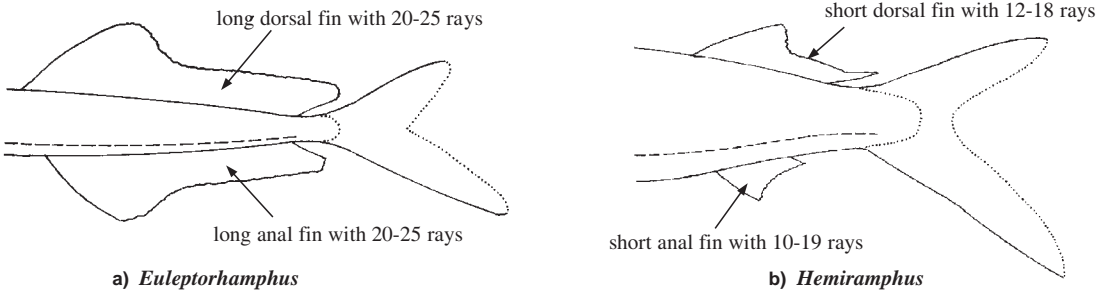


Fig. 4 posterior part of body

- 5a. Scales absent on upper jaw; preorbital ridge absent (Fig. 5a) (*Hemiramphus*) → 6
- 5b. Scales present on upper jaw; preorbital ridge well developed (Fig. 5b) → 9

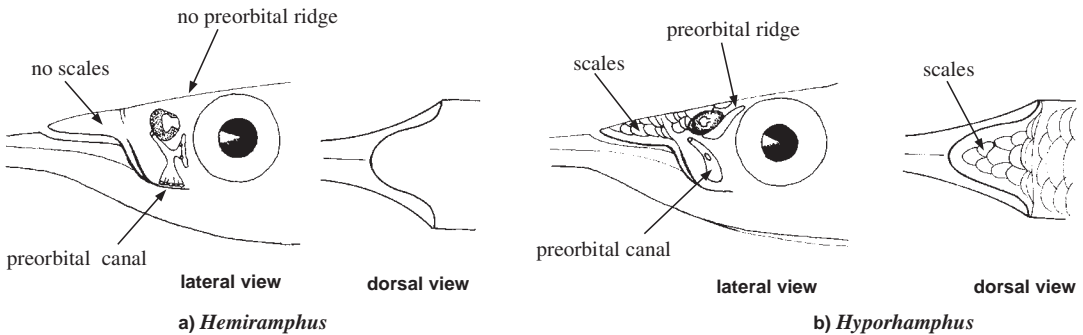


Fig. 5 detail of head

- 6a. Pectoral fins relatively long, 4.5 to 5.4 times in standard length (length greater than distance from their origin to anterior margin of nasal fossa); gill rakers on first arch 33 to 46, usually 36 or more; predorsal scales 35 to 43, usually more than 37. *Hemiramphus lutkei*
- 6b. Pectoral fins short, 5.2 to 6.8 times in standard length (length less than distance from their origin to anterior margin of nasal fossa); gill rakers on first arch 25 to 36, usually fewer than 34; predorsal scales 29 to 39, usually fewer than 37 → 7
- 7a. Dorsal fin without well-developed anterior lobe, pigmented on margins; body width contained 1.8 to 2 times in its depth; adults without spots on side of body *Hemiramphus archipelagicus*
- 7b. Dorsal fin with well-developed anterior lobe, pigmented on anterior part; body width contained 1.3 to 1.8 times in its depth; adults usually with short vertical bars on side of body → 8
- 8a. Adults usually with 3 to 9 (usually 4 to 6), short dark vertical bars on sides of body; anal-fin rays 9 to 12, usually 11. *Hemiramphus far*
- 8b. Adults usually with 1 dark spot on sides of body; anal-fin rays 11 to 14, usually 12 or 13 *Hemiramphus robustus*

- 9a. Nasal papillae fimbriate; upper jaw arched; gill rakers on first arch 47 to 78; lateral line with 2 branches ascending behind opercle and pectoral-fin origin (Fig. 6a) (*Rhynchorhamphus*) → 10
- 9b. Nasal papillae not fimbriate; upper jaw flat or nearly flat; gill rakers on first arch 19 to 47; lateral line with 1 branch ascending toward pectoral-fin origin (Fig. 6b) → 11

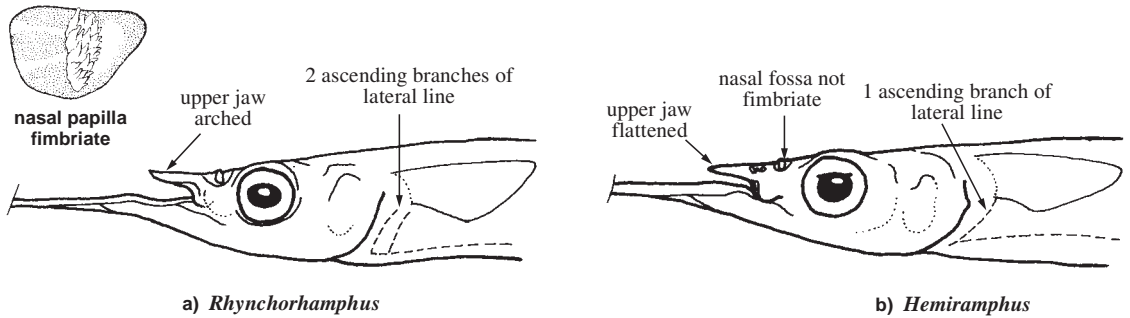


Fig. 6 anterior part of body

- 10a. Gill rakers on first arch 47 to 67, usually 56 to 63; on second arch 41 to 63 *Rhynchorhamphus georgii*
- 10b. Gill rakers on first arch 47 to 59, usually 50 to 55; on second arch 39 to 53 *Rhynchorhamphus naga*
- 11a. Lower jaw slightly elongate, less than 1/5 head length → 12
- 11b. Lower jaw longer, at least 1/2 head length (*Hyporhamphus*) → 13
- 12a. Preorbital canal without posterior branch (Fig. 7a); caudal fin emarginate or slightly forked *Arrhamphus sclerolepis*
- 12b. Preorbital canal T-shaped, with posterior branch (Fig. 7b); caudal fin deeply forked *Melapedalion breve*
- 13a. Preorbital canal simple, without posterior branch (Fig. 7a); caudal fin emarginate or slightly forked *Hyporhamphus* (*Hyporhamphus*) → 14
- 13b. Preorbital canal T-shaped, with posterior branch (Fig. 7b); caudal fin distinctly forked *Hyporhamphus* (*Reporhamphus*) → 17

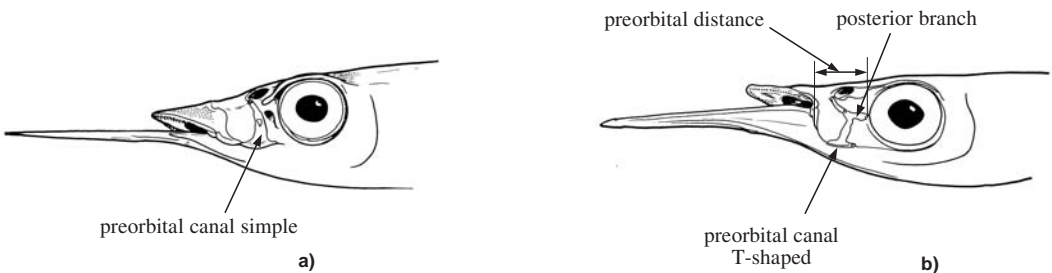


Fig. 7 lateral view of head
(scale removed in front of eye to expose preorbital canal)

- 14a. Distinct black spots on tips of dorsal fin and upper and lower lobes of caudal fin; caudal fin forked *Hyporhamphus melanopterus*
- 14b. No distinct black spots on dorsal fin or caudal fin; caudal fin emarginate, not forked → 15

- 15a. Lower jaw usually longer than head length in adults, its length contained 0.7 to 1.3 times in head length *Hyporhamphus limbatus*
- 15b. Lower jaw usually not as long as head length in adults, its length contained 0.9 to 1.8 times in head length → 16
- 16a. Preorbital distance (distance from the anterior margin of the orbit to the posterior vertical margin of the upper jaw; see Fig. 7b) contained 1.4 to 2 times in orbit diameter and 0.8 to 1.35 times in upper-jaw length *Hyporhamphus neglectus*
- 16b. Preorbital distance contained 1.05 to 1.35 times in orbit diameter and 0.6 to 0.8 times in upper-jaw length *Hyporhamphus neglectissimus*
- 17a. Width of triangular portion of upper jaw about equal to its length (0.8 to 1.05 times in its length); preorbital canal narrow, not enlarged ventrally; anterior branch on a straight line with posterior branch (Fig. 8a) *Hyporhamphus acutus*
- 17b. Width of triangular portion of upper jaw usually wider than its length (0.5 to 0.85 times in its length); preorbital canal enlarged ventrally; anterior branch at an angle with posterior branch (Fig. 8b) → 18

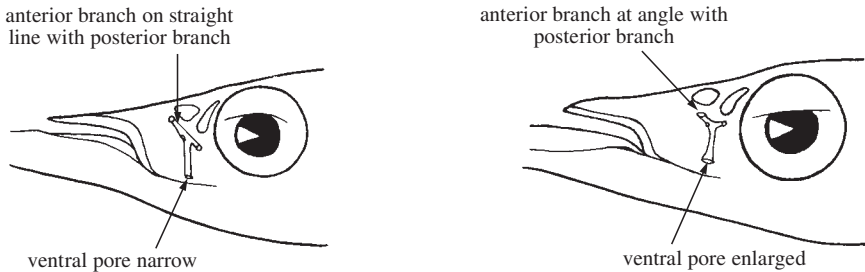


Fig. 8 lateral view of head
 (scale removed in front of eye to expose preorbital canal)

- 18a. Preorbital bone contained 1 to 1.2 times in orbit diameter and 0.65 to 1 times in upper-jaw length; lower jaw long, its length contained 0.7 to 0.9 times in head length *Hyporhamphus balinensis*
- 18b. Preorbital bone contained 1.35 to 2.15 times in orbit diameter and 0.85 to 1.4 times in upper-jaw length; lower jaw shorter, its length contained 0.8 to 2 times in head length → 19
- 19a. Preorbital bone contained 1.35 to 1.9 times in orbit diameter; pectoral-fin length contained 7.7 to 10 times in standard length *Hyporhamphus affinis*
- 19b. Preorbital bone contained 1.7 to 2.15 times in orbit diameter; pectoral-fin length contained 6.8 to 8.2 times in standard length → 20
- 20a. Upper-jaw tip pointed; gill rakers on first gill arch 36 to 47, as few as 33 in eastern Australian populations; distance from pelvic-fin origin to caudal-fin base contained 1 to 1.3 times in distance from pectoral-fin origin to pelvic-fin origin; lower jaw length moderate, in large fishes contained up to 1.4 times in head length . . . *Hyporhamphus dussumieri*
- 20b. Upper-jaw tip blunt and rounded; gill rakers on first gill arch 26 to 34, up to 36 to 39 in Australian populations; distance from pelvic-fin origin to caudal-fin base contained 0.9 to 1.05 times in distance from pectoral-fin origin to pelvic-fin origin; lower jaw short, in large fishes contained up to 2 times in head length *Hyporhamphus quoyi*

List of species occurring in the area

The symbol ➡ is given when species accounts are included.

- ➡ *Arrhamphus sclerolepis sclerolepis* (Günther 1866)
- ➡ *Euleptorhamphus viridis* (van Hasselt, 1823)
- ➡ *Hemiramphus archipelagicus* Collette and Parin, 1978
- ➡ *Hemiramphus far* (Forsskål, 1775)
- ➡ *Hemiramphus lutkei* (Valenciennes, 1846)
- ➡ *Hemiramphus robustus* Günther, 1866
- ➡ *Hyporhamphus* (*Reporhamphus*) *acutus acutus* (Günther, 1871)
- ➡ *Hyporhamphus* (*R.*) *affinis* (Günther, 1866)
- ➡ *Hyporhamphus* (*R.*) *balinensis* (Bleeker, 1858)
- ➡ *Hyporhamphus* (*R.*) *dussumieri* (Valenciennes, 1846)
- ➡ *Hyporhamphus* (*Hyporhamphus*) *limbatus* (Valenciennes, 1846)
- ➡ *Hyporhamphus* (*H.*) *melanopterus* Collette and Parin, 1978
- ➡ *Hyporhamphus* (*H.*) *neglectissimus* Parin, Collette, and Schcherbachev, 1980
- ➡ *Hyporhamphus* (*H.*) *neglectus* (Bleeker, 1866)
- ➡ *Hyporhamphus* (*Reporhamphus*) *quoyi* (Valenciennes, 1846)
- ➡ *Melapedalion breve* (Seale, 1909)
- ➡ *Oxyporhamphus convexus convexus* (Weber and de Beaufort, 1922)
- ➡ *Oxyporhamphus micropterus micropterus* (Valenciennes, 1846)
- ➡ *Rhynchorhamphus georgii* (Valenciennes, 1846)
- ➡ *Rhynchorhamphus naga* Collette, 1976

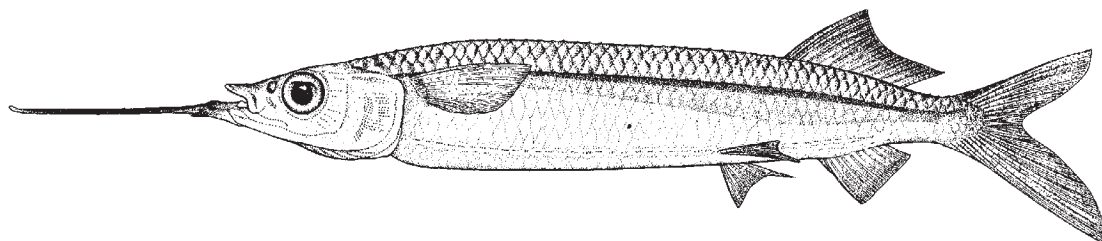
References

- Collette, B.B. 1974. The garfishes (Hemiramphidae) of Australia and New Zealand. *Rec. Australian Mus.*, 29(2):11-105.
- Collette, B.B. and J. Su. 1986. The halfbeaks (Pisces, Beloniformes, Hemiramphidae) of the Far East. *Proc. Acad. Nat. Sci. Philad.*, 138(1):250-301.
- Parin, N.V., B.B. Collette, and Y.N. Shcherbachev. 1980. Preliminary review of the marine halfbeaks (Hemiramphidae, Beloniformes) of the tropical Indo-West Pacific. *Trudy Inst. Okean.*, 97:7-173 [In Russian with English abstract].

Hemiramphus archipelagicus Collette and Parin, 1978

Frequent synonyms / misidentifications: None / *Hemiramphus marginatus* Forsskål, 1775.

FAO names: **En** - Jumping halfbeak; **Fr** - Demi-bec saltou; **Sp** - Agujeta saltona.



8° 21'N, 104° 38'E, 19 cm standard length

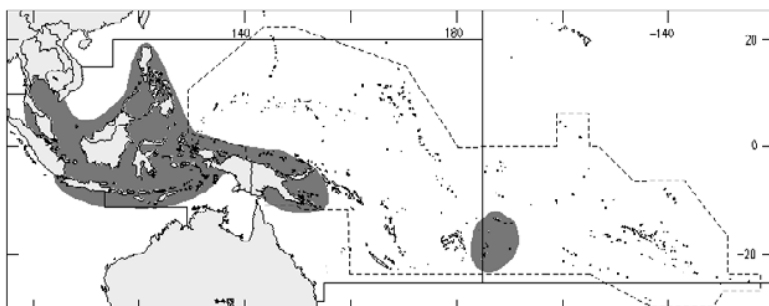
(from Collette and Parin, 1973)

Diagnostic characters: An elongate fish with **greatly prolonged, beak-like lower jaw; upper jaw short, triangular and scaleless; preorbital ridge** (bony ridge behind nostril) **absent**. **Total number of gill rakers on first gill arch 25 to 32;** 6 to 8 on upper, and 19 to 24 on lower limb of arch. **Dorsal fin without well-developed anterior lobe;** dorsal-fin rays 12 to 15; anal-fin rays 10 to 13; **pectoral fins short, not reaching past nasal pit when folded forward** and with 11 to 13 rays (usually 12); caudal fin deeply forked, lower lobe much longer than upper. Predorsal scales 32 to 37 (usually 34 to 36). **Colour:** dark bluish above, silvery white below, **without any vertical bars on sides;** beak dark with a bright red fleshy tip; upper lobe of caudal fin yellow, tip of dorsal-fin lobe with some yellow.

Size: Maximum total length about 34 cm; maximum standard length 23 cm (from tip of upper jaw to base of caudal fin).

Habitat, biology, and fisheries: Inhabits the immediate vicinity of coasts, but juveniles of this species may sometimes be found with floating plants carried out to sea. Taken with purse seines at Karwar on the west coast of India and by dol nets at Bombay. Marketed fresh and dried salted.

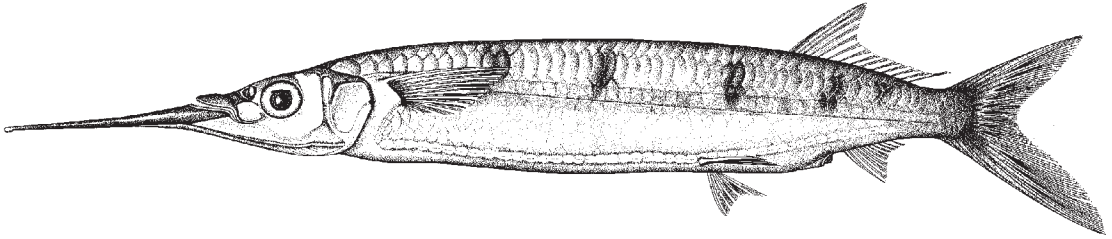
Distribution: An Indo-West Pacific species known from the western part of the Indian Ocean and western Central Pacific. Within the area, known from the Gulf of Thailand, Philippines, and Indonesia eastward to New Guinea and western Polynesia.



Hemiramphus far (Forsskål, 1775)

Frequent synonyms / misidentifications: *Hemiramphus commersonii* Cuvier, 1829 / None.

FAO names: En - Black-barred halfbeak; Fr - Demi-bec bagnard; Sp - Agujete manchada.



Philippines, 26.3 cm standard length

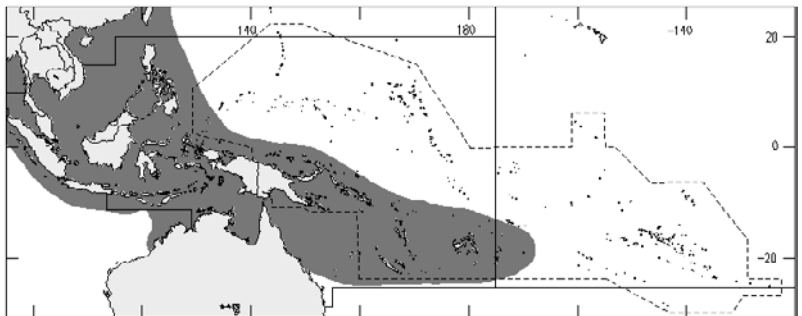
(from Collette, 1974)

Diagnostic characters: An elongate fish with **greatly prolonged, beak-like lower jaw; upper jaw short, triangular and scaleless; preorbital ridge** (bony ridge behind nostril) **absent**. **Total number of gill rakers on first gill arch 25 to 36** (usually 29 to 33); 6 to 10 on upper and 19 to 26 on lower limb of arch. Dorsal fin with well-developed anterior lobe; dorsal-fin rays 12 to 14; **anal-fin rays 10 to 12** (usually 11); **pectoral fins short, not reaching past nasal pit when folded forward** and with 11 to 13 rays (usually 12); caudal fin deeply forked, lower lobe much longer than upper. Predorsal scales 32 to 39 (usually 34 to 37). **Colour:** dark bluish above, silvery white below, with **3 to 9 (usually 4 to 6) vertical bars on sides**; beak dark, with a bright red fleshy tip.

Size: Maximum total length about 44 cm; maximum standard length 33 cm (from tip of upper jaw to base of caudal fin), commonly to 27 cm.

Habitat, biology, and fisheries: Found in proximity of continental coasts and islands, chiefly in areas of rich submerged vegetation. Adults feed mainly on sea grasses, to a lesser extent on green algae and diatoms. Taken with gill nets, shore seines, drag nets, or by drifting a fine line with tiny hooks baited with shrimp. Marketed mostly fresh and dried salted.

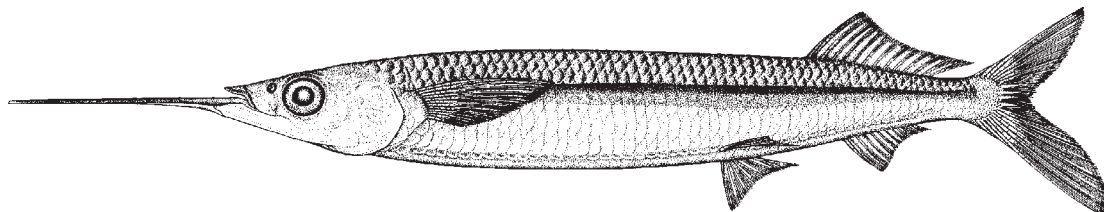
Distribution: An Indo-West Pacific species found in tropical waters of the Indian and western parts of the Pacific oceans. In the area, extends eastward to the Philippines, Palau, Fiji, Samoa, and Tonga south to New Guinea, New Caledonia, and northern Australia; north to the Izu Peninsula of Japan.



Hemiramphus lutkei (Valenciennes, 1846)

Frequent synonyms / misidentifications: None / *Hemiramphus marginatus* Forsskål, 1775.

FAO names: En - Lutke's halfbeak; Fr - Demi-bec de Lutke; Sp - Agujeta de Lutke.



Sri Lanka, 22.1 cm standard length

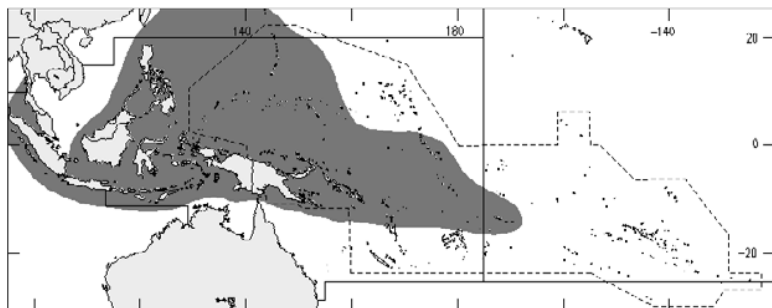
(from Parin et al., 1980)

Diagnostic characters: An elongate fish with **greatly prolonged, beak-like lower jaw; upper jaw short, triangular and scaleless; preorbital ridge** (bony ridge behind nostril) **absent. Total number of gill rakers on first gill arch 33 to 46** (usually 36 to 41); 9 to 14 on upper, and 24 to 32 on lower limb of arch. Dorsal-fin rays 12 to 15 (usually 13 or 14); anal-fin rays 10 to 13 (usually 12); **pectoral fins long, reaching beyond anterior margin of nasal pit when folded forward** and contained 4.8 to 5.4 times in standard length, with 10 to 12 rays (usually 11); caudal fin deeply forked, lower lobe much longer than upper. Predorsal scales 35 to 43 (usually 37 to 41). **Colour:** dark bluish above, silvery white below, with **no spots or vertical bars on sides**; beak dark with a bright red fleshy tip; upper lobe of caudal fin bluish.

Size: Maximum total length about 40 cm; maximum standard length 30 cm (from tip of upper jaw to base of caudal fin), commonly to 25 cm.

Habitat, biology, and fisheries: Found more offshore than other species of *Hemiramphus* in the area; juveniles and immature individuals are relatively common far from shore, usually among floating plants. Marketed fresh and dried salted.

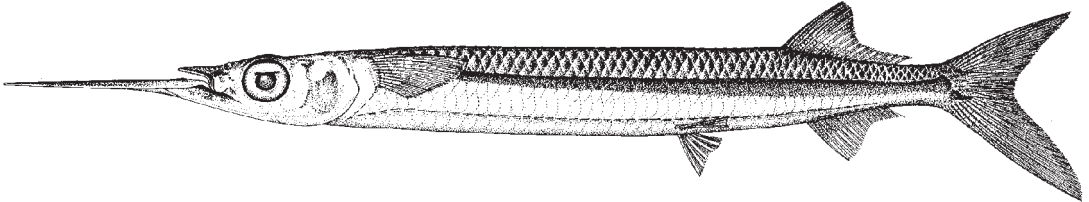
Distribution: Known from Indian and western Central Pacific oceans. Within the area, known from Indonesia, Philippines, and New Guinea; north to southern Japan, and east to Marcus Islands, the Gilbert Islands, and Samoa.



Hyporhamphus (Reporhamphus) dussumieri (Valenciennes, 1846)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Dussumier's halfbeak; Fr - Demi-bec de Dussumier; Sp - Agujeta de Dussumier.



Marshall Is., 20.8 cm standard length

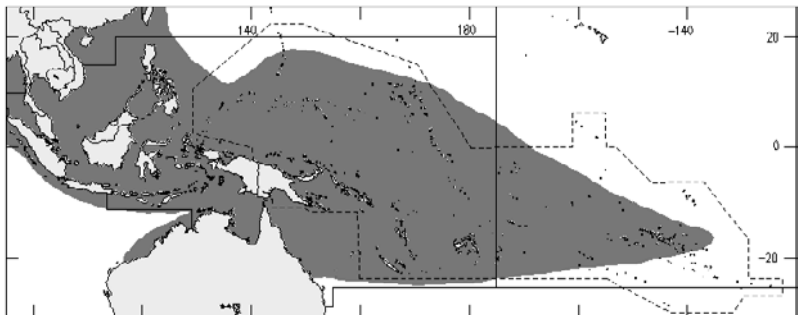
(from Parin et al., 1980)

Diagnostic characters: An elongate fish with a **prolonged, beak-like lower jaw, contained 4.2 to 5.9 times in standard length and 0.95 to 1.4 times in head length**, decreasing with growth; **upper jaw short, triangular, and scaly, its width 0.6 to 0.9 times in its length; length of preorbital bone contained 1.7 to 2.2 times in diameter of orbit and 1 to 1.4 times in length of upper jaw**; preorbital ridge (bony ridge between nasal opening and eye) present; posterior branch to preorbital lateral-line canal present. **Total number of gill rakers on first gill arch 33 to 47**, usually 38 to 43 (except in Queensland, Australia, usually 35 to 37), 10 to 14 on upper and 26 to 32 on lower limb of arch. **Dorsal and anal fin rays 14 to 16**, dorsal rays usually 15 or 16, anal rays usually 14 or 15; pectoral fins short with 11 or 12 rays; pelvic fins located closer to caudal-fin base than to origin of pectoral fins; distance from pelvic-fin origin to caudal-fin base contained 1.05 to 1.3 times in distance from pectoral-fin origin to pelvic-fin origin; **caudal fin forked, with lower lobe longer than upper**. Anterior part of dorsal fin and all of anal fin covered with scales; predorsal scales 37 to 44 (usually 38 to 41). **Colour:** greenish above, silvery white below; fleshy tip of beak red.

Size: Maximum standard length about 29.8 cm (tip of upper jaw to base of caudal fin) plus 5.3 cm beak, commonly to 19.0 cm.

Habitat, biology, and fisheries: Most common around islands and coral reefs. Taken mostly with shore seines. Marketed fresh and dried salted.

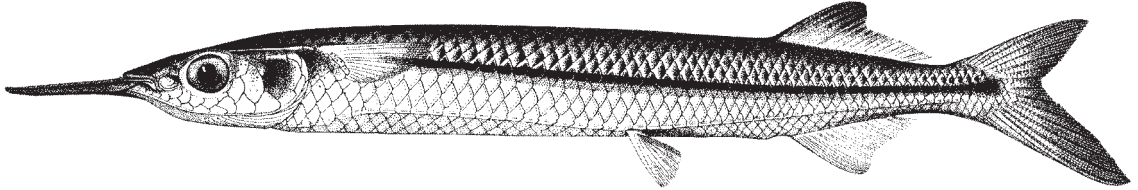
Distribution: Inhabits the tropical Indian and western Pacific oceans. Within the area, known from Indonesia, Borneo, Philippines, New Guinea and eastwards as far as Tuamotu Islands; north to Hong Kong and Okinawa.



Hyporhamphus (Reporhamphus) quoyi (Valenciennes, 1846)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Quoy's halfbeak; Fr - Demi-bec de Quoy; Sp - Agujeta de Quoy.



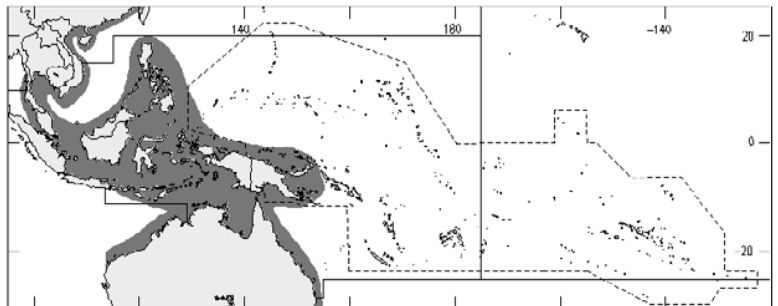
Nagasaki, Japan, 19.5 cm standard length

Diagnostic characters: An elongate fish with a **prolonged, beak-like lower jaw, shorter than head length, its length contained 4.7 to 8.6 times in standard length and 1.1 to 2 times in head length**, decreasing with growth; **upper jaw short, scaly, blunt and rounded, its width contained 0.5 to 0.6 times in its length**; **preorbital bone 1.75 to 2.15 times in diameter of orbit and 0.9 to 1.15 times in length of upper jaw**; **preorbital ridge** (bony ridge between nasal opening and eye) **present**; **posterior branch to preorbital lateral-line canal present**. **Total number of gill rakers on first gill arch 26 to 39**, usually 27 to 31 (except in Australia, usually 31 to 35), 6 to 14 on upper and 18 to 25 on lower limb of arch. **Dorsal-fin rays 14 to 17 (usually 16), anal-fin rays 13 to 17 (usually 15 or 16)**; pectoral fins short with 11 to 13 rays; pelvic fins located approximately half way between origin of pectoral fin and base of caudal fin, distance from pelvic-fin origin to caudal-fin base contained 0.9 to 1.05 times in distance from pectoral-fin origin to pelvic-fin origin; **caudal fin forked, with lower lobe longer than upper**. Anterior part of dorsal fin and all of anal fin covered with scales; predorsal scales 36 to 43 (usually 37 to 40). **Colour:** greenish above, silvery white below; fleshy tip of beak red.

Size: Maximum standard length 31.2 cm (tip of upper jaw to base of caudal fin).

Habitat, biology, and fisheries: Inhabits more turbid and estuarine situations than does *Hyporhamphus dussumieri* and is not found around oceanic islands. Taken mostly with shore seines. Marketed fresh and dried salted.

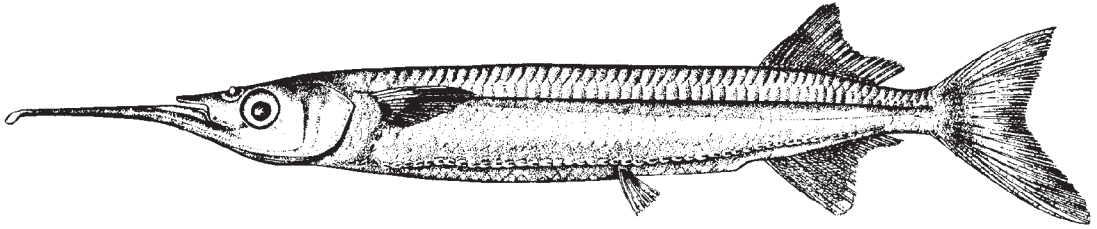
Distribution: Inhabits tropical western Indian and western Pacific oceans. Within the area, known from Thailand, Indonesia, Borneo, and Philippines; north to China and Nagasaki, Japan, south to New Guinea and the northern half of Australia.



Hyporhamphus (Hyporhamphus) limbatus (Valenciennes, 1846)

Frequent synonyms / misidentifications: None / *Hemiramphus gaimardi* Valenciennes, 1846; *Hyporhamphus unifasciatus* (Ranzani, 1847).

FAO names: En - Congaturi halfbeak; Fr - Demi-bec congaturi; Sp - Agujeta congaturi.

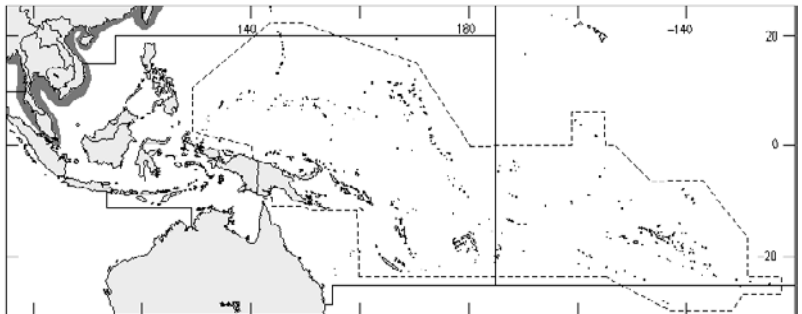


Diagnostic characters: An elongate fish with **greatly prolonged, beak-like lower jaw, equal to, or longer than head length; upper jaw short, triangular and scaly, its width 0.6 to 0.8 times in its length. Preorbital distance 1.3 to 2.1 times in diameter of orbit and 0.75 to 1.2 times in length of upper jaw;** preorbital ridge (bony ridge between nasal opening and eye) present; posterior branch to preorbital lateral-line canal absent. **Total number of gill rakers on first gill arch 23 to 37** (usually 25 to 31), 6 to 11 on upper and 19 to 23 on lower limb of arch. Dorsal-fin rays 13 to 16, usually 13 or 14; **anal-fin rays 13 to 16** (usually 14 or 15); pectoral fins short, with 10 to 12 rays; **caudal fin emarginate, not strongly forked.** Anterior part of dorsal and anal fins covered with scales; predorsal scales (in front of dorsal fin) 30 to 38 (usually 32 to 35). **Colour:** greenish above, the silvery lateral stripe widening posteriorly, white ventrally; fleshy tip of beak reddish.

Size: Maximum total length 22 cm; maximum standard length 17 cm (tip of upper jaw to base of caudal fin), commonly to 13 cm.

Habitat, biology, and fisheries: A coastal species, frequently enters estuaries and even strictly fresh-water. Taken with cast nets on coasts of India. Marketed fresh and dried salted.

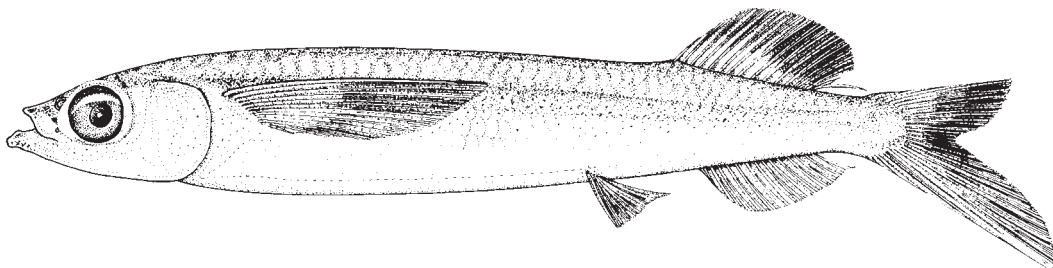
Distribution: Extends from the Persian Gulf to China along the mainland coast of Asia. Within the area, found from Thailand northward to China. Replaced in Indonesia, Borneo, and the Philippines by the closely related *Hyporhamphus neglectus*, and around southern New Guinea and northern Australia by *H. neglectissimus*.



Oxyporhamphus convexus convexus (Weber and de Beaufort, 1922)

Frequent synonyms / misidentifications: *Oxyporhamphus meristocystis* Parin, 1961 / *Oxyporhamphus micropterus* (Valenciennes, 1846).

FAO names: En - Flying halfbeak.

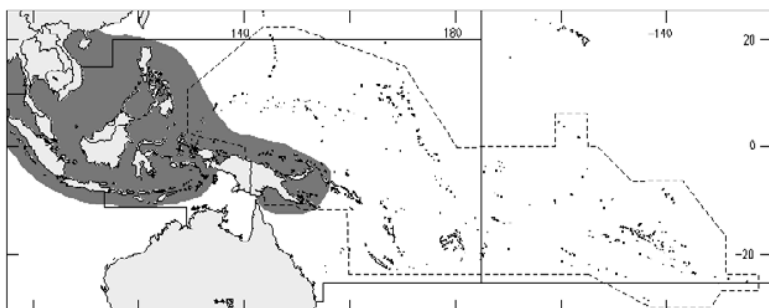


Diagnostic characters: An elongate fish; **adults without the prolonged lower jaw characteristic** of most halfbeaks, but lower jaw up to 4 times in standard length in young (specimens between 3.5 and 4.5 cm standard length); **anterior margin of upper jaw straight, not forming a prominent triangular anterior projection** as in other halfbeaks; preorbital ridge (bony ridge behind nostril) absent. Total number of gill rakers on first gill arch 26 to 33 (usually 27 to 31). Dorsal fin without well-developed anterior lobe; dorsal-fin rays 12 to 15; anal-fin rays 13 to 17; **pectoral fins elongate, 2.8 to 3.3 times in standard length**, barely reaching origin of pelvic fins, with 11 to 13 rays; pelvic fins short, 7.5 to 11.1 times in standard length, located about midway between origin of pectoral fins and caudal-fin base; **distance from pelvic-fin origin to caudal-fin base contained 1.05 to 1.35 times in distance from pectoral-fin origin to pelvic-fin origin**; caudal fin forked, with lower lobe much longer than upper. Fins not covered with scales; predorsal scales large, 28 to 34. Swimbladder in adults (greater than 12 cm standard length) alveolar, composed of many small cells. **Colour:** pelvic fins intensively pigmented, with exception of innermost ray; pelvic fins always intensively pigmented distally in young at 2.5 to 3 cm standard length and larger; skin folds along sides of lower jaw black in juveniles, with expanded lobes anteriorly (noticeably only in undamaged fish).

Size: Maximum standard length 17.6 cm, commonly to 13 cm.

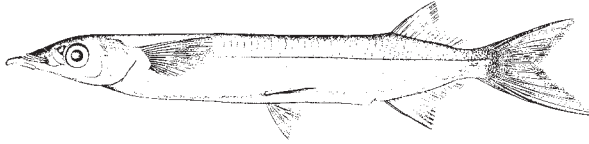
Habitat, biology, and fisheries: More coastal than *Oxyporhamphus micropterus* and frequently found near islands. Marketed fresh with flyingfishes in the markets of Cebu (Philippines) and elsewhere.

Distribution: Widespread in the Indo-West Pacific in somewhat warmer waters than *Oxyporhamphus micropterus* and extending east only to the Philippines, New Guinea, New Britain, and New Ireland. Replaced by *O. convexus bruuni* Parin, Collette, and Scherbachov, 1980, in the Red Sea, Arabian Sea, and coastal waters in between.



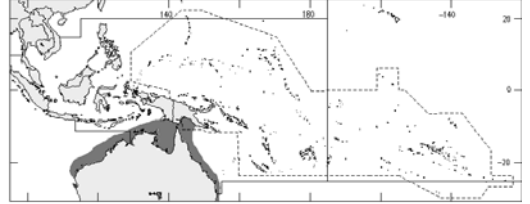
Arrhamphus sclerolepis sclerolepis* Günther, 1866*En** - Northern snubnose garfish.

Maximum standard length 21.8 cm. A coastal species that extends into fresh water. Considered an excellent food fish and taken by commercial and recreational fishermen in Queensland. Confined to northern Australia and southern Papua New Guinea. Known south along the coast of Western Australia to the Gascoyne River and along the coast of eastern Australia to Lindeman Island and Bowen, Queensland. Replaced south of Rockhampton, Queensland, by a southern subspecies, *Arrhamphus s. krefftii* (Steindachner, 1867) which extends to Sydney.



(from Collette, 1974)

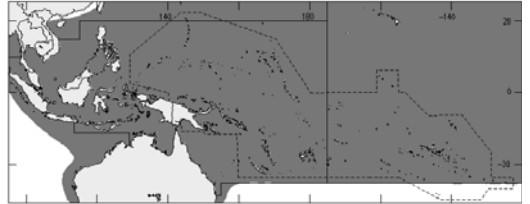
Clarence River, North South Wales, 22 cm standard length
(figure of *A. s. krefftii*)

***Euleptorhamphus viridis* (van Hasselt, 1823)****En** - Longfinned halfbeak.

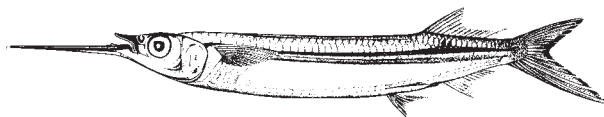
Maximum standard length 40.5 cm. An oceanic species found throughout the tropical and subtropical waters of the Indo-Pacific. Not known to be of importance to fisheries.



juvenile

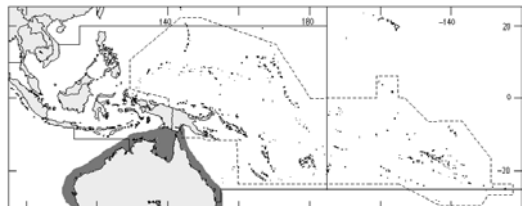
***Hemiramphus robustus* Günther, 1866****En** - Three-by-two garfish.

Maximum standard length 31.5 cm. A coastal species mostly found in more turbid inshore waters replacing *Hemiramphus far*, which is more common in more oceanic waters. A high quality food fish well known in markets of Brisbane, Queensland. Its common name is an allusion to its similarity to a 3-inch by 2-inch plank of wood. An Australian endemic extending south to Sydney on the east coast and to Perth in Western Australia.



Perth, Western Australia, 26.5 cm standard length

(from Collette, 1974)



***Hyporhamphus (Reporhamphus) acutus acutus* (Günther, 1871)**

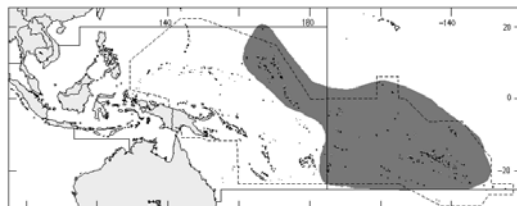
En - Sharpnose halfbeak.

Maximum standard length 18.5 cm. Of no known interest to fisheries. An oceanic species confined to areas around islands on the Pacific Plate of central Oceania, from Marshall Islands to Easter Island. Replaced in Hawaii by *Hyporhamphus a. pacificus* (Steindachner, 1900).



Easter Island, 15.6 cm standard length

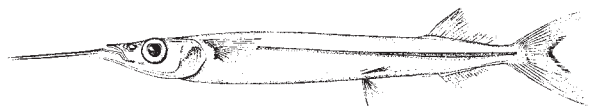
(from Collette, 1974)



***Hyporhamphus (Reporhamphus) affinis* (Günther, 1866)**

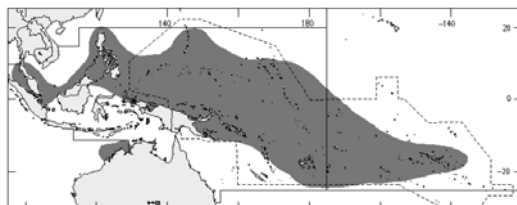
En - Coral reef halfbeak.

Maximum standard length 24.3 cm. Found chiefly around coral reefs and islands but extends a little further from shore than *Hyporhamphus (R.) dussumieri* which has a similar range. Widely distributed in tropical Indo-West Pacific from Madagascar and Red Sea through western Central Pacific east to Tuamotu Archipelago.



Marshall Islands, 24.4 cm standard length

(from Parin et al., 1980)



***Hyporhamphus (Reporhamphus) balinensis* (Bleeker, 1859)**

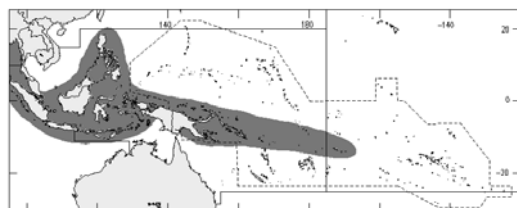
En - Bali halfbeak.

Maximum standard length 16.5 cm. Widely distributed in the tropical Indo-West Pacific from Mozambique Channel and southern part of the Red Sea through the western Central Pacific east to Samoa.



New Guinea, 13.8 cm standard length

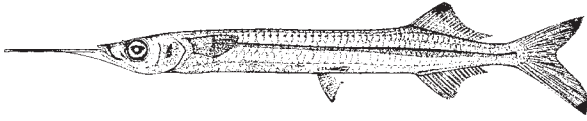
(from Parin et al., 1980)



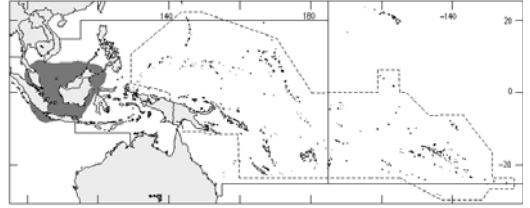
***Hyporhamphus (Hyporhamphus) melanopterus* Collette and Parin, 1978**

En - Blackfinned halfbeak.

Maximum standard length 17 cm. Confined to the Gulf of Thailand, Java Sea, and Sulu Sea.



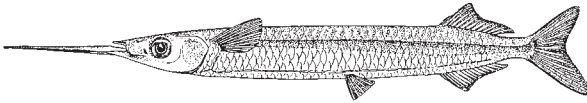
Gulf of Thailand, 13.4 cm standard length
(from Collette and Parin, 1978)



***Hyporhamphus (Hyporhamphus) neglectissimus* Parin, Collette, and Schcherbachev, 1980**

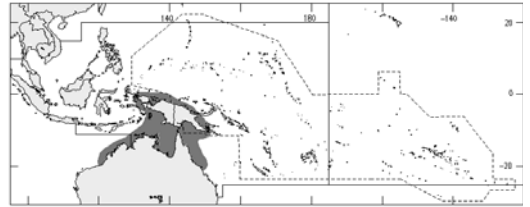
En - Australian neglected halfbeak.

Maximum standard length 14.4 cm. A coastal species that replaces *Hyporhamphus (Hyporhamphus) neglectus* in waters around New Guinea and northern Australia.



New Guinea, 13.7 cm standard length

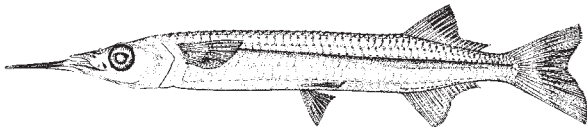
(from Parin et al., 1980)



***Hyporhamphus (Hyporhamphus) neglectus* (Bleeker, 1866)**

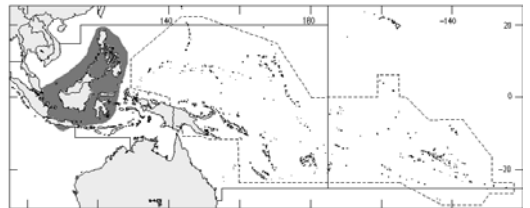
En - Neglected halfbeak.

Maximum known size 16.5 cm standard length. Replaces the coastal *Hyporhamphus (Hyporhamphus) limbatus* in waters around Java, Sumatra, Borneo, Sulawesi (Celebes), and the Philippines.



Kalimantan, 13.9 cm standard length

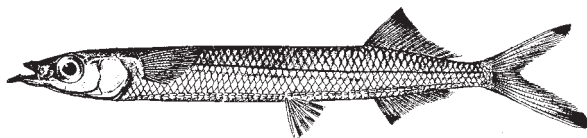
(from Parin et al., 1980)



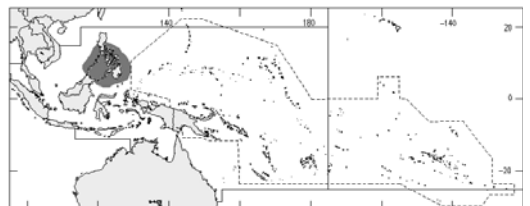
***Melapedalion breve* (Seale, 1909)**

En - Philippine snubnose halfbeak.

Maximum standard length 22.7 cm. A coastal species limited to waters of South China and Sulu seas.



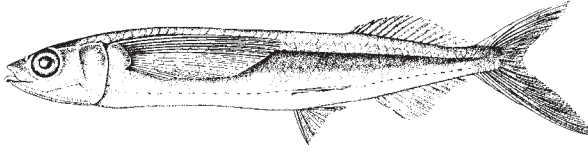
(from Seale, 1909)



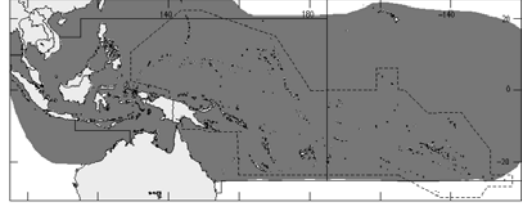
***Oxyporhamphus micropterus micropterus* (Valenciennes, 1846)**

En - Oceanic flying halfbeak.

Maximum standard length 18.5 cm. A true oceanic fish, not bound to coastal waters at any period of its life. Widespread throughout the Indo-Pacific from 20°N to 20°S and extending north to southern Japan in the western Pacific. Replaced in the Atlantic by *Oxyporhamphus m. similis* Bruun, 1935.



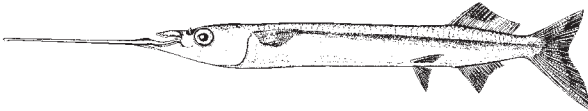
Gulf of Mexico, 14.6 cm standard length
(figure of *O. m. similis*)



***Rhynchorhamphus georgii* (Valenciennes, 1846)**

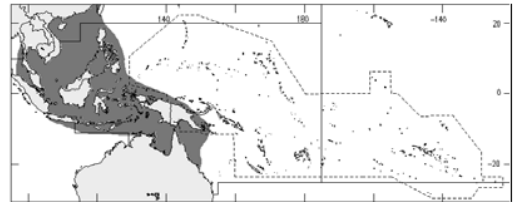
En - George's halfbeak.

Maximum standard length 23.1 cm. The most widespread of the 4 species of *Rhynchorhamphus*, found from the Persian Gulf through the Arabian Sea and Bay of Bengal through the western Central Pacific north to Taiwan Province of China and Hong Kong and east to New Guinea and northern Australia.



(from Collette, 1974)

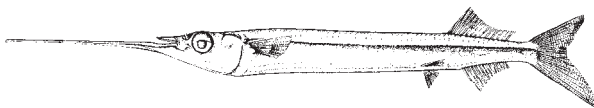
N. Borneo, 16.2 cm standard length



***Rhynchorhamphus naga* Collette, 1976**

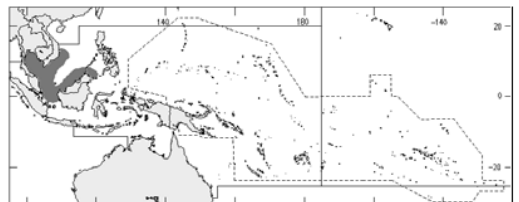
En - Naga halfbeak.

Maximum standard length 17.7 cm. Restricted to the Gulf of Thailand, South China Sea, and western Java Sea



Gulf of Thailand, 16.5 cm standard length

(from Collette, 1976)



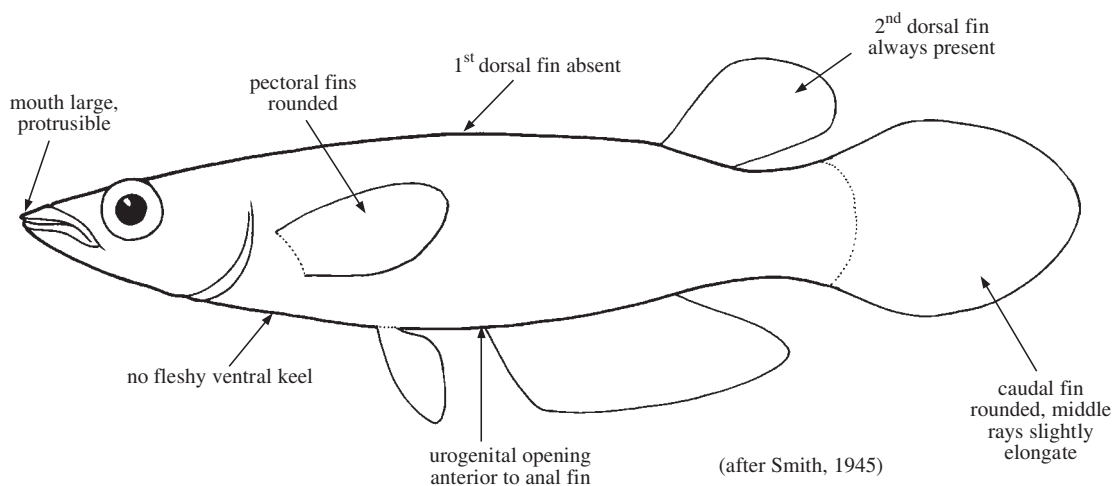
Order CYPRINODONTIFORMES

APLOCHEILIDAE

Egg-laying toothcarps

by L.R. Parenti

Diagnostic characters: Small, fusiform, cyprinodontiform fishes (average size at maturity 6 cm standard length). **Dorsal surface of head flat.** Eyes large. Mouth terminal, large, protrusible. Small, unicuspid teeth in pavement dentition in outer jaw. **Pectoral fins rounded.** Caudal fin rounded or middle rays of caudal fin elongate. Dorsal fin with 7 to 20 soft rays; anal fin with 15 to 19 soft rays; caudal fin with 14 to 21 branched rays; pectoral fins with 14 to 21 soft rays; pelvic fins with 6 soft rays. Scales moderate, cycloid, 25 to 42 in lateral series; no lateral line. **Small patch of teeth on vomer.** **Colour:** (of *Aplocheilus panchax*): highly variable; somewhat translucent in life, with a silvery, "pineal" spot on dorsal surface of head; head and body greyish yellow to medium brown dorsally, lighter brown to yellow ventrally; **thin, black horizontal line from tip of lower jaw through eye variably present; large, black spot on middle portions of dorsal-fin rays; pectoral fins hyaline; pelvic, anal, and caudal fins with submarginal brownish yellow band.**

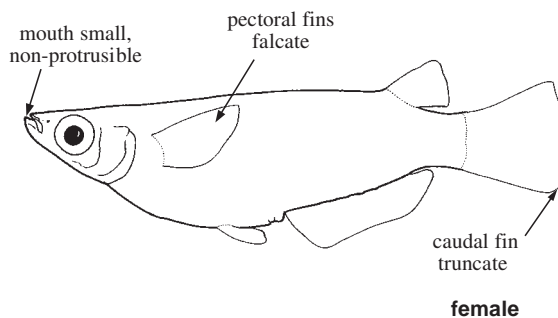


Habitat, biology, and fisheries: Fresh to brackish water; a single species (*Aplocheilus panchax*) in the area found in brackish water, estuaries, and mangroves. Small, surface-feeding, schooling fishes. Omnivorous, but feeds principally on insects and mosquito larvae. Oviparous.

Remarks: The family Aplocheilidae is distributed broadly throughout tropical Africa, Madagascar, and from the Indian subcontinent to the Indo-Australian Archipelago. Meristic data are for the family, with diagnostic colour of *A. panchax*.

Similar families occurring in area

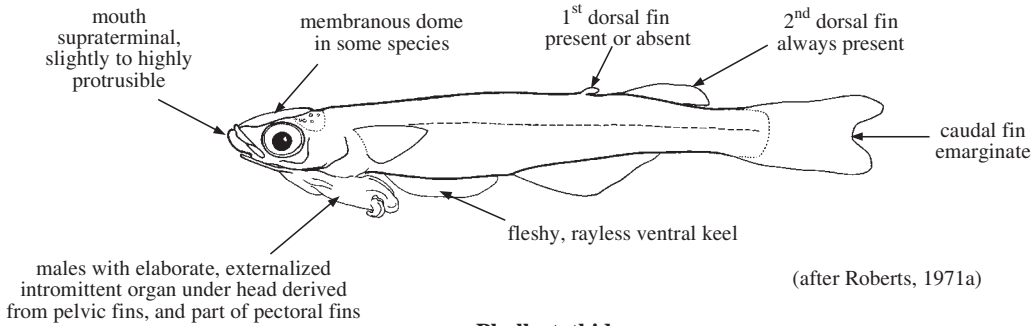
Adrianichthyidae: superficially similar to egg-laying toothcarps, but readily distinguished by a non-protrusible mouth, no teeth on vomer, dorsal- and anal-fin rays of male longer and thicker than those of females and with bony contact organs on distal segments of anal-fin rays, and pectoral fins falcate. Adrianichthyids are nearly transparent in life, with sparse pigmentation.



Adrianichthyidae

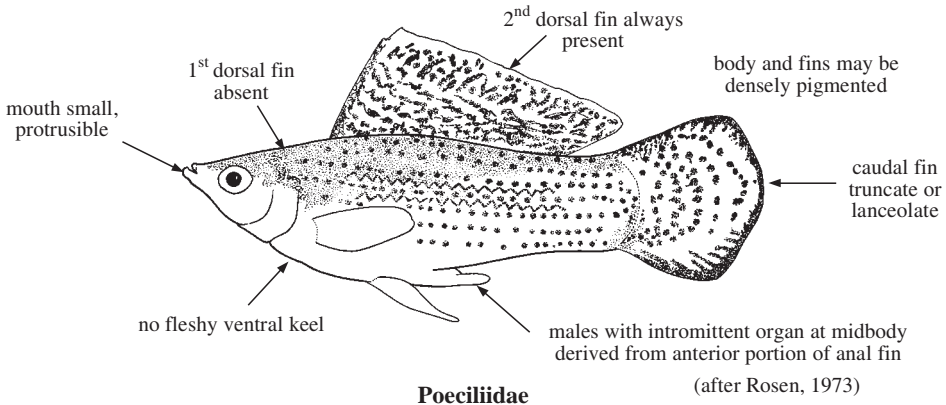
(after Iwamatsu et al., 1982)

Phallostethidae: readily distinguished from egg-laying toothcarps by the presence, in males, of a bony, externalized intromittent organ, and urogenital openings under head; nearly transparent in life, with sparse pigmentation.



Phallostethidae

Poeciliidae: readily distinguished from egg-laying toothcarps by males with an intromittent organ derived from anterior anal-fin rays, and a small mouth.



Poeciliidae

A single species occurring in the area

Aplocheilus panchax (Hamilton, 1822)

References

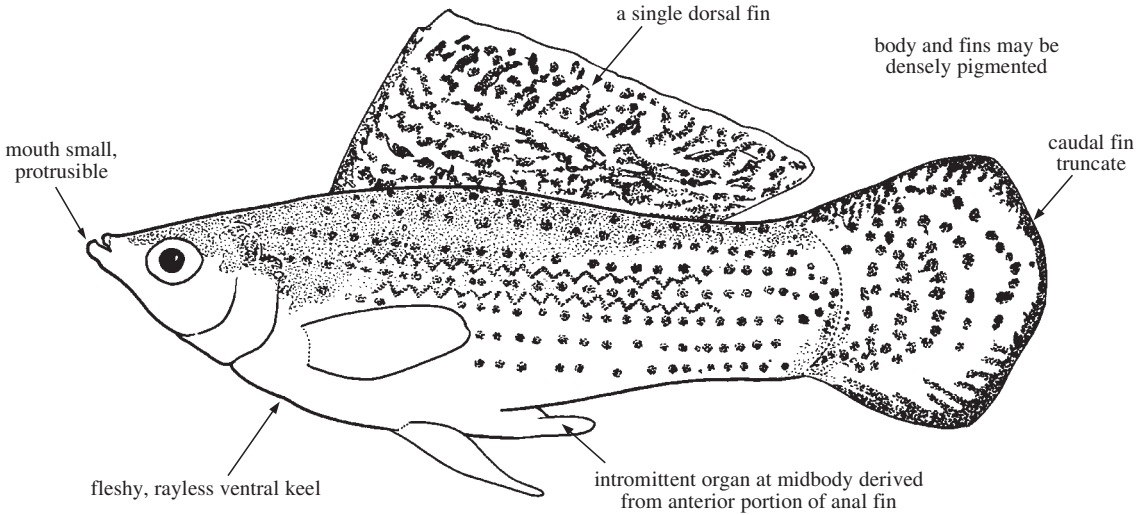
- Parenti, L. R. 1981. A phylogenetic and biogeographic analysis of cyprinodontiform fishes (Teleostei, Atherinomorpha). *Bull. Amer. Mus. Nat. Hist.* 168(4):335-557.
- Smith, H.M. 1945. The freshwater fishes of Siam, or Thailand. *Bull. U.S. Natn. Mus.*, 188(11):1-622.

POECILIIDAE

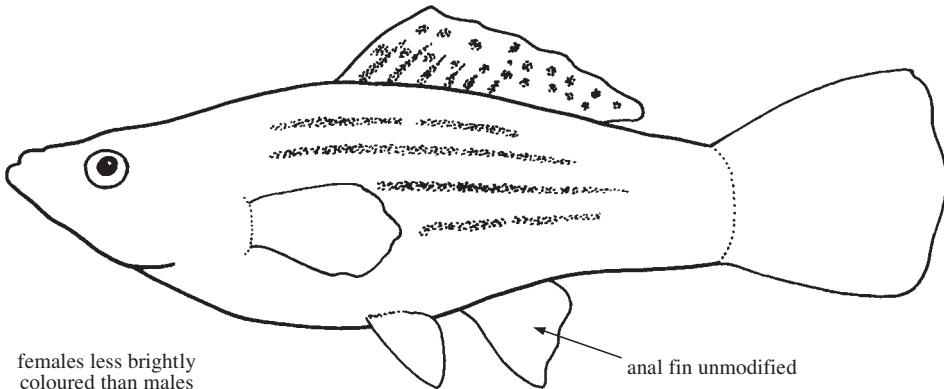
Livebearing toothcarps

by L.R. Parenti

Diagnostic characters: Small to moderate, laterally compressed, cyprinodontiform fishes; females usually larger than males. Eyes moderately large. Mouth supraterminal, small, and protrusible. Small, unicuspid teeth in single or multiple rows on premaxilla and dentary; no tooth patch on vomer. Pectoral fins falcate, may be set relatively high on side of body. Caudal fin truncate or slightly lanceolate. Single, soft-rayed dorsal fin at midbody or set posteriorly. Dorsal fin with 4 to 16 soft rays; anal fin with 8 to 10 soft rays; pectoral fins with 9 to 16 soft rays; pelvic fins with 6 soft rays; caudal fin with 11 to 15 branched rays. **Species in the area with anal fin of males modified into a gonopodium used to transfer sperm bundles to females. Anal-fin rays 3 through 5 of males thickened and elongate; haemal arches expanded.** Scales moderate, cycloid, 30 to 34 in lateral series; no lateral line. **Colour:** some species highly sexually dichromatic and dimorphic; males may be more brightly coloured and smaller than females; body nearly transparent in life in females and juveniles.



Poecilia sphenops (male)



(after Rosen, 1973)

Poecilia sphenops (female)

Habitat, biology, and fisheries: Fresh to brackish water, species in the area in tidal portions of rivers, estuaries, or in mangroves. Small, surface-feeding, abundant, schooling fishes. Omnivorous. Tolerant of extremes of temperature and salinity. Species in the area viviparous, males pass sperm bundles to females through a modified anal fin or gonopodium. Poeciliids are not native to the area; species found here were either introduced for mosquito control or released, presumably accidentally, from aquarium stocks.

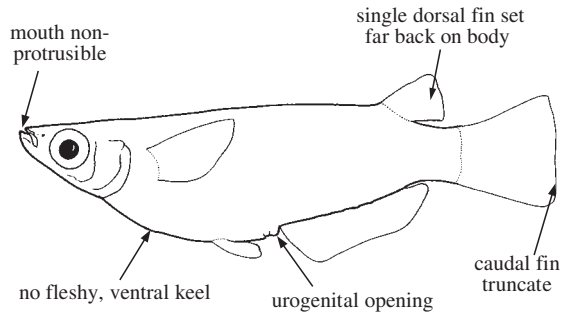
Remarks: The family Poeciliidae as diagnosed by Parenti (1981) comprises 3 subfamilies: Poeciliinae, Fluviphylacinae, and Aplocheilichthyinae. Parenti's Poeciliinae is equivalent to the Poeciliidae of previous authors, such as Rosen and Bailey (1963). The only species in the family Poeciliidae that have been introduced into the Western Central Pacific are in the subfamily Poeciliinae. The characters listed above refer only to that subfamily.

Similar families occurring in area

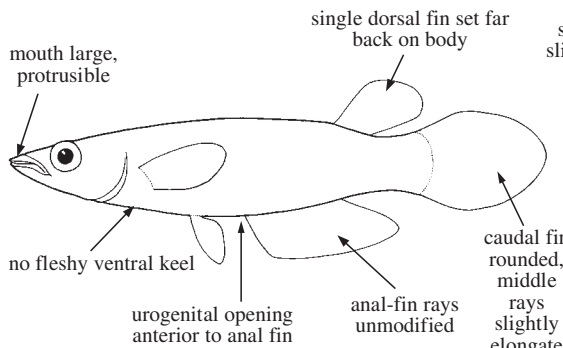
Adrianichthyidae: superficially similar to livebearers but with a non-protrusible rather than protrusible mouth and lacking an intromittent organ.

Aplocheilidae: differing most notably from livebearers by having a large mouth and lacking an intromittent organ.

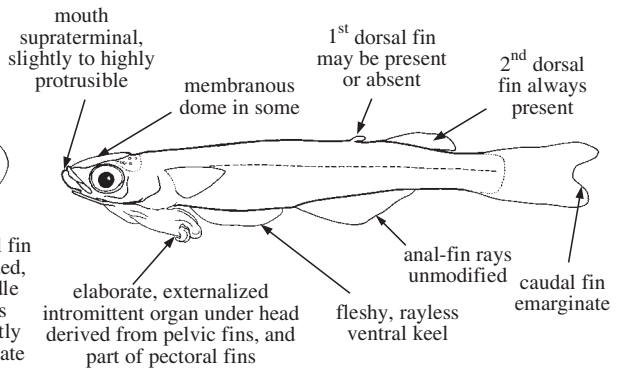
Phallostethidae: superficially similar to livebearers, but with an intromittent organ in males modified from pectoral- and pelvic-fin rays and under the head, not a modified anal fin at midbody; in addition, phallostethids are nearly transparent in life, with sparse pigmentation.



Adrianichthyidae
(after Iwamatsu et al., 1982)



Aplocheilidae
(after Smith, 1945)



Phallostethidae
(after Roberts, 1971)

List of species occurring in the area

Gambusia affinis (Baird and Girard, 1853)

Poecilia latipinna (LeSueur, 1821)

Poecilia reticulata Peters, 1859

Poecilia sphenops Valenciennes in Cuvier and Valenciennes, 1846

References

- Parenti, L.R. 1981. A phylogenetic and biogeographic analysis of cyprinodontiform fishes (Teleostei, Atherinomorpha). *Bull. Amer. Mus. Nat. Hist.*, 168(4):335-557.
- Rosen, D.E. 1973. Suborder Cyprinodontoidei. Superfamily Cyprinodontoidea. Families Cyprinodontidae, Poeciliidae, Anablenidae. *Fishes of the Western North Atlantic, part 6*. Sears Foundation for Marine Research.
- Rosen, D.E. and R.M. Bailey. 1963. The poeciliid fishes (Cyprinodontiformes), their structure, zoogeography, and systematics. *Bull. Amer. Mus. Nat. Hist.*, 126(1):1-176.

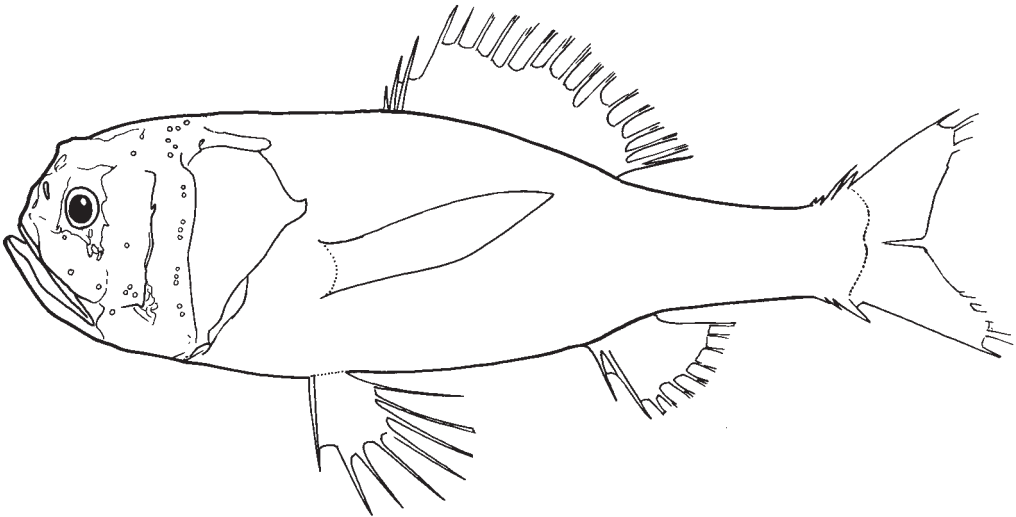
Order STEPHANOBERYCIFORMES

MELAMPHAIDAE

Big scales (ridgeheads)

by J.A. Moore and J.R. Paxton

Diagnostic characters: Small (to about 16 cm total length) stephanoberyciform fishes with subcylindrical body. Head large; large mucous cavities separated by thin ridges. Eyes small in most species. **Snout short and steep.** Jaws long, extending to or beyond posterior margin of eye. Teeth minute, in bands or uniserial row in jaws; palate toothless. **One dorsal fin with I to III weak spines and 9 to 18 soft rays;** anal fin with I weak spine and 7 to 10 soft rays; caudal fin with 3 or 4 procurrent spines preceding upper and lower lobes; **pelvic fins thoracic, with I spine and 6 to 8 soft rays;** pectoral fins with 13 to 16 rays. Scales thin and cycloid, usually deciduous, moderate-sized to very large, 12 to 40 in longitudinal series. **Lateral line reduced to 1 or 2 pored scales behind upper edge of operculum.** No photophores or light organs. **Colour:** body and head dark brown or black.

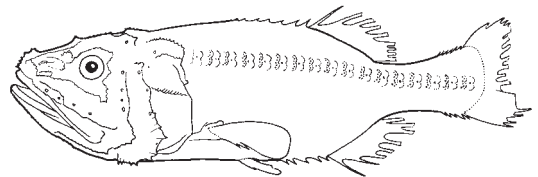


Habitat, biology, and fisheries: Occurring in meso- and bathypelagic waters in depths of 200 to 2 000 m. Many species widely distributed in Atlantic and Indo-Pacific. Feed primarily on gelatinous organisms and small crustaceans. Little is known of behaviour. In Western Central Pacific, *Scopeloberyx opisthopterus*, *Melamphaes simus*, and *M. danae* are dwarf species maturing at sizes less than 3 cm. Frequently taken in deep-water trawls, but of no commercial importance.

Remarks: A total of 33 species in 5 genera is recognized, found in the midwaters of all oceans except the Arctic Ocean and Mediterranean Sea. The genera *Poromitra* and *Scopeloberyx* need revision. Further deep-sea trawling should add more species to the area.

Similar families occurring in the area

Gibberichthyidae: dorsal fin preceded by V to VII stout, wide-based spines; anal fin preceded by III to V stout, wide-based spines; 5 to 7 procurrent spines in upper and lower lobes of caudal fin; pelvic fins with I spine and 5 soft rays; lateral line fully developed.



Gibberichthyidae

List of species occurring in the area

- Melamphaes danae* Ebeling, 1962
Melamphaes eulepis Ebeling, 1962
Melamphaes janae Ebeling, 1962
Melamphaes longivelis Parr, 1933
Melamphaes polylepis Ebeling, 1962
Melamphaes simus Ebeling, 1962
- Poromitra crassa* Parin and Ebeling, 1980
Poromitra crassiceps (Günther, 1878)
Poromitra megalops (Lütken, 1877)
Poromitra oscitans Ebeling, 1975
- Scopeloberyx opisthopterus* (Parr, 1933)
Scopeloberyx robustus (Günther, 1887)
- Scopelogadus mizolepis mizolepis* (Günther, 1878)
Scopelogadus unispinis Ebeling and Weed, 1963
- Sio nordenskjoldii* (Lönnerberg, 1905)

Reference

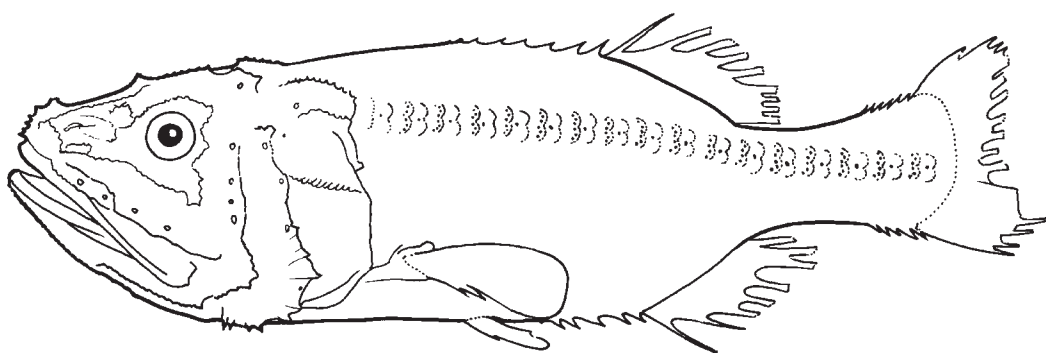
- Ebeling, A.W. 1986. Family Melamphaidae. In *Smiths' sea fishes*, edited by M.M. Smith and P.C. Heemstra. Johannesburg, Macmillan South Africa, pp. 427-431.

GIBBERICHTHYIDAE

Gibberfishes

by J.R. Paxton

Diagnostic characters: Small (to 13 cm) stephanoberyciform fishes; body deep (young) to moderately robust. Head moderate; **large mucous cavities on top of head separated by very thin ridges and covered by thin skin in undamaged (rarely) specimens.** Eyes very large in juveniles, becoming smaller than snout length in larger specimens. Mouth moderate, jaws extending to posterior margin of eye in larger specimens. Teeth villiform in bands on jaws; no teeth on vomer or palatine. Gill rakers lath-like. **Separate, rigid, wide-based fin spines precede dorsal and anal fins;** origin of soft dorsal and anal-fin rays posterior and opposite; **dorsal fin with V to VII spines and 8 or 9 soft rays; anal fin with IV or V spines and 7 to 9 soft rays;** pelvic fins abdominal, with no spines and 5 or 6 soft rays; **elaborate pelvic-fin appendage from elongated third pelvic-fin ray in larvae and prejuveniles;** pectoral fins with 13 to 15 rays. **Scales cycloid, deciduous. Lateral line as vertical rows of papillae overlying scales.** No photophores or luminous tissue. No cavernous tissue. Total vertebrae 28 to 31. **Colour:** brown-black in largest specimens.

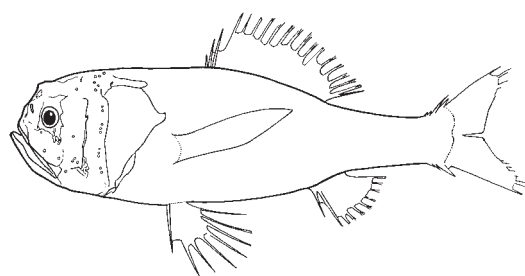


Habitat, biology, and fisheries: Meso-, bathy-, and benthopelagic, mostly over continental and island slopes. Distinctive kasidoron larval/prejuvenile stage in epipelagic waters. Feed as zooplankton pickers, with small crustaceans in stomachs of both prejuveniles and adults. Rare deep-sea fishes of no commercial importance.

Remarks: Two species in a single genus, one each in the tropical West Atlantic and tropical Indo-West Pacific.

Similar families occurring in the area

Melamphaidae: dorsal fin with I to III weak spines; anal fin with I weak spine; pelvic fins with I spine and 6 to 8 soft rays; lateral line reduced to 1 or 2 scales behind operculum, no arborescent, elongate rays in larvae or prejuveniles.



Melamphaidae

A single species occurring in the area

Gibberichthys latifrons (Thorpe, 1969)

References

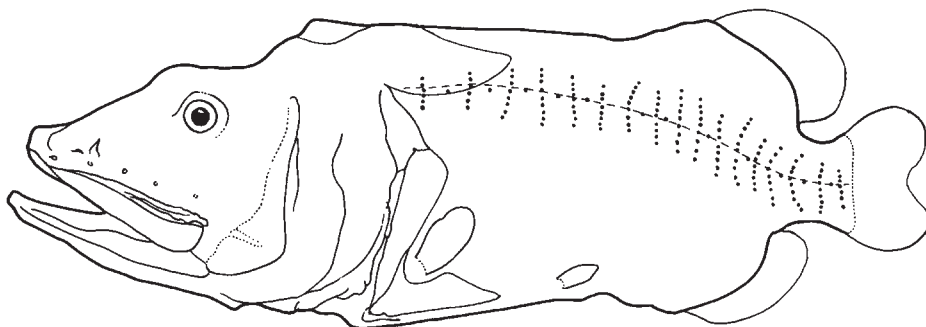
- de Sylva, D.P. and W.N. Eschmeyer. 1977. Systematics and biology of the deep-sea fish family Gibberichthyidae, a senior synonym of the family Kasidoroidae. *Proc. Cal. Acad. Sci.*, 41(6):215-231.
- Kotlyar, A.N. 1996. *Beryciform fishes of the world ocean*. Moscow, VNIRO Publishing, 368 p. [In Russian]

RONDELETIIDAE

Redmouth whalefishes

by J.R. Paxton

Diagnostic characters: Small (to 11 cm) stephanobercyiform fishes, **body flabby, somewhat whale-shaped with median fins opposite and far posterior.** Head large; mucous cavities on top of head indistinct, covered by thick skin. Eyes small. Snout very long; nasal organ moderately developed. Mouth large, **jaws not extending beyond posterior margin of eye.** Teeth small and closely set, on jaws and vomer; palatine, ectopterygoid, and copula lacking teeth. Gill rakers well developed, lath-like. Fins without spines; 1 dorsal fin with 13 to 16 soft rays; anal fin with 13 to 16 soft rays; pectoral fins with 9 to 11 rays; **pelvic fins abdominal with 5 or 6 soft rays;** caudal fin with 19 principal rays. **Lateral line as vertical rows of papillae without supporting internal scales. No external body scales.** No photophores or luminous tissue. No cavernous tissue. Pleural ribs present. **Total vertebrae 24 to 27.** **Colour:** in life, orange-brown, inside mouth and gill cavities red-orange; in preservative, brown.



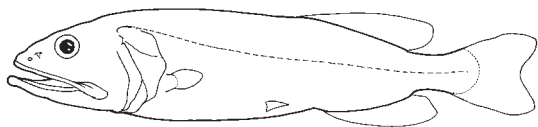
Habitat, biology, and fisheries: Meso- and bathypelagic. Feeding mode as predator on amphipods and crustaceans. Uncommon deep-sea fishes of no commercial importance.

Remarks: One genus with 2 species throughout the world ocean in tropical and temperate latitudes. *Rondeletia bicolor* is now known from 3 Pacific records, including 1 in the area.

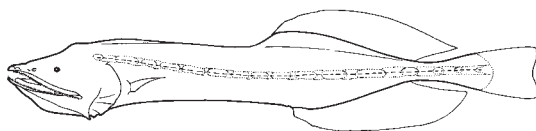
Similar families occurring in the area

Barbourisiidae: mouth very large with jaws extending far behind eye; head and body covered with tiny scales with central spine giving velvet-like texture; live colour bright red-orange.

Cetomimidae: no pelvic fins; mouth extremely large with jaws extending far behind eye; most with lateral line as broad tube pierced by large pores, a single species with vertical rows of papillae.



Barbourisiidae



Cetomimidae

List of species occurring in the area

Rondeletia bicolor Goode and Bean, 1895

Rondeletia loricata Abe and Hotta, 1963

Reference

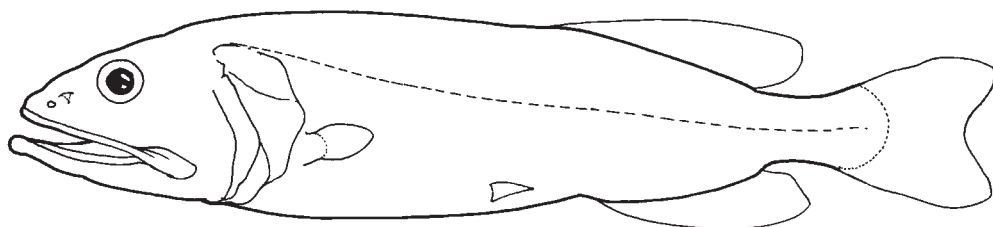
Kotlyar, A.N. 1996. The osteology, intraspecific structure, and distribution of *Rondeletia loricata* (Rondelettiidae). *Vopr. Ikhtiol.*, 36(2):154-168. [In Russian, English transl. *J. Ichthyol.*, 26(3)].

BARBOURISIIDAE

Redvelvet whalefish

by J.R. Paxton

Diagnostic characters: Moderate-sized (to 33 cm) stephanoberyciform fishes; **body somewhat flabby**, moderately robust, **whale-shaped with median fins opposite and far posterior**. Head large; mucous cavities on top of head separated by thick ridges and covered by skin. Eyes small. Snout very long; nasal organ moderately developed. **Mouth very large, jaws extending far behind eye**. Teeth small and closely set, on jaws, vomer, and ectopterygoid; palatine and copula lacking teeth. Gill rakers well developed, lath-like. Fins without spines; 1 dorsal fin with 19 to 22 soft rays; anal fin with 15 to 18 soft rays; pectoral fins with 13 or 14 rays; **pelvic fins abdominal with 6 soft rays**; caudal fin with 19 principal rays. **Lateral line well developed as a broad tube pierced by small pores and supported by internal scales. Body and head covered by small, adherent, non-imbricate scales with a single, central spine giving a velvet-like texture.** No photophores or luminous tissue. No cavernous tissue. Pleural ribs present. **Total vertebrae 40 to 43. Colour: in life, bright red-orange; in preservative, white.**



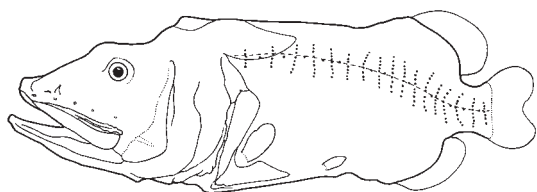
Habitat, biology, and fisheries: Mesopelagic as juveniles, benthopelagic as adults. Feeding mode unknown, presumably as predator on crustaceans. Rare deep-sea fishes of no commercial importance.

Remarks: One genus and species throughout the world ocean in tropical and temperate latitudes.

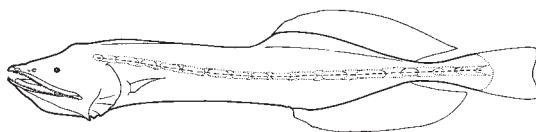
Similar families occurring in the area

Rondeletiidae: no external body scales; lateral line as vertical rows of papillae; mouth large, but jaws not extending beyond posterior margin of eye; live colour orange-brown, in preservative brown.

Cetomimidae: no external body scales; no pelvic fins; colour brown or black.



Rondeletiidae



Cetomimidae

A single species occurring in the area

Barbourisia rufa Parr, 1945

References

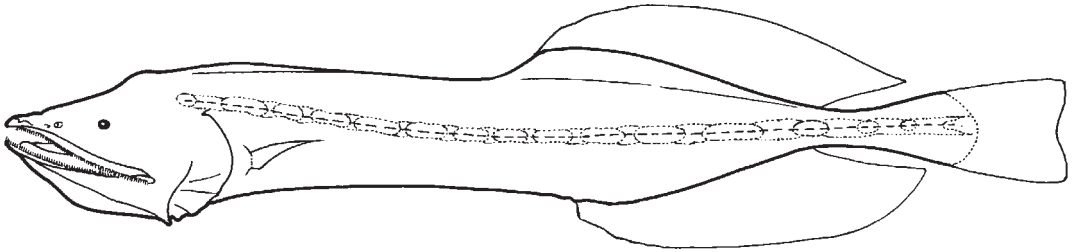
- Kotlyar, A.N. 1995. Osteology and distribution of *Barbourisia rufa* (Barbourisiidae). *Vopr. Ikhtiol.*, 35(3):282-289. [In Russian, English transl. *J. Ichthyol.*, 35(6)]
- Paxton, J.R. and D.J. Bray. 1986. Family Barbourisiidae. In *Smiths' sea fishes*, edited by M.M. Smith and P.C. Heemstra. Johannesburg, Macmillan, p. 434.

CETOMIMIDAE

Whalefishes

by J.R. Paxton

Diagnostic characters: Small to moderate-sized (to 40 cm) stephanobercyiform fishes; **body soft and flabby**, slender to robust, **whale-shaped with median fins opposite and far posterior**. **Head very large**; mucous cavities on top of head indistinct and covered by skin in undamaged specimens. Eyes tiny. Snout very long; nasal organ poorly developed (well developed in *Procetichthys*). **Mouth enormous, jaws extending far behind eye**. Teeth tiny and closely set, small and widely spaced, or elongate in well defined, closely set rows; jaws, pharyngobranchials, and **copula always with teeth**; vomer, palatine, and ectopterygoid usually with teeth. **Gill rakers club-shaped, or as tooth patches, tooth plates, or individual teeth, never lath-like**. Fins without spines; 1 dorsal fin with 13 to 37 soft rays; anal fin with 11 to 34 soft rays; pectoral fins with 15 to 24 rays; **no pelvic fins**; **caudal fin with 10 to 19 principal rays**. **Lateral line very well developed, supported with internal scales; in most as a broad tube pierced by large pores** (*Procetichthys* with vertical rows of lateral-line papillae). **No external body scales**. No photophores or apparent luminous tissue. **Unique cavernous tissue around anus in most, over base of anal fin and other areas in many species**. **No pleural ribs**. **Total vertebrae 38 to 59**. **Colour:** brown or black; in fresh specimens fin rays and inside mouth reddish orange.



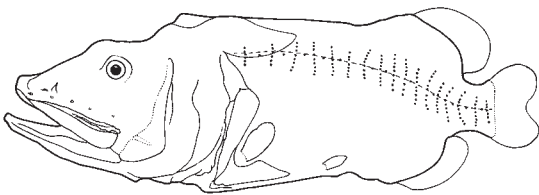
Habitat, biology, and fisheries: Bathypelagic as adults, some may be benthopelagic. Feeds on crustaceans. Rare deep-sea fishes of no commercial importance.

Remarks: Nine genera with about 35 species (including 15 undescribed) throughout the world ocean from boreal latitudes to the Antarctic. When the genus *Cetomimus* is revised, additional species will be recorded from the area.

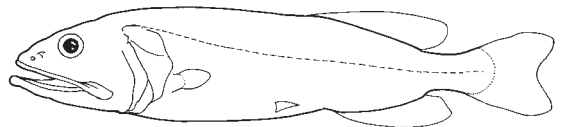
Similar families occurring in the area

Rondeletiidae: pelvic fins present; lateral line as vertical rows of papillae; jaws not extending beyond posterior margin of eye; pleural ribs present.

Barbourisiidae: pelvic fins present; head and body covered with tiny scales with central spine giving velvet-like texture; live colour bright red-orange.



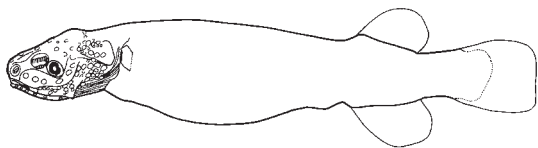
Rondeletiidae



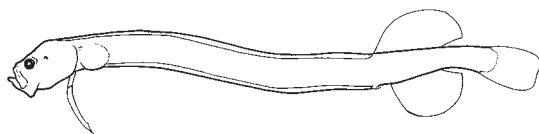
Barbourisiidae

Megalomycteridae: nasal organ enormous; jaws not extending behind eye; pelvic fins in some; body scales in some.

Mirapinnidae: jaws not extending behind eye; pelvic fins present.



Megalomycteridae



Mirapinnidae

List of species occurring in the area

Cetomimus gillii Goode and Bean, 1895

Cetostoma regani Zugmayer, 1914

Danacetichthys galathenus Paxton, 1989

Ditropichthys storeri (Goode and Bean, 1895)

Gyrinomimus bruuni Rofen, 1959 (unpublished record, Paxton ms)

Gyrinomimus sp. nov. b (unpublished record, Paxton ms)

Gyrinomimus sp. nov. c (unpublished record, Paxton ms)

Rhamphocetichthys savagei Paxton, 1989

Reference

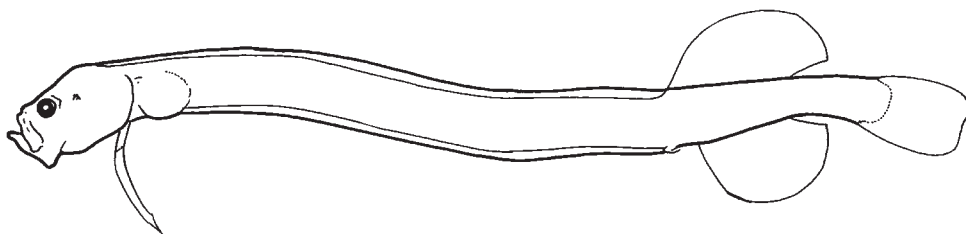
Paxton, J.R. 1989. Synopsis of the whalefishes (family Cetomimidae) with descriptions of four new genera. *Rec. Aust. Mus.*, 41(2):135-206.

MIRAPINNIDAE

Tapetails (hairfish)

by J.R. Paxton

Diagnostic characters: Small (to 5 cm) stephanoberyciform fishes; **body slender to very elongate, with median fins opposite and far posterior.** Head moderate. Eyes small to moderate. Snout moderate to large; **nasal organ poorly developed. Mouth moderate, jaws not extending behind eye.** Teeth small and closely set in 1 row on premaxillary and few rows on dentary; no teeth on vomer or palatine. Gill rakers lath-like. Fins without spines; 1 dorsal fin with 16 to 33 soft rays; anal fin with 14 to 29 soft rays; pectoral fins with 13 to 24 rays; **pelvic fins jugular with 4 to 10 soft rays;** caudal fin with 19 principal rays, **caudal streamer longer than body in larvae. No lateral line. No body scales. Body of 1 genus (*Mirapinna*) covered with dense, hair-like papillae;** others with naked skin. No photophores or luminous tissue. No cavernous tissue. **No pleural ribs. Total vertebrae 42 to 55. Colour:** brown, black, or transparent.



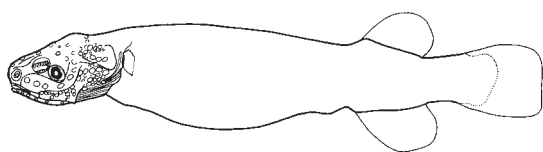
Habitat, biology, and fisheries: Larvae and juveniles epipelagic; mature adults unknown, perhaps meso-pelagic. Feeding mode zooplankton pickers on copepods. Rare oceanic fishes of no commercial importance.

Remarks: Three genera with 6 species (1 undescribed) throughout the world ocean in tropical and subtropical latitudes. The most recent review is that of Bertelsen (1986), while that of Bertelsen and Marshall (1984) illustrates the most species. A revision of the family is needed, but mature specimens have yet to be collected. More species in the area are expected.

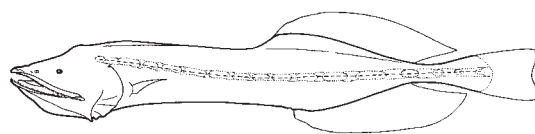
Similar families occurring in the area

Megalomycteridae: nasal organ enormous; pelvic fins thoracic with 1 to 3 rays, or absent; scales present in some; no skin papillae or caudal streamer.

Cetomimidae: pelvic fins absent; mouth enormous, jaws extending far behind eye.



Megalomycteridae



Cetomimidae

List of species occurring in the area

Eutaeniophorus festivus (Bertelsen and Marshall, 1956)

Parataeniophorus sp.

References

Bertelsen, E. 1986. Family Mirapinnidae. In *Smiths' sea fishes*, edited by M.M. Smith and P.C. Heemstra. Johannesburg, Macmillan, pp. 406-407.

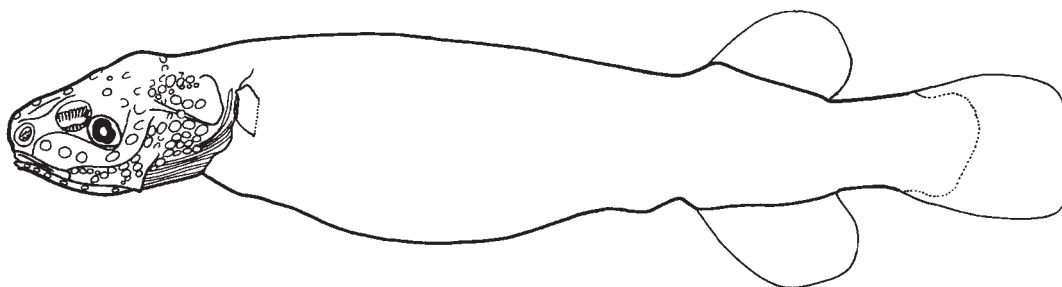
Bertelsen, E. and N.B. Marshall. 1984. Mirapinnatoidei: development and relationships. In *Ontogeny and systematics of fishes*, edited by H.G. Moser et al. *Amer. Soc. Ichthyol. Herpetol. Spec. Publ.*, (1):380-383.

MEGALOMYCTERIDAE

Bignose fishes

by J.R. Paxton

Diagnostic characters: Small (to 7 cm) stephanoberyciform fishes; **body elongate, with median fins opposite and far posterior.** Head moderate. Eyes small to moderate. Snout elongate to very large; **nasal organ enormous, covering much of snout.** **Mouth moderate, jaws not extending behind eye.** Teeth small and closely set in 1 to few rows on premaxillary and dentary; teeth present or absent on vomer, absent on palatine and copula. Gill rakers poorly developed, few in number. Fins without spines; 1 dorsal fin with 15 to 31 soft rays; anal fin 13 to 29 soft rays; pectoral fins with 18 to 23 rays; **pelvic fins thoracic with 1 to 3 rays, or absent;** caudal fin with 16 principal rays. **Lateral line poorly developed or unknown.** **Body scales small to moderate, non-imbricate, cycloid, or absent.** No photophores or luminous tissue. No cavernous tissue. **No pleural ribs. Total vertebrae 41 to 55.** **Colour:** brown, black, or unknown.



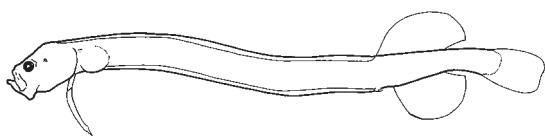
Habitat, biology, and fisheries: Meso- and bathypelagic. Feed as zooplankton pickers on copepods. All specimens histologically examined (more than 20) are males. Very rare deep-sea fishes of no commercial importance.

Remarks: Four genera with 7 or 8 species (3 undescribed) throughout the world ocean in tropical and subtropical latitudes. A family revision is necessary. More species are expected with further deep-sea collecting in the area.

Similar families occurring in the area

Mirapinnidae: nasal organ poorly developed; pelvic fins jugular with 4 to 10 rays.

Cetomimidae: jaws extending far behind eye; lateral line well developed; all but a single species with poorly developed nasal organs.



Mirapinnidae



Cetomimidae

List of species occurring in the area

Ataxolepis apus Myers and Freihof, 1966

Cetomimoides parri Koefoed, 1955 (unpublished record from the Philippines)

Reference

Becker, V.E. 1981. On the first record of a rare bathypelagic fish from the genus *Ataxolepis* (Megalomycteridae) in the southern hemisphere. *Vopr. Ikhtiol.*, 21(3):558-561. [In Russian, English transl. *J. Ichthyol.*, 21(3)]

Order BERYCIFORMES

ANOLOGASTRIDAE

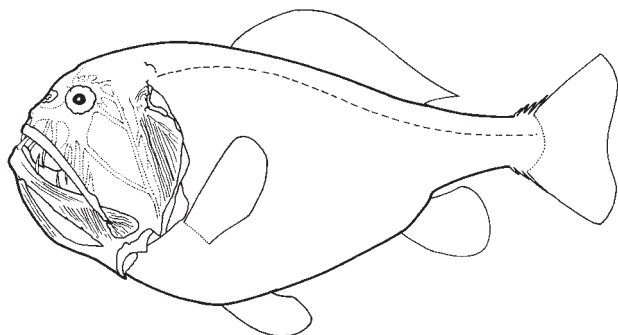
Fangtooths

by J.R. Paxton

Diagnostic characters: Small (to 16 cm) beryciform fishes, body short, deep, and compressed. Head large, steep; deep mucous cavities on top of head separated by serrated crests; very large temporal and preopercular spines and smaller orbital (frontal) spine in juveniles of one species, all disappearing with age. **Eyes smaller than snout length in adults** (but larger than snout length in juveniles). **Mouth very large, jaws extending far behind eye in adults; one supramaxilla. Teeth as large fangs in premaxilla and dentary;** vomer and palatine toothless. **Gill rakers as gill teeth in adults** (elongate, lath-like in juveniles). **No fin spines; dorsal fin long based, roughly in middle of body, with 16 to 20 rays; anal fin short-based, far posterior, with 7 to 9 rays; pelvic fin abdominal in juveniles, becoming subthoracic with age, with 7 rays; pectoral fin with 13 to 16 rays. Scales small, non-overlapping, spinose, cup-shaped in adults; lateral line an open groove partly covered by scales.** No light organs. Total vertebrae 25 to 28. **Colour:** brown-black in adults.

Habitat, biology, and fisheries: Meso- and bathypelagic. Distinctive caulolepis juvenile stage, with greatly enlarged head spines in one species. Feeding mode as carnivores on crustaceans as juveniles and on fishes as adults. Rare deepsea fishes of no commercial importance.

Remarks: One genus with 2 species throughout the world ocean in tropical and temperate latitudes. The family was revised by Kotlyar (1986).

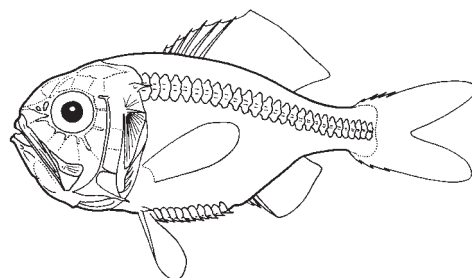


Similar families occurring in the area

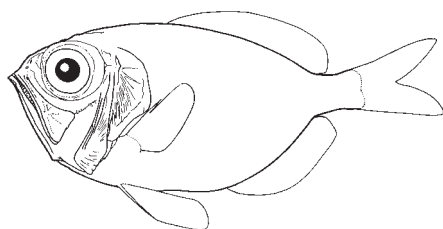
Diretmidae: No fangs, jaw teeth small, in bands; anal fin with 18 to 24 rays.

Trachichthyidae: No fangs, jaw teeth small, in bands; dorsal and anal fins with III to VIII and II or III spines respectively, in addition to soft rays.

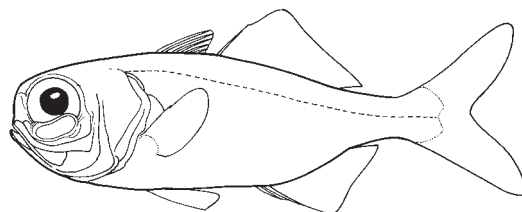
Anomalopidae: No fangs, jaw teeth small, in bands; dorsal and anal fins with II to IV and I or II spines respectively, in addition to soft rays.



Trachichthyidae



Diretmidae



Anomalopidae

List of species occurring in the area

- Anoplogaster brachycera* Kotlyar, 1986
Anoplogaster cornuta (Valenciennes, 1833)

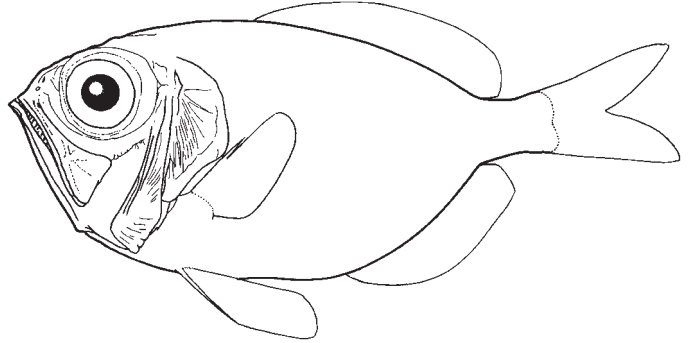
Reference

Kotlyar, A. N., 1986. Classification and distribution of fishes of the family Anoplogasteridae. *Vopr. Ikhtiol.*, 26(4):531-551. [in Russian, English transl. *J. Ichthyol.*, 26(4)]

DIRETMIDAE**Spinyfins**

by J.R. Paxton

Diagnostic characters: Moderate-sized (to 37 cm) beryciform fishes; body round to oval, strongly compressed. Head moderate to large, deep; deep mucous cavities on top of head separated by thin, serrated ridges; no spine on preopercle (except in young juveniles of some). **Eyes very large, much longer than snout length.** Mouth large, very oblique, **jaws not extending behind eye; 1 supramaxilla.** Teeth small, in villiform bands, on premaxilla and dentary; vomer and palatine toothless. Gill rakers lath-like. **No true fin spines; dorsal fin very long based, origin just behind pectoral-fin origin, with 24 to 30 soft rays; anal fin posterior, with 18 to 24 soft rays; pelvic fins subthoracic to thoracic, with I laminar, serrate spine and 6 soft rays; pectoral fins with 16 to 20 soft rays. Scales small, spinose; present on dorsal and anal-fin rays; no lateral line; enlarged midventral scutes present.** No light organs. Total vertebrae 26 to 32. **Colour:** silver and grey back.



Habitat, biology, and fisheries: Meso- and bathypelagic; largest adults of some species benthopelagic. Feeding mode as planktivores. Uncommon deep-sea fishes, sometimes locally more abundant in deep water, of no present commercial importance.

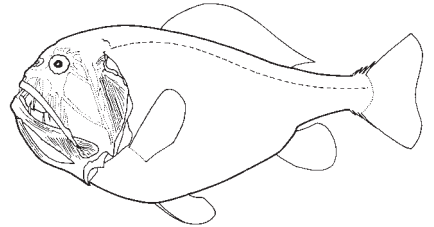
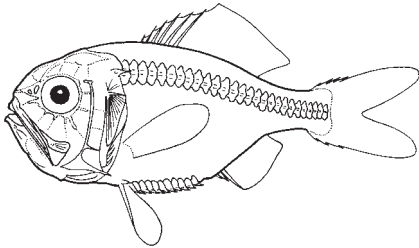
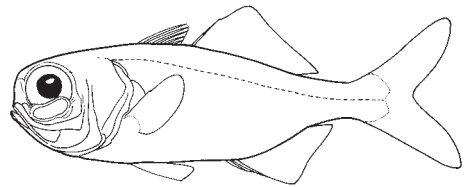
Remarks: Three genera with 4 species throughout the world ocean in tropical and temperate latitudes, except eastern North Pacific and Mediterranean Sea.

Similar families occurring in the area

Anoplogastridae: jaws with very large fangs; anal fin with 7 to 9 soft rays; pelvic fins without laminar spine.

Trachichthyidae: mucous cavities of head extensive; spine present on preopercle; dorsal and anal fins with spines; lateral-line scales distinct and usually enlarged.

Anomalopidae: large light organ present under eye; dorsal and anal fins with spines; lateral-line scales distinct and often enlarged.

**Anoplogastridae****Trachichthyidae****Anomalopidae****List of species occurring in the area**

Diretmichthys parini (Post and Quero, 1981)

Diretmoides pauciradiatus (Woods, 1973)

Diretmoides veriginae Kotlyar, 1987

Diretmus argenteus Johnson, 1864

Reference

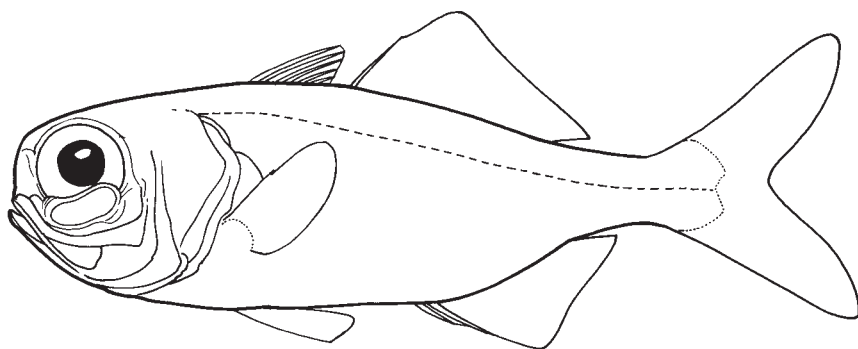
Kotlyar, A.N. 1990. *Diretmichthys*, a new genus of Diretmidae (Beryciformes). *Vopr. Ikhtiol.*, 30(1):144-151. [in Russian, English transl. *J. Ichthyol.*, 30(2)]

ANOMALOPIDAE

Flashlight fishes

by J.R. Paxton and G.D. Johnson

Diagnostic characters: Small to moderate-sized beryciform fishes (to 26 cm), oblong to moderately deep. Head moderate; snout blunt; moderate mucous cavities on top of head separated by broad ridges and covered by skin. **Eyes large, their diameter longer than snout length; large light organ below eyes, sometimes obscured by rotation downward or by curtain of dark skin.** Mouth moderate, oblique, **jaws not extending behind eyes;** 1 (*Anomalops*) or 2 supramaxillae. **Teeth** very small, conical, **on jaws and palatines, vomer toothless.** Snout blunt. One dorsal fin or spinous dorsal fin separate from second dorsal; **dorsal fin with II to VI spines and 14 to 19 soft rays;** anal fin with I or II spines and 9 to 14 soft rays; caudal fin deeply forked with 10+9 principal rays; pelvic fins with 0 to I spine and 5 to 7 soft rays; pectoral fins with 16 or 17 soft rays. Branchiostegal rays 8, ventral margins spiny or smooth. Scales small, strongly ctenoid; body scale rows 50 to 150, lateral-line scales 30 to 69; midventral scutes 5 to 19, reduced and discontinuous or moderate and continuous. Total vertebrae 30 (13-15+15-17). **Colour:** head and body brown to black; **external surface of light organ white;** lateral-line scales reflective or not.

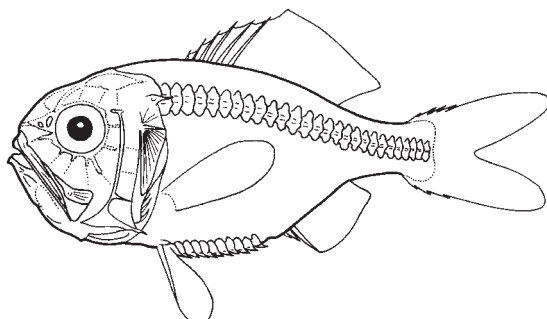


Habitat, biology, and fisheries: Mostly around coral reefs, from shallow water to a depth of 350 m, with some species migrating to the surface on moonless nights. Light organ colonized by luminous bacteria. Feeding mode as zooplankton pickers. At least 1 species schooling in large groups. Popular species in public aquaria, and a target for some local fishers as bait.

Remarks: Seven species in 6 genera are recognised, distributed in the Caribbean, Indian eastern Pacific and western Pacific from Tahiti to Japan, Australia, the Red Sea, and Comoro Islands. *Parmops coruscans* is known from only 3 specimens (Tahiti, Fiji) from 350 m, while *Protoblepharon rosenblatti* is known only from the holotype (Cook Islands) from 275 m.

Similar families occurring in the area

Trachichthyidae: no light organ under eyes in any species; midventral scutes of most species fewer and larger than those of anomalopids.



Trachichthyidae

Key to species of Anomalopidae in the area

- 1a. One dorsal fin with II spines and 18 or 19 soft rays; light organ not rotatable, obscured by raising black elastic shutter to cover lateral surface; midventral scutes reduced and discontinuous (Fig. 1) *Photoblepharon palpebratus*
- 1b. Two dorsal fins, the first with V or VI spines and the second with I spine and 14 to 16 soft rays; light organ rotatable downwards; midventral scutes well developed and continuous → 2
- 2a. Second dorsal fin with 16 soft rays; anal fin with II spines and 12 soft rays; 2 supramaxilla; lateral-line scales 30 (Fig. 2) *Parmops coruscans*
- 2b. Second dorsal fin with 14 or 15 soft rays; anal fin with II spines and 10 or 11 soft rays; 1 supramaxillae; lateral-line scales 57 to 60 → 3
- 3a. First dorsal fin with IV or V spines; gill rakers on first arch 28 to 34; light organ length 35.4% head length (Fig. 3) *Anomalops katoptron*
- 3b. First dorsal fin with VI spines; gill rakers on first arch 21, including bony plates; light organ length 14.5% head length *Protoblepharon rosenblatti*

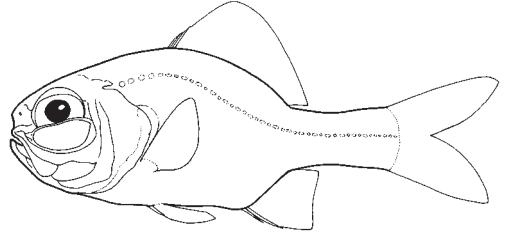


Fig. 1 *Photoblepharon palpebratus*

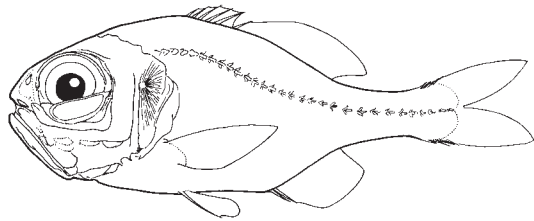


Fig. 2 *Parmops coruscans*

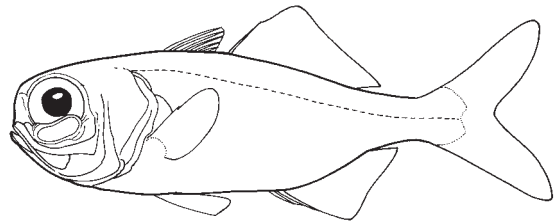


Fig. 3 *Anomalops katoptron*

List of species occurring in the area

- Anomalops katoptron* (Bleeker, 1856)
- Parmops coruscans* Rosenblatt and Johnson, 1991
- Parmops* sp. nov. (Fiji)
- Photoblepharon palpebratus* (Boddaert, 1781)
- Protoblepharon rosenblatti* Baldwin, Johnson, and Paxton, 1997

References

Baldwin, C.C., G.P. Johnson, and J.R. Paxton. 1997. *Protoblepharon rosenblatti*, a new genus and species of flashlight fish (Beryciformes: Anomalopidae) from the tropical South Pacific, with comments on anomalopid phylogeny. *Proc. Biol. Soc. Wash.*, 110(3):373-383.

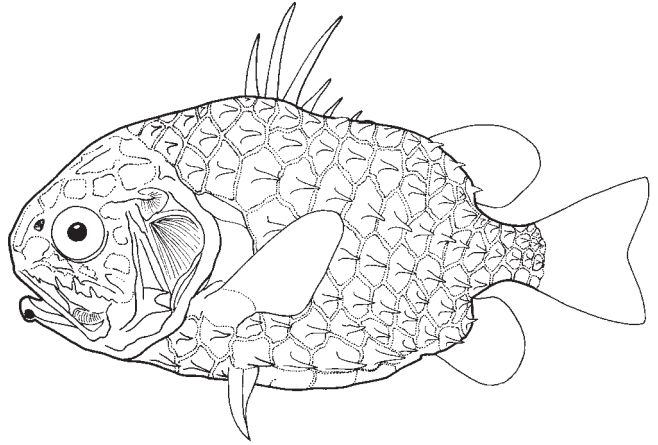
Rosenblatt, R. H. and G.D. Johnson. 1991. *Parmops coruscans*, a new genus and species of flashlight fish (Beryciformes: Anomalopidae) from the south Pacific. *Proc. Biol. Soc. Wash.*, 104(2):328-334.

MONOCENTRIDAE

Pineapple fishes

by J.R. Paxton

Diagnostic characters: Moderate-sized (to 26 cm) beryciform fishes; body short, deep, and compressed. Head large and deep; deep mucous cavities on top of head separated by thin, spinous ridges and covered by skin. Eyes moderate to large, somewhat larger than snout length. Snout protruding slightly beyond mouth. Mouth large, **jaws extending to or somewhat behind eyes; 1 supramaxilla. Teeth small, in bands on jaws and palatine, present or absent on vomer.** Gill rakers lath-like. **Two dorsal fins, first with IV to VII strong free spines alternating side to side, second with 9 to 12 soft rays; anal fin with no spines and 10 to 12 soft rays; pelvic fins subthoracic with I very large spine and 2 to 4 small soft rays; pectoral fins with 13 to 15 rays. Scales large, non-overlapping, plates with central keel and posterior spine; ventral scales forming keel between pelvic and anal fins with lateral groove for pelvic-fin spine. No lateral line. Light organ on lower jaw, either on anterior just below tip or on side under eye.** Total vertebrae 26 to 28. **Colour:** yellow with black between scale plates, lateral light organ (*Cleidopus*) red.



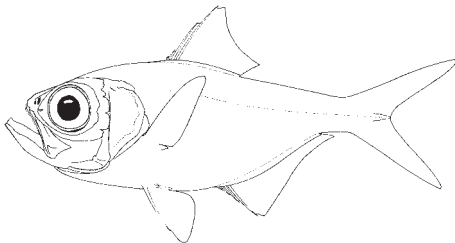
Habitat, biology, and fisheries: Demersal from 3 m to about 300 m. Feeding mode as plankton pickers or carnivores on crustaceans. Uncommon shelf fishes popular in aquaria, but of no other commercial importance.

Remarks: Two genera and 3 species known only in the Indian and Pacific Oceans, except the Northeast Pacific, in tropical and temperate latitudes.

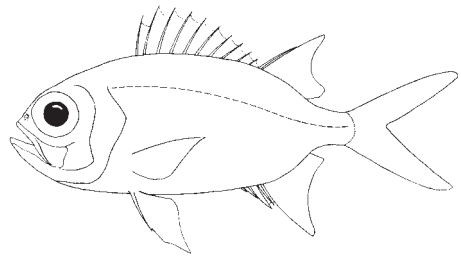
Similar families occurring in the area

Berycidae: no greatly enlarged free spines in dorsal or pelvic fins; scales not greatly enlarged and plate-like; body colour not yellow.

Holocentridae: no greatly enlarged free spines in dorsal or pelvic fins; anal fin with spines; body colour not yellow.



Berycidae



Holocentridae

List of species occurring in the area

Cleidopus gloriamaris DeVis, 1882

Monocentris japonica (Houttuyn, 1782)

Reference

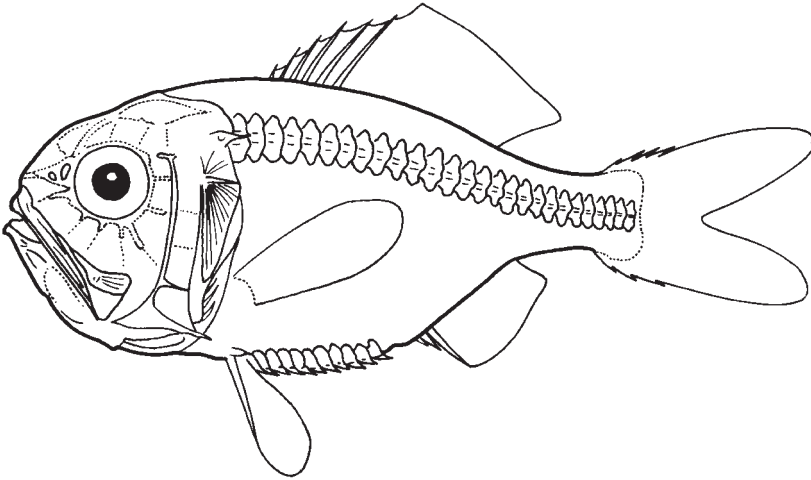
Kotlyar, A.N. 1985. Taxonomy and distribution range of the family Monocentridae (Beryciformes). *Vopr. Ikhtiol.* 25(4):531-545. [in Russian, English transl. *J. Ichthyol.* 25(4)]

TRACHICHTHYIDAE

Slimeheads (roughies)

by J.A. Moore and J.R. Paxton

Diagnostic characters: Medium-sized (to about 60 cm) beryciform fishes; body oval, laterally compressed. Head large, **extensive mucous cavities separated by spinous ridges and covered with membranous skin; flat, triangular spine on preopercle.** Eyes moderate to large in diameter, longer or shorter than snout length. Mouth large, obliquely angled when closed; **1 supramaxilla. Teeth small, in villiform bands on jaws, present or absent on vomer, present on palatine. One dorsal fin with III to VIII striated spines and 10 to 19 soft rays; anal fin with II or III spines and 8 to 12 soft rays; caudal fin forked, with 4 to 6 procurent spines in upper and lower lobes; pelvic fins with I spine and 6 soft rays; pectoral fins with 11 to 20 rays. Scales thick and ctenoid or thin and cycloid, adherent to very deciduous. Lateral-line scales usually more or less enlarged. Enlarged scales along midventral part of belly between pelvic and anal fins, forming row of well-developed scutes.** Light organs in a few species. **Colour:** generally reddish orange, pinkish, or dusky silver.

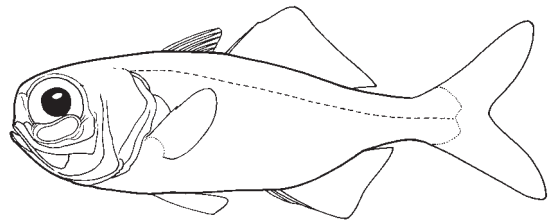


Habitat, biology, and fisheries: Occurring near bottom in depths of 2 to 1 500 m (most commonly between 150 and 650 m, but abundant aggregations of certain species occur between 700 and 1 200 m). Can be very abundant locally. Feed primarily on small crustaceans. Extensive fisheries for orange roughy (*Hoplostethus atlanticus*) in New Zealand, Australia, Namibia, west of Britain, and the mid-Atlantic Ridge, where marketed fresh, exported frozen, or made into fishmeal. Useful oils and waxes are also extracted from this species. Local abundance and recent trends towards development of deep-water fisheries make other species of potential commercial importance.

Remarks: At least 40 species in 8 genera are currently recognized, with a number of undescribed species awaiting description. The family occurs in slope waters of all oceans and shallow waters of Australia and New Zealand. The most comprehensive reviews are that of Kotlyar (1980 and 1996), but some of the Pacific species still require revision, and more species in the area are expected.

Similar families occurring in the area

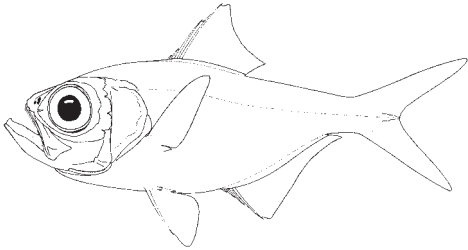
Anomalopidae: large light organ under eye in all species (may be obscured by curtain of dark skin or rotation inward); midventral scutes more numerous and smaller than those of trachichthyids.



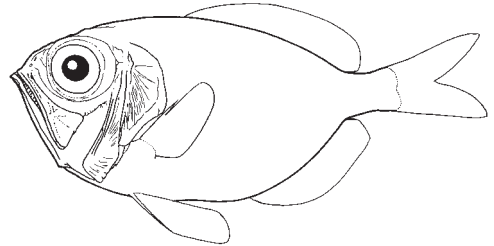
Anomalopidae

Berycidae: no spine on preopercle; 2 supramaxillae (1 in Trachichthyidae); anal-fin spines IV (II or III in Trachichthyidae); pelvic fin with 7 to 12 soft rays (6 in Trachichthyidae).

Diretmidae: no spine on preopercle; no dorsal-or anal-fin spines; no lateral line.



Berycidae



Diretmidae

Key to the genera of Trachichthyidae occurring in the area

- 1a. Anus with dark ring between pelvic fins, anterior to abdominal scutes; striated area before pectoral-fin base and over abdominal scutes and anal fin (Fig. 1) *Aulotrachichthys*
- 1b. Anus just anterior to anal fin, posterior to abdominal scutes; no striated areas on body (except for *Hoplostethus metallicus*) → 2
- 2a. Body depth less than 40% of standard length (Fig. 2) *Optivus*
- 2b. Body depth greater than 40% of standard length → 3

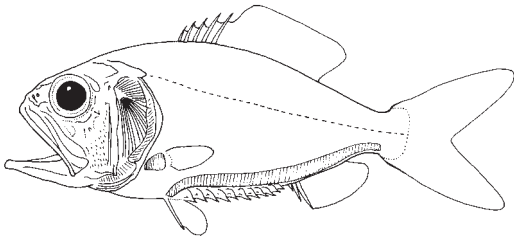


Fig. 1 *Aulotrachichthys*

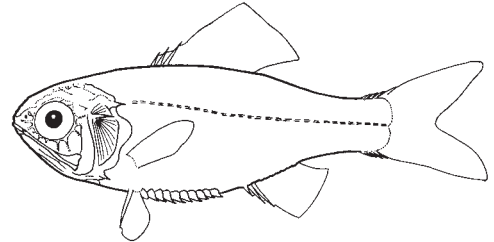


Fig. 2 *Optivus*

- 3a. Dorsal fin with III spines; dorsal and anal fins sickle-shaped with elongate anterior soft rays (Fig. 3) *Trachichthys*
- 3b. Dorsal fin with IV to VIII spines; dorsal and anal fins rounded to emarginate, anterior soft rays not elongated → 4

- 4a. Lateral-line scales enlarged and diamond-shaped (Fig. 4) *Hoplostethus*
- 4b. Lateral-line scales not enlarged → 5

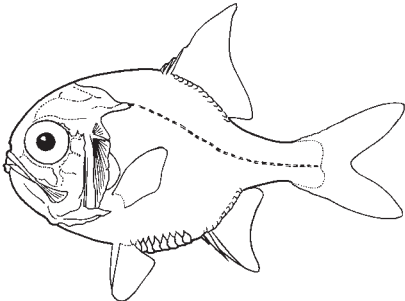


Fig. 3 *Trachichthys*

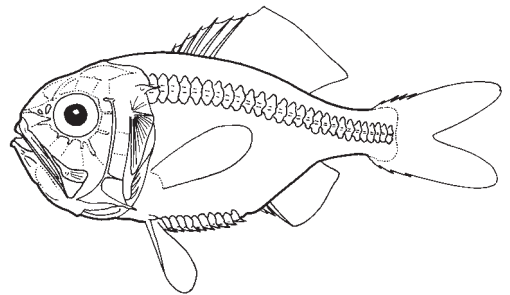


Fig. 4 *Hoplostethus*

- 5a.** Dorsal fin with VIII (very rarely VII) spines; body scales with flat, triangular, posteriorly projecting spines (Fig. 5) ***Gephyroberyx***
- 5b.** Dorsal fin with V spines; body scales with small, round, laterally projecting spines (Fig. 6) ***Parinoberyx***

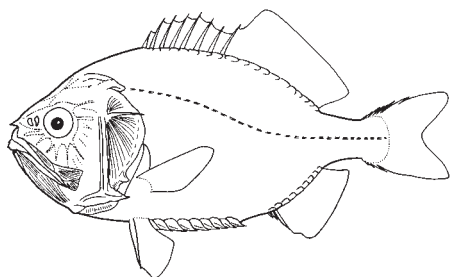


Fig. 5 *Gephyroberyx*

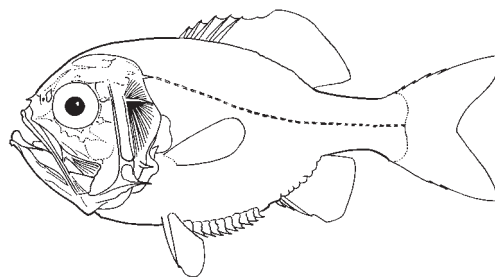


Fig. 6 *Parinoberyx*

List of species occurring in the area

- Aulotrachichthys latus* (Fowler, 1938)
Aulotrachichthys sp.
Gephyroberyx darwini (Johnson, 1866)
Gephyroberyx philippinus Fowler, 1938
Hoplostethus crassispinus Kotlyar, 1980
Hoplostethus japonicus Hilgendorf, 1879
Hoplostethus mediterraneus Cuvier, 1829
Hoplostethus melanopterus Fowler, 1938
Hoplostethus melanopus (Weber, 1913)
Hoplostethus metallicus Fowler, 1938
Hoplostethus sp.
Optivus sp.
Parinoberyx horridus Kotlyar, 1984
Trachichthys australis Shaw, 1799

References

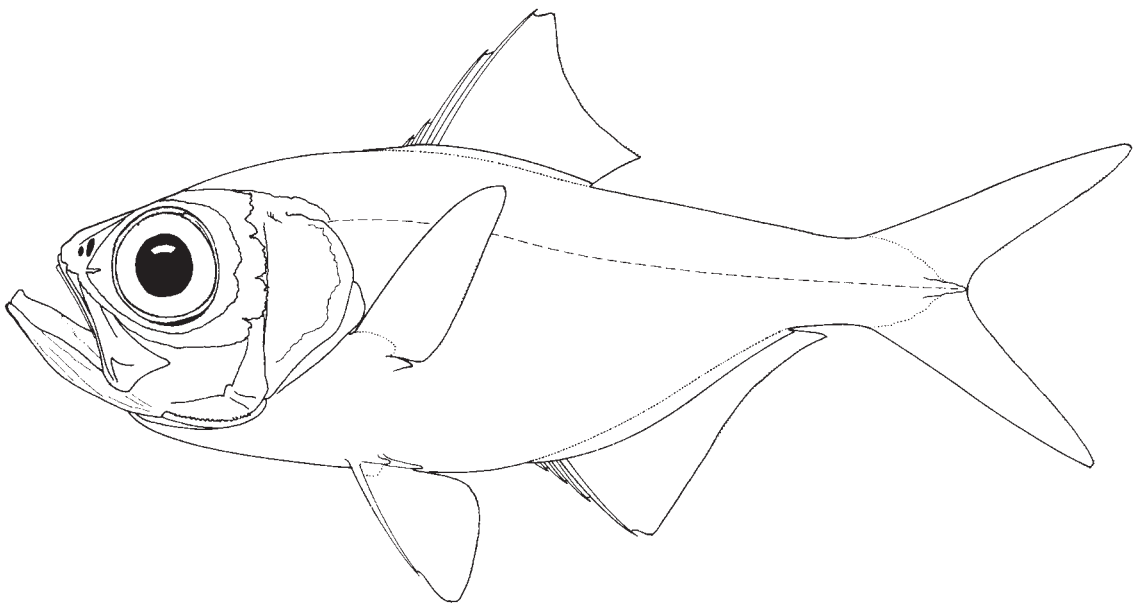
- Kotlyar, A.N. 1980. Systematics and distribution of trachichthyid fishes (Trachichthyidae, Beryciformes) of the Indian Ocean. Trudy Inst. Okeanol. Akad. Nauk S.S.S.R. 110:177-224. [in Russian]
- Kotlyar, A.N. 1996. *Beryciform fishes of the world ocean*. Moscow, VNIRO Publishing, 368 p. [in Russian]

BERYCIDAE

Alfonsinos

by J.R. Paxton

Diagnostic characters: Moderate-sized (to 60 cm) beryciform fishes, **body moderately deep to very deep**, compressed. Head moderately large; **large, deep mucous cavities on top of head separated by thin ridges and covered by skin**; small spines present or absent on snout, over eyes and behind end of jaw; anterior edge of nasal bone on snout dentate (*Centroberyx*) or smooth (*Beryx*); **cheeks and opercles with scales**; opercle crenate or smooth, with 1 or 2 flat keels, no opercular spines; **no spine on preopercle**. **Eyes very large, its diameter greater than snout length**. **Mouth large, oblique, jaws not reaching posterior margin of eyes; maxilla expanded posteriorly; lower jaw protrudes anteriorly beyond upper; 2 supramaxillae**. Teeth small, in villiform bands on jaws, vomer and palatine. **One dorsal fin with III to VII spines and 11 to 20 soft rays; anal fin with III or IV spines and 12 to 30 soft rays**; caudal fin distinctly forked, with 17 or 18 principal rays; **pelvic fins with I spine and 7 to 13 soft rays**; pectoral fins with 13 to 19 rays. Branchiostegal rays 7 or 8. Scales spinose, very rough to touch; lateral line with 36 to 82 scales, extending onto caudal fin (*Beryx*) or not (*Centroberyx*); enlarged scales between pelvic and anal fins present (*Centroberyx*) or absent (*Beryx*). Gill rakers lath-like, total of 22 to 34 on first gill arch. No light organs present. Total vertebrae 24 or 25. **Colour:** basic colour pinkish red on head, body and fins, with silvery, golden, yellow, or white in smaller proportions.



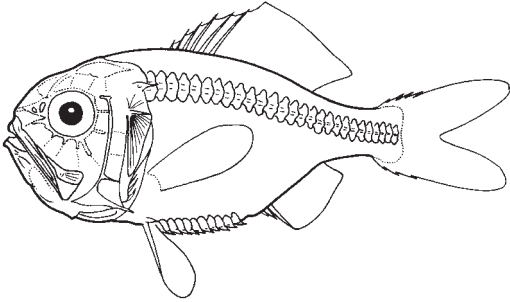
Habitat, biology, and fisheries: Benthic or benthopelagic fishes of shelf and slope to depths of at least 1 300 m; often found over seamounts; vertical migration into shallower water at night for some species. Feeding mode as carnivores on mesopelagic crustaceans, squids, and fishes. The species of *Beryx* are commercially important in many areas of the world, while at least 1 species of *Centroberyx* is commercially important, primarily in eastern Australia. They are usually taken in bottom trawls, or on longlines.

Remarks: Two genera and 9 or 10 species throughout the world ocean in temperate and tropical latitudes, except the Northeast Pacific.

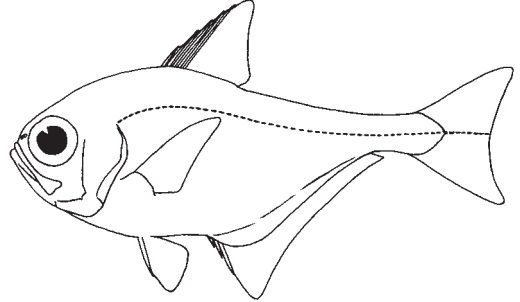
Similar families occurring in the area

Trachichthyidae: pelvic fins with I spine and 6 soft rays; anal fin with II or III spines and 8 to 12 soft rays; 1 supramaxilla.

Pempheridae: pelvic fins with I spine and 5 soft rays; very long anal fin; narrow caudal peduncle; colour bronze, tan, or cream, never pink or red.



Trachichthyidae



Pempheridae

Key to the species of Berycidae occurring in the area

- 1a. Dorsal fin with III to V spines; soft anal-fin rays 25 to 30; pelvic fins with I spine and 9 to 13 soft rays; lateral-line scales 60 to 82, extending onto caudal fin; 1 or 2 small spines present on either side of snout, most pronounced in juveniles → 2
- 1b. Dorsal fin with VI or VII spines; soft anal-fin rays 12 to 16; pelvic fins with I spine and 7 soft rays; lateral-line scales 36 to 62, not extending onto caudal fin; no spine present on snout → 3
- 2a. Dorsal fin with 12 to 15 soft rays; head with only 1 spine on snout, most pronounced in juveniles; body moderately deep, its depth about equal to head length and 2.4 to 2.8 times in standard length to base of caudal fin (Fig. 1) *Beryx splendens*
- 2b. Dorsal fin with 16 to 20 soft rays; head with 4 spines, 2 on snout, 1 over eye, 1 behind end of jaw, most pronounced in juveniles; body very deep, its depth much greater than head length and 1.9 to 2.5 times in standard length to base of caudal (Fig. 2) *Beryx decadactylus*

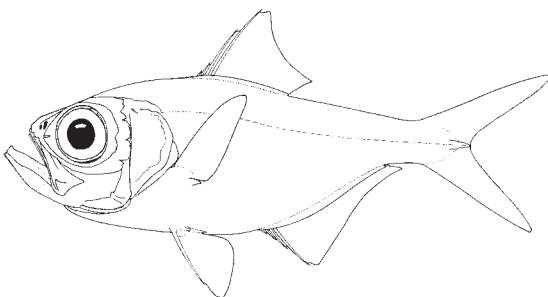


Fig. 1 *Beryx splendens*

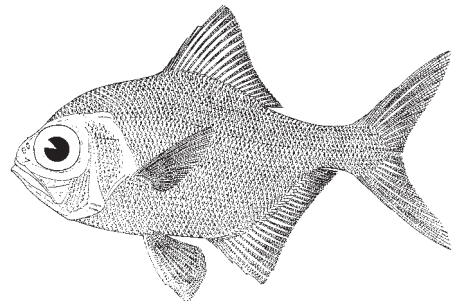


Fig. 2 *Beryx decadactylus*

- 3a. Anal fin with 12 soft rays; lateral-line scales 40 to 44; 3 rows of scales on cheek (Fig. 3)
 *Centroberyx affinis*
- 3b. Anal fin with 15 to 17 soft rays; lateral-line scales 53 to 62; 5 rows of scales on cheek
 (Fig. 4) *Centroberyx druzhinini*

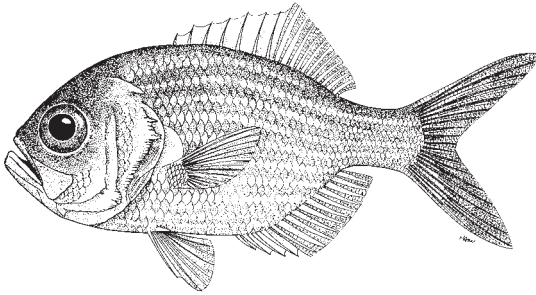


Fig. 3 *Centroberyx affinis*

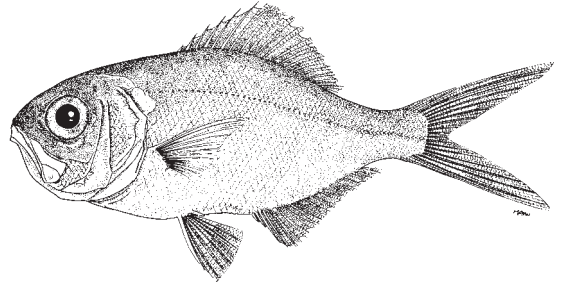







Fig. 4 *Centroberyx druzhinini*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Beryx decadactylus* Cuvier, 1829
-  *Beryx splendens* Lowe, 1834
-  *Centroberyx affinis* (Günther, 1859)
-  *Centroberyx druzhinini* (Busakhin, 1981)

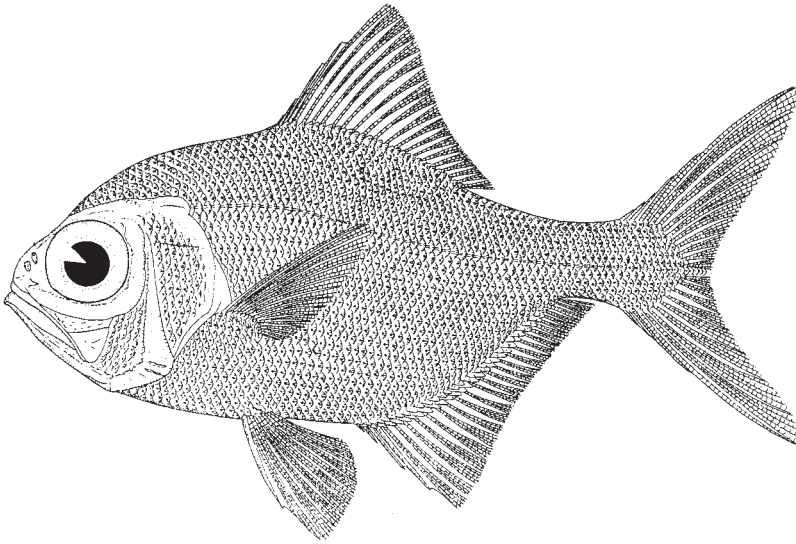
References

- Busakhin, S.V. 1982. Systematics and distribution of the family Berycidae (Osteichthyes) in the World Ocean. *Vopr. Ikhtiol.*, 22(6):904-921. [in Russian, English transl. *J. Ichthyol.*, 22(6)]
- Kotlyar, A.N. 1996. *Beryciform fishes of the world ocean*. Moscow, VNIRO Publishing, 368 p. [in Russian]

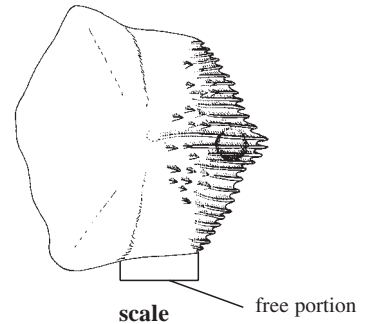
Beryx decadactylus Cuvier, 1829

Frequent synonyms / misidentifications: None / *Beryx splendens* Lowe, 1834.

FAO names: En - Alfonsino; Fr - Beryx commun; Sp - Alfonsino palometón.



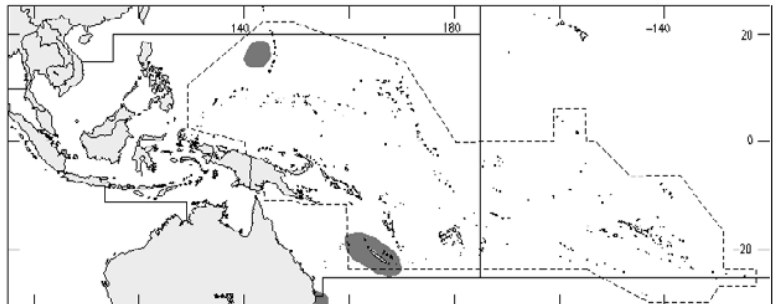
Diagnostic characters: Body very deep, greatest depth 1.9 to 2.5 times in standard length and significantly more than head length. Two small spines on snout, 1 over eye and 1 behind end of jaw, less distinct in larger fish. Dorsal fin with III to V spines and 16 to 20 soft rays, first 3 dorsal-fin rays may be elongate in smaller specimens; anal fin with III or IV spines and 25 to 30 soft rays; pelvic fins with I spine and 9 or 10 soft rays, first pelvic-fin ray may be very elongate in smaller specimens, all rays very elongate in some specimens; pectoral fins with 14 to 18 rays. Lateral line with 59 to 73 scales, extending onto caudal fin. Pyloric caecae 61 to 98. **Colour:** upper head and body, all fins and iris of eye bright red, becoming silvery-pink below.



Size: Maximum total length about 60 cm, commonly to about 35 cm; weight to 2.5 kg.

Habitat, biology, and fisheries: Benthopelagic fishes of outer shelf (180 m) and slope to at least 1 000 m, moving further from the bottom at night; often found over seamounts; juveniles pelagic. Commercially important in some areas (Madeira, Indian Ocean), where it is caught by both trawlers and longliners and marketed mostly fresh. In most areas it is both less common and less desirable than *Beryx splendens*.

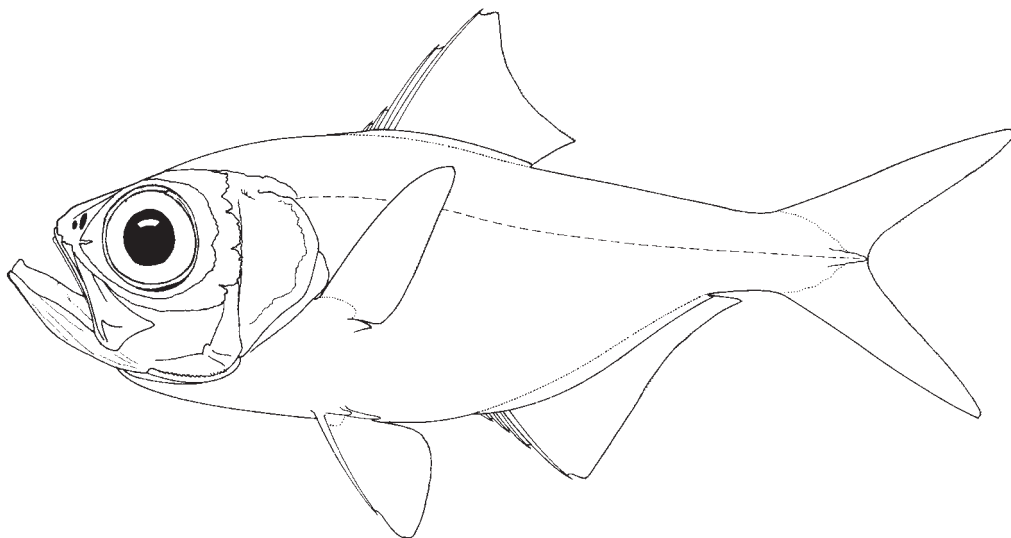
Distribution: Circumglobal, except Northeast Pacific; the limited number of records in the area is doubtless the result of limited fishing effort below 200 m.



Beryx splendens Lowe, 1834

Frequent synonyms / misidentifications: None / *Beryx decadactylus* Cuvier, 1829; *B. mollis* Abe, 1959.

FAO names: En - Slender alfonsino; Fr - Beryx long; Sp - Alfonsino besugo.

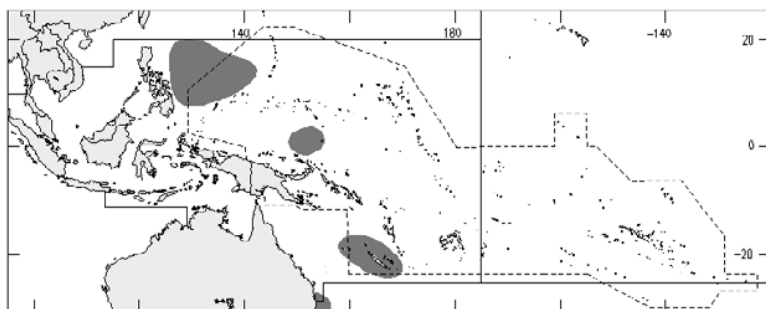


Diagnostic characters: Body depth moderate, greatest depth 2.4 to 2.8 times in standard length and equal to or slightly more than head length. One small spine on snout, less distinct in larger specimens, none elsewhere on head. Dorsal fin with III to V spines and 12 to 15 soft rays, first dorsal-fin rays may be elongate in smaller specimens; anal fin with IV spines and 25 to 30 soft rays; pelvic fins with I spine and 9 to 13 soft rays; pectoral fins with 15 to 19 rays. **Lateral line with 69 to 82 scales, extending onto caudal fin.** Pyloric caecae 23 to 34. **Colour:** upper head and body, all fins and iris of eye bright red, becoming silvery-pink below.

Size: Maximum total length 60 cm.

Habitat, biology, and fisheries: Benthopelagic fishes of outer shelf (180 m) and slope to at least 1 300 m, probably moving further from the bottom at night; often found over seamounts; juveniles pelagic. Commercially important in many areas (Madeira, Japan, New Caledonia), where it is caught by both trawlers and longliners and marketed mostly fresh. In most areas, this is both the more common and the preferred, of the 3 species of *Beryx*.

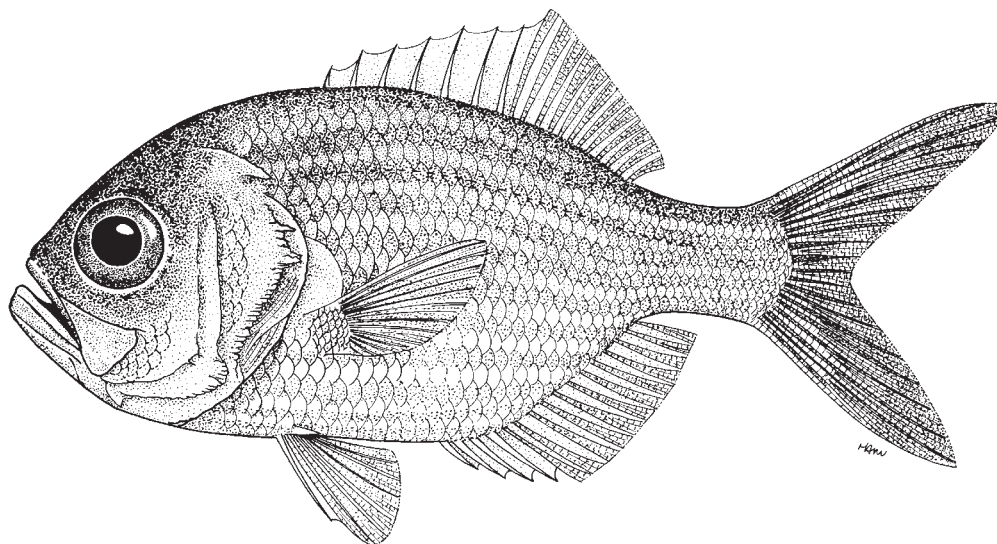
Distribution: Circumglobal, except Northeast Pacific and Mediterranean Sea; the limited number of records in the area is doubtless the result of limited fishing effort below 200 m.



Centroberyx affinis (Günther, 1859)

Frequent synonyms / misidentifications: None / *Centroberyx gerrardi* (Günther, 1887).

FAO names: En - Nannygai.

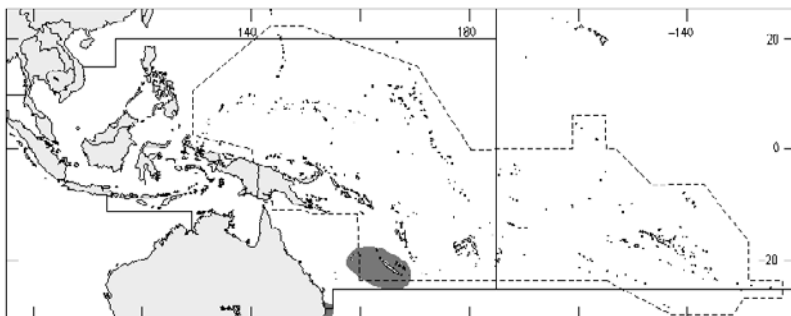


Diagnostic characters: Cheek with 3 rows of scales. Pelvic-fin origin before dorsal-fin origin. Dorsal fin with VI or VII spines and 11 to 13 soft rays; anal fin with IV spines and 12 soft rays; pelvic fins with I spine and 7 soft rays; pectoral fins with 13 or 14 rays. Lateral line with 40 to 44 scales, not extending onto caudal fin. **Colour:** upper head and body, caudal fin, and iris of eye orange-red, becoming silvery-pink below, with horizontal golden-silver lines sometimes present; other fins pink.

Size: Maximum total length 50 cm (angling record 2 kg); present catches average less than 20 cm fork length.

Habitat, biology, and fisheries: Juveniles in estuaries, adults on shelf and upper slope, rarely to a depth of 700 m; adults benthic, moving into water column at night; largest trawl catches between 100 and 300 m. Commercially important off southeastern Australia, where it is caught by bottom trawlers and marketed fresh. Previously more than 2 000 t/year were caught, but present catches are less than 1 000 t/year.

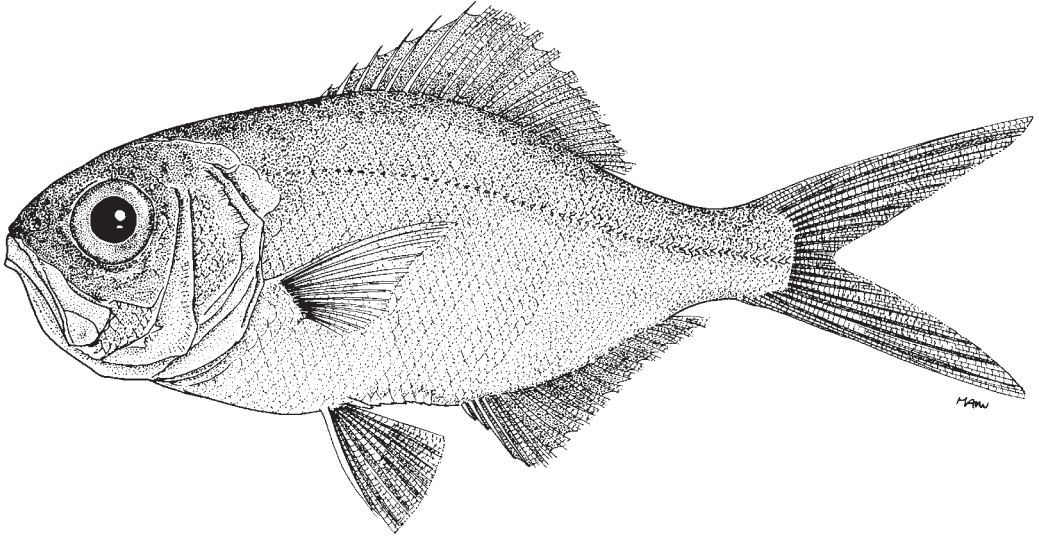
Distribution: Eastern Australia from the western edge of Bass Strait (previous records from southern and southwestern Australia based on misidentifications) and mid-way down the east coast of Tasmania north to just north of Brisbane, Queensland; New Zealand around the North Island, rare south of Cook Strait; recently recorded from the Chesterfield Islands and New Caledonia.



Centroberyx druzhinini (Busakhin, 1981)

Frequent synonyms / misidentifications: None / *Centroberyx lineatus* (Cuvier, 1829).

FAO names: En - Druzhinin's alfonsino.

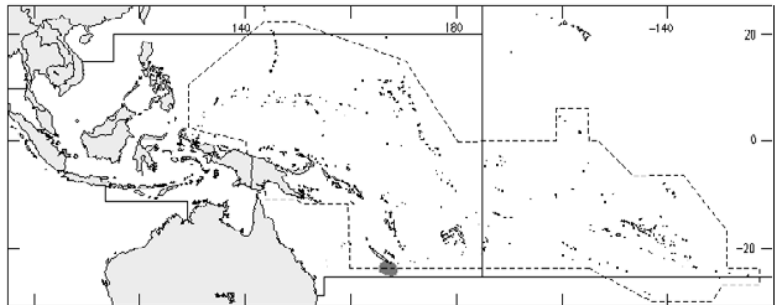


Diagnostic characters: Cheek with 5 rows of scales. Pelvic-fin origin under dorsal-fin origin. Dorsal fin with V to VII spines and 12 to 15 soft rays; anal fin with IV spines and 15 to 17 soft rays; pelvic fins with I spine and 7 soft rays; pectoral fins with 13 rays. Lateral line with 53 to 62 scales, not extending onto caudal fin. **Colour:** head and upper body and all fins except pectoral fins bright red, becoming silvery white below; pectoral fins pink; iris of eye yellow.

Size: Maximum total length 23 cm.

Habitat, biology, and fisheries: A benthic or benthopelagic fish trawled in 100 to 300 m. Only a few records have been published, nothing is known of its biology, and the few specimens captured do not indicate a potential commercial fishery.

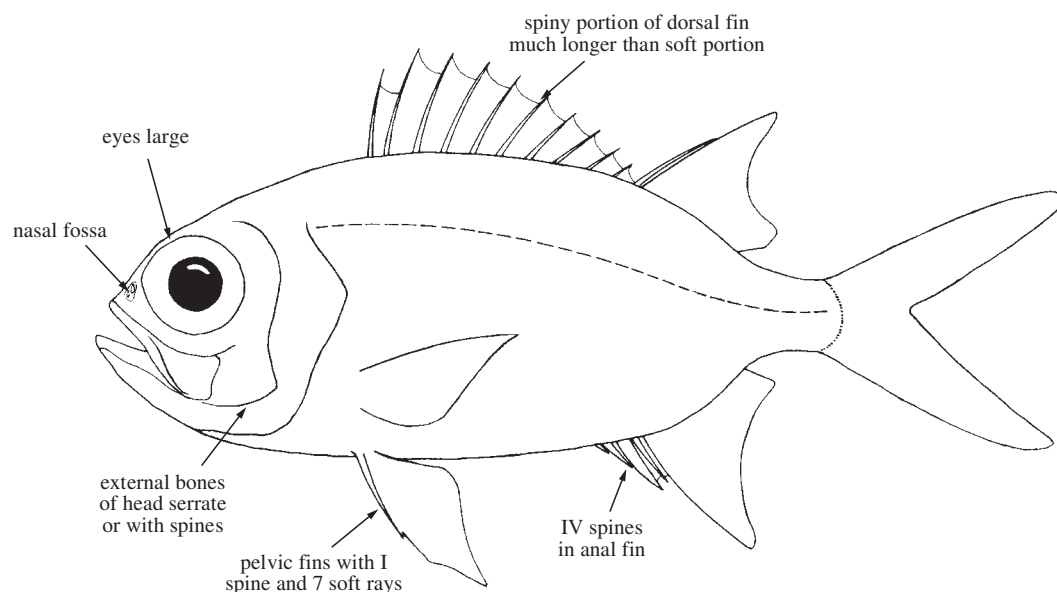
Distribution: Described from the western Indian Ocean, and recorded from Japan, the Sulu Sea, and more recently New Caledonia.



HOLOCENTRIDAE**Squirrelfishes (soldierfishes)**

by J.E. Randall and D.W. Greenfield

Diagnostic characters: Body ovate to moderately elongate; body compressed; caudal peduncle slender; ridges and mucous channels dorsally on head; **edges of external bones of head serrate or with spines. Eyes very large.** Mouth terminal or with lower jaw projecting; gape slightly to strongly oblique; mouth moderately large, the maxilla extending posterior at least to a vertical at front edge of pupil (often beyond middle of eye); upper jaw protractile; 2 supramaxillae present; small villiform teeth in bands in jaws and on roof of mouth (on vomer, palatines, and for some species on ectopterygoids). Branchiostegal rays 8. Dorsal-fin base long, base of spinous portion 2 to 4 times that of soft portion; **dorsal fin with XI to XIII (rarely XIII) stout spines and 12 to 17 soft rays, deeply or completely notched between spinous and soft portions or between last 2 dorsal-fin spines;** **anal fin with IV spines, the third stoutest and often longest, and 7 to 16 soft rays;** **pelvic fins with I spine and 7 soft rays;** **caudal fin forked with 17 branched rays. Lateral-line complete, the pored scales 25 to 56; scales of body strongly ctenoid;** surface of scales smooth or with ridges. **Colour:** usually red or pink, scale centres of body often lighter (may be silvery white), thus forming longitudinal bands; black pigment may be present on opercular membrane or as markings in fins; fins may also have yellow or white markings.



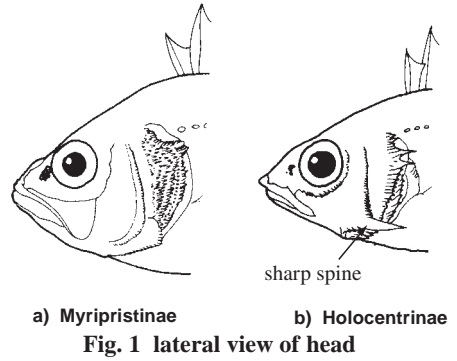
Habitat, biology, and fisheries: Most of the squirrelfishes (subfamily Holocentrinae) and soldierfishes (subfamily Myripristinae) live in relatively shallow water on coral reefs or rocky bottoms, but a few (particularly the genus *Ostichthys*) occur in depths of 200 m or more. The holocentrid fishes are believed to be derived from deep-dwelling berycoid ancestors. Their large eyes suit them well for their nocturnal habits. The family is also well known for sound production. The squirrelfishes feed mainly on crustaceans living on or near the bottom, whereas the soldierfishes of the genus *Myripristis* feed on the larger elements of the zooplankton. The preopercular spine of at least some species of *Sargocentron* is venomous. Although wounds from these spines may be very painful, they are not as serious as those from the dorsal-fin spines of most scorpionfishes. Many of the holocentrids are too small to be of any commercial value; the largest are frequently seen in local markets, but rarely in abundance.

Similar families occurring in the area

None. The serrate bony edges and spines on the head, in combination with the large eyes, the very long base on the spinous portion (as compared to soft portion) of the dorsal fin, the presence of IV spines in the anal fin and of 7 soft rays in the pelvic fins, readily distinguishes the squirrelfishes and soldierfishes from other fish families occurring in the area.

Key to the genera of Holocentridae occurring in the area

- 1a. Corner of preopercle either rounded or without a sharp spine (at most with a short, very broad spine) (Fig. 1a); front of swimbladder bifurcate, each anterior projection connected to an auditory bulla of skull; anal-fin rays 10 to 16 (rarely 10, except for *Ostichthys delta*) (subfamily **Myripristinae**) → 2
- 1b. Corner of preopercle with a sharp stout spine, longer than broad (Fig. 1b); front of swimbladder blunt, with no connection to auditory bullae of skull; anal-fin rays 7 to 10 (rarely 10, except in *Sargocentron spiniferum* and *S. ensifer*) (subfamily **Holocentrinae**) → 5



- 2a. Dorsal-fin spines XI; first gill arch with 19 to 33 gill rakers on lower limb; scales finely to moderately ctenoid *Myripristis*
- 2b. Dorsal-fin spines XII (except *Ostichthys delta* with XI); first gill arch with 11 to 18 gill rakers on lower limb; scales coarsely ctenoid → 3
- 3a. Premaxillary groove long and narrow, nasal bone margins parallel (Fig. 2a); vertebrae 29 . . . *Pristilepis* (a single species, *P. oligolepis* (Whitley), in the genus; known from Western Australia, Lord Howe Island, Japan, and Easter Island, but not yet recorded from the area)
- 3b. Premaxillary groove either broadly V-shaped or rhomboidal (Fig. 2b, c); vertebrae 26 or 27 → 4

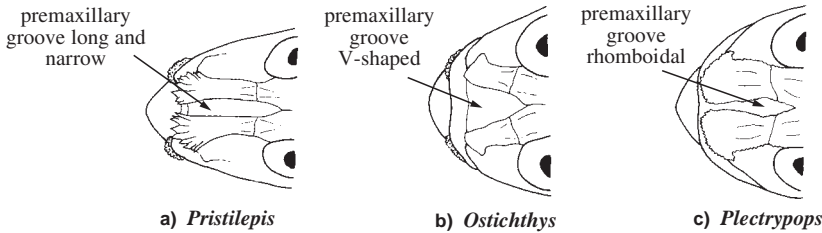


Fig. 2 dorsal view of head

- 4a. Premaxillary groove broadly V-shaped; longest dorsal-fin spine 1.9 to 2.6 times in head length; lateral-line scales 28 to 38 *Ostichthys*
- 4b. Premaxillary groove narrow and rhomboidal; longest dorsal-fin spine 2.5 to 2.9 times in head length; lateral-line scales 40 to 42 (in Indo-Pacific species) *Plectrypops* (a single species, *P. lima*, occurring in the area)
- 5a. Last dorsal-fin spine shortest, equidistant between penultimate spine and first soft ray (Fig. 3a); lower jaw not projecting (except in *S. spiniferum*); ground colour red *Sargocentron*^{1/}
- 5b. Last dorsal-fin spine longer than penultimate spine, much closer to first soft ray than to penultimate spine (Fig. 3b); lower jaw projecting; ground colour silvery to silvery pink . . . *Neoniphon*^{2/}



Fig. 3 dorsal fin

1/ The genus *Adioryx* is a junior synonym.
 2/ The genus *Flammeo* is a junior synonym.

Key to the species of *Myripristis* occurring in the area

- 1a. No scales in axil of pectoral fins (except occasionally in *M. amaena*, then only a few small scales ventrally in axil); lateral-line scales 27 to 44 → 2
- 1b. Numerous small scales (Fig. 4a) or 1 or 2 large scales (Fig. 4b) in axil of pectoral fins (except Marquesan specimens of *M. berndti* which lack scales in axil of pectoral fins, or have only a few); lateral-line scales 25 to 32 → 12
- 2a. Two pairs of symphyseal tooth patches, one above the other, at tip of lower jaw just outside gape (Fig. 5) (lower pair usually absent in specimens smaller than about 9 cm standard length); peritoneum black; lateral-line scales 27 to 29; total gill rakers on first gill arch 30 to 38 → 3
- 2b. A single pair of symphyseal tooth patches at tip of lower jaw just outside gape (occasional large specimens of *M. chryseres* from Hawaii, and specimens of *M. trachyacron*, with a second smaller lower pair); peritoneum translucent whitish; lateral-line scales 28 to 44; total gill rakers on first gill arch 29 to 48 → 4
- 3a. Interorbital not very narrow, its width 4.5 to 5.65 times in head length; caudal-peduncle length 6.2 to 7.25 times in standard length; first gill arch with 10 to 13 gill rakers on upper limb (total gill rakers on first gill arch 32 to 38); a prominent black spot distally on caudal-fin lobes and elevated portions of soft dorsal and anal fins *Myripristis botche*
(western Pacific and Indian oceans)
- 3b. Interorbital very narrow, its width 5.75 to 5.95 times in head length; caudal-peduncle length 8.4 to 9.1 times in standard length; first gill arch with 10 gill rakers on upper limb (total gill rakers on first gill arch 30 to 32); no distinct black spot distally on caudal-fin lobes and elevated portions of soft dorsal and anal fins (but some black pigment may be present on rays at these locations) *Myripristis robusta*
(Philippines and Papua New Guinea)
- 4a. A broad dark reddish brown bar from upper end of gill opening to base and axil of pectoral fins; outer part of spinous portion of dorsal fin yellow to yellow-orange; dorsal-fin rays 15 to 17 (modally 16, rarely 15); anal-fin rays 14 to 16 (modally 15); lateral-line scales 37 to 44 *Myripristis kuntzei*
(Indo-Pacific)
- 4b. No continuous broad dark reddish brown bar from upper end of gill opening to base and axil of pectoral fins; outer part of spinous portion of dorsal fin red or red with white spine tips; dorsal-fin rays 12 to 16 (modally 14 or 15); anal-fin rays 10 to 15 (modally 12 to 14); lateral-line scales 28 to 40 → 5
- 5a. Lateral edge of frontal bone (in dorsal view) above anterior half of orbit slightly convex (Fig. 6a); longest anal-fin spine 1.3 to 1.55 times in head length; no dark pigment on opercular membrane or axil of pectoral fins → 6
- 5b. Lateral edge of frontal bone (in dorsal view) above anterior half of orbit slightly concave (Fig. 6b); longest anal-fin spine 1.55 to 2.8 times in head length; dark pigment present on opercular membrane and axil of pectoral fins → 7

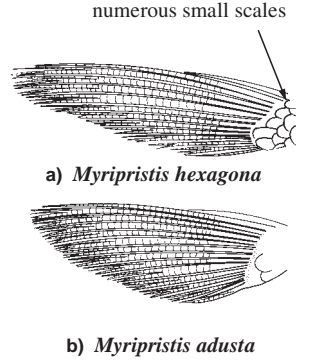
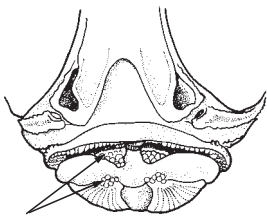
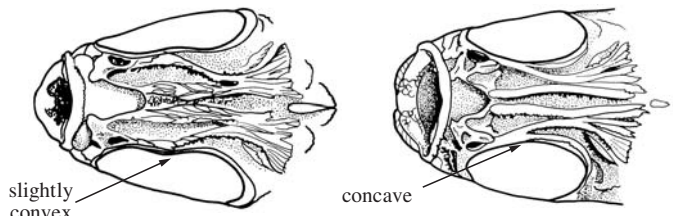


Fig. 4 axil of pectoral fin
(after Randall and Greenfield, 1996)



2 pairs of tooth patches

Fig. 5 frontal view of head



slightly convex

a) *Myripristis trachyacron*

concave

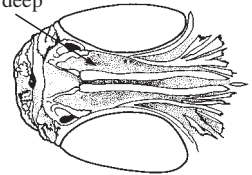
b) *Myripristis formosa*

Fig. 6 dorsal view of head

- 6a. Lateral-line scales 31 to 33; total gill rakers on first gill arch 38 to 41; third anal-fin spine very long, 1.3 to 1.55 times in head length; dorsal surface of frontal bone next to edge of orbit obliquely striated anteriorly and rugose (from small nodules) posteriorly; leading edge of soft dorsal, anal, caudal, and pelvic fins not white; dorsal-fin spines not tipped with white *Myripristis trachyacron*
(Indo-Malayan region)
- 6b. Lateral-line scales 35 to 40; total gill rakers on first gill arch 33 to 38; third anal-fin spine 1.55 to 1.8 times in head length; dorsal surface of frontal bone next to edge of orbit smooth to slightly rugose; leading edge of soft dorsal, anal, caudal, and pelvic fins white; dorsal-fin spines tipped with white *Myripristis vittata*
(Indo-Pacific)
- 7a. Third dorsal-fin spine clearly longer than fourth spine (both measured from base of scaly sheath), its tip usually extending beyond fourth spine when depressed → 8
- 7b. Third dorsal-fin spine shorter than or about equal to fourth spine (both measured from base of scaly sheath), its tip not extending beyond fourth spine when depressed → 9
- 8a. Lateral-line scales 32 to 38; total gill rakers on first gill arch 33 to 38; pair of symphyseal tooth patches outside gape in lower jaw separated by less than a tooth-patch diameter, the narrow anterior part of lower jaw bearing these teeth fitting into a distinct notch in upper jaw; median and pelvic fins largely bright yellow in life *Myripristis chryseres*
(Indo-Pacific)
- 8b. Lateral-line scales 28 to 31; total gill rakers on first gill arch 41 to 45; pair of symphyseal tooth patches outside gape in lower jaw separated by a space equal to or greater than a tooth-patch diameter, the anterior part of jaw bearing these teeth not fitting into a distinct notch in upper jaw; median and pelvic fins mainly red with white leading edges . . *Myripristis randalli*
(Pitcairn, Austral Islands, Samoa, and Tonga)
- 9a. Total gill rakers on first gill arch 39 to 48 (modally 44); dorsal-fin rays 13 or 14 (modally 14); anal-fin rays 12 or 13 (modally 12); lateral-line scales 30 to 34 (modally 32); a small white spot in life at top of pectoral-fin base, adjacent to black or deep red of axil of pectoral fin *Myripristis woodsi*
(French Polynesia to Micronesia)
- 9b. Total gill rakers on first gill arch 34 to 42 (modally 37 or 38); dorsal-fin rays 13 to 17 (modally 15); anal-fin rays 12 to 15 (modally 13 or 14); lateral-line scales 32 to 40; no white spot at top of pectoral-fin base → 10
- 10a. Anal-fin rays modally 14; posterior edge of nasal fossa strongly serrate; dark pigment of opercular membrane not extending ventral to notch below opercular spine; leading edges of soft dorsal, anal, and caudal fins white *Myripristis pralinia*
(Indo-Pacific)
- 10b. Anal-fin rays modally 13; posterior edge of nasal fossa smooth or with a few small serrae; dark pigment of opercular membrane extending ventral to notch below opercular spine; leading edges of soft dorsal, anal, and caudal fins not white or very narrowly white → 11
- 11a. Lateral-line scales 35 to 40 (modally 37); cteni on scale edges 27 to 47; body elongate for the genus, its depth 2.5 to 3 times in standard length; a distinct striped pattern on body in life and in preservative *Myripristis tiki*
(Easter Island, Pitcairn Group, and Rapa)
- 11b. Lateral-line scales 32 to 36 (modally 34); cteni on scale edges 45 to 94; body less elongate, its depth 2.3 to 2.7 times in standard length; body not distinctly striped *Myripristis amaena*
(islands of Oceania)

- 12a. A single large scale (rarely 2) in lower half of axil of pectoral fins; outer third of caudal-fin lobes and elevated part of soft dorsal and anal fins black; spinous dorsal fin reddish black with a median whitish band; scales rimmed with black dorsally on body, and salmon pink on sides and ventrally; largest species of the genus (to 25 cm standard length) . . . *Myripristis adusta* (Indo-Pacific)
- 12b. Numerous small scales in ventral part of axil of pectoral fins; outer part of median fins not black; scales rimmed with brownish red, red, or pink (except dorsally on *M. violacea* where edged in black) . . . → 13
- 13a. Two pairs of tooth patches, one above the other, at front of lower jaw outside gape in specimens larger than about 9 cm standard length; lateral-line scales 25 to 29 (modally 27); leading edges of caudal-fin lobes, soft dorsal, anal, and pelvic fins not white *Myripristis hexagona* (Samoa to East Africa)
- 13b. A single pair of tooth patches at front of lower jaw just outside gape; lateral-line scales 27 to 32 (modally 28 to 30); leading edge of soft dorsal, anal, caudal, and pelvic fins white → 14
- 14a. Scales dorsally on body with broad dark brown to black edges, those on nape almost completely black; modally 14 gill rakers on upper limb of first gill arch *Myripristis violacea* (Indo-Pacific)
- 14b. Scales dorsally on body without dark brown to black edges; modally 10 to 13 gill rakers on upper limb of first gill arch → 15
- 15a. Mucous channel on each side of anterior interorbital space deep (Fig. 7); first gill arch with 10 gill rakers on upper limb (total gill rakers on first gill arch 32); scales of body strongly silvery in life *Myripristis aulacodes* (known from a single specimen taken off Lombok, Indonesia)
- 15b. Mucous channel on each side of anterior interorbital space not deep; first gill arch with 11 to 15 gill rakers on upper limb (total gill rakers on first gill arch 35 to 44); scales of body not strongly silvery in life → 17
- 16a. Interorbital space narrow, its width 4.5 to 5.2 times in head length; lower jaw of adults strongly projecting when mouth is closed; modally 12 gill rakers on upper limb of first gill arch; outer part of spinous dorsal fin yellow or yellow-orange in life *Myripristis berndti* (Indo-Pacific and tropical eastern Pacific)
- 16b. Interorbital space broad, its width 3.65 to 4.4 times in head length; lower jaw of adults slightly projecting when mouth closed; modally 13 gill rakers on upper limb of first gill arch; outer part of spinous dorsal fin red in life *Myripristis murdjan* (Samoa and Marshall islands to East Africa and Red Sea)

mucous channel deep



dorsal view of head

Fig. 7 *Myripristis aulacodes*

Key to the species of *Neoniphon* occurring in the area

- 1a. Scales above lateral line to base of middle dorsal-fin spines 3 ½; lateral-line scales 42 to 47; silvery pink with yellow stripes on body *Neoniphon aurolineatus* (Indo-Pacific)
- 1b. Scales above lateral line to base of middle dorsal-fin spines 2 ½; lateral-line scales 36 to 43; no yellow stripes on body → 2
- 2a. First dorsal fin without dark markings; pectoral-fin rays usually 13 *Neoniphon argenteus* (Indo-Pacific)
- 2b. Spinous portion of dorsal fin with a conspicuous black spot or large black area; pectoral-fin rays usually 14 → 3

- 3a.** A black spot about as large as eye between first and third dorsal-fin spines; anal-fin rays 8
 *Neoniphon sammara*
 (Indo-Pacific)
- 3b.** A broad black median zone across entire spinous portion of dorsal fin; anal-fin rays
 usually 9 *Neoniphon opercularis*
 (Indo-Pacific)

Key to the species of *Ostichthys* occurring in the area

- 1a.** Scales above lateral line to middle of spinous portion of dorsal fin $3\frac{1}{2}$ → **2**
- 1b.** Scales above lateral line to middle of spinous portion of dorsal fin $2\frac{1}{2}$ → **5**
- 2a.** Anterior end of each nasal bone with a sharp forward-directed spine projecting to or beyond median part of upper lip; a short stout spine at corner of preopercle; gill rakers on first gill arch 10 to 12 on upper limb and 16 to 18 on lower limb. *Ostichthys acanthorhinus*
 (Gulf of Oman to southern Indonesia)
- 2b.** Anterior end of nasal bones without a forward-directed spine (except juveniles); no spine at corner of preopercle notably larger than spinules along entire margin; gill rakers on first gill arch 6 to 11 on upper limb and 12 to 17 on lower limb → **3**
- 3a.** Lateral-line scales 38; dorsal fin with XI spines and 16 rays; pectoral-fin rays 15.
 *Ostichthys ovaloculus*
 (known from a single specimen taken off Tahiti at a depth of about 300 m)
- 3b.** Lateral-line scales 28 to 30; dorsal fin with XII spines and 12 to 14 rays; pectoral-fin rays 16 or 17 → **4**
- 4a.** Last dorsal-fin spine 2 to 3 times longer than penultimate spine; depth of second suborbital bone (measured vertically below eye centre) about $\frac{1}{2}$ orbit diameter; dorsal profile of head convex; pectoral-fin rays usually 17; first gill arch with 12 to 14 gill rakers on lower limb *Ostichthys japonicus*
 (western Pacific and Andaman Sea)
- 4b.** Last 2 dorsal-fin spines subequal; depth of second suborbital bone about $\frac{1}{3}$ to $\frac{1}{4}$ orbit diameter; dorsal profile of head to above rear edge of eye nearly straight; pectoral-fin rays usually 16; first gill arch with 15 or 16 gill rakers on lower limb *Ostichthys sandix*
 (Society Islands and Hawaii)
- 5a.** Anal-fin origin below anterior soft portion of dorsal fin; anal-fin rays 9 to 11 (usually 10); lateral-line scales 27 or 28 (usually 27); upper procurrent spiniform caudal-fin rays 5, and lower procurrent spiniform caudal-fin rays 4 → **6**
- 5b.** Anal-fin origin below posterior spinous portion of dorsal fin; anal-fin rays 11 or 12 (usually 11); lateral-line scales 28 to 30; upper procurrent spiniform caudal-fin rays 4, and lower procurrent spiniform caudal-fin rays 3 → **7**
- 6a.** Dorsal fin with XI spines and 13 or 14 rays; vomerine teeth in a near-triangular patch; head length 2.5 to 2.65 times in standard length; longest dorsal-fin spine 2.05 to 2.3 times in head length; first gill arch with 7 or 8 gill rakers on upper limb, 13 or 14 on lower limb *Ostichthys delta*
 (Réunion and Samoa)
- 6b.** Dorsal fin with XII spines and 12 rays; vomerine teeth in a V-shaped patch; head length 2.45 times in standard length; longest dorsal-fin spine 2.6 times in head length; first gill arch with 8 gill rakers on upper limb, 15 on lower limb. *Ostichthys brachygnathus*
 (known from a single specimen taken off Guam at a depth of 230 m)

- 7a. A half scale directly anterior to upper half of first pored scale of lateral line; pectoral-fin rays 15; dorsal profile of head straight to above posterior edge of preopercle; snout length 3.7 to 4.3 times in head length *Ostichthys archiepiscopus*
(Réunion, Tahiti, southern Japan, and Hawaii)
- 7b. No half scale anterior to upper half of first pored scale of lateral line; pectoral-fin rays 15 to 17 (strongly modal as 16); dorsal profile of head slightly convex, especially region of nape; snout length 4.2 to 4.9 times in head length *Ostichthys kaianus*
(Réunion, northwestern Australia, and Indonesia to southern Japan)

Key to the species of *Sargocentron* occurring in the area

- 1a. Scales above lateral line to base of middle dorsal-fin spines 3 ½ → 2
- 1b. Scales above lateral line to base of middle dorsal-fin spines 2 ½ → 7
- 2a. Lateral-line scales 57 to 58; eyes very large, 2.6 times in head length *Sargocentron megalops*
(known from a single 7.9 cm specimen, Henderson Island, Pitcairn Group)
- 2b. Lateral-line scales 38 to 48; eyes not very large, the orbit diameter 2.85 to 4.8 times in head length (in specimens more than 7 cm standard length) → 3
- 3a. Anal-fin rays 10 (rarely 9); membranes of spinous portion of dorsal fin not or only slightly incised; maximum standard length greater than 20 cm → 4
- 3b. Anal-fin rays 9 (rarely 8); membranes of spinous portion of dorsal fin distinctly incised; maximum standard length about 8.5 cm → 5
- 4a. No small spines at edge of nasal fossae; dorsal-fin rays usually 15; preopercular spine of adults usually greater than orbit diameter; first dorsal-fin spine about 3/4 length of second spine; body very deep, its depth 2.4 to 2.6 times in standard length; a large oval dark red spot on preopercle behind eye; spinous portion of dorsal fin uniform dark red
. *Sargocentron spiniferum*
(Indo-Pacific)
- 4b. One or more small spines at edge of nasal fossae (Fig. 8a); dorsal-fin rays usually 14; preopercular spine of adults less than orbit diameter; first and second dorsal-fin spines subequal; body not very deep, its depth 2.5 to 2.8 times in standard length; no large dark red spot behind eye; spinous portion of dorsal fin yellow with a red margin *Sargocentron ensifer*
(Hawaii, Japan, New Caledonia, Pitcairn, and Paracel Islands in South China Sea)

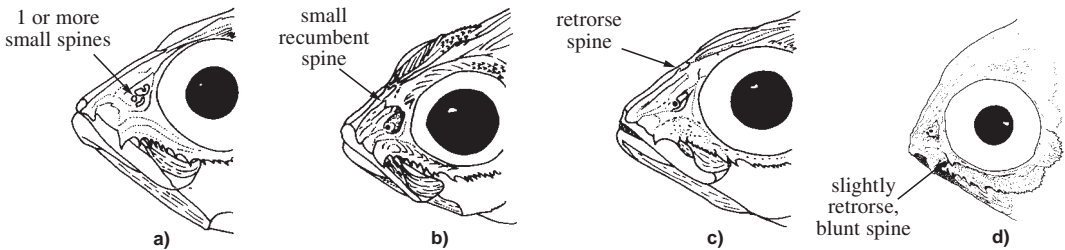


Fig. 8 lateral view of head

- 5a. No spine on nasal bone between edge of nasal fossa and premaxillary groove; lateral-line scales 42; pectoral-fin rays 14; total gill rakers on first gill arch 20 or 21 *Sargocentron shimizui*
(2 specimens: Sulawesi, Indonesia)
- 5b. A small recumbent spine on nasal bone between edge of nasal fossa and premaxillary groove (Fig. 8b); lateral-line scales 43 to 49; pectoral-fin rays usually 15; total gill rakers on first gill arch 17 to 20 → 6

- 6a.** A retrorse spine at edge of premaxillary groove (Fig. 8c); body very deep, its depth 2.3 to 2.6 times in standard length; length of upper jaw 2.6 to 2.9 times in head length . . . *Sargocentron iota*
(Hawaii, Fiji, New Caledonia, Chesterfield Bank, Palau, Papua New Guinea, and Indonesia)
- 6b.** No spine at edge of premaxillary groove; body not very deep, its depth 2.65 to 2.9 times in standard length; length of upper jaw 2.35 to 2.6 times in head length *Sargocentron lepros*
(Pitcairn, Cook Islands, Samoa, Rotuma, and Christmas Island in Indian Ocean)
- 7a.** A retrorse spine on nasal bone between nasal fossa and premaxillary groove (Fig. 8c); edge of premaxillary groove with a small retrorse spine (occasionally 2 spines); largest specimen, 11.3 cm standard length *Sargocentron inaequalis*
(Comoro Islands, Chagos Archipelago, Seychelles, and Line Islands, Central Pacific)
- 7b.** No spine on nasal bone between nasal fossa and premaxillary groove; no spine at edge of premaxillary groove (except *S. microstoma*); maximum standard length 13 cm or more → 8
- 8a.** Lateral-line scales 32 to 38 → 9
- 8b.** Lateral-line scales 38 to 55 → 14
- 9a.** A serrate ridge on upper edge of suborbital bones, preceded by a laterally projecting, slightly retrorse, blunt spine on suborbital below or slightly posterior to anterior edge of orbit (Fig. 8d) → 10
- 9b.** No serrate ridge along upper edge of suborbital bones (or only a few small serrae below posterior part of orbit), and without a laterally projecting blunt spine on suborbital below anterior edge of orbit → 13
- 10a.** A large black blotch on first 2 membranes of dorsal fin; tips of caudal-fin lobes broadly rounded; body light orange-red with narrow darker red stripes following scale edges; no blackish spot at base of soft dorsal, anal, and caudal fins; lateral-line scales modally 33 *Sargocentron dorsomaculatum*
(Ryukyu Islands, Palau, and Caroline Islands)
- 10b.** No blackish blotch on first 2 membranes of dorsal fin (or if blackish pigment is present on these membranes, it is also present on remaining spinous membranes of fin); tips of caudal-fin lobes pointed to slightly rounded; body alternately striped with red and silvery white; a blackish spot at base of soft dorsal, anal, and caudal fins (may be faint at base of anal and caudal fins); lateral-line scales modally 34 to 36 → 11
- 11a.** Spinous portion of dorsal fin largely blackish red in life (dark brown in preservative); upper-jaw length 2.75 to 2.95 times in head length; body depth 2.7 to 3 times in standard length; spinules present on edge of nasal fossae *Sargocentron cornutum*
(East Indies and Great Barrier Reef)
- 11b.** Spinous portion of dorsal fin largely red in life (not dark brown in preservative); upper-jaw length 2.35 to 2.75 times in head length; body depth 2.4 to 2.8 times in standard length; no spinules present on edge of nasal fossae (or rarely a single spinule in large *S. praslin*) → 12
- 12a.** Oblique rows of scales on cheek 4; lateral-line scales modally 34; least interorbital width 3.9 to 4.4 times in head length; upper-jaw length 2.35 to 2.55 times in head length; dark pigment on pelvic fins mainly on first soft ray *Sargocentron praslin*
(East Africa to Society Islands)
- 12b.** Oblique rows of scales on cheek 5; lateral-line scales modally 35; least interorbital width 4.5 to 5.2 times in head length; upper-jaw length 2.5 to 2.75 times in head length; dark pigment on pelvic fins confined to distal part of second to sixth (or fewer) membranes *Sargocentron rubrum*
(Red Sea and Gulf of Oman to western Pacific)

13a. Dorsal-fin rays modally 14; membranes of spinous portion of dorsal fin not incised; body depth 2.3 to 2.6 times in standard length; no blackish spot at base of median fins; body dark brownish to purplish red with a silvery white vertical line on each scale; a black spot on upper opercular membrane *Sargocentron violaceum*
(islands of western Indian Ocean to Society Islands)

13b. Dorsal-fin rays modally 13; membranes of spinous portion of dorsal fin incised; body depth 2.6 to 3 times in standard length; a large black oval spot at base of soft portion of dorsal fin, a second smaller spot at base of caudal fin, and usually a third spot at base of soft portion of anal fin; body orange-red to orange-yellow with silvery white stripes; no black spot on opercular membrane *Sargocentron melanospilos*
(East Africa to Marshall Islands and Samoa)

14a. Lateral-line scales 38 to 43; preopercular-spine length usually more than 2/3 orbit diameter. → 15

14b. Lateral-line scales 41 to 55; preopercular-spine length less than 2/3 orbit diameter (except *S. tiere*) → 16

15a. Premaxillary groove not reaching or just reaching a vertical at anterior edge of orbit (Fig. 9a); dorsal-fin rays usually 14; oblique rows of scales on cheek 5; edge of nasal fossa usually with 1 or more spinules; body red without stripes, the edges of scales narrowly silver; a prominent silvery white spot anterodorsally on caudal peduncle (posterior third of body silvery white on some individuals) *Sargocentron caudimaculatum*
(Indo-Pacific)

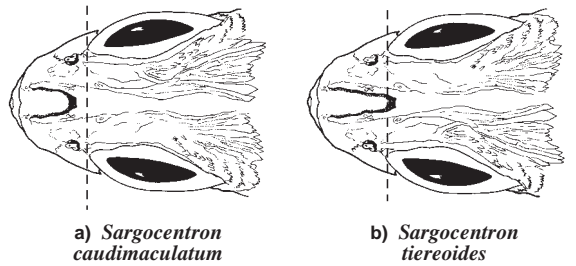


Fig. 9 dorsal view of head

15b. Premaxillary groove extending distinctly posterior to a vertical at anterior edge of orbit (Fig. 9b); dorsal-fin rays usually 13; oblique rows of scales on cheek 4; edge of nasal fossa usually without spinules; body with alternating stripes of red and silvery white; no silvery white spot on caudal peduncle *Sargocentron tiereoides*
(Indo-Pacific)

16a. Dorsal-fin spines short, the longest 2.6 to 3.5 times in head length; preopercular spine of adults about equal to orbit diameter; head and body primarily red (faint silvery stripes on body, those on lower part with blue iridescence); maximum standard length 27 cm *Sargocentron tiere*
(islands of western Indian Ocean to Hawaii and Pitcairn)

16b. Dorsal-fin spines not short, the longest 1.5 to 2.6 times in head length; preopercular spine of adults less than 2/3 orbit diameter; body distinctly striped with red and silvery white; maximum standard length 17.5 cm → 17

17a. Lateral-line scales 41 to 49 → 18


17b. Lateral-line scales 48 to 56 → 20

18a. Pectoral-fin rays usually 14; membranes of spinous portion of dorsal fin reddish black (black in preservative) with a disjunct longitudinal whitish band (lower in anterior part of fin and higher in posterior part) and whitish tips *Sargocentron diadema*
(Indo-Pacific)















18b. Pectoral-fin rays usually 15; membranes of spinous portion of dorsal fin not reddish black (if a whitish longitudinal band is present, it is not interrupted) → 19

- 19a.** Snout very short, its length less than interorbital width; body usually peppered with small blackish dots; outer part of membranes of spinous portion of dorsal fin red; no blackish blotch on first 1 or 2 interspinous membranes of dorsal fin; lateral-line scales 41 to 47
 *Sargocentron punctatissimum*
 (Indo-Pacific)
- 19b.** Snout not short, its length equal to or greater than interorbital space; body without numerous small blackish dots; tips of membranes of spinous portion of dorsal fin white (except posteriorly); preserved specimens often with a large blackish blotch on first 1 or 2 interspinous membranes of dorsal fin; lateral-line scales 43 to 49 *Sargocentron itodai*
 (Indo-Pacific)
- 20a.** Third anal-fin spine very long, its length 1 to 1.2 times in head length; longest dorsal-fin spine 1.7 to 1.95 times in head length; spinous portion of dorsal fin completely separate from soft portion; silvery white stripes on body broader than red stripes (except for narrow white stripe following lateral line) *Sargocentron microstoma*
 (islands of western Indian Ocean to French Polynesia)
- 20b.** Third anal-fin spine not very long, 1.2 to 1.45 times in head length; longest dorsal-fin spine 1.95 to 2.2 times in head length; spinous portion of dorsal fin linked by last membrane to base of exposed part of first dorsal-fin ray; red stripes on body much broader than silvery white stripes *Sargocentron hormion*
 (Pitcairn Group, Rapa, and Rarotonga in Cook Islands)

List of species occurring in the area

The symbol  is given when species accounts are included.

Subfamily MYRIPRISTINAE

-  *Myripristis adusta* Bleeker, 1853
-  *Myripristis amaena* (Castelnau, 1873)
- Myripristis aulacodes* Randall and Greenfield, 1996
-  *Myripristis berndti* Jordan and Evermann, 1903
-  *Myripristis botche* Cuvier, 1829
-  *Myripristis chryseres* Jordan and Evermann, 1903
-  *Myripristis hexagona* (Lacepède, 1802)
-  *Myripristis kuntee* Valenciennes, 1831
-  *Myripristis murdjan* (Forsskål, 1775)
-  *Myripristis pralinia* Cuvier, 1829
-  *Myripristis randalli* Greenfield, 1974
- Myripristis robusta* Randall and Greenfield, 1996
-  *Myripristis tiki* Greenfield, 1974
-  *Myripristis trachyacron* Bleeker, 1863
-  *Myripristis violacea* Bleeker, 1851
-  *Myripristis vittata* Cuvier, 1831
- Myripristis woodsi* Greenfield, 1974
- Ostichthys acanthorhinus* Randall, Shimizu, and Yamakawa, 1982
-  *Ostichthys archiepiscopus* (Valenciennes, 1862)
- Ostichthys brachygnathus* Randall and Myers, 1993
- Ostichthys delta* Randall, Shimizu, and Yamakawa, 1982
-  *Ostichthys japonicus* (Cuvier, 1829)
-  *Ostichthys kaianus* (Günther, 1880)
- Ostichthys ovaloculus* Randall and Wrobel, 1988
- Ostichthys sandix* Randall, Shimizu, and Yamakawa, 1982
- Plectrypops lima* (Valenciennes, 1831)

Subfamily HOLOCENTRINAE

- Neoniphon argenteus* (Valenciennes, 1831)
Neoniphon aurolineatus (Liénard, 1839)
 ✦✦*Neoniphon opercularis* (Valenciennes, 1831)
 ✦✦*Neoniphon sammara* (Forsskål, 1775)
 ✦✦*Sargocentron caudimaculatum* (Rüppell, 1835)
Sargocentron cornutum (Bleeker, 1853)
Sargocentron diadema (Lacepède, 1802)
Sargocentron dorsomaculatum (Shimizu and Yamakawa, 1979)
Sargocentron ensifer (Jordan and Evermann, 1904)
Sargocentron hormion Randall, 1998
Sargocentron inaequalis Randall and Heemstra, 1985
Sargocentron iota Randall, 1998
Sargocentron ittodai (Jordan and Fowler, 1903)
Sargocentron lepros (Allen and Cross, 1983)
Sargocentron melanospilos (Bleeker, 1858)
Sargocentron megalops Randall, 1996
Sargocentron microstoma (Günther, 1859)
 ✦✦*Sargocentron prasinum* (Lacepède, 1802)
Sargocentron punctatissimum (Cuvier, 1829)
 ✦✦*Sargocentron rubrum* (Forsskål, 1775)
 ✦✦*Sargocentron spiniferum* (Forsskål, 1775)
 ✦✦*Sargocentron tiere* (Cuvier, 1829)
Sargocentron tiereoides (Bleeker, 1853)
Sargocentron violaceum (Bleeker, 1853)

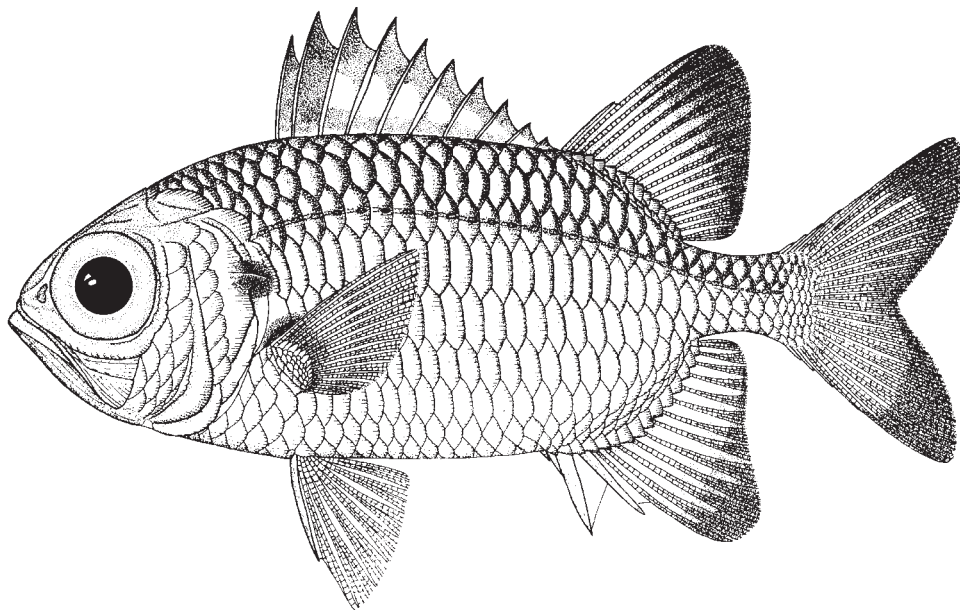
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- Shimizu, T. and T. Yamakawa. 1979. Review of the squirrelfishes (subfamily Holocentrinae: order Beryciformes) of Japan, with description of a new species. *Japan. J. Ichthyol.*, 26(2):109-147.

Myripristis adusta Bleeker, 1853

Frequent synonyms / misidentifications: None / None.

FAO names: En - Shadowfin soldierfish; Fr - Marignan ombré; Sp - Candil sombreado.

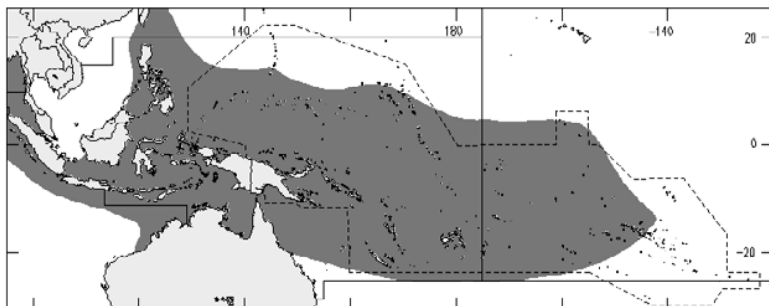


Diagnostic characters: Body oblong, its depth 2.1 to 2.55 times in standard length. **Usually a single pair of tooth patches at front of lower jaw just outside nape** (rarely a smaller second pair below). Dorsal fin with XI spines and 14 to 16 soft rays, notched to back between last 2 spines; eleventh spine more than twice length of tenth; anal fin with IV spines (third spines strongest, but fourth spine longest) and 12 to 14 soft rays. **Lateral-line scales 27 to 29 (usually 28); a single scale (occasionally 2) on lower part of pectoral-fin axil. Total gill rakers on first gill arch 35 to 40.** **Colour:** scale centres pale bluish dorsally, pale pink on sides and ventrally, the **scale edges dark brown to black dorsally and orangish brown to salmon pink on sides and ventrally**; a large blackish spot posteriorly on gill cover; **distal third of soft dorsal fin, anal fin, and caudal-fin lobes black**; spinous dorsal fin reddish black with a broad median whitish band.

Size: The largest of the soldierfishes; maximum total length about 32 cm, commonly to 25 cm.

Habitat, biology, and fisheries: Occurs on coral reefs and rocky areas in relatively shallow water; seeks refuge in caves and beneath ledges by day, often in aggregations. Usually caught at night with gill nets or hook-and-line; sometimes speared during daylight hours.

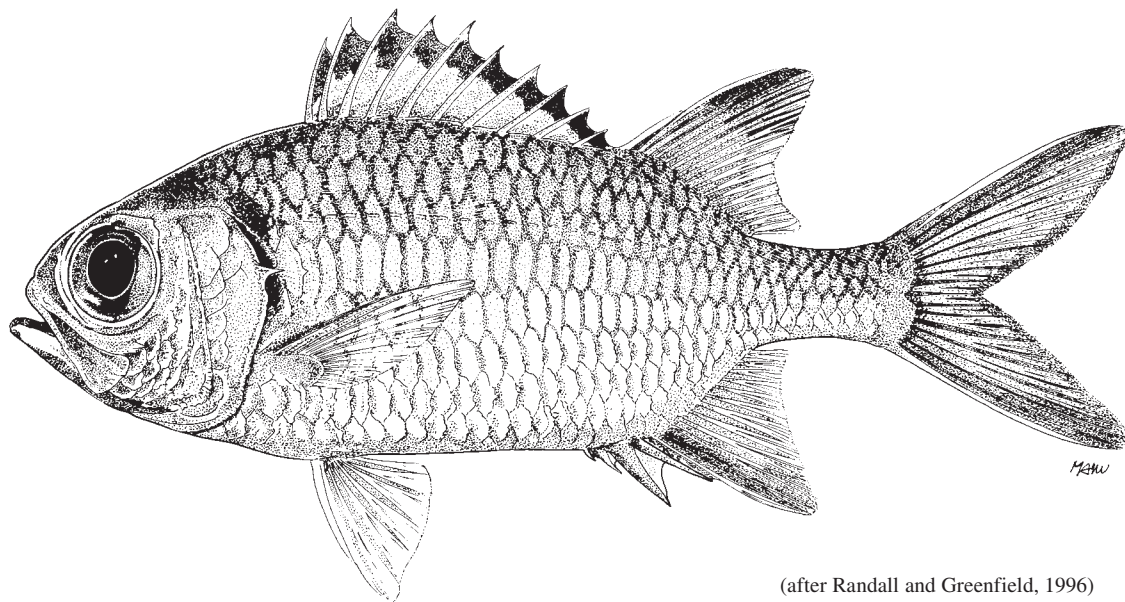
Distribution: Indo-Pacific except the Red Sea, Arabian Sea, and Persian Gulf in the Indian Ocean region and Hawaii and Pitcairn Group in the Pacific.



Myripristis amaena (Castelnau, 1873)

Frequent synonyms / misidentifications: *Myripristis argyromus* Jordan and Evermann, 1904 / None.

FAO names: En - Brick soldierfish.



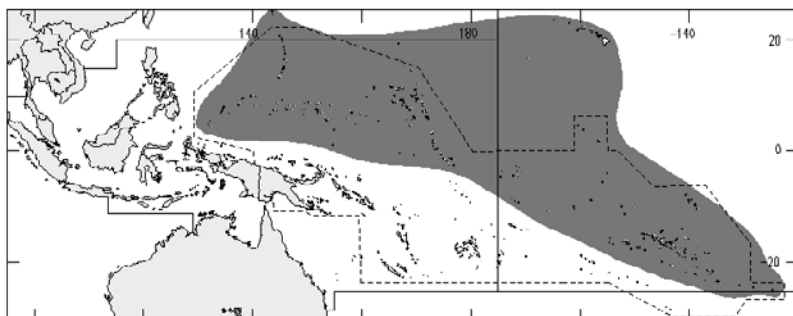
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Diagnostic characters: Body depth 2.3 to 2.7 times in standard length; interorbital width 3.4 to 4 times in head length. Lower jaw not projecting when mouth closed. **A single pair of tooth patches at front of lower jaw outside mouth.** Dorsal fin with XI spines and 13 to 16 (usually 15) soft rays, notched to back between last 2 spines; eleventh spine more than twice length of tenth; anal fin with IV spines (third and fourth spines subequal, the third most stout) and 12 to 15 (usually 13) soft rays. **Lateral-line scales 32 to 36 (modally 34).** Axil of pectoral fins naked. **Total gill rakers on first gill arch 34 to 41.** **Colour:** red, the centres of scales pale red dorsally and silvery white on sides and ventrally, thus forming a longitudinal banding; black on opercular membrane extending well below opercular spine; **median fins red without conspicuous white leading edges.**

Size: Largest specimen 26 cm, commonly to 18 cm.

Habitat, biology, and fisheries: Nocturnal, like others of the genus, hiding in caves and beneath ledges by day. Occurs in shallower water, in general, than other species. Usually caught by gill nets or by spearing.

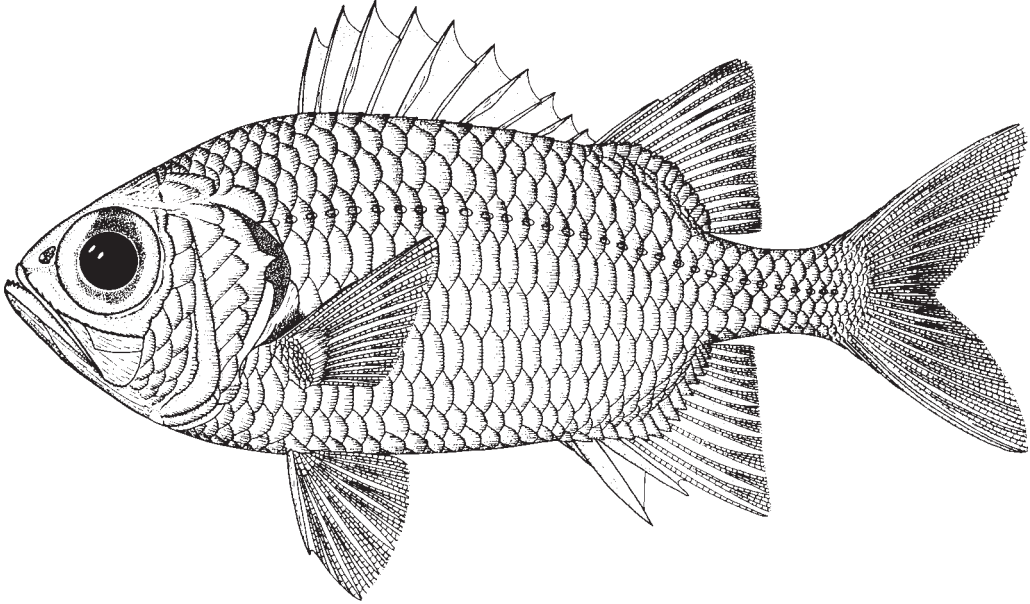
Distribution: Islands of Oceania, including Hawaii and Pitcairn Group.



Myripristis berndti Jordan and Evermann, 1903

Frequent synonyms / misidentifications: None / *Myripristis murdjan* (Forsskål, 1775).

FAO names: En - Blotcheye soldierfish; Fr - Marignan à oeilères; Sp - Candil ojo manchado.

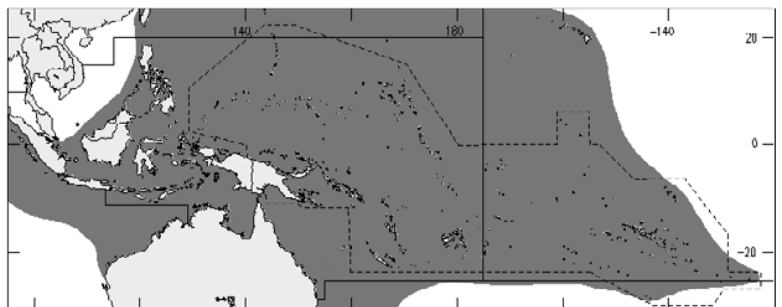


Diagnostic characters: Body depth 2.3 to 2.65 times in standard length; interorbital narrow, its width 4.5 to 5.2 times in head length. **Lower jaw of adults strongly projecting when mouth closed. A single pair of tooth patches at front of lower jaw outside mouth;** vomerine teeth in a triangular patch with rounded corners. Dorsal fin with XI spines and 13 to 15 (usually 14) soft rays, notched to back between last 2 spines; eleventh spine more than twice length of tenth; anal fin with IV spines (third and fourth spines subequal, the third strongest) and 11 to 13 (usually 12) soft rays. **Lateral-line scales 28 to 31 (modally 29). Small scales on lower half to three-quarters of pectoral-fin axil. Total gill rakers on first gill arch 35 to 42.** **Colour:** red, the scale centres pale red dorsally and silvery white on sides and ventrally; opercular membrane black to well below opercular spine; axil of pectoral fins black; **outer third to half of spinous dorsal fin yellow to orange-yellow;** leading edges of caudal-fin lobes, soft dorsal, anal, and pelvic fins white.

Size: Maximum total length 29 cm, commonly to 22 cm.

Habitat, biology, and fisheries: Among the most common of the larger species of the genus; generally found at moderate depths of 10 to 30 m; a cave resident by day. Caught mainly by gill nets, hook-and-line, and by spear.

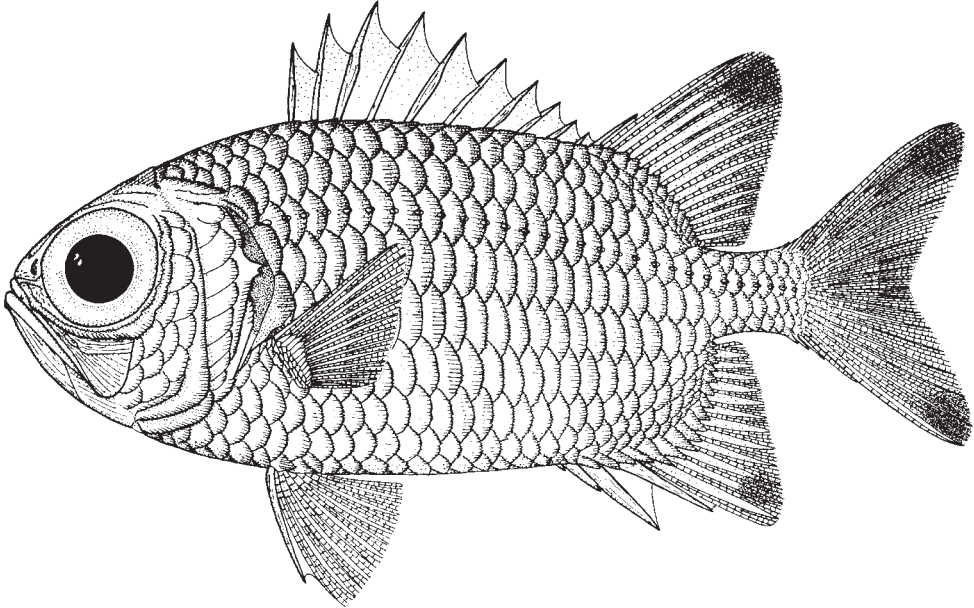
Distribution: This species has the broadest distribution of the genus, from the coast of East Africa (but not the Red Sea or Persian Gulf) to islands of the tropical eastern Pacific; in the western Pacific it ranges from southern Japan to Lord Howe Island.



Myripristis botche Cuvier, 1829

Frequent synonyms / misidentifications: *Myripristis melanostictus* Bleeker, 1863 / *Myripristis hexagona* (non Lacepède, 1802).

FAO names: En - Blacktip soldierfish; Fr - Marignan potelé; Sp - Candil rechoncho.

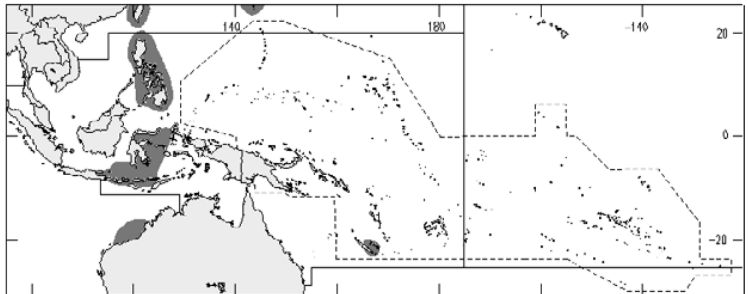


Diagnostic characters: Body robust, its depth 2.1 to 2.45 times in standard length; interorbital width 4.5 to 5.65 times in head length. Lower jaw of adults slightly projecting when mouth closed. **Two pairs of tooth patches at front of lower jaw outside mouth;** vomerine teeth in a triangular patch with rounded corners. Dorsal fin with XI spines and 13 or 15 (usually 14) soft rays, notched to back between last 2 spines; eleventh spine more than twice length of tenth; anal fin with IV spines (third spine stoutest, but fourth usually slightly longer) and 11 or 12 (usually 12) soft rays. **Lateral-line scales 27 to 29 (modally 28). No small scales in pectoral-fin axil. Total gill rakers on first gill arch 32 to 38. Colour:** silvery white, the scales rimmed with brownish red dorsally and red on sides and ventrally; black pigment of opercular membrane extending to about level of lower edge of eye; outer part of spinous dorsal fin and most of soft dorsal and anal fins red; **tips of soft dorsal and anal fins and caudal-fin lobes with a black spot, the leading edges of these fins white.**

Size: Maximum total length 31 cm, commonly to 22 cm.

Habitat, biology, and fisheries: A species of moderate to relatively deep water (generally more than 30 m). Not common, but of importance as a food fish due to its larger size than most species of *Myripristis*.

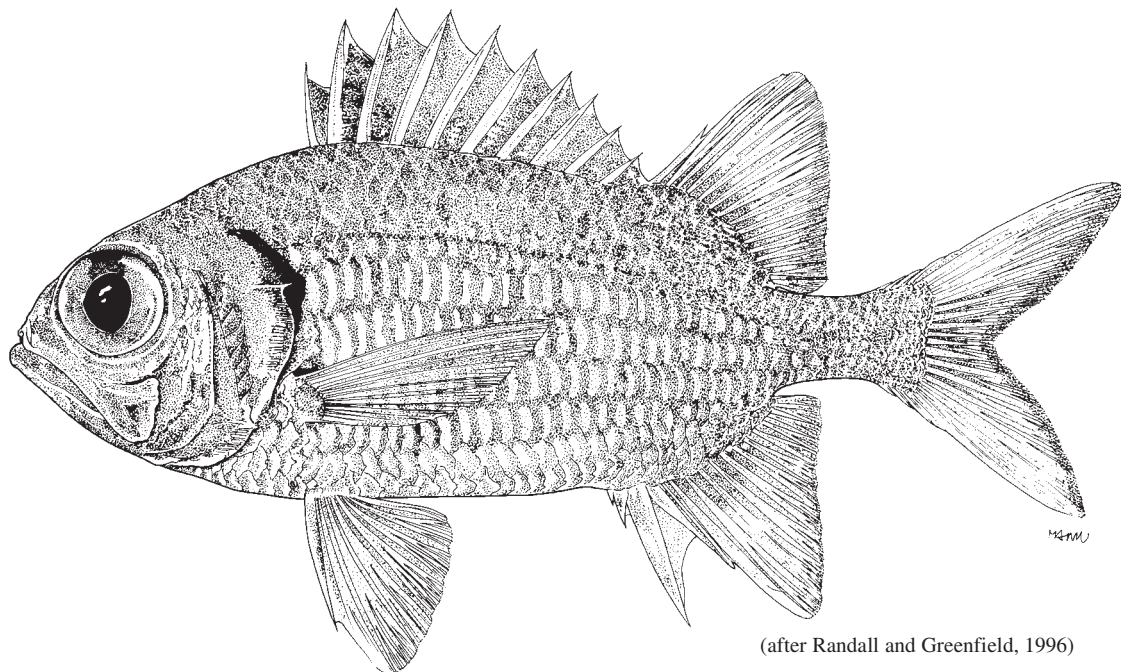
Distribution: Coast of East Africa to the western Pacific, east to New Caledonia.



Myripristis chryseres Jordan and Evermann, 1903

Frequent synonyms / misidentifications: None / None.

FAO names: En - Yellowfin soldierfish.



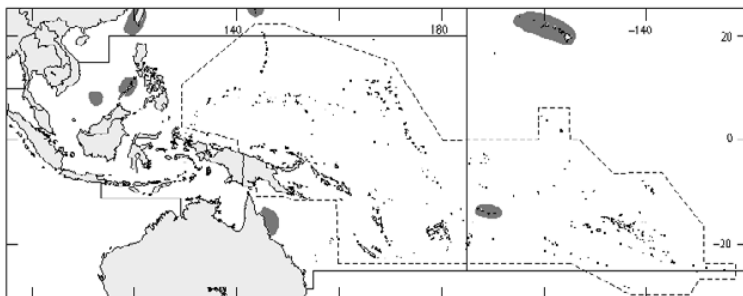
(after Randall and Greenfield, 1996)

Diagnostic characters: Body depth 2.3 to 2.6 times in standard length; interorbital narrow, its width 4.55 to 5.2 times in head length. Lower jaw of adults slightly projecting when mouth closed. **A single pair of tooth patches on knob-like front of lower jaw outside mouth, the knob fitting into a distinct notch in upper jaw when mouth closed.** Dorsal fin with XI spines and 14 or 15 (usually 14) soft rays, notched to back between last 2 spines; eleventh spine more than twice length of tenth; anal fin with IV spines (**third anal-fin spine longer and stronger than fourth**) and 11 to 13 (usually 12) soft rays. **Lateral-line scales 32 to 38 (modally 34). No small scales in pectoral-fin axil. Total gill rakers on first gill arch 33 to 39.** **Colour:** red, the scale centres lighter; opercular membrane black to well below opercular spine; axil of pectoral fins black; **soft dorsal, anal, and caudal fins largely bright yellow.**

Size: Maximum total length 26 cm, commonly to 20 cm.

Habitat, biology, and fisheries: Generally found at depths greater than 30 m; seeks refuge in caves or crevices by day.

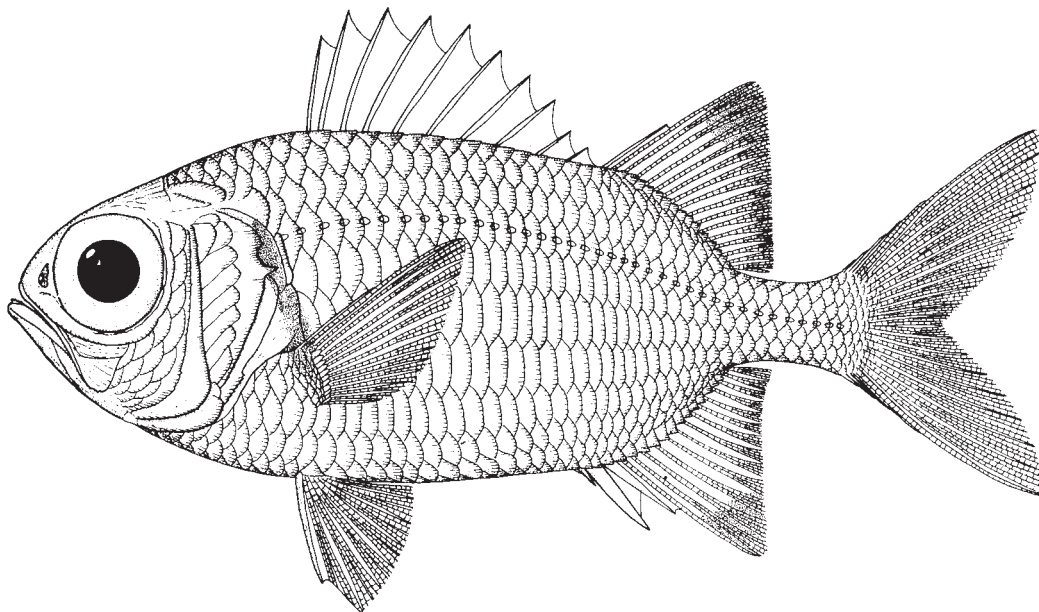
Distribution: East Africa to the Samoa Islands and Hawaii, but not reported from many intervening localities. Its occurrence in deeper water is no doubt the reason for the relatively few records.



Myripristis kuntzei Valenciennes, 1831

Frequent synonyms / misidentifications: *Myripristis borbonicus* Valenciennes, 1831; *M. multiradiatus* Günther, 1874 / None.

FAO names: En - Shoulderbar soldierfish; Fr - Marignan ardoisé; Sp - Candil de lomo manchado.



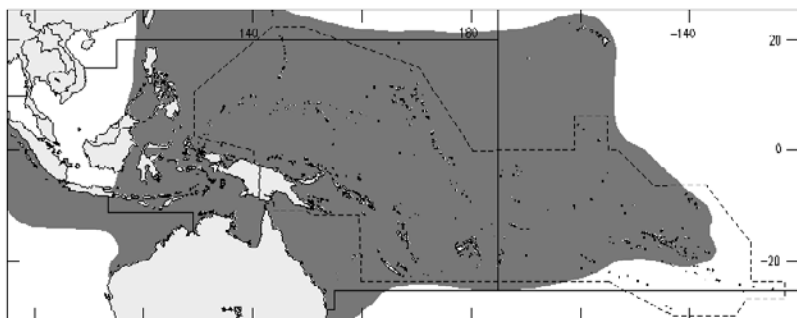
Diagnostic characters: Body depth 2.2 to 2.6 times in standard length; interorbital width 3 to 5 times in head length. Lower jaw of adults slightly projecting when mouth closed. **A single pair of tooth patches at front of lower jaw outside mouth. Dorsal fin with XI spines and 15 to 17 (usually 16) soft rays, notched to back between last 2 spines; eleventh spine more than twice length of tenth; anal fin with IV spines (third spine stoutest, but fourth slightly longer) and 14 to 16 (usually 15) soft rays. Lateral-line scales 37 to 44. No small scales in pectoral-fin axil. Total gill rakers on first gill arch 33 to 41. Colour:** light red, the edges of the scales darker than centres; **a continuous reddish brown bar from upper end of gill opening to axil of pectoral fins;** outer part of spinous dorsal fin orange-yellow; red pigment in soft dorsal and anal fins concentrated in a large spot at tip of fins.

Size: Maximum total length 20 cm, commonly to 16 cm.

Habitat, biology, and fisheries: A coral-reef species generally found in relatively shallow water. Often seen in aggregations in and at the entrance to caves. Although one of the most common of soldierfishes, its small size reduces its value as a food fish.

Distribution: A widespread Indo-Pacific species (though absent from the Red Sea and Persian Gulf).

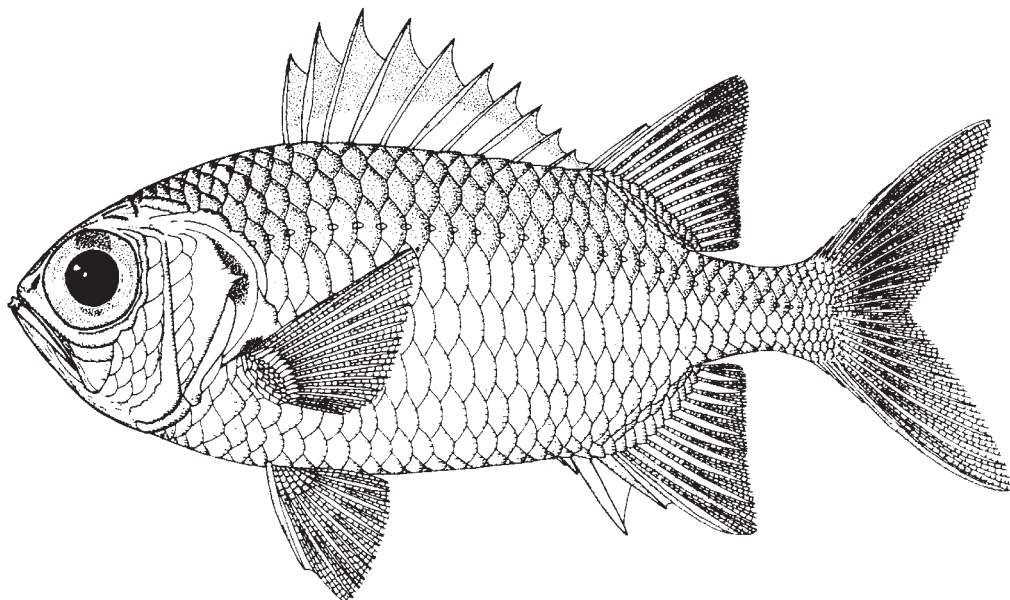
Remarks: *Myripristis kuntzei* is similar in counts to another common small species, *M. pralinia* (see abbreviated species account below), but the dark pigment on the opercular membrane of the latter extends only slightly below the opercular spine.



Myripristis murdjan (Forsskål, 1775)

Frequent synonyms / misidentifications: *Myripristis parvidens* Cuvier, 1829; *M. axillaris* Valenciennes, 1831 / None.

FAO names: En - Pinecone soldierfish; Fr - Marignan pomme de pin; Sp - Candil piñón.

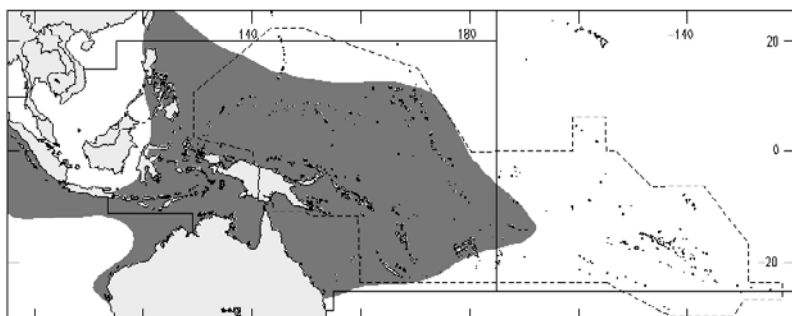


Diagnostic characters: Body depth 2.3 to 2.5 times in standard length; interorbital width narrow, 3.65 to 4.4 times in head length. Lower jaw of adults slightly projecting when mouth closed. **A single pair of tooth patches at front of lower jaw outside mouth;** vomerine teeth in a triangular patch with rounded corners. Dorsal fin with XI spines and 13 to 15 (usually 14) soft rays, notched to back between last 2 spines; eleventh spine more than twice length of tenth; anal fin with IV spines (third and fourth spines subequal, the third stoutest) and 11 to 14 (usually 12 or 13) soft rays. **Lateral-line scales usually 28 to 30 (modally 29). Small scales on lower one-fourth to three-fourths of pectoral axil. Total gill rakers on first gill arch 36 to 44.** **Colour:** light red, the edges of scales reddish brown; opercular membrane dark brown to black to about level of middle of eye; axil of pectoral fins dark brown to black; **spinous dorsal fin light red on basal two-thirds, bright red on outer third;** leading edges of soft dorsal, anal, caudal, and pelvic fins white, sometimes with blackish pigment submarginal to the white on soft dorsal and anal fins; a blackish blotch on iris above pupil, and a lesser blotch below.

Size: Maximum total length 23 cm, commonly to 18 cm.

Habitat, biology, and fisheries: A common coral-reef species, usually found in less than 10 m, but known to depths of at least 50 m. Nocturnal like others of the genus, feeding mainly on larger animals of the zooplankton.

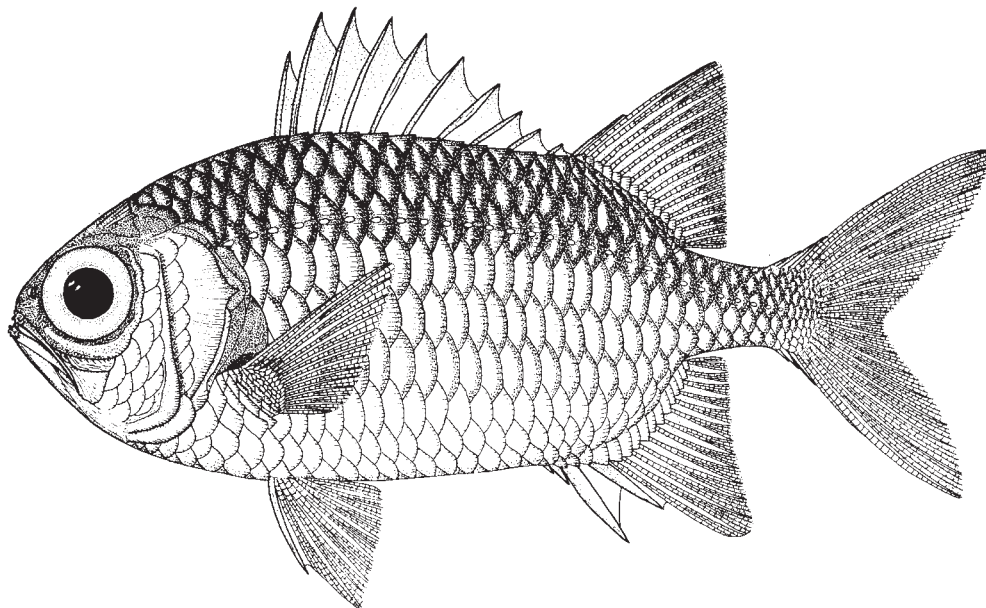
Distribution: Red Sea and coast of East Africa to the Marshall and Samoa islands; in the western Pacific from southern Japan to New South Wales.



Myripristis violacea Bleeker, 1851

Frequent synonyms / misidentifications: *Myripristis microphthalmus* Bleeker, 1852 / None.

FAO names: En - Violet soldierfish; Fr - Marignan violacé; Sp - Candil guru-guru.

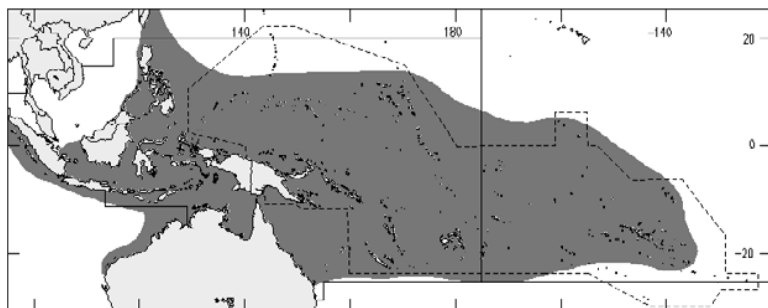


Diagnostic characters: Body moderately deep, its depth 2.15 to 2.45 times in standard length; interorbital width 3.6 to 4.1 times in head length. Lower jaw of adults slightly projecting when mouth closed. **A single pair of tooth patches at front of lower jaw outside mouth.** Dorsal fin with XI spines and 13 to 16 (usually 15) soft rays, notched to back between last 2 spines; eleventh spine more than twice length of tenth; anal fin with IV spines (third and fourth spines subequal, the third strongest) and 12 to 14 (usually 13) soft rays. **Lateral-line scales 27 to 29 (modally 28). Small scales usually present on lower half of pectoral-fin axil. Total gill rakers on first gill arch 38 to 48. Colour:** scale centres bluish silver (sometimes pinkish silver), the edges of scales above lateral line dark brown to black (broadest on nape); lateral-line scales rimmed with reddish brown, and scales below lateral line edged with brownish red; opercular membrane dark reddish brown, the darker pigment ending at about level of middle of eye; axil of pectoral fins black; spinous dorsal fin largely bright red; caudal fin and outer part of soft dorsal and anal fins bright red; leading edges of caudal-fin lobes, soft dorsal, anal, and pelvic fins white (narrow on median fins).

Size: Maximum total length 23 cm, commonly to 18 cm.

Habitat, biology, and fisheries: A common coral-reef species generally found in shallow protected waters such as lagoons.

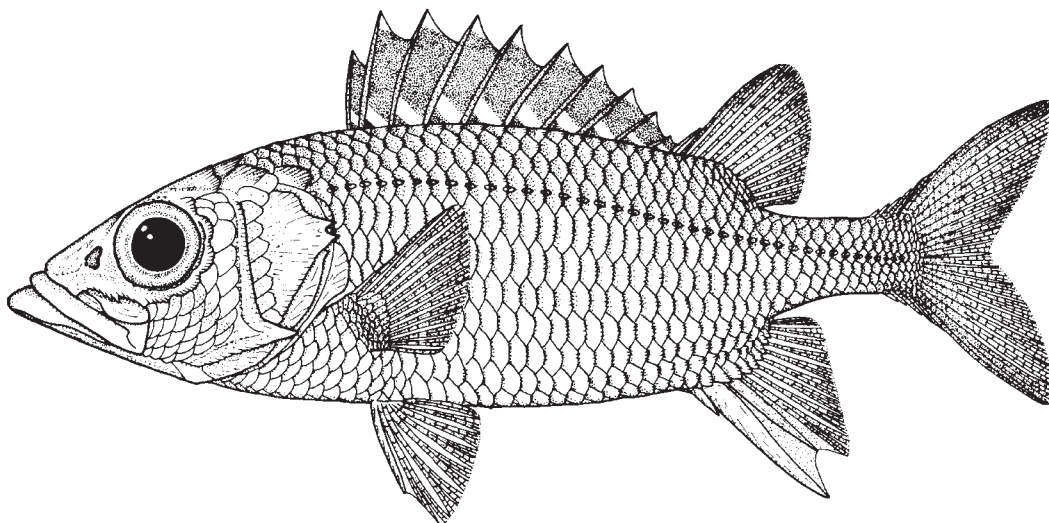
Distribution: Indo-Pacific (except the Red Sea, Persian Gulf, Hawaii, and Pitcairn Group); in the western Pacific from the Ryukyu Islands to the Great Barrier Reef (Australia).



Neoniphon opercularis (Valenciennes, 1831)

Frequent synonyms / misidentifications: *Flammeo opercularis* (Valenciennes, 1831); *Holocentrus opercularis* Smith and Smith, 1963; *Kutaflammeo opercularis* Carcasson, 1977 / None.

FAO names: En - Blackfin squirrelfish; Fr - Marignan aile noire; Sp - Candil de aleta negra.

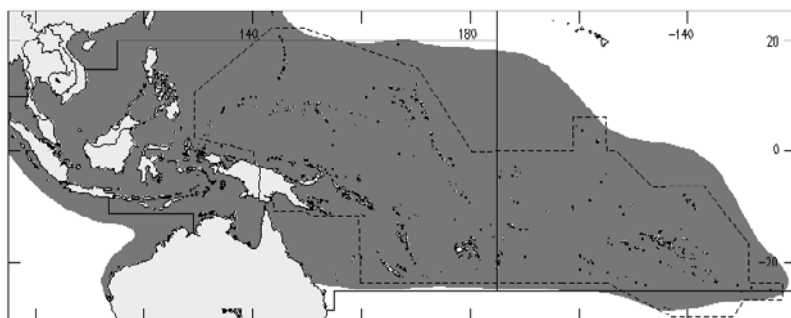


Diagnostic characters: Body moderately elongate, its depth 3.1 to 3.3 times in standard length. Dorsal profile of head slightly convex; snout pointed; **lower jaw strongly projecting when mouth closed**; preopercular spine short, less than 1/2 eye diameter. Nasal fossa large, without spinules. **Dorsal fin with XI spines, the last longer than the penultimate and close to first soft ray, the soft rays 13**; anal fin with IV spines and 9 soft rays; pectoral-fin rays 13 or 14 (usually 14). **Lateral-line scales 38 to 40**; scales above lateral line to middle of spinous portion of dorsal fin 2 ½. **Colour:** silvery pink (scale centres light red, the edges broadly silver); snout and top of head light red; **spinous dorsal fin black, the membranes tipped with white, with a diagonal white spot near base of each membrane**; lobes of caudal fin broadly light red, the rest of fin yellowish; soft dorsal and anal fins yellow, tinged with pink; pectoral fins light red; pelvic fins pinkish white.

Size: Maximum total length about 32 cm, commonly to 23 cm.

Habitat, biology, and fisheries: A reef species which may be found in shallow to moderate depths. The largest member of the genus *Neoniphon*. Taken by hook-and-line and in traps. Marketed fresh.

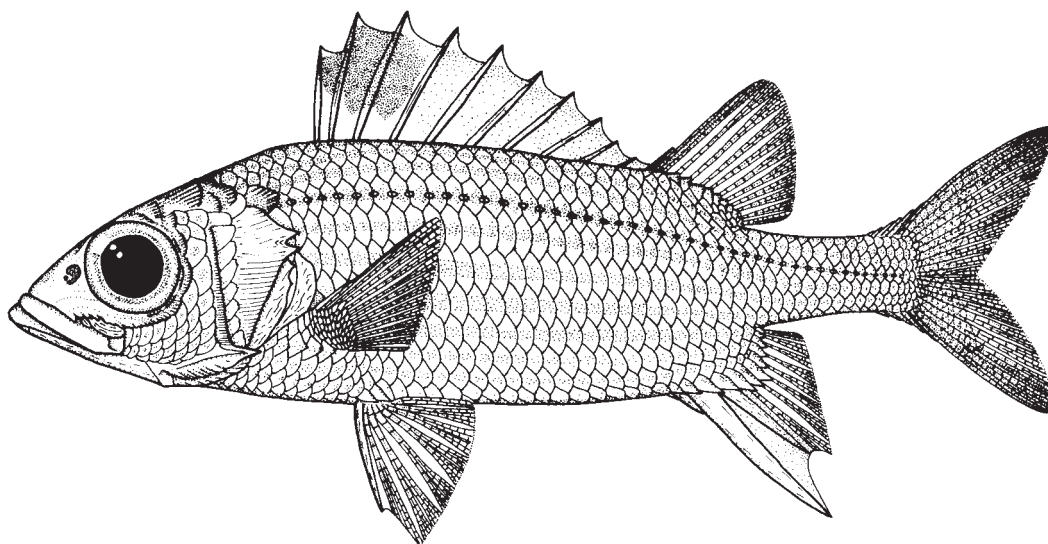
Distribution: Occurs throughout the Indo-Pacific region (except the Red Sea and Hawaii); in the western Pacific from the Ryukyu Islands to the Great Barrier Reef.



Neoniphon sammara (Forsskål, 1775)

Frequent synonyms / misidentifications: *Flammeo sammara* (Forsskål, 1775); *Holocentrus sammara* Smith and Smith, 1963; *Kutaflammeo sammara* Carcasson, 1977 / None.

FAO names: En - Sammara squirrelfish; Fr - Marnigan tacheté; Sp - Candil samara.

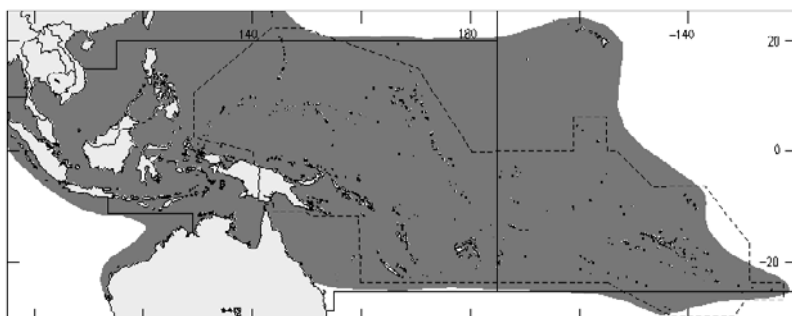


Diagnostic characters: Body moderately elongate, its depth 3 to 3.6 times in standard length. Dorsal profile of head slightly convex; snout pointed; **lower jaw projecting when mouth closed**; preopercular spine short, about 1/3 eye diameter. Nasal fossa large, without spinules. **Dorsal fin with XI spines, the last longer than the penultimate and close to first soft ray, the soft rays 11 or 12 (usually 12); anal fin with IV spines and 7 or 8 (mostly 8) soft rays**; pectoral-fin rays 13 or 14. **Lateral-line scales 39 to 43**; scales above lateral line to middle of spinous portion of dorsal fin 2 ½. **Colour:** silvery, each scale with a horizontally elongate dark reddish brown spot, thus forming **longitudinal dark lines on body**; a reddish stripe following lateral line; snout and top of head light red; **spinous portion of dorsal fin with a large black spot tinged with red on membranes between first and fourth spines**; caudal fin yellowish with a broad red band at margins of lobes; a reddish streak anteriorly in soft dorsal and anal fins.

Size: Maximum total length about 28 cm, commonly to 23 cm.

Habitat, biology, and fisheries: Associated with coral reefs; most often seen in shallow water of protected bays and lagoons. Among the first to leave shelter with the advent of darkness for feeding. About 67% of the diet consists of crabs and about 15% small fishes. Taken by hook-and-line and in traps. Marketed fresh.

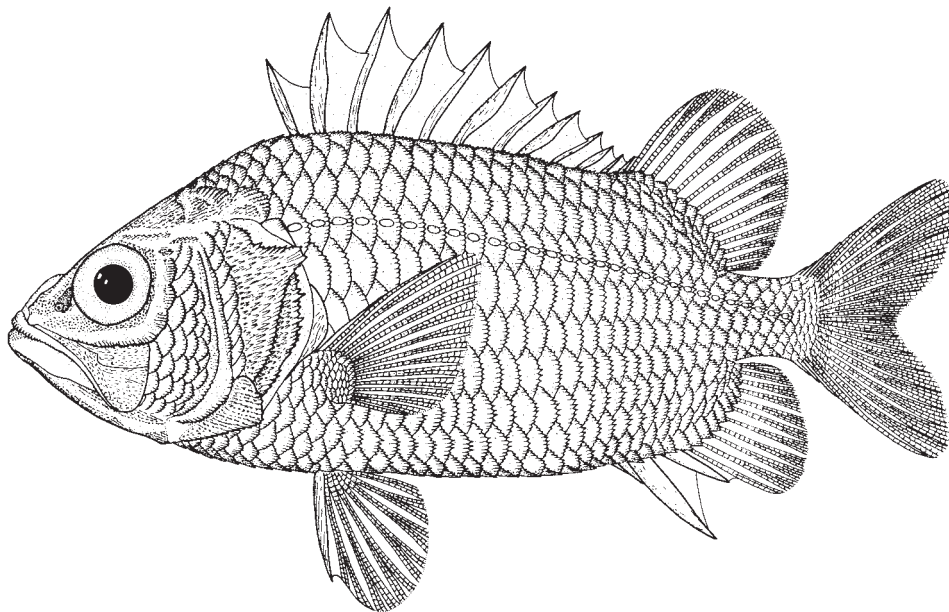
Distribution: Widespread throughout the Indo-Pacific region, including the Red Sea and Hawaii; in the western Pacific from Japan (the young ranging as far north as southern Honshu) to the southern Great Barrier Reef.



Ostichthys archiepiscopus (Valenciennes, 1862)

Frequent synonyms / misidentifications: *Ostichthys pillwaxii* (Steindachner, 1893) / None.

FAO names: En - Straighthead soldierfish; Fr - Marignan cuirassé; Sp - Candil acorazado.

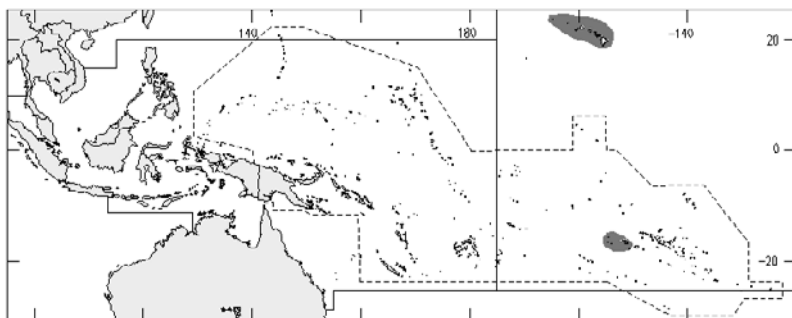


Diagnostic characters: Body oblong, its depth 2.1 to 2.35 times in standard length; caudal peduncle slender, its least depth 3.8 to 4.7 times in head length. **Dorsal profile of head straight;** head length 2.45 to 2.6 times in standard length; snout 3.7 to 4.3 times in head length; **no anteriorly directed spine on nasal bone of adults and no large spine at corner of preopercle.** Premaxillary groove broadly V-shaped; vomerine teeth in a V-shaped patch. First gill arch with 7 to 9 gill rakers on upper limb, 13 to 15 on lower limb. Dorsal fin continuous though deeply notched between spinous and soft portions; **dorsal fin with XII spines (last spine shortest and close to soft portion of fin)** and 13 or 14 soft rays; anal fin with IV spines (the third much stronger and larger) and 11 soft fin rays; **pectoral fins with 15 rays. Lateral-line scales 28 to 30 (usually 29); rows of scales above lateral line to middle of spinous portion of dorsal fin 2 ½; a half scale directly anterior to upper half of first lateral-line scale.** **Colour:** light red, the centres of the scales paler, thus forming faint longitudinal bands.

Size: Maximum total length about 28 cm, commonly to 24 cm.

Habitat, biology, and fisheries: A benthic species, probably occurring mainly over hard substratum; known from its depth range of 146 to 400 m. Usually caught by hook-and-line, rarely by trawling.

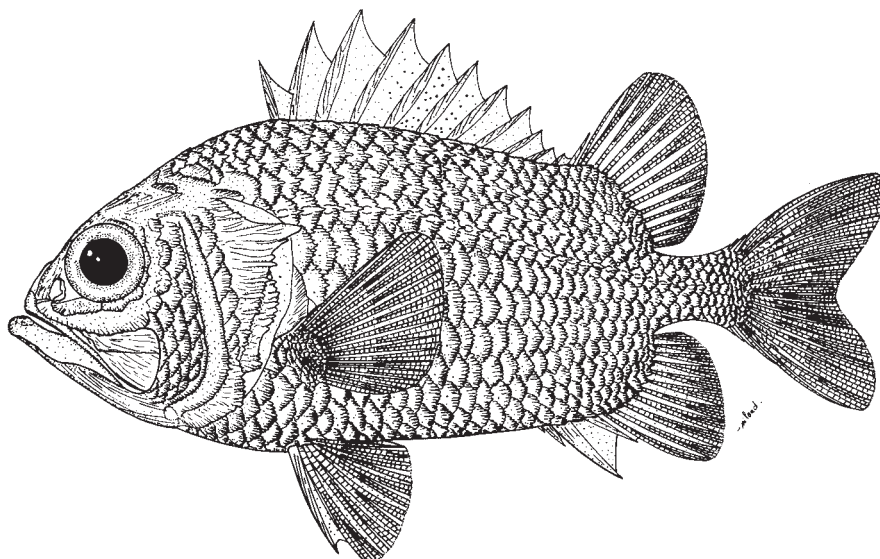
Distribution: Reported only from Réunion in the south-western Indian Ocean (type locality), the Ryukyu Islands, Hawaii, and Society Islands, thus suggesting an antiequatorial distribution.



Ostichthys japonicus (Cuvier, 1829)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Japanese soldierfish.

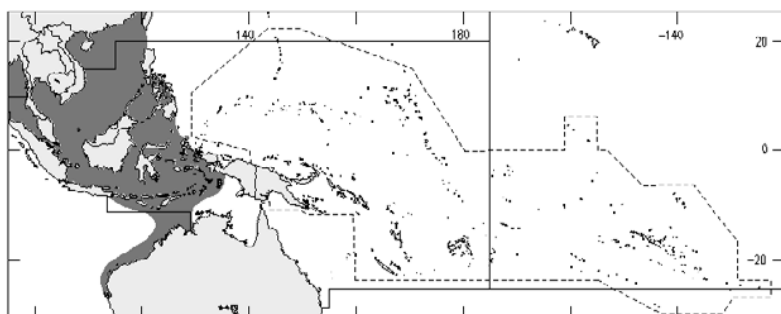


Diagnostic characters: Body oblong, its depth 2.05 to 2.2 times in standard length; caudal peduncle slender, its least depth 4 to 4.5 times in head length. **Dorsal profile of head convex**; head length 2.35 to 2.5 times in standard length; snout short, 4.65 to 5.6 times in head length; **height of second suborbital bone (measured vertically below eye centre) about 1/2 orbit diameter. No anteriorly directed spine on nasal bone of adults or subadults**; no spine at corner of preopercle of adults (subadults may have a small spine at angle). Premaxillary groove broadly V-shaped. Vomerine teeth in a V-shaped patch. First gill arch with 7 to 10 gill rakers on upper limb, 12 to 14 on lower limb. Dorsal fin continuous, though deeply notched between spinous and soft portions; **dorsal fin with XII spines, the last distinctly longer than penultimate spine**, and 12 to 14 (usually 13) soft rays; **space between last spine and first ray of dorsal fin much less than space between last 2 dorsal-fin spines**; anal fin with IV spines (the third longest and stoutest) and 10 to 12 (usually 11) soft rays; **pectoral fins with 16 or 17 (usually 17) rays**. Lateral-line scales 28 to 30 (modally 28); **rows of scales above lateral line to middle of spinous portion of dorsal fin 3 1/2; no half scale anterior to first lateral-line scale. Colour:** edges of scales red, the centres silvery pink; spinous portion of dorsal fin mottled light red and whitish; remaining fins with light red rays and pale membranes; iris red.

Size: Maximum total length about 41 cm, commonly to 20 cm.

Habitat, biology, and fisheries: Most specimens have come from fish markets with little or no information on type of bottom or depth of capture. Those for which the depth is known were taken in 90 to 194 m. Caught mostly by hook-and-line and marketed fresh.

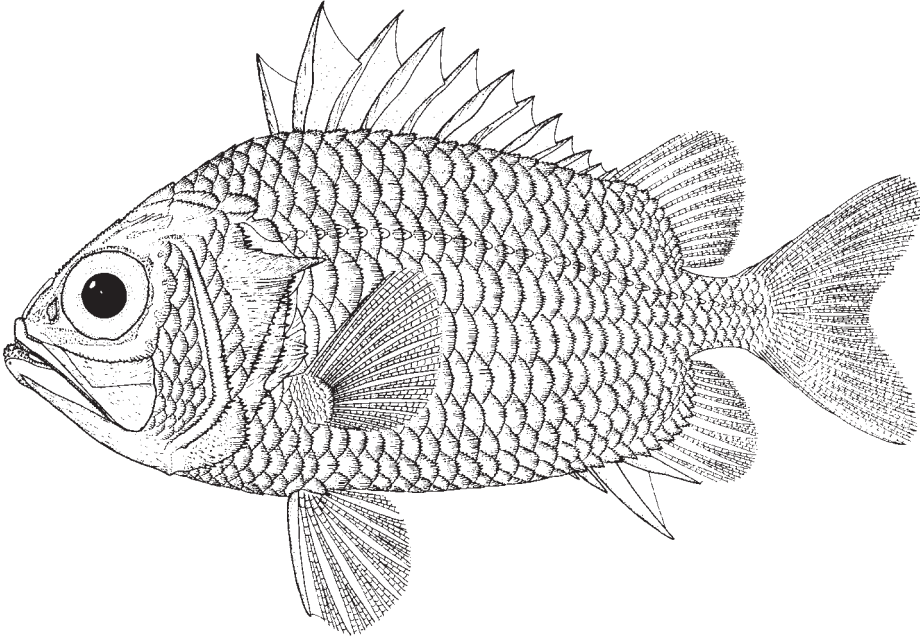
Distribution: Reported in Japan (type locality) from the Ryukyu Islands to Honshu at 31°31'N; Korea; China off Shanghai and Hong Kong; South China Sea; Lesser Sunda Islands, Indonesia; northwestern Australia; New South Wales at 34°26'S (where named *Holotrachys major* Whitley), and the Andaman Sea.



Ostichthys kaianus (Günther, 1880)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Kai soldierfish.



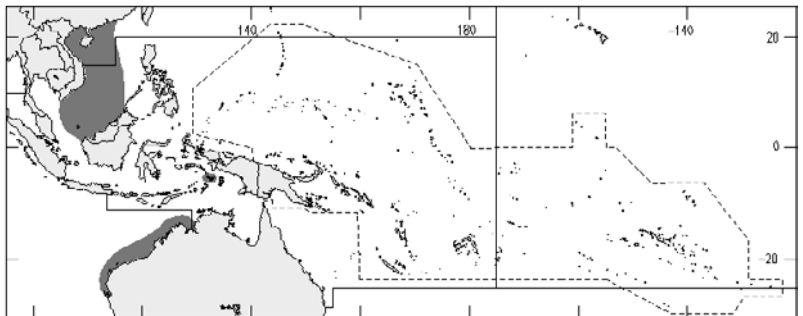
Diagnostic characters: Body oblong, its depth 2.05 to 2.2 times in standard length; caudal peduncle slender, its least depth 3.8 to 4.6 times in head length. **Dorsal profile of head slightly convex**; head length 2.15 to 2.4 times in standard length; snout moderately short, 4.2 to 4.9 times in head length. **No anteriorly directed spine on nasal bone of adults or subadults**; no spine at corner of preopercle of adults (subadults may have a small spine at angle). Premaxillary groove broadly V-shaped. Vomerine teeth in a V-shaped patch. First gill arch with 7 to 9 gill rakers on upper limb, 14 to 16 on lower limb. Dorsal fin continuous, though deeply notched between spinous and soft portions; **dorsal fin with XII spines, the last 2 spines subequal**, and 12 or 13 (usually 13) soft rays; **space between last spine and first ray of dorsal fin about 1/2 as broad as space between last 2 dorsal-fin spines**; anal fin with IV spines (the third longest and stoutest) and 11 soft rays; **pectoral fins with 15 to 17 (usually 16) rays**. Lateral-line scales 28 to 30 (modally 28); **rows of scales above lateral line to middle of spinous portion of dorsal fin 2 1/2**; **no half scale anterior to first lateral-line scale**. **Colour:** red with a series of silvery white dashes (1 on each scale for nearly its full exposed width) forming longitudinal bands on body; fins pale red; iris red.

Size: Maximum total length about 36 cm, commonly to 20 cm.

Habitat, biology, and fisheries:

Obtained by hook-and-line and by trawling in the depth range of 310 to 640 m.

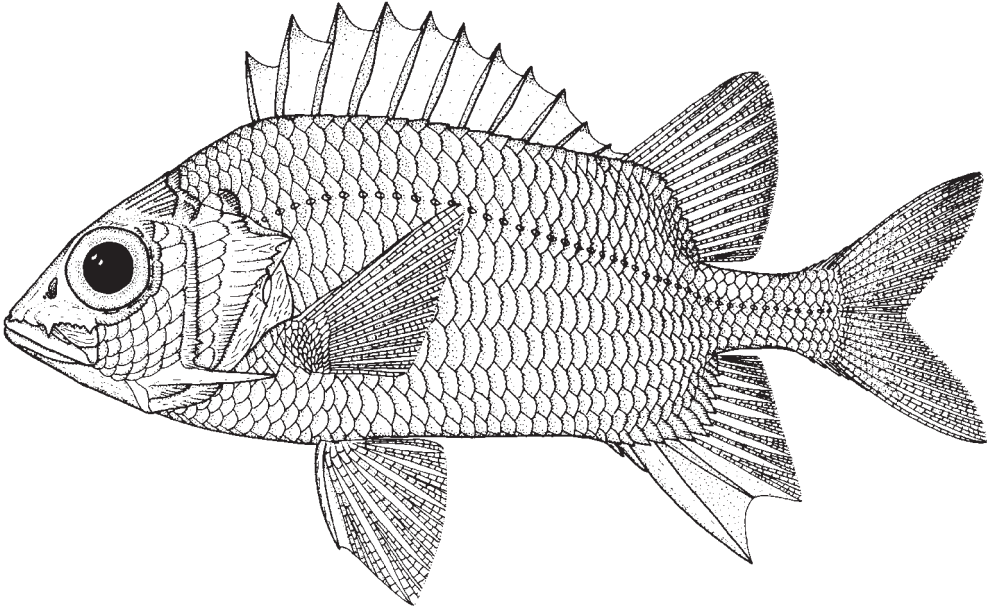
Distribution: Reported from Kai Island, eastern Banda Sea (type locality), South China Sea, the Ryukyu Islands, northwestern Australia, and Réunion (locality of *Myripristis (Holotrachys) guezeti* Postel).



Sargocentron caudimaculatum (Rüppell, 1838)

Frequent synonyms / misidentifications: *Adioryx caudimaculatus* (Rüppell, 1838); *Holocentrus caudimaculatus* Smith and Smith, 1963; *Holocentrum andamanense* Day, 1870 / None.

FAO names: En - Silverspot squirrelfish; Fr - Marignan rouge et argent; Sp - Candil platero.

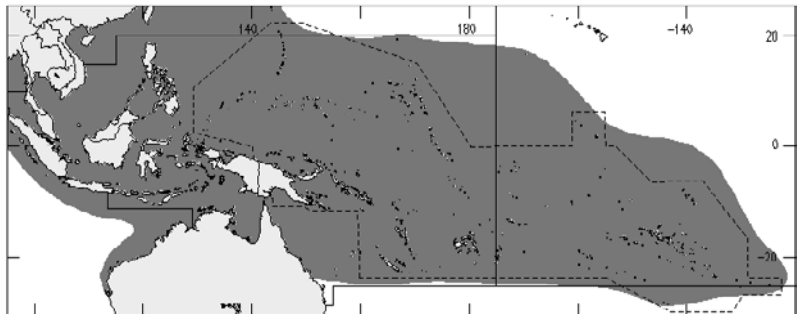


Diagnostic characters: Body depth 2.3 to 2.7 times in standard length. Dorsal profile of head slightly convex; preopercular spine long, its length about 1 eye diameter. **Nasal fossa with 1 or 2 spinules on anterior margin. Dorsal fin with XI spines (last spine shortest)** and 13 to 15 (usually 14) soft rays; anal fin with IV spines and 8 to 10 (usually 9) soft rays; pectoral-fin rays 13 to 15 (usually 14). **Lateral-line scales 38 to 43**; scale rows above lateral line to middle of spinous portion of dorsal fin 2 ½. **Colour:** red, the scales rimmed posteriorly with silvery white; **a saddle-like silvery white spot dorsally on caudal peduncle**; spinous dorsal fin light red to whitish, the outer triangular part of each membrane deep red; **no blackish markings; in life, posterior third of body may be silvery white.**

Size: Maximum total length about 24 cm, commonly to 18 cm.

Habitat, biology, and fisheries: A reef species which may be locally abundant. Caught by hook-and-line and in traps. Marketed fresh.

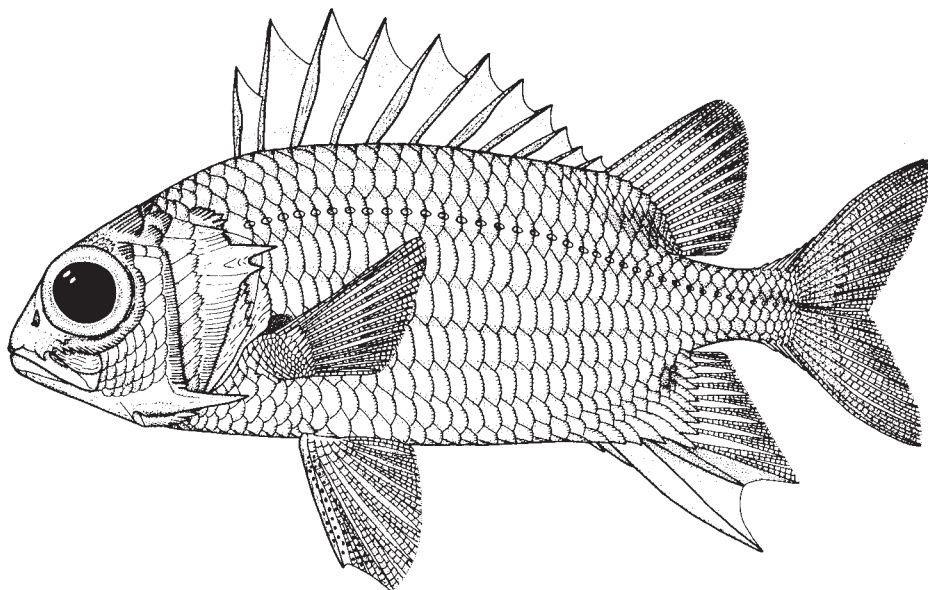
Distribution: Wide-ranging in the Indo-Pacific, from the Red Sea south to Transkei, South Africa, east to the Marshall Islands and Society Islands; in the western Pacific from the Ryukyu Islands to the southern Great Barrier Reef.



Sargocentron praslin (Lacepède, 1802)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Brownsport squirrelfish; Fr - Marignan chocolat; Sp - Candil chocolate.

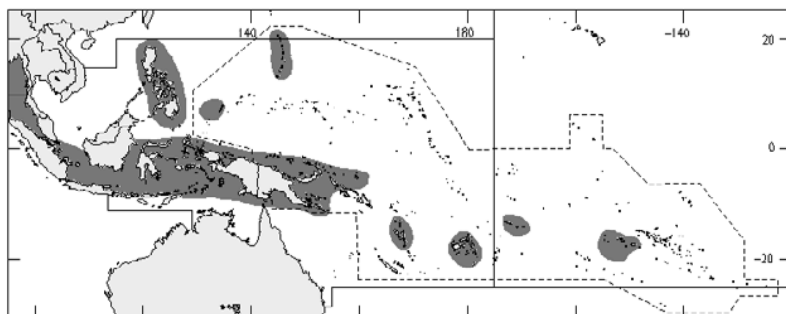


Diagnostic characters: Body deep, its depth 2.5 to 2.8 times in standard length. Dorsal profile of head convex; preopercular spine about 3/4 eye diameter; first suborbital bone with 1 or 2 short lateral spines near upper margin. Nasal fossa without spinules. Dorsal fin with XI spines (last spine shortest) and 12 or 13 (usually 13) soft rays; anal fin with IV spines and 8 or 9 (rarely 8) soft rays; pectoral-fin rays 13 to 15 (usually 14). **Lateral-line scales 33 to 36; scale rows above lateral line to middle of spinous portion of dorsal fin 2 1/2; cheek with 4 diagonal rows of scales.** **Colour:** body with alternate stripes of silvery white and reddish brown; a triangular streak of brownish red on cheek, from eye to corner of preopercle; often a concentration of pigment forming an **elongate brown spot beneath soft portion of dorsal fin and a roundish blotch above base of soft portion of anal fin**, spinous portion of dorsal fin red with a median band of cojoined whitish spots, the membranes tipped with white; **a large dark brown spot in axil of pectoral fins; front edge of pelvic fins dark.**

Habitat, biology, and fisheries: A shallow-water species, more often found in a coral reef environment than the closely related *Sargocentron rubrum*.

Size: Maximum total length about 32 cm, commonly to 20 cm.

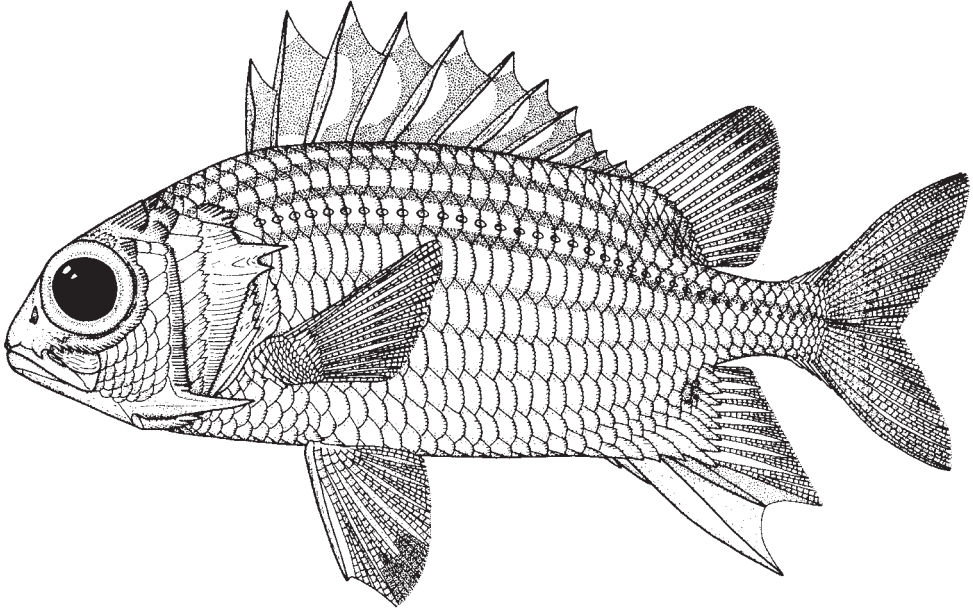
Distribution: Indo-Pacific, but exact distribution not known due to confusion with *S. rubrum*. Definite records from Kenya, Mozambique (15°S), Aldabra, Comoro Islands, Chesterfield Islands (Madagascar), Indonesia, New Guinea, New Britain (type locality), Solomon Islands (locality of neotype), Fiji, Vanuatu, Palau, Philippines, Ryukyu Islands, Mariana Islands, Samoa Islands, and Society Islands.



Sargocentron rubrum (Forsskål, 1775)

Frequent synonyms / misidentifications: *Adioryx ruber* (Forsskål, 1775); *Holocentrus ruber* Smith and Smith, 1963 / None.

FAO names: En - Redcoat; Fr - Marignan rouget; Sp - Candil rubí.

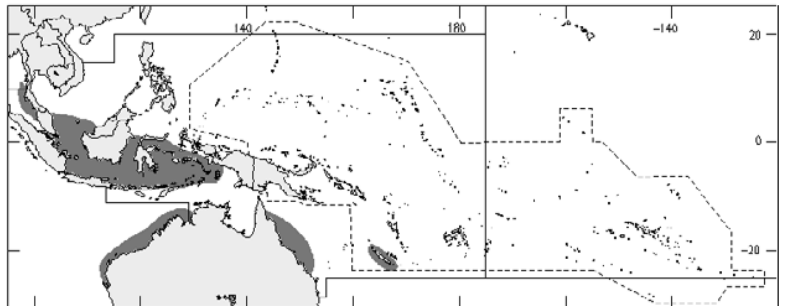


Diagnostic characters: Body deep, its depth 2.5 to 2.8 times in standard length. Dorsal profile of head convex, preopercular spine about 3/4 eye diameter; first suborbital bone with 1 or 2 short lateral spines near upper margin. **Nasal fossa without spinules. Dorsal fin with XI spines (last spine shortest)** and 12 to 14 (usually 13) soft rays; anal fin with IV spines and 8 to 10 (rarely 10) soft rays; pectoral-fin rays 13 to 15 (usually 14). **Lateral-line scales 34 to 38; scale rows above lateral line to middle of spinous portion of dorsal fin 2 ½; cheek with 5 diagonal rows of scales.** **Colour:** body with alternate stripes of silvery white and brownish red; a triangular streak of brownish red on cheek from eye to corner of preopercle; often a concentration of pigment forming an **elongate brown spot beneath soft portion of dorsal fin and a roundish blotch above base of soft portion of anal fin**; spinous portion of dorsal fin red with a median band of cojoined whitish spots, the membranes tipped with white; **no dark spot in pectoral-fin axil; tips of second to fourth soft pelvic-fin rays darker**; upper and lower edges of caudal fin brownish red; rest of caudal fin and soft portions of dorsal and anal fins yellowish.

Size: Maximum total length about 32 cm, commonly to 20 cm.

Habitat, biology, and fisheries: A shallow-water species usually found in protected habitats such as bays and lagoons, but less often around coral reefs than the closely related *Sargocentron praslin*.

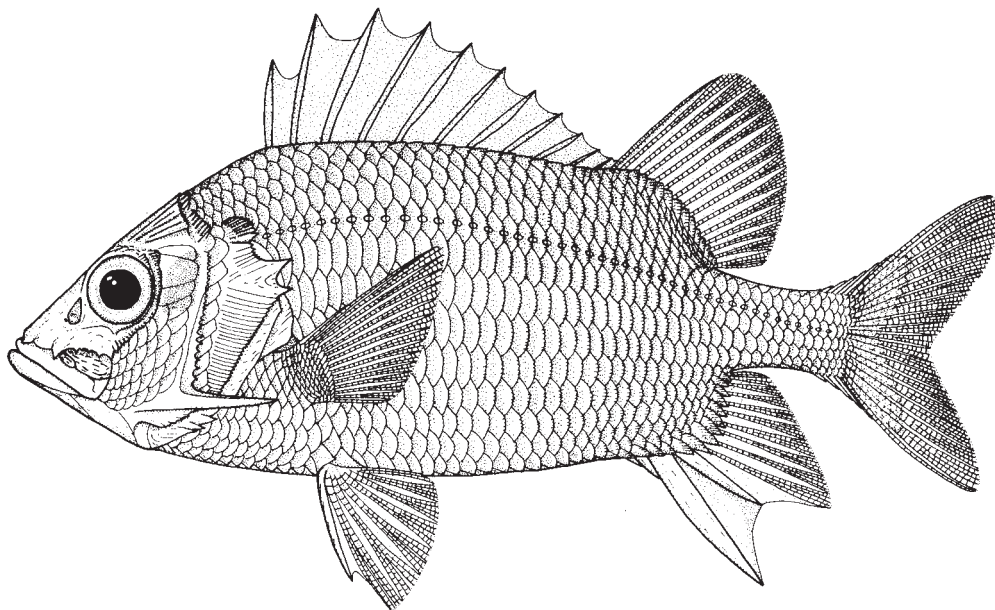
Distribution: Known from the Red Sea (type locality), Mediterranean Sea (an immigrant via the Suez Canal), Gulf of Oman, India, Sri Lanka, Andaman Sea (off Thailand), and northwestern Australia, but remains unreported from the coast of East Africa or any islands of the western Indian Ocean; definite records in the Pacific include Indonesia, Malaysia, Great Barrier Reef, New Caledonia, and southern Japan.



Sargocentron spiniferum (Forsskål, 1775)

Frequent synonyms / misidentifications: *Holocentrus spiniferus*: Smith and Smith, 1963 / None.

FAO names: En - Sabre squirrelfish; Fr - Marignan sabre; Sp - Candil sable.

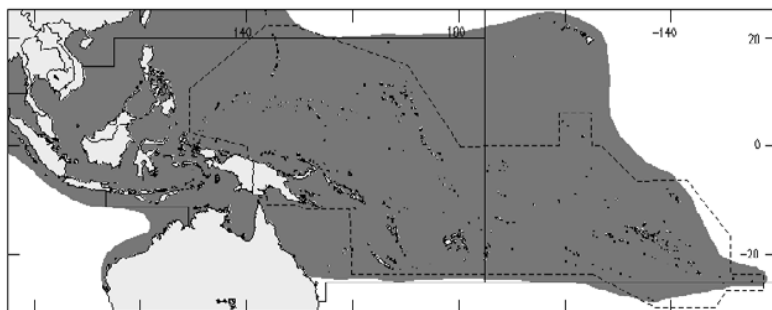


Diagnostic characters: Body deep, its depth 2.4 to 2.6 times in standard length. Dorsal profile of head straight; lower jaw protruding when mouth closed; preopercular spine long, slightly longer than eye diameter. Nasal fossa without spinules. Dorsal fin with XI spines (last spine shortest) and 14 to 16 soft rays, the membranes of spinous portion only slightly incised; anal fin with IV spines and 9 or 10 (usually 10) soft rays; pectoral-fin rays 14 to 16 (usually 15). Lateral-line scales 41 to 46; scale rows above lateral line to middle of soft portion of dorsal fin $3\frac{1}{2}$. **Colour:** head and body red, darker dorsally than ventrally, the scales rimmed with silvery white; a large vertically elongate deep red spot behind eye; pectoral-fin axil and region above pectoral-fin base deep red; spinous portion of dorsal fin solid deep red; remaining fins yellowish.

Size: Maximum total length about 45 cm, commonly to 35 cm.

Habitat, biology, and fisheries: Largest of holocentrid fishes. Associated with coral reefs. Like other squirrelfishes, it tends to hide in caves by day and emerges for foraging with the onset of darkness. Feeds mainly on crustaceans, especially crabs, but occasionally ingests small fishes. Caught by hook-and-line, in traps and by spearing. Marketed fresh. Has been implicated in ciguatera poisoning.

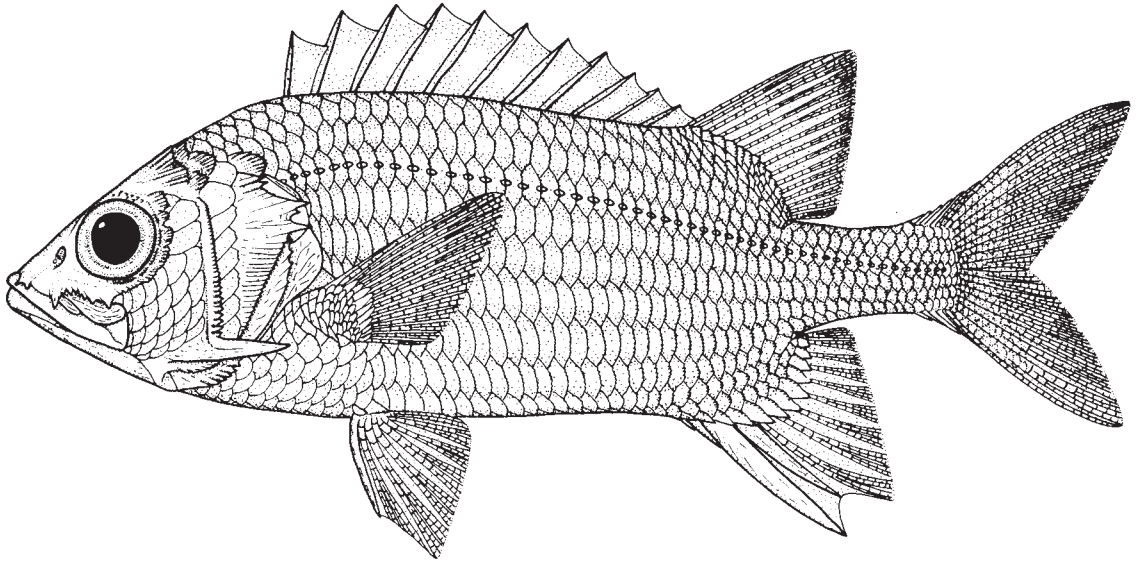
Distribution: Widespread in the Indo-Pacific from the Red Sea (type locality) and coast of East Africa south to Natal and east to Hawaii and Pitcairn Group in Oceania; in the western Pacific from the Ruykyu Islands to the southern Great Barrier Reef.



Sargocentron tiera (Cuvier, 1829)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Tahitian squirrelfish.

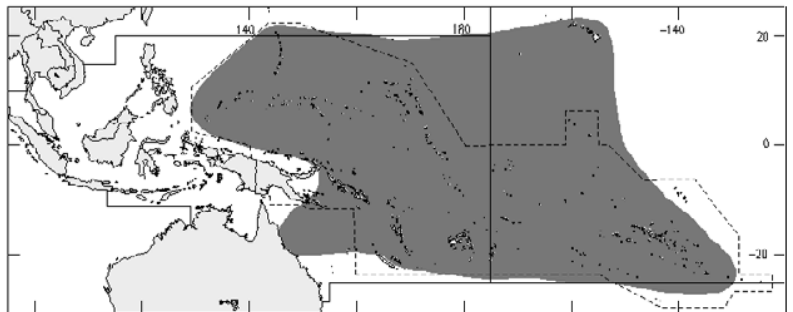


Diagnostic characters: Body moderately deep, its depth 2.6 to 2.95 times in standard length; dorsal profile of head straight to slightly convex; mouth terminal; preopercular spine nearly as long as orbit diameter in adults; no lateral spinules on first suborbital bone; **nasal fossa without spinules at edges**. First gill arch with 7 to 9 gill rakers on upper limb, 13 to 16 on lower limb. **Dorsal fin with XI spines and 13 to 15 (usually 14) soft rays**; anal fin with IV spines and 9 (rarely 10) soft rays; **dorsal-fin spines short, the longest 2.6 to 3.5 times in head length**; membranes of spinous portion of dorsal fin slightly incised; pectoral-fin rays 13 to 15. **Lateral-line scales 45 to 52; scale rows above lateral line to middle of spinous portion of dorsal fin 2 ½.** **Colour:** red, the sides and ventral part of body with faint silvery red stripes overlaid with blue iridescence (particularly the ventral stripes); fins red except white tips of dorsal-fin spines and a white spot in middle of each interspinous membrane of dorsal fin except first 2 membranes where near the fin base; leading edge of anal and pelvic fins white.

Size: Maximum total length about 35 cm, commonly to 20 cm.

Habitat, biology, and fisheries: A coral-reef species occurring more often on exposed than sheltered reefs. It may be seen in as little as 1 to 2 m, but is found at least as deep as 20 m. Feeds at night, mainly on crabs. At night it displays 2 prominent white bars on its otherwise bright red body.

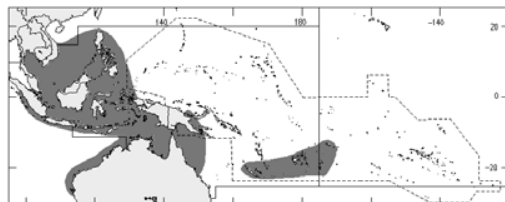
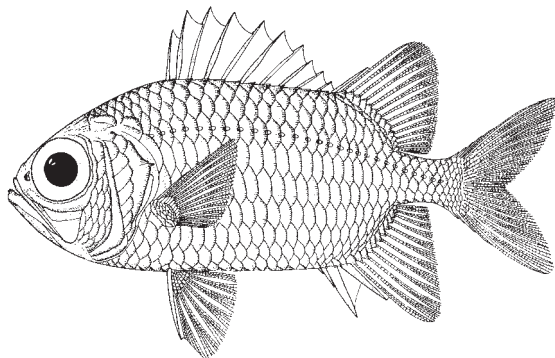
Distribution: Ranges from the Pitcairn Group and Hawaii to islands of the western Indian Ocean. It is primarily a species of oceanic islands, rather than continental waters. It remains unknown from the Red Sea, the coasts of Africa and Asia, and the islands of Indonesia. In the western Pacific it is reported from the Great Barrier Reef, Solomon Islands, Palau Islands, and the Ryukyu Islands.



Myripristis hexagona (Lacepède, 1802)

En - Doubletooth soldierfish.

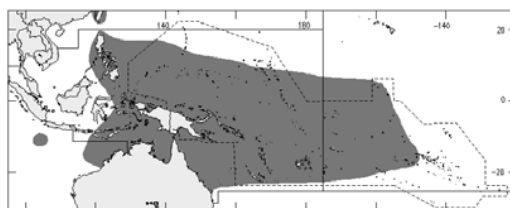
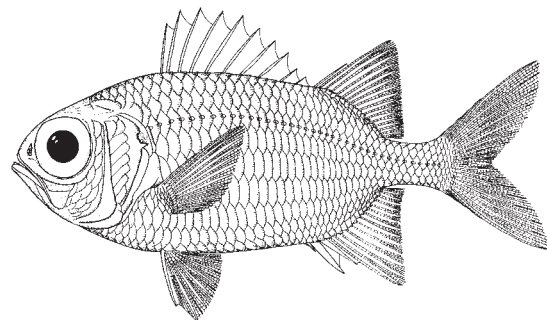
Maximum standard length about 16 cm. Distributed from Samoa to East Africa; in the western Pacific it ranges from the Ryukyu Islands in the north to the Great Barrier Reef and New Caledonia in the south.



Myripristis pralinia Cuvier, 1829

En - Scarlet soldierfish.

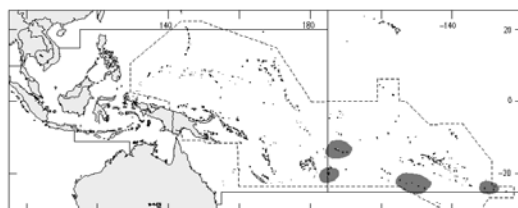
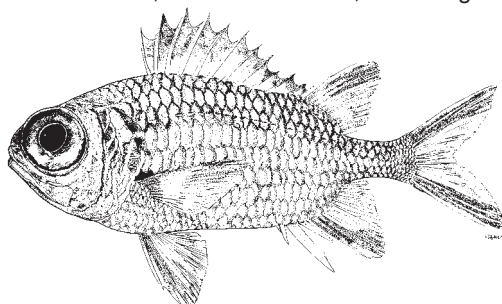
Maximum standard length about 16 cm. Generally found in moderately shallow water on coral reefs in depths of 1 to 30 m. Distributed from the Tuamotu Archipelago and Line Islands to East Africa; in the western Pacific it ranges from the Ryukyu Islands in the north to the southern Great Barrier Reef in the south.



Myripristis randalli Greenfield, 1974

En - Randall's soldierfish.

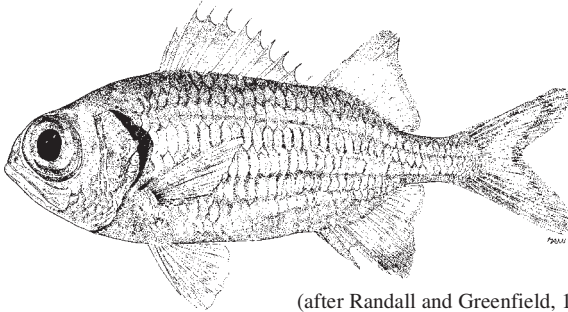
Maximum standard length about 15 cm. Found at depths of 15 to 53 m. Known from Pitcairn Island, Austral Islands, American Samoa, and Tonga.



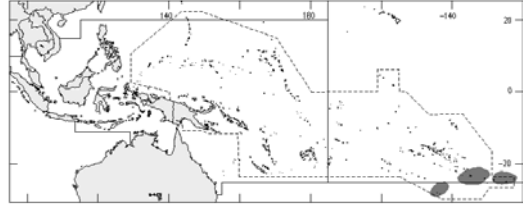
(after Randall and Greenfield, 1996)

Myripristis tiki* Greenfield, 1974*En** - Tiki soldierfish.

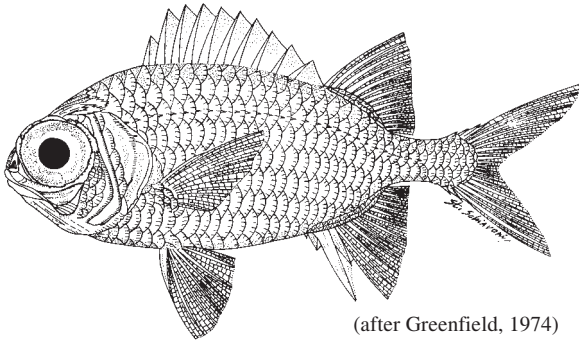
Maximum standard length about 21 cm. Found at depths of 1.5 to 15 m. Known only from the Easter Islands, Pitcairn Group, and Rapa.



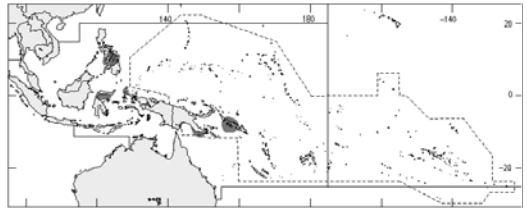
(after Randall and Greenfield, 1996)

***Myripristis trachyacron* Bleeker, 1863****En** - Roughskull soldierfish.

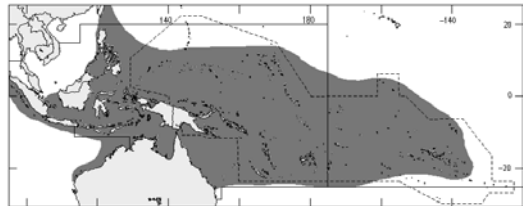
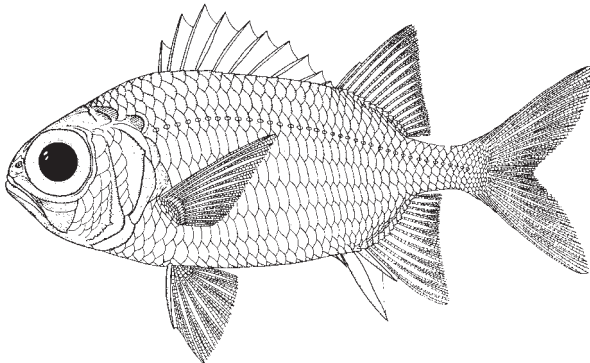
Maximum standard length about 12 cm. Apparently occurs in deep water, but was also reported from shallower waters. Known only from the Indo-Australian Archipelago (Philippines, Indonesia, and Solomon Islands).



(after Greenfield, 1974)

***Myripristis vittata* Cuvier, 1831****En** - Whitetip soldierfish.

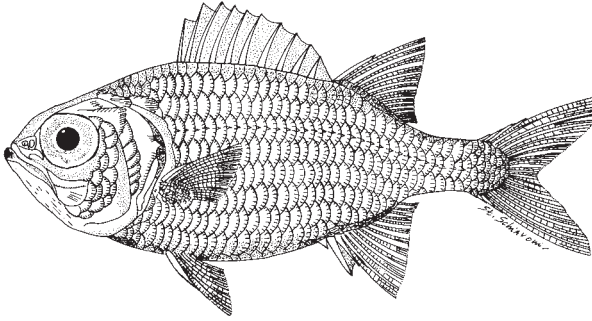
Maximum standard length about 16 cm. Generally found in depths of more than 20 m, but a single specimen was collected at 3 m; most likely will be found in other locations. Distributed from the Marquesas Islands, and Hawaii westward to the Mascarene Islands and Seychelles.



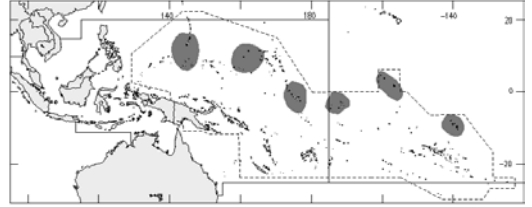
Myripristis woodsi Greenfield, 1974

En - Wood's soldierfish.

Maximum standard length about 21 cm. A shallow-water species typically found on exposed outer-reef areas, more often at low islands and atolls than high islands. Western Central Pacific. Confirmed records from the Marquesas Islands, Line Islands, Phoenix Islands, Kiribati, Marshall Islands, Minami tori shima (Marcus Island), and Mariana Islands.



(after Greenfield, 1974)



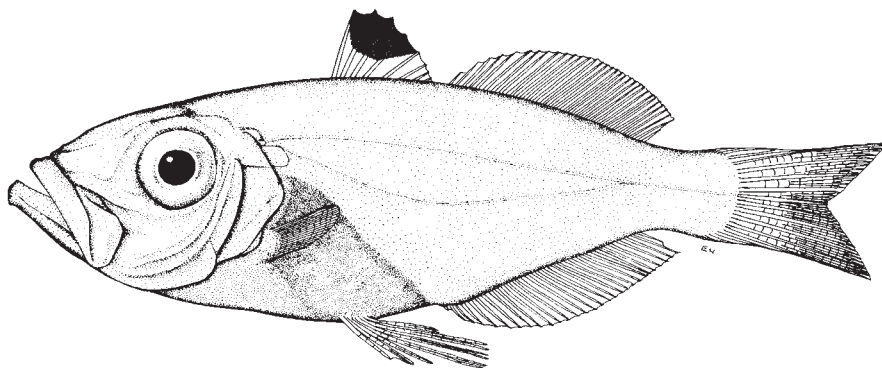
Order ZEIFORMES

PARAZENIDAE

Parazen

by P.C. Heemstra

D diagnostic characters: **Body oblong and compressed (size to 30 cm total length), its depth about equal to head length, contained 0.9 to 2.1 times in standard length.** Eye large, its diameter greater than snout length and contained 2.8 to 5.2 times in head length. **Mouth large, terminal, the upper jaw highly protrusible;** jaws with 1 or 2 rows of short, slender, conical teeth; similar teeth on vomer; maxilla exposed posteriorly; no supramaxilla. Gill rakers short and flattened, 1 on upper limb and 4 to 6 on lower limb of first arch (not counting rudiments). Gills $3\frac{1}{2}$ (no slit behind last hemibranch). Branchiostegal membranes separate from isthmus; branchiostegal rays 7. **Two dorsal fins, the first with VI to VIII slender spines, the second dorsal fin with 26 to 30 soft rays; anal fin with I small spine and 28 to 34 soft rays;** caudal fin forked, with 11 segmented rays and 9 branched rays; **pectoral fins much shorter than head, with 12 to 16 rays; pelvic fins with 1 unbranched soft ray and 6 branched soft rays (no spine).** Two lateral lines anteriorly, merging to a single line on the caudal peduncle. Head naked; body scales moderate in size, deciduous and weakly ctenoid. Vertebrae 34. **Colour:** reddish silver.



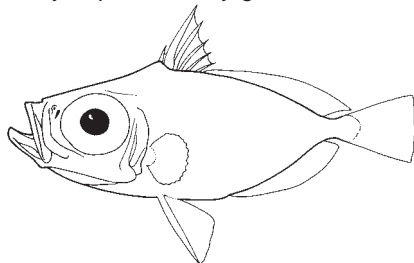
Habitat, biology, and fisheries: Caught with trawls in depths of 150 to 600 m.

Remarks: This family comprises a single genus and species. Not reported yet from the WCP area but very likely to occur there. Common off Japan in the western Pacific and also known from specimens collected off Tanzania in the western Indian Ocean and Cuba in the western Atlantic.

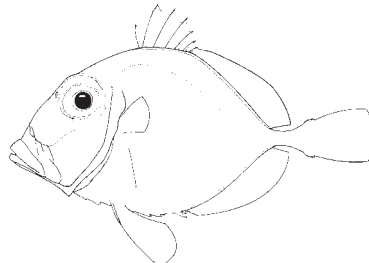
Similar families occurring in the area

Macrurocyttidae: eye diameter distinctly longer than snout; pelvic-fin spine well developed.

Zeidae: body depth distinctly greater than head length, contained 0.9 to 2.1 times in standard length.



Macrurocyttidae



Zeidae

List of species occurring in the area

? *Parazen pacificus* Kamohara, 1935

Reference

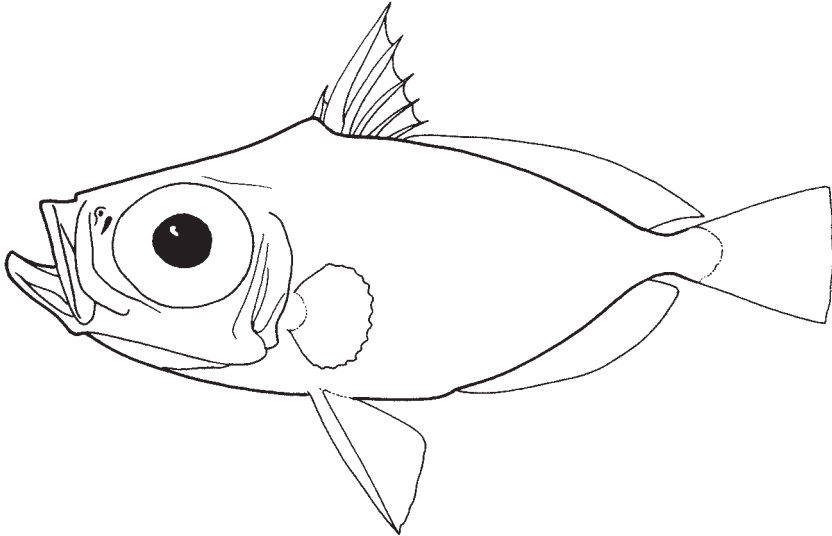
Masuda, H., K. Amaoka, C. Araga, T. Uyeno, and T. Yoshino (eds). 1988. *The fishes of the Japanese Archipelago*. Second edition. Tokyo, Tokai University Press, 456 p.

MACRUROCYTTIDAE

Dwarf dories

by P.C. Heemstra

Diagnostic characters: Body oval or oblong and compressed, its depth contained 2.2 to 2.8 times in standard length; head length 2 to 2.8 times in standard length. Eye huge, its diameter about twice snout length, and 30 to 52% head length. Mouth slightly or greatly protrusible; jaws with a row of minute conical teeth; no teeth on vomer; maxilla exposed posteriorly; no supramaxilla. Gills 3½ (no slit behind last hemibranch); gill rakers rudimentary low knobs. **One dorsal fin, with IV to VII spines and 25 to 30 soft rays, the second spine longest and serrate along its front margin; anal-fin spine rudimentary or absent, anal-fin rays 25 to 32;** caudal fin rounded or almost truncate, with 12 to 16 rays; pectoral fins much shorter than head, with 12 to 17 rays; **pelvic fins with I strong spine and 2, 3 or 6 soft rays.** Lateral line complete or replaced by fleshy tubercles. Body scales small, rudimentary, or absent; head naked. Vertebrae 25 to 34. **Colour:** *Macrurocyttus acanthopodus* has the head and front part of body blackish brown, the rear part of body and fins pale dusky or brownish. *Zenion hololepis* is dusky silver, with a reddish sheen; black spot distally on first dorsal fin; caudal fin reddish distally.

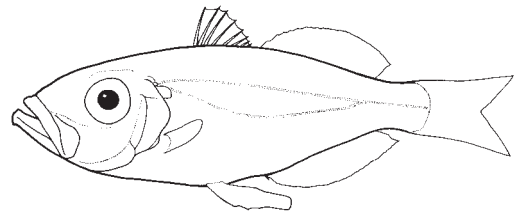


Habitat, biology, and fisheries: Taken with trawls over sand or mud bottoms in depths of 330 to 1 140 m. Biology unknown. These small, rare fishes are of no importance to fisheries.

Remarks: This poorly defined family comprises 2 or 3 genera and 4 or 5 species. The relationship of *Macrurocyttus* to *Zenion* may be more superficial than real.

Similar families occurring in the area

Parazenidae: eye shorter than snout; pelvic fin with 1 unbranched soft ray, 6 branched soft rays, and no spine.



Parazenidae

List of species occurring in the area

Macrurocyttus acanthopodus Fowler, 1934

Zenion hololepis Goode and Bean, 1896
 (= *Zenion japonicum* Kamohara, 1934)
 (= *Cyttula macropus* Weber, 1913)

Reference

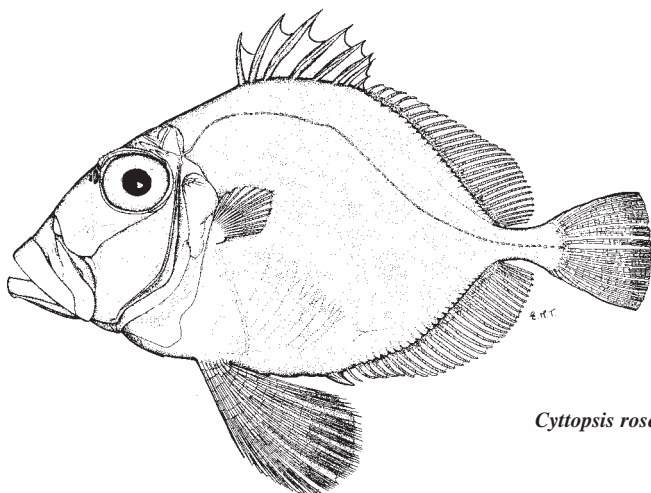
Nyako, C.O. and K. Amaoka. 1996. First records of the zeiform fish, *Macrurocyttus acanthopodus* Fowler, 1933, from the Coral Sea. *Ichthyol. Res.*, 43:93-96.

ZEIDAE

Dories

by P.C. Heemstra

Diagnostic characters: Body oval and strongly compressed; head also strongly compressed; body depth greater than head length, contained 0.9 to 2.1 times in standard length. Mouth highly protrusible, forming a downward-pointing tube when protruded; jaws with bands of villiform granular teeth or minute conical teeth, or rows of small canines; similar teeth on vomer; maxilla exposed posteriorly, no supramaxilla. Gills 3 ½ (no slit behind the last hemibranch); gill rakers rudimentary low knobs. Branchiostegal membranes separate from isthmus; branchiostegal rays 7. **A single dorsal fin, with VII to X spines and 20 to 37 soft rays; anal fin with I to IV spines and 20 to 39 soft rays;** caudal fin rounded or almost truncate, the upper lobe with 6 segmented rays and 5 branched rays, the lower lobe with 7 segmented rays and 6 branched rays; **pectoral fins much shorter than head, with 11 to 18 rays; pelvic fins with I spine and 6 or 7 rays, or lacking the spine and with 6 or 7, or 9 or 10 soft rays.** Lateral line complete, strongly curved over pectoral fin. Body scales small, rudimentary or absent; head naked (cheek and operculum scaly in *Cyttomimus*). Swimbladder present. Vertebrae 29 to 42. **Colour:** *Zenopsis*: silvery with faint dusky blotches; *Zeus*: bronzy copper, with prominent black ocellus at midside; *Cyttopsis*: reddish silvery, *Cyttomimus*: dusky silver.

*Cyttopsis rosea*

Habitat, biology, and fisheries: Most zeids are caught with trawls over sand or mud bottom in depths of 35 to 600 m. They usually occur near the bottom and feed on fishes and benthic invertebrates (mainly crustaceans and worms).

Remarks: This poorly defined family comprises 5 or 6 genera and 11 or 12 species. Zeids are rare in tropical and subtropical waters, but 5 species have been reported from the Western Central Pacific.

Similar families occurring in the area

Drepanidae: pectoral fins falciform, longer than head, reaching caudal peduncle; pelvic fins with I spine and 5 soft rays.

List of species occurring in the area

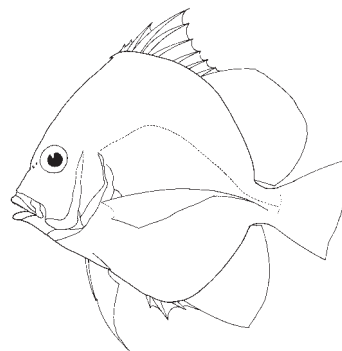
Cyttomimus affinis Weber, 1913

Cyttopsis cypho (Fowler, 1934)

Cyttopsis rosea (Lowe, 1843)

Zenopsis nebulosa (Temminck and Schlegel, 1847)

Zeus faber Linnaeus, 1758



Drepanidae

Reference

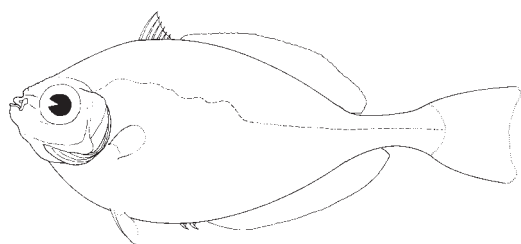
Heemstra, P.C. 1986. Zeidae. In *Smith's sea fishes*, edited by M.M. Smith and P.C. Heemstra. Johannesburg, Macmillan South Africa, pp. 435-438.

GRAMMICOLEPIDIDAE

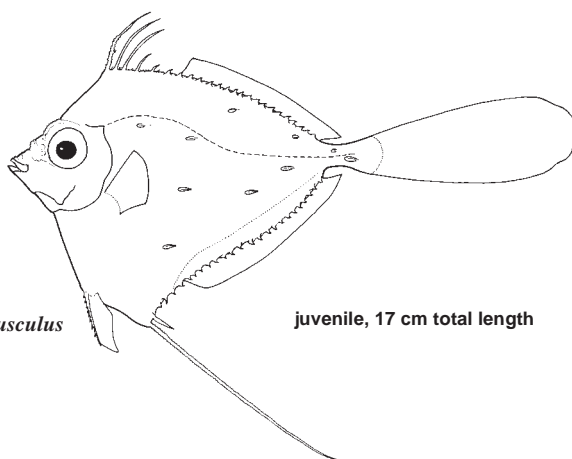
Tinselifishes

by P.C. Heemstra

Diagnostic characters: Body oval, oblong, or diamond-shaped, and strongly compressed, its depth much greater than head length, contained 0.8 to 2.3 times in standard length; head length 2.9 to 4.4 times in standard length; body, cheeks, and operculum covered with vertically elongated scales; a row of small spines along each side of dorsal- and anal-fin bases. Mouth small; maxilla ridged, bound to ascending processes of premaxillae, loosely connected to palatines; jaws with 1 or 2 rows of small, slender teeth; vomer with or without teeth. Gills $3\frac{1}{2}$, no slit behind last hemibranch; gill rakers rudimentary flat tooth plates attached to skin covering the first gill arch. Branchiostegal rays 7, with membranes joined to front of isthmus. **Two dorsal fins, the first with V to VII slender spines, the second dorsal fin with 17 to 34 unbranched soft rays; anal fin with II spines and 27 to 39 unbranched soft rays; juveniles with first anal-fin spine and second dorsal-fin spines greatly elongated; caudal fin with 13 branched rays; pelvic fins with I spine and 6 branched soft rays.** Vertebrae 37 to 46. **Colour:** adults silvery (with black spots in *Xenolepidichthys*).



adult, 60 cm total length

Grammicolepis brachiusculus

juvenile, 17 cm total length

Habitat, biology, and fisheries: Apparently rare, no information available on biology. Caught with trawls, but of no importance for fisheries.

Remarks: This family comprises 2 genera, each with a single species. Tinselifishes occur worldwide (but not in polar seas) at depths of 100 to 800 m.

Similar families occurring in the area

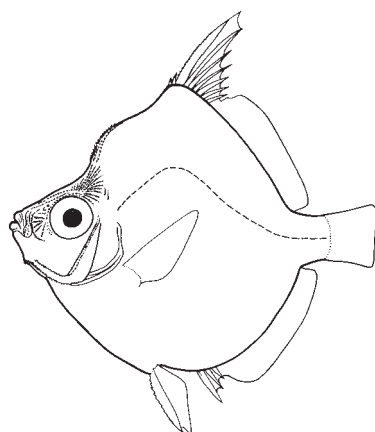
Caproidae: have small, oval ctenoid scales; branched dorsal- and anal-fin rays; pelvic fins with I spine and 5 soft rays; caudal fin with 10 branched rays; branchiostegal rays 6; vertebrae 9+12.

The transparent, compressed, deep-bodied acronurus postlarva of surgeonfishes (family Acanthuridae) superficially resembles a small tinselifish, but acanthurids have a restricted gill opening, and the postlarva lacks elongate fin spines.

List of species occurring in the area

Grammicolepis brachiusculus Poey, 1873

Xenolepidichthys dalgleishi Gilchrist, 1922



Caproidae

Reference

Karrer, C. and P.C. Heemstra. 1986. Grammicolepididae. In *Smith's Sea Fishes*, edited by M.M. Smith and P.C. Heemstra. Johannesburg, Macmillan South Africa, pp. 440-441.

CAPROIDAE

Boarfishes

by P.C. Heemstra

Diagnostic characters: Body disc-shaped, strongly compressed; dorsal profile angular, ventral profile semicircular; body depth more than twice head length and contained 0.8 to 1.4 times in standard length; head length 2.4 to 3 times in standard length. Mouth small, oblique; upper jaw protrusible; bands of small teeth on jaws, none on vomer or palatines. Gills 4, a small slit behind last gill; gill rakers on first gill arch 15 to 23. Branchiostegal rays 6, the membranes joined far forward. **Single dorsal fin with VII to IX spines and 26 to 38 soft rays; anal fin with III spines and 24 to 34 soft rays; dorsal- and anal-fin rays branched; caudal fin truncate, with 10 branched rays; pectoral-fin rays 12 to 14; pelvic fins with I strong spine and 5 branched soft rays.** Scales small, round or slightly oval, with enlarged ctenii. Vertebrae 9+12. **Colour:** reddish orange.

Habitat, biology, and fisheries: Tropical and temperate waters of all oceans; adults usually found near the bottom in depths of 50 to 600 m; the larvae are pelagic.

Remarks: Two genera are presently recognized. The monotypic *Capros aper* (Linnaeus, 1758) is common in the North Atlantic and Mediterranean. *Antigonia* comprises 10 species, of which 4 are known from the Western Central Pacific. The placement of this family in the order Zeiformes is controversial and it is often considered more closely aligned with the Perciformes.

Similar families occurring in the area

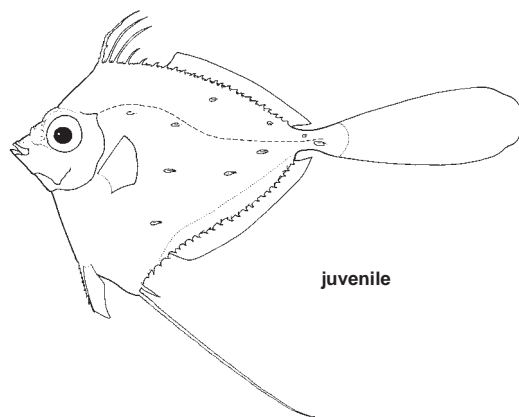
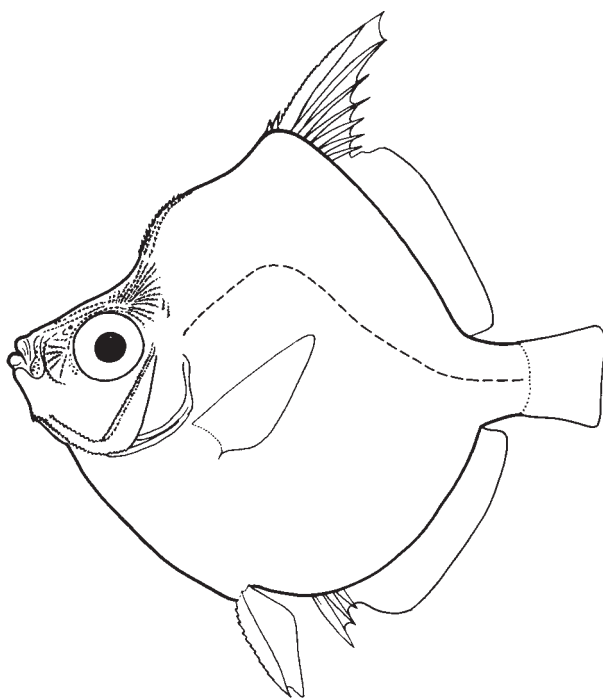
Grammicolepididae: scales greatly elongated vertically; dorsal- and anal-fin rays unbranched; pelvic fins with I spine and 6 branched soft rays; caudal fin with 13 branched rays; brachiostegal rays 7; vertebrae 37 to 46.

List of species occurring in the area

- Antigonia capros* Lowe, 1843
- Antigonia malayana* Weber, 1913
- Antigonia rubescens* Günther, 1860
- Antigonia rubicunda* Ogilby, 1910

References

- Parin, N.V. and O.C. Borodulina. 1986. Preliminary review of the benthopelagic fish genus *Antigonia* Lowe (Zeiformes, Caproidae). *Trans. P.P. Shirshov Inst. Oceanol.*, 121:141-172.
- Zehren, S.J. 1987. Osteology and evolutionary relationships of the boarfish genus *Antigonia* (Teleostei: Caproidae). *Copeia*, 1987(3):564-592.



juvenile

Grammicolepididae

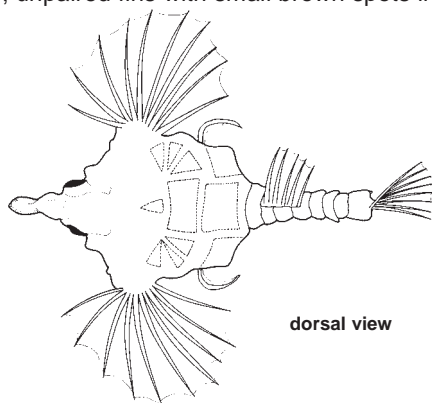
Order GASTEROSTEIFORMES

PEGASIDAE

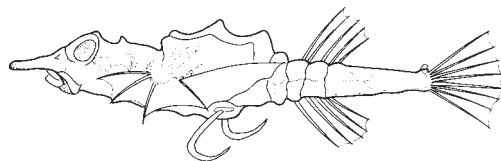
Seamoths (seadragons)

by T.W. Pietsch and W.A. Palsson

Diagnostic characters: Small fishes (to 18 cm total length); body depressed, **completely encased in fused dermal plates**; tail encircled by 8 to 14 laterally articulating, or fused, bony rings. Nasal bones elongate, fused, forming a rostrum; mouth inferior. **Gill opening restricted to a small hole on dorsolateral surface behind head. Spinous dorsal fin absent**; soft dorsal and anal fins each with 5 rays, placed posteriorly on body. Caudal fin with 8 unbranched rays. **Pectoral fins large, wing-like**, inserted horizontally, composed of 9 to 19 unbranched, soft or spinous-soft rays; pectoral-fin rays interconnected by broad, transparent membranes. **Pelvic fins thoracic, tentacle-like**, with 1 spine and 2 or 3 unbranched soft rays. **Colour:** in life highly variable, apparently capable of rapid colour change to match substrata; head and body light to dark brown, olive-brown, reddish brown, or almost black, with dorsal and lateral surfaces usually darker than ventral surface; dorsal and lateral body surface often with fine, dark brown reticulations or mottled lines, sometimes with irregular white or yellow blotches; tail rings often encircled with dark brown bands; pectoral fins with broad white outer margin and small brown spots forming irregular, longitudinal bands; unpaired fins with small brown spots in irregular rows.



dorsal view



lateral view

Habitat, biology, and fisheries: Benthic, found on sand, gravel, shell-rubble, or muddy bottoms. Collected incidentally by seine, trawl, dredge, or shrimp nets; postlarvae have been taken at surface lights at night. They apparently "walk" over the bottom with the aid of the tentacular pelvic fins. In Hong Kong and other southeast Asian localities, specimens are dried and sold for medicinal purposes; the dried bodies are subsequently boiled in water and the resulting broth is sipped as a cure for various throat irritations; dried specimens have also been collected and maintained as curiosities in Chinese insect boxes. Otherwise these fishes are of no commercial value.

Similar families occurring in the area

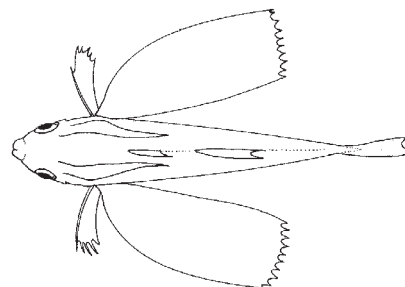
Dactylopteridae: head large, snout blunt, body covered with scute-like scales, not encased in fused bony plates; tail not encased in bony rings. Spinous dorsal fin well developed; pectoral fins extremely large, with 28 to 37 rays; pelvic fins with 1 spine and 4 soft rays.

List of species occurring in the area

Eurypegasus draconis (Linnaeus, 1766)

Pegasus laternarius Cuvier, 1816

Pegasus volitans Linnaeus, 1758



Dactylopteridae

References

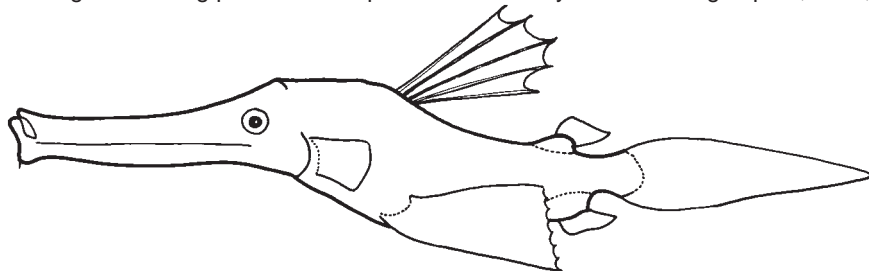
- Orr, J.W. and T.W. Pietsch. 1994. Pipefishes and their allies. In *Encyclopedia of fishes*, edited by J. R. Paxton and W.N. Eschmeyer. Sydney, University of New South Wales Press, pp. 168-172.
- Palsson, W.A. and T.W. Pietsch. 1989. Revision of the acanthopterygian fish family Pegasidae (order Gasterosteiformes). *Indo-Pac. Fishes*, (18):38 p.
- Pietsch, T.W. 1978. Evolutionary relationships of the sea moths (Teleostei: Pegasidae) with a classification of gasterosteiform families. *Copeia*, 1978:517-529.

SOLENOSTOMIDAE

Ghost pipefishes

by R.A. Fritzsche and K.G. Thiesfeld

Diagnostic characters: Small fishes (12 to 16 cm total length); **body elongate, laterally compressed**, depth greatest between origin of spinous dorsal and pelvic fins, **strongly constricted between pelvic-fin insertion and origin of soft dorsal and anal fins**. **Head elongate**, approximately 44% of standard length; **snout elongate, tubular**, with nasal lamellae (number of lamellae sexually dimorphic); mouth small, vertically oriented, toothless, **with single mandibular barbel**. Two dorsal fins, the first with V weak spines and the second with 17 to 22 unbranched soft rays; **spinous and soft dorsal fins widely separated, each on a raised base**; anal fin rounded, situated opposite soft dorsal fin and on a raised base, composed of 17 to 22 unbranched soft rays; caudal fin truncate, rounded, or lanceolate; pectoral fins small, rounded; pelvic fins large, situated opposite spinous dorsal fin. Lateral line absent. **Body covered with stellate plates that bear spines, variously with cutaneous papillae**. **Colour:** overall colour highly variable, ranging between light and dark phases: light colour phase with light background often overlain with spots and/or reticulations; dark colour phase with overall dusky to black coloration or strongly contrasting reticulating pattern of deep red-brown with yellow to orange spots, lines, or blotches.

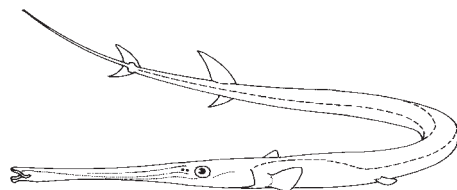


Similar families occurring in the area

Aulostomidae: larger; distinct separate spines anterior to soft dorsal fin; lateral line present; never cutaneous papillae.

Syngnathidae: body encased in bony rings; no spines in fins; pelvic fins absent; anal fin reduced or absent; male with specialized ventral brooding surface or pouch.

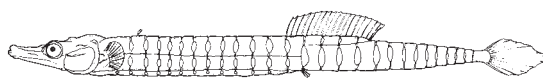
Fistulariidae: body depressed rather than compressed; spinous dorsal fin absent; a distinct caudal-fin filament present.



Fistulariidae



Aulostomidae



Syngnathidae

Habitat, biology, and fisheries: Ghost pipefishes are found over sand or mud bottoms, in seagrass beds, marine algae, or in association with reef invertebrates. They feed on small benthic and pelagic invertebrates, mainly crustaceans. Reproduction involves the brooding of eggs in a ventral brood pouch formed by the pelvic fins of the female. Ghost pipefish are not utilized as food. Sought by aquarium hobbyists. Taken in bottom trawls and by hand. Occur throughout the Indo-West Pacific.

List of species occurring in the area

- Solenostomus armatus* Weber, 1913
- Solenostomus cyanopterus* Bleeker, 1854
- Solenostomus paradoxus* (Pallas, 1770)

Reference

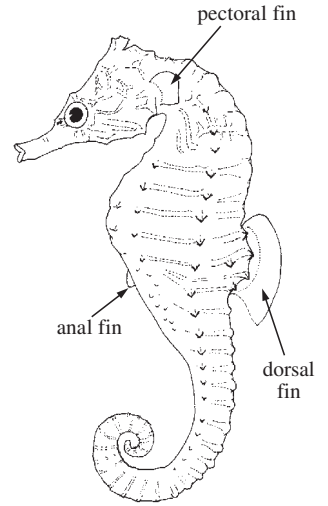
- Orr, J.W. and R.A. Fritzsche. 1993. Revision of the ghost pipefishes, family Solenostomidae (Teleostei: Syngnathoidei). *Copeia*, 1993(1):168-182.

SYNGNATHIDAE

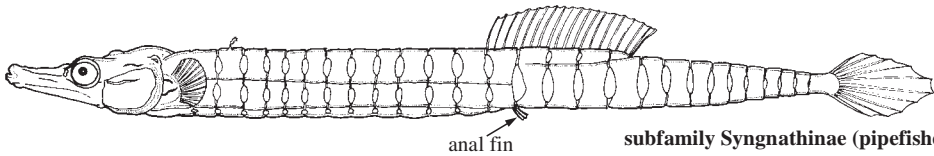
Pipefishes and seahorses

by T. Paulus

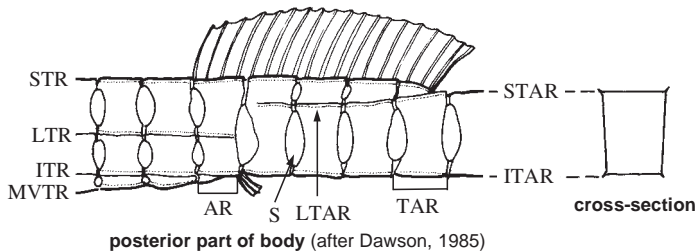
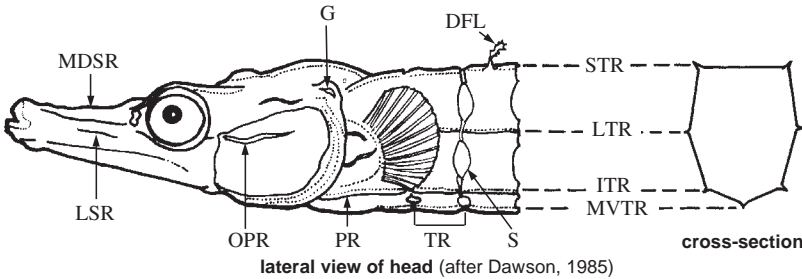
Diagnostic characters: Usually small fishes (4 to 55 cm total length). **Body typically slender and elongate, without scales, encased in a series of bony rings;** with or without a prehensile tail. Head either more or less along same axis as rest of body (subfamily Syngnathinae), or clearly bent in ventral direction from main axis of body (subfamily Hippocampinae). **Snout generally long and tubular;** mouth small, toothless, located at tip of snout. **Branchiostegal rays 1 to 3;** gill opening reduced to a pore in the opercular membrane. **Spinous dorsal and pelvic fins absent;** other fins variously present or absent; a single dorsal fin, usually with 15 to 60 soft rays; anal fin small, with 2 to 6 soft rays; caudal fin, if present, with 8 to 10 rays; pectoral fins usually with 10 to 23 rays. Some species develop dermal appendages along body, head, and snout. **No lateral line.** **Colour:** variable with the species, generally adapted to the preferred habitat; species living on seagrass, sand, and coral rubble usually have grey, green, brown, or black ground colour with various patterns; coral-reef species sometimes colourful with white, yellow, orange, blue, red, and black stripes and bands; fins usually transparent; caudal fin sometimes with colourful patterns.



subfamily Hippocampinae (seahorses)



subfamily Syngnathinae (pipefishes)



morphological features used in the identification key

(adapted from Dawson, 1985)

AR - anal ring; DFL - dermal flap; G - gill opening; ITAR - inferior tail ridge; ITR - inferior trunk ridge; LSR - lateral snout ridge; LTAR - lateral tail ridge; LTR - lateral trunk ridge; MDSR - median dorsal snout ridge; MVTR - median ventral trunk ridge; OPR - opercular ridge; PR - pectoral ring (1st trunk ring); S - scutellum; STAR - superior tail ridge; STR - superior trunk ridge; TAR - tail ring; TR - trunk ring.

Habitat, biology, and fisheries: Syngnathidae usually live in coastal marine waters; some are found in estuarine waters, and only a few in fresh water. The marine species live in a wide variety of habitats, such as on sand and rubble substrate, seagrass beds, in caves and crevices of coral reefs and on steep drop-offs of the reef. Juveniles often with a planktonic stage. Some species are associated with floating objects such as *Sargassum* seaweeds. Generally found in shallow waters at depths of 1 to more than 100 m, planktonic juveniles are sometimes caught in trawls from greater depths in the open sea. The majority of the known species feed on minute benthic and planktonic fauna, preferably microcrustaceans. Perhaps the most peculiar behaviour displayed by the seahorses and pipefishes is their habit of male egg incubation. The female deposits the eggs on the ventral surface of the male body, where they are fertilized. The eggs are kept in a pouch or on a specially vascularized surface of the trunk or tail. The brood is carried by the male until the young hatch. Most of the relatively small species are of no or minor commercial importance. However, some colourful species regularly appear in the aquarium trade, e.g. *Corythoichthys* spp., *Doryrhamphus* spp., *Halicampus* spp., and *Hippocampus* spp. In addition, seahorses and pipefishes are sold primarily for use on Asian markets as medicine and aphrodisiacs, but also as curios and food.

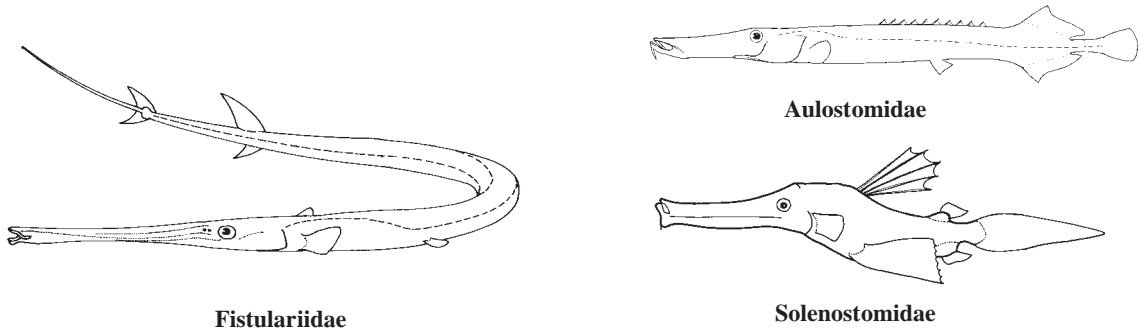
Similar families occurring in the area

The body encased in bony rings, typical body shape, and the lack of pelvic and second dorsal fins easily distinguishes the seahorses and pipefishes from other families. Members of the Aulostomidae, Fistulariidae, and Solenostomidae may superficially resemble syngnathids.

Aulostomidae: larger, reaching a maximum length of 80 cm; body compressed, elongate, and scaly; series of 8 to 12 isolated dorsal-fin spines, followed by a normal dorsal fin; well-developed lateral line; caudal fin well developed and rounded.

Fistulariidae: generally larger, with maximum length of 1.8 m, but usually less than 1 m; body depressed, elongate, and naked, or with minute prickles and linear row of scutes; caudal fin forked, with elongate filament produced by the median 2 caudal-fin rays.

Solenostomidae: body short, compressed, with large stellate bony plates; 2 separate dorsal fins, the first with 5 long feeble spines; pelvic fins relatively large; females with brood pouch formed by the pelvic fins; maximum length 16 cm.



Identification note

The identification of seahorses and pipefishes is based on specific morphological features such as the typical bony ridges on the head, trunk, and tail (see figure on previous page) as well as the number of trunk and tail rings. An additional important morphological character is the position and type of the male brood area. A revision of the subfamily Hippocampinae is urgently needed.

Key to the genera and subgenera of Syngnathidae occurring in the area

(Key adapted from Dawson, 1985; figures after Dawson, 1985)

- 1a. Distal part of tail clearly prehensile and tapered → 2
- 1b. Distal part of tail not prehensile or tapered, its tip with a distinct caudal fin → 8
- 2a. Head clearly bent in ventral direction from longitudinal axis of body, usually more than 70° *Hippocampus*
- 2b. Head essentially in line with longitudinal axis of body or bent very little in ventral direction → 3

- 3a. Principal body ridges with enlarged spines; snout long, head 1.6 to 1.7 times as long as snout *Haliichthys*
- 3b. Principal body ridges without enlarged spines → 4
- 4a. With bony platelets on sclera of eye (Fig. 1) → 5
- 4b. Without bony platelets on sclera of eye → 6

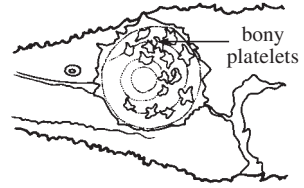


Fig. 1 lateral view of head

- 5a. Superior trunk and tail ridge continuous (Fig. 2a). *Solegnathus (Runcinatus)*
- 5b. Superior trunk and tail ridge discontinuous (Fig. 2b) *Solegnathus (Solegnathus)*
- 6a. Lateral trunk ridge bent dorsally, ending just below superior ridge near rear of dorsal-fin base (Fig. 2c) *Syngnathoides*
- 6b. Lateral trunk ridge not bent dorsally → 7
- 7a. Superior trunk and tail ridge continuous (Fig. 2d) *Acentronura (Acentronura)*
- 7b. Superior trunk and tail ridge discontinuous (Fig. 2e) *Acentronura (Idiotropiscis)*
- 8a. Superior trunk and tail ridges continuous (Fig. 2d) → 9
- 8b. Superior trunk and tail ridges discontinuous (Fig. 2e) → 19
- 9a. Inferior trunk and tail ridges continuous, lateral trunk ridge not confluent with inferior tail ridge. → 10
- 9b. Inferior trunk and tail ridges discontinuous, lateral trunk ridge confluent with inferior tail ridge. → 16
- 10a. Anal fin present → 11
- 10b. Anal fin absent → 14
- 11a. Lateral trunk ridge deflected ventrally near rear anal ring, dorsal-fin origin on tail (Fig. 2f) *Ichthyocampus*
- 11b. Lateral trunk ridge not deflected ventrally, dorsal-fin origin on trunk. → 12

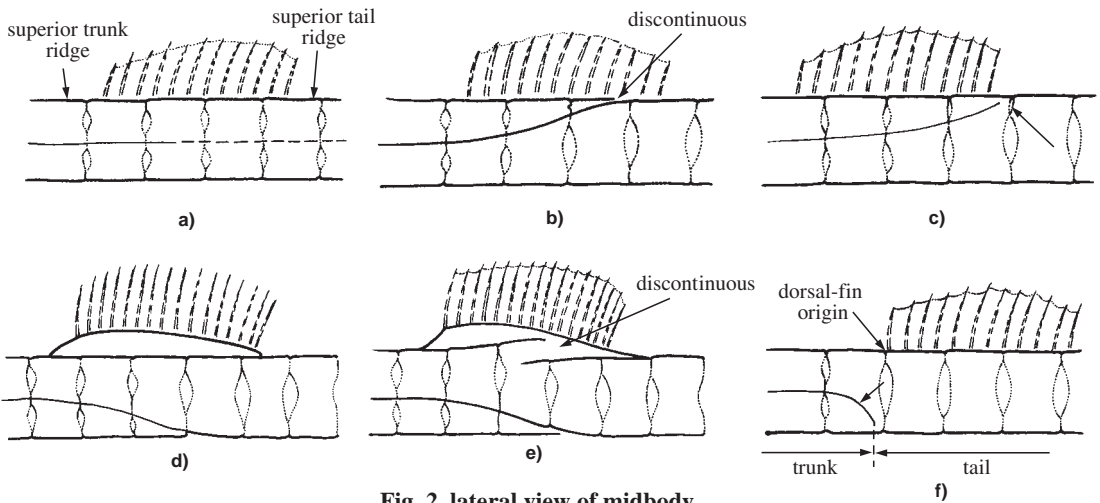


Fig. 2 lateral view of midbody

- 12a. Principal tail ridges produced laterally, the posterior angles of tail rings usually hook-like (Fig.3) *Phoxocampus*
- 12b. Principal tail ridges essentially straight, the posterior angles of tail rings not produced and hook-like → 13

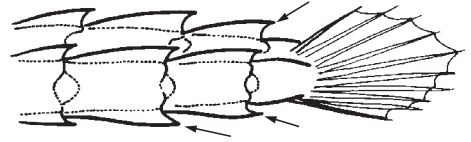


Fig. 3 end of tail

- 13a. Median dorsal snout ridge low, essentially entire and concave in lateral profile; snout 2.5 to 6.5 times as long as deep; total number of rings 46 to 59, dorsal-fin rays 18 to 28, pectoral-fin rays 10 to 17 *Festucalex*
- 13b. Median dorsal snout ridge elevated or with semi-isolated dorsal projections; snout 1.3 to 2.3 times as long as deep; total number of rings 39 to 52, dorsal-fin rays 16 to 19, pectoral-fin rays 7 to 11 *Campichthys*
- 14a. Mouth inferior, not on projecting snout; dorsal fin absent in subadults and adults (Fig. 4a) *Bulbonaricus*
- 14b. Mouth terminal on projecting snout; dorsal fin present (Fig. 4b) → 15

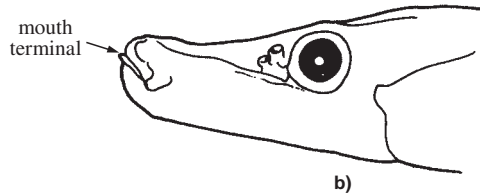
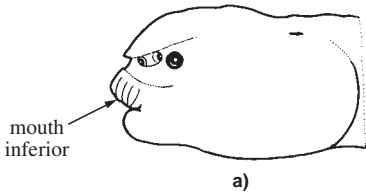


Fig. 4 lateral view of head

- 15a. Pectoral fins present *Nannocampus (Mannarichthys)*
- 15b. Pectoral fins absent *Nannocampus (Nannocampus)*
- 16a. Pectoral fins present →17
- 16b. Pectoral fins and dorsal fin absent in subadults and adults →18
- 17a. Dorsal-fin origin on trunk; caudal-fin rays typically 10; anal fin present; total number of rings 31 to 44, pectoral-fin rays 18 to 23; anal fin present *Choeroichthys*
- 17b. Dorsal-fin origin on tail, usually between first and sixth tail ring; total number of rings 57 to 73, pectoral-fin rays 9 to 13; anal fin absent *Siokunichthys*
- 18a. Trunk rings 10 to 12; brood pouch without bilateral folds, a closed sac-like structure opening through an anteromesial pore (Fig. 5a) *Apterygocampus*
- 18b. Trunk rings 17 to 19; brood pouch with bilateral membranous folds and semi-pouch closure (Fig. 5b) *Penetopteryx*
- 19a. Inferior trunk and tail ridges continuous, lateral trunk ridge not confluent with lateral and superior tail ridge → 20
- 19b. Inferior trunk and tail ridges discontinuous, the lateral trunk ridge confluent with the inferior tail ridge (Fig. 6) → 25

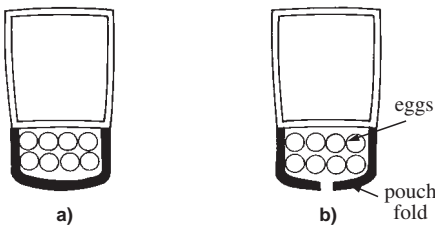


Fig. 5 cross-section of body and brood pouch

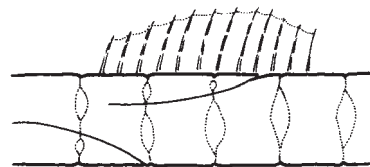


Fig. 6 lateral view of midbody

- 20a. Snout with dorsolateral spines and spinules, adults with bony platelets in gill membranes (Fig. 7) *Bhanotia*
- 20b. Snout without dorsolateral spines and spinules, without bony platelets in gill membranes → 21

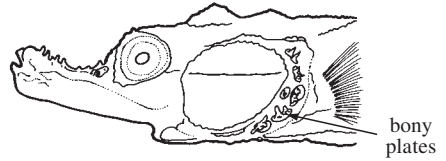


Fig. 7 lateral view of head

- 21a. Caudal-fin rays typically 9; trunk rings 15 to 26; male brood area under trunk *Doryichthys*
- 21b. Caudal-fin rays typically 10 → 22
- 22a. With lateral snout ridge and/or dermal flaps *Cosmocampus*
- 22b. Without lateral snout ridge or dermal flaps → 23
- 23a. Anal-fin rays 4; pouch plates absent, semi-pouch closure (Fig. 8a) *Corythoichthys*
- 23b. Anal-fin rays 2 or 3; pouch plates present, everted pouch closure (Fig. 8b) → 24
- 24a. Lateral trunk ridge deflected ventrally at anal ring (Fig. 9a). *Hippichthys (Hippichthys)*
- 24b. Lateral trunk ridge not deflected at anal ring (Fig. 9b) *Hippichthys (Parasyngnathus)*

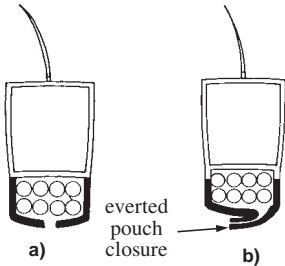


Fig. 8 cross-section of body and brood pouch

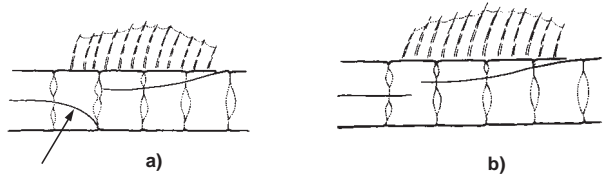


Fig. 9 lateral view of midbody

- 25a. Caudal-fin rays typically 8 or 9 → 26
- 25b. Caudal-fin rays typically 10. → 33
- 26a. Caudal-fin rays typically 8 → 27
- 26b. Caudal-fin rays typically 9 → 28
- 27a. Median dorsal snout ridge with 1 to 3 semi-isolated dorsal projections; pectoral-fin rays 8 to 13; anal-fin rays 2 or 3 *Minyichthys*
- 27b. Median dorsal snout ridge entire; pectoral-fin rays 14 to 16; anal-fin rays 4 *Filicampus*

- 28a. Caudal fin often stubby (Fig. 10); trunk rings 21 to 24, the first clearly longer than second; male brood area under tail *Trachyrhamphus*
- 28b. Caudal fin well developed; trunk rings 15 to 21, the first not much longer than second; male brood area under trunk → 29

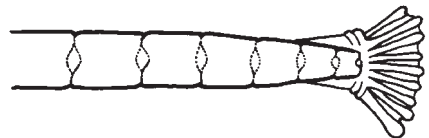


Fig. 10 end of tail

- 29a. Opercular ridge distinct, typically complete; pectoral-fin base with 1 or 2 distinct ridges; lateral and inferior trunk ridges distinct → 30
- 29b. Opercular ridge vestigial or obsolete; pectoral-fin base without distinct ridges in subadults and adults; lateral and inferior trunk ridges indistinct *Microphis (Coelonotus)*

- 30a. Without supplemental ridges below longitudinal opercular ridge (Fig. 11a) → 31
- 30b. With 1 or more supplemental ridges below longitudinal opercular ridge (Fig. 11b) → 32

- 31a. Dorsal-fin rays 57 to 74; subdorsal trunk rings 5.5 to 12; usually with some keeled scutella in subadults-adults (Fig. 12a) *Microphis (Belonichthys)*
- 31b. Dorsal-fin rays 28 to 56; subdorsal trunk rings 0.25 to 3.5; scutella without longitudinal keels (Fig.12b) *Microphis (Microphis)*

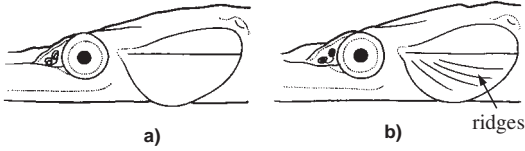


Fig. 11 lateral view of head

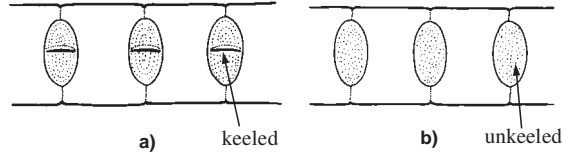


Fig. 12 detail of body (lateral view)

- 32a. Snout relatively long and slender, on average 4.3 to 10.6 times as long as deep; scutella without keels *Microphis (Oostethus)*
- 32b. Snout relatively short and deep, its depth averages 3.5 to 4.1 in snout length; usually with some keeled scutella *Microphis (Lophocampus)*
- 33a. First trunk ring much longer than second (Fig. 13a); pectoral fins typically emarginate; caudal fin large; dermal flaps absent; male brood area under trunk → 34
- 33b. First trunk ring not much longer than second (Fig. 13b); pectoral fins rounded; caudal fin not large; dermal flaps usually present; male brood area under tail → 35

- 34a. Snout with 1 to 5 rows of dorsolateral spinules; without banded colour pattern; membranous pouch folds present in brooding males (Fig. 14a) *Doryrhamphus (Doryrhamphus)*
- 34b. Snout without rows of dorsolateral spinules; mostly with banded colour pattern; membranous pouch folds absent in brooding males (Fig.14b) *Doryrhamphus (Dunckerocampus)*

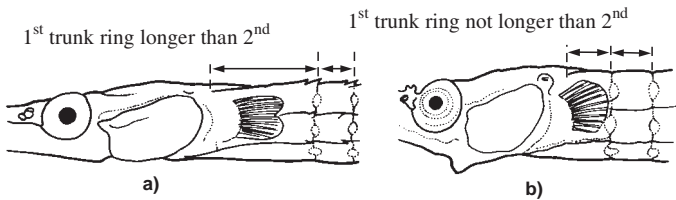


Fig. 13 head and anterior part of trunk (lateral view)

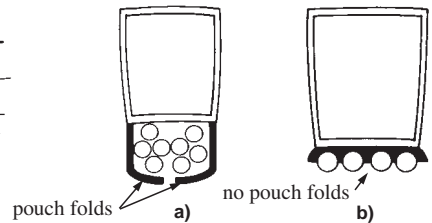


Fig. 14 cross-section of body and brood pouch

- 35a. Median dorsal snout ridge low, entire, essentially concave in lateral profile; lateral snout ridge absent; without dermal flaps on eye *Micrognathus*
- 35b. Median dorsal snout ridge not essentially concave in lateral profile, often elevated or spiny; lateral snout ridge or spine usually present; usually with dermal flaps on eye *Halicampus*

List of species occurring in the area

Note: species that occur in brackish or fresh water are marked in the following list by an asterisk (*). A plus mark (+) indicates commercial species (i.e. used in the aquarium trade, as curios, medicine, or food).

The symbol ↔ is given when species accounts are included.

Subfamily HIPPOCAMPINAE

- Hippocampus angustus* Günther, 1870
- ↔ *Hippocampus histrix* Kaup, 1856 +
- ↔ *Hippocampus kuda* Bleeker, 1852 +
- Hippocampus planifrons* Peters, 1877
- ↔ *Hippocampus whitei* Bleeker, 1855 +

Subfamily SYNGNATHINAE*Acentronura (Acentronura) gracilissima* (Temminck and Schlegel, 1850)*Acentronura (Acentronura) tentaculata* Günther, 1870*Acentronura (Idiotropiscis) larsonae* Dawson, 1984*Apterygocampus epinnulatus* Weber, 1913*Bhanotia fasciolata* (Duméril, 1870)*Bhanotia nuda* Dawson, 1978*Bulbonaricus brauni* (Dawson and Allen, 1978)*Bulbonaricus davaoensis* (Herald, 1953)*Campichthys tricarinatus* Dawson, 1977*Campichthys tryoni* (Ogilby, 1890)*Choeroichthys brachysoma* (Bleeker, 1855)*Choeroichthys cinctus* Dawson, 1976*Choeroichthys sculpatus* (Günther, 1870)*Choeroichthys suillus* Whitley, 1951✦ *Corythoichthys amplexus* Dawson and Randall, 1975 +✦ *Corythoichthys flavofasciatus* (Rüppell, 1838) +✦ *Corythoichthys haematopterus* (Bleeker, 1851) +*Corythoichthys intestinalis* (Ramsay, 1881) +✦ *Corythoichthys nigripectus* Herald, 1953 +*Corythoichthys ocellatus* Herald, 1953*Corythoichthys paxtoni* Dawson, 1977*Corythoichthys polynotatus* Dawson, 1977✦ *Corythoichthys schultzi* Herald, 1953 +*Cosmocampus banneri* (Herald and Randall, 1972)*Cosmocampus darrosanus* (Dawson and Randall, 1975)*Cosmocampus howensis* (Whitley, 1948)*Cosmocampus investigatoris* (Hora, 1925)*Cosmocampus maxweberi* (Whitley, 1933)*Doryichthys boaja* (Bleeker, 1851) **Doryichthys deokhatoides* (Bleeker, 1853) **Doryichthys heterosoma* (Bleeker, 1851) **Doryichthys martensii* (Peters, 1869) *✦ *Doryrhamphus (Doryrhamphus) excisus excisus* Kaup, 1856 +*Doryrhamphus (Doryrhamphus) janssi* (Herald and Randall, 1972) +*Doryrhamphus (Doryrhamphus) negrosensis malus* (Whitley, 1954)*Doryrhamphus (Doryrhamphus) negrosensis negrosensis* Herre, 1934*Doryrhamphus (Dunckerocampus) chapmani* (Herald, 1953)✦ *Doryrhamphus (Dunckerocampus) dactyliophorus* (Bleeker, 1853) +✦ *Doryrhamphus (Dunckerocampus) pessuliferus* (Fowler, 1938) +*Festucalex cinctus* (Ramsay, 1882)*Festucalex erythraeus* (Gilbert, 1905)*Festucalex gibbsi* Dawson, 1977*Festucalex prolixus* Dawson, 1984*Festucalex wassi* Dawson, 1977*Filicampus tigris* (Castelnau, 1879)*Halicampus boothae* (Whitley, 1964)*Halicampus brocki* (Herald, 1953) +✦ *Halicampus dunckeri* (Chaubanaud, 1929) +*Halicampus grayi* Kaup, 1856 +*Halicampus macrorhynchus* Bamber, 1915 +*Halicampus marquesensis* Dawson, 1984*Halicampus mataafae* (Jordan and Seale, 1906)*Halicampus nitidus* (Günther, 1873) +*Haliichthys taeniophorus* Gray, 1859

- Hippichthys (Hippichthys) cyanospilus* (Bleeker, 1854)
Hippichthys (Hippichthys) heptogonus Bleeker, 1849
Hippichthys (Hippichthys) spezifer (Rüppell, 1838)
Hippichthys (Parasyngnathus) parvicarinatus (Dawson, 1978) *
Hippichthys (Parasyngnathus) penicillus (Cantor, 1849) *
Ichthyocampus carce (Hamilton Buchanan, 1822) *
Micrognathus andersonii (Bleeker, 1858)
Micrognathus brevirostris pygmaeus Fritzsche, 1981
Micrognathus micronopterus (Fowler, 1936)
Micrognathus natans Dawson, 1982
Microphis (Belonichthys) mento (Bleeker, 1856)
Microphis (Belonichthys) spinachioides (Duncker, 1915)
Microphis (Coelonotus) angulus (Peters, 1855) *
Microphis (Coelonotus) leiaspis (Bleeker, 1853) *
Microphis (Lophocampus) brevidorsalis (de Beaufort, 1913) *
Microphis (Lophocampus) caudocarinatus (Weber, 1908) *
Microphis (Lophocampus) ocellatus (Duncker, 1910) *
Microphis (Lophocampus) retzii (Bleeker, 1856) *
Microphis (Microphis) cruentus Dawson and Fourmanoir, 1981 *
Microphis (Oestethus) brachyurus brachyurus Bleeker, 1853
Microphis (Oestethus) jajorii Peters, 1869 *
Microphis (Oestethus) manadensis (Bleeker, 1856) *
Microphis (Oestethus) pleurostictus (Peters, 1869) *
Minyichthys brachyrhinus (Herald, 1953)
Minyichthys myersi (Herald and Randall, 1972)
Nannocampus (Mannarichthys) pictus (Duncker, 1915)
Nannocampus (Mannarichthys) weberi Duncker, 1915
Penetopteryx taeniocephalus Lunel, 1881
Phoxocampus blecheri (Kaup, 1856)
Phoxocampus diacanthus (Schultz, 1943)
Phoxocampus tetrophthalmus (Bleeker, 1858)
Siokunichthys breviceps Smith, 1963 +
Siokunichthys herri Herald, 1953
Siokunichthys nigrolineatus Dawson, 1983 +
Siokunichthys southwelli (Duncker, 1910)
Solegnathus (Runcinatus) dunckeri Whitley, 1927
Solegnathus (Solegnathus) hardwickii (Gray, 1830)
Solegnathus (Solegnathus) lettiensis Bleeker, 1860
Solegnathus (Solegnathus) spinosissimus Günther, 1870
 ↖ *Syngnathoides biaculeatus* (Bloch, 1785) +
 ↖ *Trachyrhamphus bicoarctatus* (Bleeker, 1857) +
Trachyrhamphus longirostris Kaup, 1856 +

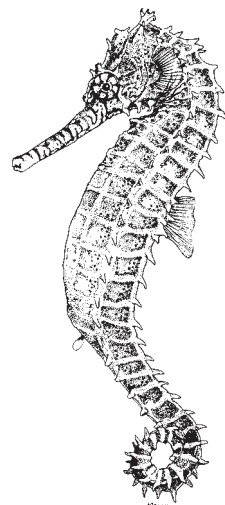
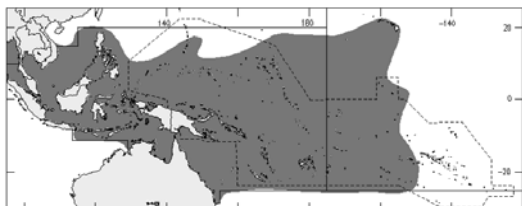
References

- Dawson, C.E. 1985. *Indo-Pacific pipefishes (Red Sea to the Americas)*. Ocean Springs, Mississippi, Gulf coast Res. Lab., 230 p.
 Dawson, C.E. and Vari, R.P. 1982. Fishes of the western north Atlantic, Part 8: order Gasterosteiformes. *Mem. Sears. Found. Mar. Res.*, 1(8):189 p.
 Fritzsche, R.A. 1980. Revision of eastern Pacific Syngnathidae (Pisces: Syngnathiformes) including both recent and fossil forms. *Proc. Calif. Acad. Sci.*, 42:181-227.
 Herald, E.S. 1959. From pipefish to seahorse. - a study of phylogenetic relationship. *Proc. Calif. Acad. Sci.*, 4. Ser., 29(13):465-473.
 Vincent, A.C.J. 1996. *The international trade in seahorses (species in danger)*. TRAFFIC International report.

***Hippocampus hystrix* Kaup, 1856**

En - Thorny seahorse.

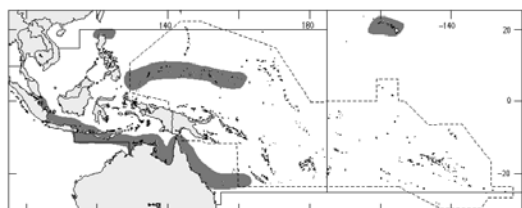
Maximum total length 15 cm (stretched). Colour varying. In coastal areas among clumps of algae or in seagrass beds. Feeds primarily on crustacean zooplankton. Sometimes sold as medicine and aphrodisiac, but also as aquarium fish, curios, and food. Widespread in the western Indian Ocean, including the Red Sea, and the western and eastern Central Pacific.



***Hippocampus kuda* Bleeker, 1852**

En - Yellow seahorse.

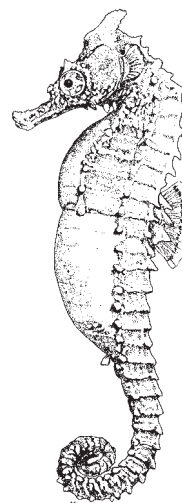
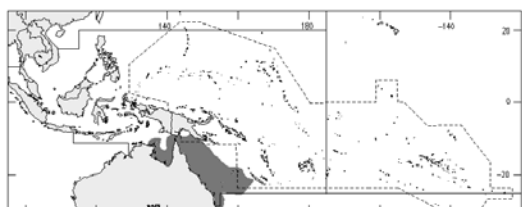
Maximum total length 30 cm (stretched). Colour ranges from dirty yellow over reddish brown to black, and may be blotched or banded. In coastal areas on seagrass, also in sandy and coral areas, to a depth of about 30 m. Often sold as curios and aphrodisiacs on Asian markets. Feeds on zooplankton. Widespread in the Indian Ocean and the western and eastern Central Pacific.



***Hippocampus whitei* Bleeker, 1855**

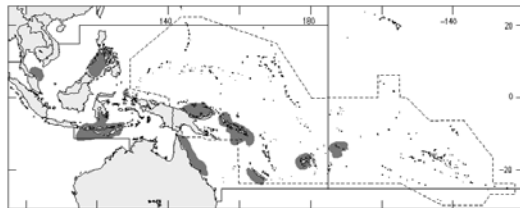
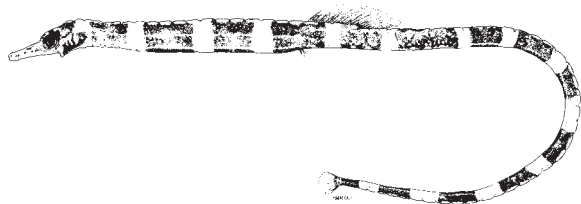
En - White's seahorse.

Maximum total length 15 cm (stretched). Colour varying from grey to brown and black, sometimes with saddle-like markings. Along coastal areas among seaweeds. Feeds on microcrustaceans. Regularly imported by the aquarium trade and sold as curios and medicine. Common along the coasts of Australia, Madagascar, Mozambique, and South Africa.

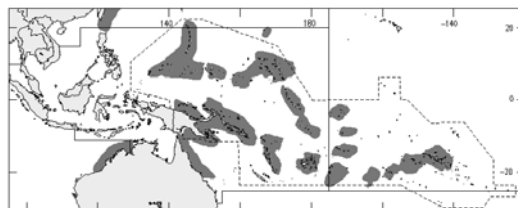
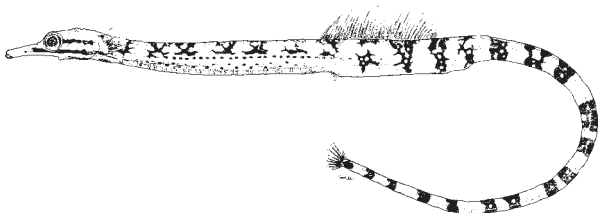


Corythoichthys amplexus Dawson and Randall, 1975**En** - Brownbanded pipefish.

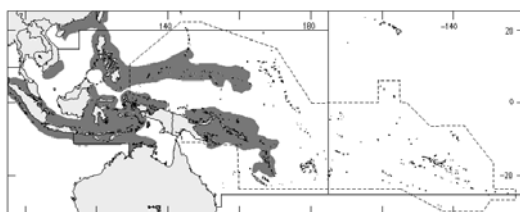
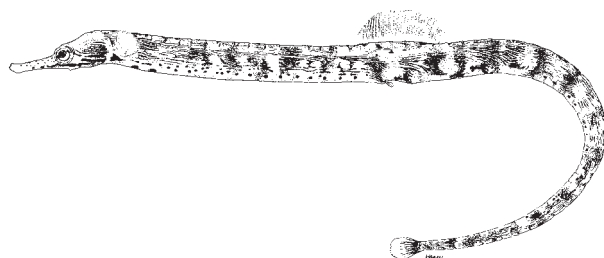
Maximum total length about 10 cm. Body with broad dark bands crossing side and dorsum. Occurs on shallow reefs and deep walls in depths to about 30 m. Feeds on microcrustaceans by sucking in through the tube snout. Sometimes imported by the aquarium trade. Widespread in the eastern Indian Ocean and Pacific.

***Corythoichthys flavofasciatus*** (Rüppell, 1838)**En** - Network pipefish.

Maximum total length about 14 cm. Body with about 13 to 25 reticulate bands crossing side and dorsum; males during courtship with intensive dark blue or black blotch on the ventral of the anal ring. Occurs in small schools along the coastline on sand and seagrass beds near coral reefs. Feeds on live zooplankton. Couples seem to be monogamous. Rarely in the aquarium trade. Widespread in the Indian Ocean, including the Red Sea and the Persian Gulf, the northwestern and western Central Pacific, except the Philippines and Indonesia.

***Corythoichthys haematopterus*** (Bleeker, 1851)**En** - Reeftop pipefish.

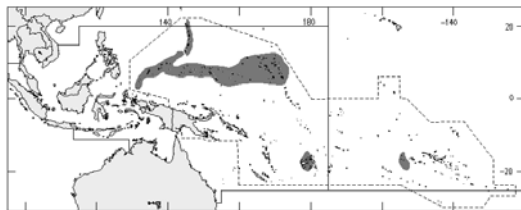
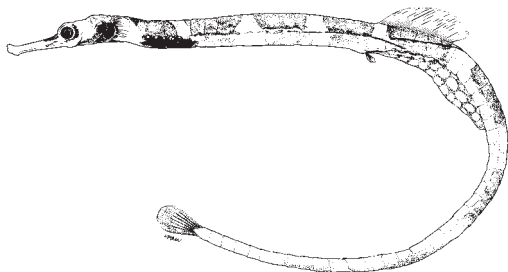
Maximum total length about 20 cm. Feeds on zooplankton. Occurs in groups or schools along the coastline in depths to 20 m, but mostly from 0 to 3 m. Sold regularly in the aquarium trade in Europe and America. Widespread in the Indian Ocean from the African coast to the western Central and northeastern Pacific.



***Corythoichthys nigripectus* Herald, 1953**

En - Blackbreasted pipefish.

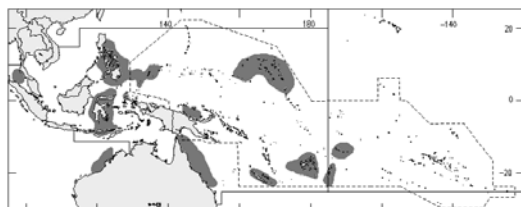
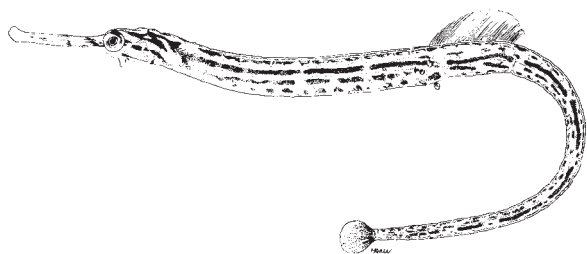
Maximum total length about 11 cm. Coloration variable without distinct bars or stripes, opercle mostly orange-red, breast dark brown to black. Not a common species, occurs alone or in pairs in lagoons and seaweed reefs in caves and crevices in depths from 4 to about 30 m. Feeds on zooplankton. Very rarely in the aquarium trade. Found in the northern Red Sea, throughout Micronesia, and the Society and Caroline islands.



***Corythoichthys schultzi* Herald, 1953**

En - Schultz' pipefish.

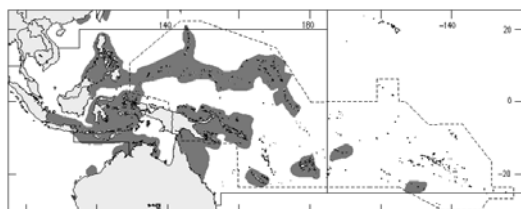
Maximum total length about 17 cm. Coloration varying in geographic regions; usually with dark stripes and spots on the side of the snout, trunk with 10 to 15 bars. A very common species in large groups on reef crests, sandy areas with coral patches and rubble flats near seagrass beds down to a depth of about 30 m. Feeds on small crustaceans, sucked in from the sandy substratum or from between the branches of soft corals. Very rarely in the aquarium trade. Widespread throughout the Indo-Pacific including the Red Sea and the northwestern and western Central Pacific.



***Doryrhamphus (Doryrhamphus) dactyliophorus* (Bleeker, 1853)**

En - Banded pipefish.

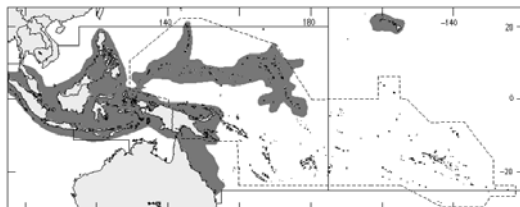
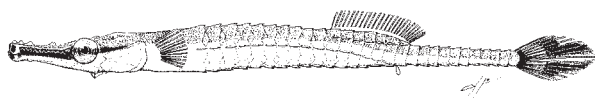
Maximum total length about 18 cm. Specimens regularly banded with white and red or black bands along trunk and tail. Occurs in pairs or large groups in protected coastal reefs and lagoons, mostly in caves. Feeds mostly on planktonic amphipods. Very common in the aquarium trade, exported from Indonesia and the Philippines in large numbers. Widespread in the Indo-Pacific including the Red Sea, western and eastern Central Pacific, and northwestern Pacific, from South Africa to Japan and Australia.



***Doryrhamphus (Doryrhamphus) excisus excisus* Kaup, 1856**

En - Bluestripe pipefish.

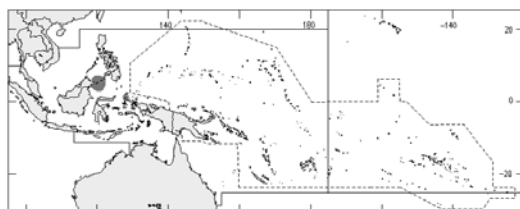
Maximum total length about 7 cm. A colourful species with a blue longitudinal stripe along the trunk and tail; yellowish dorsally and ventrally; fan-like tail fin. Several subspecies are reported from different geographic regions. Lives secretive in crevices and caves along the coastline in depths of usually more than 35 m. Sometimes hides between the spines of sea urchins. Feeds on floating planktonic organisms. Hovers in pairs over the substratum. Regularly seen in large numbers in the aquarium trade, and used as curios and medicine in Asia. Widespread in the Indian Ocean, including the Red Sea, and throughout the Pacific.



***Doryrhamphus (Doryrhamphus) pessuliferus* (Fowler, 1938)**

En - Yellowbar pipefish.

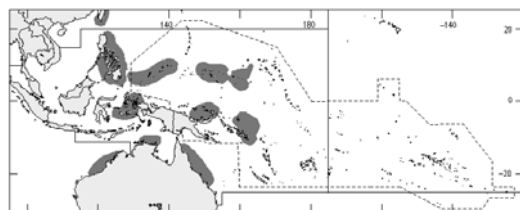
Maximum total length about 14 cm. Similar to *Doryrhamphus (Doryrhamphus) multiannulatus*, but differs in coloration and tail and trunk rings. Snout bright yellow, trunk and tail regularly with red and yellow bands; red tail fin with yellow dot in centre. Occurs secretively in caves and crevices along coral reefs in depths of 30 m and more. No data on food preferences available. Frequently imported to Europe by the aquarium trade. A single reliable record from the Sulu Archipelago in the western Central Pacific.



***Halicampus dunckeri* (Chaubanaud, 1929)**

En - Duncker's pipefish.

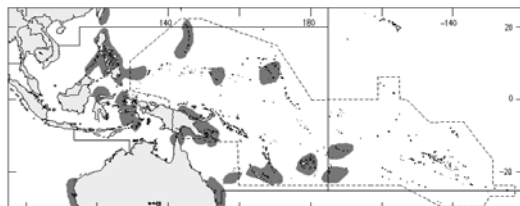
Maximum total length about 12 cm. Colour variable from pale to brown and black with black, brown, and white bands. Different morphological types have been reported from various geographical regions. Occurs on sand and rubble along the coastline of coral reefs in a depth of more than 20 m. Feeds on small planktonic organisms. Sometimes used as curios and sold in the aquarium trade. Widespread in the western and eastern Indian Ocean, including the Red Sea, northwestern and western Central Pacific.



Syngnathoides biaculeatus (Bloch, 1785)

En - Alligator pipefish.

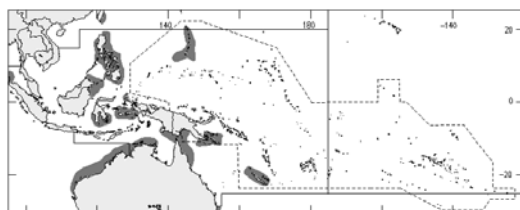
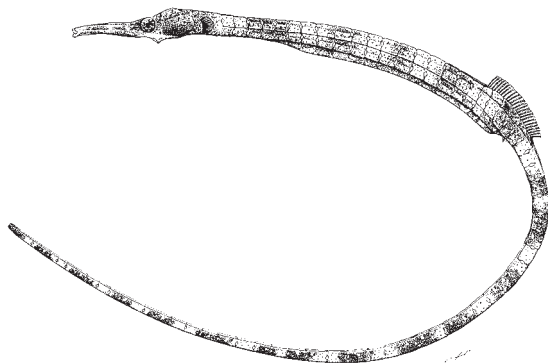
Maximum total length about 30 cm. Colour varying from green and brown with irregular white markings. Tail fin absent in adults, tail prehensile like a seahorse; dermal flaps over much of trunk and tail. Occurs in shallow waters in seagrass beds or close to floating weeds. Juveniles are found in offshore samples. Feeds on small planktonic organisms. Regularly enters the aquarium trade and primarily used as curios and medicine. Widespread in the Indian Ocean including the Red Sea, South Africa, and Mozambique, as well as the northwestern, eastern, and western Central Pacific.



Trachyrhamphus bicoarctatus (Bleeker, 1857)

En - Double-ended pipefish.

Maximum total length about 42 cm. Colour varying from near white, green, grey, or brown to black; body plain, spotted, or mottled, adapted to the substratum. Tip of snout often pale. Planktonic juveniles have elongate appendages on the dorsum of trunk and tail. Adults lose their tail fin, which cannot be regenerated. Occurs on sand and rubble along coastlines in depths from 1 to more than 45 m, where it imitates drifting seagrass. Feeds on crustaceans, such as Gammarida, Mysidacea, Amphipoda, and Caprellidae. Sometimes sold for use as medicine, curios, and in the aquarium trade. Widespread in the western and eastern Indian Ocean, including the Red Sea, the Persian Gulf, and South Africa; also in the northwestern, eastern, and western Central Pacific to China, Japan, and southern Australia.



AULOSTOMIDAE

Trumpetfishes

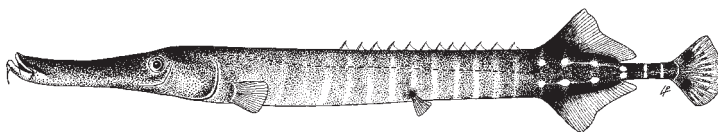
by R.A. Fritzsche and K.G. Thiesfeld

A single species occurring in the area.

Aulostomus chinensis (Linnaeus, 1766)

Frequent synonyms / misidentifications: *Aulostomus valentini* (Bleeker, 1853) / None.

FAO names: **En** - Chinese trumpetfish; **Fr** - Trompette chinoise; **Sp** - Trompetero chino.

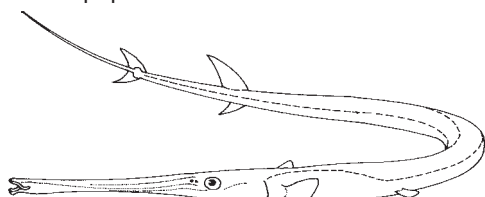


Diagnostic characters: Body elongate and compressed. Mouth located at tip of elongate snout; single barbel on chin. First dorsal fin with VIII to XII isolated spines; second dorsal fin and anal fin opposite to each other and similarly shaped; second dorsal fin with 24 to 27, and anal fin with 26 to 29 segmented soft rays; pelvic fins small, abdominal, with 6 soft rays. Lateral line continuous. Body covered with small ctenoid (rough) scales, except for the head and anterior part of the back, which are scaleless. Vertebrae 62 to 64, the first 4 elongate and fused. **Colour:** overall colour variable; body most commonly brownish with irregular light vertical bar, or with several white horizontal stripes, or uniform yellow colour; a black maxillary stripe usually present, but may be reduced; dorsal and anal fins light, but with a dark basal bar; caudal fin usually with 2 round black spots; a black spot at base of each pelvic fin.

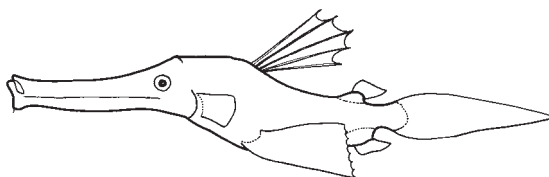
Similar families occurring in the area

Fistulariidae: a distinct caudal-fin filament present; body depressed rather than compressed; no spines before soft dorsal fin.

Solenostomidae: smaller; dorsal-fin spines not isolated; no lateral line; body variously covered with cutaneous papillae.



Fistulariidae



Solenostomidae

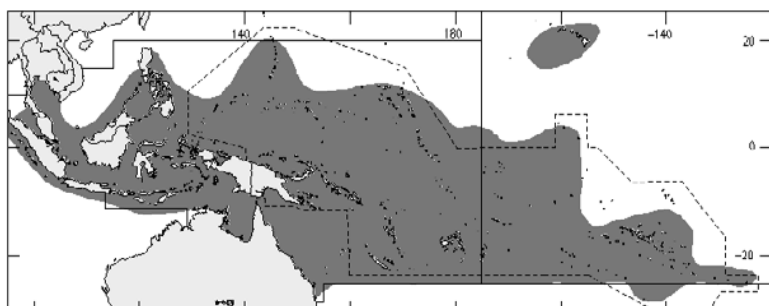
Size: Maximum total length 80 cm; commonly to 40 cm.

Habitat, biology, and fisheries: Occurs in shallow, clear water, most frequently observed hanging vertically in the water with the head down and associated with gorgonians. Also will conceal itself by hiding among schools of other fish. Capable of colour changes depending on surroundings. Feeds on small fishes and crustaceans. Taken occasionally as bycatch in artisanal fisheries. Of no commercial importance. Occasionally consumed by the local population.

Distribution: Tropical Indo-Pacific, just reaching offshore islands of eastern Pacific, including southern Japan, Hawaii, and Lord Howe and Easter islands.

Reference

Wheeler, A.C. 1955. A preliminary revision of the fishes of the genus *Aulostomus*. *Ann. Mag. Nat. Hist., Ser.*, 12(8):613-623.

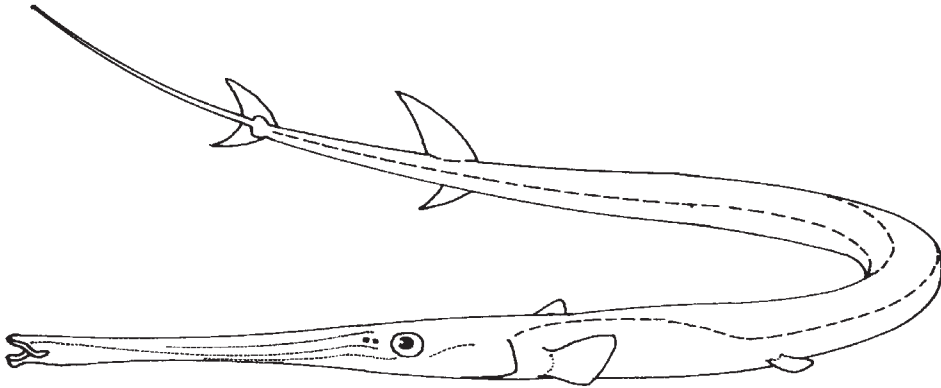


FISTULARIIDAE

Cornetfishes (flute mouths)

by R.A. Fritzsche and K.G. Thiesfeld

Diagnostic characters: Large fishes (to about 2 m total length); **body elongate and depressed**. Mouth small, at end of a **long tubular snout, hexagonal in cross-section**; teeth in jaws small. **Dorsal and anal fins short based and opposite, with 14 to 17 segmented soft rays**; pectoral fins with 13 to 17 soft rays; pelvic fins small and abdominal, with 6 soft rays. Lateral line arched, running anteriorly along back, then bending downward on side and continuing posteriorly onto **an elongate filament produced by the middle 2 caudal-fin rays**; lateral line composed of tube-shaped ossifications that gradually take the form of long bony shields sometimes bearing sharp spines. Body of juveniles covered with rows of small spinules (retained in adults of only 1 of the Indo-Pacific species, *Fistularia petimba*); a row of elongate bony plates may be present along dorsal and ventral midlines of body just anterior to dorsal and/or anal fin. Total number of vertebrae 76 to 85, with the first 4 elongate and fused. **Colour:** variable with the species; either red to orange-brown above and silvery below, or brownish olive above, lighter below, with a series of blue spots on back and snout.



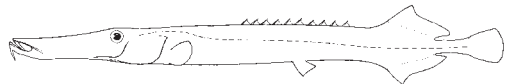
Habitat, biology, and fisheries: *Fistularia petimba* is typically found in coastal areas over soft bottoms, usually at depths greater than 10 m. *F. commersonii* is most often seen in seagrass beds and coral reefs. Cornetfishes feed on small fishes and crustaceans. Although not important in commercial fisheries of the area, they are frequently taken in trawls and by various types of artisanal gear and may appear in local fish markets. Although edible, they are most often used for fishmeal.

Similar families occurring in the area

Aulostomidae: no caudal-fin filament present; barbel present on lower jaw; body compressed rather than depressed; distinct separate spines anterior to soft dorsal fin.

Syngnathidae: smaller; body covered with armor; anal fin reduced or absent; no caudal-fin filament present.

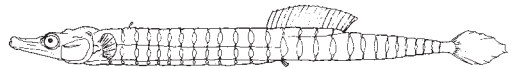
Belonidae: no caudal-fin filament present; mouth large, both jaws produced into slender beak, lower jaw longer, with single series of distinct canines.



Aulostomidae



Belonidae



Syngnathidae

Key to the species of Fistulariidae occurring in the area

- 1a. A row of elongate bony plates embedded in skin along midline of back anterior to dorsal fin (Fig. 1); posterior lateral-line ossifications ending in a sharp spine; immaculate red or brown above. *Fistularia petimba*
- 1b. No elongate bony plates along midline of back; posterior lateral-line ossifications without a spine; rows of blue spots on back, sides and snout *Fistularia commersonii*

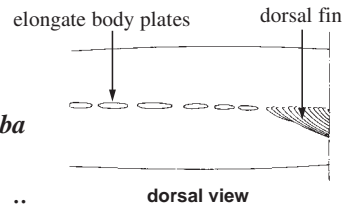



Fig. 1 *Fistularia petimba*

List of species occurring in the area

The symbol  is given when species accounts are included.

 *Fistularia commersonii* Rüppell, 1835

 *Fistularia petimba* Lacepède, 1803

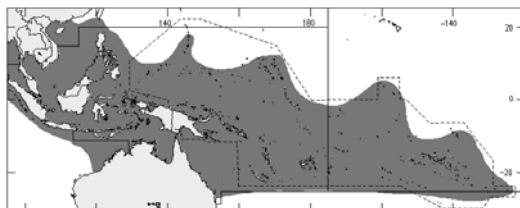
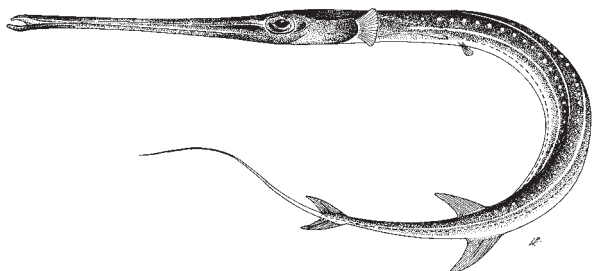
Reference

Fritzsche, R.A. 1976. A review of the cornetfishes, genus *Fistularia* (Fistulariidae), with a discussion of intrageneric relationships and zoogeography. *Bull. Mar. Sci.*, 26(2):196-204.

***Fistularia commersonii* Rüppell, 1835**

En - Bluespotted cornetfish; **Fr** - Cornette à taches bleues; **Sp** - Corneta pintada.

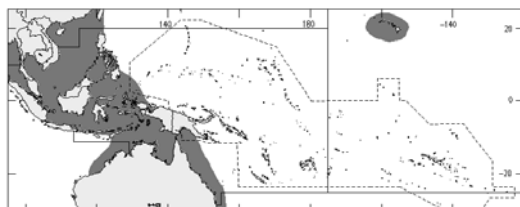
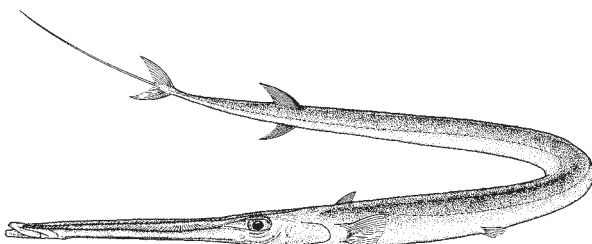
Maximum total length about 1.6 m; commonly to 1 m. Brownish to olive above, becoming lighter to silvery below; a pair of blue stripes or a row of blue spots along back; dorsal and anal fins with an orange cast becoming transparent at base; caudal-fin filament white. Juveniles may have dark barred pattern with a dusky caudal-fin filament. Most common in seagrass beds and coral reefs in shallow water. Feeds on small fishes and crustaceans. No special fishery, but taken frequently in trawls and artisanal fisheries. Caught with bottom trawls, gill nets, and line gear. Utilized fresh, dried salted, or smoked; also reduced to fishmeal. Indo-Pacific: Red Sea to Panama, north to southern Japan and Hawaii, south to Lord Howe and Easter islands, throughout Micronesia.



***Fistularia petimba* Lacepède, 1803**

En - Red cornetfish; **Fr** - Cornette rouge; **Sp** - Corneta colorada.

Maximum total length about 2 m; commonly to 1 m. Colour in life red to orange-brown above, silvery below; vertical fins also have an orange cast. Found in coastal areas over soft bottoms, usually at depths greater than 10 m. Feeds on small fishes and crustaceans. No special fishery, but caught frequently in bottom trawls and in artisanal fisheries. Caught with bottom trawls, gill nets, and line gear. Utilized fresh, dried salted, or smoked; also reduced to fishmeal. Atlantic, Indian, and western Pacific oceans, including Hawaii.



MACRORHAMPHOSIDAE

Snipefishes

by R.A. Fritzsche and K.G. Thiesfeld

A single species occurring in the area.

Macrorhamphosus scolopax (Linnaeus, 1758)

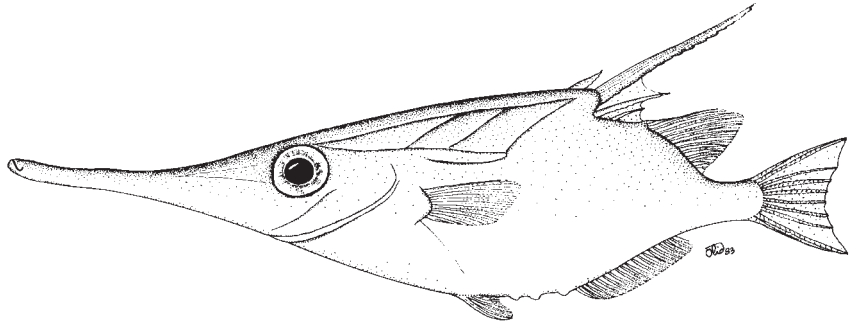
Frequent synonyms / misidentifications: *Macrorhamphosus gracilis* (Lowe, 1839); *M. velitaris* (Pallas, 1776) / None.

FAO names: **En** - Longspine snipefish; **Fr** - Bécasse de mer; **Sp** - Trompetero.

Diagnostic characters:

Body compressed, deep, widest point at or posterior to midbody at origin of first dorsal fin, narrowing at caudal peduncle. **Head elongate; snout long, tubular;** mouth small, toothless, located at tip of snout; eyes lateral, large, contained about 4.5 times in snout length. First dorsal fin originating at or behind midbody;

second spine greatly enlarged, posterior edge serrated, other spines stout but short; pelvic fins small, originating at or behind midbody. Lateral line absent. **Body covered with small but distinct scales, 2 series of bony plates embedded in the skin on the back between head and dorsal fin, each series consisting of 3 well-developed plates and a fourth much smaller plate.** There are 2 forms, slender and deep bodied, often treated as distinct species. **Colour:** orange, pink, or red on back; paler and silvery on sides.



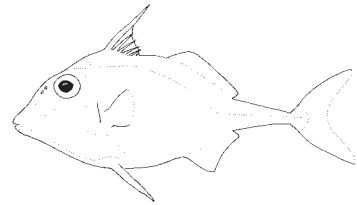
Similar families occurring in the area

Centriscidae: body blade-like and enclosed in transparent, bony casing with sharp ventral edge; first dorsal-fin spine greatly enlarged, first dorsal-fin spine at hindmost point of body.



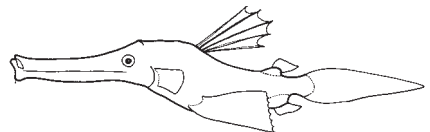
Centriscidae

Triacanthidae: mouth much wider than snout; gill opening small, less than or equal to width of pectoral-fin base; first dorsal-fin origin anterior to midbody, dorsal-fin spines not enlarged.



Triacanthidae

Solenostomidae: body strongly constricted between pelvic-fin insertion and origin of soft dorsal and anal fins, covered with stellate plates bearing spines; mouth with singular mandibular barbel; spinous and soft dorsal fin widely separated and on a raised base; pelvic fins large.



Solenostomidae

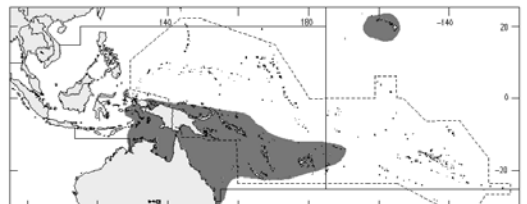
Size: Maximum total length 20 cm.

Habitat, biology, and fisheries: Snipefishes are benthic or benthopelagic fishes commonly found in schools over mud or sand bottoms in deep water to 600 m. Juveniles are epipelagic in oceanic waters. They feed on zooplankton and benthic invertebrates, mainly crustaceans. Not a commercially important species. Not considered a food fish. Caught in abundance by bottom trawl.

Distribution: Ranges across tropical and temperate Atlantic, Pacific, and Indian oceans, probably worldwide.

Reference

Heemstra, P.C. 1986. Family Macrorhamphosidae. In *Smith's sea fishes*, edited by M.M. Smith and P.C. Heemstra. Johannesburg, Macmillan South Africa, pp. 459-461.



CENTRISCIDAE

Shrimpfishes (razorfishes)

by R.A. Fritzsche and K.G. Thiesfeld

Diagnostic characters: Small fishes (14 to 30 cm total length); **body elongate, strongly compressed, and blade-like.** Head elongate; **snout long, slender, and tubular;** mouth small, toothless, located at tip of snout. Two short-based dorsal fins; **first dorsal-fin spine greatly enlarged, originating at hindmost end of body;** all other spinous and soft portions of dorsal fins on **ventral surface of body;** caudal fin small, on ventral surface, **nearly at right angle to body axis;** pelvic fins small, with 4 short soft rays, originating at or behind midbody. Lateral line absent. Body enclosed in a flattened, transparent, bony casing with sharp ventral edge. **Colour:** variable with the species; either silvery or yellowish brown to pale green on back, silvery on sides; dusky to conspicuous lateral streak running length of body and through eye.

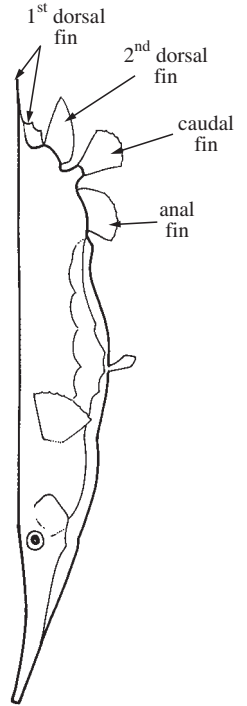
Habitat, biology, and fisheries: Razorfishes are found on muddy bottoms near mangroves to inshore coral reefs, frequently seeking refuge among coral branches or the spines of long-spined sea urchins. They swim in small groups, each fish in a vertical position, with its snout pointing downwards. They feed on small benthic invertebrates, mainly crustaceans. Razorfishes are not utilized as food, have no commercial importance, but are sought by aquarium hobbyists. Taken in bottom trawls and by hand.

Similar families occurring in the area

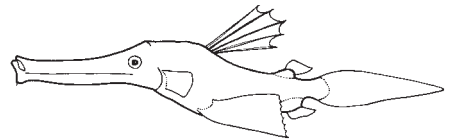
Macrorhamphosidae: body not blade-like, lacking bony casing, with small but distinct scales; first dorsal fin originating near midbody; second dorsal-fin spine greatly enlarged, serrated on posterior edge; caudal fin not at right angle to body axis on ventral surface.

Solenostomidae: body not blade-like, covered with stellate plates that bear spines; pelvic fins enlarged; caudal fin not at right angle to body axis on ventral surface.

natural orientation in life



Macroramphosidae







Solenostomidae

Key to the species of Centriscidae occurring in the area

- 1a. First dorsal-fin spine hinged at its base, slightly movable, with a movable spinous ray at its end; interorbital space striated, convex, without a longitudinal groove. *Aeoliscus strigatus*
- 1b. First dorsal-fin spine fused with body armour plate, without a movable spinous ray at its end; interorbital space convex or with a groove continued to crown of head, which is striated →2
- 2a. Interorbital space with a groove continued to crown of head; sutures of lateral plates serrated; postorbital part of head 1/2 or more than 1/2 distance of operculum from base of pectoral fins *Centriscus scutatus*
- 2b. Interorbital space convex, without groove; sutures of lateral plates smooth; postorbital part of head 3 times the distance of operculum from base of pectoral fins *Centriscus cristatus*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Aeoliscus strigatus* (Günther, 1860)
-  *Centriscus cristatus* (De Vis, 1885)
-  *Centriscus scutatus* Linnaeus, 1758

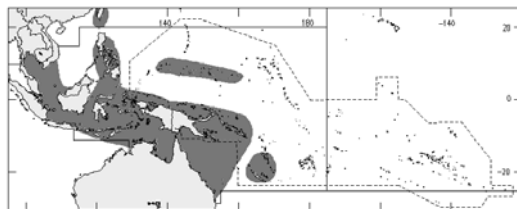
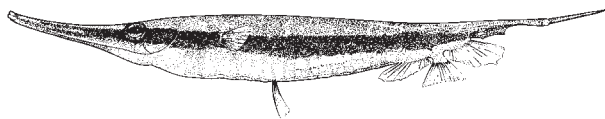
Reference

Mohr, E.W. 1937. Revision der Centriscidae (Acanthopterygii, Centrisciformes). *Dana Rept.*, 13:1-69.

Aeoliscus strigatus (Günther, 1860)

En - Shrimpfish.

Maximum total length about 14 cm. Colour yellowish brown to pale green on back, silvery on sides; conspicuous black stripe running from the snout, through the eye, to the base of spinous dorsal fin. Occurs in small schools that frequently seek refuge among the spines of the long-spined sea urchin *Diadema setosum*, or coral branches. Feed primarily on crustacean zooplankton. Indo-West Pacific, but not in the Red Sea.

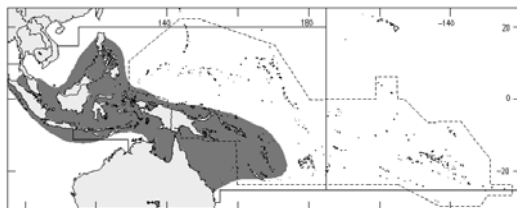
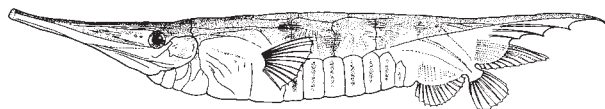


(after Randall, Allen, and Steene, 1990)

Centriscus cristatus (De Vis, 1885)

En - Smooth razorfish.

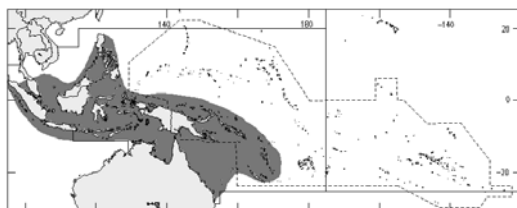
Maximum total length 30 cm. Colour silvery, with a pronounced black band running through the eye to the base of spinous dorsal fin. Western Pacific, northern Australia.



Centriscus scutatus Linnaeus, 1758

En - Serrate razorfish.

Maximum total length 14 cm. Colour silvery, with a dusky lateral streak running length of body; 7 or 8 silvery crossbars on ventral plates. Indo-West Pacific.



(after Sainsbury, Kailola, and Leyland, 1984)

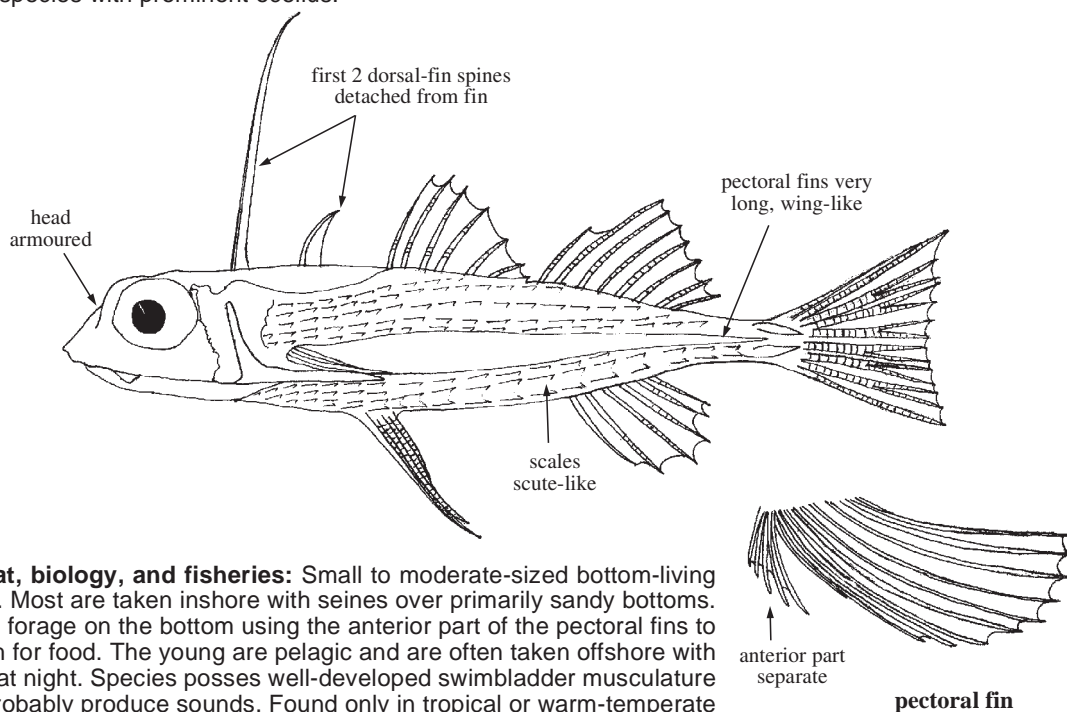
Order SCORPAENIFORMES

DACTYLOPTERIDAE

Flying gurnards (helmet gurnards)

by S.G. Poss and W.N. Eschmeyer

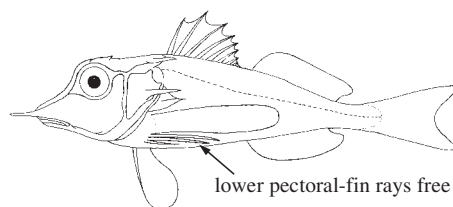
Diagnostic characters: Moderately elongate scorpaeniform fishes (size to 40 cm). **Head large, heavily armored.** Eyes large. Interorbit wide, concave. Mouth small, subterminal, and protractile; teeth minute, nodular or absent. **A small movable bone (pontinal) between plate-like bones around eye and preopercle. Preopercle with a prominent elongate spine.** Gill openings restricted and fused to isthmus. Spinous and soft parts of dorsal fin separated by a deep notch and 1 short spine (reduced to a short spinous point); **total number of dorsal-fin spines VII or VIII**, with first or first 2 anterior spines separated from remainder of fin; soft-rayed part of dorsal fin with 8 or 9 rays. Anal fin without spines and with 6 or 7 soft rays. **Caudal fin emarginate. Base of pectoral fins horizontal, the fins divided into 2 sections: a short anterior part, with 5 to 7 rays, and an elongate posterior part reaching to caudal-fin base in adults, with 25 to 31 rays.** Pelvic fins with 1 spine and 4 soft rays. Lower side of posterior part of trunk with 2 to 4 enlarged, keel-like scales. Scales scute-like, forming prominent keels. Lateral line present or absent (obscured by scute-like scales), if present, extending to near base of caudal fin. Swimbladder divided at midline into 2 halves; swimbladder musculature present. **Colour:** usually, dusky red or purple with brown spots above, pinkish or whitish below, changing somewhat with growth; upper surface of pectoral-fin rays brightly coloured, usually bluish, with dark brown and often whitish spots, and young of some species with prominent ocellus.



Habitat, biology, and fisheries: Small to moderate-sized bottom-living fishes. Most are taken inshore with seines over primarily sandy bottoms. Adults forage on the bottom using the anterior part of the pectoral fins to search for food. The young are pelagic and are often taken offshore with lights at night. Species possess well-developed swimbladder musculature and probably produce sounds. Found only in tropical or warm-temperate waters. These fishes are usually of little commercial importance, but are often taken as bycatch in nearshore fisheries. The flesh is edible and consumed in some localities.

Similar families occurring in the area

Triglidae: also with large, heavily armored head, but additionally with rostral projections; bony scutes present; pectoral fins smaller, with lowermost rays free; lack the small movable bone (pontinal) at the angle of the preopercle; all dorsal fin-spines united by a fin membrane.

**Triglidae**

Key to the species of Dactylopteridae occurring in the area

- 1a. A single elongate spine anterior to continuous part of spinous dorsal fin (Fig. 1a) → 2
- 1b. A spine about midway between elongate anteriormost spine and those in continuous part of spinous dorsal fin (Fig. 1b) → 3

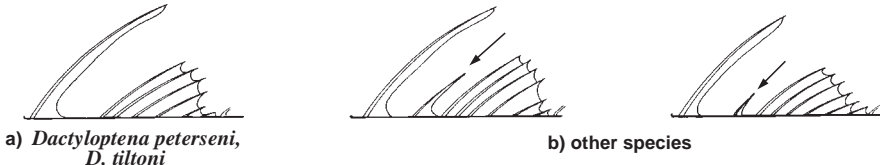


Fig. 1 first dorsal fin (after Eschmeyer, 1997)

- 2a. Snout rounded (Fig. 2a); scales on sides with a single, strong, transverse knife-like ridge at middle of each scale *Dactyloptena peterseni*
- 2b. Snout pointed (Fig. 2b); scales on sides with multiple transverse ridges on each scale, with middle ridges slightly stronger *Dactyloptena tiltoni*

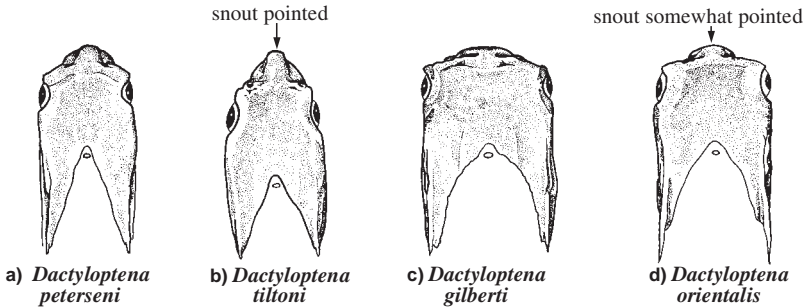


Fig. 2 dorsal view of head (after Eschmeyer, 1997)

- 3a. Interorbit very wide, 16 to 23% of standard length (Fig. 2c, d) → 4
- 3b. Interorbit moderate, 12 to 16% of standard length → 5
- 4a. Posttemporal spine lying flat against body; granular projections on snout arranged in rows; snout somewhat rounded and wide (Fig. 2c) *Dactyloptena gilberti*
- 4b. Posttemporal spine elevated at rear; granular projections on snout scattered uniformly; snout somewhat pointed and narrow (Fig. 2d) *Dactyloptena papilio*
- 5a. Preopercular spine not extending further posteriorly than posttemporal spine; many dark spots on pectoral fins, upper flank, and top of head in specimens over 15 cm standard length; 1 dark ocellus about 2/3 from tip of fin in specimens between about 5 and 6.5 cm standard length *Dactyloptena orientalis*
- 5b. Preopercular spine usually extending further posteriorly than posttemporal spine; usually 1 dark blotch, which often contains small pale spots on pectoral fins, situated about 1/2 distance from tip of fin *Dactyloptena macracantha*

List of species occurring in the area

The symbol is given when species accounts are included.

- ? *Dactyloptena cheirophthalmus* (Bleeker, 1854)^{1/}
- Dactyloptena gilberti* Snyder, 1909
- Dactyloptena macracantha* (Bleeker, 1854)
- Dactyloptena orientalis* (Cuvier, 1829)
- Dactyloptena papilio* Ogilby, 1910
- Dactyloptena peterseni* (Nyström, 1887)
- Dactyloptena tiltoni* Eschmeyer, 1997

Reference

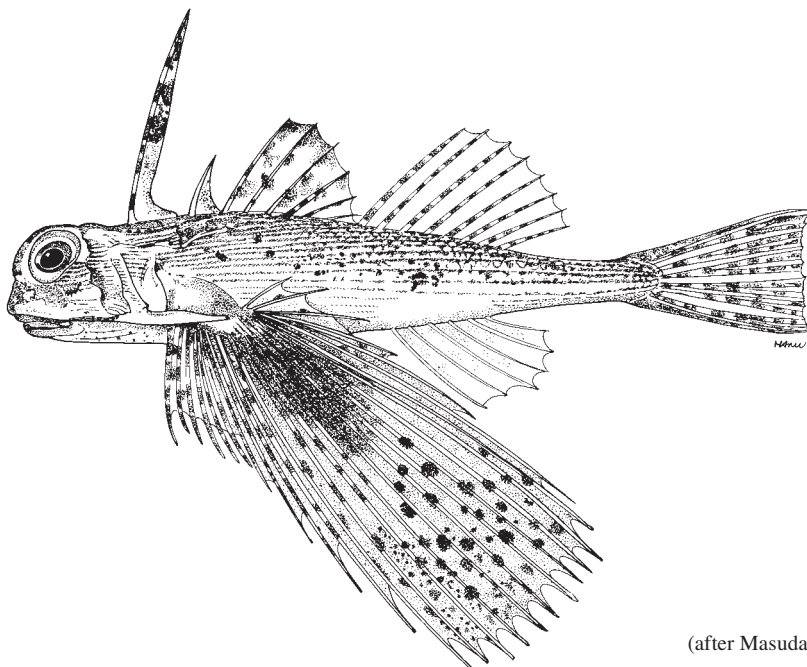
Eschmeyer, W.N. 1997. A new species of Dactylopteridae (Pisces) from the Philippines and Australia, with a brief synopsis of the family. *Bull. Mar. Sci.*, 60(3):727-738.

1/ May be a synonym of *Dactyloptena macracantha*. Not included in the identification key.

***Dactyloptena gilberti* Snyder, 1909**

Frequent synonyms / misidentifications: None / *Dactyloptena jordani* Franz, 1910.

FAO names: En - Flateared helmet gurnard.



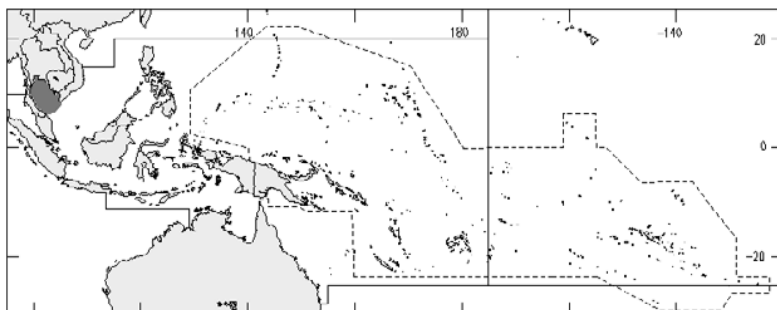
(after Masuda et al., 1984)

Diagnostic characters: Body moderately elongate, squarish in cross-section. Head very broad, blunt, depressed anteriorly, with a prominent keeled spine extending posteriorly from nape to below second spine of continuous spinous part of dorsal fin. **Posttemporal spine strong, but not markedly elevated above rest of cranium. Granular projections on snout arranged in rows.** Angle of preopercle with a long, prominent spine. Eyes large. **Interorbit extremely wide (width 18 to 23% of standard length) and strongly concave, with depth 12 to 17% of head length.** Mouth small, subterminal, and protractile. Upper jaw largely obscured by bones surrounding eye. Minute teeth present on jaws, vomer, and palatines. Anterior 2 dorsal-fin spines separated from remainder of spinous dorsal fin, the first spine elongate, the second short; continuous part of spinous dorsal fin with V spines, followed by I short spinous point and the soft dorsal fin with 8 rays (dorsal-fin formula: I, I, V+I, 8). Anal fin with 6 or 7 soft rays. Caudal fin elongate. Pectoral fins with 28 to 32 rays. Pelvic fins with I spine and 4 soft rays. Scales strong, each with a distinct ridge and no secondary ridges. Large scute-like scales posteriorly on caudal peduncle. **Lateral line present, extending to caudal fin. Colour: pectoral fins dusky, with large dark spots arranged in row and especially dark over middle fin rays; separated anterior portion of pectoral fins paler, with no large ocellus or spot; pectoral fins mostly black in juveniles, but without black spot or ocellus.**

Size: Maximum total length 22 cm.

Habitat, biology, and fisheries: Little is known of the biology of this species. Taken nearshore with seines or trawls and occasionally marketed fresh, it forms a minor component to the fisheries of the area. Captured over sand or mud-sand bottoms at depths of 20 to 71 m.

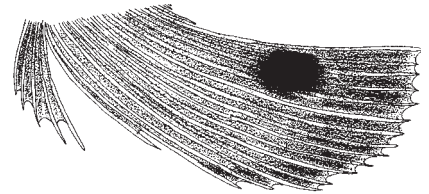
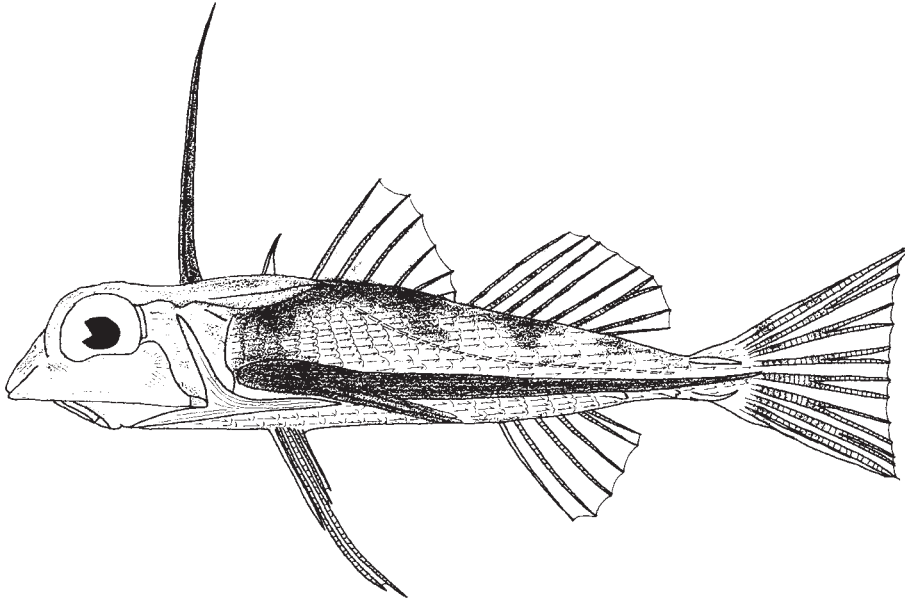
Distribution: Ranges from southern Japan and Gulf of Thailand to India and the Arabian Peninsula.



Dactyloptena macracantha (Bleeker, 1854)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Spotwing helmet gurnard; Fr - Grondin volant cocarde; Sp - Alón buho.



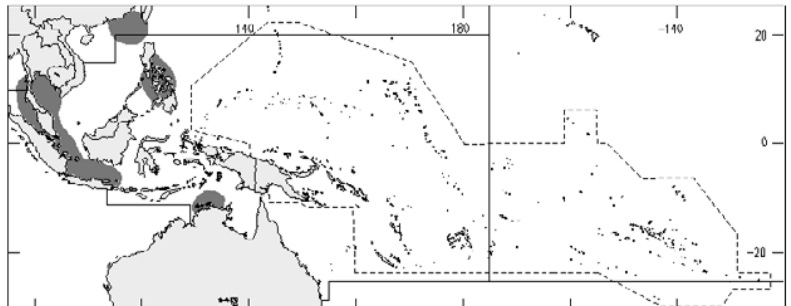
pectoral fin

Diagnostic characters: Body moderately elongate, squarish in cross-section. Head broad, blunt, depressed anteriorly, with a prominent keeled spine extending posteriorly from nape to below second spine of continuous spinous part of dorsal fin. Angle of preopercle with a long, prominent spine. Eyes large. **Interorbital width 12 to 15% of standard length; interorbit weakly concave, with depth 6 to 8% of head length.** Mouth small, subterminal, and protractile. Upper jaw largely obscured by bones surrounding eye. Minute teeth present on jaws, vomer, and palatines. Anterior 2 dorsal-fin spines separated from remainder of spinous dorsal fin, the first spine elongate, the second short (rarely missing); continuous part of spinous dorsal fin with V spines, followed by I short spinous point and the soft dorsal fin with 8 or 9 rays (dorsal-fin formula: I, I, V+I, 8-9; rarely I, 0, V+I, 8). Anal fin with 6 soft rays. Caudal fin elongate. Pectoral fins with 31 to 34 rays. Pelvic fins with I spine and 4 or 5 soft rays. Scales strong, each with a distinct ridge. Large scute-like scales posteriorly on caudal peduncle. Scales in about 45 to 47 rows. **Lateral line present, extending to caudal fin.** **Colour:** dusky violet above and pinkish below; an oblong black blotch over middle of pectoral fins.

Size: Maximum total length 16.5 cm.

Habitat, biology, and fisheries: Typically, this species has been reported from depths of 45 to 125 m. However, a single record from 128 to 177 m is known. Usually taken near shore with trawls or handlines and occasionally marketed fresh.

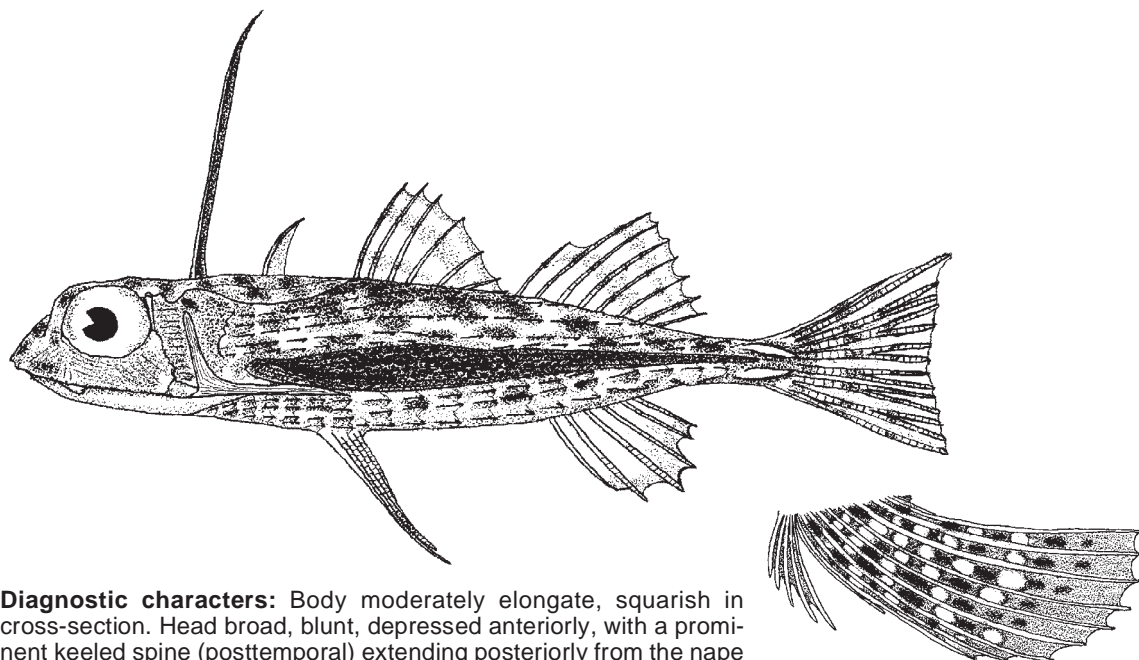
Distribution: This species ranges eastward in the Indian Ocean to India, Sri Lanka, and western Pacific Ocean. Within the area found in Java, the Philippines, the Malay Peninsula, Sumatra, Indonesia, and the Northern Territory (Australia).



Dactyloptena orientalis (Cuvier, 1829)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Oriental helmet gurnard; **Fr** - Grondin volant oriental; **Sp** - Alón oriental.

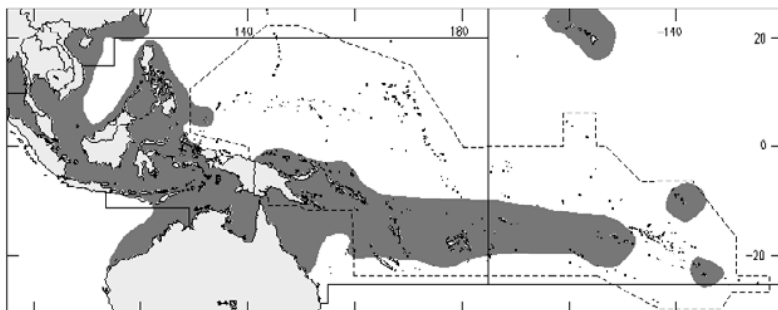


Diagnostic characters: Body moderately elongate, squarish in cross-section. Head broad, blunt, depressed anteriorly, with a prominent keeled spine (posttemporal) extending posteriorly from the nape to below second spine of continuous spinous part of dorsal fin. Angle of preopercle with a long, prominent spine. Eyes large. **Interorbital width 13 to 15% of standard length; interorbit moderately concave, with depth 8 to 11% of head length.** Mouth small, subterminal, and protractile. Upper jaw largely obscured by bones surrounding eye. Minute teeth present on jaws, vomer, and palatines. **Anterior 2 dorsal-fin spines separated from remainder of spinous dorsal fin, the first spine elongate, the second short;** continuous part of spinous dorsal fin with V spines, followed by I short spinous point and the soft dorsal fin with 8 rays (dorsal-fin formula: I, I, V+I, 8). Anal fin with 6 or 7 soft rays. Caudal fin elongate in adults (much shorter in young). Base of pectoral fins horizontal, the fins divided into 2 sections, a short anterior part with 5 rays, and a long posterior section with 27 to 30 rays. Pelvic fins with 1 spine and 4 or 5 soft rays. Scales strong, each with a distinct ridge. Large scute-like scales posteriorly on caudal peduncle. Scales in about 45 to 47 rows. **Lateral line absent or greatly obscured. Colour:** variable, usually yellowish brown above, lighter brown below; small orange spots over top of head and back; dusky, golden spots on pectoral fins (larger distally); 4 golden bands on caudal fin; a yellow band along upper part of spinous dorsal fin.

Size: Maximum total length 40 cm; commonly to 20 cm.

Habitat, biology, and fisheries: This is a benthic species primarily inhabiting sandy bottoms in shallow coastal waters. It is capable of “walking” on the bottom by alternately moving the pelvic fins and short pectoral-fin rays. Feeds on benthic crustaceans, clams, and small fishes. The enlarged pectoral-fin rays are spread as a defensive behavior. Not commercially fished, but taken incidentally throughout its range.

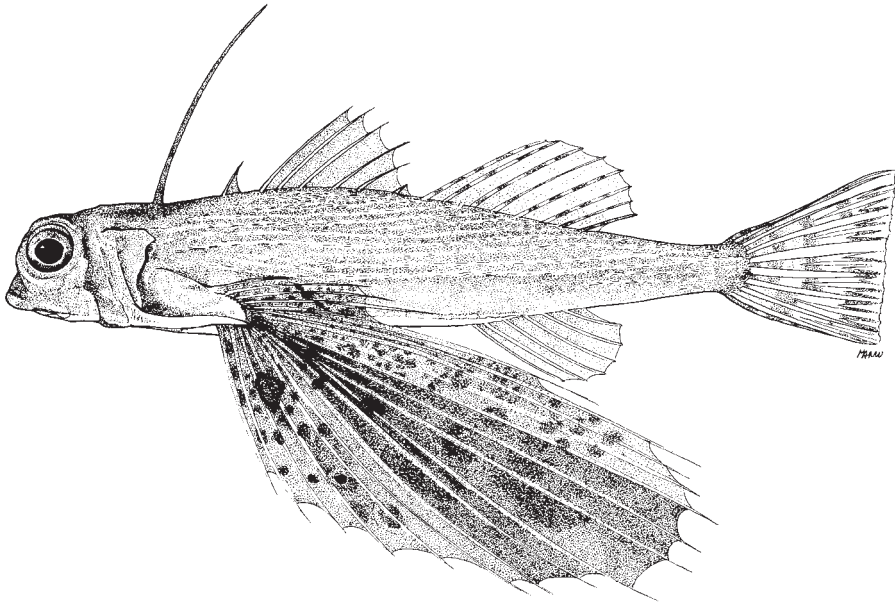
Distribution: This species is the most widely ranging dactylopterid. It has been captured from the Red Sea and South Africa to the Tuamoto Archipelago and Hawaii.



Dactyloptena papilio Ogilby, 1910

Frequent synonyms / misidentifications: None / None.

FAO names: En - Sharpeared helmet gurnard.



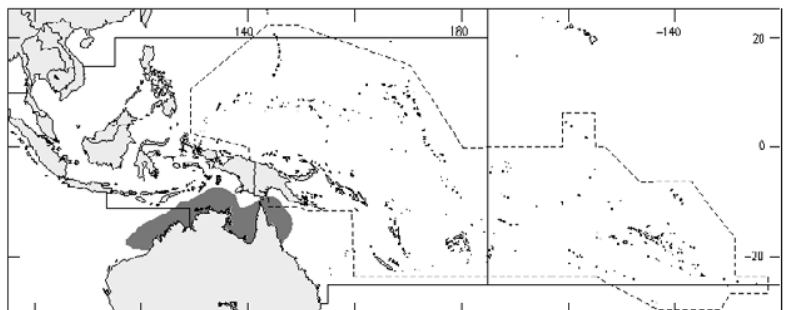
(after Sainsbury, Kailola, and Leyland, 1984)

Diagnostic characters: Body moderately elongate, squarish in cross-section. Head very broad, blunt, depressed anteriorly, with a prominent keeled spine extending posteriorly from the nape to below second spine of continuous spinous part of dorsal fin. **Posttemporal spine strong and elevated above rest of cranium.** Angle of preopercle with a long, prominent spine. Eyes large. **Interorbit extremely wide (width 16 to 20% of standard length) and strongly concave, with depth 12 to 17% of head length.** **Granular projections on snout scattered uniformly.** Mouth small, subterminal, and protractile. Upper jaw largely obscured by bones surrounding eye. Minute teeth present on jaws, vomer, and palatines. Anterior 2 dorsal-fin spines separated from remainder of spinous dorsal fin, the first spine elongate, the second short; continuous part of spinous dorsal fin with V spines, followed by I short spinous point and the soft dorsal fin with 8 rays (dorsal-fin formula: I, I, V+I, 8). Anal fin with 6 or 7 soft rays. Caudal fin elongate. Pectoral fins with 28 to 32 rays. Pelvic fins with I spine and 4 soft rays. Scales strong, each with a single median ridge. Large scute-like scales posteriorly on caudal peduncle. Lateral line present, extending to caudal fin. **Colour:** pectoral fins with group of dark spots and an irregular dark area extending 1/3 length of fin near base; faint dark saddles on dorsum in specimens between 8 and 12 cm standard length.

Size: Maximum total length 22 cm.

Habitat, biology, and fisheries: This species is poorly known and no fishery exists for it.

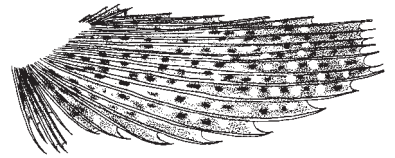
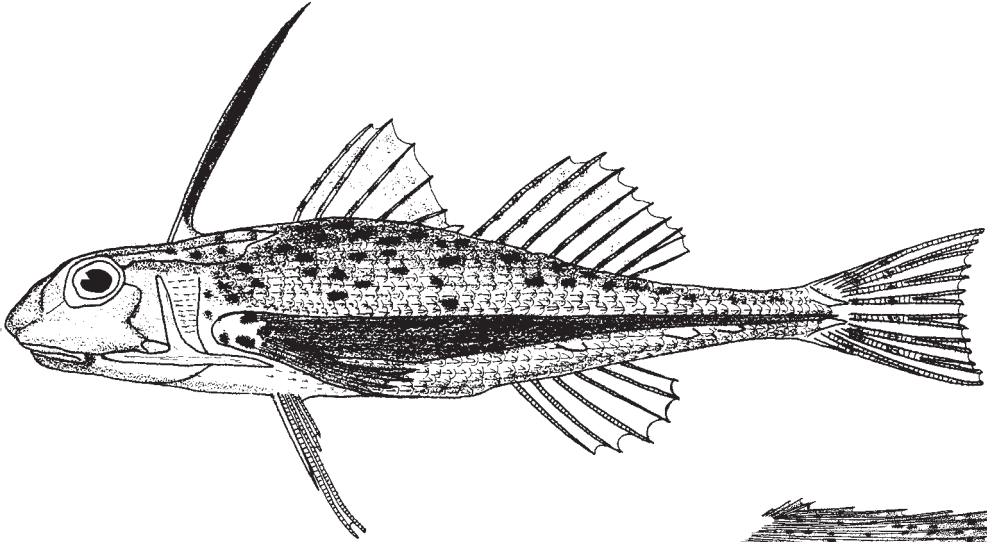
Distribution: *Dactyloptena papilio* is found in western and northern Australia and the Arafura Sea in depths of 13 to 137 m.



Dactyloptena peterseni (Nyström, 1887)

Frequent synonyms / misidentifications: *Daicocus peterseni* (Nyström, 1887) / None.

FAO names: En - Starry helmet gurnard; Fr - Grondin volant étoilé; Sp - Alón estrellado.



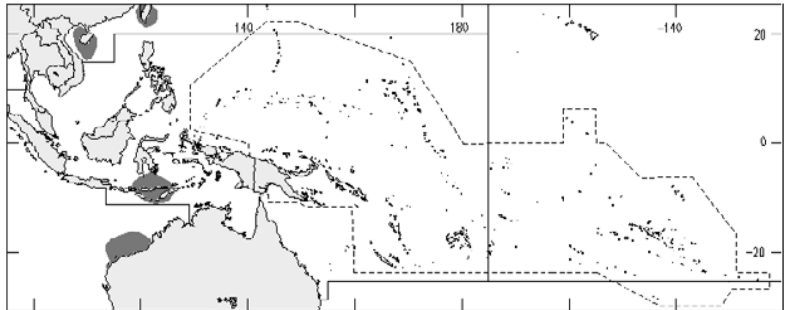
pectoral fin

Diagnostic characters: Body moderately elongate, squarish in cross-section. Head broad, blunt, depressed anteriorly, with a prominent keeled spine (posttemporal) extending posteriorly from the nape to below second spine of continuous spinous part of dorsal fin. Angle of preopercle with a long, prominent spine. Spinous and soft dorsal fins separated by a deep notch. Eyes large. **Interorbital width 13 to 14% of standard length; interorbit region weakly concave, its depth a midline about 2/3 width of pupil (5 to 7% of head length).** Mouth small, subterminal, and protractile. Upper jaw largely obscured by bones surrounding eye. Nodular teeth present on jaws. Small teeth on vomer and palatines. **A single elongate filamentous spine widely separated from remainder of spinous dorsal fin, continuous part of spinous dorsal fin with VII spines, soft dorsal fin with 8 rays** (dorsal-fin formula: I, VII, 8). Anal fin with 6 soft rays. Caudal fin emarginate. Bases of pectoral fins horizontal, the fins divided into 2 sections, a short anterior part with 5 rays and a long posterior part, with 25 or 26 rays that reach to caudal-fin base in adults. **Lower side of posterior part of trunk with 3 enlarged keel-like scales, the first above middle of anal fin.** Scales each with a strong median ridge. **Lateral line absent or greatly obscured.** **Colour:** dusky violet above, pinkish below; an oblong black blotch over middle of pectoral fins.

Size: Maximum total length 25 cm; commonly to 15 cm.

Habitat, biology, and fisheries: Benthic, found on sandy bottoms in coastal waters at depths of 20 to 71 m. It feeds primarily on benthic crustaceans. It is not fished commercially and is rarely used for food. Most adults are taken with trawls.

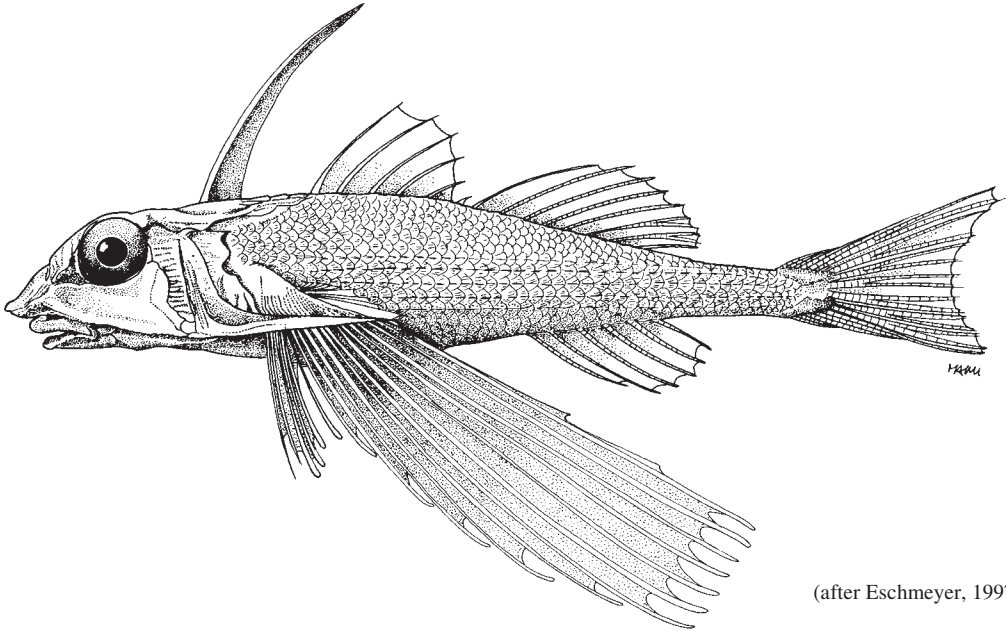
Distribution: This species occurs from southern Japan and the South China Sea to South Africa. The extent of its range in the West Pacific is uncertain as it is sometimes confused with *Dactyloptena orientalis*.



Dactyloptena tiltoni Eschmeyer, 1997

Frequent synonyms / misidentifications: None / None.

FAO names: En - Plain helmet gurnard.



(after Eschmeyer, 1997)

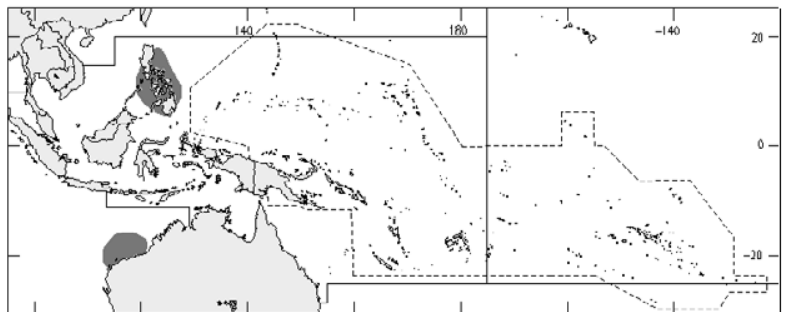
Diagnostic characters: Body moderately elongate, squarish in cross-section. Head broad, blunt, depressed anteriorly, with a prominent keeled spine (posttemporal) extending posteriorly from the nape to below second spine of continuous spinous part of dorsal fin. Angle of preopercle with a long, prominent spine. Eyes large. **Interorbital width 13 to 14% of standard length; interorbit region weakly concave, its depth at midline about 2/3 width of pupil (5 to 8% of head length).** Mouth small, subterminal, and protractile. Upper jaw largely obscured by bones surrounding eye. Nodular teeth present on jaws. Small teeth on vomer and palatines. Spinous and soft dorsal fins separated by a deep notch. **A single elongate filamentous spine widely separated from remainder of spinous dorsal fin; continuous part of spinous dorsal fin with V spines, followed by I short spinous point and the soft dorsal fin with 8 rays** (dorsal-fin formula: I, V, I, 8). Anal fin with 6 soft rays. Caudal fin emarginate. Bases of pectoral fins horizontal; pectoral fins with 29 to 32 rays, the fins divided into 2 sections, a short anterior part and a long posterior part that reaches to caudal-fin base. **Lower side of posterior part of trunk with 3 enlarged keel-like scales, the first above middle of anal fin. Scales scute-like, with those on upper flank with several wavy keel-like ridges, the middle ridge strongest. Lateral line absent or greatly obscured.** **Colour:** unknown in life, but **without spots when preserved**, with mostly dusky pectoral fins and faint bands on the soft dorsal-fin rays, and with pale pelvic, anal, and caudal fins.

Size: Maximum standard length at least 9.4 cm.

Habitat, biology, and fisheries:

Nothing is known about biology of this recently described species other than it appears to be the deepest living dactylopterid; the known specimens were trawled at depths of 119 to 565 m.

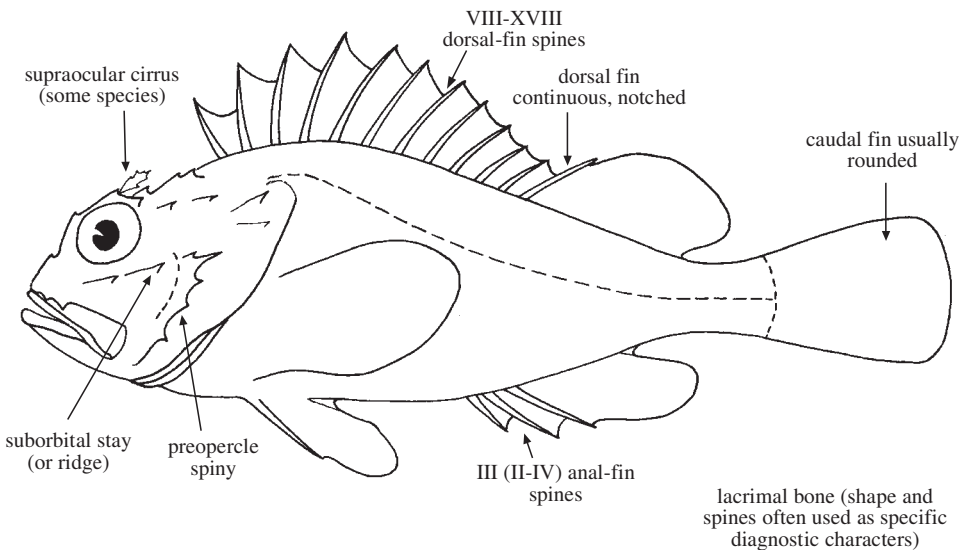
Distribution: Known from the Philippines and Western Australia.



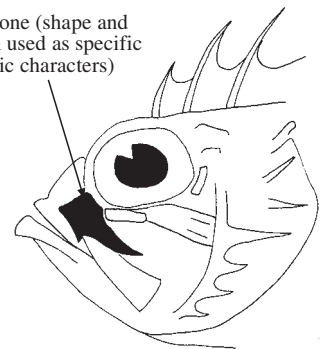
SCORPAENIDAE**Scorpionfishes (also, lionfishes, rockfishes, stingfishes, stonefishes, and waspfishes)**

by S.G. Poss

Diagnostic characters: Body usually weakly, rather than strongly, compressed; body depth 21 to 50% standard length. **Head moderate to large, 37 to 50% standard length**, often notably depressed with cirri, particularly above eye. Eye small to relatively large, 4 to 14% of standard length. Snout short to long, often prominent, 6 to 20% of standard length. Mouth often large and upturned, upper jaw 9 to 23% standard length. Numerous small conical teeth present on upper and lower jaws, with those on vomer and palatine present or absent. Branchiostegal rays typically 7 (rarely 6). Gill rakers usually small or moderate, 1 to 9 in upper arch and 4 to 20 in lower arch. **All species with suborbital stay (or ridge), an extension of the third infraorbital bone (second suborbital) extending backward across the cheek and usually firmly bound to preopercle. Most species with numerous head spines**, with those on lacrimal bone (or first infraorbital bone), those above orbital margin and those behind occiput most prominent. **Dorsal fin with strong venomous spinous part bearing VIII to XVIII spines** connected to soft-rayed part posteriorly, with $3\frac{1}{2}$ to 14 soft rays, the last typically split to its base and counted as $1\frac{1}{2}$. **Anal fin with II to IV, but usually III strong, sharp spines**, the second usually longest, followed by $3\frac{1}{2}$ to 15 soft rays, the last usually split to its base and counted as $1\frac{1}{2}$. Caudal fin typically rounded or truncate, never forked, 15 to 40% standard length, usually about 27 to 35% standard length. Pectoral fins usually large, with 11 to 24 rays; with rays of larger individuals of most species branched. Pelvic fins with I strong spine and 5, or less often, 4 branched rays. Scales in most species relatively small and either ctenoid or pseudocycloid, entirely absent in others, or present only as deeply embedded scale rudiments. Lateral-line scales present, with 4 to 54 pored or tubed scales (lateral-line scales trough-like in the subfamily Setarchinae). When present, scales above lateral line 4 to 8; scales below lateral line 10 to 19. **All species possess striated swimbladder musculature that is extrinsic in nearly all species**, with musculature present even in those without swimbladders. Pyloric caecae 1 to 16. Vertebrae 24 to 29. **Colour:** most species strongly camouflaged and red, reddish brown, or brown in colour, and usually have barred or mottled colour patterns that are typically darker dorsally than ventrally.



Habitat, biology, and fisheries: Scorpionfishes and their near relatives are typically found on or near the bottom, which they often strongly resemble. Most species in the area are found on relatively nearshore hard bottoms and reefs or associated with coral rubble, from the surface to a depth of 150 m. Some species in the area range, into deeper waters (to 800 m), although outside the area captures to 1 113 m have been reported. A few species, such as those of the genera *Setarches*, *Lioscorpilus*, and *Ectreposebastes*, are pelagic or semipelagic occurring offshore in depths of 200 to 800 m. Many species are relatively small, typically under 20 cm standard length, and their biology poorly studied. Nonetheless, most are known to lead solitary lives, and evidently aggregate only for reproduction. The young of most species are planktonic, with many

**detail of head**

settling out of the plankton relatively quickly. Most feed primarily on arthropods and many feed on small fishes as they attain larger sizes. Most species are extremely well camouflaged and excellent ambush predators. The vividly (aposematically) coloured lionfishes or turkeyfishes are notable exceptions, cornering their prey with their elongate pectoral fins. Most scorpionfishes are ovoviparous, producing between a few hundred and a few thousand eggs, although some are viviparous. Nearly all possess well-developed venom glands and should be handled with extreme caution, lest painful and potentially fatal wounds be inflicted by their sharp fin and head spines. Although all are edible, most species in the Western Central Pacific are small and dangerous to handle and thus do not form the basis of large fisheries. However, a few species in the area are relatively large, occur in considerable number, and are marketed fresh. Numerous species outside the area for important fisheries.

Remarks: Scorpaenoid fishes form a large (approximately 500 species) and heterogeneous assemblage of fishes. The limits of the Scorpaenidae, included subfamilies, and associated families are not well established nor is there agreement on what family or subfamily names should be used. Some phylogenetically derived taxa, such as the Synanceiinae and Tetraroginae, are often treated as distinct families by many authors, whereas such authors usually regard more phylogenetically distant relatives as belonging to the Scorpaenidae. Other derived taxa, such as Caracanthidae and Aploactinidae, are almost universally regarded as separate families, although they too are more closely related than are some genera invariably included in the Scorpaenidae. For purposes of this general treatment a broad definition of the Scorpaenidae is adopted. With a few commonly accepted exceptions, this avoids use of an unfamiliar and highly split classification.

Similar families occurring in the area

Fishes of several other bony-fish families are superficially similar to scorpaenids in general appearance. Like all near relatives (Triglidae, Platycephalidae, Caracanthidae, and Aploactinidae), scorpaenids possess a bony suborbital stay below and behind the eye that attaches to the preopercle. In addition, most scorpionfishes bear numerous head spines not seen in species otherwise of similar colour or body shape (see above diagram of head spines).

Triglidae: possess a very broad suborbital stay; all species have heavily armoured heads and free, highly mobile lowermost pectoral-fin rays (only few scorpaenids possess heavily armoured heads or free pectoral-fin rays, and none have these characteristics in combination as do sea robins, except for the Apistinae, which can be distinguished from triglids by their movable lacrimal bone).

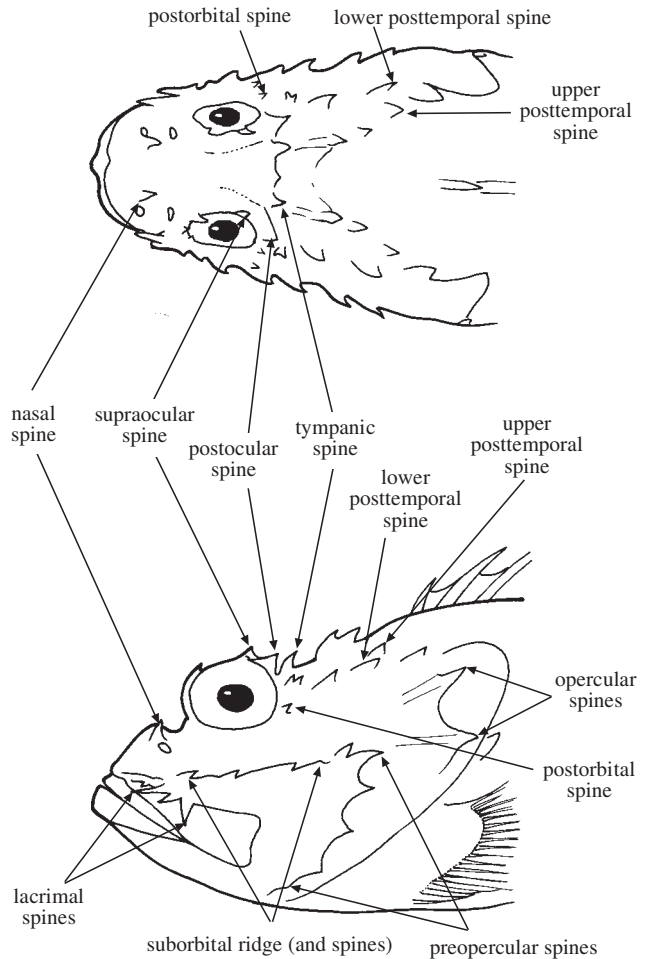
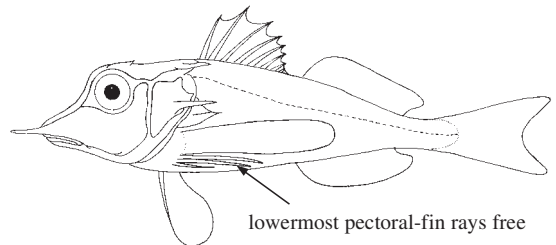


diagram of head spines used in the identification key

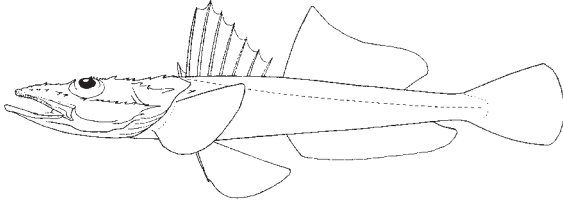
(after Eschmeyer, 1969)



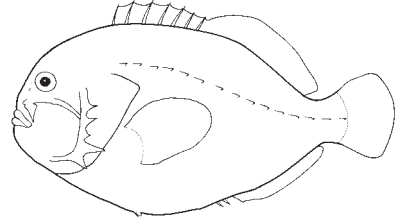
Triglidae

Platycephalidae: possess similar head spines, but are distinguished by their highly depressed head (head depth less than about 20% standard length), and by having the ventral margin of the lacrimal bone smooth (ventral margin of lacrimal often bearing numerous large spines in scorpaenids; see diagram of head spines on previous page).

Caracanthidae: also have a suborbital stay and similar head spines anterior and posterior to the eye, but are distinguished by their notably compressed heads and bodies with rounded profiles that are covered with numerous fleshy papillae-like projections not seen in scorpaenids (which usually have ctenoid or pseudocycloid scales; a few species lack scales).



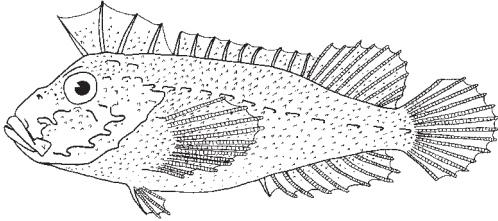
Platycephalidae



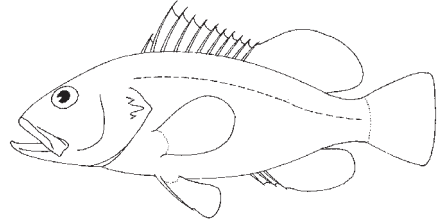
Caracanthidae

Aploactinidae: closely related to the subfamily Synanceiinae and also have a suborbital stay and head spines, but most aploactinids are distinguished by the possession of highly modified tack-like scales (but many are without scales); all aploactinids lack branched fin rays (as seen in nearly all scorpaenids, except subfamilies Synanceiinae and Minoinae), and most have comparatively blunt spines (instead of strongly pungent spines seen in scorpaenids).

Serranidae: similar to some scorpaenids in head and body shape, but often having concave, lunate, or forked caudal fins; no suborbital stay under the eye that attaches to preopercle; often 3 opercular spines (typically only 2 in scorpaenoids); many species possess large canine teeth common in anterior end of upper and lower jaws (in contrast to the comparatively uniform small teeth of scorpaenoids).

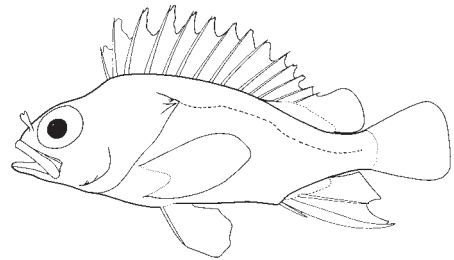


Aploactinidae



Serranidae

Centrogeniidae: the only member of this family, *Centrogenys vaigiensis* (false scorpionfish, sometimes placed in the Serranidae), sufficiently resembles scorpaenids in coloration and size and shape of its fins, perhaps for purposes of mimicry, that it was originally described in the genus *Scorpaena*. However, *C. vaigiensis* does not possess a suborbital stay that extends back toward the eye and firmly attaches to the preopercle, nor does it have venom glands associated with the fin spines.



Centrogeniidae

Identification note

Many scorpaenoid species, but not all, have the **last fin ray of the dorsal and anal fins** split to their base yet borne on a single pterygiophore, as revealed by radiography. Workers have differed in how such fin rays are counted, some counting this condition as 1 ray, others as 2. A convention has developed among scorpaenoid workers to count this last double ray as 1 ½. This method is used here as it has the advantage of permitting the split-rayed condition to be distinguished from the single-rayed condition, while eliminating the ambiguity inherent in counting the split ray as either 1 or 2 rays. Vertical scale row counts are taken above the lateral line from the uppermost posttemporal spine to the base of the caudal fin. **Gill raker counts** are presented as formulas, with the first range indicating the rakers in the upper arm of the first gill arch, the middle number indicating a gill raker at the angle between the upper and lower arms and the last range referring to the rakers on the lower arm (e.g. 3-5+1+7-11=12+16) with the range after the equal sign indicating the total number of gill rakers.

Key to the species of Scorpaenidae occurring in the area

Note: in the anticipation that they may be recorded in the future from the area, some species known from adjoining seas are included in the key, with their distribution indicated in parenthesis.

- 1a. Skin at gill openings broadly connected to isthmus **(subfamily Syanceiinae)** → 2
- 1b. Skin at gill openings connected to each other or connected to isthmus only narrowly anteriorly, not broadly connected to isthmus (partially united in *Taenianotus triacanthus*) → 26
- 2a. Pectoral fins with lowermost 1 to 3 rays not free from other rays → 3
- 2b. Pectoral fins with lowermost 1 to 3 rays free, and independently mobile → 9
- 3a. Mouth terminal, slightly oblique; eyes lateral on head **(Erosa)** → 4
- 3b. Mouth strongly upturned; eyes on dorsal surface of head → 5
- 4a. Pectoral-fin rays 14 to 16, usually 15; dorsal-fin spines XIII to XV, usually XV; dorsal-fin rays 5 ½ or 6 ½, usually 6 ½; anal-fin spines III; anal-fin rays 5 ½ or 6 ½ **Erosa erosa**
- 4b. Pectoral-fin rays 12 or 13, usually 12; dorsal-fin spines XII or XIII; dorsal-fin rays 8 ½ or 9 ½ **Erosa daruma**
(Western Australia; not yet recorded from the area)
- 5a. Dorsal-fin spines XVI or more **Leptosynanceia asteroblepa**
- 5b. Dorsal-fin spines XI to XIV → 6
- 6a. Anal fin with II spines and 12 to 15 soft rays, the last split to base . . . **Trachicephalus uranoscopus**
- 6b. Anal fin with III spines and 4 ½, 5 to 6 ½, or 7 soft rays → 7
- 7a. Pectoral-fin rays 10 to 15, usually 11 **Synanceia alula**
- 7b. Pectoral-fin rays 14 to 19 → 8
- 8a. Orbital margin heavily ossified, forming a “crest” above eye; pectoral-fin rays 15 to 17 **Synanceia horrida**
- 8b. Orbital margin not heavily ossified, not forming a “crest” above eye; pectoral-fin rays 17 to 19 (usually 18 or 19) **Synanceia verrucosa**
- 9a. Only lowermost pectoral-fin ray free and relatively mobile **(Minous)** → 11
- 9b. Lowermost 2 or 3 pectoral-fin rays free and relatively mobile → 10
- 10a. Dorsal-fin spines XIII to XV; lowermost 3 pectoral-fin rays free; eyes small to moderate (about 7 to 11% head length), positioned laterally on head **Choridactylus multibarbus**
- 10b. Dorsal-fin spines XV to XVIII; lowermost 2 pectoral-fin rays free; eyes small (about 4 to 7% head length), positioned on top of head **(Inimicus)** → 17
- 11a. First dorsal-fin spine equal to or longer than second dorsal-fin spine; first spine widely separated from base of second spine → 12
- 11b. First dorsal-fin spine notably shorter than second dorsal-fin spine (first spine typically less than 1/2 length of second spine); first dorsal-fin spine close to base of second dorsal-fin spine → 14
- 12a. Caudal fin without transverse dark bars; medial (axillary) surface of pectoral fin with dark brown stripes; posterior spine of lacrimal bone about twice length of anterior spine and not bayonet-shaped **Minous quincarinatus**
- 12b. Caudal fin with transverse dark bars; medial (axillary) surface of pectoral fin either uniformly coloured or spotted; posterior spine of lacrimal bone long and bayonet-shaped → 13

- 13a. Soft portion of dorsal fin with wavy bands; dorsal-fin spines usually IX; caudal fin usually with 3 or 4 transverse wavy bands *Minous versicolor*
- 13b. Soft portion of dorsal fin black anteriorly; dorsal-fin spines usually X or more; caudal fin with 2 broad, dark vertical bars *Minous monodactylus*

- 14a. Dorsal-fin spines weak and hair-like *Minous pusillus*
- 14b. Dorsal-fin spines strong or thin, but not hair-like → 15

- 15a. Posterior lacrimal spine about equal in length to anterior lacrimal spine; soft portion of dorsal fin with 8 to 11 rays, usually 10; anal-fin rays plus anal-fin spines together 9 to 11; caudal-fin rays usually with alternating dark and pale markings *Minous trachycephalus*
- 15b. Posterior lacrimal spine much longer than anterior lacrimal spine; soft portion of dorsal fin with 11 to 13 rays; anal-fin rays plus anal-fin spines together 11 to 13; caudal fin pale, without dark markings → 16

- 16a. Medial (axillary) surface of pectoral-fin stripes radiating distally along course of fin rays *Minous pictus*
- 16b. Medial (axillary) surface of pectoral fin with irregular black spots on a pale background *Minous coccineus*

- 17a. Snout shorter than postorbital length (0.7 to 0.9 in postorbital length); fin membranes of dorsal-fin spines subsequent to third spine incised to about midlength of spines → 18
- 17b. Snout about equal to, or usually, longer than postorbital length (0.9 to 1.7 in postorbital length); fin membranes of dorsal-fin spines subsequent to third spine incised for nearly entire length of spines → 20

- 18a. Medial (axillary) surface of pectoral fins dusky or blackish, often with black spots or streaks, but without a transverse white band in middle of fin *Inimicus brachyrhynchus*
- 18b. Medial (axillary) surface of pectoral fins dusky, with black spots, and a transverse band in middle of fin → 19

- 19a. Third pectoral-fin ray from bottom not free, except at its tip *Inimicus japonicus*
- 19b. Third pectoral-fin ray from bottom free for about 1/3 of its length *Inimicus joubini*

- 20a. Orbits extremely elevated and closely spaced at their bases, which are broadly joined; interorbit narrow, about equal to orbit diameter; uppermost 2 pectoral-fin rays filamentous in juveniles and adults *Inimicus filamentosus*
- 20b. Orbits slightly elevated and widely spaced at their bases, which are joined only by a low ridge; interorbit wide, usually 1.5 times orbit diameter; uppermost 2 pectoral-fin rays not filamentous in specimens longer than about 5 cm standard length → 21

- 21a. Medial surface of pectoral fins nearly uniform grey, without markings, except with sometimes a few scattered dark spots *Inimicus cuvieri*
- 21b. Medial surface of pectoral fins not uniformly coloured in adults → 22

- 22a. Medial surface of pectoral fins with a broad terminal dark band in adults → 23
- 22b. Medial surface of pectoral fins without a broad terminal dark band in adults, or with a thin dusky band terminally in adults → 24

- 23a. Medial surface of pectoral fins with broad dark transverse bar near proximal end of fin in adults, which may be streaked with white lines extending along fin rays and a white area separating it from terminal dark band *Inimicus didactylus*
- 23b. Medial surface of pectoral fins without a broad dark transverse bar near proximal end of fin in adults → 25

- 24a.** Medial surface of pectoral fins either with irregular dusky spots proximally or entirely pale *Inimicus gruzovi*
- 24b.** Medial surface of pectoral fins with irregular dusky spots proximally and 2 large dark spots on an otherwise pale background *Inimicus smirnovi*
- 25a.** Medial surface of pectoral fins with irregularly-sized pale spots on a dark grey background *Inimicus sinensis*
- 25b.** Medial surface of pectoral fins with 2 dark regions separated by a pale area . *Inimicus caledonicus*
- 26a.** Lacrimal bone (infraorbital 1) highly mobile, hinged to lateral ethmoid dorsally and abutting but not firmly bound to first suborbital bone (infraorbital 2) posteriorly → 27
- 26b.** Lacrimal bone (infraorbital 1) relatively immobile; strongly bound to the lateral-ethmoid dorsally and to first suborbital bone (infraorbital 2) posteriorly → 51
- 27a.** Ventralmost 1 or 3 pectoral-fin rays detached or separated from rest of fin so that independent movement is possible; second suborbital bone (third infraorbital) very deep (about as deep as long) covering nearly entire cheek and very broadly connected to preopercle (Subfamily *Apistinae*) → 28
- 27b.** Ventralmost pectoral-fin rays not detached or separated from more dorsal-fin rays; second suborbital (third infraorbital) notably longer than deep, not covering entire cheek, and usually not forming wide connection to preopercle . . . (Subfamily *Tetraroginae*) → 30
- 28a.** Ventralmost 3 pectoral-fin rays not detached or separate from more dorsal-fin rays; no barbels on lower jaw; no ocellus in dorsal fin *Cheroscorpaena tridactyla*
- 28b.** Ventralmost pectoral-fin ray not detached or separate from more dorsal-fin rays; barbels on lower jaw; a pronounced ocellus at rear of spinous dorsal fin → 29
- 29a.** Orbit 8 to 10% head length, interorbit 13 to 17% of head length and 18 to 24% of body depth in specimens greater than about 4 cm standard length; head bones of larger specimens relatively smooth, not densely covered with numerous denticulations . *Apistops caloundra*
- 29b.** Orbit 3 to 6% head length, interorbit 6 to 10% of head length and 6 to 13% of body depth in specimens greater than about 4 cm standard length; head bones of larger specimens densely covered with numerous denticulations, often closely set and arranged in rows *Apistus carinatus*
- 30a.** Numerous cycloid scales present on body → 31
- 30b.** Scales absent on body or few that are present form weakly developed spinous points → 46
- 31a.** Dorsal-fin origin distinctly posterior to posterior margin of orbit → 32
- 31b.** Dorsal-fin origin distinctly anterior to posterior margin of orbit → 34
- 32a.** Occipital region large, relatively elongate *Notesthes robusta*
- 32b.** Occipital region greatly foreshortened (*Centropogon*) → 33
- 33a.** A broad naked area below anterior part of spinous dorsal fin; jaw short, 10 to 15% standard length; body with strong dark saddles *Centropogon australis*
- 33b.** No broad naked area below anterior part of spinous dorsal fin; jaw moderate, 15 to 19% standard length; interorbital ridges relatively weak; body marmorated . . . *Centropogon marmoratus*
- 34b.** Dorsal fin with anterior 3 dorsal-fin spines forming a nearly separate fin, with fin membrane deeply incised posterior to third spine (*Vespicula*) → 43
- 34a.** Dorsal fin continuous with anterior 3 dorsal-fin spines not forming a nearly separate fin → 35

- 35a.** Pelvic fins with I spine and 4 soft rays → **36**
- 35b.** Pelvic fins with I spine and 5 soft rays → **38**
- 36a.** Pectoral fins with 13 to 15 rays, usually 14; body depth 39 to 46% standard length; upper jaw 17 to 19% standard length; scales in about 40 to 45 vertical rows; gill rakers 3-5+1+7-11=12-16 *Liocranium praepositum*
- 36b.** Pectoral fins with 10 or 11 rays; body depth 31 to 38% standard length; upper jaw 12 to 15% standard length; scales in 44 to 66 vertical rows; gill rakers 2-3+1+4-7=7-11 (*Paracentropogon*) → **37**
- 37a.** Lateral-line scales 19 to 24; dorsal-fin spines XII to XV (usually XIII or XIV, rarely XV); pectoral-fin rays 10 or 11 (rarely 11); total gill rakers on first gill arch (including rudiments) typically 7 to 10, rarely 11 *Paracentropogon longispinis*
- 37b.** Lateral-line scales 16 to 18; dorsal-fin spines XV; pectoral-fin rays 11; total gill rakers on first gill arch 11 *Paracentropogon zonatus*
- 38a.** Dorsal fin with XVII or XVIII spines; upper jaw small, about 12 to 14% standard length (*Ablabys*) → **39**
- 38b.** Dorsal fin with XIV to XVI spines; upper jaw moderate or large, about 16 to 25% standard length → **41**
- 39a.** Dorsal fin with XVII or XVIII spines (usually XVII) and 6 ½ or (usually) 7 ½ soft rays; anal fin with III spines and 4 ½ or (usually) 5 ½ soft rays *Ablabys taenianotus*
- 39b.** Dorsal fin XV or XVI spines and 8 ½ to 10 ½ soft rays; anal fin with III spines and 7 or 8 ½ soft rays *Ablabys macracanthus*
- 40a.** Gill rakers elongate, rakers 4-6+1+12-14=18-21; body depth 34 to 42% standard length; scales in 64 to 68 vertical rows *Cottapistus cottoides*
- 40b.** Gill rakers stout, rakers 2-5+1+6-12=9-17; body depth 29 to 36% standard length; scales in 74 to 95 vertical rows → **41**
- 41a.** Palatine teeth absent; body depth 34 to 42% standard length; upper jaw 14 to 17% standard length *Snyderina yamanokami*
(based on a single unverified record from Indonesia)
- 41b.** Palatine teeth present; body depth 29 to 33% standard length; upper jaw 17 to 19% standard length (*Neocentropogon*) → **42**
- 42a.** Body with a large blotch behind head above pectoral fins, but no other distinct dark markings elsewhere; scales in about 85 to 95 vertical rows on body *Neocentropogon affinis*
- 42b.** Body with a blotch behind head above pectoral fins, but with 2 dark blotches on dorsal fin and numerous spots over body; scales in about 74 to 85 vertical rows *Neocentropogon trimaculatus*
- 43a.** Dorsal fin with XIII to XVI spines and 3 ½ to 5 ½ soft rays; anal fin with III spines and 3 ½ or 4 ½ soft rays; orbit 6 to 9% standard length *Vespacula trachinoides*
- 43b.** Dorsal fin with XIII or XIV spines and 6 ½ or 7 ½ soft rays; anal fin with III spines and 4 ½ or (usually) 5 ½ soft rays; orbit 9 to 12% standard length → **44**
- 44a.** Pectoral-fin rays 11; orbit 9 to 10% standard length; body notably compressed *Vespacula depressifrons*
- 44b.** Pectoral-fin rays 12; orbit 11 to 13% standard length; body compressed but not greatly so → **45**

- 45a.** Dorsal fin with XIII or XIV spines and 6 ½ soft rays; body depth about 31 to 37% standard length; body nearly uniform brown *Vespicula zollingeri*
- 45b.** Dorsal fin with XIII spines and 7 ½ soft rays; body depth about 37% standard length; body with spotted or reticulate pattern *Vespicula cypho*
- 46a.** Body entirely without scales, except for lateral line. → 47
- 46b.** Body with a few scattered tack-like or rudimentary scales (most evident above lateral line behind head, but must be closely examined), as well as on lateral-line scales. → 50
- 47a.** Body robust, not strongly compressed; head profile rounded; pectoral-fin rays 14 to 16 (rarely 13); dorsal fin with XII to XIV spines and 5 to 9 segmented rays *Richardsonichthys leucogaster*
- 47b.** Body notably compressed; head profile angular; pectoral-fin rays 11 to 13 (usually 12); dorsal fin with XIV to XVII spines and 7 to 9 segmented rays (*Ocosia*) → 48
- 48a.** Second and third dorsal-fin spines notably elongate relative to succeeding spines; no small spine on lower margin of second infraorbital bone; no small spine on lateral face of lacrimal bone; body with distinct brown spots *Ocosia zaspilota*
- 48b.** Second dorsal-fin spine notably elongate relative to succeeding spines; a small spine on lower margin of second infraorbital bone; a small spine usually present on lateral face of lacrimal bone; small flecks of brown on sides, but no distinct spots → 49
- 49a.** Ratio of length of second dorsal-fin spine to length of third spine 1.6 to 1.7; pectoral-fin rays 12 or 13 (usually 12); gill rakers 2-5+1+8-15=12-21 *Ocosia apia*
- 49b.** Ratio of length of second dorsal-fin spine to length of third spine about 1.15, with both notably longer than succeeding spines; gill rakers about 4+1+9=15 *Ocosia spinosa*
(Taiwan Province of China; not yet recorded from the area)
- 50a.** Anal fin with III spines and 4 ½ or 5 ½ soft rays; gill rakers 2-3+1+5-7=8-10 . . . *Tetraroge barbata*
- 50b.** Anal fin with III spines and 6 ½ or 7 ½ soft rays; gill rakers 3-4+1+6-7=10-11. . . . *Tetraroge niger*
- 51a.** Pectoral fins strongly notched or notably bilobate with upper rays longest → 52
- 51b.** Pectoral fins rounded or elongate, but not strongly notched or bilobate (somewhat bilobate in some species of *Neosebastes*). → 53
- 52a.** Pectoral-fin rays 22 or 23; dorsal-fin spine X extremely short, with membrane between it and spines IX and XI absent or nearly so *Plectrogenium nanum*
- 52b.** Pectoral-fin rays 20 to 22; dorsal-fin spine X short, but not extremely so, with membrane between it and spines IX and XI normally developed as between other spines *Trachyscorpia capensis*
(New Zealand; not yet recorded from the area)
- 53a.** Opercle usually with a single weak ridge that typically ends in a small spine; lacrimal and suborbital bones (infraorbital bones 1 to 3) relatively broad, flat, and thin; postorbital always absent; dorsal-fin membranes incised nearly entire length of all spines; dorsal-fin spines greatly elongate in most species (subfamily *Pteroinae*) → 54
- 53b.** Opercle with 2 distinct ridges that diverge at an acute angle, both usually strongly developed and bearing spines; lacrimal and suborbital bones (infraorbital bones 1 to 3) relatively narrow and usually somewhat convex laterally and usually strongly ossified; lacrimal bone with strong spines along ventral margin; dorsal-fin spines short, usually less than 1/2 body depth; dorsal-fin membranes not incised nearly entire length of all spines; dorsal-fin spines not greatly elongate in most species → 67
- 54a.** Pectoral-fin rays unbranched in juveniles and adults (*Pterois*) → 61
- 54b.** Pectoral-fin rays branched in juveniles and adults → 55

- 55a.** Dorsal-fin spines relatively short, less than 1/2 body depth and nearly equal to length of dorsal-fin rays; mandible scaled, with serrated ridges *Brachypterois serrulatus*
- 55b.** Dorsal-fin spines long, usually longer than body depth and much longer than dorsal-fin rays; mandible without serrate ridges or scales → **56**
- 56a.** Anal fin with II spines (III spines in juveniles) and 7 ½ or 8 ½ soft rays; lateral surface of lacrimal bone with numerous ventrally directed spines; caudal fin with outer rays elongate and becoming filamentous in larger individuals *Parapterois heterurus*
- 56b.** Anal fin with III spines and 5 ½ to 8 ½ soft rays; lateral surface of lacrimal bone without ventrally directed spines; caudal fin with outer rays never elongate → **57**
- 57a.** Preopercle with IV spines, with third from dorsalmost notably enlarged and often with multiple points; males bearing a thin bony crest above orbit; pectoral-fin rays 15 to 18 *Ebosia bleekeri*
(Taiwan Province of China; not yet recorded from the area)
- 57b.** Preopercle with III spines, none notably enlarged; males without a bony crest above orbit; pectoral-fin rays 17 to 21 → **58**
- 58a.** Two (rarely 1 or 3) large ocelli on soft part of dorsal fin; 2 large cirri on snout; pectoral-fin rays 20 or 21 *Dendrochirus biocellatus*
- 58b.** No ocelli on soft part of dorsal fin; nasal without cirrus; pectoral-fin rays 17 or 18 → **59**
- 59a.** Body with broad red vertical bars on a pale background; vertical scale rows about 34; snout 8 to 10% standard length *Dendrochirus bellus*
- 59b.** Body with red or reddish brown saddles or with broad red vertical bars that alternate with thinner red or reddish brown bars; vertical scale rows 45 to 54; snout 11 to 15% standard length → **60**
- 60a.** Dorsal fin with XII or XIII spines and 9 ½ or 10 ½ soft rays (usually 9 ½); anal fin with III spines and 5 ½ soft rays; supraocular cirrus absent or shorter than orbit diameter *Dendrochirus brachypterus*
- 60b.** Dorsal fin with XIII spines and 10 ½ or 11 ½ soft rays (usually 10 ½); anal fin with III spines and 6 ½ or 7 ½ soft rays; supraocular cirrus usually well developed and typically longer than orbit diameter *Dendrochirus zebra*
- 61a.** Vertical scale rows more than 65 (65 to 80 in *Pterois russellii*) → **62**
- 61b.** Vertical scale rows less than 60 (50 to 60 in *Pterois lunulata*) → **64**
- 62a.** Ventral surface of mandible with numerous longitudinal dark stripes; pectoral-fin rays 14; caudal fin and soft parts of dorsal and anal fins spotted → **63**
- 62b.** Ventral surface of mandible pallid, without longitudinal dark stripes; pectoral-fin rays 13; caudal fin and soft parts of dorsal and anal fins without spots *Pterois russellii*
- 63a.** Dorsal-fin rays 9 ½ to 11 ½ (almost always 10 ½); anal-fin rays 5 ½ or 6 ½ (almost always 6 ½) *Pterois miles*
- 63b.** Dorsal-fin rays 10 ½ to 12 ½ (almost always 11 ½); anal-fin rays 5 ½ to 7 ½ (almost always 7 ½) *Pterois volitans*
- 64a.** Pectoral-fin rays 12 to 14 (usually 13); anal fin with III spines and 7 ½ or 8 ½ soft rays; no spots on soft-rayed part of dorsal, caudal, and anal fins; vertical scale rows 50 to 60; scales on flank mostly cycloid *Pterois lunulata*
- 64b.** Pectoral-fin rays 16 to 20; anal fin with III spines and 5 ½ or 6 ½ soft rays; spots on soft-rayed part of dorsal, caudal, and anal fins; vertical scale rows less than 60; scales on flank mostly ctenoid → **65**

- 65a.** Dorsal fin with XIII spines and 10 ½ soft rays; pectoral-fin rays 18 or 19; supraocular cirrus usually poorly developed or absent *Pterois mombasae*
- 65b.** Dorsal fin with XII spines and 10 ½ to 12 ½ soft rays; pectoral-fin rays 16 to 18 (usually 16 or 17); supraocular cirrus well developed → **66**
- 66a.** About 5 broad dark bars on body, bordered by distinct white lines; broad horizontal stripe on caudal peduncle; supraocular cirrus not banded. *Pterois radiata*
- 66b.** Numerous dark bars on body; thin diagonal bars on caudal peduncle; supraocular cirrus with alternating light and dark bands *Pterois antennata*
- 67a.** Lateral-line scales weakly ossified and barely roofing an otherwise open trough; bones of cranium relatively weakly ossified (subfamily *Setarchinae*) → **68**
- 67b.** Lateral-line scales forming relatively complete tubes, that are sometimes buried; bones of cranium strongly or moderately ossified → **71**
- 68a.** Anal fin with II spines; greatest body depth less than 28% of standard length; 2 or 3 spines immediately anterior to last dorsal-fin spine extremely small, sometimes covered by scales *Lioscorpius longiceps*
- 68b.** Anal fin with III spines; greatest body depth greater than 30% of standard length; 2 or 3 spines immediately anterior to last dorsal-fin spine small, but at least 1/5 length of last spine → **69**
- 69a.** Anteriormost lacrimal spine much shorter than posterior 2; anal fin with usually 6 ½ soft rays; eye relatively small with orbit diameter roughly 1/2 of interorbital width *Ectreposebastes imus*
- 69b.** Anteriormost lacrimal spine about as long as posterior 2; anal fin with usually 5 ½ soft rays; eye relatively large with orbit diameter roughly equal to interorbital width (*Setarches*) → **70**
- 70a.** Second preopercular spine nearly equal to or longer than uppermost (first) or third; interorbital width 7 to 9% standard length *Setarches guentheri*
- 70b.** Second preopercular spine reduced or absent, much shorter than uppermost (first) or third; interorbital width 9 to 12% standard length *Setarches longimanus*
- 71a.** Lateral line normal, continuing onto or near base of caudal fin, with 20 to 54 scales → **72**
- 71b.** Lateral line incomplete, continuing for short distance onto flank only, with 4 to 8 scales *Phenacoscorpius megalops*
- 72a.** Posterior lacrimal spine hooked forward (not pronounced in small juveniles) (*Parascorpaena*) → **73**
- 72b.** Posterior lacrimal spine absent or not hooked forward → **76**
- 73a.** Suborbital ridge with 3 spines or spinous points, first ventral to eye, second and third posterior to eye and close together; pectoral-fin rays usually 15 or 16 → **74**
- 73b.** Suborbital ridge with 2 spines or spinous points behind eye (no spinous point ventral to eye); pectoral-fin rays usually 17 or 18. → **75**
- 74a.** Spinous dorsal fin of males with a distinct black blotch, mostly between spines VIII to XI (females with smaller or no spot); supraocular cirrus usually small or absent; reddish in life, not strongly mottled with dark brown *Parascorpaena mcadamsi*
- 74b.** Spinous dorsal fin without black blotch in either sex; supraocular cirrus, when present, relatively large; mottled with dark brown; with 2 pale areas on caudal peduncle *Parascorpaena mossambica*

- 75a.** Interorbital ridges well developed from middle of eye posteriorly, joining to form a broad loop at rear of interorbit and enclosing a depression; depression at occiput fairly well marked; tympanic spines usually closer together than are postocular spines. *Parascorpaena aurita*
- 75b.** Interorbital ridges weakly or moderately developed, not joining to enclose a depression; depression at occiput shallow or of moderate depth; tympanic spines usually further apart than are postocular spines *Parascorpaena picta*

- 76a.** Scales on flank ctenoid, particularly above lateral line; head and body sometimes slightly compressed but not markedly so → **84**
- 76b.** Scales on flank cycloid or each reduced to form small spiny point and widely scattered on body; head and body strongly compressed, at times extremely so. → **77**

- 77a.** Scales reduced to small widely scattered points; body extremely compressed; dorsal fin without or with only weak notch anterior to last dorsal-fin spine. *Taenianotus triacanthus*
- 77b.** Scales cycloid; body notably compressed but not extremely so; dorsal fin with relatively pronounced notch immediately anterior to last dorsal-fin spine → **78**

- 78a.** Body not notably elevated, with body depth less than about 36% standard length *(Pteroidichthys)* → **83**
- 78b.** Body notably elevated, with body depth 38 to 54% standard length → **79**

- 78a.** Vertical scale rows 30 to 45 *Rhinopias filamentosa*
- 79b.** Vertical scale rows 65 to 80 → **80**

- 80a.** Pectoral fins with 15 or 16 rays; an ocellus or black spot on soft part of dorsal fin → **81**
- 80b.** Pectoral fins with 17 or 18 rays; no ocellus or black spot on soft part of dorsal fin → **82**

- 81a.** Head, body, and fins with round and oblong spots or blotches, with spots typically with pale centres and dark margins *Rhinopias frondosa*
- 81b.** Head, body, and fins with dark reticulations or intricate markings on a pale background *Rhinopias aphanes*

- 82a.** Third dorsal-fin spine about 16% standard length; mandibular cirri absent . . . *Rhinopias argoliba*
- 82b.** Third dorsal-fin spine about 24 to 36% standard length; mandibular cirri present . . *Rhinopias xenops*

- 83a.** Anal fin with II spines and 6 ½ soft rays *Pteroidichthys amboinensis*
- 83b.** Anal fin with III spines and 5 ½ soft rays *Pteroidichthys noronhai*

- 84a.** Third infraorbital bone (suborbital 2) inclined ventrally at an angle of about 30° to 45° and only narrowly connected to preopercle; dorsal-fin rays usually 11 ½, or more; ventral margin of lacrimal bone typically without spines or with weak spines. . . *Sebastiscus tertius*
- 84b.** Third infraorbital bone (suborbital 2) extends nearly straight posteriorly and relatively broadly connected to preopercle; ventral margin of lacrimal bone usually with numerous spines → **85**

- 85a.** Dorsal-fin spines XIII → **86**
- 85b.** Dorsal-fin spines XII → **100**

- 86a.** Teeth on palatines present → **87**
- 86b.** Teeth on palatines absent → **89**


- 87a.** Lengths of longest dorsal-fin spines (third or fourth) much shorter than body depth *Thysanichthys crossotus*
(presence in the area uncertain; reported from northeastern Taiwan Province of China)
- 87b.** Lengths of longest dorsal-fin spines (third or fourth) about equal to body depth → **88**
- 88a.** Mandibular foramina each leading to a single large opening *Neosebastes incispinnis*
- 88b.** Mandibular foramina each leading to numerous tiny perforations in membrane covering each foramen *Neosebastes entaxis*
(Taiwan Province of China, Western Australia; not yet recorded from the area)
- 89a.** Anal fin with II spines and 6 ½ or 7 ½ soft rays (occasionally with III spines and 5 ½ rays); first anal-fin spine rudimentary, about 20% length of second spine . . . *Hoplosebastes armatus*
(Japan, Hong Kong, Taiwan Province of China; not yet recorded from the area)
- 89b.** Anal fin with III spines and 5 ½ soft rays; first anal-fin spine about 50% length of second spine (*Scorpaenodes*) → **90**
- 90a.** Vertical scale row counts 70 to 75 *Scorpaenodes muciparus*
- 90b.** Vertical scale row counts 30 to 60 → **91**
- 91a.** Pectoral-fin rays 14 to 16, middle rays abruptly longer than those immediately above; nasal spine absent → **92**
- 91b.** Pectoral-fin rays 17 to 20, middle rays not abruptly longer than those immediately above, fin wedge-shaped; nasal spine present, although sometimes reduced → **93**
- 92a.** Dorsal-fin soft rays 9 ½; pectoral-fin rays usually 16; vertical scale rows more than 37 *Scorpaenodes albaiensis*
- 92b.** Dorsal-fin soft rays 8 ½; pectoral-fin rays 15 to 16 (usually 15); vertical scale rows less than 32 *Scorpaenodes minor*
- 93a.** A pronounced dark spot on subopercle; coronal and interorbital spines almost always present *Scorpaenodes littoralis*
- 93b.** No pronounced dark spot on subopercle; coronal and interorbital spines always or often absent → **94**
- 94a.** Vertical scale rows 29 to 35; dorsal-fin rays usually 8 ½ → **95**
- 94b.** Vertical scale rows 38 to 50; dorsal-fin rays usually 9 ½ → **96**
- 95a.** Pectoral-fin rays 17 or 18; usually 4 spines along suborbital ridge, a fifth spine on second infraorbital bone, below that in main line of suborbital ridge *Scorpaenodes hirsutus*
- 95b.** Pectoral-fin rays 18 to 20, usually 18 or 19; usually 3 spines along suborbital ridge, without small spine on lateral face of lacrimal bone and without small second spine on second infraorbital bone ventral to those along main suborbital ridge *Scorpaenodes kelloggi*
- 96a.** Five to 15 spines on suborbital ridge; numerous cirri on head and body . *Scorpaenodes parvipinnis*
- 96b.** Usually 3 spines on suborbital ridge; few or no cirri on head and body → **97**
- 97a.** A dark spot at rear of spinous portion of dorsal fin; a dark triangular mark at base of pectoral fins *Scorpaenodes varipinnis*
- 97b.** No dark spot at rear of spinous portion of dorsal fin; no dark triangular mark at base of pectoral fins → **98**
- 98a.** No large dark spot over opercle *Scorpaenodes smithi*
- 98b.** A large dark spot (sometimes diffuse) over opercle → **99**

- 99a.** Dark spot on opercle usually pronounced; fourth dorsal-fin spine relatively short, about 3 to 16% standard length; spine at posteroventral margin of lacrimal bone relatively weak, usually with a cirrus; body moderately blotched, particularly on dorsal and caudal fin *Scorpaenodes guamensis*
- 99b.** Dark spot on opercle usually diffuse; fourth dorsal-fin spine relatively long, about 13 to 20% standard length; spine at posteroventral margin of lacrimal bone relatively strong, usually without a cirrus; body moderately speckled *Scorpaenodes scaber*
- 100a.** Palatine teeth absent on roof of mouth → **101**
- 100b.** Palatine teeth present on roof of mouth → **114**
- 101a.** Black pigment between dorsal-fin spines I to III (or II and III); fourth dorsal-fin spine notably elongate relative to other spines in specimens larger than about 6 cm . *Iracundus signifer*
- 101b.** No black pigment between dorsal-fin spines I to III; fourth dorsal-fin spines not notably elongate relative to other spines → **102**
- 102a.** Suborbital ridge without spines or with a single spine at end of ridge, near preopercle *Scorpaenopsis fowleri*
- 102b.** Suborbital ridge with 3 to 5 spines → **103**
- 103a.** Second dorsal-fin spine 7 to 10% standard length; first dorsal-fin spine 4 to 6% standard length; head profile notably blunt and with orbit 7 to 10% standard length . . *Scorpaenopsis brevifrons*
- 103b.** Second dorsal-fin spine 11 to 18% standard length; first dorsal-fin spine 6 to 9% standard length; head profile relatively pointed or with orbit 12 to 15% standard length → **104**
- 104a.** Upper opercular spine usually ending in 3 or more points; about 30 to 35 vertical scale rows; orbit large, 12 to 15% standard length → **105**
- 104b.** Upper opercular spine ending in 1 or 2 points; more than 35 vertical scale rows; orbit moderate 7 to 11% standard length → **106**
- 105a.** Predorsal scales 4; predorsal length 39 to 43% standard length; third dorsal-fin spine 12 to 16% standard length *Scorpaenopsis iop*
(Japan; not yet recorded from the area)
- 105b.** Predorsal scales 5 or 6; predorsal length 46 or 47% standard length; third dorsal-fin spine 17 to 21% standard length *Scorpaenopsis cotticeps*
- 106a.** Body immediately behind head strongly elevated, giving dorsal profile of back a strongly humped appearance; mouth superior and strongly upturned; interorbit 10 to 12% standard length → **107**
- 106b.** Body immediately behind head elevated, but not strongly so; mouth terminal or superior but not strongly upturned; interorbit 6 to 8% standard length → **110**
- 107a.** Supraorbital spine ending in multiple spinous points *Scorpaenopsis neglecta*
- 107b.** Supraorbital spine ending in a single spinous point → **108**
- 108a.** Medial surface of pectoral fins with a dark subterminal band along entire margin of fin *Scorpaenopsis macrochir*
- 108b.** Medial surface of pectoral fins with a dark subterminal band incomplete or absent entirely → **109**



- 109a.**Ratio of orbit diameter to snout length 0.39 to 0.53; pectoral-fin rays 17 to 19, but usually 18; black subterminal band on medial (axial) surface of pectoral fins present along upper 1/2 or less of fin margin (absent in Hawaiian populations); pigment over proximal 1/2 of upper rays not distinct from that on axial, if present *Scorpaenopsis diabolus*
- 109b.**Ratio of orbit diameter to snout length 0.62 to 0.92; pectoral-fin rays 16 to 18, but usually 17; a black subterminal band on medial (axial) surface of pectoral fins extending slightly more than 1/2 of fin margin; a distinct large spot over proximal 1/3 of upper rays. *Scorpaenopsis gibbosa*
(Indian Ocean; not yet recorded from the area)
- 110a.**Pectoral-fin rays 19 or 20; vertical scale rows 60 to 68 *Scorpaenopsis oxycephala*
- 110b.**Pectoral-fin rays 15 to 19; vertical scale rows 35 to 61 (*Scorpaenopsis cirrhosa* occasionally with more than 60 and rarely 19 pectoral-fin rays) → 111
- 111a.**Pectoral-fin rays 16 or 17 (usually 17) → 112
- 111b.**Pectoral-fin rays 17 to 19 (usually 18 or 19) → 113
- 112a.**Vertical scale rows about 35 *Scorpaenopsis furneauxi*
- 112b.**Vertical scale rows 44 to 53 *Scorpaenopsis venosa*
- 113a.**Vertical scale rows 42 to 52; occipital pit relatively deep; snout relatively pointed *Scorpaenopsis papuensis*
- 113b.**Vertical scale rows 55 to 61; occipital pit relatively shallow; snout relatively rounded *Scorpaenopsis cirrhosa*
- 114a.**Occiput depressed, with at least a shallow pit, a deep pit in some species, never flat or convex; scales on pectoral-fin base reduced or absent; scales on breast cycloid, often notably reduced, or absent (*Scorpaena*) → 115
- 114b.**Occiput inclined, but flat or slightly convex, never concave; scales on breast ctenoid or cycloid, small, but never absent → 119
- 115a.**Scales on pectoral-fin base → 116
- 115b.**Scales absent on pectoral-fin base → 118
- 116a.**Coronal spines present *Scorpaena papillosus*
(New Zealand; not yet recorded from the area)
- 116b.**Coronal spines absent → 117
- 117a.**Pectoral-fin rays 16; vertical scale rows about 30; lateral-line scales about 33 *Scorpaena gibbifrons*
- 117b.**Pectoral-fin rays 17 or 18; vertical scale rows 64 to 67; lateral-line scales 24 to 26 *Scorpaena cookii*
- 118a.**Pectoral-fin rays 17; vertical scale rows 48 to 63 *Scorpaena cardinalis*
- 118b.**Pectoral-fin rays 19; vertical scale rows about 43 *Scorpaena hemilepidota*
- 119a.**All pectoral-fin rays simple; no slit behind last hemibranch *Pontinus rhodochrous*
- 119b.**At least some rays branched (need to observe carefully); a slit behind last hemibranch (except *N. bauchotae*, which does not occur in fishing area) → 120
- 120a.**Dorsal fin-rays 8 ½ to 10 ½, the last split to base; occiput convex (*Sebastapistes*) → 121
- 120b.**Dorsal fin-rays 9 ½ to 11 ½, the last split to base; occiput flat or nearly so → 126

- 121a.**Coronal spines present; pronounced dark blotch at rear of spinous portion of dorsal fin
 *Sebastapistes mauritiana*
- 121b.**Coronal spines absent; no dark blotch at rear of spinous portion of dorsal fin → 122
- 122a.**Lacrimal bone with 2 spines; a ridge anterior to lower opercular spine *Sebastapistes strongia*
- 122b.**Lacrimal bone with 3 to 5 spines; no ridge anterior to lower opercular spine → 123
- 123a.**Body and fins covered with numerous conspicuous small dark spots → 124
- 123b.**Body and fins without numerous dark spots; spots, when present, large and pale → 125
- 124a.**Lacrimal bone with 4 spines; vertical scale rows 50 to 55 *Sebastapistes conioria*
- 124b.**Lacrimal bone with 5 spines; vertical scale rows 44 to 49 *Sebastapistes tinkhami*
- 125a.**Cycloid or emarginate scales on flank; lacrimal bone with 2 spines *Sebastapistes galactacma*
- 125b.**Ctenoid scales on flank; lacrimal bone with usually 5 spines *Sebastapistes cyanostigma*
- 126a.**Vertebrae 25; posterior lacrimal spine relatively weak, pointing directly ventrally; caudal peduncle at base of caudal fin probably with scattered large melanophores . . . *Idiastion pacificum*
 (Kyushu-Palau Ridge; not yet recorded from the area)
- 126b.**Vertebrae 24; posterior lacrimal spine relatively strong, pointing posteroventrally; caudal peduncle at base of caudal fin without scattered large melanophores (*Neomerinthe*) → 127
- 127a.**Pectoral-fin rays usually 18; 3 spines on suborbital ridge; no spine on lateral face of lacrimal bone; 5 preopercular spines, with third from dorsalmost longest . . . *Neomerinthe rotunda*
- 127b.**Pectoral-fin rays usually 19; 4 spines on suborbital ridge; anteriormost on lateral face of lacrimal bone; 4 preopercular spines → 128
- 128a.**Fourth dorsal-fin spine longest; tip of lower jaw protruding just beyond tip of upper jaw
 *Neomerinthe megalepis*
- 128b.**Third dorsal-fin spine longest; jaws subequal → 129
- 129a.**Suborbital spine ventral to midorbit in line with ridges of succeeding spines
 *Neomerinthe amplisquamiceps*
- 129b.**Suborbital spine ventral to midorbit slightly below ridges of succeeding spines
 *Neomerinthe procurva*


List of species occurring in the area

The symbol  is given when species accounts are included. A question mark indicates that presence in the area is uncertain.






Subfamily APISTINAE

-  *Apistops caloundra* de Vis, 1885
-  *Apistus carinatus* (Bloch and Schneider, 1801)
- Cheroscorpaena tridactyla* Mees, 1964

Subfamily PLECTROGENINAE

-  *Plectrogenium nanum* Gilbert, 1905

Subfamily PTEROINAE

-  *Brachypterois serrulatus* (Richardson, 1846)
-  *Dendrochirus bellus* (Jordan and Hubbs, 1925)
-  *Dendrochirus biocellatus* (Fowler, 1938)
-  *Dendrochirus brachypterus* (Cuvier, 1829)
-  *Dendrochirus zebra* (Quoy and Gaimard, 1824)

? *Ebosia bleekeri* (Döderlein, 1884)

✦ *Parapterois heterurus* (Bleeker, 1856)

✦ *Pterois antennata* (Bloch, 1787)

✦ *Pterois lunulata* Temminck and Schlegel, 1842

✦ *Pterois miles* (Bennett, 1828)

✦ *Pterois mombasae* (Smith, 1957)

✦ *Pterois radiata* Cuvier, 1829

✦ *Pterois russellii* Bennett 1831

✦ *Pterois volitans* (Linnaeus, 1758)

Subfamily SCORPAENINAE

? *Idiastion pacificum* Ishida and Amaoka, 1992

✦ *Iracundus signifer* Jordan and Evermann, 1903

✦ *Neomerinthe amplisquamiceps* (Fowler, 1938)

✦ *Neomerinthe megalepis* (Fowler, 1938)

✦ *Neomerinthe procurva* Chen, 1981

✦ *Neomerinthe rotunda* Chen, 1981

Parascorpaena aurita (Rüppell, 1838)

✦ *Parascorpaena mcadamsi* (Fowler, 1938)

✦ *Parascorpaena mossambica* (Peters, 1855)

✦ *Parascorpaena picta* (Kuhl and Van Hasselt in Cuvier 1829)

✦ *Phenacoscorpius megalops* Fowler, 1938

Pontinus rhodochrous (Günther, 1871)

Pteroidichthys amboinensis Bleeker, 1856

Pteroidichthys noronhai (Fowler, 1938)

✦ *Rhinopias aphanes* Eschmeyer, 1973

Rhinopias argoliba Eschmeyer, Hirotsuki, and Abe, 1973

Rhinopias filamentosa (Fowler, 1938)

✦ *Rhinopias frondosa* (Günther, 1891)

Rhinopias xenops (Gilbert, 1905)

✦ *Scorpaena cardinalis* Richardson, 1842

✦ ? *Scorpaena cookii* Günther, 1873

✦ *Scorpaena gibbifrons* Fowler, 1938

✦ *Scorpaena hemilepidota* Fowler, 1938

✦ *Scorpaenodes albaiensis* (Evermann and Seale, 1907)

✦ *Scorpaenodes hirsutus* (Smith, 1957)

✦ *Scorpaenodes guamensis* (Quoy and Gaimard, 1824)

✦ *Scorpaenodes kelloggi* (Jenkins, 1903)

✦ *Scorpaenodes littoralis* (Tanaka, 1917)

✦ *Scorpaenodes minor* (Smith, 1958)

Scorpaenodes muciparus (Alcock, 1889)

✦ *Scorpaenodes parvipinnis* (Garrett, 1864)

✦ *Scorpaenodes scaber* (Ramsey and Ogilby, 1885)

Scorpaenodes smithi Eschmeyer and Rama Rao, 1972

✦ *Scorpaenodes varipinnis* Smith, 1957

Scorpaenopsella armata Fowler, 1938^{1/}

✦ *Scorpaenopsis brevifrons* Eschmeyer and Randall, 1975

✦ *Scorpaenopsis cirrhosa* (Thunberg, 1793)

✦ *Scorpaenopsis cotticeps* Fowler, 1938

✦ *Scorpaenopsis diabolus* (Cuvier, 1829)

✦ *Scorpaenopsis fowleri* (Pietschmann, 1934)

^{1/} Known from a single specimen taken at Sombero Island, between Balayan Bay and Verde Island Passage in the Philippines. Not included in the identification key.

- Scorpaenopsis furneauxi* Whitley, 1959
 ? *Scorpaenopsis gibbosa* (Bloch and Schneider, 1801)
 ✦ *Scorpaenopsis macrochir* Ogilby, 1910
Scorpaenopsis neglecta (Heckel, 1840)
 ✦ *Scorpaenopsis oxycephala* Bleeker, 1849
Scorpaenopsis papuensis (Cuvier, 1829)
 ✦ *Scorpaenopsis venosa* (Cuvier, 1829)
Sebastapistes coniora Jenkins, 1903
 ✦ *Sebastapistes cyanostigma* (Bleeker, 1856)
 ✦ *Sebastapistes galactacma* Jenkins, 1903
 ✦ *Sebastapistes mauritiana* (Cuvier, 1829)
 ✦ *Sebastapistes strongia* (Cuvier, 1829)
 ✦ *Sebastapistes tinkhami* (Fowler, 1946)
 ✦ *Taenianotus triacanthus* Lacepède, 1802

Subfamily NEOSEBASTINAE

Neosebastes incispinnis Ogilby, 1910

Subfamily SEBASTINAE

- ? *Sebastes inermis* Cuvier, 1829^{2/}
 ? *Sebastes joyneri* Günther, 1878^{2/}
 ? *Sebastes pachycephalus* Temminck and Schlegel, 1843^{2/}
 ? *Sebastes albofasciatus* Lacepède, 1801^{2/}
 ? *Sebastes marmoratus* Cuvier, 1829^{2/}
 ✦ *Sebastes tertius* Barsukov and Chen, 1978

Subfamily SETARCHINAE

- ✦ *Ectreposebastes imus* Garman, 1899
 ✦ *Lioscorpius longiceps* Günther, 1880
 ✦ *Setarches guentheri* Johnson, 1862
 ✦ *Setarches longimanus* (Alcock, 1894)

Subfamily SYNANCEIINAE

- ✦ *Choridactylus multibarbus* Richardson, 1848
 ✦ *Erosa erosa* Langsdorf, 1829
 ? *Erosa daruma* (Whitley, 1932)
Inimicus brachyrhynchus (Bleeker, 1874)
 ✦ *Inimicus caledonicus* (Sauvage, 1875)
 ✦ *Inimicus cuvieri* (Grey, 1835)
 ✦ *Inimicus didactylus* (Pallas, 1769)
Inimicus filamentosus (Cuvier, 1829)
Inimicus gruzovi Mandritsa, 1991
Inimicus japonicus (Cuvier, 1829)
Inimicus joubini (Chevy, 1927)
 ✦ *Inimicus sinensis* (Valenciennes, 1833)
Inimicus smirnovi Mandritsa, 1990
 ✦ *Leptosynanceia asteroblepa* (Richardson, 1848)
Minous coccineus Alcock, 1890
 ✦ *Minous monodactylus* (Bloch and Schneider, 1801)
Minous pictus Günther, 1880
 ✦ *Minous pusillus* Temminck and Schlegel, 1843
Minous quincarinatus (Fowler, 1943)
 ✦ *Minous trachycephalus* (Bleeker, 1854)
 ✦ *Minous versicolor* Ogilby, 1910

^{2/} Reported from the Mariana Islands, but based on records that are unconfirmed and likely erroneous. Not included in the identification key.

Synanceia alula Eschmeyer and Rama Rao, 1973

✚ *Synanceia horrida* (Linnaeus, 1766)

✚ *Synanceia verrucosa* Bloch and Schneider, 1801

✚ *Trachicephalus uranoscopus* (Bloch and Schneider, 1801)

Subfamily TETRAROGINAE

Ablabys macracanthus Bleeker, 1857

✚ *Ablabys taenianotus* (Cuvier, 1829)

✚ *Centropogon australis* (White, 1790)

Centropogon marmoratus Günther, 1862

✚ *Cottapistus cottoides* (Linnaeus, 1758)

✚ *Liocranium praepositum* Ogilby, 1904

Neocentropogon affinis (Lloyd, 1909)

✚ *Neocentropogon trimaculatus* Chan, 1965

✚ *Notesthes robusta* (Günther, 1860)

✚ *Ocosia apia* Poss and Eschmeyer, 1975

? *Ocosia spinosa* Chen, 1981

✚ *Ocosia zaspilota* Poss and Eschmeyer, 1975

✚ *Paracentropogon longispinis* (Cuvier, 1829)

Paracentropogon vespa Ogilby, 1910^{3/}

Paracentropogon zonatus (Weber, 1913)^{4/}

✚ *Richardsonichthys leucogaster* (Richardson, 1848)

? *Snyderina yamanokami* Jordan and Starks, 1901^{5/}

✚ *Tetraroge barbata* (Cuvier, 1829)

✚ *Tetraroge niger* (Cuvier, 1829)

✚ *Vespacula cypho* (Fowler, 1938)

✚ *Vespacula depressifrons* Richardson, 1848

✚ *Vespacula trachinoides* (Cuvier, 1829)

Vespacula zollingeri (Bleeker, 1848)

References

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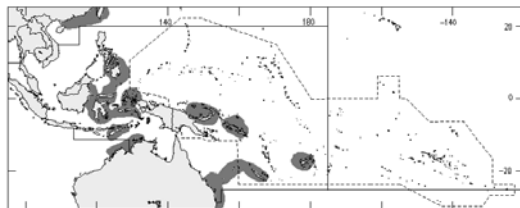
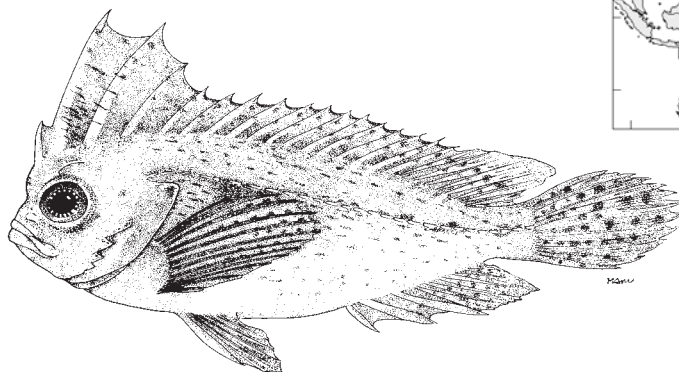
^{3/} Not included in the identification key. The differences between this species and *Paracentropogon longispinnis* are uncertain.

^{4/} Known only from 2 syntypes from the Sulu or Postillon Island, Philippines.

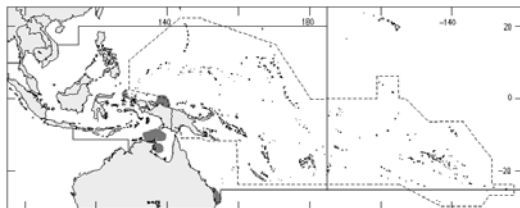
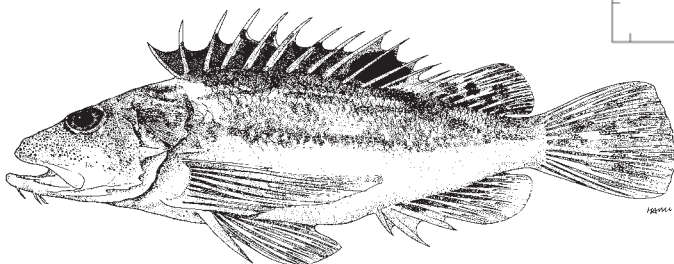
^{5/} Based on a single record from Indonesia that may not be this species.

Ablabys taenianotus (Cuvier, 1829)**En** - Cockatoo waspfish.

Maximum standard length 10.7 cm. Among seaweeds in rocky intertidal or littoral habitats to depths of nearly 80 m. Rocks back and forth in response to surge and can be easily caught with small hand nets. Of no importance to fisheries, but of interest to the aquarium trade because of its intriguing appearance. Widely distributed in the western Pacific from Japan in the north, to Australia and Fiji in the south. Found along the Asian mainland, the Philippines, throughout the Indonesian Archipelago, and westward to the Solomons and Fiji, but does not reach more oceanic islands of the area. Outside the area, known from India, the Andaman Islands, Taiwan Province of China, Japan, and Western Australia. Originally described from a specimen said to be taken at Mauritius, but this needs further confirmation.

***Apistops caloundra*** (de Vis, 1885)**En** - Shortspined waspfish.

Maximum standard length 8.8 cm. Taken in muddy and silty areas and near river mouths. Known to partially bury itself in the soft substrate. Caught in shrimp trawls, but of no commercial importance. Care should be exercised when removing this species from nets. Known from the Gulf of Carpentaria, near Groote Eylandt eastward to Caloundra, Queensland and taken from Jayapura, Irian Jaya.

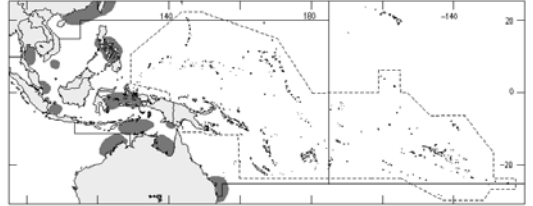
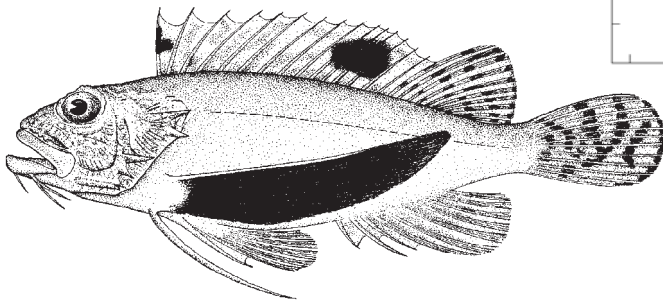


(after Sainsbury, Kailola, and Leyland, 1985)

Apistus carinatus (Bloch and Schneider, 1801)

En - Ocellated waspfish; **Fr** - Rascasse ocellée; **Sp** - Rascacio ocelado.

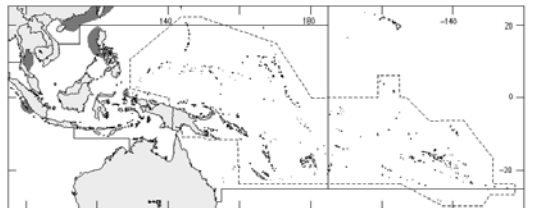
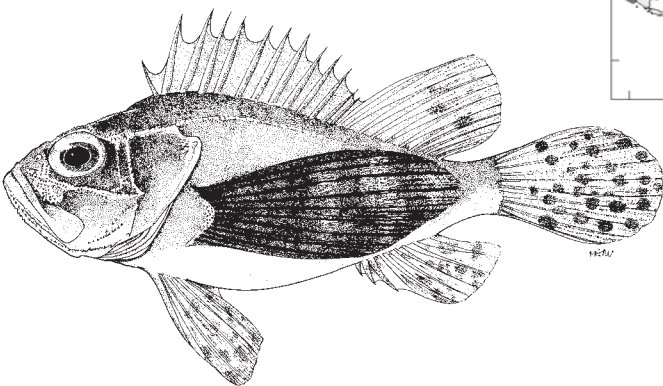
Maximum standard length 12.5 cm. Taken over fine sand in depths of 21 to 60 m, particularly in bays. Quite common in trawls and utilized as a food fish in local markets, despite its venomous nature. Extreme caution should be exercised in handling this species, as wounds from its fin spines can be painful. A widespread species, occurring from the mouth of the Umblanga River in South Africa and the Eilat and Massawa in the Red Sea in the west, to Japan, the Philippines, and Australia in the east. In the area, reported from the Sunda-Mollucas Archipelago, the Malay Archipelago, Indonesia, the Philippines (Cavite and Luzon), New Guinea (Merauke), Western Australia (Kimberly Region), Timor and Arafura seas, and Gulf of Carpentaria, to just south of the area at Ballina, New South Wales; also known from China and Taiwan Province of China.



Brachyterois serrulatus (Richardson, 1846)

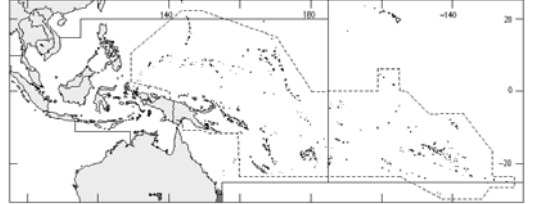
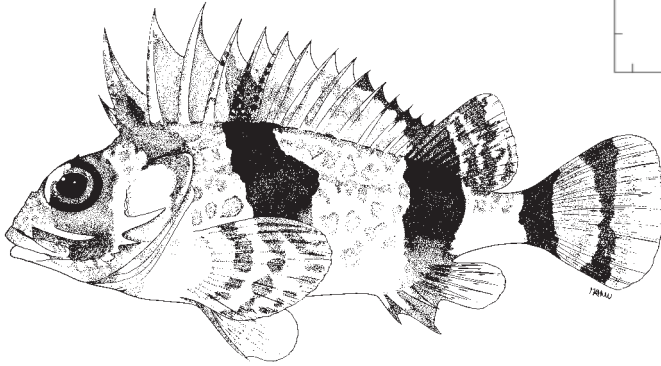
En - Sawcheek scorpionfish.

Maximum standard length about 11.5 cm. A little-known species, occasionally found in trawls and collected to a depth of 82 m. Of no interest to fisheries, because of its small size and venomous nature. In the north of the area, known from the western coast of Luzon and Thailand; outside the area, reported from Japan, Taiwan Province of China, southern China, Western Australia, India, and the Red Sea.

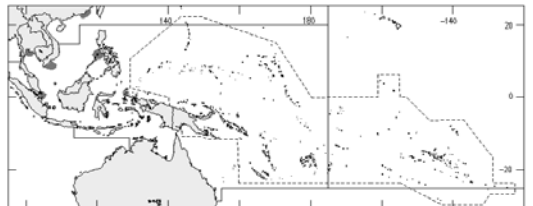
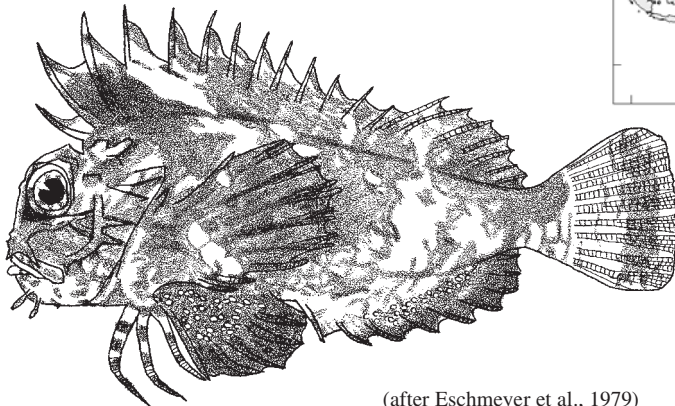


Centropogon australis* (White, 1790)*En** - Fortesque.

Maximum standard length at least 8.1 cm. Extremely common in estuaries, particularly in the reproductive season in the austral Spring. Although of no commercial importance, commonly entrapped in fishing gear, such as trawls, and can be dangerous to fishermen who attempt to remove them. Just enters the south of the area, reaching Dunwich, Moreton Bay, in southern Queensland; found south of the area along the Australian coast to southern New South Wales; reports of this species in Melanesia are erroneous.

***Choridactylus multibarbus* Richardson, 1848****En** - Threefinger scorpionfish.

Maximum standard length at least 10.3 cm. A highly venomous species, occasionally taken in coastal waters and tidal inlets. Although consumed only in subsistence fisheries and of little commercial value, it represents a danger to fishermen in areas where it occurs. Widely distributed, known from the Red Sea, eastward through the Persian Gulf, Pakistan, and India to the Gulf of Thailand, China, and the Philippines.

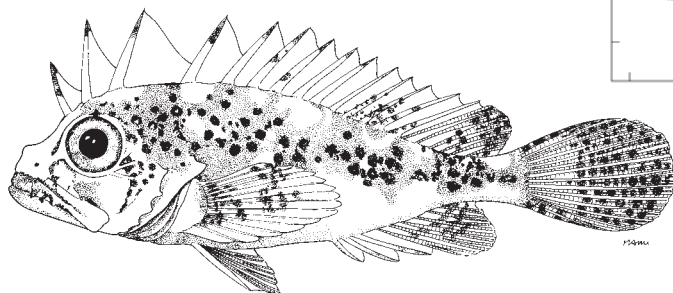


(after Eschmeyer et al., 1979)

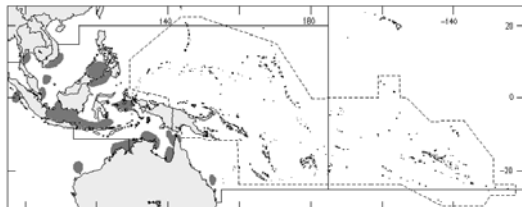
***Cottapistus cottoides* (Linnaeus, 1758)**

En - Yellow waspfish.

Maximum standard length at least 9.2 cm. Over moderately soft bottoms, from less than a metre to a depth of 24 m. This species can be common in shrimp trawls. Care must be taken when removing it from nets as it is highly venomous. Commonly taken in China, Viet Nam, Thailand, Singapore, Java, Flores, Kei Islands, Borneo, the Dampier Archipelago, New Guinea, northwestern Australia, the Gulf of Carpentaria, and the east coast of Queensland south to Bowen; not yet reported from the Philippines, except at Jolo.



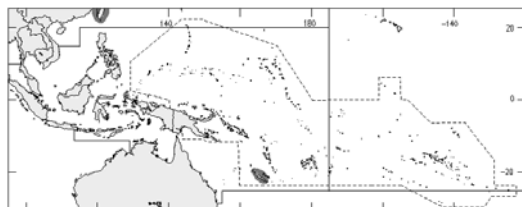
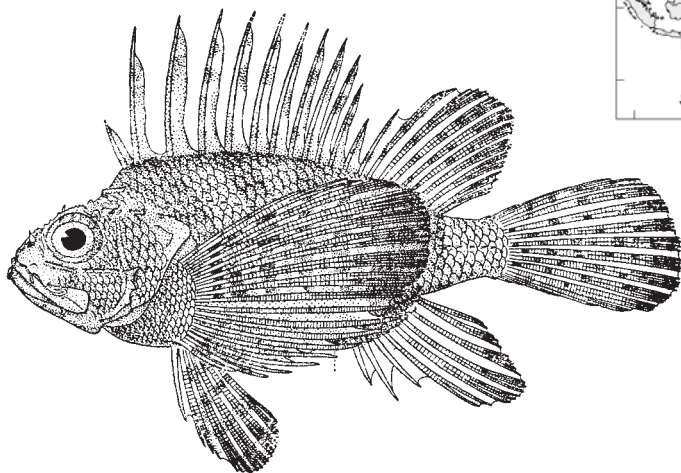
(after Weber and de Beaufort, 1962)



***Dendrochirus bellus* (Jordan and Hubbs, 1925)**

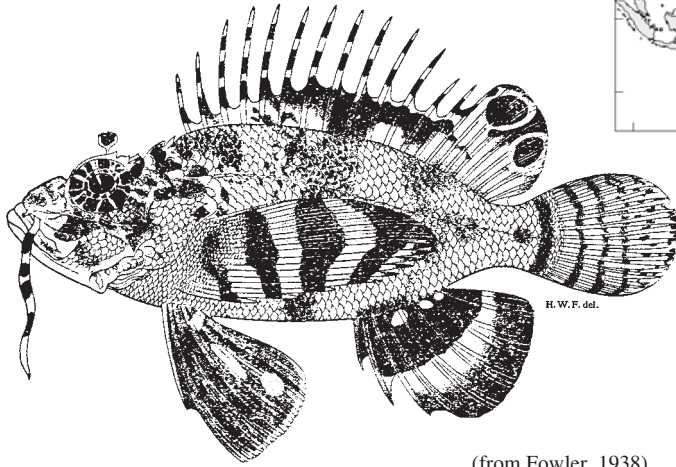
En - Butterfly scorpionfish.

Maximum standard length 15 cm. A rare food fish; when taken, it is caught on sandy-mud or gravel bottoms at depths of 15 to 200 m. Common in the rocky littoral and sublittoral zones of northern Taiwan Province of China. Also reported from New Caledonia, but better known from Taiwanese and Japanese waters; likely has a broader distribution than presently reported.

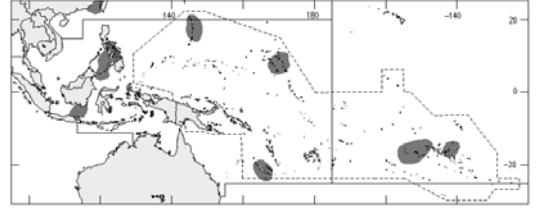


Dendrochirus biocellatus* (Fowler, 1938)*En** - Twinspot lionfish.

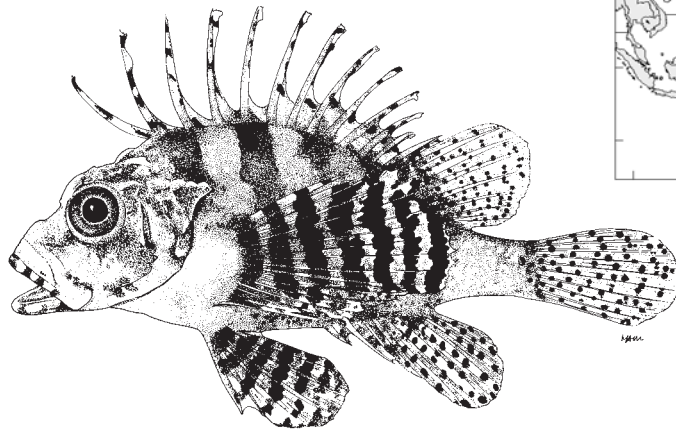
Maximum standard length 12 cm. A little-known species, without importance to fisheries. Found in rocky littoral and sublittoral areas, which may account for its infrequent capture. Although only occasionally collected, it has a broad distribution, from South Africa and Mauritius in the west to the Tuamotu Archipelago in the east; reported from Jolo and the Sulu Islands, near the southern Philippines, New Caledonia, and as rare in Taiwan Province of China and the Ryukyu Islands.



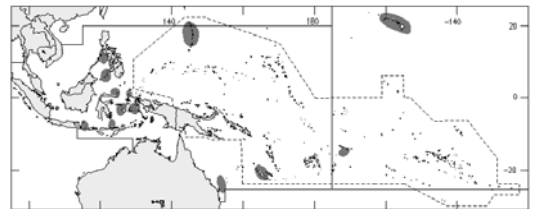
(from Fowler, 1938)

***Dendrochirus brachypterus* (Cuvier, 1829)****En** - Dwarf lionfish.

Maximum standard length at least 15 cm; possibly to 25 cm. Commonly caught at depths of 32 to 80 m. Crepuscular or nocturnal in habit, remaining inactive by day. Highly venomous, but frequently used as food in subsistence fisheries. A common and widespread species, ranging from the Red Sea and South Africa to the Philippines, Samoa, and Hawaii. In the south of the area, likely abundant throughout all of Indonesia, but becoming less common on the Great Barrier Reef and on the eastern Australian coast.



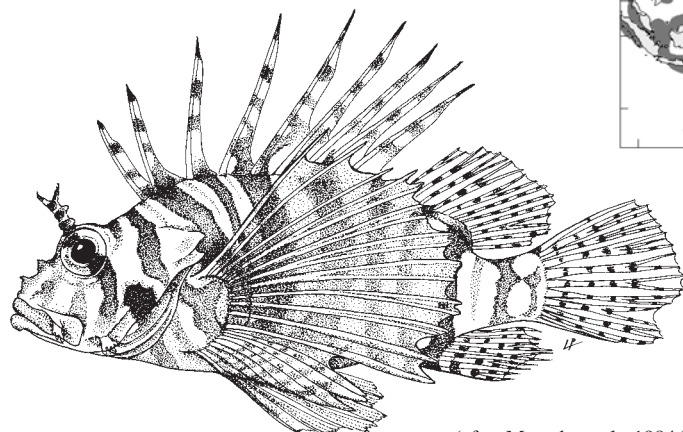
(after Smith and Heemstra, 1986)



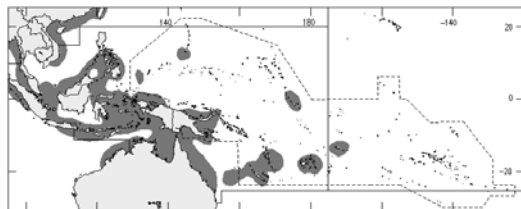
Dendrochirus zebra (Cuvier, 1829)

En - Zebra lionfish.

Maximum standard length about 20 cm. Common in lagoons and outer reef slopes among corals, as well as rocky littoral and sublittoral areas to depths of about 73 m. Very common in the area, and ranging widely beyond it; known from South Africa, Madagascar, the Red Sea, India, and Sri Lanka in the west, to the Philippines, Palau, Guam, Apia, Fiji, and Samoa in the east; commonly reported in Australia and southern Japan.



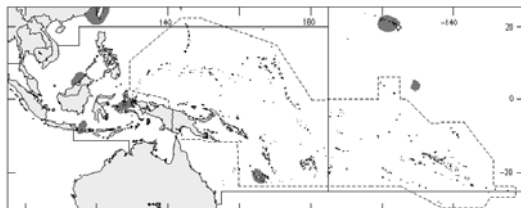
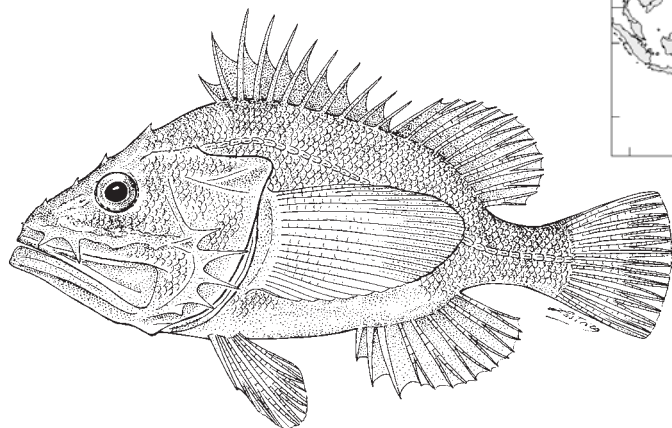
(after Masuda et al., 1984)



Ectreposebastes imus Garman, 1899

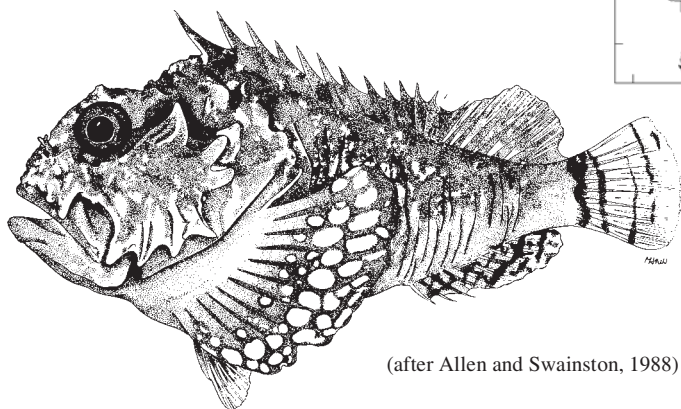
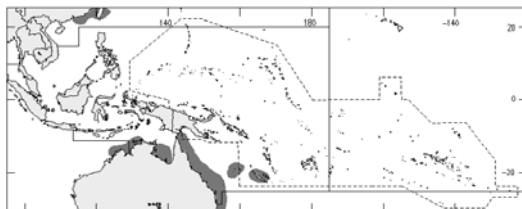
En - Black scorpionfish.

Maximum standard length 17 cm. Occurs at considerable depths; taken in trawls and midwater nets from 150 to 800 m. Although catchable by commercial gear, this small species is not sufficiently abundant to have potential for fisheries. Within the area, reported only from off Bali, Indonesia, and off New Caledonia; also known from Taiwan Province of China, Hawaii, and nearly circumglobal in tropical and subtropical waters of the Atlantic and Pacific Oceans; additional records in the area can be expected.



Erosa erosa (Langsdorf, 1829)**En** - Daruma stinger.

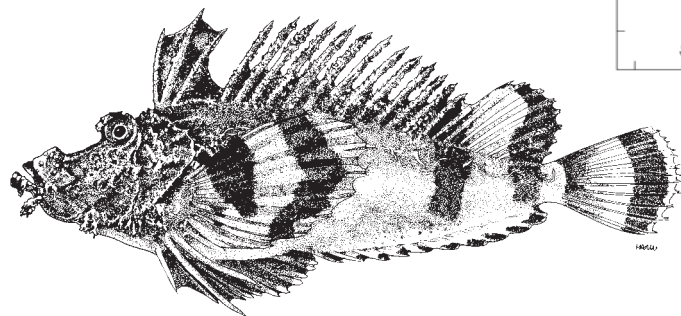
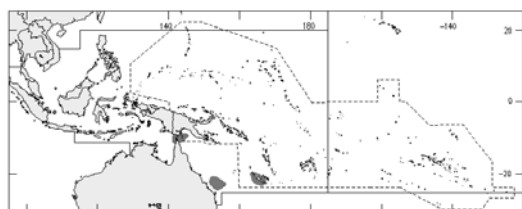
Maximum standard length 14 cm. A common food fish in Japan, but seldom eaten elsewhere, either because it is infrequently encountered, or perhaps due to its grotesque appearance. Occurs in depths of 60 to 85 m at Chesterfield Bank, but more frequently seen in shallow waters of southern Japan, Taiwan Province of China, and Australia. Common in Australia, where it is taken as far south as New South Wales; also reported from New Caledonia and Chesterfield Bank, but records from the Indonesian Archipelago do not exist.



(after Allen and Swainston, 1988)

Inimicus caledonicus (Sauvage, 1875)**En** - Caledonian stinger.

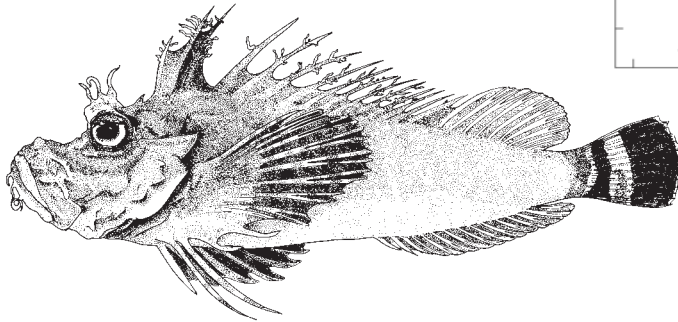
Maximum standard length 17 cm. This species can be found on sandy bottoms in depths of 15 to 60 m. In the area, reported from New Caledonia and Queensland. Known to range westward to the Nicobar and Andaman Islands.



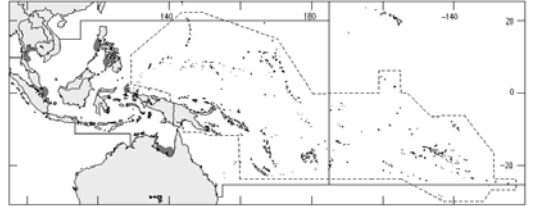
(after Day, 1875)

Inimicus cuvieri (Grey, 1835)**En** - Longsnout stinger.

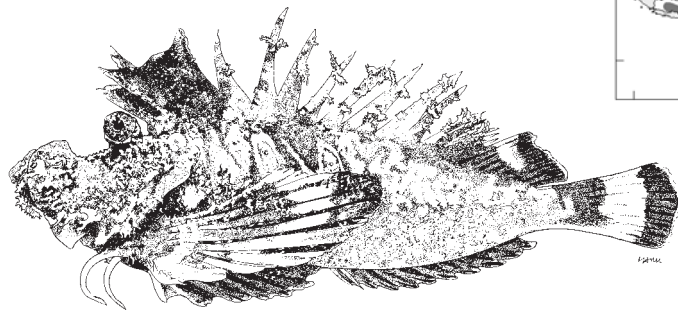
Maximum standard length 19.5 cm. Common over sandy or muddy-sand bottoms at depths of 1 to 50 m. Occasionally consumed in subsistence fisheries despite its grotesque appearance and venomosity. Appears to have a restricted range, from the South China Sea, Gulf of Thailand, Singapore, Java, Bali, and Sarawak.



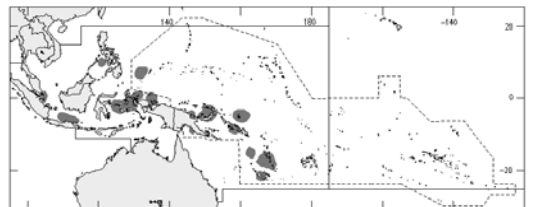
(after Eschmeyer, Rama-Rao, and Hallacher, 1979)

***Inimicus didactylus*** (Pallas, 1769)**En** - Bearded ghoulfish.

Maximum standard length 14.3 cm. Like other species of the genus, *Inimicus didactylus* occurs over sandy and sandy-mud bottoms from inshore to a depth of about 80 m, where it can be numerous. Used for food throughout its range in subsistence fisheries, but a significant fishery for species of *Inimicus* only occurs in Japan, where *I. japonicus* is cultured as well as caught in the wild. Study of additional materials may show *I. gruzovi* and *I. smirnovi* to be synonyms. Widely distributed in the area, ranging from the Ryukyu Islands southward through China, Viet Nam, Thailand, Singapore, Indonesia, New Guinea, Northern Territories and Queensland, the Solomon Islands, Chesterfield Bank, New Caledonia, and Vanuatu.

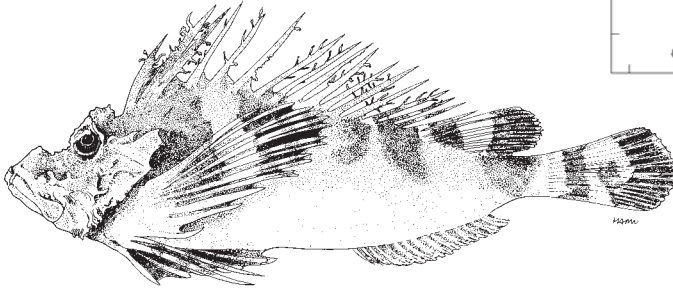


(after Eschmeyer, Rama-Rao, and Hallacher, 1979)

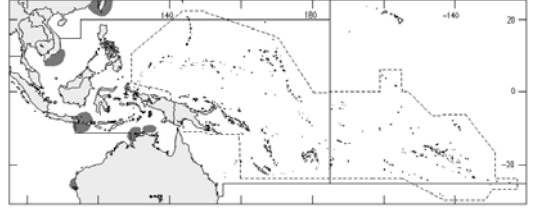


Inimicus sinensis (Valenciennes, 1833)**En** - Spotted stonefish.

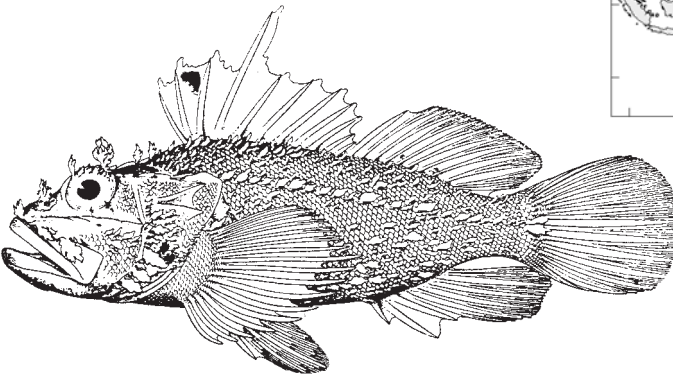
Maximum standard length 15 cm. This dangerous species is frequently taken in trawls over soft, sandy bottoms. Although likely consumed as food in subsistence fisheries, no significant commercial market exists for it. Known from southern China and Viet Nam, southward through Java and Bali to Shark Bay, Western Australia; some records are known from the west coast of Luzon; outside the area, taken in Sri Lanka and the southeast coast of India.



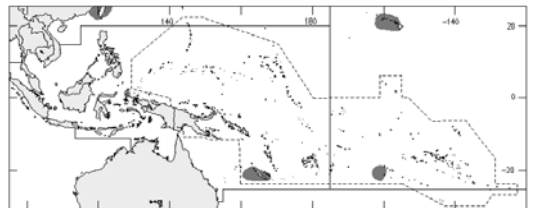
(after Eschmeyer, Rama-Rao, and Hallacher, 1979)

***Iracundus signifer*** Jordan and Evermann, 1903**En** - Decoy scorpionfish.

Maximum standard length 11 cm. Found on coral reefs or nearby sandy bottoms to depths of about 10 to 70 m. Moves the dorsal fin to a lure and captures small fishes. Although probably good eating, no fishery exists for this uncommon species. Known within the area from New Caledonia and Chesterfield Bank; outside the area, reported from Iriomote-jima in the southern Ryukyus, Taiwan Province of China, Hawaii, Raratonga, and South Africa. Future collecting will undoubtedly document its presence at many Indo-Pacific localities.



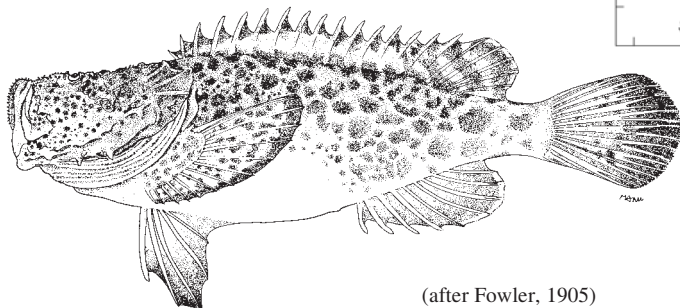
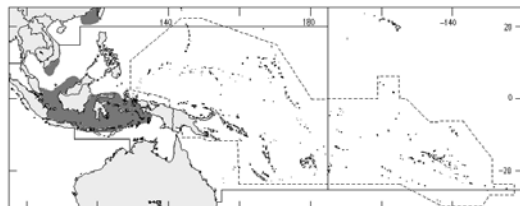
(from Jordan and Evermann, 1903)



***Leptosynanceia asteroblepa* (Richardson, 1848)**

En - Stareyed stonefish.

Maximum standard length reported as 11.7 cm. Occurs in estuaries and may tolerate fresh water. Dangerous to fishermen and typically thrown overboard, although edible. Distribution relatively limited; found off Hong Kong, Viet Nam, Sumatra, Indonesia, Borneo, Sarawak, and New Guinea.

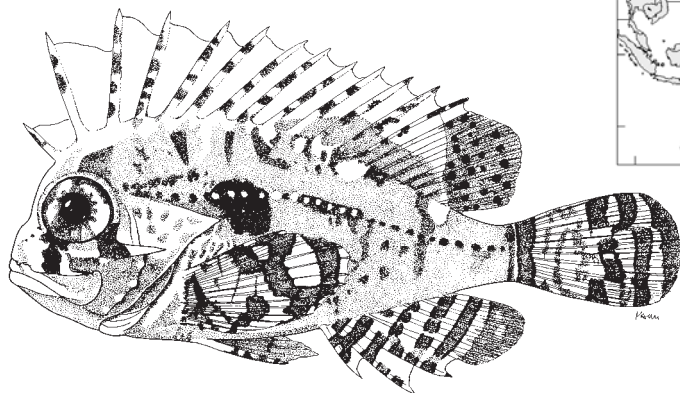
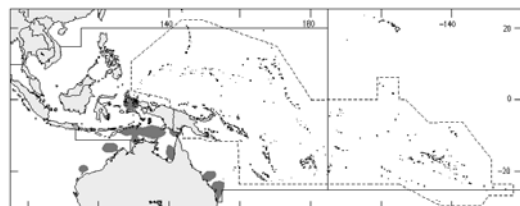


(after Fowler, 1905)

***Liocranium praepositum* Ogilby, 1904**

En - Blackspot waspfish.

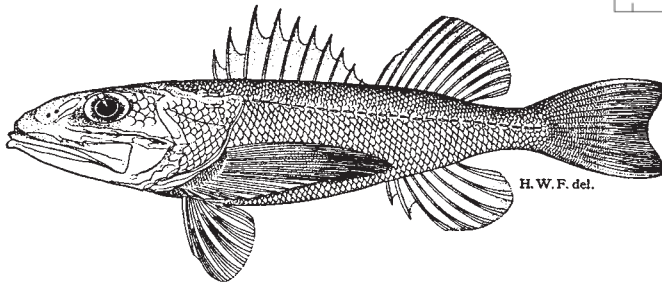
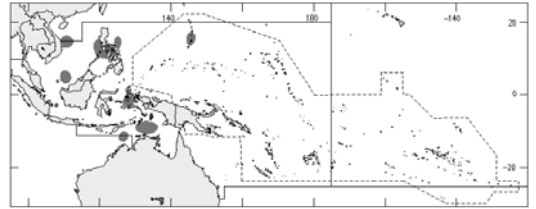
Maximum standard length 10.7 cm. Little is known of the biology of this species, which is not infrequently taken in trawls at depths of about 12 to 65 m. It is highly venomous and can inflict a painful wound. Found along the northern coast of Australia from Exmouth Gulf to Port Curtis, Queensland; also known from New Guinea, between Misol and Salawatti.



(after Weber and de Beaufort, 1962)

Lioscorpius longiceps* Günther, 1880*En** - Slender scorpionfish.

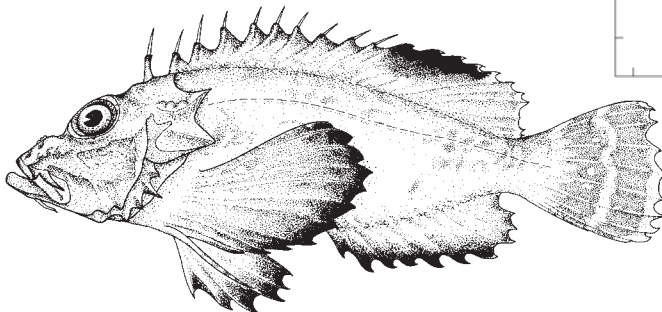
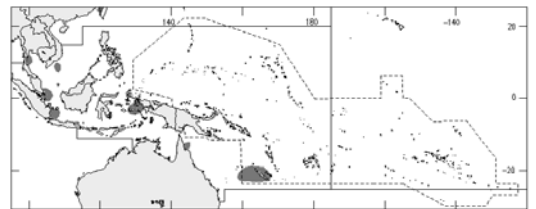
Maximum standard length 13.5 cm. Infrequently taken in trawls at considerable depths (256 to 402 m). Apparently does not occur in large quantities and is not of large enough size to be of importance to fisheries. Known from southern Japan, Saipan, through the South China Sea and into the Arafura Sea; also recorded in the Philippines from the vicinity of northern Mindanao and the Kei Islands.



(from Fowler, 1938)

Minous monodactylus* (Bloch and Schneider, 1801)*En** - Grey goblinfish.

Maximum standard length 8.6 cm. Frequently taken in trawls, but of no interest to fisheries. Caution should be exercised when removing this species from nets. Ranges broadly from South Africa and the Red Sea to New Caledonia; occurs in southern Japan and China southward into the Indonesian Archipelago; apparently absent in Australia and the Philippines.

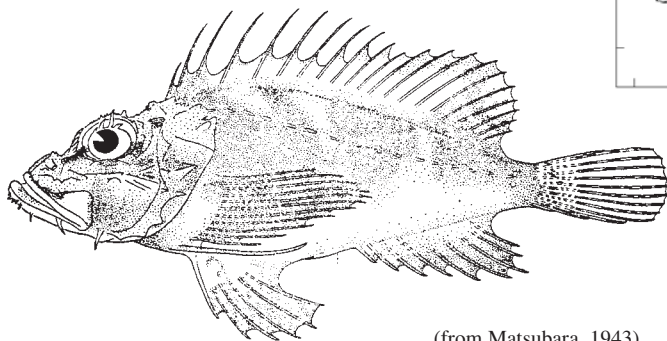
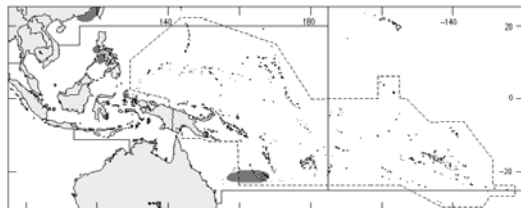


(after Eschmeyer et al., 1979)

Minous pusillus Temminck and Schlegel, 1843

En - Dwarf stingfish.

Maximum standard length 5.8 cm; matures at about 4.5 cm total length. Over soft bottoms, taken at depths of 30 to 110 m. Frequently covered with hydroids, like several other species of *Minous*. Found in southern Japan, south to Hong Kong, the Philippines, and New Caledonia.

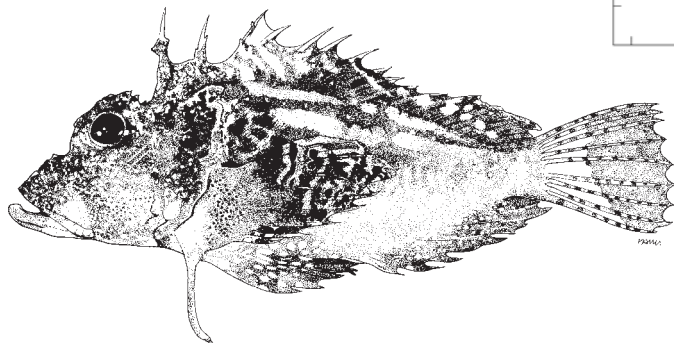
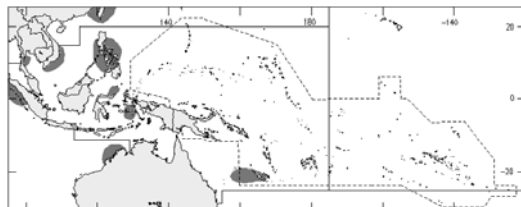


(from Matsubara, 1943)

Minous trachycephalus (Bleeker, 1854)

En - Striped stingfish.

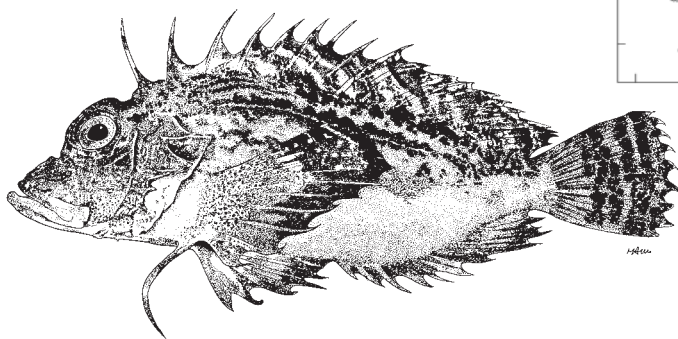
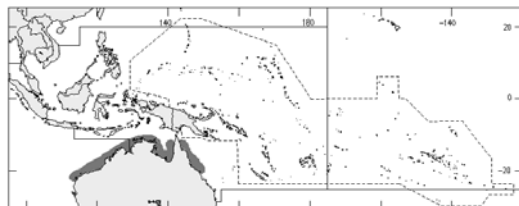
Maximum standard length 5.5 cm. Over soft bottoms, between depths of 11 and 46 m. Occurs from Taiwan Province of China southward through Viet Nam and the Philippines into the Indonesian Archipelago; reported from New Caledonia and from northwestern Australia, just outside the area; listed also from the Red Sea, but this is likely based on a misidentification of *Minous coccineus*.



(after Sainsbury, Kailola, and Leyland, 1985)

Minous versicolor Ogilby, 1910**En** - Plumbstriped stingfish.

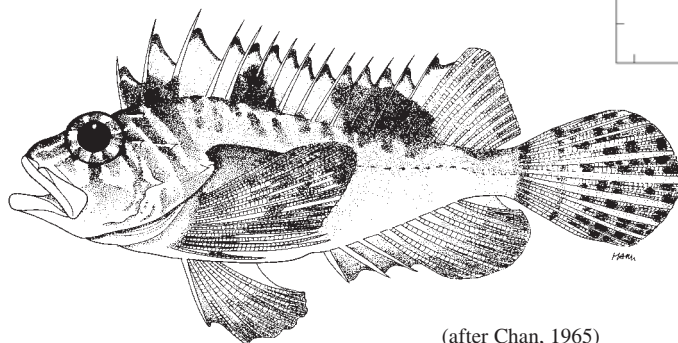
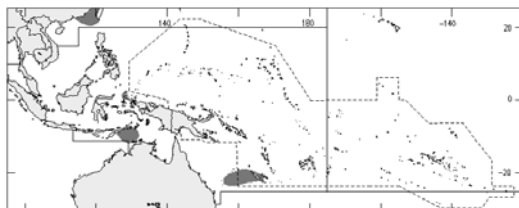
Maximum standard length 8.4 cm. Commonly taken in shrimp trawls in northern Australia between depths of 12 to 64 m. Its sting can be painful and it should be removed from nets with caution. Known only from the northwestern Australian shelf eastward to Cape Gloucester, Queensland.



(after Sainsbury, Kailola, and Leyland, 1985)

Neocentropogon trimaculatus Chan, 1965**En** - Threespotted waspfish.

Maximum standard length at least 81 cm, but larger records should be expected. A rare but dangerous species. Of little importance to fisheries, but may appear in deeper trawls (depth range 203 to 225 m). Known from the South China Sea, off the northwestern Shelf of Australia, at Chesterfield Bank, and New Caledonia.

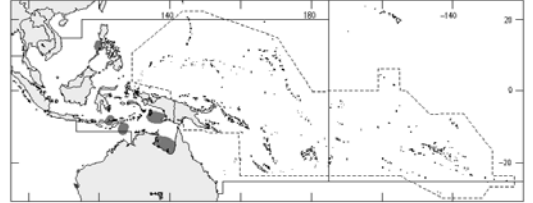
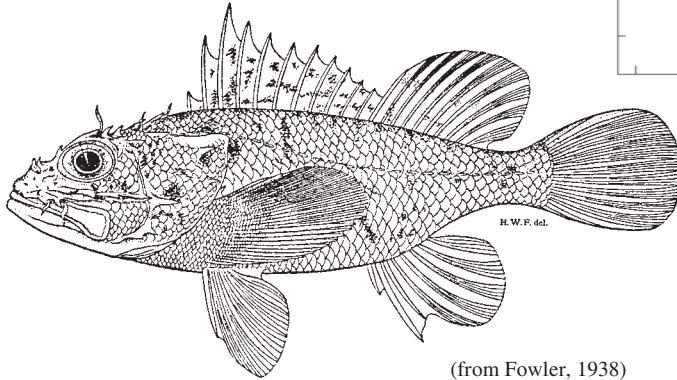


(after Chan, 1965)

***Neomerinthe amplisquamiceps* (Fowler, 1938)**

En - Orange scorpionfish.

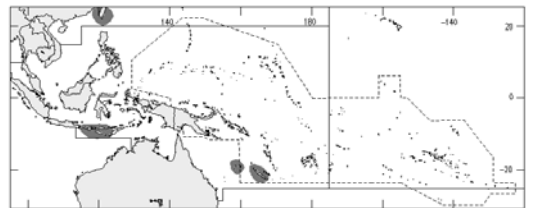
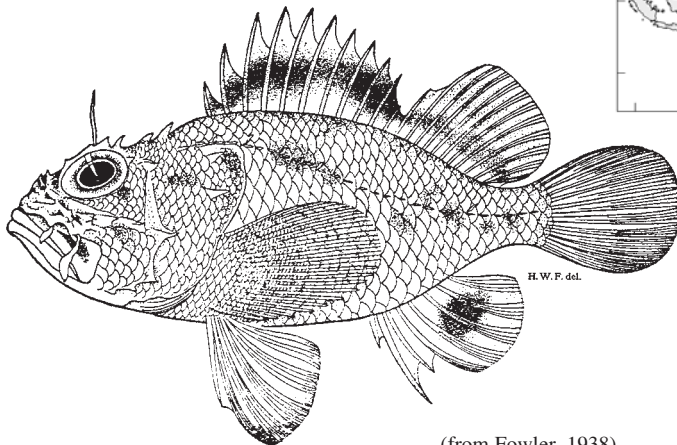
Maximum standard length 15.2 cm. Found at depths of 183 to 294 m. A small species of no commercial importance. Reported from the Philippines and northwestern Australia. Additional study may prove it to be the senior synonym of *Neomerinthe procurva*.



***Neomerinthe megalepis* (Fowler, 1938)**

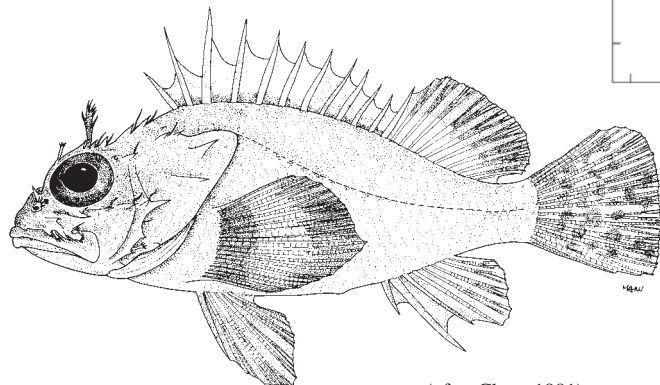
En - Bigscale scorpionfish.

Maximum standard length 9.9 cm. A little-known species, taken at depths of about 62 to 82 m. Of no importance to fisheries. In the area, known only from the South China Sea at 21°54'N, and 114°46'E, and from the Philippines; also reported from Taiwan Province of China.

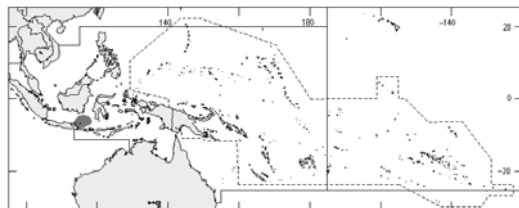


Neomerinthe procurva* Chen, 1981*En** - Curvedspine scorpionfish.

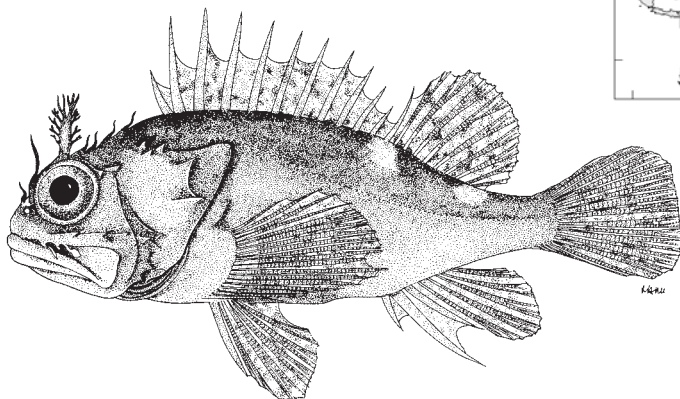
Maximum standard length at least 14.1 cm. A little-known species; data on its depth range are unavailable. Evidently, it can be common where it occurs, but probably not in sufficient numbers to support a significant fishery; possibly taken in subsistence fisheries within the area. Occurs off Taiwan Province of China and off Indonesia at 09°01'S, 116°18'E. Further study may prove it to be a junior synonym of *Neomerinthe amplisquamiceps*.



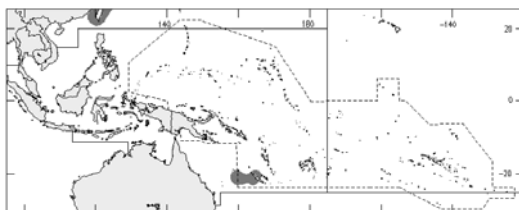
(after Chen, 1981)

***Neomerinthe rotunda* Chen, 1981****En** - Round scorpionfish.

Maximum standard length 9.4 cm. Biology largely unknown; occurs at depths of 225 to 295 m. Unlikely to form the basis of an important fishery. At present known only from the western margin of the area, at Chesterfield Bank and New Caledonia, and outside the area in Taiwan Province of China.



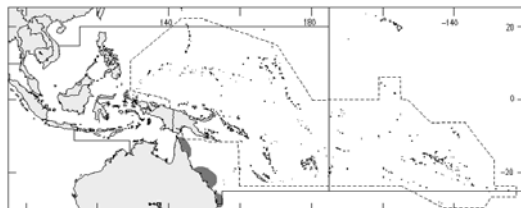
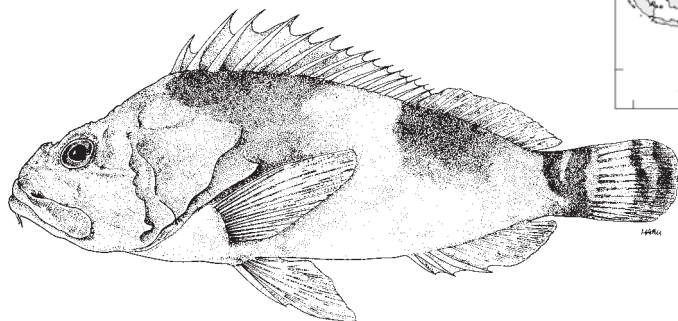
(after Chen, 1981)



***Notesthes robusta* (Günther, 1860)**

En - Bullrout.

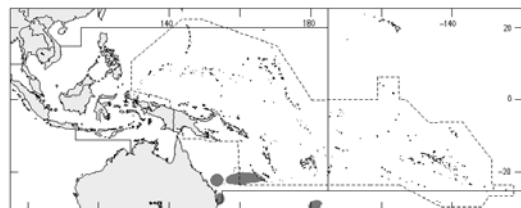
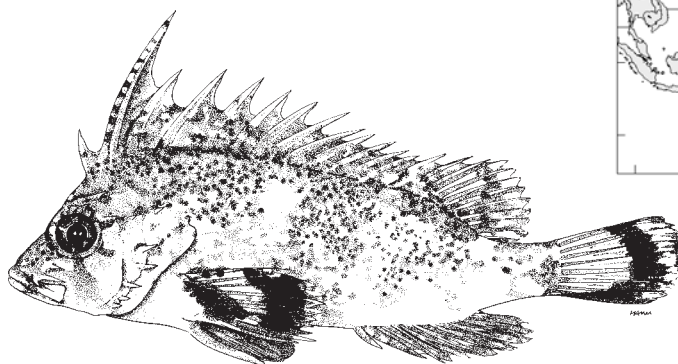
Maximum standard length 22.9 cm. Primarily restricted to fresh water and upper estuarine localities. Can be taken by seines or by hook-and-line. Considerable care should be exercised when handling this species. Although it can be used for food, it is generally avoided due to its formidable appearance and because of the extremely venomous spines. Common in the coastal rivers and estuaries of northeast and southeast coastal Queensland and northern New South Wales to the Shoalhaven River; also reported from southern Papua New Guinea, but unconfirmed.



***Ocosia apia* Poss and Eschmeyer, 1975**

En - Stoutspine waspfish.

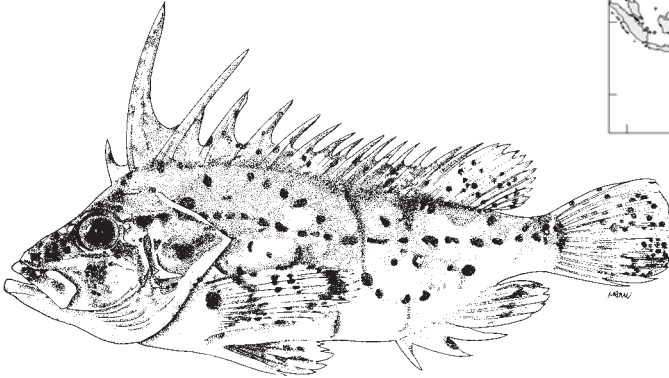
Maximum standard length at least 5.3 cm. Taken in trawls at depths of 225 to 350 m. Of no commercial importance. Within the area, reported at Chesterfield Bank; previously known from the Kermadec Islands to the southeast (29°15'S, 177°57'W).



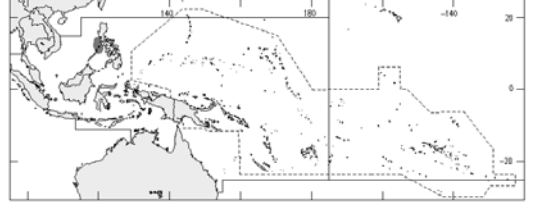
(after Poss and Eschmeyer, 1975)

Ocosia zaspilota* Poss and Eschmeyer, 1975*En** - Polka dot waspfish.

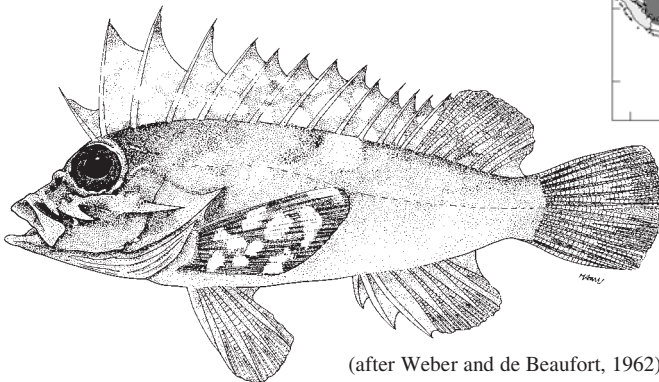
Maximum standard length 7 cm. This small species has been trawled over moderately muddy bottoms from depths of 192 to 247 m. Of no commercial importance, but potentially dangerous to fishermen. To date, known only from the vicinity of Balayan Bay in Luzon, Philippines.



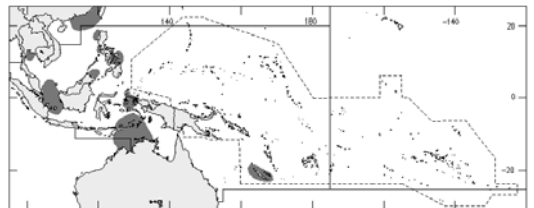
(after Poss and Eschmeyer, 1975)

***Paracentropogon longispinis* (Cuvier, 1829)****En** - Whiteface waspfish.

Maximum standard length 8 cm. A venomous species that should be handled with caution, found inshore down to nearly 70 m, on and around corals and hard bottoms. Of little importance to fisheries, but often taken in nets and by hand lines. Some colour patterns are characteristic of a given region. For example, specimens from the Gulf of Thailand almost always have large blotches over the body, while those from Indonesia and Australia generally have less solid markings. Although these various colour patterns may suggest that specimens identified here as *Paracentropogon longispinis* belong to a species complex, limited information on live coloration exists and some intermediate colour patterns are observed. Further study may show *P. vespa* Ogilby, 1910 to be a synonym. This species has been seen to alter its colour from light to dark in captivity. Known throughout the western Pacific from Taiwan Province of China and southern China southward through Indonesia, the Philippines, to New Caledonia; occurs west of the area to southern India.

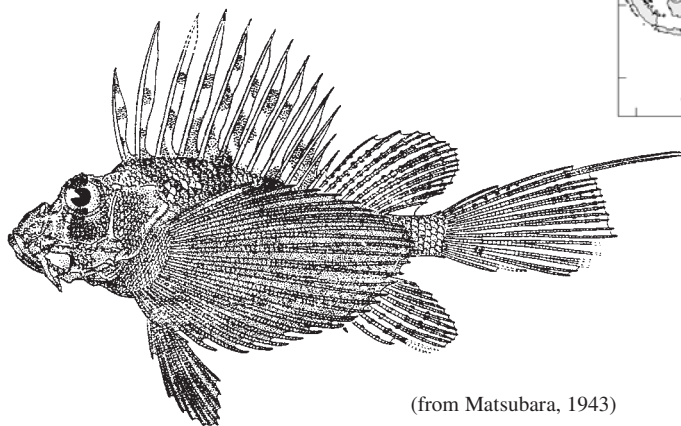


(after Weber and de Beaufort, 1962)

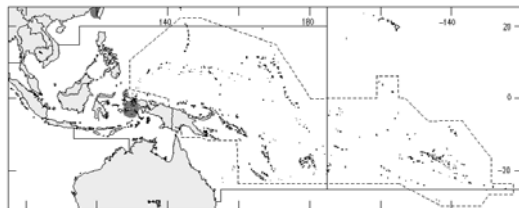


Parapterois heterurus (Bleeker, 1856)**En** - Blackfooted firefish.

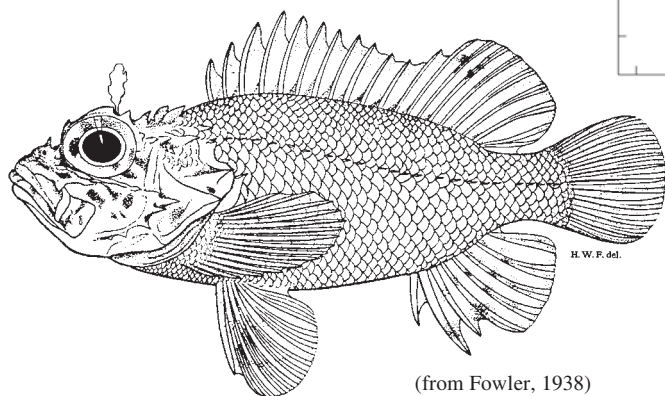
Maximum standard length 25 cm. Occasionally appears in trawls over soft bottoms at depths of 40 to 300 m. Too infrequently taken to be of importance to fisheries, but can force trawl fishermen to handle their catch with greater caution. Reported within the area at Amboina; more commonly taken in southern Japan and Taiwan Province of China and is also known from South Africa.



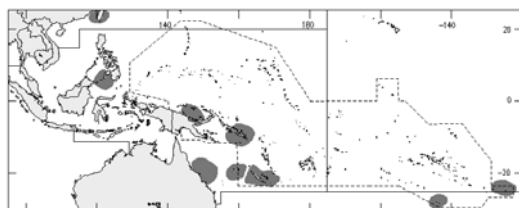
(from Matsubara, 1943)

***Parascorpaena mcadamsi*** (Fowler, 1938)**En** - Ocellated scorpionfish.

Maximum standard length 6 cm. A small relatively uncommon, reef-dwelling or shallow rocky-bottom inhabiting species of minor commercial value, but occasionally seen in subsistence fisheries. Found from near shore in lagoons to outer reef slopes to depths of 37 m. Widely ranging, like other species of *Parascorpaena*, and known from South Africa to the southern Philippines (at Jolo), to Taiwan Province of China and Queensland, Guadalcanal in the Solomon Islands, Chesterfield Islands, New Caledonia, and Rapa. *Scorpaena moultoni* is a probable junior synonym.

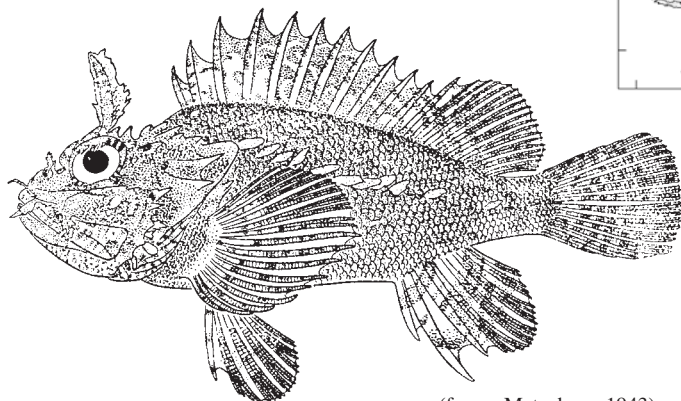
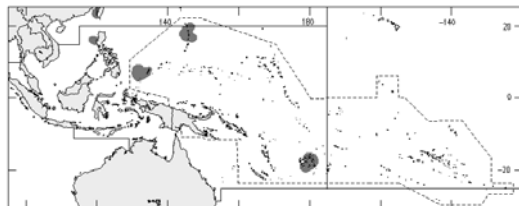


(from Fowler, 1938)



Parascorpaena mossambica (Peters, 1855)**En** - Mozambique scorpionfish.

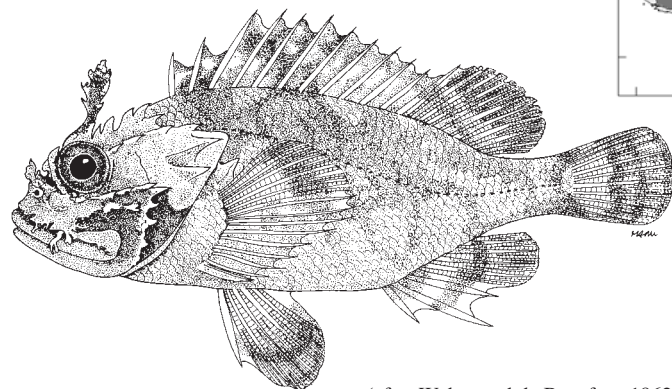
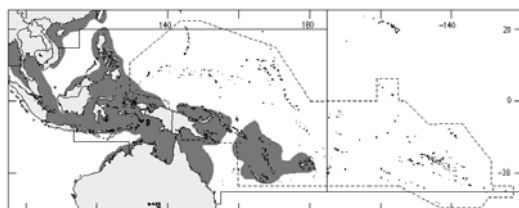
Maximum standard length 10 cm. Occupies inshore rocky areas and can be abundant. Although this species makes its way into local markets and is consumed as food, no significant fisheries exists for it, due to its small size. Widely distributed, occurring from South Africa and the Red Sea to the Ryukyu and Palau Islands and eastward to the Society Islands.



(from Matsubara, 1943)

Parascorpaena picta (Kuhl and Van Hasselt in Cuvier 1829)**En** - Painted scorpionfish.

Maximum standard length 17 cm. Quite common in nearshore waters on reefs and over rocky bottoms. Utilized as food, but does not form the basis of a significant fishery. Distributed from Sri Lanka to Fiji.

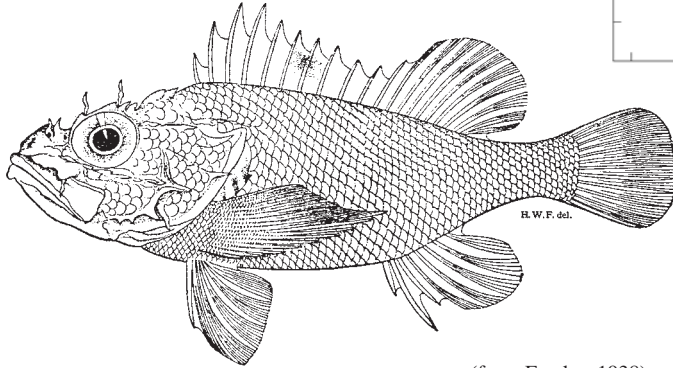


(after Weber and de Beaufort, 1962)

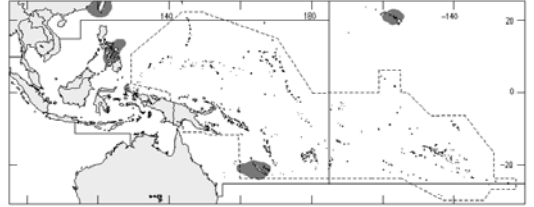
***Phenacoscorpius megalops* Fowler, 1938**

En - Noline scorpionfish.

Maximum standard length 5.1 cm. Infrequently trawled at considerable depths (66 to 622 m) over coralline rubble bottoms. Too small and rarely caught to be of commercial importance. Known from the Philippines, Indonesia, Taiwan Province of China, Hawaii, and New Zealand.



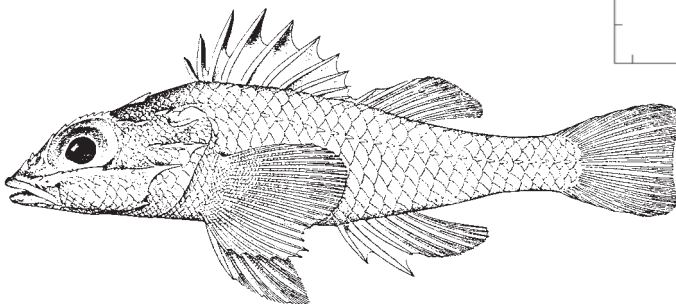
(from Fowler, 1938)



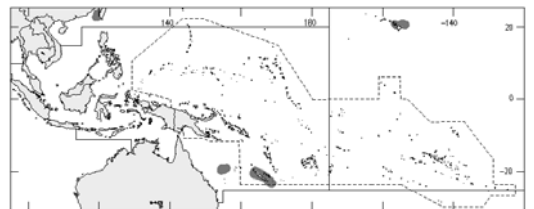
***Plectrogenium nanum* Gilbert, 1905**

En - Dwarf thronyhead.

Maximum standard length 7.7 cm. Only found at depths of 274 to 600 m, with peak abundance off Hawaii, occurring at depths of 300 to 450 m. This species does not support a fishery, but can be very common where it occurs. Currently known from Madagascar, southern Japan, Taiwan Province of China, New Caledonia, the Kermadec Islands, and New Zealand. Southern populations may represent a distinct species.

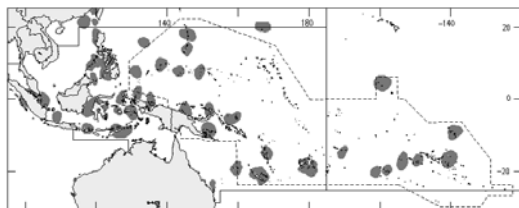
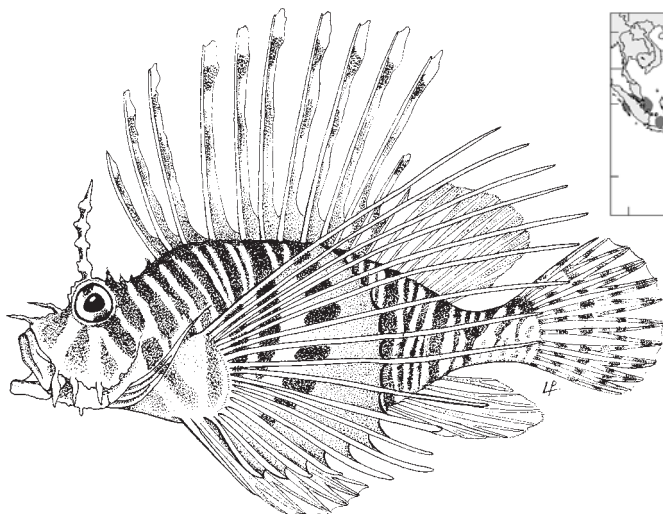


(adopted from Gilbert, 1905)

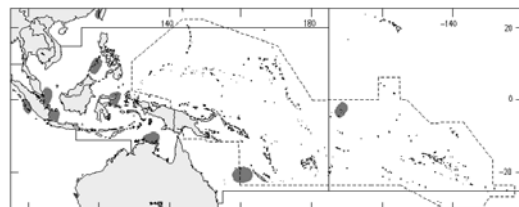
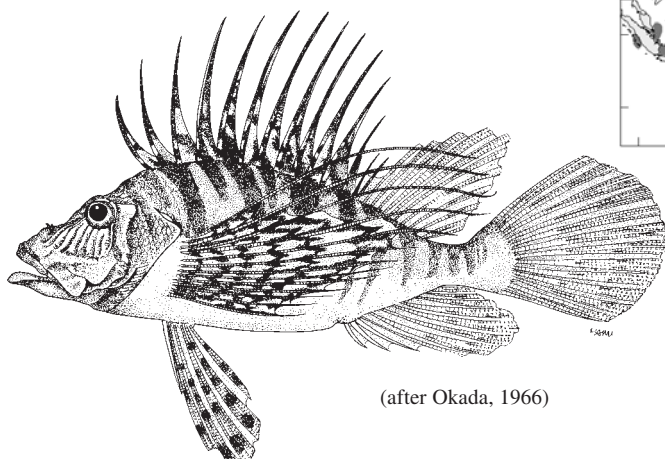


Pterois antennata (Bloch, 1787)**En** - Broadbared lionfish.

Maximum standard length 14 cm. Found in lagoons and on outer reef slope habitats down to depths of 76 m. Like most lionfishes, living in crevices and holes by day and ventures out over the surface of reefs at night to forage on shrimps and crabs. Common in the area and consumed as food in subsistence fisheries, but nowhere supports large scale food fisheries due to its dangerous spines and small size. Commonly collected for the aquarium trade. A common, wide-ranging species; reported from off South Africa and the Red Sea eastward to through Indonesia and adjoining parts of the area to Queensland, New Caledonia, Guam, the Solomon Islands, and onward to southern Japan, the Kermadec Islands, and the Marquesas and Mangareva.

***Pterois lunulata*** Temminck and Schlegel, 1842**En** - Dragon's beard fish.

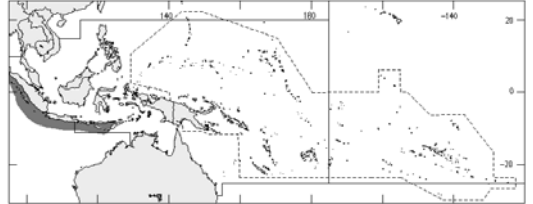
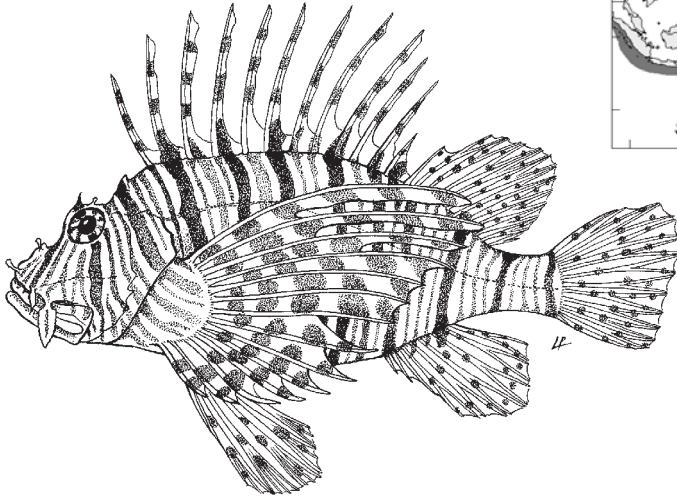
Maximum standard length 30 cm. This venomous species is utilized as food and the dorsal-fin spines are removed by fishermen when marketed. May prove to be conspecific with *Pterois russellii*. Additional study of the individual variation in these species, particularly of colour pattern, is needed. Distributed throughout the western Pacific Ocean from southern Hokkaido and Korea, southward through China, Taiwan Province of China, Indonesia, northern Australia, Queensland, and Caledonia.



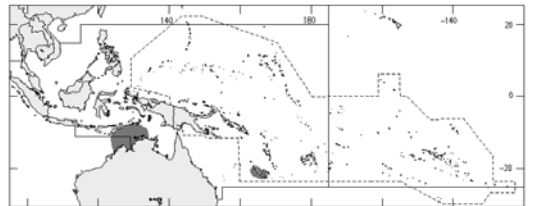
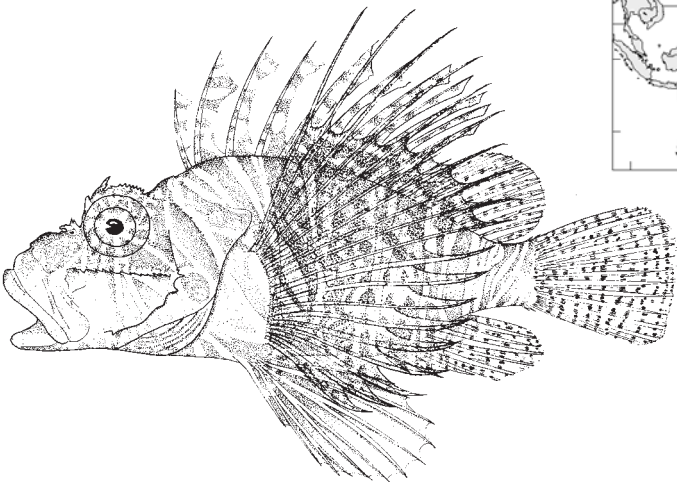
(after Okada, 1966)

Pterois miles (Bennett, 1828)**En** - Devil firefish; **Fr** - Poisson volant.

Maximum standard length 25 cm. Frequently misidentified as *Pterois volitans*. This species will direct spines toward an intruder if annoyed. Numerous fatalities have resulted from stings of this species and its close relative *P. volitans*, and it should be treated with extreme caution. Used for human consumption in subsistence fisheries and frequently finds its way into the aquarium trade. Hardy and easily reared, but dangerous and voracious. Primarily ranges outside the area throughout the Indian Ocean, but also recorded from the westernmost regions of Indonesia and northwestern Australia.

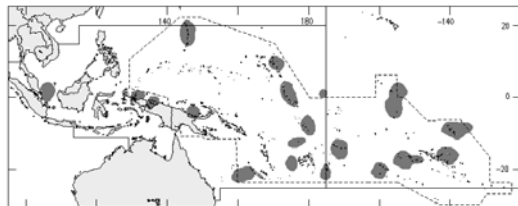
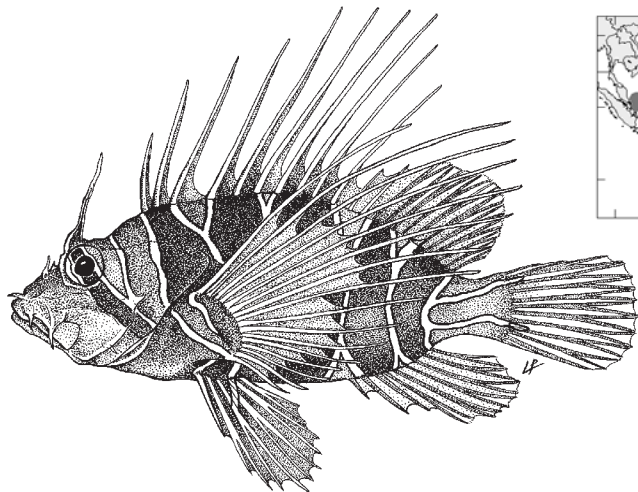
***Pterois mombasae*** (Smith, 1957)**En** - Deepwater firefish.

Maximum standard length 16 cm. Apparently occurs on deeper reefs. Of no commercial importance but should be handled cautiously when taken to avoid its highly venomous spines. Ranges from South Africa eastward into the area in Indonesia and northwestern Australia.

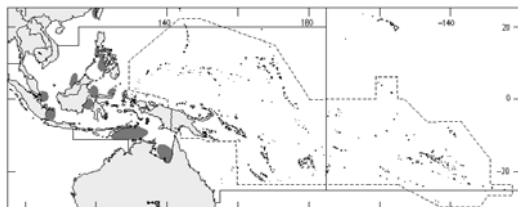
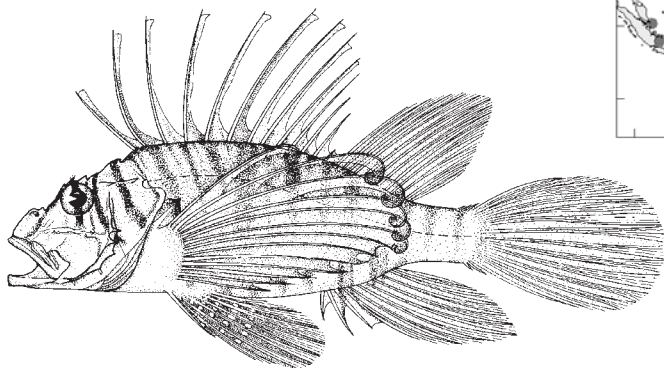


Pterois radiata* Cuvier, 1829*En** - Radial firefish.

Maximum standard length 10 cm. Common in rock areas and coral reefs. Like other species of *Pterois*, it is extremely venomous and should be handled with caution. Of importance as food only in subsistence fisheries, but forms an important component of the aquarium trade. A wide-ranging species, taken from South African and the Red Sea eastward to the Tuamotou Archipelago, northward to Japan and southward to southern Queensland.

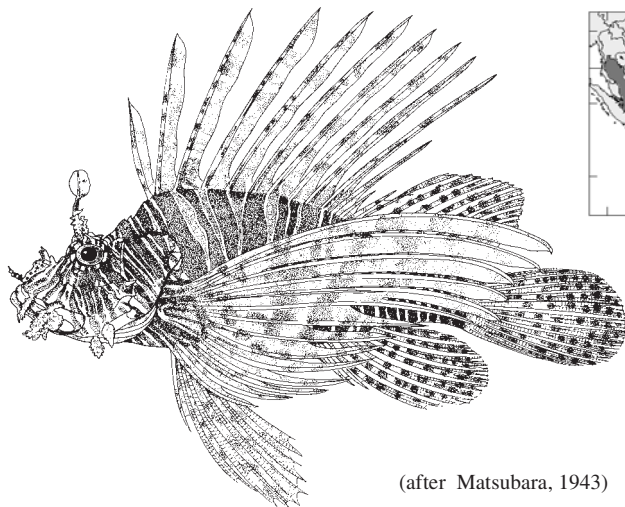
***Pterois russellii* Bennett, 1831****En** - Plaintail firefish.

Maximum total length 30 cm. Commonly found on reefs. Despite its venomosity it is sometimes taken for the aquarium trade. Frequently misidentified as *Pterois volitans*, but distinguished by the lack of dark spots on its dorsal, anal, and caudal fin, a lower pectoral-fin ray count (typically 12 or 13), its fewer vertical rows (65 to 80), and its shorter supraocular cirrus. In these respects it approaches and is perhaps conspecific with *P. lunulata*. However, variation of these features within and among lionfishes are poorly understood and are in need of additional study. Occurs throughout the Indian Ocean and is widespread through all but the easternmost part of the area; reported from the Philippines and off Queensland.

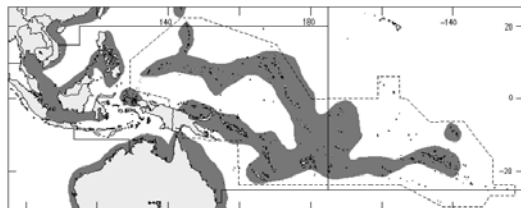


Pterois volitans* (Linnaeus, 1758)*En** - Lionfish.

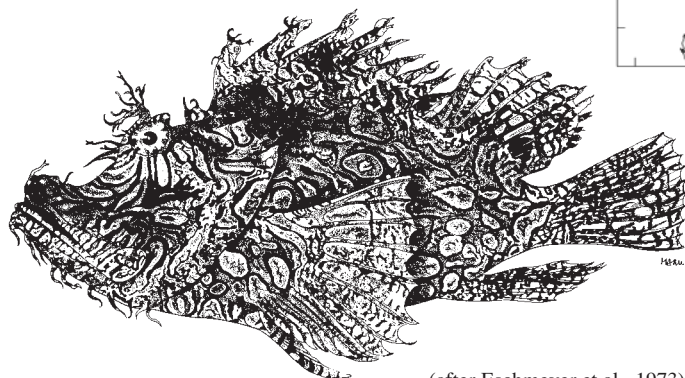
Maximum standard length 30 cm. Frequently confused with *Pterois miles*. A well-known reef species, frequently taken in trawls at depths of about 10 to 175 m. Largely inactive by day but forages in deeper water at night, where it evidently reproduces. Its spines are exceedingly dangerous and numerous fatalities have been reported from wounds resulting from its fin-spines. Nonetheless, with its fin-spines removed it is used for food in subsistence fisheries. Also extremely popular in the aquarium trade despite its dangerous reputation. Widespread in the western Pacific from southern Japan to Australia and the Philippines; it ranges to offshore localities in the Marshall Islands, New Caledonia, the Kermadec Islands, Fiji, to Tuamotu Archipelago.



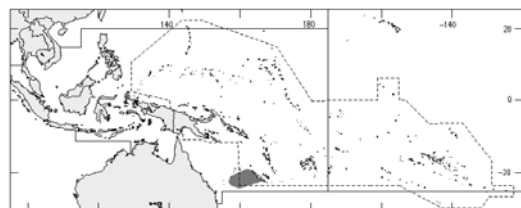
(after Matsubara, 1943)

***Rhinopias aphanes* Eschmeyer, 1973****En** - Weedy scorpionfish.

Maximum standard length 24 cm. One of many cryptic and rare scorpionfishes about which little is known. It is reported from depths of about 30 m, perhaps favouring outer reef slopes. Of no commercial importance, but of interest to aquarists because of its remarkable appearance. At present reported only from northeastern Australia, New Caledonia, New Guinea, and southern Japan, but will probably become known from more widely distributed localities within the area with further collecting.



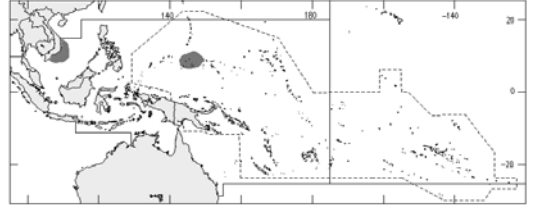
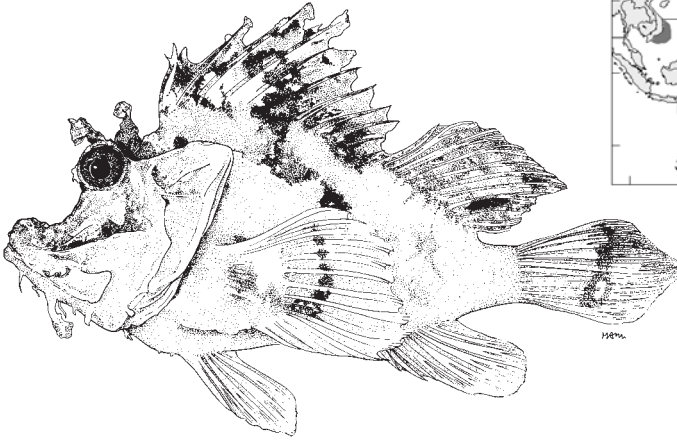
(after Eschmeyer et al., 1973)



Rhinopias frondosa (Günther, 1891)

En - Popeyed scorpionfish; **Fr** - Poisson scorpion feuillu.

Maximum standard length at least 15.2 cm. Appears to inhabit rock and coralline bottoms at depths of 13 to 90 m. Little else is known about its biology. Reported from local markets; taken in lobster gill nets and shrimp trawls, but unlikely to be of significant commercial importance. A widely distributed species, known from South Africa, Mauritius, and the Seychelles eastward to Sri Lanka, Viet Nam, Japan, and the Caroline Islands.

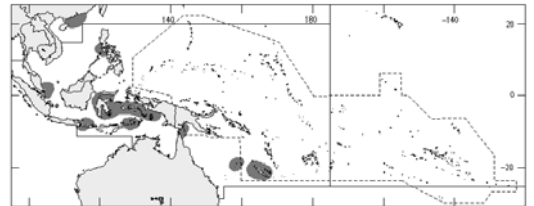
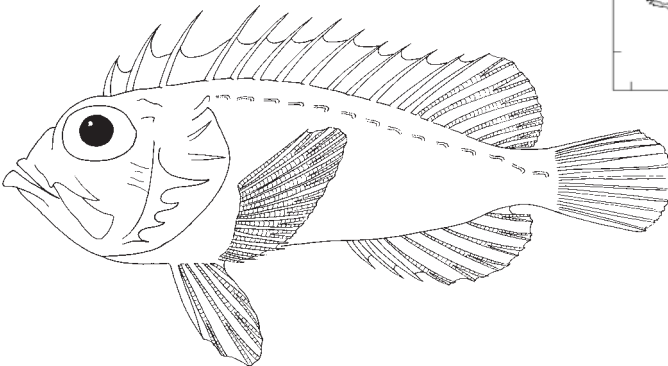


(after Eschmeyer et al., 1973)

Richardsonichthys leucogaster (Richardson, 1848)

En - Whitebellied rougefish.

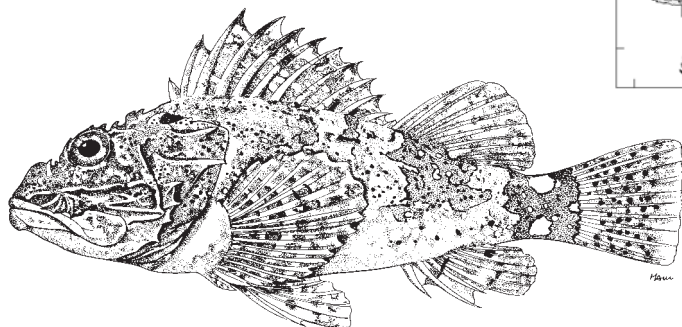
Maximum standard length 6.6 cm standard length. A little-known, dangerous small species, which has been reported among corals. Not infrequently taken in trawls at depths of 55 to 90 m. Although associated with corals and widely reported throughout islands of the Indonesian Archipelago, it appears more commonly near continental margins. Reported from off Zanzibar, Madagascar, and the Seychelles eastward to northern Queensland, the Chesterfield Islands, New Caledonia, and the Philippines.



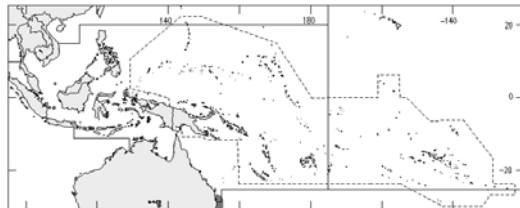
***Scorpaena cardinalis* Richardson, 1842**

En - Northern scorpionfish.

Maximum standard length 38 cm. An inshore species. Good eating and commonly taken by divers and fishermen over rocky reefs. Diet consists mainly of fishes but also includes crabs, shrimps, and octopus. Can be aggressive toward divers. Enters into the area in the northern part of its range, reaching southern Queensland; occurs southward to Tasmania.



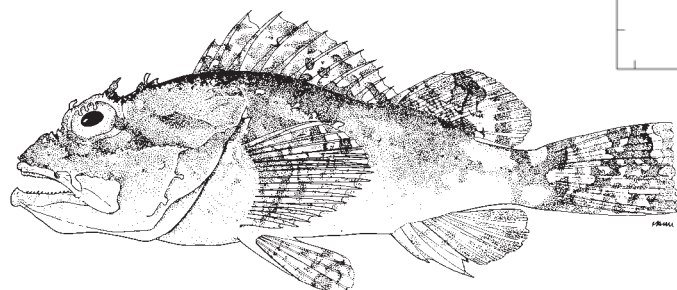
(after Ayling and Cox, 1982)



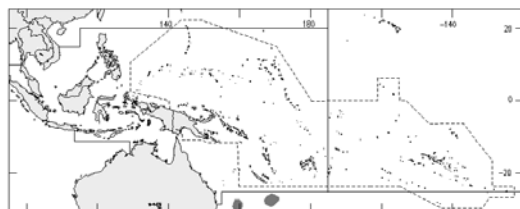
***Scorpaena cookii* Günther, 1860**

En - Sandy-Bay cod.

Maximum standard length 26.4 cm. Fished inshore over rocky reefs and consumed locally for food; exact depths of capture and statistics on the size of this fishery are unavailable. Limited in its range, known from the southern part of the area at Raoul Island in the Kermadecs, Lord Howe Island, Norfolk Island, and at Elizabeth and Middleton Reefs. Reported also from coast of New South Wales in the vicinity of Coffs Harbor.

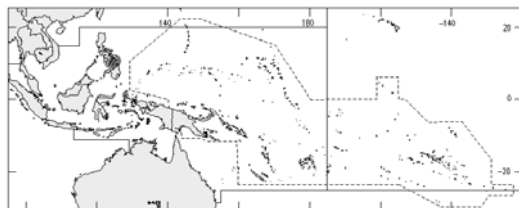
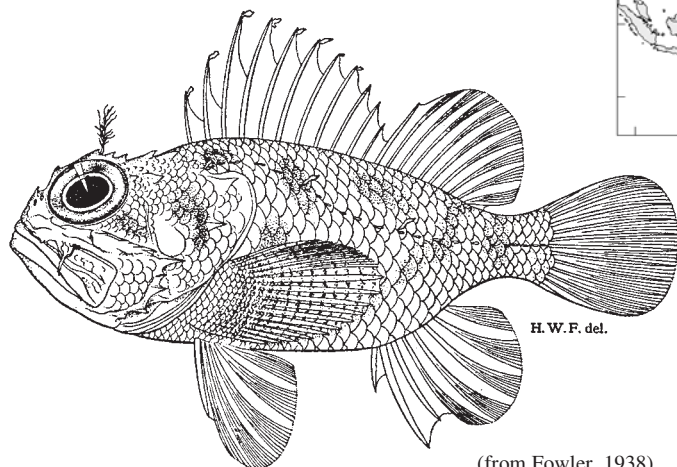


(after Paulin, 1982)

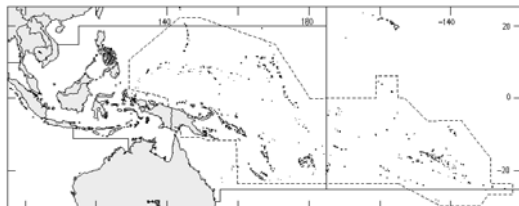
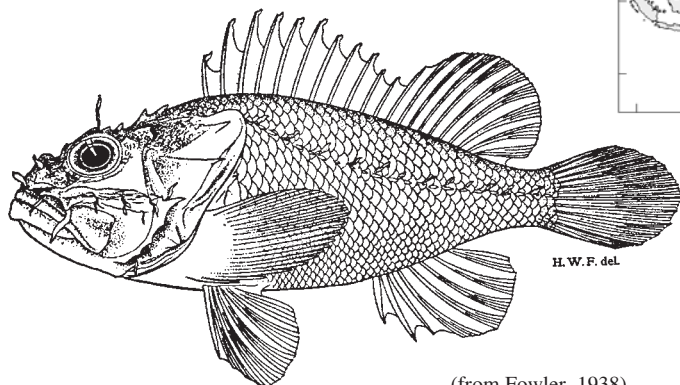


Scorpaena gibbifrons* Fowler, 1938*En** - Bumphead scorpionfish.

Maximum standard length 6.8 cm. Other than where it is captured, very little is known of this species. Of no importance to fisheries, but may be encountered while trawling for other species. Known only from the Philippines in the vicinity of Cabugan Grande Island (10°27'30" N, 125°18'E).

***Scorpaena hemilepidota* Fowler, 1938****En** - Halfscaled scorpionfish.

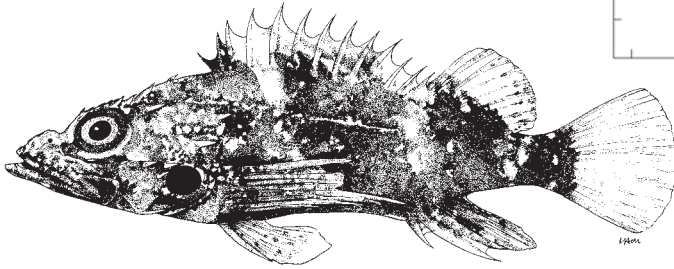
Maximum standard length at least 15 cm. Nothing is known of the biology of this species other than it occurs to depths of at least 247 m. Of no importance to fisheries. Only collected from the Philippines in offshore waters between Samar and Masbate (12°12'35"N, 124°2'48"E).



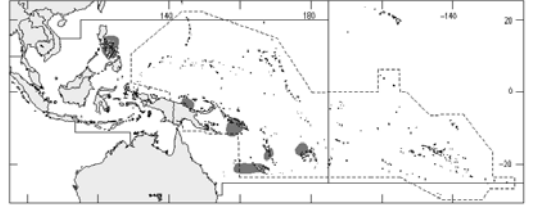
Scorpaenodes albaiensis (Evermann and Seale, 1907)

En - Longfingered scorpionfish.

Maximum standard length 8 cm. Of no importance to fisheries, although it does appear incidentally in nearshore catches. Caught in depths of about 3 to 8 m. A widely-ranging species, that occurs from Africa eastward to the Chesterfield Islands, New Caledonia, and the Philippines.



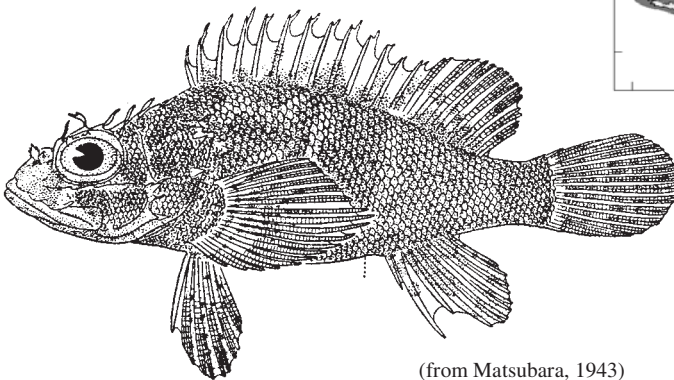
(after Smith and Heemstra, 1986)



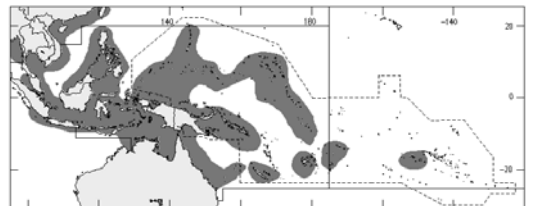
Scorpaenodes guamensis (Quoy and Gaimard, 1824)

En - Guam scorpionfish.

Maximum standard length 12 cm. Common in lagoons and outer reef slope habitats at depths between 3 and 15 m. *Sebastes meleagris* may be a junior synonym. A wide-ranging species that occurs from off Africa and the Red Sea eastward to Tonga and the Society Islands. Occurs north to Japan and south to Capricorn Group at the southern end of the Great Barrier Reef.

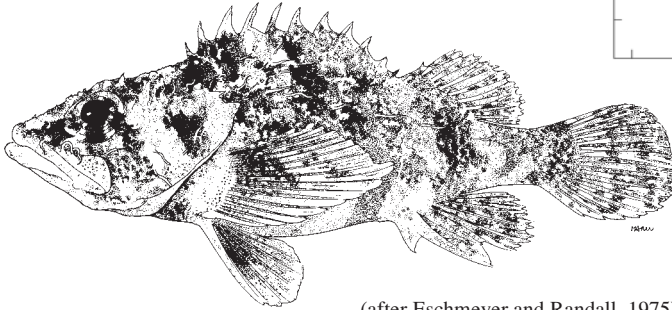


(from Matsubara, 1943)

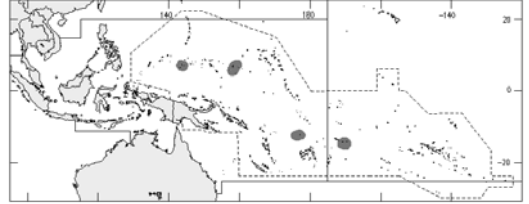


Scorpaenodes hirsutus (Smith, 1957)**En** - Hairy scorpionfish.

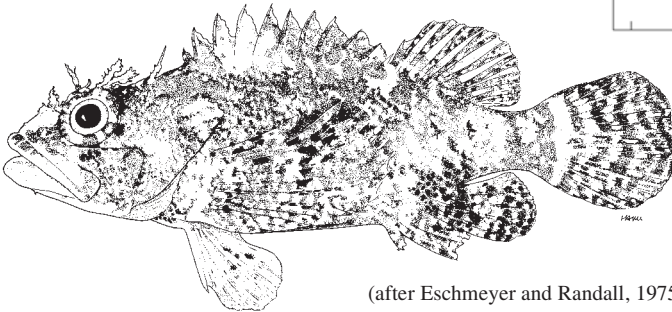
Maximum standard length about 5 cm. A small, little-known species of no commercial importance. Distributed from East Africa and the Red Sea to the Tuamoto Archipelago; found north to Japan and south to the Great Barrier Reef.



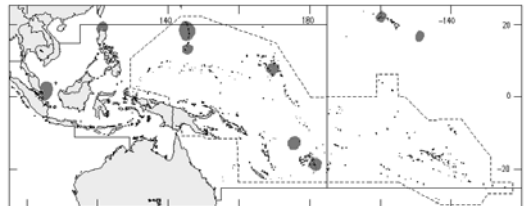
(after Eschmeyer and Randall, 1975)

***Scorpaenodes kelloggi*** (Jenkins, 1903)**En** - Dwarf scorpionfish.

Maximum standard length about 5 cm. Lives on coral reefs in shallow depths. Distributed throughout the western Central Pacific, including Hawaii, Gilbert Islands, Caroline Islands, Palau, Raiatea, and Japan and Taiwan Province of China.



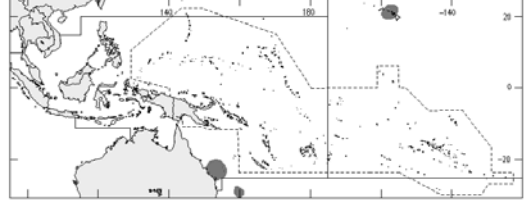
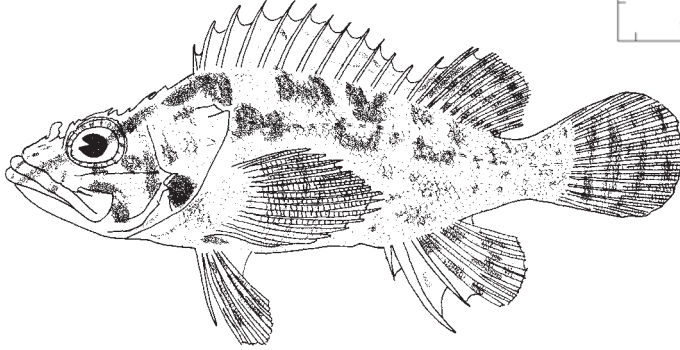
(after Eschmeyer and Randall, 1975)



***Scorpaenodes littoralis* (Tanaka, 1917)**

En - Cheekspot scorpionfish.

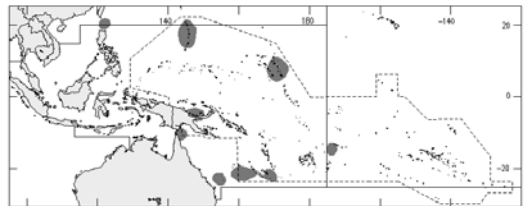
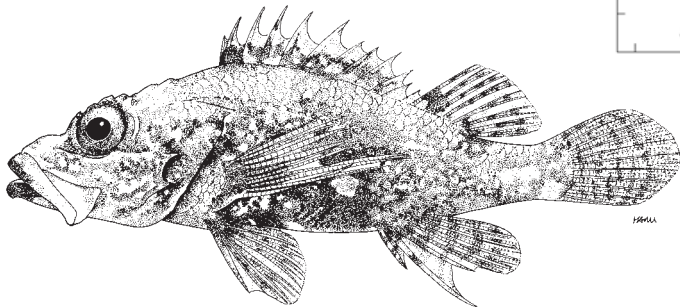
Maximum standard length 10 cm. Not consumed as food. Females are gravid in summer. No fishery exists for this small species. Found in South Africa eastward to Japan, Hawaii, and the southern end of the Great Barrier Reef, Norfolk, and the Kermadec Islands. Not reported at intermediate latitudes and may have an antitropical distribution.



***Scorpaenodes minor* (Smith, 1958)**

En - Minor scorpionfish.

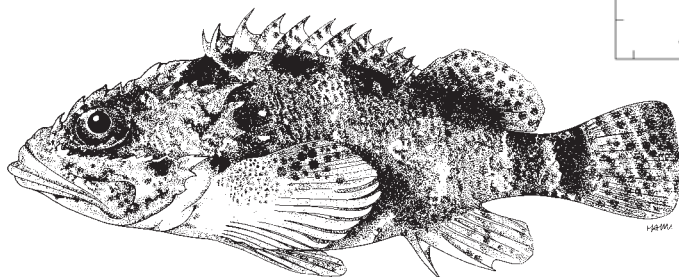
Maximum standard length about 5 cm. Virtually nothing is known about this small species. Rarely seen, except in poison stations on coral reefs and in infrequent trawls over hard bottoms. Ranges broadly across the African coast of the Indian Ocean to the western Pacific Ocean from the Ryukyus in the north to the Capricorn Group (Great Barrier Reef) in the south; within the area, reported from Indonesia, the Marshall Islands, the Philippines, and New Caledonia.



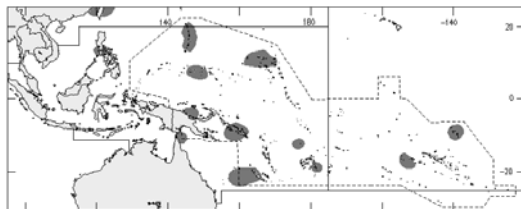
(after Smith and Heemstra, 1986)

Scorpaenodes parvipinnis* (Garrett, 1864)*En** - Coral scorpionfish.

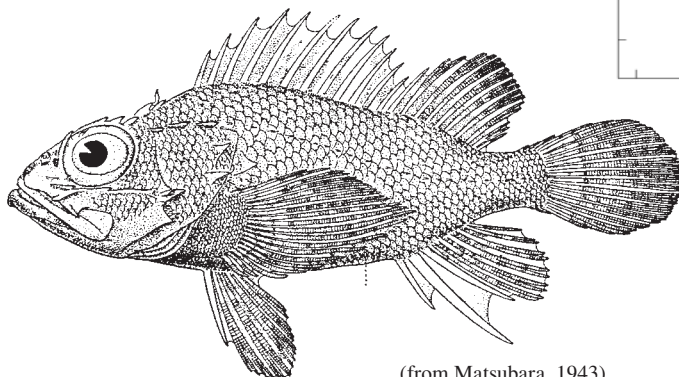
Maximum standard length 13 cm; one of the larger species of *Scorpaenodes*. Known from inshore reef habitats from depths of 3 to 15 m. A tropical species, known from coral reefs of the Seychelles and the Red Sea eastward to the Solomon and Chesterfield Islands and New Caledonia. Just north of the area, it reaches Taiwan Province of China and to the south it is known from the southern end of the Great Barrier Reef.



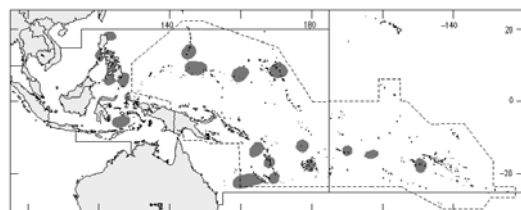
(after Smith and Heemstra, 1986)

***Scorpaenodes scaber* (Ramsey and Ogilby, 1885)****En** - Pygmy scorpionfish.

Maximum standard length 8 cm. Biology poorly known. A small species of no commercial importance. Occurs on reefs at depths to about 8 to 12 m. Found at dispersed localities throughout the area from the Society Islands westward to the Indian Ocean; records from the Red Sea can not be confirmed. Frequently misidentified as *Scorpaenodes guamensis* or *S. littoralis*.



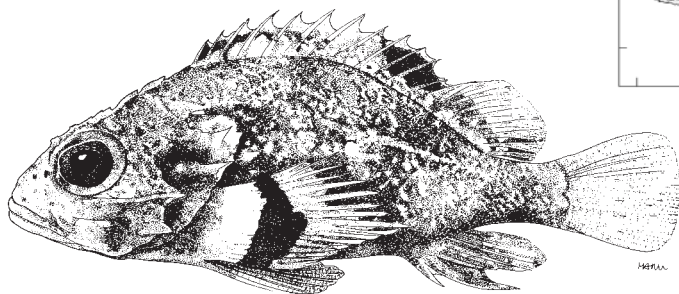
(from Matsubara, 1943)



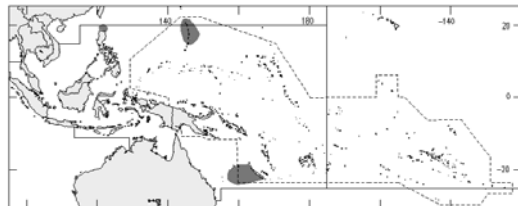
***Scorpaenodes varipinnis* Smith, 1957**

En - Blotchfin scorpionfish.

Maximum standard length 7 cm. This rare species has been collected to depths of about 15 m in rocky and coral reef sublittoral areas. Of no importance to fisheries. Distributed from the Seychelles and the Red Sea eastward to Australia, the Chesterfield Islands, and New Caledonia.



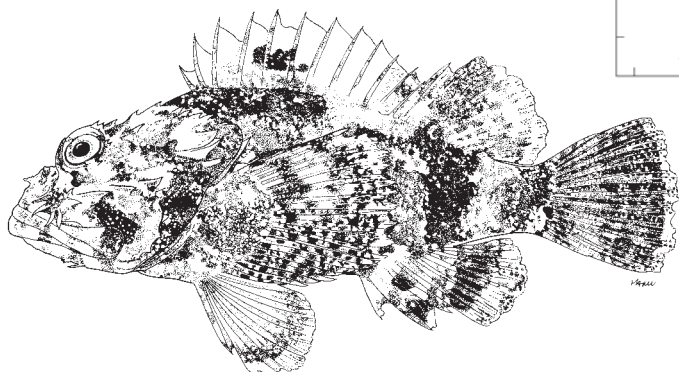
(after Smith and Heemstra, 1986)



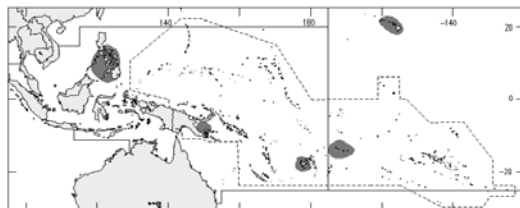
***Scorpaenopsis brevifrons* Eschmeyer and Randall, 1975)**

En - Bigmouth scorpionfish.

Maximum standard length about 11 cm. Taken over coral and rock areas inshore to depths of 35 m. Reported from South Africa to Hawaii; within the area, known to occur in the Philippine and Tobriand islands, Fiji, and Samoa.

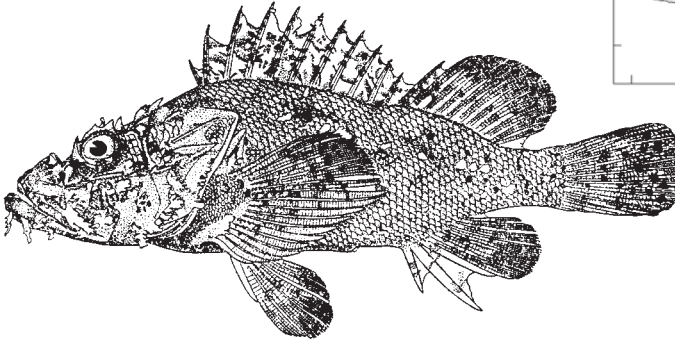


(after Eschmeyer and Randall, 1975)

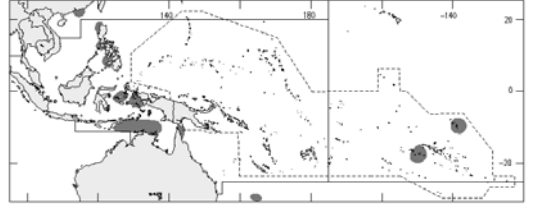


Scorpaenopsis cirrhosa* (Thunberg, 1793)*En** - Weedy stingfish; **Fr** - Poisson arme.

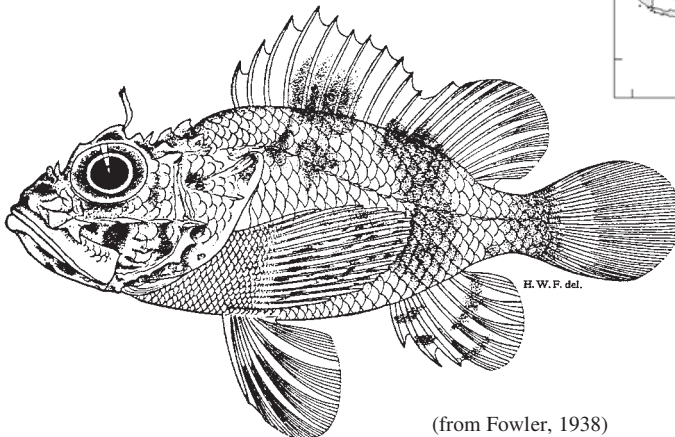
Maximum standard length at least 21 cm. Most specimens of *Scorpaenopsis* reported throughout the area have been misidentified as this species. These are often based on specimens correctly identified as *S. oxycephala*. Because numerous literature reports that purport to document the widespread occurrence of this species can not presently be confirmed, this species is included here even though further research may likely show that it is restricted to Japan, China, and Taiwan Province of China. *S. cirrhosa* occurs in coralline intertidal areas to depths of 37 to 91 m. Known to occur in Japanese waters, on the Chinese mainland, and Taiwan Province of China; unconfirmed reports within the area are numerous and include New Guinea and scattered Indonesian localities.



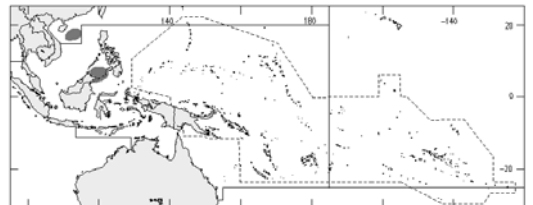
(from Matsubara, 1943)

***Scorpaenopsis cotticeps* Fowler, 1938****En** - Bulbheaded scorpionfish.

Maximum standard length 4.4 cm. Of no commercial importance. Taken at depths of about 18 m. Restricted range, presently known only from MacClesfield Bank in the South China Sea, the Sulu Archipelago, and the southern Philippines. Closely related to *Scorpaenopsis iop* from Japan. Both species are in need of further study.



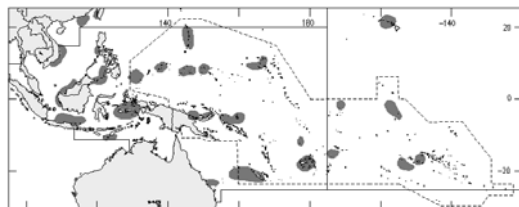
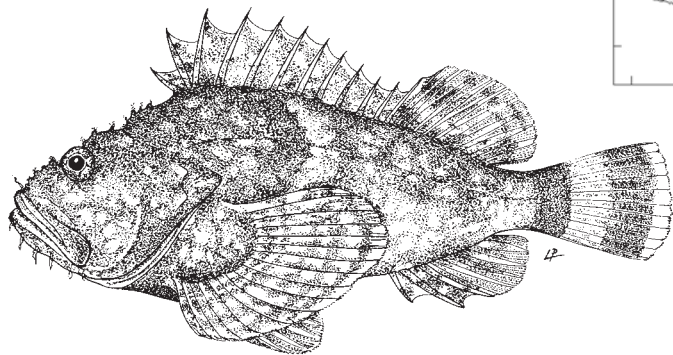
(from Fowler, 1938)



***Scorpaenopsis diabolus* (Cuvier, 1829)**

En - False stonefish.

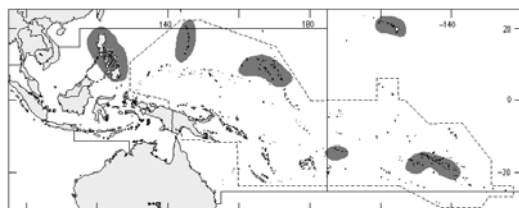
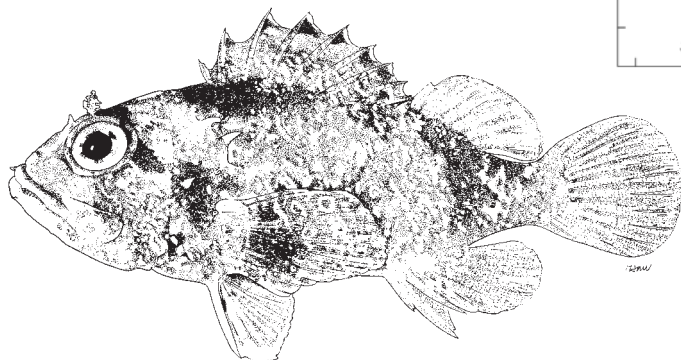
Maximum standard length at least 2.2 cm. Occurs in reef flats and outer reef slope habitats among coral. Like most scorpaenoids, this species is an ambush predator that seldom moves. However, when alarmed, this fish reveals bright inner coloured pectoral fins as a warning. Distributed from East African coast eastward to the Society Islands and Hawaii. Often misidentified as *Scorpaenopsis gibbosa*.



***Scorpaenopsis fowleri* (Pietschmann, 1934)**

En - Fowler's scorpionfish.

Maximum standard length 2.8 cm. A diminutive species of no commercial importance, occurring in depths of 7 to 38 m in association with *Seriatopora* corals. It matures at about 2.5 cm standard length. Known from the Maldive Islands to Mangareva, and the Hawaiian Islands.

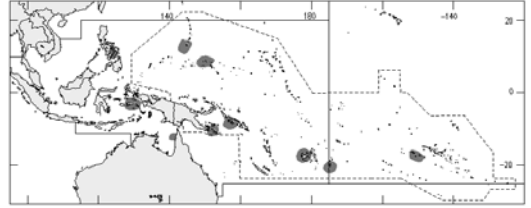
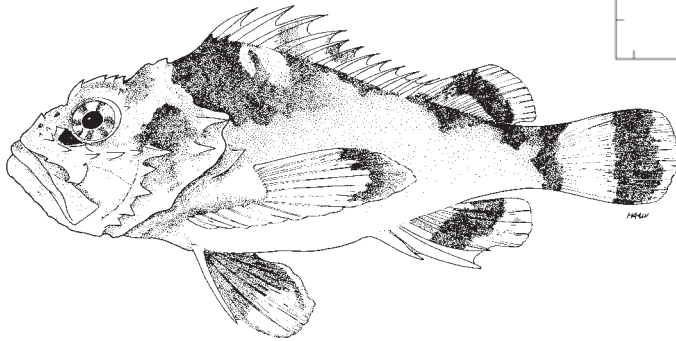


(after Eschmeyer and Randall, 1975)

***Scorpaenopsis macrochir* Ogilby, 1910**

En - Rough humpbacked scorpionfish.

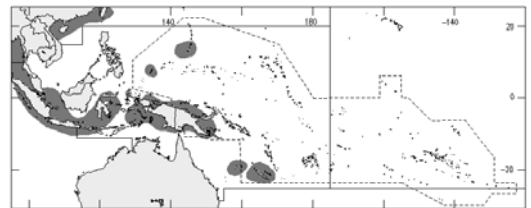
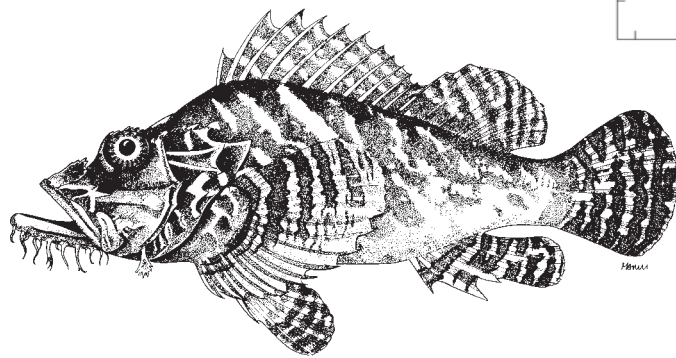
Maximum standard length 10 cm. Biology little known, but reported to occur at Guam on mixed sand and coral rubble areas of reef flats and shallow lagoons. Originally described from Queensland, and reported also from the Moluccas, the Philippines, Tonga, the Marianas, and the Caroline Islands. Ranges northward to the Ryukyus Islands. Sometimes confused with other humpbacked *Scorpaenopsis*: *S. diabolus*, *S. gibbosa*, and *S. neglecta*.



***Scorpaenopsis oxycephala* Bleeker, 1849**

En - Smallscale scorpionfish.

Maximum standard length about 30 cm. An inshore species, common on reefs. Taken as food in subsistence fisheries. Widely distributed and found from the Red Sea to the Philippines, northward to the Ryukyu Islands and southward to New Caledonia. Often misidentified as *Scorpaenopsis cirrhosa* as are many species of *Scorpaenopsis*.

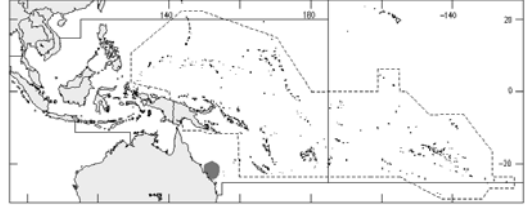
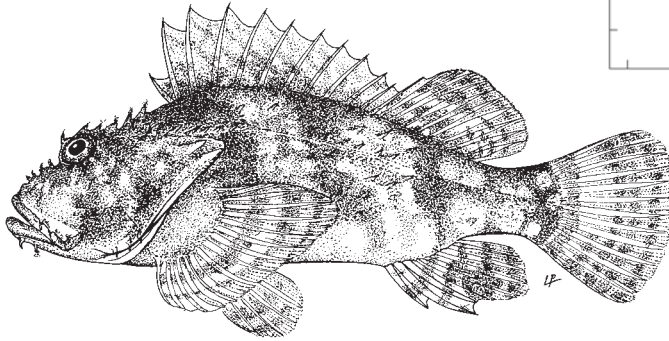


(after Smith and Heemstra, 1986)

***Scorpaenopsis venosa* (Cuvier, 1829)**

En - Raggy scorpionfish; **Fr** - Lappies.

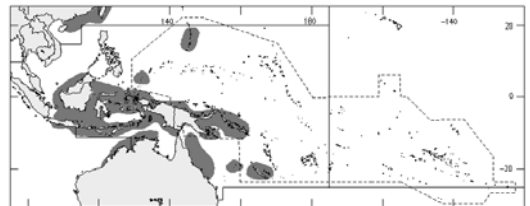
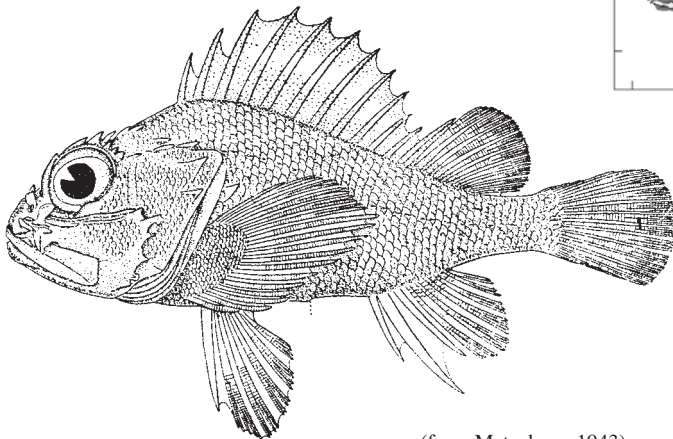
Maximum standard length at least 18 cm standard length. A little-known species. Occurs inshore on reefs. Occasionally taken by hook-and-line and in trawls, but of no commercial importance. Reported from widely scattered localities from southern Africa, the Red Sea, India, Indonesia, and northwestern Australia.



***Sebastapistes cyanostigma* (Bleeker, 1856)**

En - Yellowspotted scorpionfish.

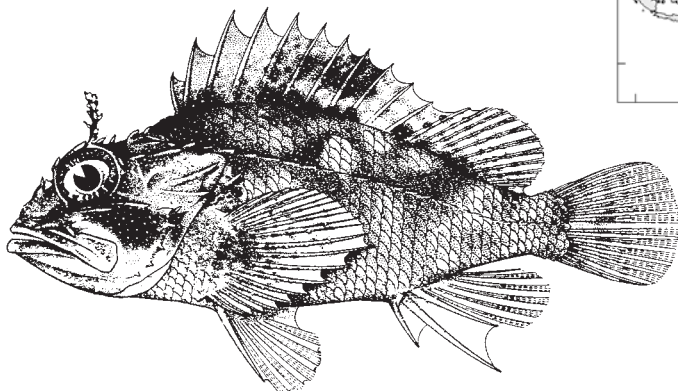
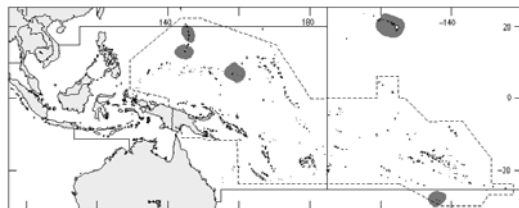
Maximum standard length about 7 cm. Common in shallow water on coral reefs and hard bottoms to about 9 m. Of no commercial importance, but occasionally makes its way into the aquarium trade, because of its small size and coloration. Ranges from South Africa and the Red Sea eastward to Okinawa, Guadalcanal, and New Caledonia.



(from Matsubara, 1943)

Sebastapistes galactacma* Jenkins, 1903*En** - Galactacma scorpionfish.

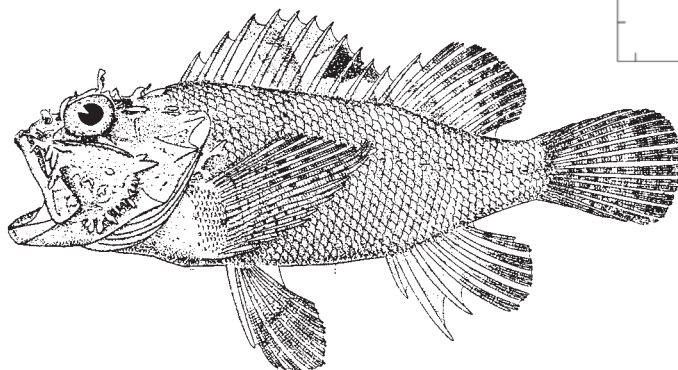
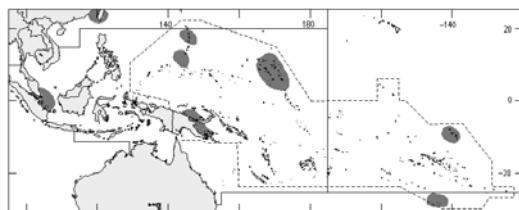
Maximum standard length 4.9 cm. Taken over coral and coral rubble in depths of 6 to 29 m. Appears to be confined to the Pacific Plate, and is known from Guam, Pohnpei, and Rapa within the area and at Hawaii outside the area.



(from Jordan and Evermann, 1903)

Sebastapistes mauritiana* (Cuvier, 1829)*En** - Spineblotch scorpionfish; **Fr** - Rascasse de Suez; **Sp** - Rascacio de Suez.

Maximum standard length about 8 cm. Typically collected in outer intertidal reef and lagoon habitats at depths of less than 10 m. Commonly taken, but of no commercial importance. Distributed from the eastern shores of Africa and the Red Sea eastward to Guam, Marshall Islands, Gilbert Islands, Phoenix Islands, Rapa, and the Marquesas; also reported to have passed through the Suez Canal and into the Mediterranean. Further study of the Hawaiian *Sebastapistes ballieu* (Sauvage, 1875) may prove it to be a synonym of *S. mauritiana* or only subspecifically distinct.

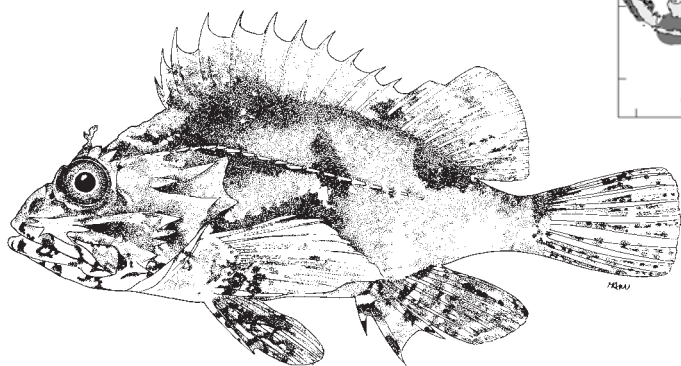


(from Matsubara, 1943)

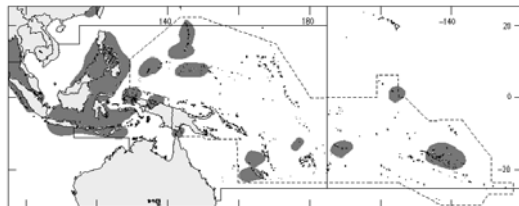
***Sebastapistes strongia* (Cuvier, 1829)**

En - Barchin scorpionfish.

Maximum standard length about 6 cm. Study of the biology of this small reef-dwelling fish originally described from the Caroline Islands has been stymied by considerable confusion associated with its taxonomic identity. Further analysis may prove specimens of this variable species may perhaps belong to 2 species, which have been thoroughly confused under a variety of inconsistently used names. Often confused with *Scorpaena bynoensis* Richardson, 1845, which is a synonym of *Parascorpaena picta*. Of no commercial importance, but often caught at shallow depths over coral reefs. A wide-ranging species, commonly taken from East Africa and the Red Sea, eastward to Sri Lanka and Taiwan Province of China; occurs throughout the Indonesian Archipelago, Melanesia, Micronesia, and the Philippines to the Tuamotu Archipelago; it has traversed the Suez Canal and was reported from Cyprus.



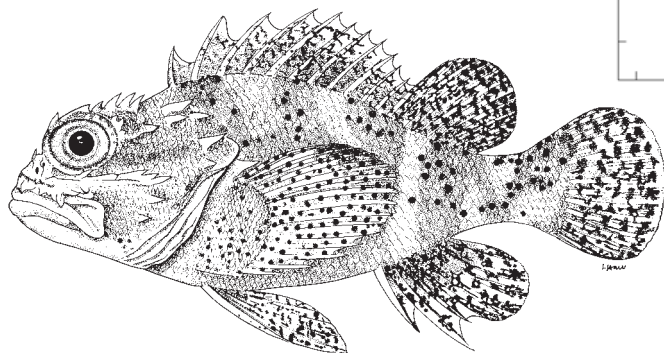
(after Smith and Heemstra, 1986)



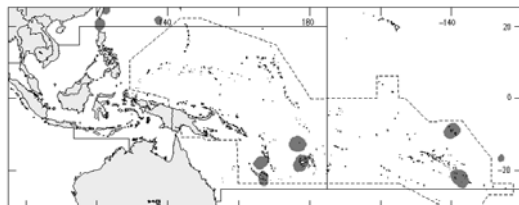
***Sebastapistes tinkhami* (Fowler, 1946)**

En - Darkspotted scorpionfish.

Maximum standard length about 8 cm. A small relatively rare species that appears to occur on deeper reefs. Of no importance to fisheries, but occasionally appears in trawls. Care should be taken when handling it. Widely distributed. Known from South Africa eastward to the Tuamotu Archipelago, and also reported in the area from Fiji.

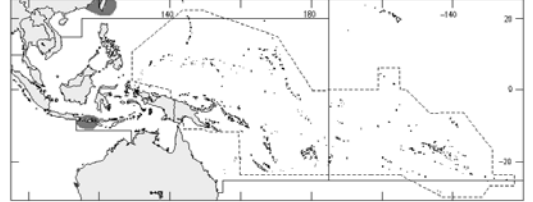
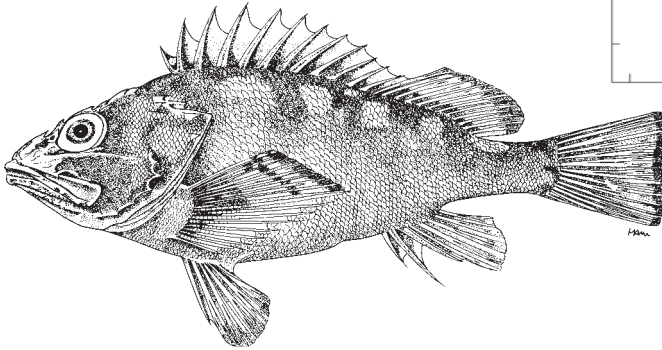


(after Smith and Heemstra, 1986)

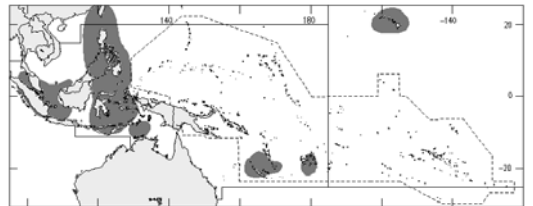
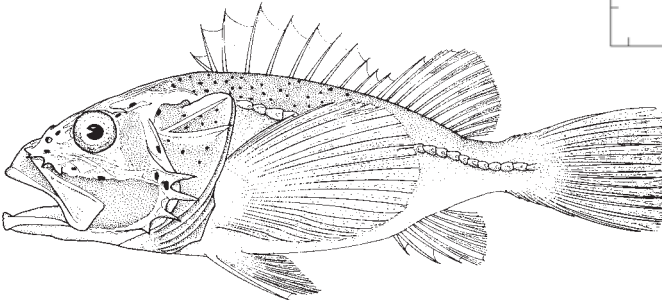


Sebastiscus tertius Barsukov and Chen, 1978**En** - Absent-minded scorpionfish.

Maximum standard length 37 cm. Very closely related to *Sebastiscus marmoratus* and likely has similar habits, but occurs in deeper waters at depths of 70 to 500 m. A relatively large species and would make an excellent food fish as does its near relatives. Although presently no major fishery exists for this species, discovery of suitable hard-bottom habitats over which it may occur in large numbers, could make a sustainable fishery possible. Best known from southern Japan, Korea, and Taiwan Province of China, but also reported in the area from Indonesia (08°58'S, 116°34'E).

***Setarches guentheri*** Johnson, 1862**En** - Deepwater scorpionfish; **Fr** - Rascasse serran; **Sp** - Rascacio serrano.

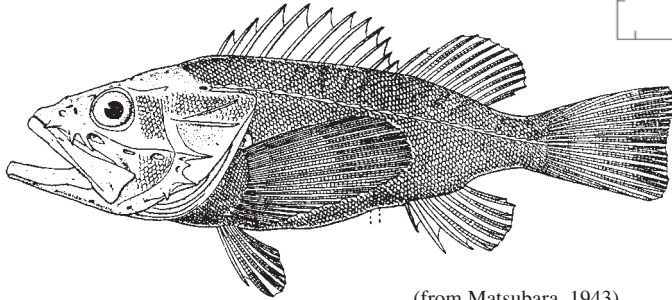
Maximum standard length 18 cm. No commercial fishery exists for this deep-dwelling scorpionfish, although it occurs in large numbers at some localities. Taken with bottom trawls and bottom-set long lines at depths of 170 to 576 m. Wounds from this species can be painful. The most widely-ranging scorpaenoid fish, found worldwide on continental slopes in tropical and warm-temperate latitudes, as well as insular localities. In the area, reported from off Sumatra, Bali, Ujung Padang, the Arafura Sea, Fiji, the Philippines, and near the Kei Islands.



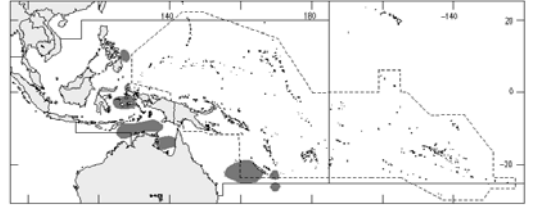
Setarches longimanus (Alcock, 1894)

En - Redsmooth scorpionfish.

Maximum standard length 18 cm. Reported from trawls fished at depths of 110 to 763 m, with most specimens taken at intermediate depths between 180 and 550 m. The spines of this species are venomous and should be avoided. Distributed from Andaman Islands in the Eastern Indian Ocean to the Philippines, north to southern Japan and south to northern Australia and New Caledonia.



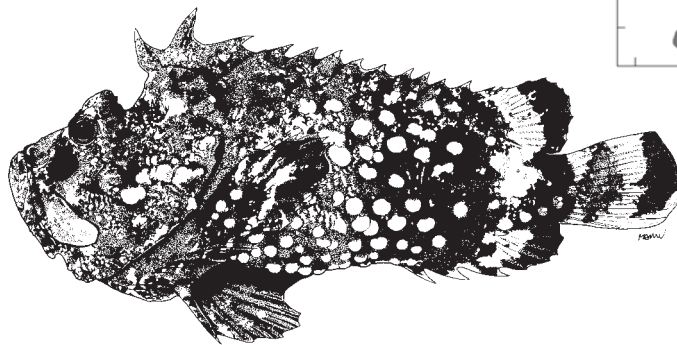
(from Matsubara, 1943)



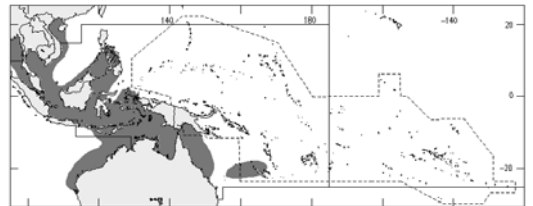
Synanceia horrida (Linnaeus, 1766)

En - Estuarine stonefish.

Maximum standard length 19.6 cm; may weigh up to 2 kg. Most frequently found in lagoons and reef flats, but can also be encountered in relatively muddy or rubble bottoms associated with estuaries. Used as food in subsistence fisheries and found in local markets, but extremely venomous and therefore of limited value. Capable of inflicting fatal wounds and should be handled, if at all, with extraordinary caution. Found from the eastern Indian Ocean eastward through the Indonesian Archipelago to Australia and the Philippines.



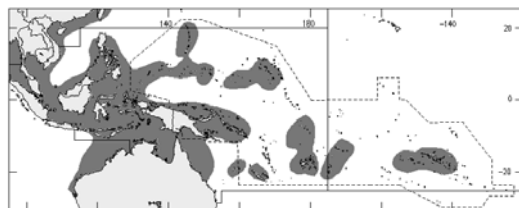
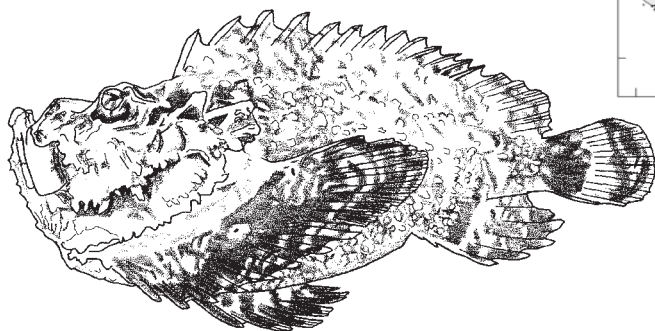
(after Eschmeyer and Rama-Rao, 1973)



Synanceia verrucosa Bloch and Schneider, 1801

En - Reef stonefish; **Fr** - Poisson-pierre.

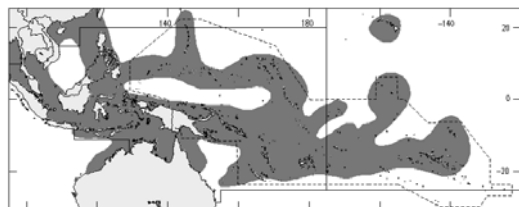
Maximum standard length 18.7 cm. Usually seen at low tide in coral rubble in pools on shallow reef flats and in lagoons, often under rocks and ledges. Can be abundant at some localities, reaching depths of about 13 m. Larger individuals appear to favour surge channels. Also capable of burying in sand. Feeds on *Abudefduf leucozona*, *A. biocellatus*, *A. glaucus*, *Pomacentrus littoralis*, and other small fishes and invertebrates. Because it is remarkably well camouflaged and exceedingly venomous, this species should be fished and handled only with extreme caution; its spines can inflict fatal wounds. Although typically feared, it is occasionally fished by spear and utilized for human consumption. A widely distributed species, known from East Africa and the Red Sea eastward to the Tuamoto Archipelago.



Taenianotus triacanthus Lacepède, 1802

En - Leaf scorpionfish; **Fr** - Poisson balance.

Maximum standard length 7.9 cm. Typically inhabits coral beds and rocks in sublittoral and intertidal habitats in areas of strong wave action, to depths of about 78 to 134 m. Individuals will “sway” with the current, mimicking its surroundings, even in the absence of current. *T. triacanthus* molts, at times, shedding its skin in a nearly single piece like some snakes. A variety of strikingly different colour morphs exist, with yellow-brown and red and pink morphs being the most common. It is unknown to what extent individuals can change colours. A poor swimmer and easily caught with hand nets. Of no commercial importance, but has become a frequent but voracious aquarium fish, due to its unusual appearance and interesting behaviour. Distributed from East Africa eastward to the Galapagos Islands, where it has been photographed but not yet collected; also known from southern Japan in the north to the southern end of the Great Barrier Reef in the south.

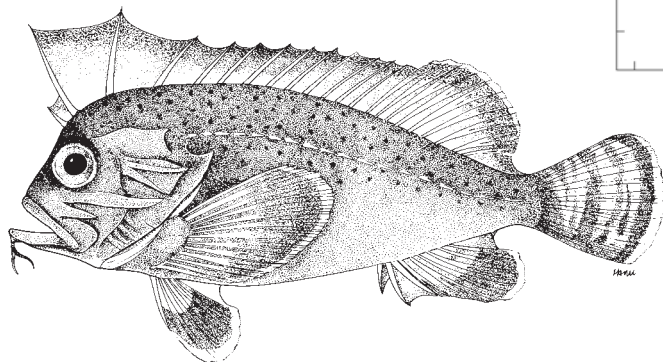


(after Eschmeyer and Randall, 1975)

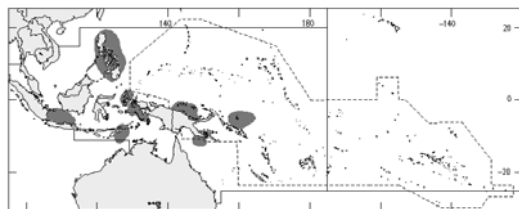
Tetraroge barbata (Cuvier, 1829)

En - Bearded rougefish.

Maximum standard length 9.3 cm. Found in brackish water and lower fresh water reaches of shallow slow-flowing coastal drainages. Likely mimics leaf-litter. No fishery exists for this dangerous species. Distributed from Japan southward through Taiwan Province of China and the Philippines, throughout Indonesia from Southern Malaysia to the Solomon Islands; not known to occur in Australia or Fiji.



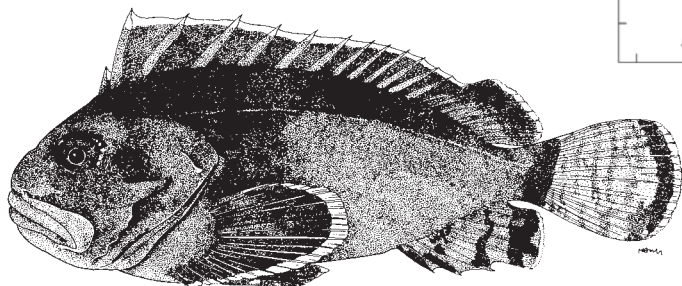
(after Munro, 1967)



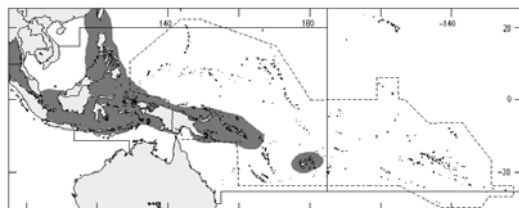
Tetraroge niger (Cuvier, 1829)

En - Blacksea wasp.

Maximum standard length 10 cm. A little-known, highly venomous species; enters brackish and fresh water often considerable distances (16 to 42 km) from the coast. Females can be extremely fecund bearing tens of thousands of eggs. Found from India eastward, throughout the Indonesia Archipelago to Fiji; also occurs in the Philippines and northward to Taiwan Province of China and the southernmost Ryukyu Islands.



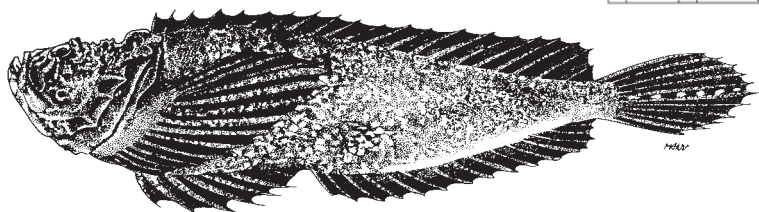
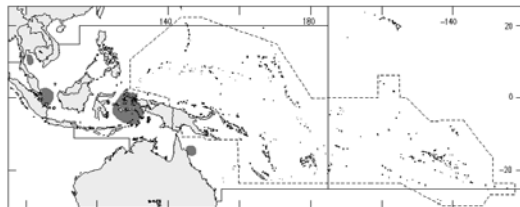
(after Weber and de Beaufort, 1962)



***Trachicephalus uranoscopus* (Bloch and Schneider, 1801)**

En - Stargazing stonefish.

Maximum standard length 8 cm. Generally caught in inshore trawls over mud bottoms in estuaries. Despite its venomosity, this small species does appear in local market catches. Occurs from India eastward through the Strait of Mallaca and northward along the coasts of Malaysia and Thailand northward to Hong Kong and southern China; also reported westward to Java, Borneo, and Amboina.

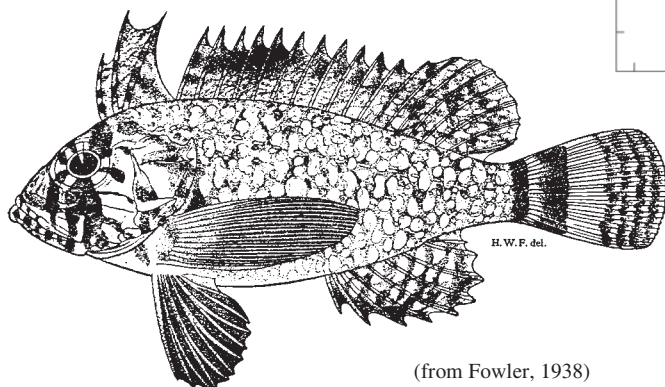
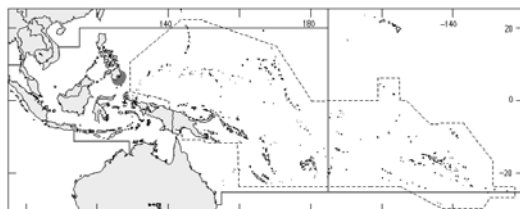


(after Eschmeyer and Rama-Rao, 1973)

***Vespicula cypho* (Fowler, 1938)**

En - Hunchbacked goblinfish.

Maximum standard length 3.3 cm. A rare venomous species that may become entrapped in nets, but is of no commercial importance. Known only from a single specimen taken in the Philippines at Davao, Mindanao.

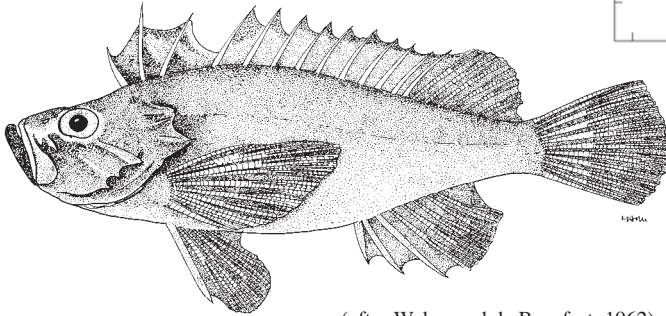


(from Fowler, 1938)

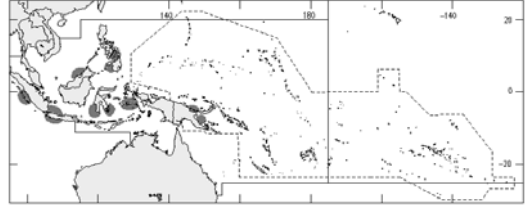
***Vespicola depressifrons* Richardson, 1848**

En - Leaf goblinfish.

Maximum standard length 6 cm. A little-known species, typically found in brackish or semi-fresh waters. No fishery exists for this species, but it does appear from time to time in the aquarium trade. Found in the Nicobar Islands through the Indonesia Archipelago and the Philippines westward to Papua New Guinea, reports of this species from Japan are erroneous.



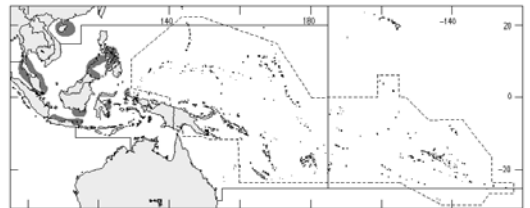
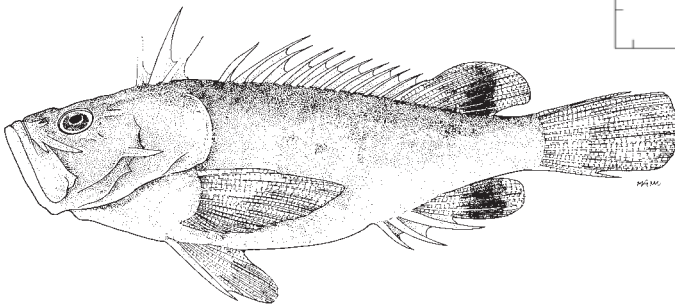
(after Weber and de Beaufort, 1962)



***Vespicola trachinoides* (Cuvier, 1829)**

En - Goblinfish.

Maximum standard length 5.8 cm. Appears to be found over soft sand and broken shell bottoms. This small species is of little commercial importance, but does seem to be marketed fresh in local fisheries throughout the area. Distributed from the Mergui Archipelago (Myanmar) eastward to the Philippines and Sulawesi; known outside the area from Hainan Island, China; a single record from the Red Sea (under the synonym *Apistus bottae*) is likely based on a locality error.

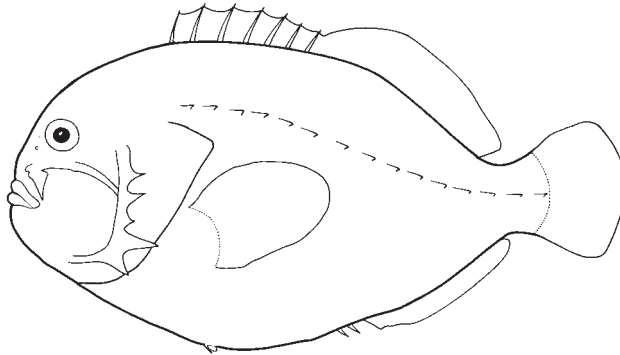


CARACANTHIDAE

Orbicular velvetfishes (coral crouchers)

by S.G Poss

Diagnostic characters: Small fishes (typically under 4 cm standard length); **body rounded, compressed, although not greatly so.** Head moderate to large, 37 to 49% of standard length. Eyes small to moderate, 8 to 12% of standard length. Snout 8 to 13% of standard length. Mouth moderate to large, upper jaw 12 to 21% of standard length. Numerous small conical teeth present on upper and lower jaws, none on vomer or palatines. **Lacrimal movable, with 2 spines, posteriormost largest directed ventrally.** **All species with a narrow extension of the third infrarobital bone (second suborbital) extending backward and downward across the cheek and usually firmly bound to preopercle.** No postorbital bones. Branchiostegal rays 7. **Skin over gill covers strongly fused to isthmus.** Dorsal fin with VII or VIII (rarely VI) short spines and 12 to 14 branched soft rays. Anal fin usually with II short spines, followed by 11 or 12 branched soft rays. Caudal fin rounded, never forked. Pelvic fins small, difficult to see, with I stout spine and 2 or 3 (rarely 1) rays. Pectoral fins with 14 or 15 thickened rays. **Scales absent, except for lateral line, but body densely covered with tubercles.** Lateral-line scales present; usually 11 to 19 tubed scales. All species possess extrinsic striated swimbladder musculature. Vertebrae 24. **Colour:** orbicular velvetfish are either pale pinkish white with numerous small black spots, or light brown or greenish and with orange spots or reticulations.



Habitat, biology, and fisheries: Velvetfishes live within the branches of *Acropora*, *Poecilopora*, and *Stylophora* corals, rarely venturing far from the coral head. Other than their close association with corals, little is known of their biology.

Similar families occurring in the area

Gobid fishes of the genus *Gobiodon* also occur among coral heads and are easily mistaken for caracanthids. However, these fishes lack the suborbital stay that extends back to the preopercle, the large moveable lacrimal spines, and the large preopercular spines.

Key to the species of Caracanthidae occurring in the area

- 1a. No deep notch between spinous and soft-rayed parts of dorsal fin, fin membrane relatively continuous; relatively uniformly light brown or grey, without distinct spots or mottling; lacrimal with 1 large spine and 2 small blunt spines *Caracanthus unipinna*
- 1b. A deep notch between spinous and soft-rayed parts of dorsal fin; body with either spots or with reticulate pattern dorsally; lacrimal with 1 long spine and 1 small blunt knob → 2
- 2a. Body covered with numerous black spots *Caracanthus maculatus*
- 2b. Body with reticulate pattern over dorsum *Caracanthus madagascariensis*
(Indian Ocean; not yet recorded from the area)

List of species occurring in the area

- Caracanthus maculatus* (Gray, 1831)
- Caracanthus unipinna* (Gray, 1831)

Reference

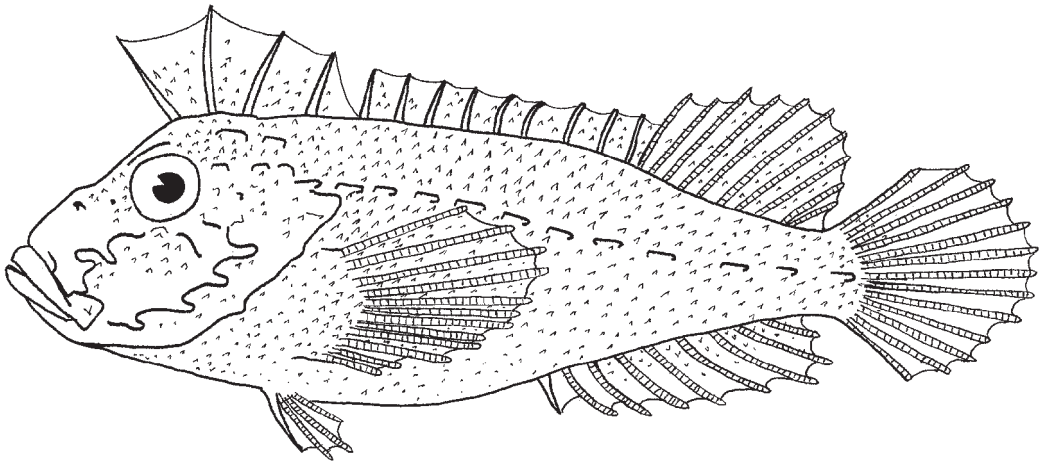
Smith, J.L.B. 1958. Fishes of the families Tetrarogidae, Caracanthidae, and Synanceiidae from the Western Indian Ocean with further notes on scorpaenid fishes. *Ichthyol. Bull. Rhodes Univ.*, 12:167-181.

APLOACTINIDAE

Velvetfishes

by S.G. Poss

Diagnostic characters: Small fishes (typically under 5 cm standard length); body usually compressed, although usually not greatly so. Head moderate to large, 26 to 42% of standard length. Eyes small to relatively large, 5 to 11% of standard length. Snout often prominent, 6 to 14% of standard length. Mouth moderate to large, upper jaw 7 to 18% of standard length. Numerous small conical teeth present on upper and lower jaws, with those on vomer usually present and those on palatine always absent. Branchiostegal rays typically 7 (rarely 6). Gill rakers usually small or moderate, 0 to 6 on upper limb of first gill arch, and 3 to 11 on lower limb (including raker at angle between upper and lower limb). **Most species with a fleshy papillae at end of isthmus**, but with skin over gill covers fused to isthmus in some species. Pseudobranch with 0 to 18 filaments. **No branched rays in fins. Dorsal fin with IX to XVI spines, usually blunt at their tip, and 7 to 16 soft rays.** Anal fin usually with 0 to 5 usually weak or blunt spines, followed by 5 to 16 soft rays. Caudal fin moderate to large (21 to 38% standard length) and rounded, never forked. Pectoral fins usually large, with 9 to 16 rays. Pelvic fins with I strong spine and 2 or 3 (rarely 1) soft rays. **Scales in most species irregular and forming highly modified tack-like structures** (some without scales, except for lateral line). Lateral-line scales present, with usually 9 to 16 tubed scales. All species with an extension of the third infraorbital bone (second suborbital) extending backward across the cheek and usually firmly bound to preopercle. **Most species with numerous, usually blunt head spines, with those on movable lacrimal, usually most prominent.** All species possess striated swimbladder musculature that is extrinsic in nearly all species, with musculature present even in those without swimbladders. Pyloric caecae 1 to 16. Vertebrae 21 to 33. **Colour:** most species strongly camouflaged and brown, reddish brown, or greenish; usually with barred or mottled colour patterns, typically darker dorsally than ventrally.



Habitat, biology, and fisheries: Velvetfishes live in or on the bottom, where they are often found under or between rocks or vegetation. Although most are taken at shallow depths, a few species in the area range into deeper waters (to 510 m). Most species are extremely well camouflaged. They are of no importance to fisheries.

Similar families occurring in the area

Scorpaenidae: have a suborbital stay but scales, if present, do not form spinous points (except in *Taenianotus*); dorsal fin originates before eye in waspfishes (tetragone scorpaenids), but in these species all spines are sharp and there is no fleshy extension on the anteriormost part of the isthmus; pelvic fins with I spine and 3 to 5 segmented rays (I spine and 2 or 3 segmented rays in Aploactinidae); caudal-fin rays always branched (except in *Coccotropsis* and *Minous*); other fins, except pectoral fins, usually with branched rays (all segmented rays unbranched in Aploactinidae); eyes on top of head or lower pectoral-fin rays detached in some species (never true of Aploactinidae).

Key to the species of Aploactinidae occurring in the area

Note: in the anticipation that they may be recorded in the future from the area, some species known from adjoining seas are included in the key, with their distribution indicated in parenthesis.

- 1a.** Gill membranes not broadly united to isthmus → **2**
- 1b.** Gill membranes broadly united to isthmus → **26**
- 2a.** No fleshy papillae at anterior end of isthmus *Eschmeyer nexis*
(incertae sedis)
- 2b.** A fleshy papillae at anterior end of isthmus → **3**
- 3a.** Frontals, parietals, and infraorbital bones heavily armored; with a wide depression in interorbit; pelvic-fin insertion well behind pectoral-fin base *Peristrominous dolosus*
- 3b.** Frontals, parietals, and infraorbital bones not heavily armored; depression in interorbit narrow or non-existent; pelvic-fin insertion anterior or just behind pectoral-fin base → **4**
- 4a.** Anus just behind pelvic fins, far forward of anal-fin origin *Prosoproctus pataecus*
- 4b.** Anus slightly before anal-fin origin → **5**
- 5a.** Three dorsal fins, scales on body form expanded spinous points; each scale forms a blade-like ridge *Neaploactis tridorsalis*
- 5b.** One or 2 dorsal fins, scales on body absent or form spinous points that are not expanded or blade-like → **6**
- 6a.** Anteriormost 3 dorsal-fin spines form small fin that originates over or immediately behind eye and is widely separated from remainder of fin → **7**
- 6b.** Dorsal fin continuous or nearly so, without small, separate fin over eye → **10**
- 7a.** Body smooth, covered with numerous elongate cirri, especially anteriorly; lacrimal weakly ossified, without spine *Sthenopus mollis*
- 7b.** Body covered with numerous scales that form spinous points; lacrimal with 2 strong sharp spines (*Xenaploactis*)
- 8a.** Interorbit with ridges nearly parallel; body depth less than 1/3 of standard length; dorsal fin with III spines, followed by IX spines and 8 or 9 soft rays (based on limited material; some variation to be expected) *Xenaploactis cautes*
- 8b.** Interorbit with ridges divergent anteriorly, convergent over middle of orbit, divergent posteriorly; body depth equal to or greater than 1/3 of standard length; dorsal fin with III spines, followed by X spines and 8 or 9 soft rays (based on limited material; some variation to be expected) → **9**
- 9a.** Second infraorbital bone with 1 or 2 spines; pore of infraorbital lateral-line canal at second infraorbital bone a simple obscure pore; body depth greater than 1/3 of standard length; no finger-like cirri above uppermost preopercular lateral-line pores; dorsal fin with III spines, followed by X spines and 9 soft rays; anal fin with I spine and 10 soft rays (based on limited material; some variation to be expected) *Xenaploactis asperrima*
- 9b.** Second infraorbital bone without spines; pore of infraorbital lateral-line canal at second infraorbital bone a prominent elongate slit; body depth equal to 1/3 of standard length; finger-like cirri present above uppermost preopercular lateral-line pores; dorsal fin with III spines, followed by X spines and 8 soft rays; anal fin with I spine and 9 soft rays (based on limited material; some variation to be expected) *Xenaploactis anopta*
- 10a.** Pelvic fins with I spine and 3 soft rays → **11**
- 10b.** Pelvic fins with I spine and 2 (1) soft rays → **19**

- 11a.** Interorbital ridges run in parallel or converge posteriorly (*Cocotropus*) → 12
- 11b.** Interorbital ridges diverge strongly posteriorly (*Paraploactis*) → 16
- 12a.** Total dorsal-fin elements 24 (i.e. XIII spines and 11 soft rays); pectoral-fin rays 11 (based on limited material; some variation to be expected); prickles on body greatly reduced and widely spaced *Cocotropus echinatus*
- 12b.** Total dorsal-fin elements less than 24 (i.e. XII to XIII spines plus 8 to 10 soft rays); pectoral-fin rays 12 to 14; prickles on body relatively large, densely covering head and body → 13
- 13a.** Upper jaw relatively short, 10 to 11% of standard length; a stubby fleshy cirrus near distal end of maxilla; anal fin with I spine and 8 or 9 soft rays *Cocotropus altipinnis*
(Lord Howe Island, Kermadec Islands; not yet recorded from the area)
- 13b.** Upper jaw relatively long, 12 to 14% of standard length; no stubby fleshy cirrus near distal end of maxilla; anal fin with II spines and 7 to 9 soft rays → 14
- 14a.** First dorsal-fin spine relatively short, 20 to 21% of standard length; second dorsal-fin spine relatively short, 19 to 20% standard length *Cocotropus dermacanthus*
- 14b.** First dorsal-fin spine relatively long, 22 to 31% of standard length; second dorsal-fin spine relatively short, 23 to 26% standard length → 15
- 15a.** Dorsal fin with XIII spines and 9 or 10 soft rays; anal fin with II spines and 8 or 9 soft rays; snout in lateral profile notably concave; numerous short dark streaks along body, particularly between lateral-line scales *Cocotropus larvatus*
- 15b.** Dorsal fin with XII spines and 9 soft rays; anal fin with II spines and 7 soft rays; snout in lateral profile notably convex; few, if any, dark streaks on body *Cocotropus masudai*
(Hatizyo Island, Izu Islands; not yet recorded from the area)
- 16a.** Ventral surface of lower jaw smooth, not covered with prickles or papillose villi; mandibular cirri almost confined to outer margin → 17
- 16b.** Ventral surface of lower jaw covered with numerous prickles or papillose villi and with cirri on both inner and outer margins → 18
- 17a.** Minute cirri on snout, those in larger patch on tip of snout across lacrimal bone about equal in size to those in smaller patch on nasal bone; fleshy pad on isthmus with its width about 1/4 to 1/3 of its length *Paraploactis trachyderma*
- 17b.** Large, fleshy, and extensively branched cirri on snout; those in larger patches on tip of snout and across lacrimal bone large, those in smaller patch on nasal bone smaller; fleshy pad on isthmus with its width about 1/2 to 3/4 of its length *Paraploactis pulvinus*
- 18a.** No fleshy pad on isthmus *Paraploactis kagoshimensis*
- 18b.** Fleshy pad present on isthmus, its width about 1/4 to 1/3 of its length *Paraploactis intonsa*
- 19a.** Dorsal fin originates over dorsal ramus of preopercle *Adventor elongatus*
- 19b.** Dorsal fin originates over or before eye → 20
- 20a.** Lacrimal with 2 sharp spines, second large and extends down over maxilla; preopercle with 4 sharp spines; pelvic fins in front of pectoral-fin base (*Erisphex*) → 24
- 20b.** Lacrimal spines, if present, blunt, never sharp; preopercle with 4 or 5 blunt spines; pelvic fins just under or just behind pectoral-fin base → 21
- 21a.** Head 28 to 38% of standard length; body elongate; dorsal fin with XIII or XIV spines and 11 to 15 soft rays; anal fin usually with I spine and 11 to 14 soft rays *Aploactis aspera*
- 21b.** Head 35 to 40% of standard length; body oblong or gibbous; dorsal fin with XII or XIII spines and 8 to 10 soft rays; anal fin with I or II spines and 8 or 9 soft rays (*Kanekonia*) → 22

- 22a.** Body gibbous; greatest body depth 37 to 40% standard length; body covered with highly modified scales each of which forms a small spinous point; interorbital ridges thick and fused in middle of interorbit; dorsal margin of operculum inclined about 35° above horizontal *Kanekonia queenslandica*
- 22b.** Body oblong; greatest body depth 29 to 33% standard length; body without modified scales, except for a few at base of pectoral fins, on cheek, and sometimes on caudal peduncle; interorbital ridges thin and do not fuse in middle of interorbit; dorsal margin of operculum inclined about 15° above horizontal → 23
- 23a.** Head bones not strongly sculptured; dorsal profile of head sloping at about 40° to 45° from horizontal, not notably rounded; interorbital ridges converge and just meet posteriorly; space between ridges not expanded posteriorly; interorbital bones usually with only fine striations *Kanekonia florida*
(Japan; not yet recorded from the area)
- 23b.** Head bones, especially infraorbital series, strongly sculptured; dorsal profile of head notably rounded; interorbital ridges converge posteriorly but do not meet, notably sculptured; space between ridges narrow but expanded anteriorly and posteriorly *Kanekonia pelta*
- 24a.** Dorsal-fin rays 14 to 16; anal-fin rays 13 to 15; vertebrae 30 to 31 *Erisphex philippinus*
- 24b.** Dorsal-fin rays 9 to 13; anal-fin rays 9 to 11; vertebrae 27 to 29 (rarely 30) → 25
- 25a.** Head and body densely covered with modified scales, the largest of which forms a point that is about 3 to 6 times as long as wide at base; knob on second infraorbital bone almost always forms 2 blunt spines, one above the other *Erisphex potti*
(China, Korea, Japan; not yet recorded from the area)
- 25b.** Head and body covered with modified scales, the largest of which forms a point that is about 1 to 2 times as long as wide at base; knob on second infraorbital bone almost always forms a single spine (blunt in larger specimens). *Erisphex aniarus*
- 26a.** Body somewhat elongate, not compressed; dorsal fin with II spines, followed by VI spines and 6 soft rays; pelvic fin with I spine and 1 soft ray; vertebrae 21. *Matsubarichthys inusitatus*
- 26b.** Body notably compressed; dorsal fin with XI to XV spines and 7 to 9 soft rays → 27
- 27a.** Anal fin with I or II spines and 6 to 8 soft rays *Acanthosphelex leurynnis*
- 27b.** Anal fin with III or IV spines and 5 to 9 soft rays (*Bathyploactis*) → 28
- 28a.** Anal fin with III spines and 8 or 9 soft rays; pectoral-fin rays 10; 2 pairs of barbels on lower jaw *Bathyploactis curtisensis*
- 28b.** Anal fin with IV spines (rarely V) and 5 to 7 soft rays; pectoral-fin rays 11 or 12 (rarely 10); lower jaw without barbels or with a single pair of barbels. *Bathyploactis ornatissima*

List of species occurring in the area

A question mark indicates that presence in the area is uncertain.

Acanthosphelex leurynnis (Jordan and Seale, 1905)

Adventor elongatus (Whitley, 1952)

Aploactis aspera (Richardson, 1844)

Bathyploactis curtisensis Whitley, 1933

Bathyploactis ornatissima Whitley 1933

? *Cocotropus altipinnis* Waite, 1903

Cocotropus dermacanthus (Bleeker, 1852)

Cocotropus echinatus (Cantor, 1850)

Cocotropus larvatus Poss and Allen, 1987

? *Cocotropus masudai* Matsubara, 1943

- Erisphex aniarus* (Thompson, 1967)^{1/}
Erisphex philippinus (Fowler, 1938)
? *Erisphex pottii* (Steindachner, 1896)
Erisphex simplex Chen, 1981
Eschmeyer nexus Poss and Springer, 1983 (insertae sedis)
? *Kanekonia florida* Tanaka, 1915
Kanekonia pelta Poss, 1982
Kanekonia queenslandica Whitley, 1952
Matsubarichthys inusitatus Poss and Johnson, 1991
Neaploactis tridorsalis Eschmeyer and Allen, 1978
Paraploactis hongkongiensis (Chan, 1966)
Paraploactis intonsa Poss and Eschmeyer, 1978
Paraploactis kagoshimensis (Ishikawa, 1904)^{2/}
Paraploactis obbesi (Weber, 1913)
Paraploactis pulvinus Poss and Eschmeyer, 1978
Paraploactis trachyderma Bleeker, 1865
Peristrominous dolosus Whitley, 1952
Prosoproctus pataecus Poss and Eschmeyer, 1979
Sthenopus mollis Richardson, 1848
Xenaploactis anopta Poss and Eschmeyer, 1980
Xenaploactis asperrima (Günther, 1860)
Xenaploactis cautes Poss and Eschmeyer, 1980

Reference

- Poss, S.G. and W.N. Eschmeyer. 1978. Two new Australian velvetfishes, genus *Paraploactis* (Scorpaeniformes: Aploactinidae), with a revision of the genus and comments on the genera and species of the Aploactinidae. *Proc. Calif. Acad. Sci.*, 41(18):401-426.

1/ May be a complex of species including *Erisphex simplex* (Taiwan Province of China).

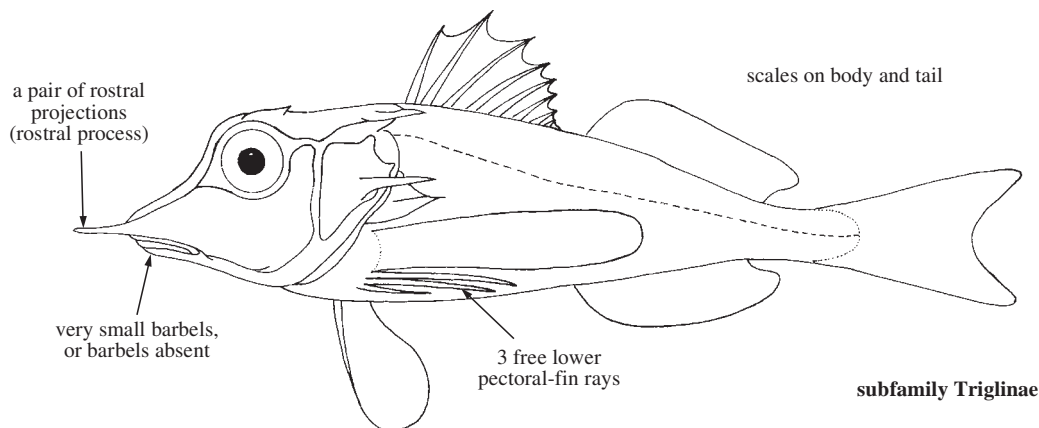
2/ May be a complex of species including *Paraploactis obbesi* and *P. hongkongiensis*.

TRIGLIDAE

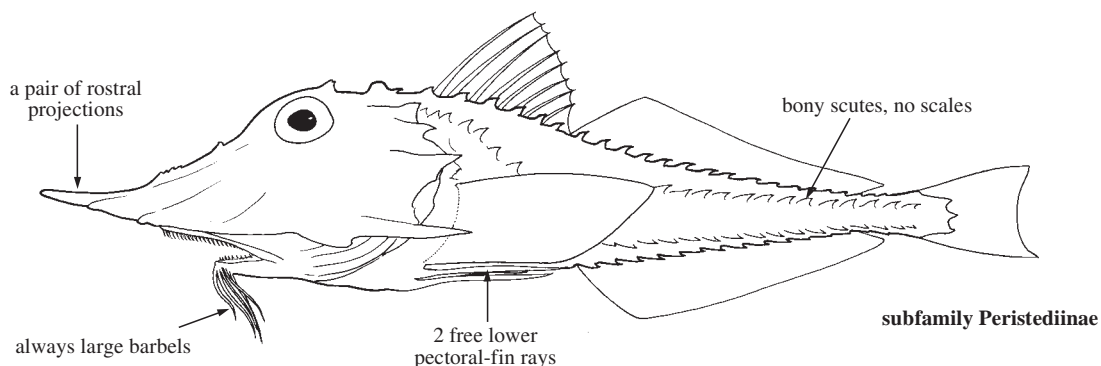
Gurnards, sea robins (also, armoured gurnards, armoured sea robins)

by W.J. Richards

Diagnostic characters (subfamily Triglinae): Body elongate. **Head large, bony, with a pair of rostral projections (rostral process), with spines but no scales or skin covering musculature on head. Very small barbels present on lower jaw in a few species.** Teeth present on upper and lower jaws. Two separate dorsal fins, first spinous; with either bony plates at spinous base or plates and spines along bases of both dorsal fins; single anal fin; **pectoral fins large, with 3 free lower rays**; pelvic fins with I spine and 5 soft rays. **Trunk and tail covered with scales of varying size; lateral line distinct, composed of tube-like scales to enlarged bony scales.** **Colour:** brownish, but often red or reddish when caught; body often with dark spots, blotches or saddles; first dorsal fin often with black or red blotch; pectoral fins dark but often with bright blue spots on black background and often with greenish or bluish margins.



Diagnostic characters (subfamily Peristediinae): Body elongate. **Head large, bony, with rostral projections, with spines but no scales or skin covering musculature on head. Large barbels on lower jaw.** Teeth present or absent on both jaws. Two separate dorsal fins, first spinous; single anal fin; **pectoral fins with 2 free lower rays**; pelvic fins with I spine and 5 soft rays. **Trunk and tail completely covered with large bony scutes.** **Colour:** red or reddish; some with dark spots or markings on body; pectoral fins generally dark without bright colours.



Habitat, biology, and fisheries: Members of the subfamily Triglinae are benthic species with several of commercial importance inhabiting continental shelves and insular areas from shallow water to 500 m. The Peristediinae comprise deep benthic species of limited commercial value inhabiting warm tropical seas of all oceans along continental shelf edge and slope and insular areas from 200 to 500 m.

Remarks: A recent study (Inamura, 1996) provides strong evidence that the Triglidae and Peristediidae should be recognized as separate families based principally on pelvic bone differences.

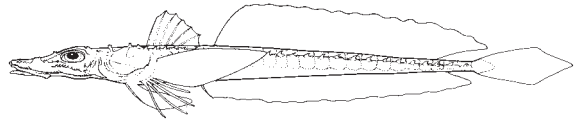
Similar families occurring in the area

Dactylopteridae: also with large bony head, but lack rostral projections and have no barbels; bony scutes always absent; pectoral fins much enlarged and brightly coloured, lacking free lower soft rays.

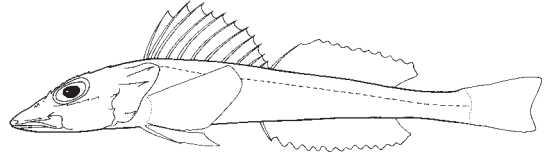
Hoplichthyidae: also have (3 or 4) free lower pectoral-fin rays, but are distinguished by having the large bony head extremely depressed, lacking rostral projections, and scales or bony scutes absent.

Bembridae: head also bony, but depressed; no free lower pectoral-fin rays.

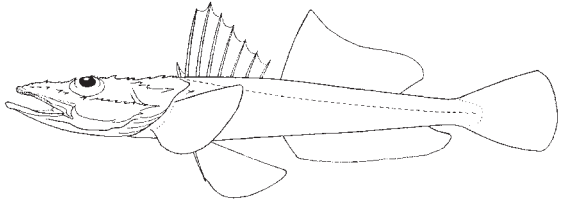
Platycephalidae: head also bony, but depressed; no free lower pectoral-fin rays.



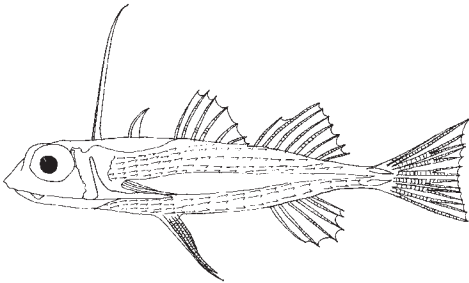
Hoplichthyidae



Bembridae



Platycephalidae



Dactylopteridae

Key to the genera of Triglidae occurring in the area

Note: the genus *Pterygotrigla* includes many species, several of which are undescribed. It is provisionally divided into subgenera which can be separated as follows:

1. Subgenus *Pterygotrigla* - nasal spine absent, opercular spine long, nuchal spine long, antrorse rostral spine absent, cleithral spine long and strong. Includes *P. andertonii* and *P. pauli*.
2. Subgenus *Otohime* - opercular spine long and slender, extending behind cleithrum, nasal spine absent, antrorse rostral spine absent, cleithral spine small if present (often absent). Includes *P. hemisticta* and *P. tagala*.
3. Subgenus *Bovitrigla* - nasal spine absent, opercular spine short, cleithral spine long and strong, rostral spine long, antrorse rostral spine absent. Includes *P. acanthomlopatе*.
4. Subgenus *Parapterygotrigla* - nasal spine present or absent, nuchal and cleithral spines long and strong, opercular spine small, rostral spines long in young and strong in large adults, antrorse rostral spine present in a single species (*P. multiocellata*). This subgenus may be divided into additional subgenera or species groups. Provisionally includes *P. hoplites*, *P. macrorhynchus*, *P. megalops*, *P. multiocellata*, and *P. ryukyuensis*.

1a. Pectoral fins with 3 free lower soft rays; body and tail covered with scales; no large barbels on lower jaw (Fig.1) (subfamily **Triglinae**) → 2

1b. Pectoral fins with 2 free lower soft rays; body and tail covered with large bony scutes; large barbels present on lower jaw (Fig. 2) (subfamily **Peristediinae**) → 5

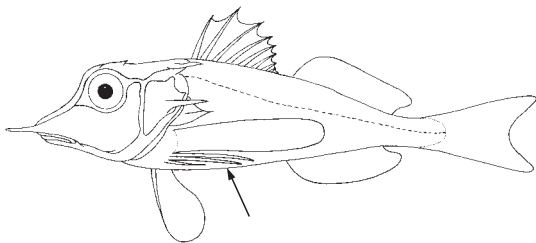


Fig. 1 Triglinae

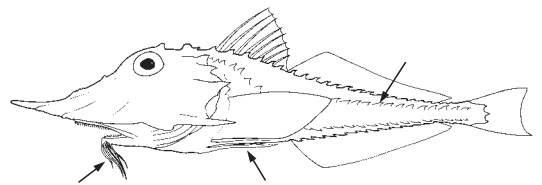


Fig. 2 Peristediinae

- 2a. Bony plates with sharp spines posteriorly along entire length of both dorsal fins (Fig. 3a) → 3
- 2b. Bony plates only along base of first dorsal fin (Fig. 3b) → 4

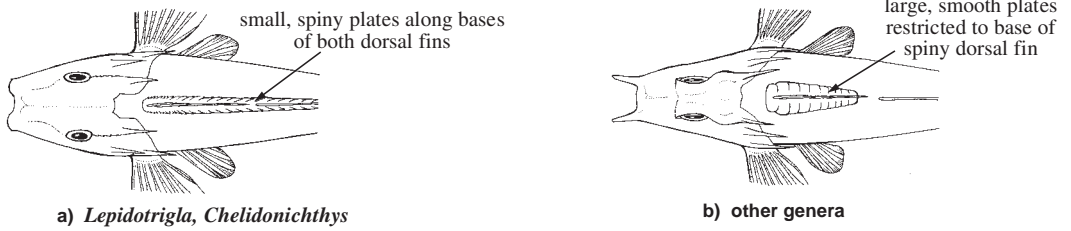


Fig. 3 head and anterior part of body (dorsal view)

- 3a. Trunk and tail scales large, usually less than 60 rows along lateral line; head usually with a deep occipital groove (Fig. 4a) *Lepidotrigla*
- 3b. Trunk and tail scales small, usually more than 60 rows along lateral line; head lacking deep occipital groove (Fig. 4b) *Chelidonichthys*

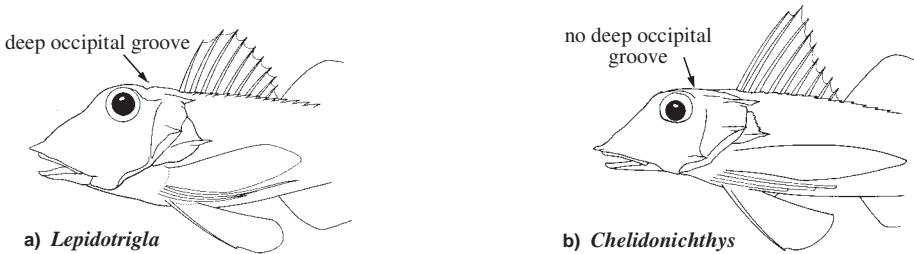


Fig. 4 head and anterior part of body (lateral view)

- 4a. Scales small, more than 60 rows along lateral line *Pterygotrigla*
(see note at beginning of identification key)
- 4b. Scales large, less than 60 rows along lateral line *Uradia*
- 5a. Upper jaw with villiform teeth → 6
- 5b. Upper jaw lacking teeth → 8
- 6a. Second dorsal fin with 14 soft rays *Gargariscus*
- 6b. Second dorsal fin with 20 or more soft rays → 7
- 7a. Rostral process short and triangular *Heminodus*
- 7b. Rostral process long and spatulate *Paraheminodus*
- 8a. Preopercular spine long well visible in dorsal view *Satyrichthys*
- 8b. Preopercular spine small, not visible in dorsal view *Peristedion*

List of species occurring in the area

The symbol is given when species accounts are included.

Subfamily TRIGLINAE

- Chelidonichthys kumu* (Cuvier, 1829)
- Chelidonichthys spinosus* (McClelland, 1844)
- Lepidotrigla abyssalis* Jordan and Starks, 1904
- Lepidotrigla alata* (Houttuyn, 1782)
- Lepidotrigla annamarae* Del Cerro and Lloris, 1997
- Lepidotrigla argyrosoma* Fowler, 1938
- Lepidotrigla deasoni* Herre and Kauffman, 1952

- Lepidotrigla eydouxi* Sauvage, 1878
Lepidotrigla japonica (Bleeker, 1857)
Lepidotrigla jimjoebob Richards, 1992
Lepidotrigla kanagashira Kamohara, 1936
Lepidotrigla lepidojugulata Li, 1981
Lepidotrigla longimana Li, 1981
Lepidotrigla macrobrachia Fowler, 1938
Lepidotrigla marisinensis Fowler, 1938
Lepidotrigla musorstom Del Cerro and Lloris, 1997
Lepidotrigla nana Del Cerro and Lloris, 1997
Lepidotrigla oglina Fowler, 1938
Lepidotrigla pectoralis Fowler, 1938
Lepidotrigla punctipectoralis Fowler, 1938
Lepidotrigla sereti Del Cerro and Lloris, 1997
 ↖ *Lepidotrigla spiloptera* Günther, 1880
Lepidotrigla venusta Fowler, 1938
Lepidotrigla spp. (possibly 20 undescribed forms and in need of revision)
- ↖ *Pterygotrigla acanthomoplate* (Fowler, 1938)
 ↖ *Pterygotrigla andertoni* Waite, 1910
 ↖ *Pterygotrigla hemisticta* (Temminck and Schlegel, 1843)
 ↖ *Pterygotrigla hoplites* (Fowler, 1938)
 ↖ *Pterygotrigla leptacanthus* (Günther, 1880)
 ↖ *Pterygotrigla macrorhynchus* (Kamohara, 1936)
 ↖ *Pterygotrigla megalops* (Fowler, 1938)
 ↖ *Pterygotrigla multiocellata* (Matsubara, 1937)
Pterygotrigla pauli Hardy, 1982
Pterygotrigla robertsi Del Cerro and Lloris, 1997
 ↖ *Pterygotrigla ryukyuensis* Matsubara and Hiyama, 1932
 ↖ *Pterygotrigla tagala* (Herre and Kauffman, 1952)
Pterygotrigla n. sp. (close to *Pterygotrigla tagala*)
Pterygotrigla n. sp. (close to *Pterygotrigla hemisticta*)
Pterygotrigla n. sp. (about 2 undescribed species)
Pterygotrigla n. sp. (several undescribed species)
- ↖ *Uradia macrolepidota* Kamohara, 1938

Subfamily PERISTEDEDIINAE

- ↖ *Gargariscus prionocephalus* (Dumeril, 1868)
Heminodus japonicus Kamohara, 1952
 ↖ *Heminodus philippinus* Smith, 1917
 ↖ *Paraheminodus murrayi* (Günther, 1880)
Peristedion amblygenys Fowler, 1938
Peristedion halyi (Alcock, 1899)
Persitedion investigatoris (Alcock, 1898)
 ↖ *Peristedion liorhynchus* Günther, 1871
Peristedion moluccense Bleeker, 1850
Peristedion nierstraszi Weber, 1913
Peristedion orientale Temminck and Schlegel, 1843
Peristedion riversandersoni (Alcock, 1899)
- Satyrichthys adeni* (Lloyd, 1907)
Satyrichthys amiscus (Jordan and Starks, 1904)
Satyrichthys clavilapis Fowler, 1938
Satyrichthys engyceros (Günther, 1871)
Satyrichthys hians (Gilbert and Cramer, 1897)
Satyrichthys isokawae Yatou and Okamura, 1985
Satyrichthys magnus Yatou, 1985
Satyrichthys orientale (Fowler, 1938)
Satyrichthys piercei Fowler, 1938

- Satyrichthys quadratorostratus* (Fourmanoir and Rivaton, 1979)
➡ *Satyrichthys rieffeli* (Kaup, 1859)
Satyrichthys serrulatus (Alcock, 1898)
Satyrichthys welchi (Herre, 1925)

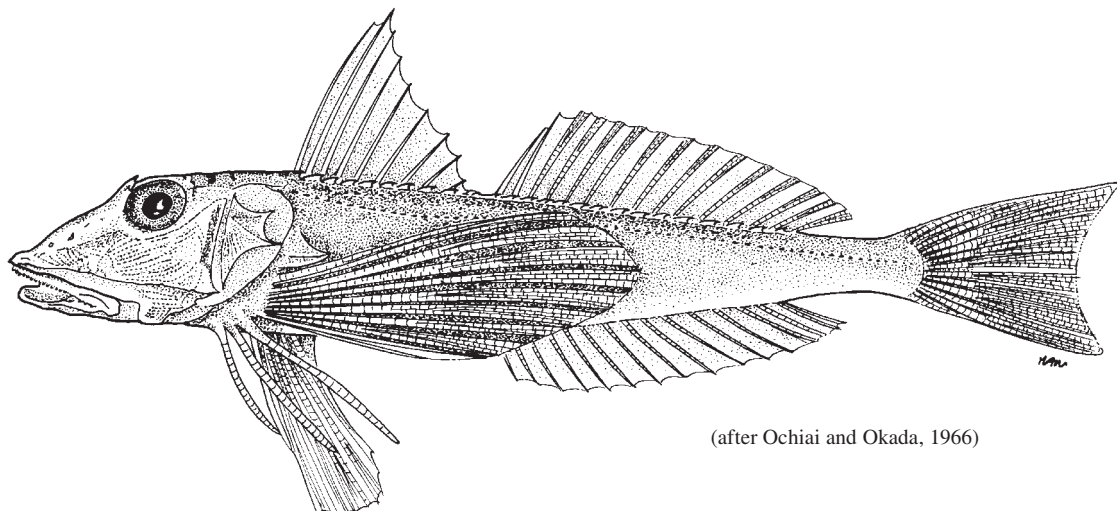
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Chelidonichthys kumu (Cuvier, 1829)

Frequent synonyms / misidentifications: *Trigla kumu* Lesson, 1830 / *Chelidonichthys spinosus* (McClelland, 1844).

FAO names: En - Bluefin gurnard; Fr - Grondin aile bleue; Sp - Testolín de aleta azul.



(after Ochiai and Okada, 1966)

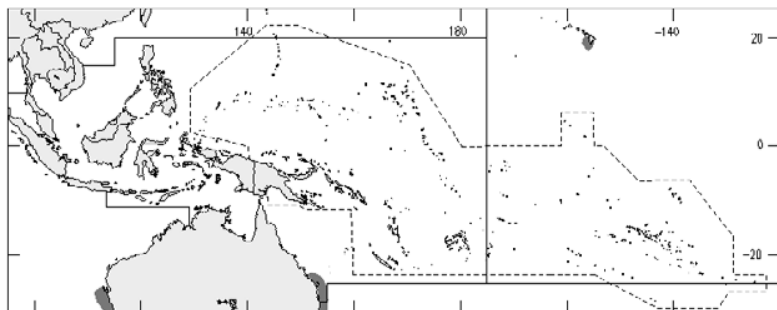
Diagnostic characters: Head large, triangular, with many ridges and spines, but without a fissure (occipital groove) on top of head. Eye diameter greater than interorbital width. First gill arch with 8 or 9 gill rakers. Soft dorsal- and anal-fin rays 14 to 17; bases of first and second dorsal fins with small plates bearing strong spines (often called bucklers and resulting from outgrowths of the pterygiophores). Body scales small, 70 to 80 along lateral line; breast scaleless. **Colour:** olive or brownish, becoming red when stressed; **lower half of inner part of pectoral fins with large black blotch surrounded by numerous pale spots (bluish in life, white or pale in preserved specimens).**

Size: Maximum standard length 40 cm.

Habitat, biology, and fisheries: A tropical and subtropical species. Found from estuaries to the edge of continental shelves generally over sandy bottoms. Separate statistics are generally not reported for this species except for Australia and New Zealand. Taken mainly by trawls off southern Africa, Australia, and New Zealand. Reported to be an excellent food fish. Dorsal-fin spines reported to be venomous.

Distribution: Known from South Africa and southern Mozambique, southern Australia, and New Zealand. One record from Hawaii and unconfirmed records from Chile. Because of Hawaiian record the Chilean record could be authentic.

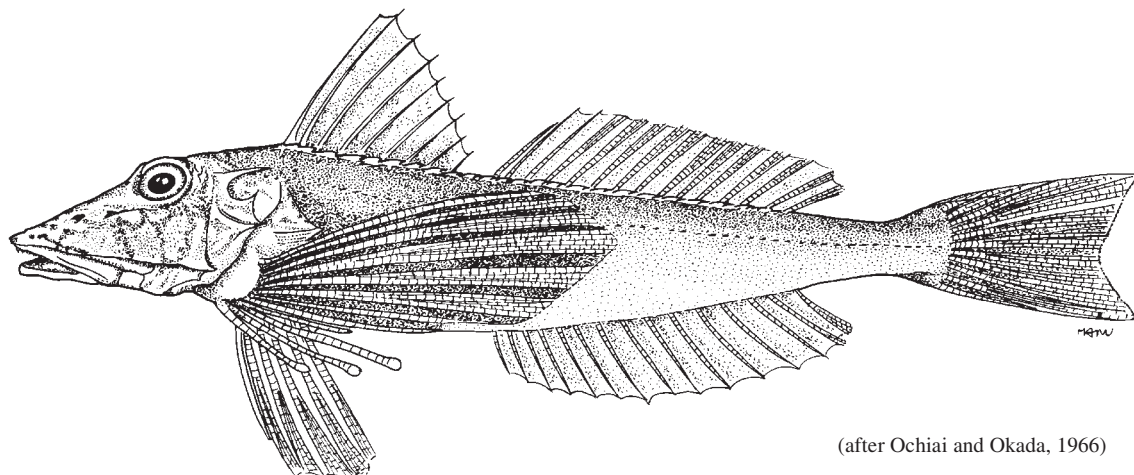
Remarks: A thorough study of the taxonomy of this species is called for throughout its range together with *Chelidonichthys spinosus* to resolve identification questions.



Chelidonichthys spinosus (McClelland, 1844)

Frequent synonyms / misidentifications: *Trigla spinosa* McClelland, 1844 / *Chelidonichthys kumu* (Lesson, 1830).

FAO names: En - Red gurnard.



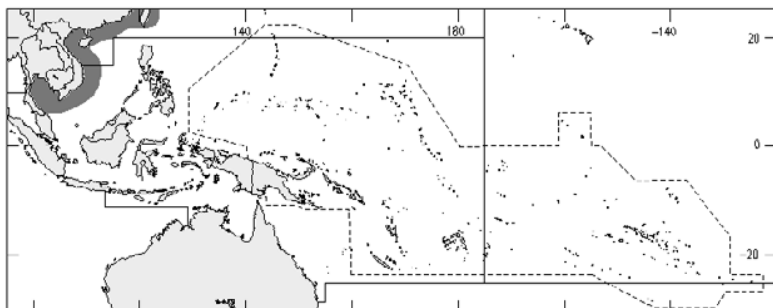
(after Ochiai and Okada, 1966)

Diagnostic characters: Head large, triangular, with many ridges and spines, but without a fissure (occipital groove) on top of head. Eye diameter greater than interorbital width. First gill arch with 8 or 9 gill rakers. Soft dorsal- and anal-fin rays 15 to 17; bases of first and second dorsal fins with small plates bearing strong spines (often called bucklers and resulting from outgrowths of the pterygiophores). Body scales small, 70 to 80 along lateral line; breast scaleless. **Colour:** olive or brownish, becoming red when stressed; **lower half of inner part of pectoral fins with scattered numerous pale spots (bluish in life, white or pale in preserved specimens); black blotch appears occasionally on lower inner part of pectoral fins.**

Habitat, biology, and fisheries: A tropical to warm-temperate species. Taken mainly in trawls throughout its range. Excellent food fish.

Distribution: Found in the China Sea, Yellow Sea, and Japan (principally west of Kyushu).

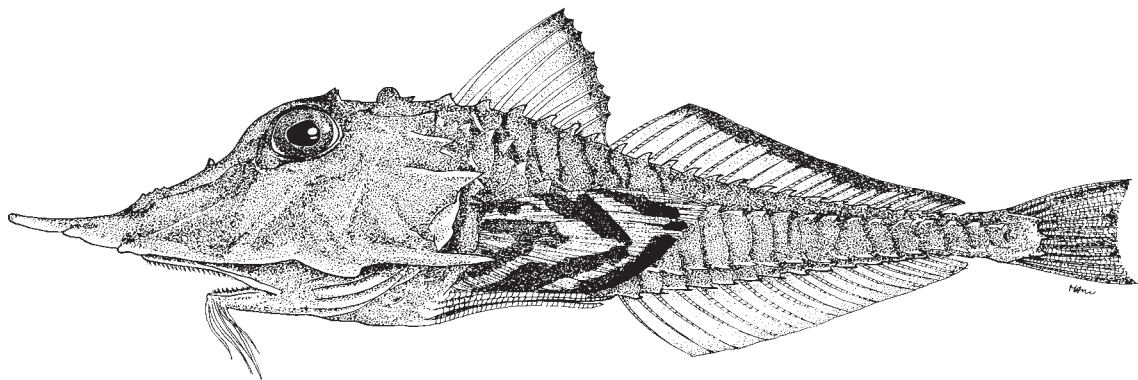
Remarks: A thorough study of the taxonomy of this species is needed throughout its range together with *Chelidonichthys kumu* to resolve identification questions.



***Gargariscus prionocephalus* Dumeril, 1868**

Frequent synonyms / misidentifications: *Peristedion undulatus* Weber, 1913; *Gargariscus semidentatus* Smith, 1917 / None.

FAO names: En - Jaggedhead armoured gurnard.

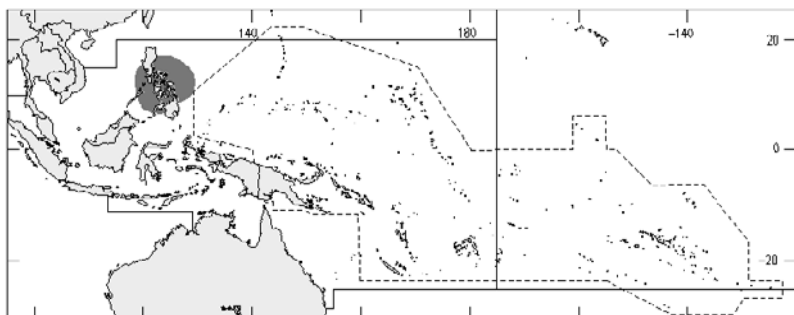


Diagnostic characters: Head large, expanded, and flattened with crenulations. Rostral process very broad and short. Preopercular spine sharp and strong. Filamentous barbel short, extending below eye. **Teeth on both jaws.** **Colour:** orange reddish in life with black bands in pectoral fins and black edge on dorsal fins.

Size: Maximum standard length 25 cm.

Habitat, biology, and fisheries: A deep-water species. No present fishery, but taken incidentally throughout its range. Bony scutes reduce commercial value.

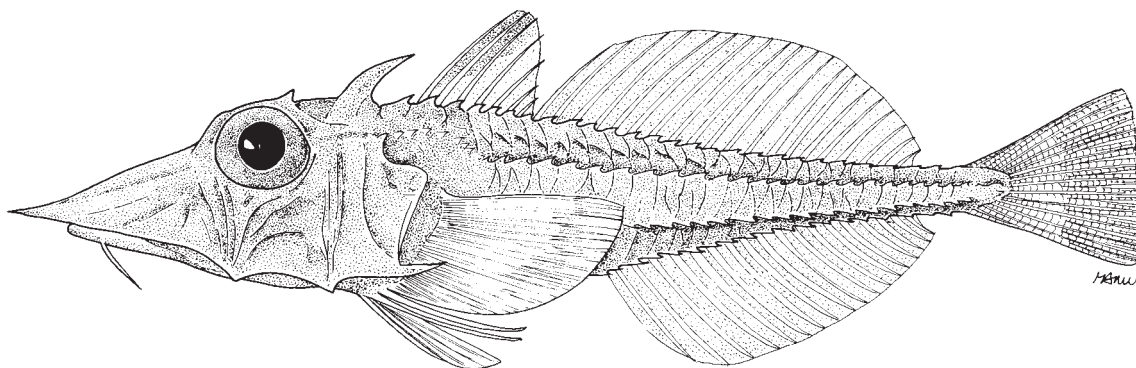
Distribution: Only known from the Philippines.



Heminodus philippinus Smith, 1917

Frequent synonyms / misidentifications: None / Other species of the subfamily Peristediinae.

FAO names: En - Philippine armoured gurnard.

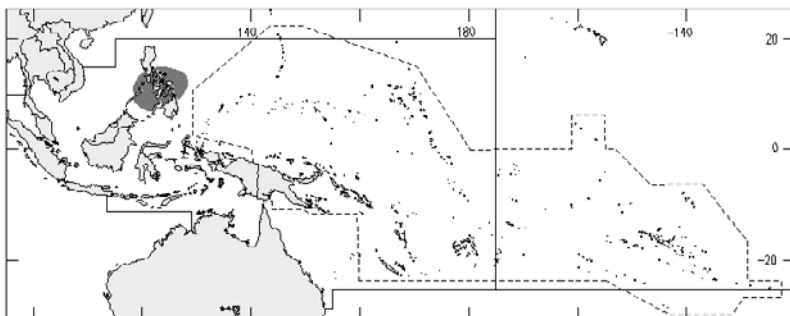


Diagnostic characters: Head large. Rostral process short. Filamentous barbel short. Teeth present on both jaws. **Colour:** preserved specimens pale, reddish in life.

Size: Maximum standard length 15 cm.

Habitat, biology, and fisheries: A deep-water species. No present fishery, but taken incidentally throughout its range. Bony scutes reduce commercial value.

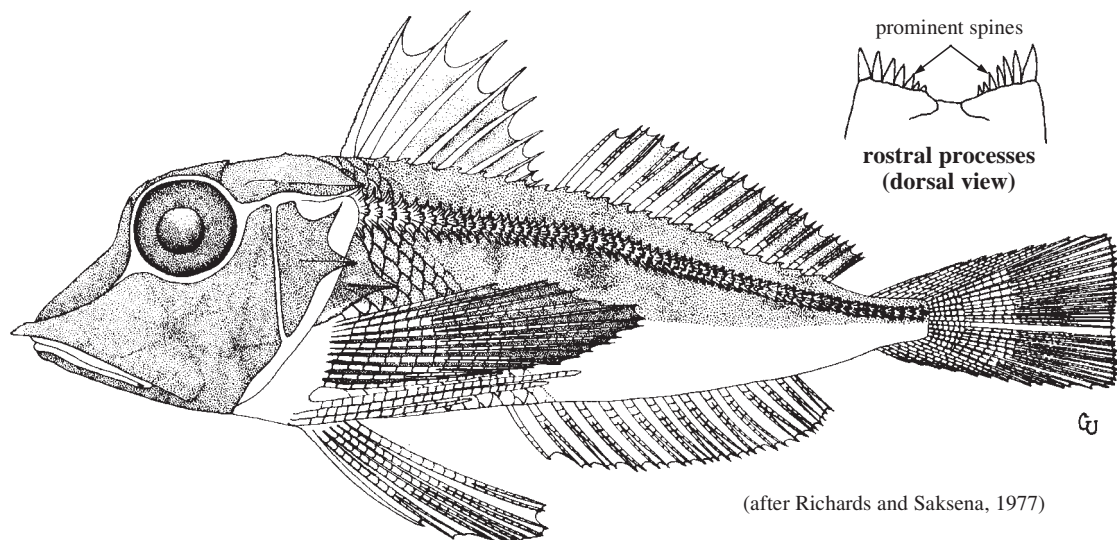
Distribution: Only known from the Philippines.



Lepidotrigla spiloptera (Günther, 1880)

Frequent synonyms / misidentifications: None / *Chelidonichthys kumu* (Lesson, 1830).

FAO names: En - Spotwing gurnard; Fr - Grondin aile tacheté; Sp - Cabete aleta manchada.



(after Richards and Saksena, 1977)

Diagnostic characters: Head large, triangular, with many ridges and spines, and a fissure on top of head, behind eyes (occipital groove). **Rostral process with several prominent spines.** Bases of first and second dorsal fins with many small plates bearing strong lateral spines. Large lateral-line scales, fewer than 70 rows; scale rows below lateral line 19 to 21; breast lacking scales; body scale attachment weak.

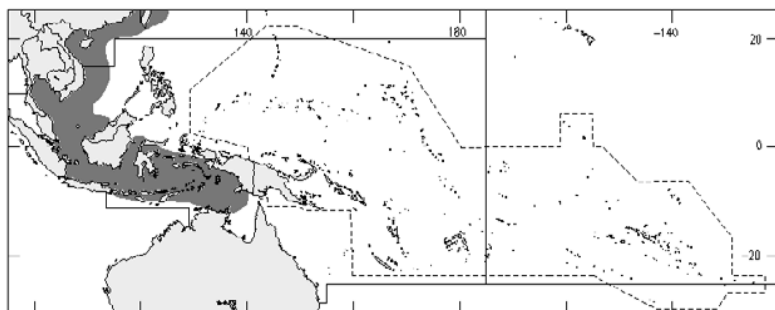
Colour: mostly red with definite silvery white breast, belly, and lower flank.

Size: Maximum standard length less than 11 cm.

Habitat, biology, and fisheries: A tropical to warm-temperate species. Taken mainly in trawls throughout its range. Excellent food fish.

Distribution: Found in the China Sea, Yellow Sea, and Japan (principally west of Kyushu). Also found off East Africa and northern Australia.

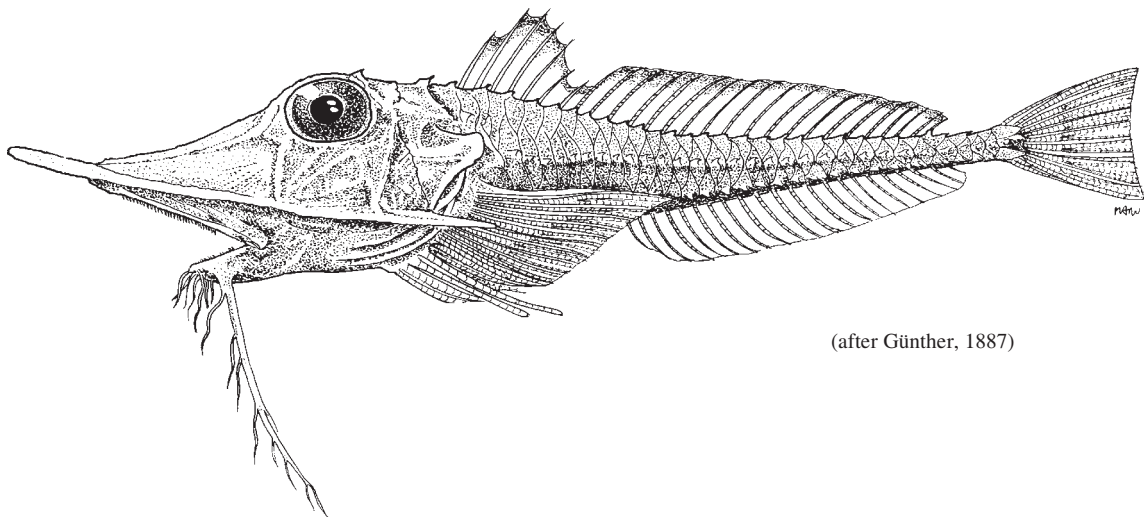
Remarks: As with *Chelidonichthys kumu* and *C. spinosus*, a thorough taxonomic study is needed throughout the range of *Lepidotrigla spiloptera*.



Paraheminodus murrayi (Günther, 1880)

Frequent synonyms / misidentifications: *Satyrichthys murrayi* (Günther, 1880) / *Satyrichthys* spp.

FAO names: En - Murray's armoured gurnard.



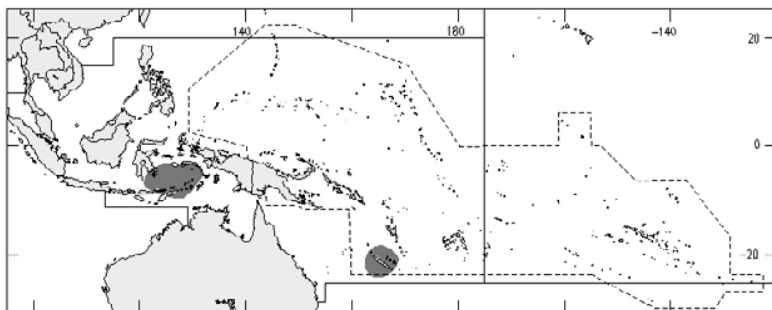
(after Günther, 1887)

Diagnostic characters: Head large, broadly expanded laterally. Rostral process long and flattened. Preopercular spine long. Filamentous barbel long, extending to first dorsal-fin origin. Teeth on both jaws. Dorsal-fin spines VII; second dorsal-fin rays 20 to 22; anal-fin rays 20 to 22; pectoral-fin rays 14 or 15. **Colour:** reddish in life, preserved specimens pale; edge of dorsal fins black.

Size: Maximum standard length 10 cm.

Habitat, biology, and fisheries: A deep-water species. No present fishery, but taken incidentally throughout its range. Bony scutes reduce commercial value.

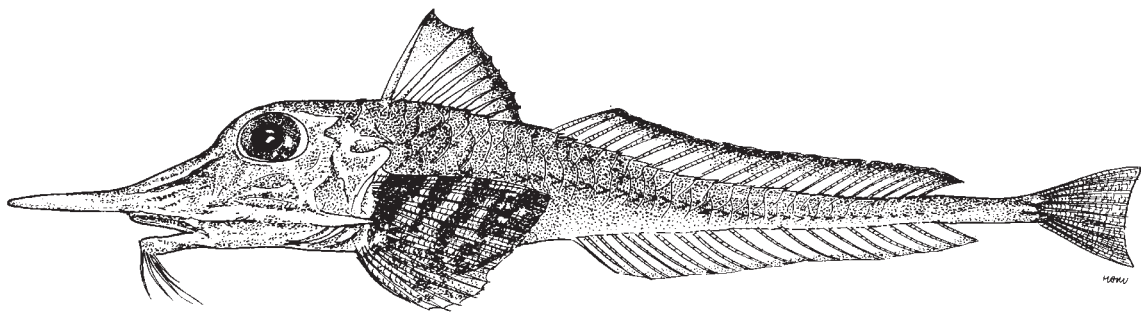
Distribution: Japan, Banda Sea, New Caledonia, and off Horn of Africa.



Peristedion liorhynchus Günther, 1871

Frequent synonyms / misidentifications: None / Other species of the subfamily Peristediinae.

FAO names: En - Smoothnose armoured gurnard.



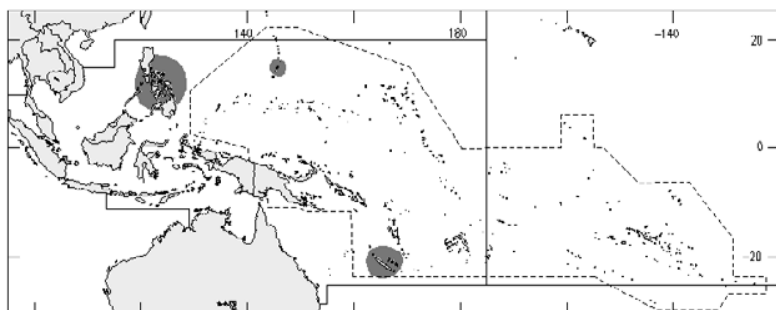
(after Okamura, 1985)

Diagnostic characters: Head large. Filamentous barbel moderately long, 12% of standard length. Dorsal-fin spines VIII; second dorsal-fin rays 21; anal-fin rays 20; attached pectoral-fin rays 11. **Colour:** mostly brownish red with **dark margin on dorsal fins and banded pectoral fins.**

Size: Maximum standard length 30 cm.

Habitat, biology, and fisheries: A deep-water species. No present fishery, but taken incidentally throughout its range. Bony scutes reduce commercial value.

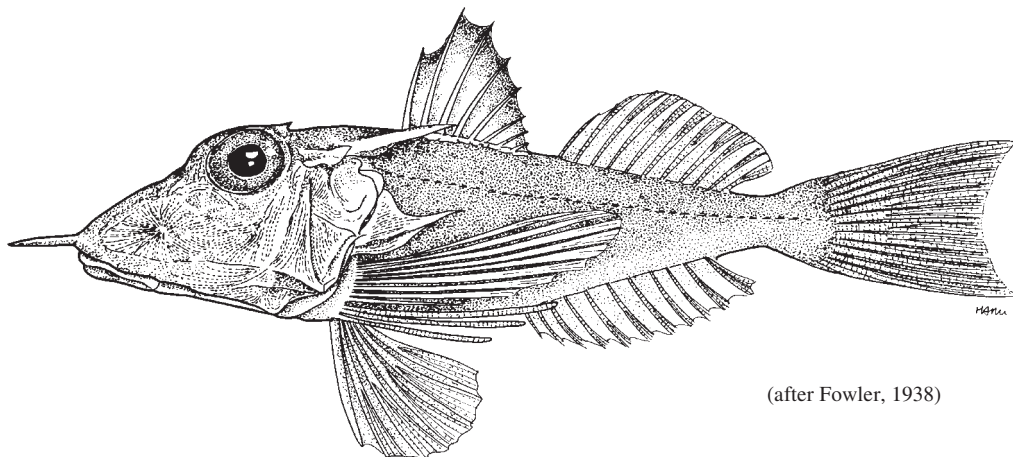
Distribution: Western Pacific and Indian Oceans.



Pterygotrigla acanthomoplate (Fowler, 1938)

Frequent synonyms / misidentifications: *Bovitrigla acanthomoplate* (Fowler, 1938) / None.

FAO names: En - Bullheaded gurnard.



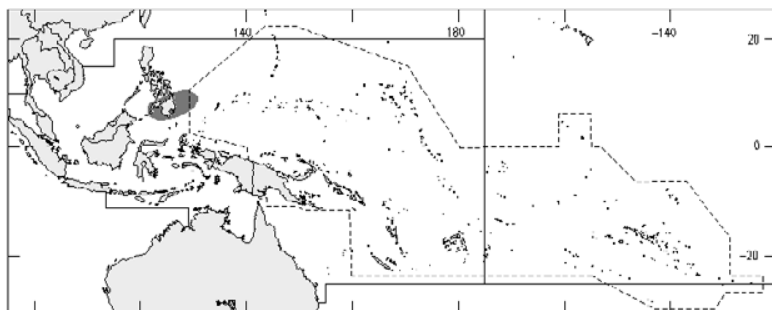
(after Fowler, 1938)

Diagnostic characters: Head large, triangular. **Nasal spine present**, opercular spine short, nuchal spine long, rostral spines moderately long, antrorse rostral spine absent, and cleithral spine long. Base of first dorsal fin with about 10 flat plates, **first plate extends in advance of first dorsal-fin spine**. Lateral-line scales small, about 50 rows. **Colour:** preserved specimens uniformly tan with no black spots on dorsum.

Size: Maximum standard length 12 cm.

Habitat, biology, and fisheries: A rare deep-water species. Incidentally caught by deep trawling or hook-and-line.

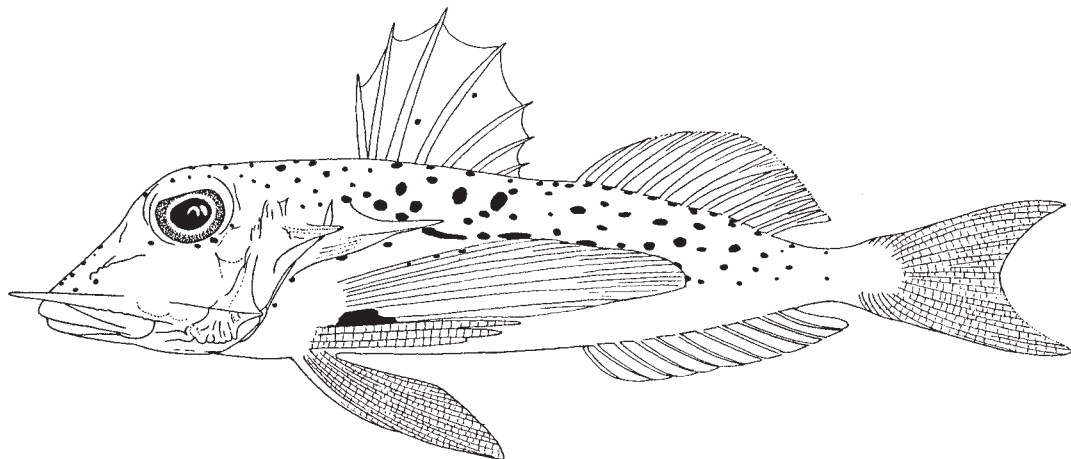
Distribution: Only known from northern Mindanao in the Philippines.



Pterygotrigla andertoni Waite, 1910

Frequent synonyms / misidentifications: None / *Pterygotrigla picta* (Günther, 1880).

FAO names: En - Spotted gurnard.



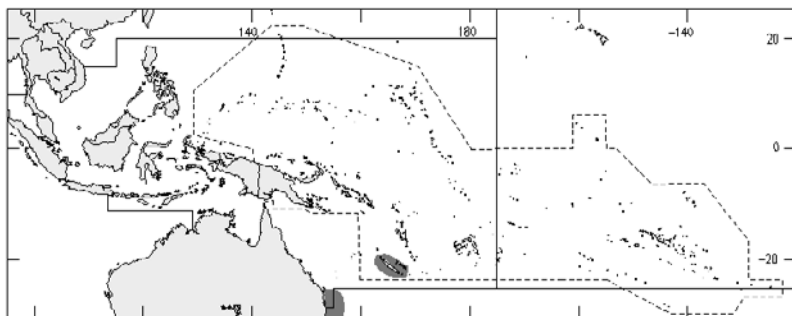
Diagnostic characters: Head large, triangular. No spines around orbit; nasal spine absent, opercular spine long, nuchal spine long, rostral spines strong but short, no antrorse rostral spine, cleithral spine long. Base of first dorsal fin with 10 flat plates, first plate extends in advance of first dorsal-fin spine. Lateral-line scales small, more than 70 rows. **Colour:** mostly red with prominent black spots; **head and dorsum covered with prominent black spots.**

Size: Maximum standard length 38 cm.

Habitat, biology, and fisheries: A tropical to warm-temperate species in generally deep water of 200 to 500 m, but shallower in New Zealand (90 m). Taken mainly in trawls off New Zealand and Australia. Excellent food fish but catches are rare.

Distribution: Occurs around both North Island and South Island of New Zealand, southeastern Australia, and north to New Caledonia (New Caledonia record from Del Cerro and Lloris, 1997, specimens not seen).

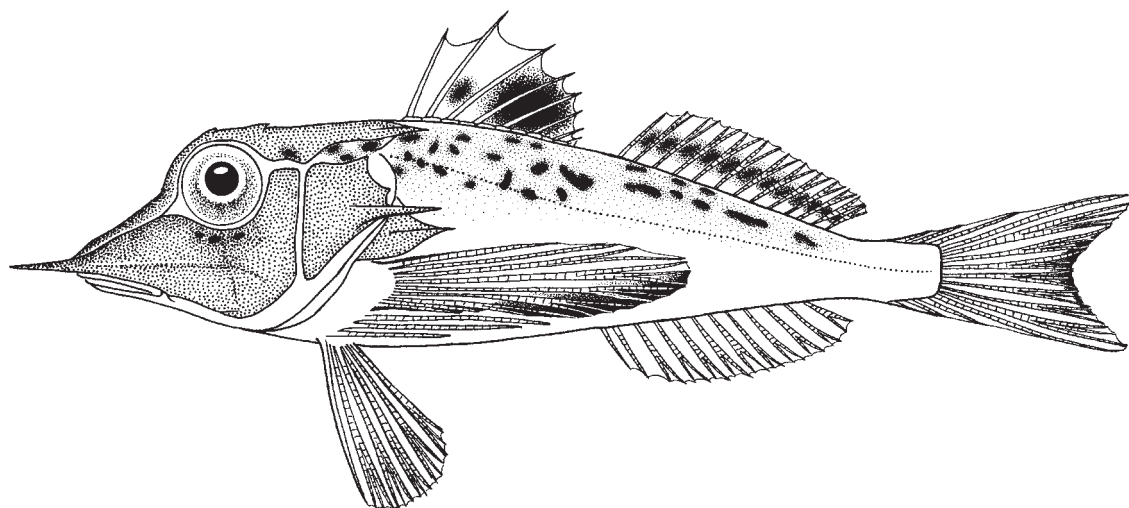
Remarks: The closely related *Pterygotrigla picta* occurs around islands and guyots off the coast of Chile and was considered to be the senior synonym of *P. andertoni* until recent revisionary studies.



Pterygotrigla hemisticta (Temminck and Schlegel, 1843)

Frequent synonyms / misidentifications: *Otohime hemisticta* (Temminck and Schlegel, 1843); *Trigla arabica* Boulenger, 1887; *Prionotus alepis* Alcock, 1889 / *Pterygotrigla picta* (Günther, 1880).

FAO names: En - Blackspotted gurnard; Fr - Grondin encre; Sp - Cabete tintero.



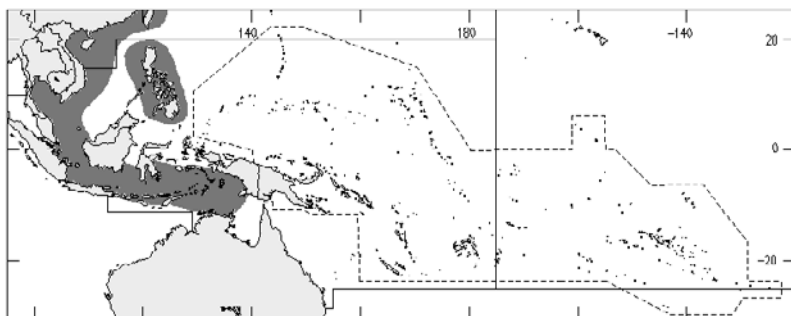
Diagnostic characters: Head large, triangular, with many ridges and spines. **Opercular spine long and slender, extending posteriorly of cleithrum;** nasal spine and antrorse rostral spine absent; cleithral spine small; rostral spines strong but short. Base of first dorsal fin with 10 flat plates, first plate extends in advance of first dorsal-fin spine. Pectoral fins with 12 connected rays. Lateral-line scales small, more than 70 rows. **Colour:** mostly red with prominent black spots and large black spot in first dorsal fin; **head and dorsum covered with prominent black spots; inner surface of pectoral fins with large dark area and diagonal band of separate white spots.**

Size: Maximum standard length 25 cm.

Habitat, biology, and fisheries: A wide depth range of 10 to 420 m. No present fishery, but taken incidentally throughout its range. Taken mainly in trawls. Excellent food fish but catches are rare.

Distribution: From Japan southwards to the China Sea, Philippines, and northern Australia.

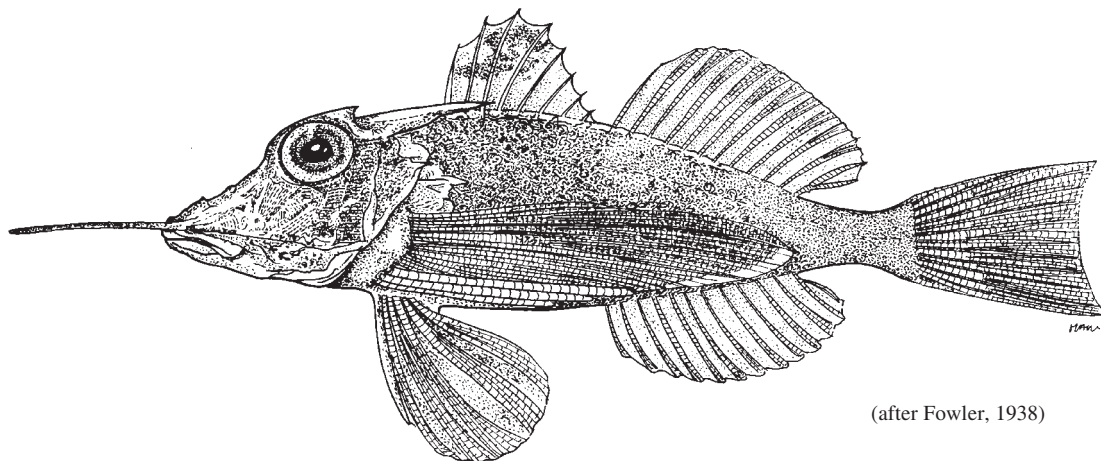
Remarks: A closely related species reported from the western Indian Ocean, *Pterygotrigla arabica* Boulenger, is distinguished from *P. hemisticta* by the white markings on the inner side of the pectoral fins, and other characters.



Pterygotrigla hoplites (Fowler, 1938)

Frequent synonyms / misidentifications: *Dixipichthys hoplites* Fowler, 1938 / None.

FAO names: En - Swordspine gunard.



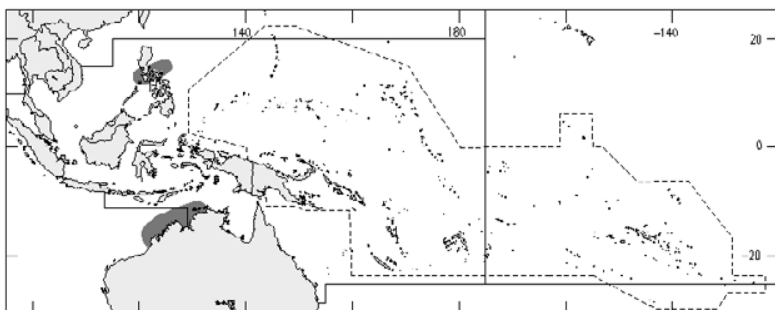
(after Fowler, 1938)

Diagnostic characters: Head large, triangular. **Nasal spine present**, opercular spine short, nuchal spine long, rostral spines very long, antrorse rostral spine absent, and cleithral spine long. Base of first dorsal fins with about 7 flat plates, **first plate not extending in advance of first dorsal-fin spine**. **Pectoral fins long, more than 50% of standard length**. Nape, breast, and belly scaly. Lateral-line scales small, more than 70 rows. **Colour:** preserved specimens uniformly tan; no spots on dorsum.

Size: Maximum standard length 10.7 cm.

Habitat, biology, and fisheries: A rare deep-water species. Incidentally caught by deep trawling or hook-and-line.

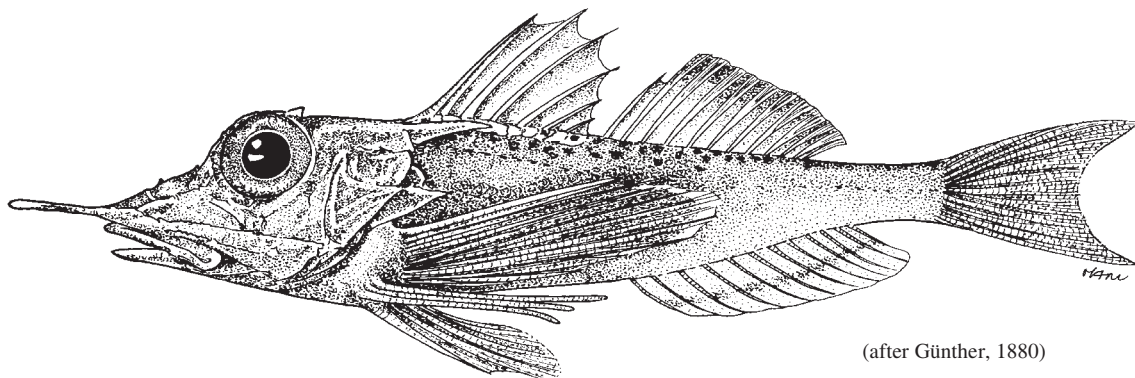
Distribution: Philippines and northwestern Australia.



Pterygotrigla leptacanthus (Günther, 1880)

Frequent synonyms / misidentifications: *Trigla leptacanthus* Günther, 1880; *Bovitrigla leptacanthus* (Günther, 1880) / None.

FAO names: En - Spotted bullheaded gurnard.



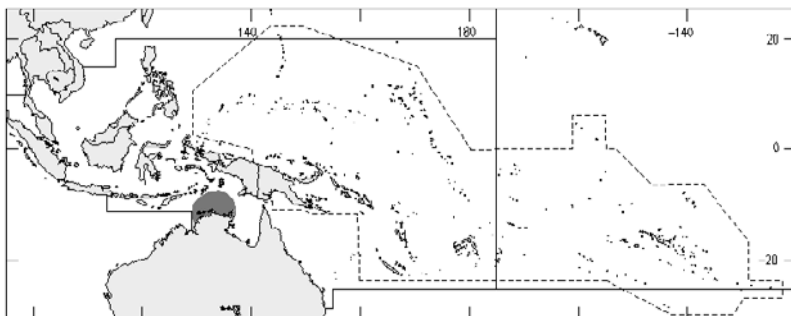
(after Günther, 1880)

Diagnostic characters: Head large, triangular. **Nasal spine present**, opercular spine short, nuchal spine long, rostral spines moderately long, antrorse rostral spine absent, and cleithral spine long. Base of first dorsal fin with about 10 flat plates, **first plate extends in advance of first dorsal-fin spine**. Pectoral fins moderate sized, 38 to 41% of standard length. Lateral-line scales small, more than 70 rows. **Colour:** preserved specimens uniformly tan with black spots on dorsum.

Size: Maximum standard length 12 cm.

Habitat, biology, and fisheries: A rare deep-water species. Incidentally caught by deep trawling or hook-and-line.

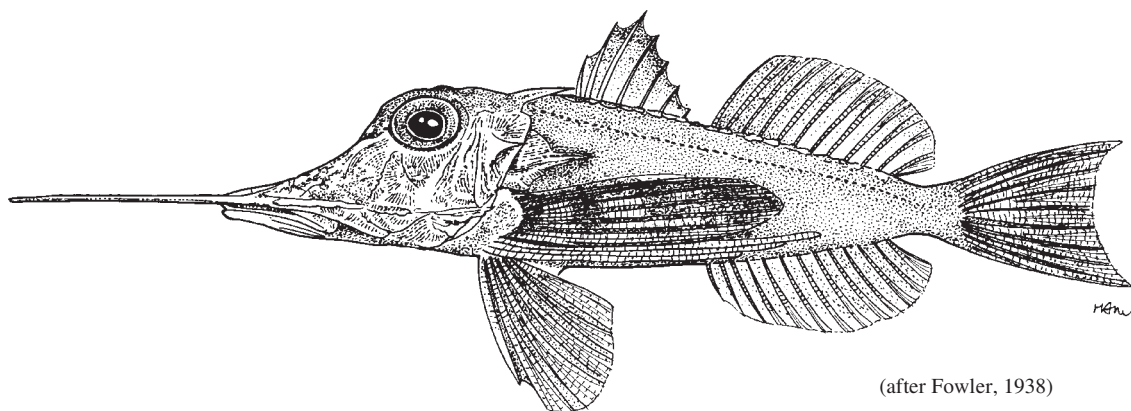
Distribution: Northwestern Australia, Arafura Sea.



Pterygotrigla macrorhynchus Kamohara, 1936

Frequent synonyms / misidentifications: *Parapterygotrygla macrorhynchus* (Kamohara, 1936); *Dixiphistes macrorhynchus* Fowler, 1938; *Dixiphichthys ferculum* Whitley, 1952 / None.

FAO names: En - Longnose gurnard.



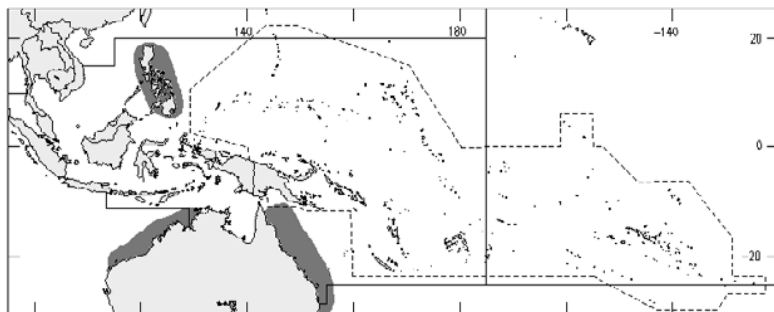
(after Fowler, 1938)

Diagnostic characters: Head large, triangular. **Snout long, 17 to 22% of standard length. Nasal spine present**, opercular spine short, nuchal spine long, rostral spines very long, antrorse rostral spine absent, and cleithral spine long. Base of first dorsal fin with 10 flat plates, first plate extends in advance of first dorsal-fin spine. Lateral-line scales small, more than 70 rows; breast and nape scaleless. **Colour:** preserved specimens with 3 dark bands on pectoral fins; no spots on dorsum.

Size: Maximum standard length 16 cm.

Habitat, biology, and fisheries: A rare deep-water species. Incidentally caught by deep trawling or hook-and-line.

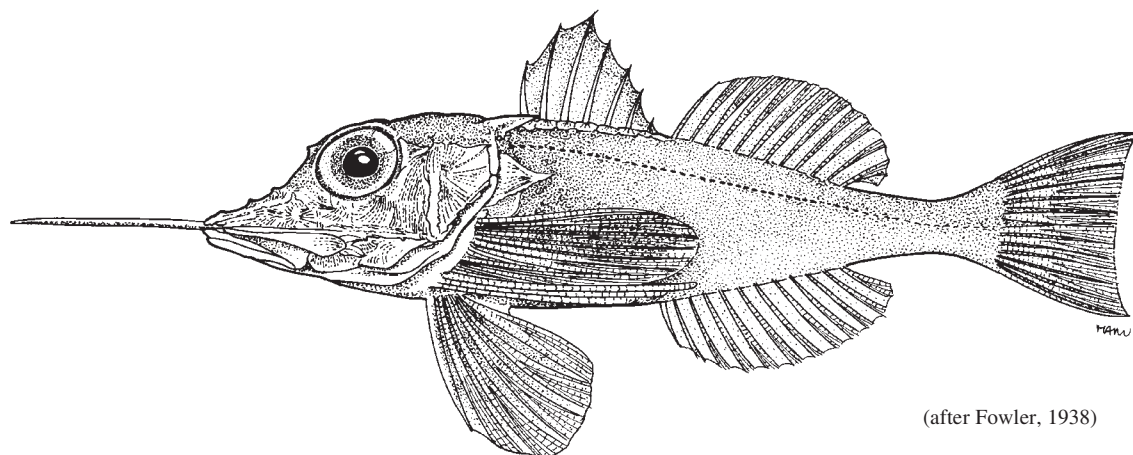
Distribution: Japan southward to the Philippines; also in western and eastern Australia and western Indian Ocean around Madagascar, Mozambique Channel, and Andaman Sea.



Pterygotrigla megalops (Fowler, 1938)

Frequent synonyms / misidentifications: *Parapterygotytrigla megalops* (Fowler, 1938); *Dixiphistops megalops* Fowler, 1938 / None.

FAO names: En - Bigeye gurnard.



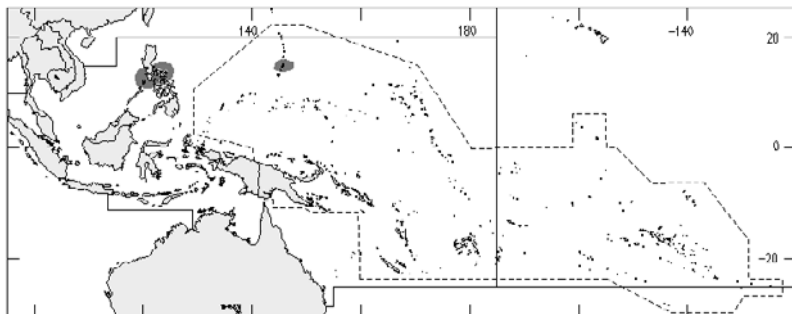
(after Fowler, 1938)

Diagnostic characters: Head large, triangular. **Nasal spine present**, opercular spine short, nuchal spine long, rostral spines very long, antrorse rostral spine absent, cleithral spine long. Base of first dorsal fin with 10 flat plates, first plate extends in advance of first dorsal-fin spine. **Pectoral fins short, 30 to 35% of standard length. Nape, breast, and belly scaly.** Lateral-line scales small, more than 70 rows. **Colour:** preserved specimens uniformly tan; no spots on dorsum.

Size: Maximum standard length 12 cm.

Habitat, biology, and fisheries: A rare deep-water species. Incidentally caught by deep trawling or hook-and-line.

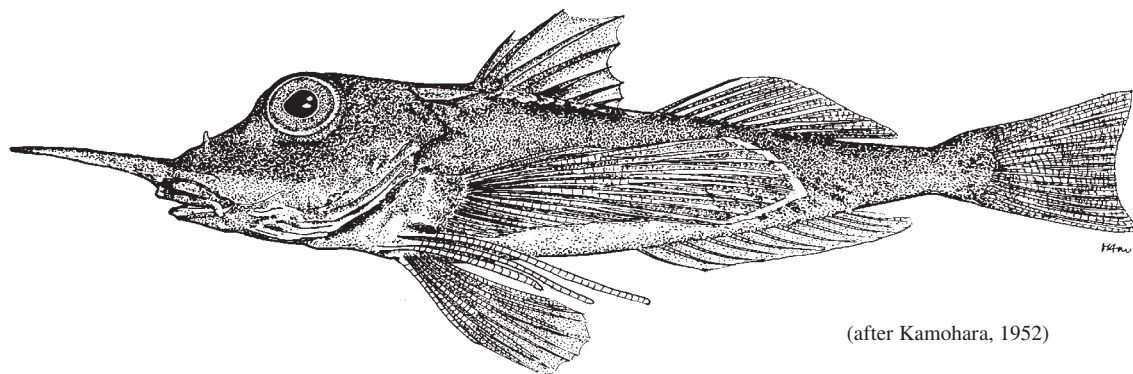
Distribution: Philippines and Saipan.



Pterygotrigla multiocellata (Matsubara, 1937)

Frequent synonyms / misidentifications: *Parapterygotrigla multiocellata* Matsubara, 1937 / None.

FAO names: En - Antrorse spined gurnard.



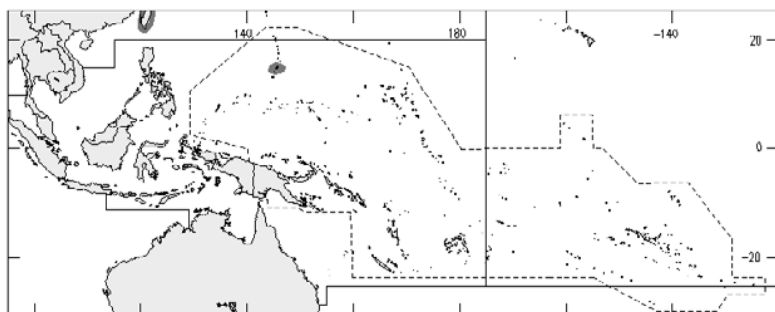
(after Kamohara, 1952)

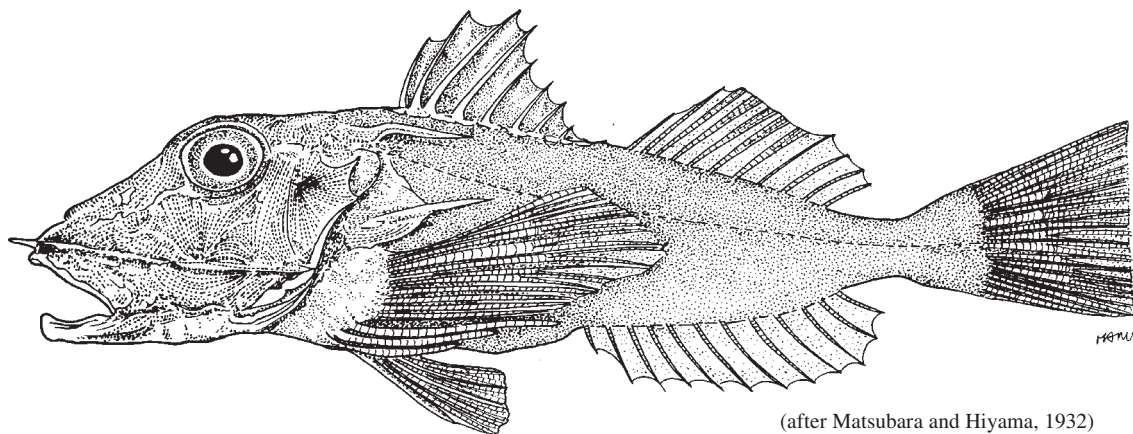
Diagnostic characters: Head large, triangular. No spines around orbit; nasal spine present, opercular spine short, nuchal spine long, rostral spines strong but short, **antrorse rostral spine present**, and cleithral spine long. Base of first dorsal fin with 10 flat plates, first plate extends in advance of first dorsal-fin spine. Lateral-line scales small, more than 70 rows. **Colour:** mostly red without black spots.

Size: Maximum standard length 24 cm.

Habitat, biology, and fisheries: A rare deep-water species. Incidentally caught by deep trawling or hook-and-line.

Distribution: Japan southward to Taiwan Province of China, eastward to Saipan.



Pterygotrigla ryukyuensis* Matsubara and Hiyama, 1932)*Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Ryukyu gurnard.

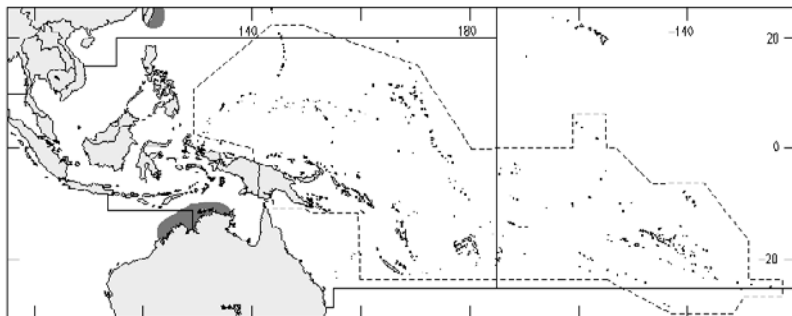
(after Matsubara and Hiyama, 1932)

Diagnostic characters: Head large, triangular. **Nasal spine absent**, opercular spine short, nuchal spine long, rostral spines very long, antrorse rostral spine absent, and cleithral spine long. Base of first dorsal fin with about 10 flat plates, **first plate extends in advance of first dorsal-fin spine**. Nape scaleless, breast, and belly scaly. Lateral-line scales small, more than 70 rows. **Colour:** preserved specimens uniformly tan; no spots on dorsum.

Size: Maximum standard length 25 cm.

Habitat, biology, and fisheries: A rare deep-water species. Incidentally caught by deep trawling or hook-and-line. Some specimens exhibit extreme hyperostosis of the head and dorsal-fin spines.

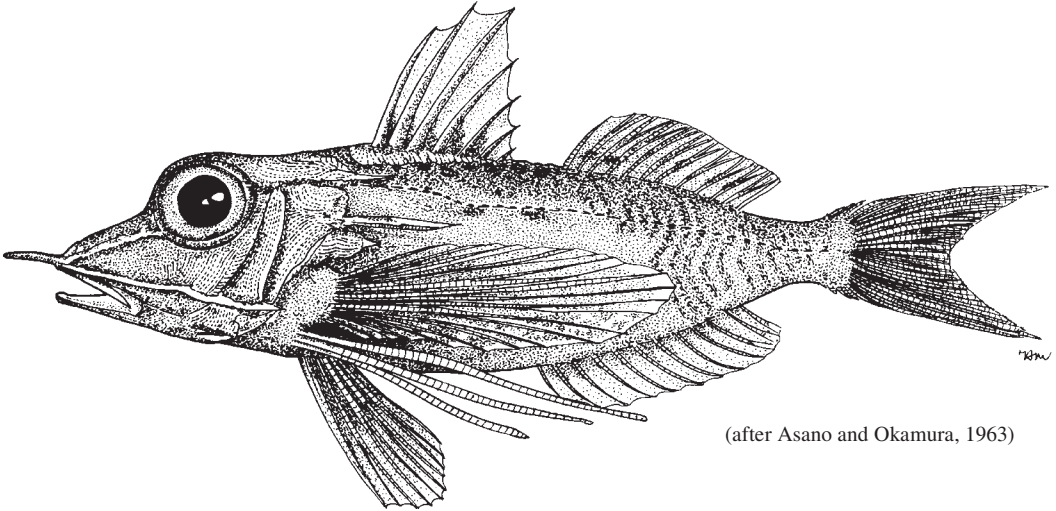
Distribution: Japan southward to Taiwan Province of China, and northwestern Australia.



Pterygotrigla tagala (Herre and Kaufman, 1952)

Frequent synonyms / misidentifications: *Pterygotrigla spinosa* Asano and Okamura, 1963 / *Pterygotrigla hemisticta* (Temminck and Schlegel, 1843).

FAO names: En - Tagala gurnard.



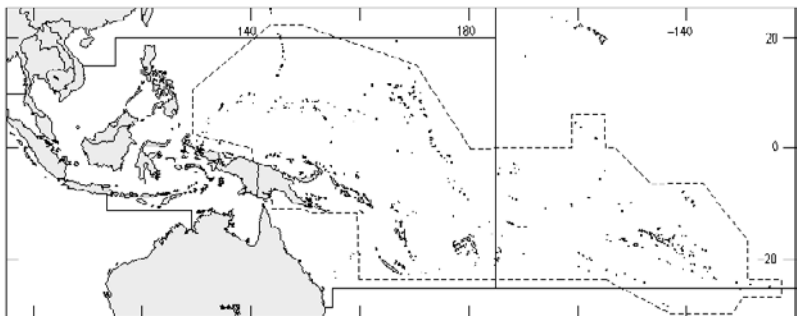
(after Asano and Okamura, 1963)

Diagnostic characters: Head large, triangular, with many ridges and spines. **Opercular spine long and slender, extending behind cleithrum**, nasal spine absent, antrorse rostral spine absent, cleithral spine very reduced or absent, with base barely visible. Rostral spines strong but short. Base of first dorsal fin with 10 flat plates, first plate extends in advance of first dorsal-fin spine. Lateral-line scales small, more than 70 rows. Pectoral fins with 13 connected rays. **Colour:** probably reddish in life as are congeners; preserved specimens brownish; **dorsum with a few dark spots; pectoral fins with black area bordered with white or light spots**, remainder dark.

Size: Maximum standard length 10 cm.

Habitat, biology, and fisheries: Taken in depths of 99 to 119 m. No present fishery, but taken incidentally throughout its range.

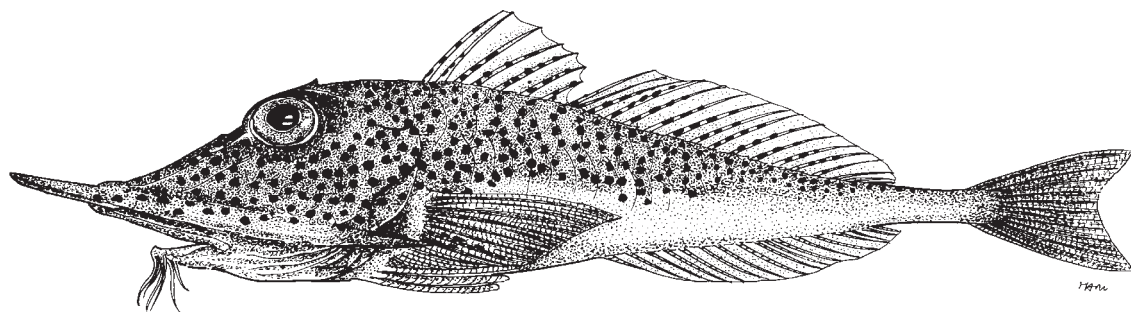
Distribution: Known only from Manila Bay (Philippines).



Satyrichthys riefflei (Kaup, 1859)

Frequent synonyms / misidentifications: None / Other species of the subfamily Peristediinae.

FAO names: En - Spotted armoured gurnard.



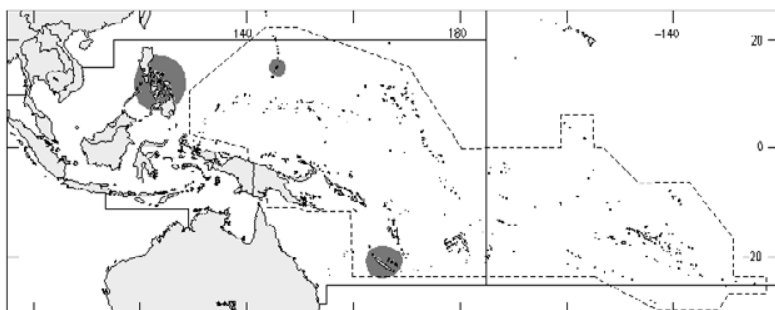
(after Okamura, 1985)

Diagnostic characters: Head large, with long preopercular spine and long flattened rostral process. Filamentous barbel moderately long, 15% of standard length. Dorsal-fin spines VII; second dorsal-fin rays 17. Anal-fin rays 17. **Colour:** mostly reddish with **dark spots on head and dorsum**.

Size: Maximum standard length 30 cm.

Habitat, biology, and fisheries: A deep-water species. No present fishery, but taken incidentally throughout its range. Bony scutes reduce commercial value.

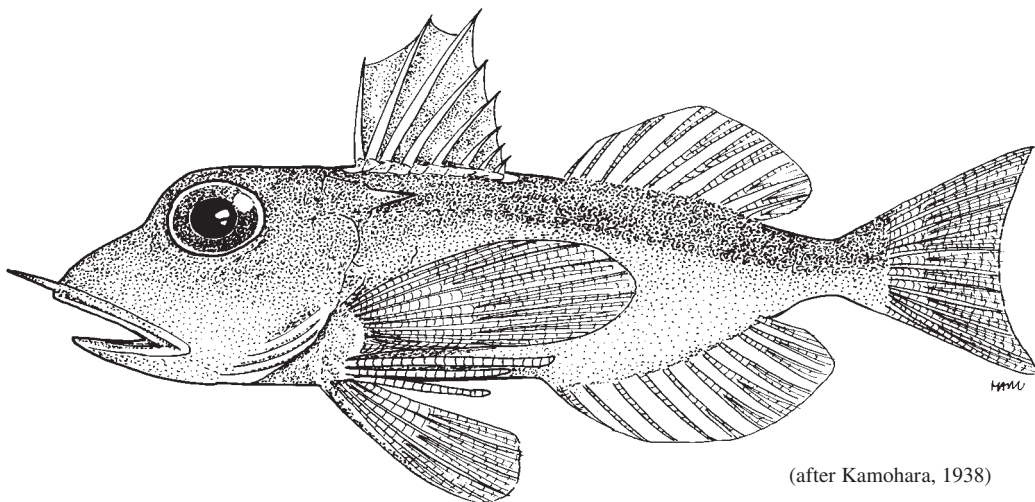
Distribution: Western Pacific and Indian oceans.



Uradia macrolepidota (Kamohara, 1938)

Frequent synonyms / misidentifications: *Pterygotrigla macrolepidota* (Kamohara, 1938) / None.

FAO names: En - Largescaled gurnard.



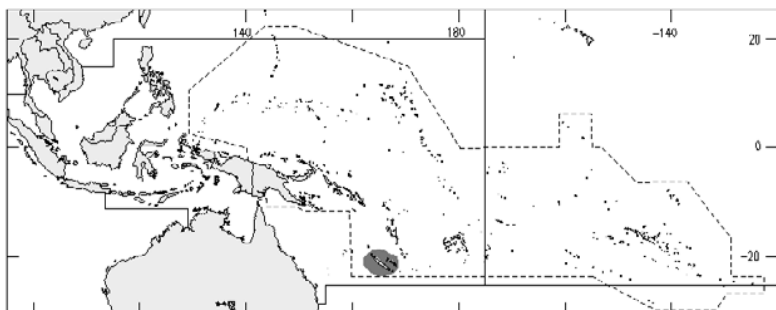
(after Kamohara, 1938)

Diagnostic characters: Head large, triangular, with large orbit. Rostral spines strong but short. Opercular spine short, nasal spine absent, antrorse rostral spine absent, and cleithral spine moderate. **Base of first dorsal fin with 10 flat plates, first plate extends in advance of first dorsal-fin spine.** Pectoral fins with 12 connected rays. **Large lateral-line scales, about 60 rows.** **Colour:** mostly reddish head and dorsum; flanks and belly white.

Size: Maximum standard length 15 cm.

Habitat, biology, and fisheries: A deep-water species. No present fishery, but taken incidentally throughout its range as bycatch.

Distribution: Tosa Bay, Japan and recent records from New Caledonia (Del Cerro and Lloris, ms; specimens not seen).

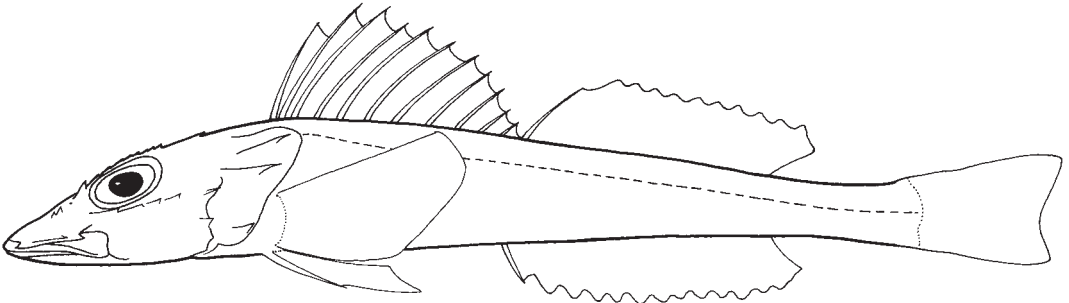


BEMBRIDAE

Deepwater flatheads

by S.G. Poss

Diagnostic characters: Small bottom fishes (size to nearly 30 cm standard length), with large and depressed heads and subcylindrical bodies. **Body without large scute-like spines.** Lower jaw superior or slightly subterminal. Eye moderately large, about 24 to 42% of head length. No iris lapit or ocular flaps. **Infraorbital bones forming a strong ridge, confluent with uppermost preopercular spine and bearing 4 to 6 spines.** Spines on head short or moderate, 8 to 11 above eye. Dorsal fin separated into a spinous and soft-rayed part. None to III spines present in anal fin. Pectoral fins without free rays. Lateral-line scales about 28 to 85. Scales on body otherwise ctenoid. **Colour:** usually red, orange, or light brown; some species with green, dark green, or black spots or blotches on body and fins; anal fins sometimes black or nearly so.

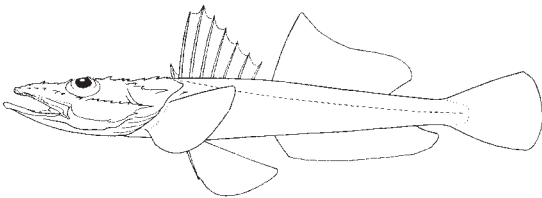


Habitat, biology, and fisheries: Bottom fishes living on the continental shelf at depths of 80 to 581 m. The family limits are not well understood and have been variously regarded as including from 5 to 13 species in 6 genera, with the most recent review (not including *Brachybembras*) restricting the family to include only species of the genus *Bembras*, with the monotypic *Parabembras curtus* being placed in a closely related family Parabembridae and species of *Bembradium* being placed in a family Plectrogeniidae.

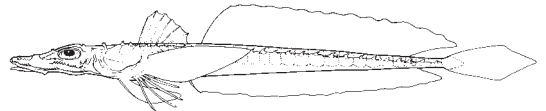
Similar families occurring in the area

Platycephalidae: first dorsal-fin spine relatively short, not broadly attached to the second dorsal fin-spine (long and broadly attached in Bembridae); pelvic fins inserted behind pectoral-fin insertion (immediately ventral to pectoral-fin insertion in Bembridae).

Hoplichthyidae: head extremely compressed with numerous minute head spines (head less compressed with fewer somewhat larger spines in Bembridae); spiny scutes along lateral line (absent in Bembridae); pectoral fins with 3 or 4 detached lower rays (no detached rays in Bembridae).



Platycephalidae



Hoplichthyidae

Key to the species of Bembridae occurring in the area

- 1a. Anal fin with III spines; lower jaws extended anterior to upper jaws; maxillae relatively narrow posteriorly. *Parabembras curtus*
- 1b. Anal fin without spines; lower jaws terminal, not extending anterior to upper jaws; maxillae relatively broad posteriorly → 2

- 2a. Lateral-line scales 28 to 32; pectoral-fin rays 21 to 30; head larger, 38 to 46% of standard length → 3
- 2b. Lateral-line scales 52 to 56; pectoral-fin rays 16 to 22; head smaller, 34 to 38% of standard length → 4
- 3a. Dorsal fin with VIII spines and 12 soft rays; lateral-line scales 32; pectoral-fin rays 21; 5 suborbital spines on ridge of second and third infraorbital bones . . . *Brachybembras aschemeieri*
- 3b. Dorsal fin with IX spines and 11 or 12 soft rays; lateral-line scales 28 to 29; pectoral-fin rays 25 to 30; 9 to 20 suborbital spines on ridge of second and third infraorbital bones *Bembradium furici*
- 4a. Broad subterminal vertical band in caudal fin; 54 to 62 scale rows above lateral line *Bembras macrolepis*
- 4b. Several narrow vertical bands in caudal fin or with a large dark spot, more densely pigmented in ventral lobe of fin; 77 to 85 scale rows above lateral line → 5
- 5a. Anal-fin rays 15; first gill arch with 3 or 4 gill rakers on upper limb *Bembras megacephala*
- 5b. Anal-fin rays usually 13 or 14 (rarely 15); first gill arch with 1 or 2 gill rakers on upper limb → 6
- 6a. Pectoral fins with 16 to 18 rays (usually 17); ratio of pectoral-fin length to caudal-fin length 0.88 to 1.05 *Bembras japonica*
- 6b. Pectoral fins with 17 to 19 rays (usually 18); ratio of pectoral-fin length to caudal-fin length 1.05 to 1.15 *Bembras longispinnis*

List of species occurring in the area

- Bembradium furici* Fourmanoir and Rivaton, 1979
- Bembras japonica* Cuvier, 1829
- Bembras longispinnis* Imamura and Knapp, 1998
- Bembras macrolepis* Imamura, 1998
- Bembras megacephala* Imamura and Knapp, 1998
- Brachybembras aschemeieri* Fowler, 1938
- ? *Parabembras curtus* (Temminck and Schlegel, 1843)^{1/}

Reference

Imamura, H. and L.W. Knapp. 1998. Review of the genus *Bembras* Cuvier, 1829 (Scorpaeniformes: Bembridae) with description of three new species collected from Australia and Indonesia. *Ichthyol. Res.*, 45(2):165-178.

^{1/} Reported from the area by some authors, but without documentation; no museum records have been located to confirm these reports.

PLATYCEPHALIDAE

Flatheads

by L.W. Knapp

Diagnostic characters: Body elongate, head moderately to strongly depressed. Mouth large, lower jaw longer than upper. Eye partly directed upward; orbit diameter subequal to or less than snout length. Small villiform or caniniform teeth on jaws, vomer, and palatines in most; stout canines present in a few species. Bony ridges of head usually bearing spines or serrations. Branchiostegal rays 7. Gill rakers few, relatively short or mere stubs; gill membranes free from isthmus. Two dorsal fins, well separated; spinous dorsal fin with VI to X spines, first spine short, isolated or scarcely connected to second spine; second dorsal fin with 10 to 15 soft rays; anal fin with 10 to 15 soft rays (no spines). Pelvic fins thoracic in position, behind pectoral-fin base, set far apart towards sides of body, with I spine and 5 soft rays. Vertebrae 27, usually 11+16 or 12+15. Lateral line complete, number of pored scales varying from as few as 28 in *Onigocia* to more than 100 in *Elates*; most species with a small spine or ridge on first few anterior lateral-line scales, and in a few species all or most lateral-line scales bear a spine. **Colour:** usually dark above and pale below, the dark colours with various shades of brown, grey, or black; brighter hues of reddish, purplish, or greenish in some species.

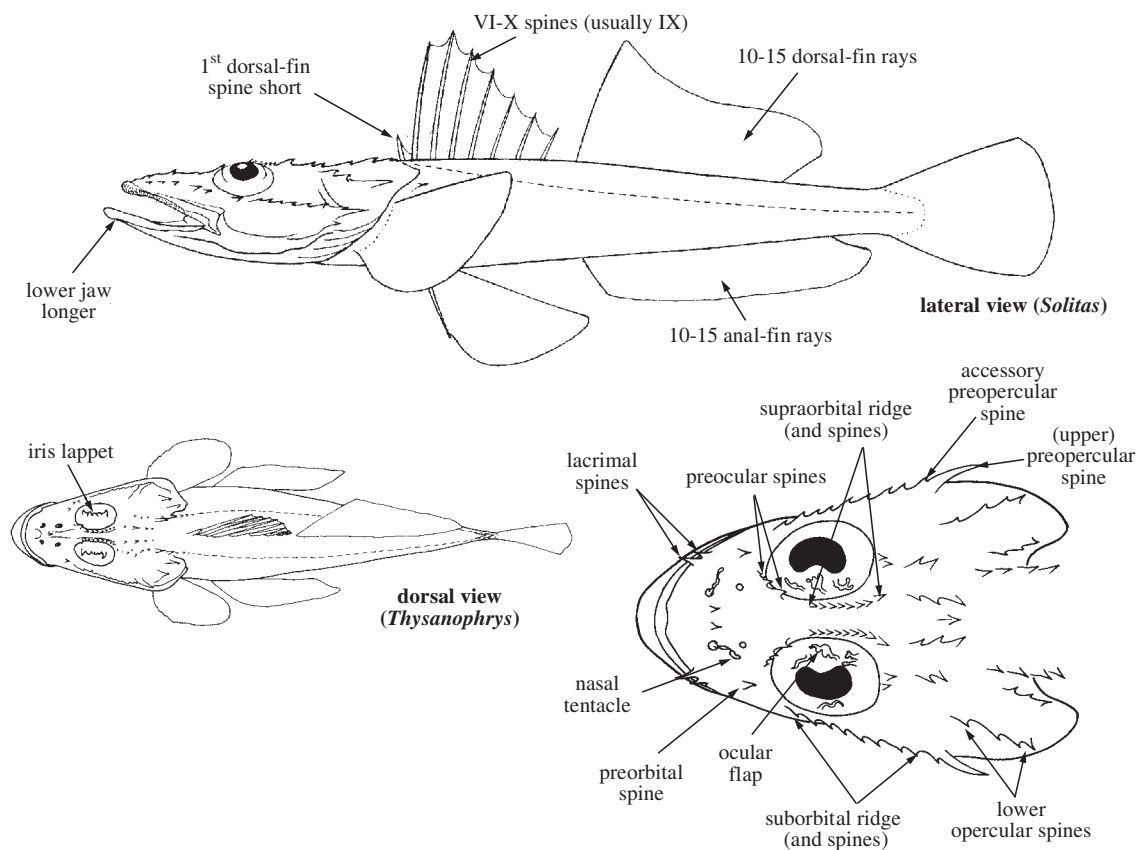


diagram of head spines used in the identification key and species accounts

(after Knapp in Smith and Heemstra, 1986)

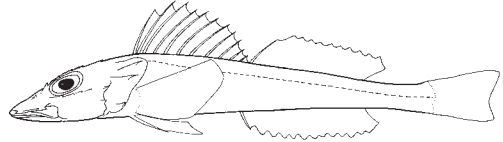
Habitat, biology, and fisheries: Benthic fishes frequently found on mud or sand bottoms of the continental shelf at depths to 300 m, most found at less than 100 m; a second group is associated with rocky shores or coral reefs. Many species are excellent eating, a few attain sizes of 70 cm or greater.

Similar families occurring in the area

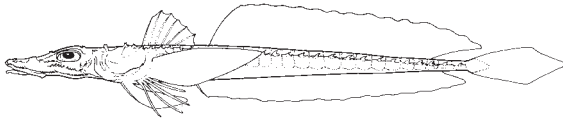
Bembridae: head less depressed; pelvic fins set close together; first dorsal-fin spine broadly attached to second spine.

Hoplichthyidae: superficially resemble platycephalids, but are mostly scaleless, with a row of large spiny scutes along the lateral line, and with 3 or 4 detached lower pectoral-fin rays.

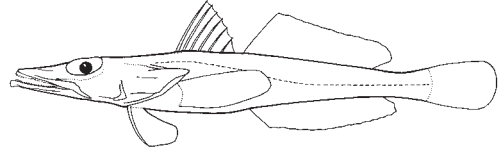
Percophidae: no bony ridges and spines on head; pelvic fins set close together, in advance of pectoral fins; first dorsal-fin spine broadly attached to second spine.



Bembridae



Hoplichthyidae



Percophidae

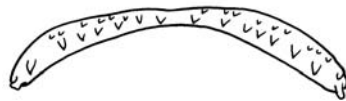
Identification note

Counts of dorsal-fin spines are presented as short formulas, with the first small, isolated spine counted separately (e.g. I,VIII). In a few species, the spiny dorsal fin is followed by a second small, isolated spine (e.g. I,VIII,I).

Key to the species of Platycephalidae occurring in the area

- 1a. A single, long preopercular spine; caudal fin forked, upper lobe longest, a single upper caudal-fin ray ending in elongate filament; dorsal-fin spines VI *Elates ransonnetii*
- 1b. Two or more preopercular spines; upper lobe of caudal fin not elongate, lacks elongate caudal-fin filament; dorsal-fin spines VII to X → 2

- 2a. Teeth on vomer in 1 transverse patch (Fig. 1a); 13 or more dorsal-fin rays; 2 preopercular spines, lower spine usually longest (*Platycephalus*) → 3



a)

- 2b. Teeth on vomer in 2 distinct patches (Fig. 1b); 12 or fewer dorsal-fin rays; 2 or more preopercular spines, upper spine longest → 5



b)

Fig. 1 teeth on vomer

- 3a. Caudal fin with 4 or more horizontal dark streaks, no yellow blotch; first gill arch with 3 or 4 gill rakers on upper limb, 10 to 12 on lower limb *Platycephalus arenarius*
- 3b. Caudal fin with 2 or 3 horizontal dark bars and a large yellow blotch; first gill arch with 1 to 3 gill rakers on upper limb, 6 to 10 on lower limb → 4
- 4a. First gill arch usually with 1 or 2 gill rakers on upper limb, 5 to 7 on lower limb; yellow blotch located towards central area of caudal fin *Platycephalus indicus*
- 4b. First gill arch usually with 1 to 3 gill rakers on upper limb, 7 to 10 on lower limb; yellow blotch located along upper margin of caudal fin *Platycephalus endrachtensis*

5a. Pored lateral-line scales 28 to 42; side of head uncarinate (lower edge of suborbital turned inward, not visible) (Fig. 2) (*Onigocia*) → 6

5b. Pored lateral-line scales 48 to 56 → 8

6a. Upper surface of eye without ocular flap; first gill arch without gill rakers on upper limb and 4 or 5 gill rakers on lower limb; lateral-line scales 29 to 33 *Onigocia pedimacula*

6b. Upper surface of eye bearing ocular flap (Fig. 2); first gill arch with 1 gill raker on upper limb, and 4 or 5 on lower limb; lateral-line scales 34 to 42 → 7

7a. A single preocular spine; suborbital ridge with a smooth notch below eye; antorbital margin of lacrimal bone with 2 antrorse (forward directed) spines *Onigocia macrolepis*

7b. Three or more preocular spines; suborbital ridge lacks notch; antorbital margin with 3 antrorse spines *Onigocia spinosa*

8a. All lateral-line scales bearing a stout spine (*Grammoplites*) → 9

8b. Lateral-line scales lack spines on posterior part of body → 10

9a. Interorbital width 9 to 13.1% of head length; lateral-line scale spines strong, extending beyond rear margin of scale on posterior part of body *Grammoplites scaber*

9b. Interorbital width 6.4 to 8.4% of head length; lateral-line scale spines weak, not reaching beyond rear margin of scale on posterior part of body *Grammoplites knappi*

10a. Diagonal scale rows slanting downward and backward above lateral-line usually exceed number of lateral-line scales by 5 or more (about equal in *Cymbacephalus beauforti* but pit present behind eye and rear edge of maxilla ends well in front of eye) → 11

10b. Diagonal scale rows slanting downward and backward above lateral line about equal to number of lateral-line scales, usually differing by only 1 or 2 scales → 17

11a. Upper preopercular-spine length approximately equal to second, no accessory spine on base; iris lappet of eye cirrose (Fig. 3a) (*Cymbacephalus*) → 12

11b. Upper preopercular-spine distinctly longer than second, accessory spine on base; iris lappet simple or bilobed (Fig. 3b, c) → 15

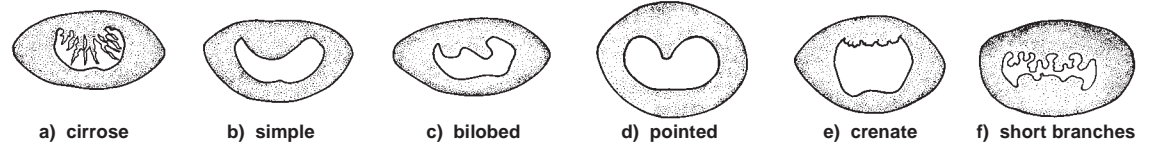


Fig. 3 various types of iris lappets

12a. No pit behind eye; soft dorsal- and anal-fin rays 12; caudal fin with a black streak along upper and lower edge *Cymbacephalus bosschei*

12b. A pit located behind upper rear edge of eye; soft dorsal- and anal-fin rays 11; caudal fin with a mottled pattern of dark blotches and light streaks. → 13

13a. Rear edge of maxilla ends well in front of eye; a series of papillae and cirri on upper surface of eye; number of oblique scale rows slanting backward above lateral line approximates number of pored lateral-line scales *Cymbacephalus beauforti*

13b. Rear edge of maxilla located below or behind front of eye; number of oblique scale rows usually exceeds number of pored lateral-line scales by 5 or more scales → 14

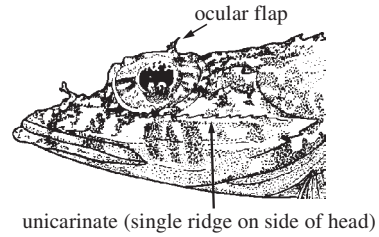


Fig. 2 lateral view of head

- 14a. Upper surface of eye with several cirri and papillae; suborbital ridge with a single spine; short dark streaks crossing fin rays in dorsal and caudal fins . . . *Cymbacephalus nematophthalmus*
- 14b. Upper surface of eye lacks cirri and papillae; suborbital ridge with 2 spines; no dark streaks crossing fin rays *Cymbacephalus staigeri*

- 15a. Caniniform jaw teeth are depressible; suborbital ridge bearing 3 or more spines below eye; iris lappet pointed (Fig. 3d) *Ratabulus diversidans*
- 15b. Jaw teeth not depressible; suborbital ridge bearing 2 spines under eye; iris lappet simple or slightly bilobed (Fig. 3b, c) (*Cociella*) → 16

- 16a. Suborbital ridge with 2 spines below eye, several spines behind eye; upper preopercular spine long, reaching nearly to opercular margin; preorbital spine slight or lacking . . . *Cociella hutchinsi*
- 16b. Suborbital ridge with 2 spines below eye, no spines behind eye; upper preopercular spine shorter, reaching about half-way to opercular margin; preorbital spine usually well developed *Cociella punctata*

- 17a. Second dorsal-fin spine much shorter than third; pectoral fins with falcate rear margin, black with pale central area; scale pores of lateral line with a single opening to outside (Fig. 4a) *Kumococius rodericensis*
- 17b. Second dorsal-fin spine length about equal to third; pectoral-fin margin not falcate, colour pattern not as above; scale pores of lateral line with 2 openings to exterior (Fig. 4b) → 18

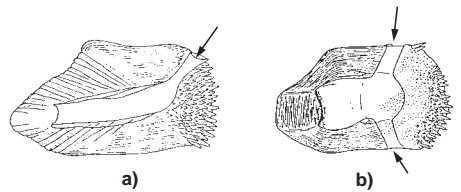


Fig. 4 detail of lateral-line scale

- 18a. Bony ridges of head bearing many fine serrations; side of head beneath eye unicarinate (lower edge of suborbital turned inward, not readily visible) (Fig. 5a); iris lappet bilobed (Fig. 3c) (*Rogadius*) → 19
- 18b. Bony ridges of head bearing some larger spines; side of head beneath eye bicarinate (lower edge of suborbital more vertically positioned, visible on side of head) (Fig. 5b); iris lappet with crenate or short branches (Fig. 3e, f) → 22

- 19a. No antrorse preopercular spine; soft dorsal-fin rays usually 12; caudal fin whitish, usually with 3 horizontal dark bars *Rogadius patriciae*
- 19b. Antrorse spine (Fig. 5a) projecting from lower preopercle (barely visible in some); soft dorsal-fin rays usually 11; caudal fin with 1 or more vertical dark bands → 20

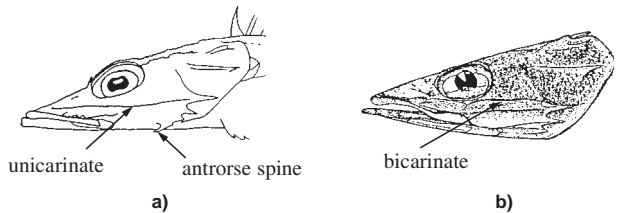


Fig. 5 lateral view of head

- 20a. Preocular spine with small accessory spine(s) along anterior base; usually 9 (8 to 10) scale rows between soft dorsal fin and lateral line *Rogadius serratus*
- 20b. Preocular spine(s) lack basal accessory spines; usually 6 or 7 (5 to 7) scale rows between soft dorsal fin and lateral line → 21

- 21a. A single preocular spine; antrorse preopercular spine stout, easily visible; caudal fin with a broad dark subterminal band *Rogadius pristiger*
- 21b. Two or more preocular spines; antrorse preopercular spine slight, only tip visible; caudal fin with several narrow dark bands *Rogadius welanderi*

- 22a.** Preocular spines 2 to 6; preopercular spines 4 or more; posterior edge of breast scales elongated to a slight point; iris lappet crenate (Fig. 3e) *Sorsogona tuberculata*
- 22b.** Preocular spines usually 1 (may have a cluster of smaller spines around base, *Ambiserrula jugosa*); preopercular spines 3 or less; breast scales normal, without posterior elongation → 23
- 23a.** Upper preopercular spine bayonet-like, reaching to or past opercular margin; total gill rakers on first gill arch usually 8 or more (rarely 7) *Suggrundus macracanthus*
- 23b.** Upper preopercular spine shorter, not reaching opercular margin; gill rakers on first gill arch usually 7 or less (rarely 8) → 24
- 24a.** Upper 2 preopercular spines short, subequal; base of lower opercular spine extends across opercle as a bony ridge; iris lappet cirrose (Fig. 3a) (*Inegocia, Ambiserrula*) → 25
- 24b.** Upper preopercular spine distinctly longer than next spine; base of lower opercular spine concealed by scales; iris lappet crenate or with short branches (Fig. 3e, f) . . . (*Thysanophrys*) → 27^{1/}
- 25a.** Preocular spines 1 or 2, with several smaller spines around anterior and distal base; suborbital ridge with many small spines under entire length of eye; base of lower opercular spine bearing serrations *Inegocia jugosa*
- 25b.** A single stout preocular spine, no spines around base; suborbital ridge lacking spines under front of eye; base of lower opercular spine smooth → 26
- 26a.** Soft dorsal- and anal-fin rays usually 12, rarely 11; pectoral-fin rays 18 to 21 (usually 20); interopercular flap present (Fig. 6) *Inegocia japonica*
- 26b.** Soft dorsal- and anal-fin rays usually 11; pectoral-fin rays 22 to 25 (usually 23 or 24); interopercular flap lacking. *Inegocia harrisii*
- 27a.** One or more dermal papillae present on upper surface of eye; greatest diameter of eye about equal to snout length → 28
- 27b.** No papillae on eye; greatest diameter of eye 1.3 or more times in snout length → 30
- 28a.** A row of small papilla on upper eye, 1 or 2 elongate; 7 to 10 scale rows between soft dorsal-fin base and lateral line; iris lappet crenate (Fig. 3e) *Thysanophrys carbunculus*
- 28b.** A single papilla on upper eye (minute in *Thysanophrys armatus*); 4 or 5 scale rows between soft dorsal-fin base and lateral line → 29
- 29a.** Soft dorsal-fin rays 12; anal-fin rays 13; 2 or more preorbital spines *Thysanophrys celebicus*
- 29b.** Soft dorsal-fin rays 11; anal-fin rays 12; 1 preorbital spine *Thysanophrys armatus*
- 30a.** Rear edge of maxilla in front of anterior margin of orbit; least interorbital width 3.8 to 7.2 times in greatest diameter of orbit *Thysanophrys chiltonae*
- 30b.** Rear edge of maxilla behind front margin of orbit; least interorbital width 1.5 to 3.5 times in orbit → 31
- 31a.** Soft dorsal-fin rays usually 11; lips with a row of small fleshy papillae *Thysanophrys otaitensis*
- 31b.** Soft dorsal-fin rays usually 12; lips smooth, without papillae *Thysanophrys arenicola*

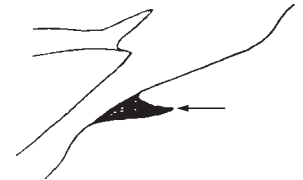










Fig. 6 interopercular flap

^{1/} The classification used for this field guide does not follow Imamura (1996), who restricted *Thysanophrys* to include *T. celebica*, *T. chiltonae*, *T. armata*, and 2 species not found in the area. His new genus *Eurycephalus* includes the WCP species *E. arenicola* and *E. otaitensis*, as well as *E. carbunculus* from outside the area.

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Ambiserrula jugosa* (McCulloch, 1914)
-  *Cociella hutchinsi* Knapp, 1996
-  *Cociella punctata* (Cuvier in Cuvier and Valenciennes, 1829)
-  *Cymbacephalus beauforti* (Knapp, 1973)
-  *Cymbacephalus bosschei* (Bleeker, 1860)
-  *Cymbacephalus nematophthalmus* (Günther, 1860)
-  *Cymbacephalus staigeri* (Castelnau, 1875)
-  *Elates ransonnetii* (Steindachner, 1877)
-  *Grammoplites knappi* Imamura and Amaoka, 1994
-  *Grammoplites scaber* (Linnaeus, 1758)
-  *Inegocia harrisii* (McCulloch, 1914)
-  *Inegocia japonica* (Tilesius, 1812)
-  *Kumococius rodericensis* (Cuvier in Cuvier and Valenciennes, 1829)
-  *Onigocia macrolepis* (Bleeker, 1854)
-  *Onigocia pedimacula* (Regan, 1908)
-  *Onigocia spinosa* (Temminck and Schlegel, 1843)
-  *Platycephalus arenarius* Ramsy and Ogilby, 1886
-  *Platycephalus endrachtensis* Quoy and Gaimard, 1825
-  *Platycephalus fuscus* Cuvier in Cuvier and Valenciennes, 1829^{2/}
-  *Platycephalus indicus* (Linnaeus, 1758)
-  *Ratabulus diversidans* (McCulloch, 1914)
-  *Rogadius patriciae* Knapp, 1987
-  *Rogadius pristiger* (Cuvier in Cuvier and Valenciennes, 1829)
-  *Rogadius serratus* (Cuvier in Cuvier and Valenciennes, 1829)
-  *Rogadius welanderi* (Schultz, 1966)
-  *Sorsogona tuberculata* (Cuvier in Cuvier and Valenciennes, 1829)
-  *Suggrundus macracanthus* (Bleeker, 1869)
-  *Thysanophrys arenicola* Schultz, 1966
-  *Thysanophrys armatus* (Fowler, 1938)
-  *Thysanophrys carbunculus* (Valenciennes in Cuvier and Valenciennes, 1833)
-  *Thysanophrys celebicus* (Bleeker, 1854)
-  *Thysanophrys chiltonae* Schultz, 1966
-  *Thysanophrys otaitensis* (Parkinson in Cuvier and Valenciennes, 1829)

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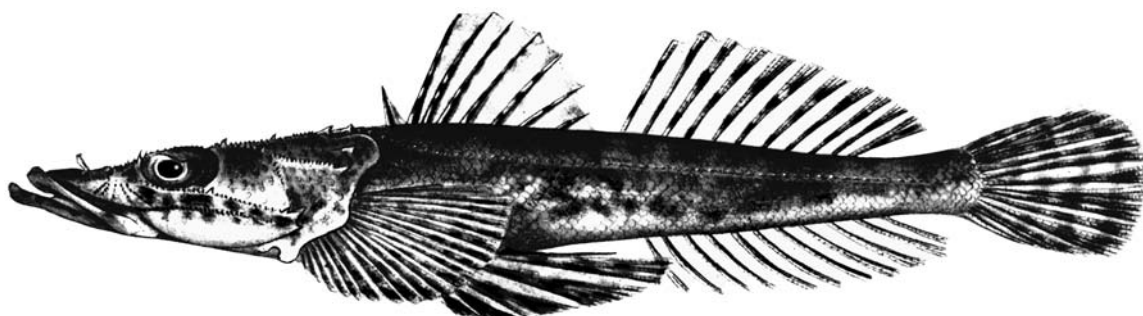
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- Imamura, H. 1996. Phylogeny of the family Platycephalidae and related taxa (Pisces: Scorpaeniformes). *Species Diversity*, 1(2):123-233.
- Myers, R.F. 1989. *Micronesian reef fishes*. Guam, Coral Graphics, 298 p.
- Sainsbury, K.J., P.J. Kailola, and G.G. Leyland. 1985. *Continental shelf fishes of northern and north-western Australia*. Canberra, Glouston and Hall and Peter Pownall Fisheries Information Service, 375 p.

^{2/} Not included in the identification key. The dusky flathead, *Platycephalus fuscus*, commonly occurs in southeastern Australia and only enters the area from Brisbane to near Mackay, Queensland. It usually has 14 soft rays both in the second dorsal fin and anal fin, which distinguishes it from the other 3 species of *Platycephalus* treated here. Its caudal fin is dusky with some dark spots in the upper lobe; horizontal dark bars are never present.

Ambiserrula jugosa (McCulloch, 1914)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Mud flathead.



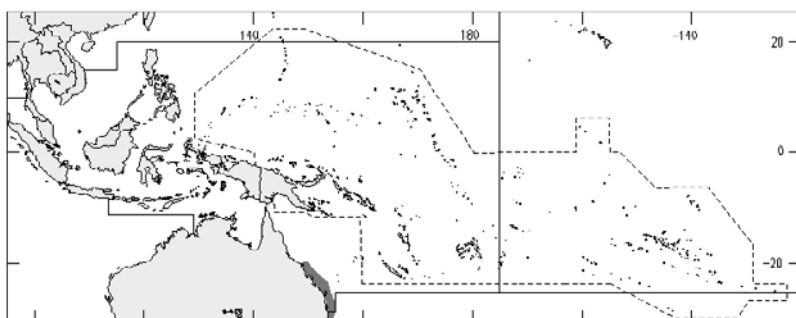
(from McCulloch, 1914)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to slightly behind front edge of eye. Preopercular spines usually 3, **upper spine short, subequal with next**; small accessory spine present. **Supraorbital ridge serrate, with a cluster of small spines posteriorly.** A series of small preorbital spines present; **preocular spines often clustered, with 1 larger spine and several smaller spines around its base**; **suborbital ridge with numerous small serrations.** Teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet cirrose. **Interopercular flap truncated, tongue-shaped.** Total gill-rakers on first gill arch 6. Dorsal-fin spines IX or I,VIII; dorsal-fin rays 11 or 12 (usually 11); anal-fin rays 11 or 12 (usually 11); **pectoral-fin rays 21 or 22.** Oblique scale rows slanting downward above lateral line about equal to number of lateral-line scales. Lateral-line scales 52 to 55 (usually 52 or 53), anterior 10 to 25 (mean 16.7) scales bearing a small spine or ridge. Scale pores of lateral line with 2 openings to the exterior. **Colour:** head and body brown or grey above, pale below; 4 or 5 dark blotches on cheek including a broad dark bar below eye, lips also with dark blotches; back crossed by about 4 dark bands; lower side with dark blotches and streaks; spinous dorsal fin with a submarginal dark band, spines with dark spots; anal fin pale anteriorly, rear portion dusky; other fins with a series of brown spots, forming vertical bands in caudal fin.

Size: Maximum total length about 21 cm, commonly to 15 cm.

Habitat, biology, and fisheries: Found in shallow coastal waters, taken by trawls up to about 20 m.

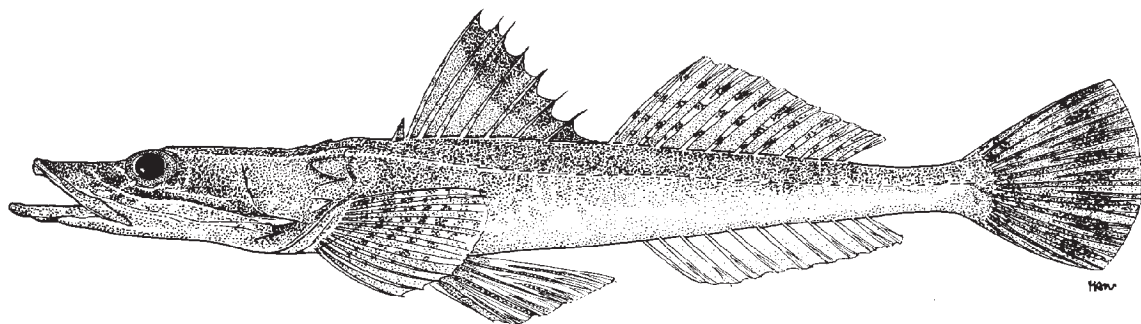
Distribution: East coast of Australia from Botany Bay (New South Wales) to vicinity of Bowsen (Queensland).



***Cociella hutchinsi* Knapp, 1996**

Frequent synonyms / misidentifications: *Suggrundus* sp. 1 [Sainsbury, Kailola, and Leyland, 1985] / None.

FAO names: En - Brownmargined flathead.



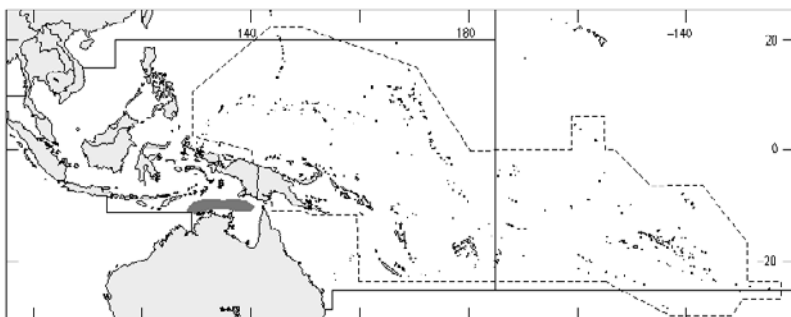
(after Sainsbury, Kailola, and Leyland, 1985)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches behind front edge of eye. Preopercular spines usually 2 (a weak third spine sometimes present), **upper preopercular spine long, nearly reaching to rear margin of opercle. Preorbital spine slight, often lacking. Supraorbital ridge usually smooth over anterior quarter of eye**, bearing 7 to 10 small spines posteriorly. Suborbital ridge bearing 2 spines below eye, and **3 or 4 spines behind eye**. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Interopercular flap absent. Iris lappet simple, semicircular.** Total gill rakers on first gill arch 6 or 7 (usually 6). Dorsal-fin spines I,VII or I,VIII (usually I,VIII); dorsal-fin rays 11 or 12 (usually 11); anal-fin rays 11; pectoral-fin rays 20 to 23 (usually 21 or 22). Oblique scale rows slanting backward above lateral line 59 to 68 (mean 63). Lateral-line scales 51 to 55, anteriormost 2 to 8 scales bearing weak spines. Scale pores of lateral line with a single opening to the exterior. **Colour:** body brownish to tannish above; white below with specks of brown sparse on breast, more heavily stippled posteriorly; spinous dorsal fin dusky, with a broad submarginal brown band; soft dorsal fin pale, with small brown spots on rays; anal fin white; pectoral fins dusky brown, with traces of vertical dark bands, lower margin white; pelvic fins with whitish base, stippled with brown, with well-developed submarginal dark band; caudal fin dusky, usually with a row of dark streaks forming a submarginal dark band.

Size: Maximum total length about 30 cm, commonly to 23 cm.

Habitat, biology, and fisheries: Benthic species inhabiting the continental shelf off western and northern Australia to depths of about 108 m. Caught in trawls.

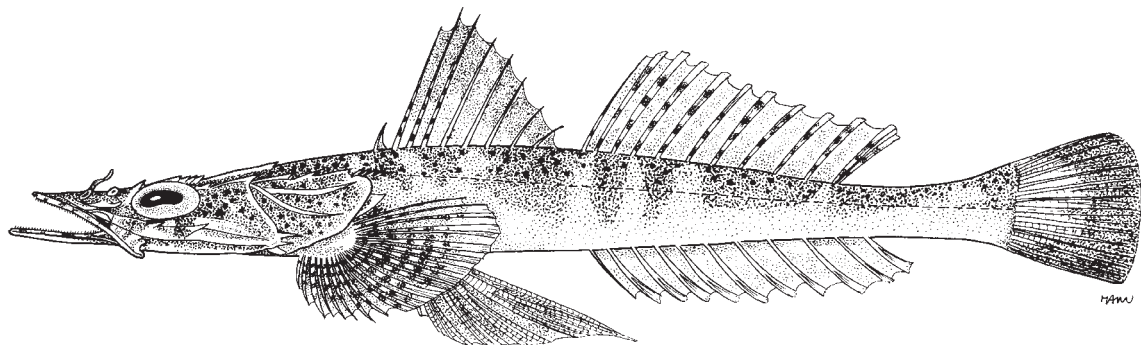
Distribution: Restricted to the Arafura and Timor seas off Australia.



Cociella punctata (Cuvier in Cuvier and Valenciennes, 1829)

Frequent synonyms / misidentifications: None / *Cociella crocodila* (Tilesius, 1812).

FAO names: En - Spotted flathead.



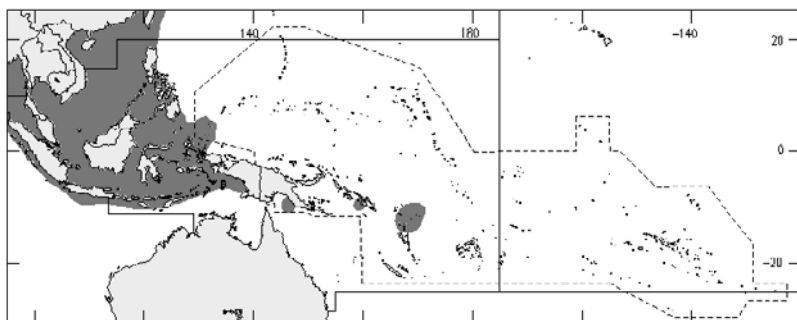
(after Bleeker, 1877-78)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to behind front edge of eye. Preopercular spines usually 3 (sometimes 2), **uppermost preopercular spine longest, reaching only about half-way to opercular margin. Preorbital spine present. Supraorbital ridge usually smooth over anterior half of eye**, bearing 5 to 8 small spines posteriorly. Suborbital ridge bearing 1 spine in front of eye, 2 spines below, and **no spines behind eye**. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Interopercular flap present. Iris lappet simple, semicircular.** Dorsal-fin spines I,VIII; dorsal-fin rays 10 to 12 (usually 11); anal-fin rays 11 or 12 (usually 11); pectoral-fin rays 19 to 22 (usually 20 or 21). Number of oblique scale rows slanting backward above lateral line 56 to 76 (mean 68). Lateral-line scales 50 to 56 (usually 53 or 54), anteriormost 1 to 16 scales bearing a small spine. Scale pores of lateral line with a single opening to the exterior. **Colour:** head and body reddish, greyish or brown above, whitish below, frequently with 5 or 6 dark bands crossing back; **numerous small dark spots on back reaching to below lateral line, more widely scattered posteriorly**; spinous dorsal fin with broad submarginal dark band; soft dorsal fin with dark spots on rays; anal-fin membranes dusky; pectoral fins dusky on lower half, spotted above; pelvic fins dusky; caudal fin somewhat variable, usually with a broad dark marginal band or series of dark spots and horizontal streaks, basal area more or less pale.

Size: Maximum total length about 35 cm, commonly to 25 cm.

Habitat, biology, and fisheries: Frequents shallow coastal areas in depths of 10 m or less. Taken in trawl fisheries at depths of 23 to 250 m. Reported from a trap in the Gulf of Aqaba at a depth of 300 m. Young to juvenile stages utilize mangrove habitat.

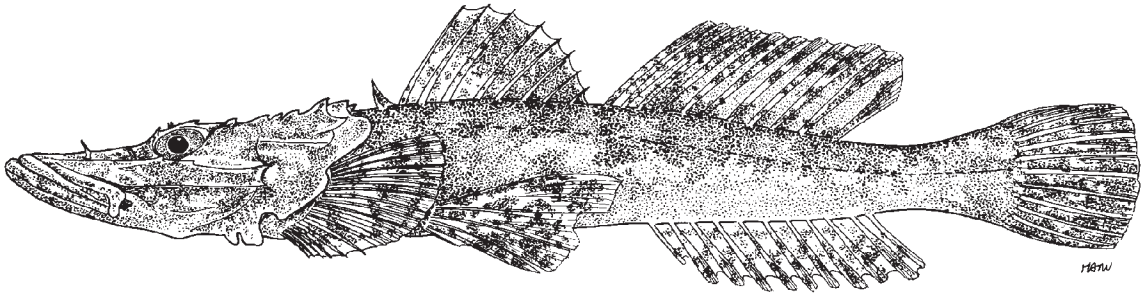
Distribution: Widespread in the Indo-Pacific; Vanuatu to Papua New Guinea, north to Taiwan Province of China, through Indonesia to Thailand, Pakistan, the Red Sea, and South Africa.



Cymbacephalus beauforti (Knapp, 1973)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Crocodile fish.

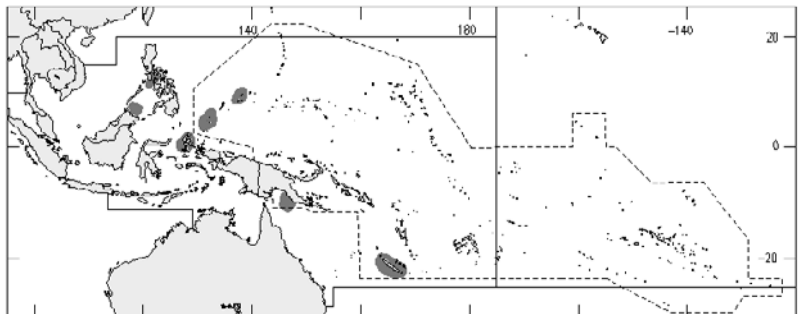


Diagnostic characters: Body elongate, head moderately depressed. **Rear edge of maxilla ends well in front of eye. Prominent pit present behind upper eye. Preopercular spines short, usually 2 subequal, rarely 3. Supraorbital ridge usually smooth over eye, bearing a few small spines posteriorly. Preorbital spines lacking; a single preocular spine; suborbital ridge largely smooth, bearing 2 spines below eye.** Teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet cirrose. **Dermal papillae (10 to 12 in adults) on upper eye, some simple, some branched, longest not reaching above supraorbital ridge. Interopercular flap usually broader than long, with several subdivisions.** Total gill rakers on first gill arch 5 or 6 (usually 6). **Dorsal-fin spines I,VIII or I,IX; dorsal-fin rays 11; anal-fin rays 11; pectoral-fin rays 19 to 21 (usually 20). Oblique scale rows slanting backward above lateral line more or less equal to number of lateral-line scales.** Lateral-line scales 50 to 55 (usually 52 or 53), anterior 1 to 3 scales bearing a weak spine. Scale pores of lateral line with a single opening to the exterior. **Colour:** body dark brown above, lower sides frequently with irregular dark brown blotches, pale below, breast with brown streaks in some; all fins mottled with small to large dark blotches.

Size: Maximum total length about 47 cm, commonly to 35 cm.

Habitat, biology, and fisheries: Frequents shallow sandy or coral rubble areas near seagrasses or mangroves. Found at depths to about 8 m, but usually at 2 to 3 m.

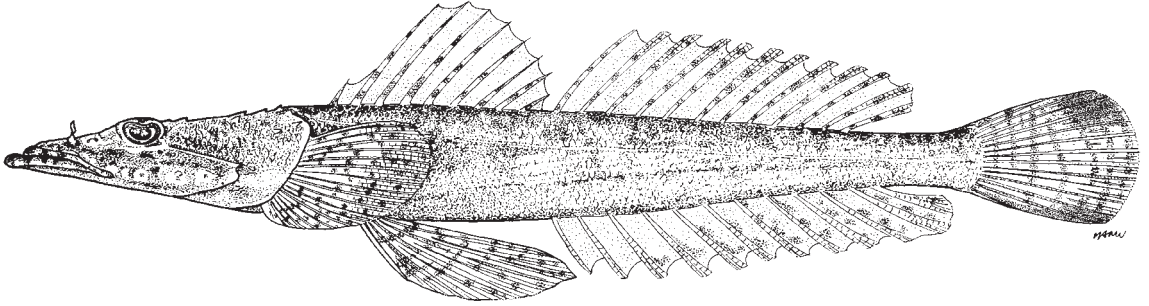
Distribution: Known from New Caledonia, Papua New Guinea, Moluccas, Borneo, Philippines, Palau, and Yap Island to the Ryukyu Islands.



Cymbacephalus bosschei (Bleeker, 1860)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Smalleyed flathead.



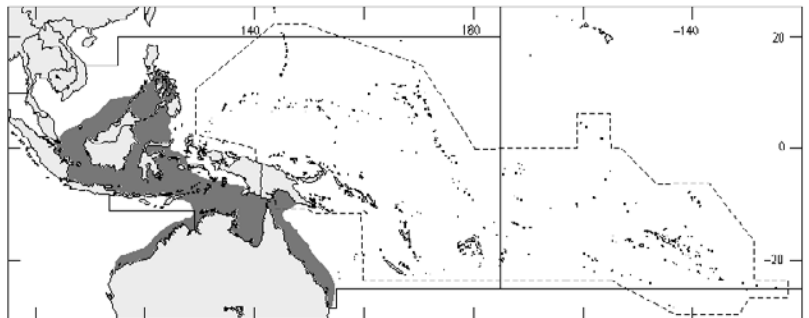
(after Taylor, 1964)

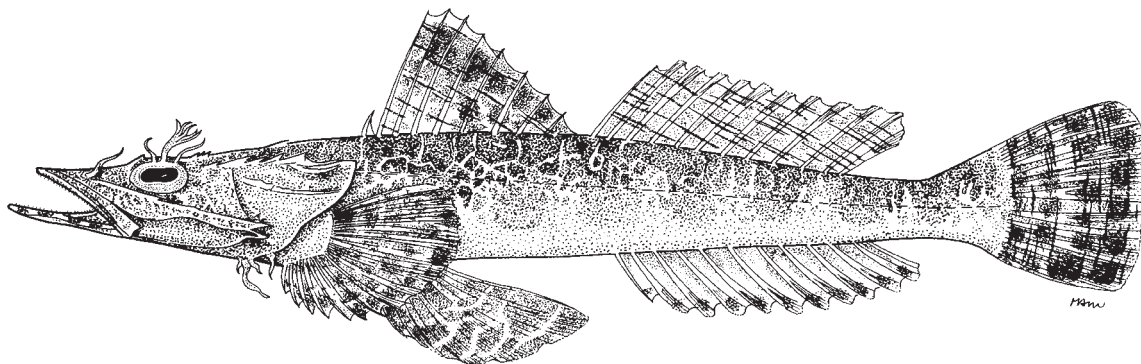
Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to or behind front of eye. **No pit present behind upper eye.** Preopercular spines short, usually 2 subequal, rarely 3. Supraorbital ridge usually smooth over eye, bearing a few small spines posteriorly. Preorbital spines lacking; a single preocular spine; **suborbital ridge mostly smooth, bearing 1 slight spine just behind eye, spine often obscure or lacking in adults.** Teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet cirrose. No dermal papillae on upper eye. Interopercular flap broad, with shallow incisions. Total gill rakers on first gill arch 6 or 7 (usually 6). Dorsal-fin spines IX or I, VIII; **dorsal-fin rays 12; anal-fin rays 12;** pectoral-fin rays 18 to 21 (usually 19 or 20). Oblique scale rows slanting backward above lateral line 55 to 68, usually about 61 (specimens from Singapore with the lowest counts). Lateral-line scales 51 to 55 (usually 52 or 53), anterior 0 to 2 scales bearing a weak spine. Scale pores of lateral line with a single opening to the exterior. **Colour:** most with body brownish above, light tan below, back mottled with dark brown blotches; some darker specimens with white spots on head and back; fins with dark brown spots, forming vertical bands in caudal fin; **caudal fin with a large elongate dark blotch along upper and lower margins;** lower lip with about 4 dark brown bars.

Size: Maximum total length about 44 cm, commonly to 35 cm.

Habitat, biology, and fisheries: Shallow coastal areas and reef flats to about 50 m. Usually captured by spear fishing or with ichthyocide, occasional specimen taken by trawls.

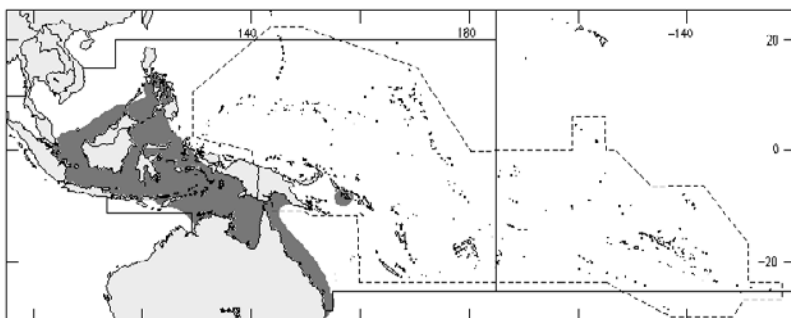
Distribution: Widespread from Brisbane and Darwin to Western Australia, Papua New Guinea, the Philippines, Borneo, and Singapore.



Cymbacephalus nematophthalmus* (Günther, 1860)*Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Fringe-eyed flathead.

(after Bleeker, 1877-78)

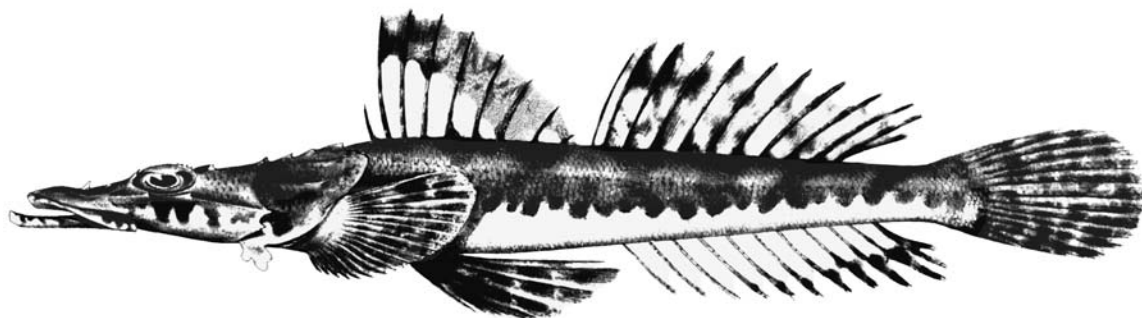
Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to or behind front of eye. **Prominent pit present behind upper eye. Preopercular spines short, upper 2 subequal**, a small third spine often present. **Supraorbital ridge usually smooth over eye**, with a few small spines posteriorly. Preorbital spines lacking; a single preocular spine; **suborbital ridge mostly smooth, bearing 1 spine below rear of eye**. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet cirrose. **Dermal papillae (usually 6 to 9 in adults) on upper surface of eye, longest branched, reaching well above supraorbital ridge**. Interopercular margin bearing several flaps of varying sizes. Total gill rakers on first gill arch 5 to 7 (usually 6). **Dorsal-fin spines IX or I, VIII**; dorsal-fin rays 11; anal-fin rays 11; pectoral-fin rays 19 to 21 (usually 20). Oblique scale rows slanting backward above lateral line 57 to 70 (often 62 or 63). Lateral-line scales 51 to 55 (frequently 53), anterior 1 to 6 scales (usually 2 or 3), bearing a weak spine or ridge. Scale pores of lateral line with a single opening to the exterior. **Colour:** upper body grey-green or brown, with about 7 dark bands crossing back and reaching far down sides; lower parts of body pale to white; fins mottled with dark and light blotches, may be yellow and green in life; **short dark streaks usually crossing rays in dorsal and caudal fins**; a broad, dark bar below eye; about 4 dark bands on lower lip.

Size: Maximum total length about 58 cm, commonly to 30 cm.**Habitat, biology, and fisheries:** Inhabits shallow rocky coastal areas, frequently associated with weed beds and mangroves, most commonly at depths of less than 5 m.**Distribution:** From the north-western shelf of Australia to Brisbane, New Georgia, Papua New Guinea, Celebes, Borneo, Singapore, and the Philippines.

Cymbacephalus staigeri (Castelnau, 1875)

Frequent synonyms / misidentifications: *Cymbacephalus parilis* (McCulloch, 1914) / None.

FAO names: En - Blotched flathead.



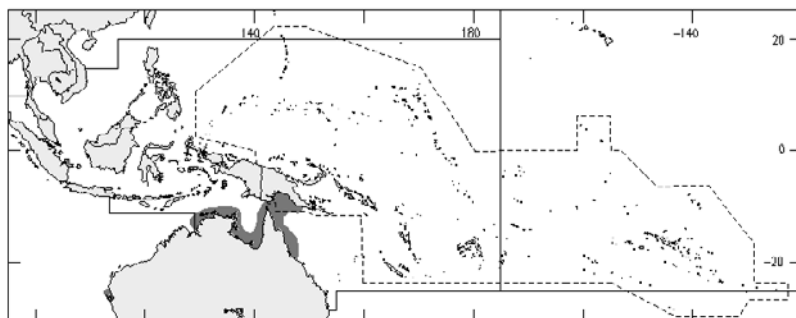
(from McCulloch, 1914)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to or behind front of eye. **A prominent pit present behind upper eye. Preopercular spines short, 2 subequal.** Supraorbital ridge smooth over most of eye, with a few small spines posteriorly. Preorbital spines lacking; a single preocular spine; **suborbital ridge mostly smooth, bearing 2 spines below eye.** Teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet cirrose. No dermal papillae on upper eye. A prominent lobate interopercular flap present. Total gill rakers on first gill arch usually 6. Dorsal-fin spines IX or I,VIII; dorsal-fin rays 11; anal-fin rays 11; pectoral-fin rays 20 to 22 (usually 20 or 21). Oblique scale rows slanting backward above lateral line 59 to 71 (usually about 65). Lateral-line scales 51 to 54 (usually 52 or 53), anterior 1 or 2 scales bearing a weak spine. Scale pores of lateral line with a single opening to the exterior. **Colour:** body brownish, with 6 or 7 dark bands crossing back down to lateral line; a series of dark blotches on lower side; lower body white; usually a row of dark blotches on lower cheek; spinous dorsal fin with a broad submarginal dark band widening posteriorly; soft dorsal fin dusky; anal fin with a series of large brown blotches; pectoral and pelvic fins with small brown spots; and caudal fin mottled with light streaks and dark blotches.

Size: Maximum total length about 50 cm, commonly to 40 cm.

Habitat, biology, and fisheries: Possibly associated with aquatic vegetation. Has been taken by trawls at depths of 15 to 46 m, frequently found at depths of 10 m or less.

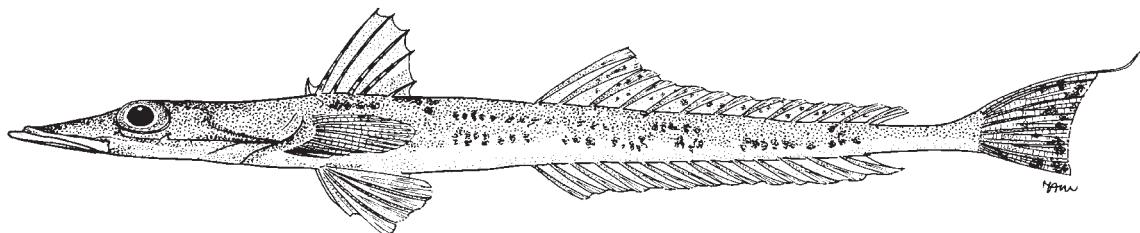
Distribution: From Port Moresby (Papua New Guinea) and northern Queensland, Gulf of Carpentaria, Darwin, Shark Bay, to Christmas Island.



Elates ransonnetii (Steindachner, 1877)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Dwarf flathead.



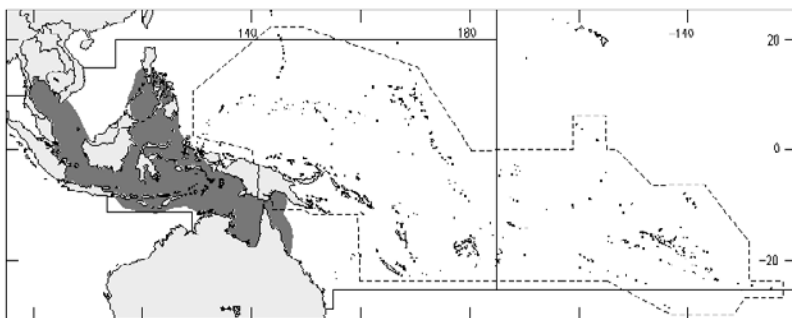
(after Allen and Swainston, 1988)

Diagnostic characters: Body elongate, head moderately depressed. **Rear edge of maxilla ends below anterior nostril, well in front of eye. Preopercular spine single, long, bayonet-like, reaching to or past rear opercular margin,** accessory spine lacking. **Supraorbital ridge smooth.** Preorbital spine present; a single preocular spine; suborbital ridge with 2 spines, a short spine under front of eye, and a long spine under rear of eye. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Iris lappet slightly developed as a simple lobe.** No dermal papillae on eye. Interopercular flap lacking. Total gill rakers on first gill arch 15 to 21. **Dorsal-fin spines VI;** dorsal-fin rays 12 to 14 (usually 13); anal-fin rays 12 to 14 (usually 13); pectoral-fin rays 19 to 22 (usually 20 or 21). **Caudal fin emarginate, upper lobe longest, bearing an elongate filament.** Lateral-line scales 83 to 107 (often about 94), anterior 0 to 2 scales bearing weak spines. Scale pores of lateral line with a single opening to the exterior. **Colour:** head and body light tan or cream; a series of small oval dark blotches along sides; dorsal and caudal fins with scattered black spots.

Size: Maximum total length about 19 cm, commonly to 15 cm.

Habitat, biology, and fisheries: Taken by trawls over sand and mud bottoms at depths of about 5 to 53 m.

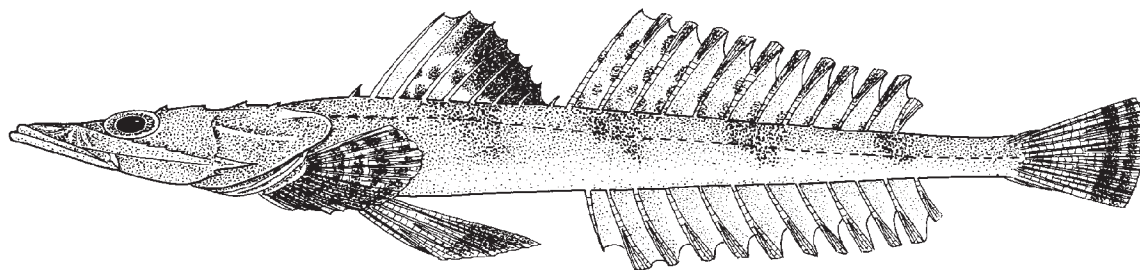
Distribution: From the Timor Sea off Australia to Papua New Guinea and northern Queensland, through Indonesia, to Singapore, the Gulf of Thailand, South China Sea, and the Philippines.



Grammoplites knappi Imamura and Amaoka, 1994

Frequent synonyms / misidentifications: None / *Grammoplites scaber* (Linnaeus, 1758).

FAO names: En - Smallspined flathead.



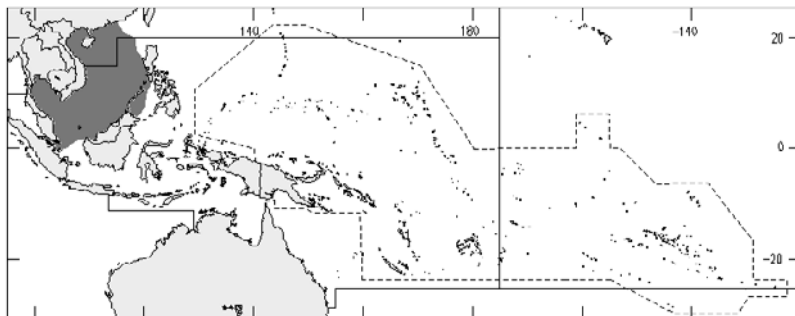
(after Imamura and Amaoka, 1994)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to behind front edge of eye. Preopercular spines 3; upper longest, not reaching to opercular margin, bearing a small accessory spine on base. Supraorbital ridge smooth anteriorly, with a few serrations posteriorly. Preorbital spine absent; a single preocular spine; suborbital ridge bearing 3 or 4 spines. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Iris lappet a simple lobe.** Interopercular flap absent. Total gill rakers on first gill arch 5 to 7 (usually 6). **Interorbital width less than 9% of head length.** Dorsal-fin spines IX, I,VIII, or I,VII,I (usually I,VIII); dorsal-fin rays 12; anal-fin rays 12; pectoral-fin rays 20 to 22 (usually 21 or 22). Oblique scale rows slanting backward above lateral line closely approximate number of lateral-line scales. **Lateral-line scales 51 to 55 (frequently 53), each scale with a backward directed spine that does not extend beyond rear margin of scale on posterior part of the body. Scale pores of lateral line with a single opening to the exterior.** **Colour:** head and body brown, with about 4 dark bands crossing back; spinous dorsal fin dusky or with a broad dark marginal band; soft dorsal fin with dark spots; pectoral fins with dark spots that form several vertical bands; **caudal fin frequently with 2 dark bands posteriorly.**

Size: Maximum total length about 30 cm, commonly to 25 cm.

Habitat, biology, and fisheries: Taken by trawls to depths of about 32 m.

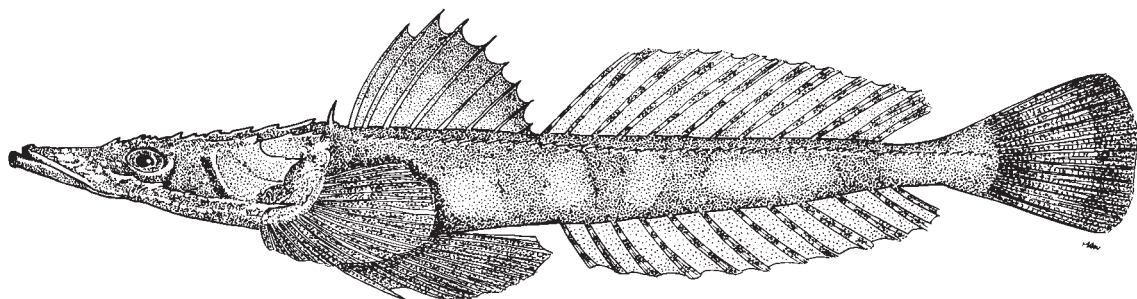
Distribution: Known from Hainan Island (China), the South China Sea, the Gulf of Thailand, and Johore Shoals off Malaysia.



Grammoplites scaber (Linnaeus, 1758)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Rough flathead.



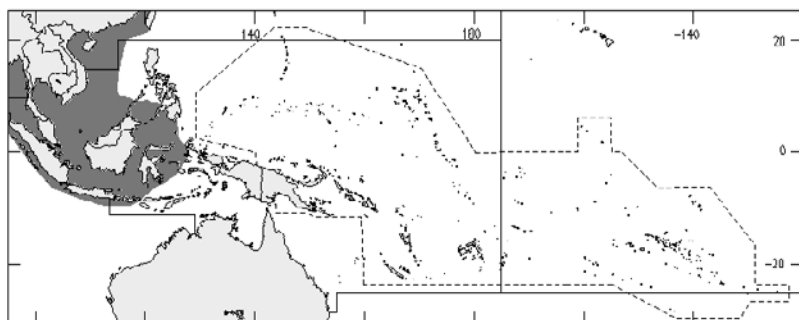
(after Day, 1878)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to behind front edge of eye. Preopercular spines 3; upper longest, not reaching to opercular margin, bearing a small accessory spine on base. Supraorbital ridge smooth anteriorly, with a few serrations posteriorly. Preorbital spine usually present; a single preocular spine; suborbital ridge bearing about 3 or 4 spines. **Interorbital width 9% or more of head length.** Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Iris lappet a simple lobe.** Interopercular flap absent. Total gill rakers on first gill arch 6 or 7 (usually 6). Dorsal-fin spines IX, I,VIII, or I,VII,I; dorsal-fin rays 11 to 13 (usually 12); pectoral-fin rays 19 to 22 (usually 20 or 21). Oblique scale rows slanting backward above lateral line closely approximate number of lateral-line scales. Lateral-line scales 51 to 55 (often 53), **each scale with a backward directed spine that extends beyond rear margin of scale, especially noticeable along caudal peduncle.** **Scale pores of lateral line with a single opening to the exterior.** **Colour:** head and body brownish above, whitish below; back crossed by about 6 dark bands in some, obscure or absent in others; first dorsal fin and pelvic fins dusky; soft dorsal fin with dark spots on rays; anal fin white or with a submarginal row of dark spots; caudal fin dusky, some with a row of dark spots along upper edge.

Size: Maximum total length about 30 cm, commonly to 20 cm.

Habitat, biology, and fisheries: Taken by trawls over mud and sand at depths to about 55 m.

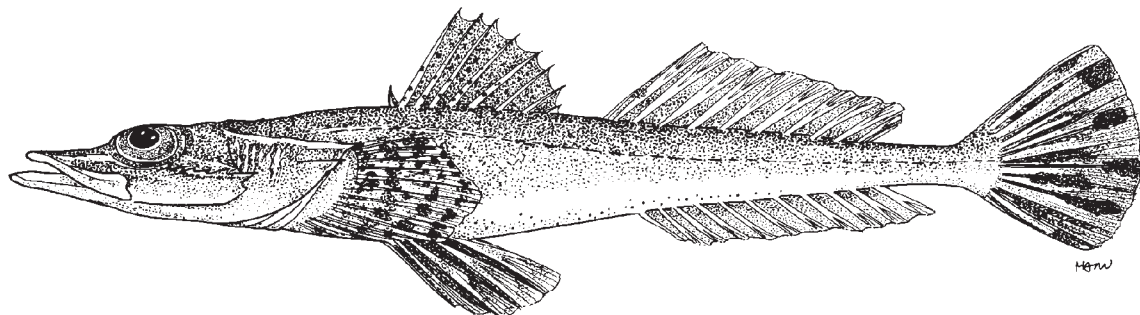
Distribution: From the southern Arabian Sea and Bay of Bengal through Malaysia, Indonesia to Bali and Celebes, Gulf of Thailand, Viet Nam, Hong Kong, and southern Philippines.



Inegocia harrisii (McCulloch, 1914)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Harris' flathead.



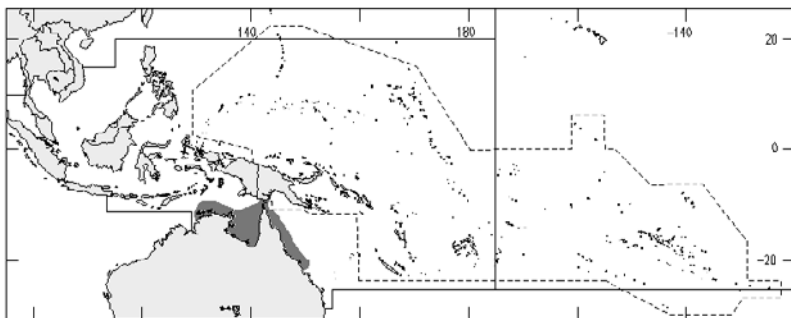
(after Gloerfelt-Tarp and Kailola, 1984)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to behind front edge of eye. Preopercular spines usually 3, **upper preopercular spine short, subequal with next; accessory spine absent.** Supraorbital ridge smooth anteriorly, with serrations over posterior half of eye. Preorbital spine absent; a single preocular spine; **suborbital ridge usually with 2 spines under eye and several more spines behind eye.** Teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet cirrose. **Interopercular flap absent.** Total gill rakers on first gill arch 5 to 7 (usually 6). Dorsal-fin spines I,VIII; **dorsal-fin rays 11; anal-fin rays 11; pectoral-fin-rays 22 to 25 (usually 23 or 24).** Oblique scale rows slanting backward above lateral line closely approximate number of lateral-line scales. Lateral-line scales 51 to 54 (frequently 52 or 53), anterior 6 to 36 scales bearing a small spine. Scale pores of lateral line with 2 openings to the exterior. **Colour:** head and body grey or brown above, with small brown spots, whitish below with dark stippling, several vague dark bands crossing back; dorsal fins dusky, with small brown spots; anal fin whitish, rays dusky, darkest posteriorly; pectoral fins dusky, with brown spots forming vertical bands; pelvic fins dusky, with a few dark spots; caudal fin dusky, with prominent elongate dark blotches.

Size: Maximum total length about 24 cm, commonly to 20 cm.

Habitat, biology, and fisheries: Taken over sand and mud bottoms by trawls at depths of 8 to 64 m. Young to juvenile stages commonly found in Darwin Harbour.

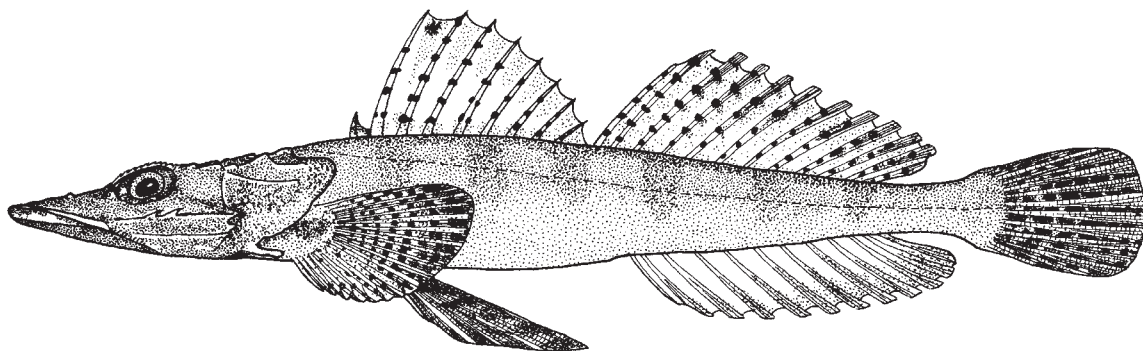
Distribution: Northern Australia from the northwestern shelf, Napier Broome Bay, Darwin, to the Gulf of Carpentaria and Pine Peak, Queensland; also Daru, Papua New Guinea.



Inegocia japonica (Tilesius, 1812)

Frequent synonyms / misidentifications: *Inegocia isacanthus* (Cuvier *in* Cuvier and Valenciennes, 1829) / None.

FAO names: **En** - Japanese flathead; **Fr** - Platycéphale japonais; **Sp** - Chato japones.

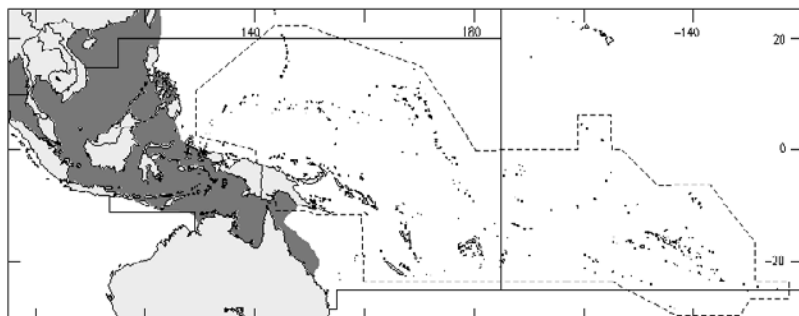


Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to behind front edge of eye. Preopercular spines usually 3, **upper preopercular spine short, subequal with next; small accessory spine usually present**. Supraorbital ridge smooth anteriorly, with serrations over posterior half of eye. Preorbital spine absent; a single preocular spine; **suborbital ridge usually smooth except for 2 spines under eye** (specimens from Indonesia and Australia frequently have a few additional small serrations). Teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet cirrose. **Interopercular flap finger-like, pointed**. Total gill rakers on first gill arch 5 to 7 (usually 6). Dorsal-fin spines IX or I,VIII; dorsal-fin rays 11 to 13 (**usually 12**); anal-fin rays 11 to 13 (**usually 12**); **pectoral-fin rays 19 to 21 (frequently 19 or 20)**. Oblique scale rows slanting downward above lateral line closely approximate number of lateral-line scales. Lateral-line scales 51 to 55 (usually 52 or 53), anterior 2 to 21 scales bearing a small spine or ridge. Scale pores of lateral line with 2 openings to exterior. **Colour:** head and body brown or grey above, whitish below, back crossed by about 6 obscure dark bands; dorsal fins clear, with small brown spots on rays; pectoral fins with somewhat larger brown spots, pelvic fins with pale base, several vague dark bands near tip; caudal fin pale, with large dark spots, some elongated.

Size: Maximum total length about 25 cm, commonly to 20 cm.

Habitat, biology, and fisheries: Taken by trawls over sand and mud to depths of about 85 m.

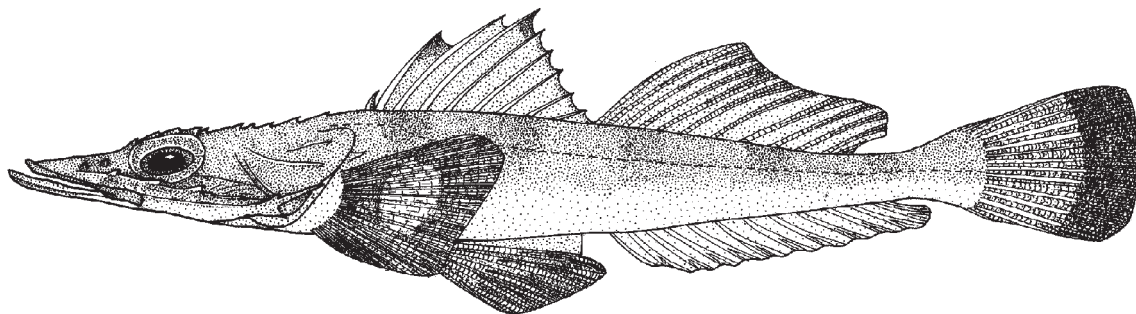
Distribution: Widespread, from Cockburn Sound (Western Australia) to Moreton Bay (Queensland); also Papua New Guinea, Indonesia, Philippines, southern Japan, South China Sea, Gulf of Thailand to India and Sri Lanka.



Kumococius rodericensis (Cuvier *in* Cuvier and Valenciennes, 1829)

Frequent synonyms / misidentifications: *Kumococius detrusus* (Jordan and Seale, 1905) / None.

FAO names: En - Spiny flathead; Fr - Platycéphale cocarde; Sp - Chato rodrigo.

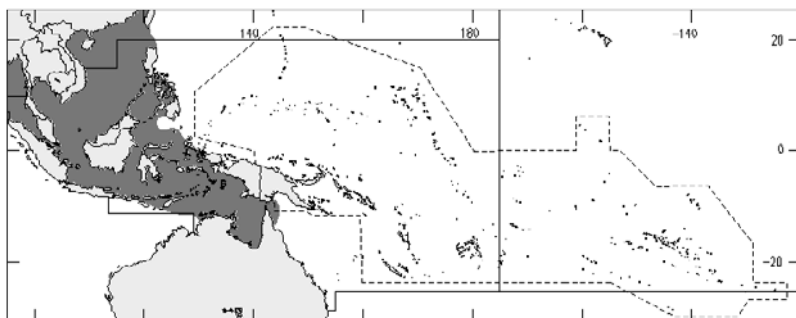


Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to behind front edge of eye. Preopercular spines 3, **upper much longer, reaching nearly to or just past opercular margin**; accessory spine present. Supraorbital ridge with stout serrations over eye. Preorbital spine present; a single preocular spine; suborbital ridge bearing numerous strong spines and serrations. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet simple or slightly bilobed. **Interopercular flap present.** Total gill rakers on first gill arch 8 to 12 (usually 10 or 11). Dorsal-fin spines XI or I,VIII; dorsal-fin rays 11 or 12 (usually 11); **second dorsal-fin spine noticeably shorter than third.** Anal-fin rays 11 to 13 (usually 12); pectoral fin-rays 19 to 22 (usually 19 or 20); **pectoral fin with a falcate posterior margin.** Oblique scale rows slanting backward above lateral line closely approximate number of lateral-line scales. Lateral-line scales 50 to 54 (frequently 52 or 53), anterior 2 to 22 scales (mean 10.6) bearing small spines (2 specimens from the Moluccas had spines on most of the lateral-line scales). Scale pores of lateral line with a single opening to the exterior. **Colour:** head and body brown above, white below with scattered minute black spots, about 5 broad dark bands crossing back in some; spinous dorsal fin dusky with a black blotch frequently present distally between second and third spines and a second blotch at edge above middle of fin; anal fin whitish with a dusky margin; **pectoral fins dark brown, with a clear or whitish central area**; pelvic fins dark brown with a light edge; caudal fin dusky on posterior half.

Size: Maximum total length about 25 cm, commonly to 20 cm.

Habitat, biology, and fisheries: Taken by trawls over sand and mud bottoms at depths of 18 to 130 m.

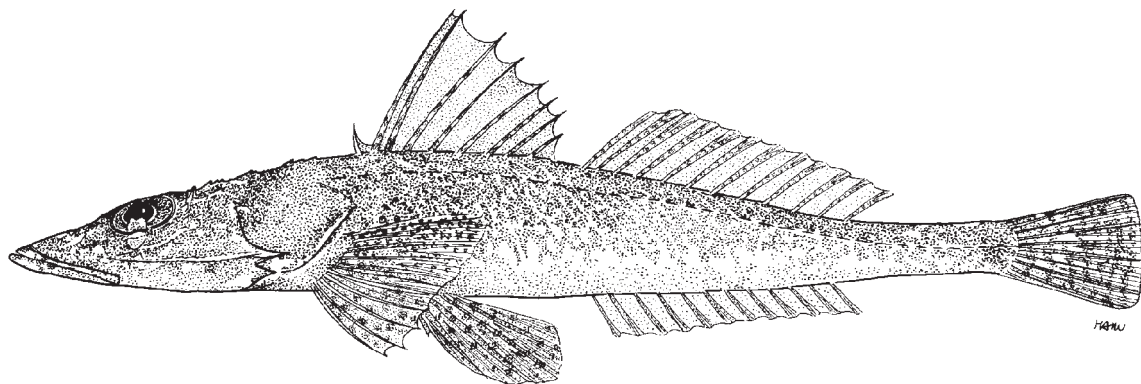
Distribution: Widespread from the Gulf of Oman to the Bay of Bengal, Malaysia, Gulf of Thailand, Indonesia, northern Australia, Philippines, South China Sea, and southern Japan.



Onigocia macrolepis (Bleeker, 1854)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Notched flathead.



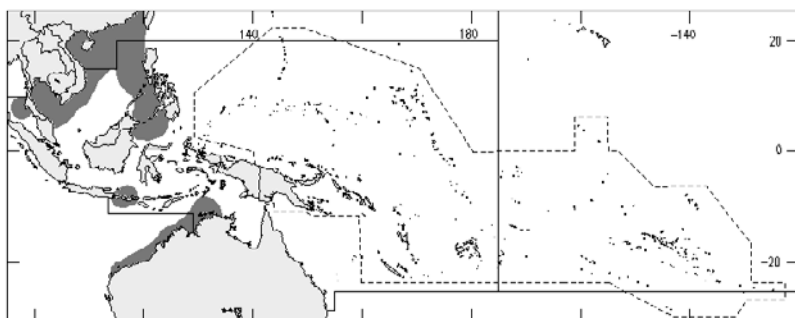
(after Masuda et al., 1984)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches behind front edge of eye. Preopercular spines 3, uppermost longest, with an accessory spine on base. **Supraorbital ridge smooth over front half of eye, serrated posteriorly.** Preorbital spines 1 to 4 (usually 2 or 3); a single preocular spine; **suborbital ridge** bearing numerous small spines or serrations, **with a distinct smooth notch below middle of eye.** **Antorbital margin with 2 antrorse spines.** Teeth on vomer in 2 separate patches. **Lower side of head uncarinate.** **Iris lappet bearing numerous short branches with bifurcate tips.** **Upper surface of eye with a short, branched cirrus.** Interopercular flap absent. Total gill rakers on first gill arch 5 to 7 (usually 5 or 6). Dorsal-fin spines IX or I.VIII; dorsal-fin rays 11 or 12; anal-fin rays 11 to 13 (usually 12); pectoral-fin rays 21 to 23 (usually 21 or 22). Oblique scale rows slanting backward above lateral line closely approximate number of lateral-line scales. **Lateral-line scales 34 to 41 (frequently 37 or 38), anterior 2 to 10 (usually 2 to 5) scales bearing spines.** Scale pores of lateral line with 2 openings to the exterior. **Colour:** body light brown above, pale below; back crossed by about 4 dark bands; anal fin pale, other fins mostly with brown spots or blotches forming bands.

Size: Maximum total length about 15 cm, commonly to 12 cm.

Habitat, biology, and fisheries: Taken by trawls over sand and mud bottoms to 130 m.

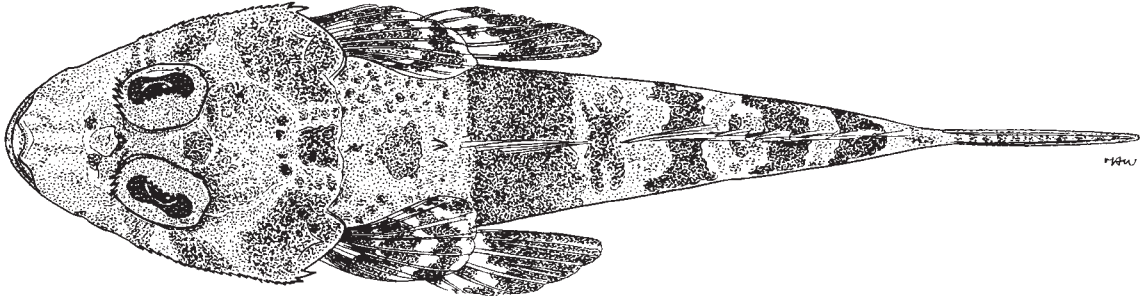
Distribution: Sea of Japan, Yellow Sea, South China Sea, Philippines to the northwestern shelf of Australia, Indonesia, Gulf of Thailand, and Andaman Sea.



Onigocia pedimacula (Regan, 1908)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Broadband flathead.

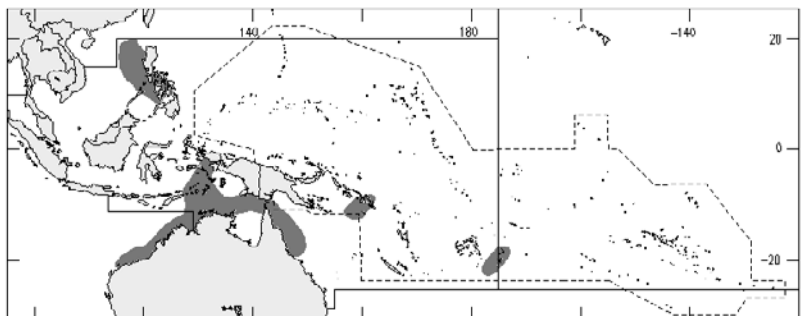


Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to or behind front edge of eye. **No supraocular cirrus present.** Preopercular spines 3, upper longest, with an accessory spine on base. **Supraorbital ridge entirely serrated over eye.** Preorbital with 2 to 6 serrations; **preocular spines 3 to 5, slanting towards midline;** suborbital ridge bearing numerous small spines or serrations, **no smooth notch under eye.** **Antorbital margin with 2 antrorse spines.** Teeth on vomer in 2 separate patches. **Lower side of head unicarinate.** **Iris lappet bilobed or crenate.** **Upper surface of eye smooth, no cirrus present.** Interopercular flap absent. **Total gill rakers on first gill arch 4 or 5 (usually 4).** Dorsal-fin spines IX or I, VIII; dorsal-fin rays 11; anal-fin rays 10 or 11 (usually 11); pectoral-fin rays 19 to 23 (usually 21 or 22). Oblique scale rows slanting backward above lateral-line about equal to number of lateral-line scales. **Lateral-line scales 29 to 33 (frequently 30 or 31), anterior 2 to 6 (frequently 3) scales bearing spines.** Scale pores of lateral line with 2 openings to the exterior. **Colour:** head and body grey or brown above, whitish below; back crossed by 4 to 6 brown or olive dark bands, the widest under first dorsal fin; spinous dorsal-fin dusky; soft dorsal, pectoral, and caudal fins more or less with dark spots; **pelvic fins with a prominent dark blotch in middle, a smaller dark blotch near base.**

Size: Maximum total length about 11 cm, commonly to 7 cm.

Habitat, biology, and fisheries: Taken by trawls over sand or coral-rubble bottom at 15 to 110 m, also taken by scuba divers off coral or rocky slopes.

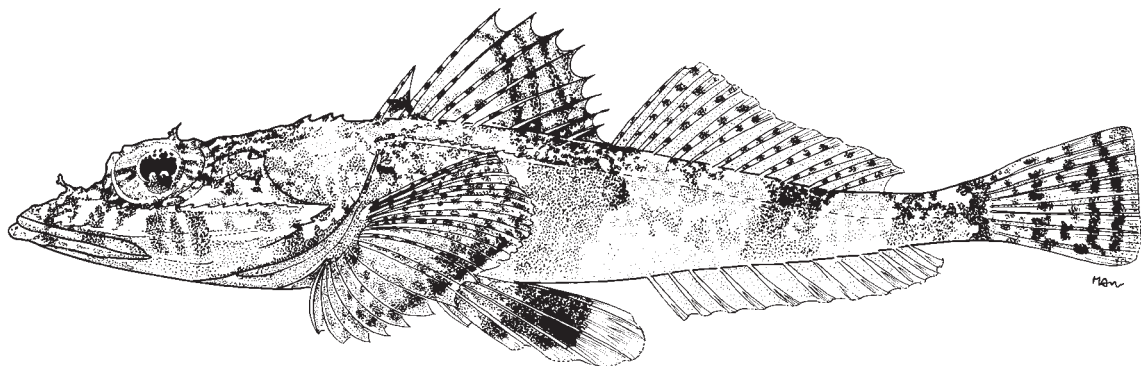
Distribution: Widespread, from off Natal, South Africa to Karachi, Maldives, South China Sea, Philippines, Irian Barat (Teluk Berau), north-western shelf of Australia, Timor and Arafura seas, Great Barrier Reef, Guadalcanal, and Tonga.



Onigocia spinosa (Temminck and Schlegel, 1843)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Largescaled spiny flathead.



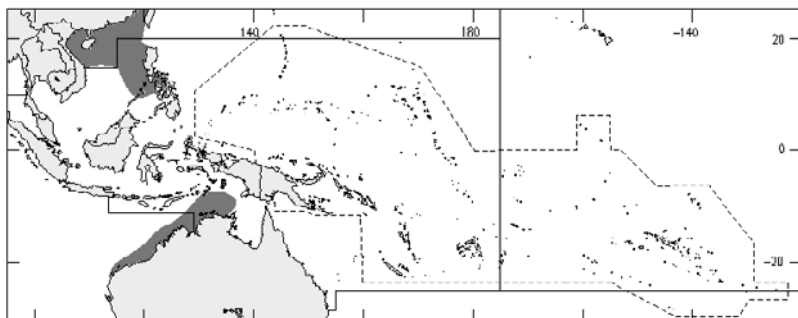
(after Masuda et al., 1984)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches behind front of eye. Preopercular spines 3, upper longest, with an accessory spine on base. **Supraorbital ridge entirely serrated over eye.** Preorbital serrations 3 to 6; **preocular spines 3 to 5, not noticeably slanting towards midline;** suborbital ridge bearing numerous small spines; **no smooth notch under eye.** **Antorbital margin with 3 antrorse spines.** Teeth on vomer in 2 separate patches. **Lower side of head uncarinate.** Iris lappet bearing numerous short branches with bifurcate tips. **Upper surface of eye with a short, branched cirrus.** Interopercular flap absent. **Total gill rakers on first gill arch 5 or 6 (usually 5).** Dorsal-fin spines IX or I,VIII; dorsal-fin rays 11 or 12 (usually 12); anal-fin rays 11 or 12 (usually 12); pectoral-fin rays 20 to 23 (usually 21 or 22). Oblique scale rows slanting backward above lateral line are about equal to number of lateral-line scales. **Lateral-line scales 34 to 42 (frequently 37 or 38), anterior 7 to 27 bearing a small spine or ridge.** Scale pores of lateral line with 2 openings to the exterior. **Colour:** head and body tan or brown above, pale below, back crossed by 3 or 4 dark bands; anterior half of spinous dorsal with brown spots on spines, posterior half of fin with dusky blotches forming about 3 horizontal bands; soft dorsal fin with series of brown spots forming horizontal bands; pectoral fins with dark spots forming vertical bands; pelvic fins mostly dark, light distally; anal fin pale, with a faint dusky submarginal band; caudal fin with several vertical dark bands.

Size: Maximum total length about 13 cm, commonly to 10 cm.

Habitat, biology, and fisheries: Taken by trawls over sand and mud bottoms to about 250 m.

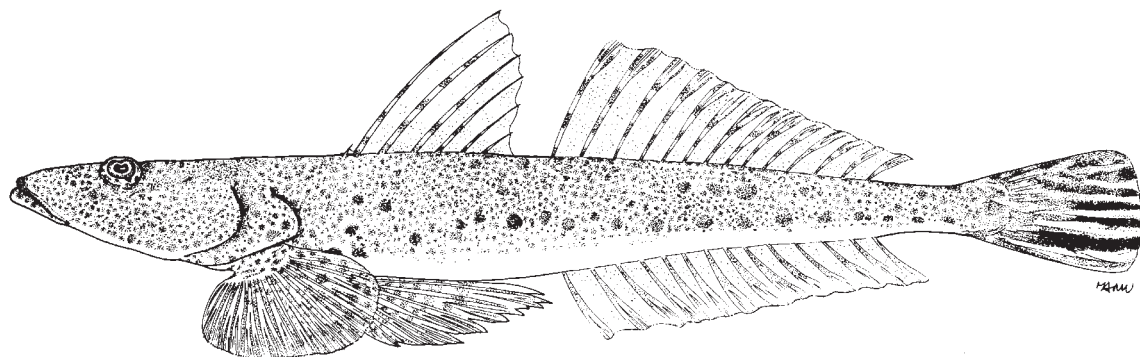
Distribution: Southern Japan, South China Sea, and the Philippines, through Arafura and Timor seas to the northwestern shelf of Australia.



Platycephalus arenarius Ramsay and Ogilby, 1886

Frequent synonyms / misidentifications: None / None.

FAO names: En - Sand flathead.

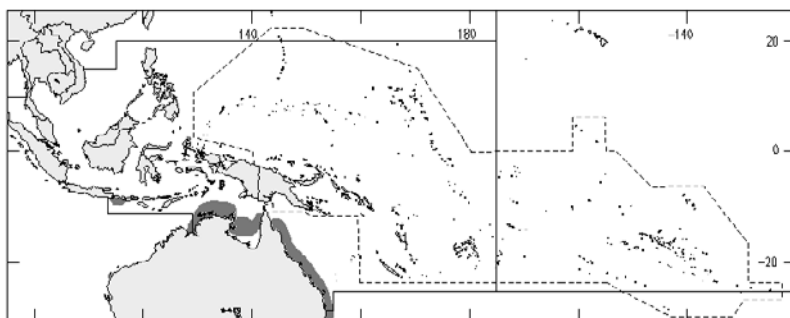


Diagnostic characters: Body elongate, **head strongly depressed**. Rear edge of maxilla reaches to about front third of eye. **Preopercular spines 2, lower distinctly longer; no accessory spine on base of upper**. Supraorbital ridge smooth. Preorbital spine lacking; a single preocular spine. Suborbital ridge smooth in adults, bearing a spine just behind eye in juveniles. **Teeth on vomer in a single transverse band**. Lower side of head bicarinate. **Iris lappet a simple elongated lobe**. Interopercular flap present, finger-like in shape. **Total gill rakers on first gill arch 12 to 16**. **Dorsal-fin spines I,VI, I,VII, VII,I, or VIII; dorsal-fin rays 13 or 14 (usually 13); anal-fin rays 13 or 14 (usually 13); pectoral-fin rays 19 to 21 (frequently 20)**. **Diagonal scale rows slanting backward above lateral line 82 to 96 (mean 89)**. **Lateral-line scales 69 to 83 (mean 74), anteriormost scale usually with a small spine or ridge**. Scale pores of lateral line with 1 opening to the outside. **Colour:** head and body with many small brown blotches above, whitish below; dorsal fins with small brown spots on rays; pectoral and pelvic fins with small brown spots forming bands; anal fin whitish; **caudal fin white, with 5 or 6 dark horizontal streaks which become narrower above**.

Size: Maximum total length about 46 cm, commonly to 35 cm.

Habitat, biology, and fisheries: Taken by angling along sandy beaches and by trawls to depths of about 55 m, usually less. Juveniles frequently found in shallows.

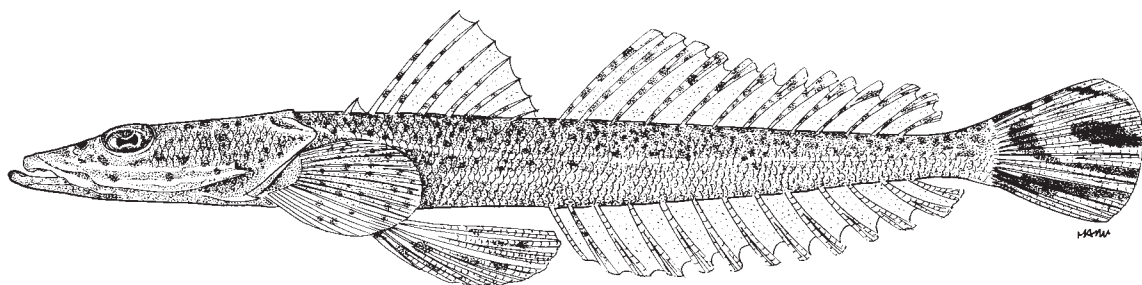
Distribution: From Jervis Bay (North South Wales), across northern Australia to Hamelin Bay (Western Australia); also recorded from Bali (Indonesia).



Platycephalus endrachtensis Quoy and Gaimard, 1825

Frequent synonyms / misidentifications: None / *Platycephalus indicus* (Linnaeus, 1758).

FAO names: En - Yellowtailed flathead.



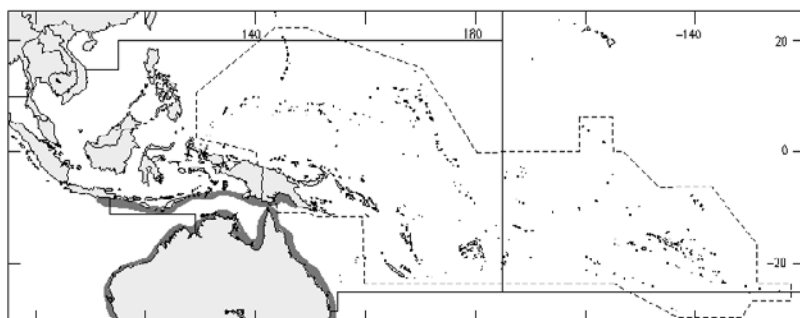
(after Taylor, 1964)

Diagnostic characters: Body elongate, **head strongly depressed**. Rear edge of maxilla reaches to about below middle of eye. **Preopercular spines 2, lower usually longest**; accessory spine usually lacking on base of upper preopercular spine. Supraorbital ridge smooth. Preorbital spine lacking; a single preocular spine, obscure in large adults. Suborbital ridge smooth in adults, bearing a spine below rear of eye in juveniles. **Teeth on vomer in a single transverse band**. Lower side of head bicarinate. **Iris lappet a simple elongated lobe**. Interopercular flap present, finger-like in shape. **Total gill rakers on first gill arch 9 to 13 (usually 10 or 11)**. **Dorsal-fin spines I,I,VI,I, I,VII,I, or I,I,VII,I; dorsal-fin rays 13; anal-fin rays usually 13; pectoral-fin rays 18 to 20 (usually 19 or 20)**. **Diagonal scale rows slanting backward above lateral line 93 to 109. Lateral-line scales 67 to 77, anteriormost scale usually with a small spine or ridge**. Scale pores of lateral line with 1 opening to the outside. **Colour:** head and body covered with small brown flecks, whitish below, several indistinct dark bands crossing back in some; dorsal, pectoral, and pelvic fins with small brown spots on rays; **caudal fin whitish, with 3 or 4 horizontal dark bars and a prominent yellow blotch along upper margin**.

Size: Maximum total length about 40 cm, commonly to 3 m.

Habitat, biology, and fisheries: Taken by handlines and seines in shallow coastal waters; also taken by trawls over mud and sand at shallow depths. Frequently found in estuaries.

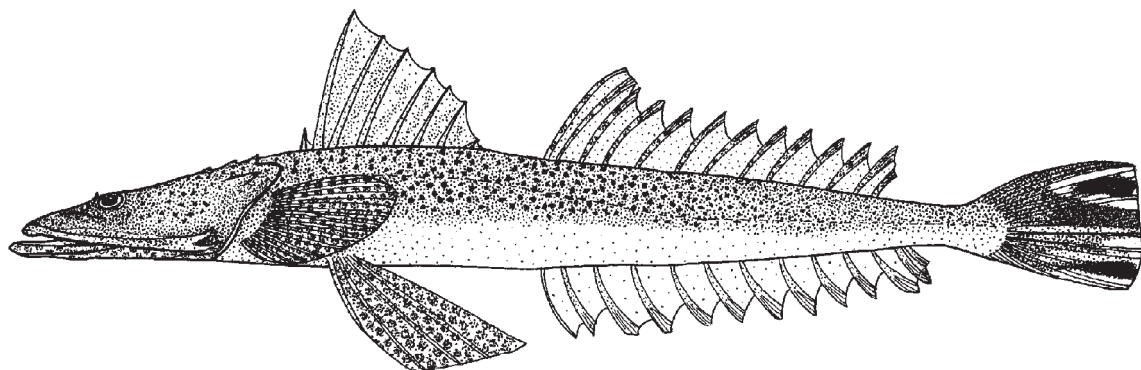
Distribution: Known from Freemantle (Western Australia), across northern Australia to Brisbane. Also appears to reach the southern coasts of Java and Papua New Guinea.



Platycephalus indicus (Linnaeus, 1758)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Bartail flathead; Fr - Platycephale indien; Sp - Chato índico.

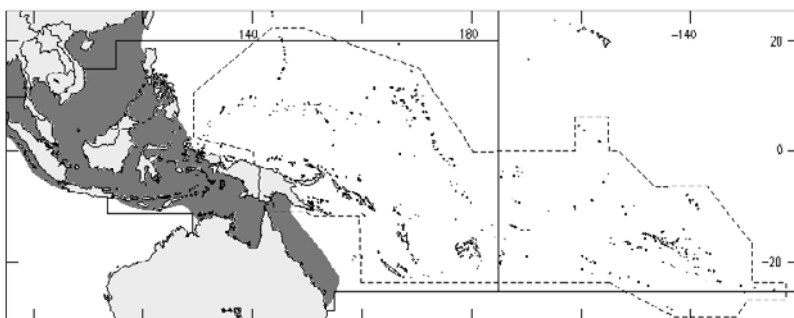


Diagnostic characters: Body elongate, **head strongly depressed**. Rear edge of maxilla reaches to about below middle of eye. **Preopercular spines 2, lower usually longest**; a trace of an accessory spine usually present on base of upper spine. Supraorbital ridge smooth. Preorbital spine lacking; a single preocular spine, obscure in large adults. Suborbital ridge smooth in adults, bearing a spine below rear of eye in juveniles. **Teeth on vomer in a single transverse band**. Lower side of head bicarinate. **Iris lappet a simple elongated lobe**. Interopercular flap present, finger-like in shape. **Total gill rakers on first gill arch 7 to 10 (usually 8 or 9)**. **Dorsal-fin spines I,VII,I, I,I,VII,I or I,VIII; dorsal-fin rays 13; anal-fin rays usually 13**; pectoral-fin rays 17 to 20 (usually 18 or 19). **Diagonal scale rows slanting backward above lateral line 83 to 107**. **Lateral-line scales 65 to 81, anteriormost scale usually with a small spine or ridge**. Scale pores of lateral line with a single opening to the outside. **Colour:** head and body covered with small brown flecks, whitish below, several indistinct dark bands crossing back in some; dorsal, pectoral, and pelvic fins with small brown spots on rays; **caudal fin with 2 or 3 horizontal dark bars, a prominent yellow blotch near middle of fin, whitish areas in upper lobe and along lower margin**.

Size: Maximum total length about 50 cm, commonly to 35 cm.

Habitat, biology, and fisheries: Taken by handlining and seining in shallow coastal waters; taken by trawls over mud and sand at depths to 30 m, usually less. Frequently found in estuaries, small juveniles have been taken in fresh water.

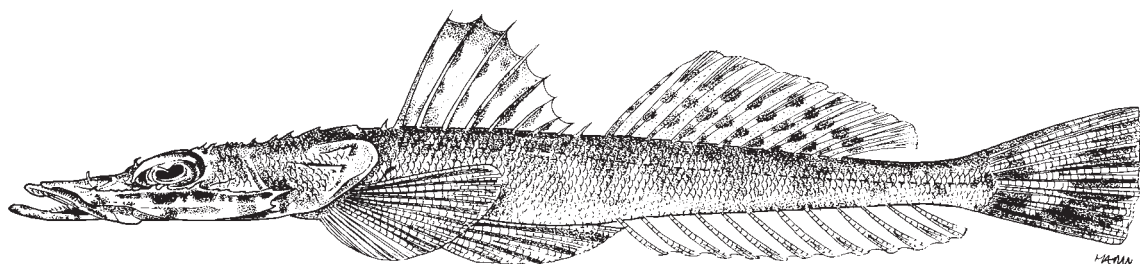
Distribution: Widespread, from the eastern Mediterranean, Red Sea, to South Africa, northern Indian Ocean to Indonesia, Korea, southern Japan, Philippines, and northern and eastern Australia.



Ratabulus diversidans (McCulloch, 1914)

Frequent synonyms / misidentifications: *Ratabulus megacephalus* (Tanaka, 1917) / None.

FAO names: En - Freespine flathead.



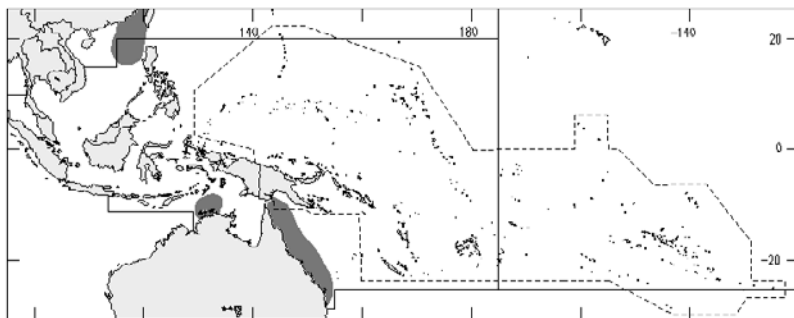
(after McCulloch, 1914)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla about even with front margin of eye. Preopercular spines 2 or 3, uppermost longest, accessory spine present on base; third spine minute, when present. Supraorbital ridge smooth over anterior half of eye, with stout serrations posteriorly. Preorbital spine present; a single preocular spine; suborbital ridge bearing numerous spines and serrations, the 2 largest under the eye. **Some caniniform teeth on jaws and palate are depressible;** teeth on vomer in 2 separate patches. Lower side of head bicarinate. Iris lappet a small simple lobe. Interopercular flap absent. Total gill rakers on first gill arch 7 to 9 (usually 7 or 8). **Dorsal-fin spines IX,I or I,VIII,I;** dorsal-fin rays 11; anal-fin rays 11 or 12 (usually 12); pectoral-fin rays 18 to 20 (usually 19 or 20). Diagonal scale rows slanting backward above lateral line 64 to 79. Lateral-line scales 52 to 55 (usually 53 or 54), anterior 2 to 8 scales bearing a small spine. Scale pores of lateral line with a single opening to the exterior. **Colour:** body grey to light tan above, whitish below; back crossed by 7 or 8 indistinct dark bands; a series of purplish blotches along midsides; orange or brown spots on head, larger specimens may have orange or green spots on upper body; spinous dorsal fin with a dark submarginal band, anterior basal area clear, with scattered dark spots; soft dorsal and pectoral fins with fine brown flecks; anal fin whitish; pelvic fins with scattered dark spots; caudal fin with submarginal dark band, basal area whitish with scattered dark spots above.

Size: Maximum total length about 35 cm, commonly to 30 cm.

Habitat, biology, and fisheries: Taken by trawls at depths of 79 to 261 m. Recorded at Galathea Station number 539 as being dredged over gravel.

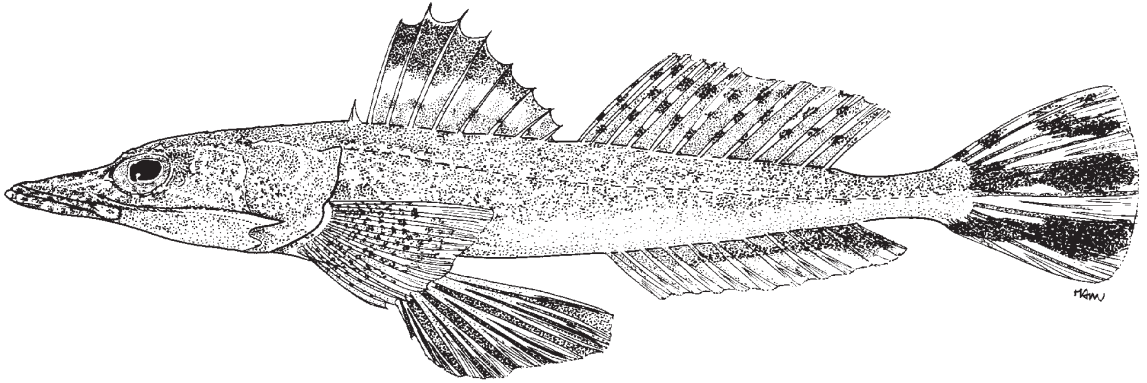
Distribution: From East China Sea, South China Sea, and northern Philippines to northwestern shelf of Australia, Timor Sea, Coral Sea, and Botany Bay (New South Wales).



***Rogadius patriciae* Knapp, 1987**

Frequent synonyms / misidentifications: *Suggrundus* sp. 2 [Sainsbury, Kailola, and Leyland, 1985] / None.

FAO names: En - Blackbanded flathead.



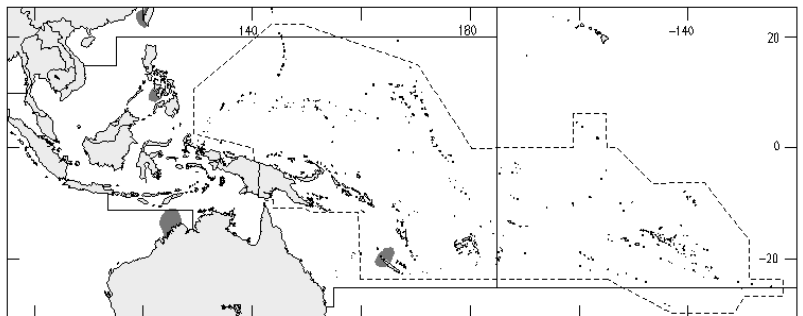
(after Sainsbury, Kailola, and Leyland, 1985)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to below front edge of eye. Preopercular spines 2 to 5 (usually 3 or 4), uppermost longest, with an accessory spine on its base; **antrorse spine lacking. Supraorbital ridge bearing many fine serrations.** Preorbital spine lacking, several small serrations present; preocular spine 1. Teeth on vomer in 2 separate patches. **Lower side of head uncarinate. Iris lappet bilobed.** Interopercular flap absent. Total gill rakers on first gill arch 5 to 8 (usually 7). Dorsal-fin spines IX or I,VIII; **dorsal-fin rays 11 or 12 (usually 12), anal-fin rays 11 or 12 (usually 11);** pectoral-fin rays 20 to 23 (frequently 22). **Number of scale rows between soft dorsal-fin origin and lateral line 6 to 11 (usually 7 or 8).** Oblique scale rows slanting backward above lateral line are about equal to number of lateral-line scales. Lateral-line scales 49 to 55 (frequently 52 or 53), anterior 4 to 11 bearing a spine or ridge. Scale pores of lateral line with 2 openings to the outside. **Colour:** body light tan or orange above, pale below; a brown band crossing nape to preopercular spines; suborbital dark bar present; spinous dorsal fin with marginal dark band; soft dorsal fin with small black spots on rays; anal fin white, with dusky basal band becoming black posteriorly; pectoral-fin rays bearing numerous small brown spots on upper fin, lower part black with white lower edge; pelvic fins black with outer edge and ray tips white; **caudal fin white with several dark blotches along upper edge and 2 or 3 elongate horizontal black bars below.**

Size: Maximum total length about 27 cm, commonly to 20 cm.

Habitat, biology, and fisheries: Taken by trawls on coastal shelves at depths of 14 to 100 m.

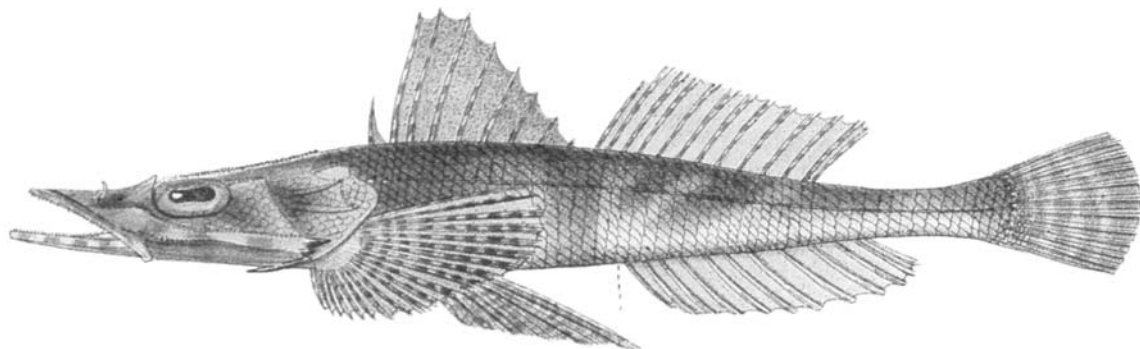
Distribution: Northwestern shelf of Australia, northern Queensland off Cairns, New Caledonia, Philippines, Taiwan Province of China, and Ryukyu Islands.



Rogadius pristiger (Cuvier in Cuvier and Valenciennes, 1829)

Frequent synonyms / misidentifications: None / *Rogadius asper* (Cuvier, 1829).

FAO names: En - Thorny flathead.



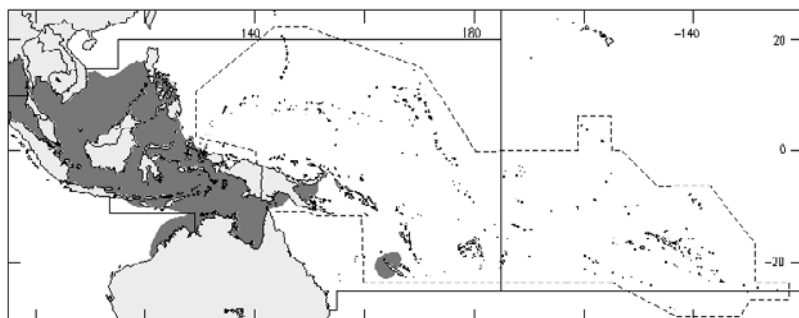
(from Bleeker, 1877-78)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches behind front edge of eye. Preopercular spines 3 to 6 (**usually 4 or 5**), upper longest, with an accessory spine on base; **lower edge of preopercle projecting downward as a strong antrorse spine. Supraorbital and suborbital ridges bearing many fine serrations.** Preorbital spine lacking, several small serrations present; preocular spine 1. Teeth on vomer in 2 separate patches. **Lower side of head unicarinate. Iris lappet bilobed.** Interopercular flap absent. Total gill rakers on first gill arch 5 to 8 (frequently 7). Dorsal-fin spines IX or I,VIII; **dorsal-fin rays 10 to 12 (usually 11)**; anal-fin rays 10 to 12 (usually 11); pectoral-fin rays 20 to 24 (usually 22 or 23). **Number of scale rows between soft dorsal-fin origin and lateral line 5 to 7 (usually 6 or 7).** Oblique scale rows slanting backward above lateral line about equal to number of lateral-line scales. Lateral-line scales 49 to 55 (usually 52 or 53), anterior 4 to 14 scales bearing a small spine or ridge. Scale pores of lateral line with 2 openings to the outside. **Colour:** body brown above, pale below, 3 or 4 dusky bands crossing back; lower lip dusky, with 4 to 6 dark bands; spinous dorsal fin with a black marginal band and a triangular light basal area towards front; soft dorsal fin with brown spots on rays; pectoral fins with base and lower edge white, upper rays with brown dash marks, middle of fin dusky; pelvic fins with black blotches; **caudal fin with a white basal band, a broad dusky submarginal band and a narrow white edge.**

Size: Maximum total length about 21 cm, commonly to 15 cm.

Habitat, biology, and fisheries: Taken by trawls over mud and sand bottoms at depths to about 80 m.

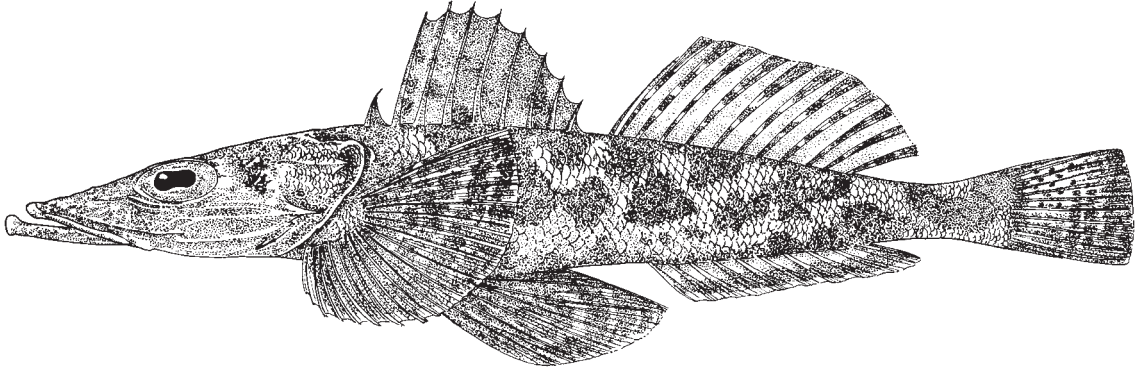
Distribution: Widespread, New Caledonia, Papua New Guinea, northwestern shelf of Australia, Indonesia, Philippines, Gulf of Thailand, and northern Indian Ocean to Gulf of Oman, Red Sea, and Madagascar.



Rogadius serratus (Cuvier in Cuvier and Valenciennes, 1829)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Serrated flathead.



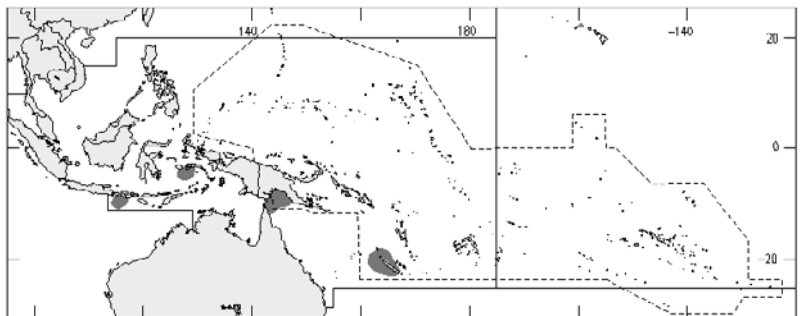
(after Günther, 1887)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches behind front edge of eye. Preopercular spines 4 or 5 (**usually 4**), uppermost longest, with an accessory spine on base; tip of antrorse spine sometimes difficult to see. **Supraorbital and suborbital ridges bearing many fine serrations.** Preorbital spine absent, several small serrations present; **preocular spine 1, with an accessory spine on anterior base.** Teeth on vomer in 2 separate patches. **Lower side of head unicarinate. Iris lappet bilobed.** Interopercular flap absent. Total gill rakers on first gill arch 6 to 8 (usually 7). Dorsal-fin spines IX or I,VIII; dorsal-fin rays 11 (rarely 12); anal-fin rays 11; pectoral-fin rays 20 to 23 (usually 21 or 22). **Number of scale rows between soft dorsal-fin origin and lateral line usually 9 (8 to 10).** Oblique scale rows slanting backward above lateral line about equal to number of lateral-line scales. Lateral-line scales usually 51 to 54 (rarely 50), anterior 1 to 9 scales bearing a small spine. Scale pores of lateral line with 2 openings to the outside. **Colour:** body light tan above, pale below, back crossed by about 7 or 8 dark bands, side with a series of dark blotches; a broad suborbital dark bar; spinous dorsal dusky; soft dorsal fin with dark spots on rays; anal fin whitish, with submarginal dark band; pectoral fins dark below with whitish edge, pale above with dark spots; pelvic fins with white base, black distally; **caudal fin with dark basal band, whitish central band, blackish submarginal band becoming paler above, upper area usually with a few distinct dark spots.**

Size: Maximum total length about 24 cm, commonly to 15 cm.

Habitat, biology, and fisheries: Taken over sand around coral reefs to a depth of 11 m; a single specimen taken by trawls at 45 m.

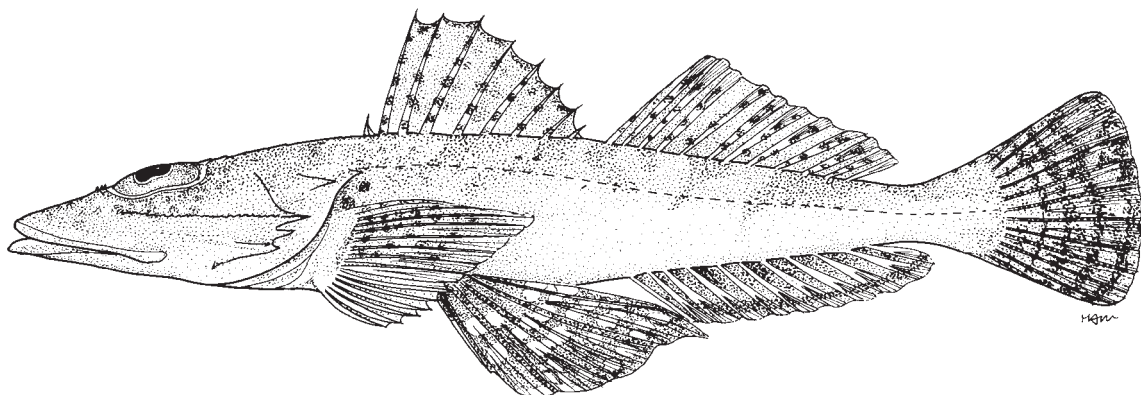
Distribution: Mauritius, Seychelles, Somalia, Pakistan, Sri Lanka, Maldives, Chagos Archipelago, Indonesia, Philippines, Port Moresby, northern Queensland, and New Caledonia.



Rogadius welanderi (Schultz, 1966)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Welander's flathead.



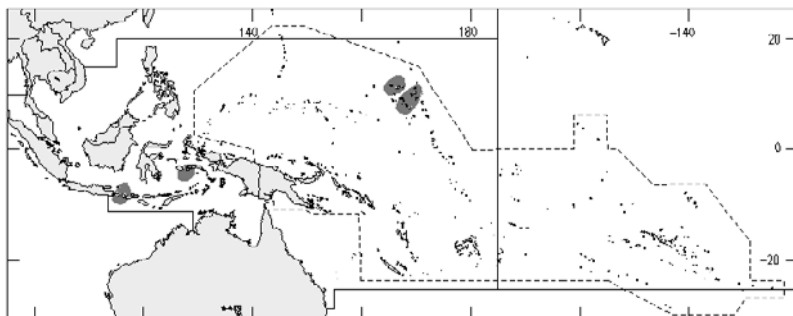
(after Gloerfelt-Tarp and Kailola, 1984)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches behind front edge of eye. **Preopercular spines 4 or 5**, uppermost longest, with an accessory spine on base; **small antrorse spine present**. **Supraorbital and suborbital ridges bearing many fine serrations**. Several small preorbital serrations present; **preocular spines 2 or 3**. Teeth on vomer in 2 patches. **Lower side of head uncarinate**. **Iris lappet slightly bilobed**. Interopercular flap absent. Total gill rakers on first gill arch 7 or 8. Dorsal-fin spines IX; dorsal-fin rays 11; anal-fin rays 11; pectoral-fin rays 21 or 22. **Number of scale rows between soft dorsal-fin origin and lateral line usually 6 or 7**. Oblique scale rows slanting backward above lateral line about equal to number of lateral-line scales. Lateral-line scales 52 or 53, anterior 5 to 9 scales bearing a small spine. Scale pores of lateral line with 2 openings to the outside. **Colour:** body light brown above, pale below; several indistinct dark bands crossing back; dorsal and pelvic fins dusky; anal fin pale, with a narrow submarginal dark band; pectoral fins with vague dark spots above, dusky below; caudal fin pale, with about 4 narrow vertical dark bands.

Size: Maximum total length about 13 cm, commonly to 8 cm.

Habitat, biology, and fisheries: Taken over sand near coral reefs to a depth of 40 m.

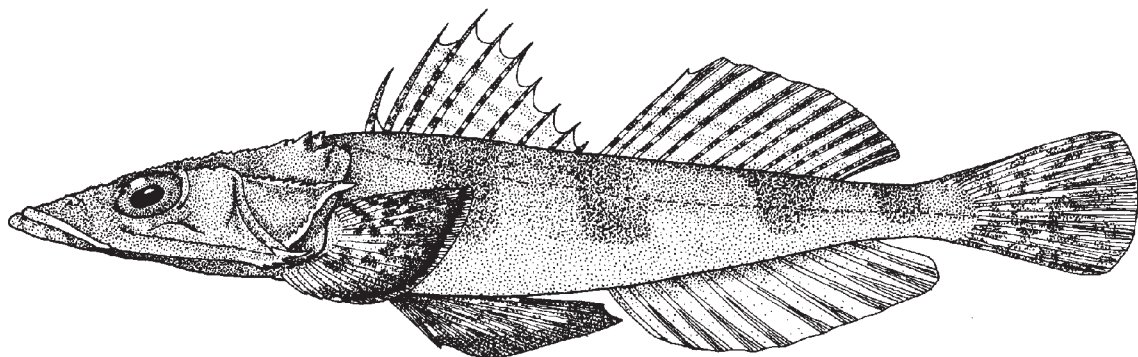
Distribution: American Samoa, Marshall Islands, and Moluccas; to Réunion Island (Western Indian Ocean).



Sorsogona tuberculata (Cuvier in Cuvier and Valenciennes, 1829)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Tuberculated flathead; Fr - Platycephale poignard; Sp - Chato puñalero.

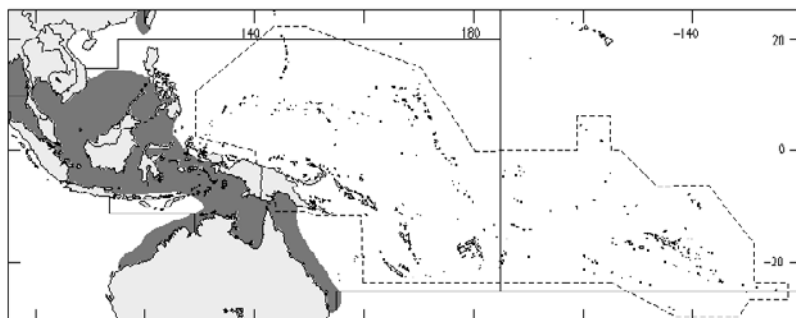


Diagnostic characters: Body elongate, head moderately depressed. **Posterior edge of breast scales elongated to a point.** Rear end of maxilla reaches to below front margin of eye. **Preopercular spines 4 to 9**, decreasing in size ventrally, accessory spine on base of upper. **Supraorbital and suborbital ridges bearing small spines or serrae (some bicuspid).** Preorbital spine absent, several small serrations present; **preocular spines 2 to 6.** Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Iris lappet crenate.** Interopercular flap absent. **Total gill rakers** on first gill arch 7 to 9, **frequently 8.** Dorsal-fin spines IX or I,VIII; dorsal-fin rays 10 to 12 (mostly 11); anal-fin rays 10 to 12 (mostly 11); pectoral-fin rays 19 to 22 (frequently 21). **Scales in rows above anterior lateral line sometimes bearing a hook or tubercle.** Oblique scale rows slanting backward above lateral line about equal to number of lateral-line scales. Lateral-line scales 47 to 54 (usually 51 or 52), **anterior 12 to 28 bearing a small spine or ridge.** Pores of lateral-line scales with 2 openings to the outside. **Colour:** body light olive or tan above, whitish below, with 3 or 4 dark bands crossing back; spinous dorsal fin with a submarginal brown band; soft dorsal fin with small brown spots on rays; anal fin white, with a few dark streaks on posterior rays; pectoral and pelvic fins with several black bands, margins whitish; caudal fin whitish with faint brown spots on rays and several vague vertical brown bands.

Size: Maximum total length about 14 cm, commonly to 12 cm.

Habitat, biology, and fisheries: Taken by trawls over mud and sand to a depth of about 80 m.

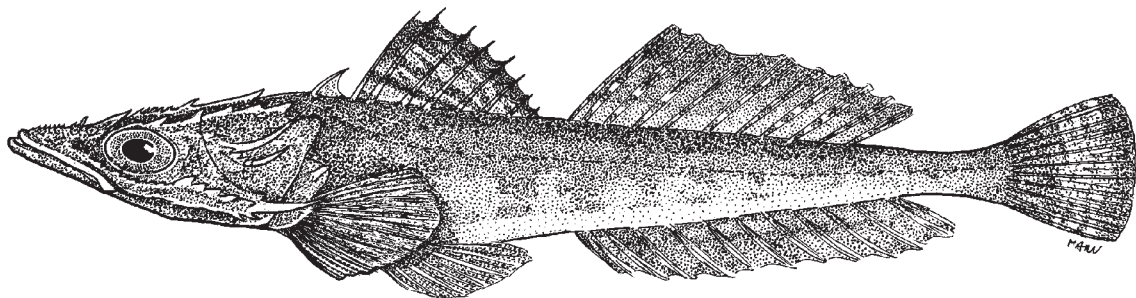
Distribution: From Persian Gulf, northern Indian Ocean, Malaysia, Gulf of Thailand, Indonesia, Philippines, north-western shelf of Australia to Gulf of Carpentaria, Coral Sea, and Platypus Bay (Queensland).



Suggrundus macracanthus (Bleeker, 1869)

Frequent synonyms / misidentifications: *Suggrundus sundaicus* (Bleeker, 1878) / None.

FAO names: En - Largespined flathead.



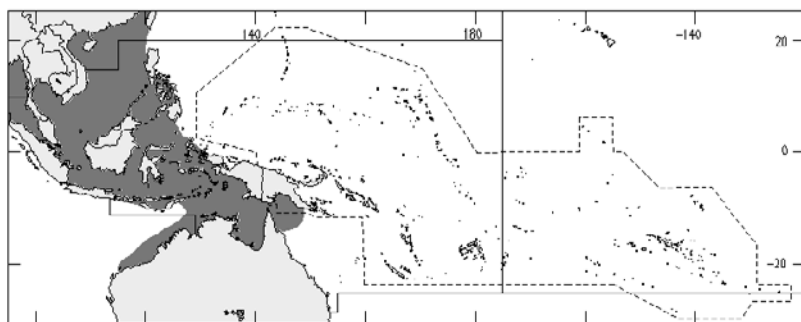
(after Day, 1878)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches behind front edge of eye. **Preopercular spines 3, upper long, bayonet-like, reaching to or past opercular margin**, with an accessory spine on base. Supraorbital ridge smooth over anterior third of eye, with stout spines posteriorly. Preorbital spine present; a single preocular spine. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Iris lappet bilobed in adults, crenate in juveniles. Finger-like interopercular flap present. Total gill rakers on first gill arch 7 to 9 (usually 8).** Dorsal-fin spines IX or I, VIII; dorsal-fin rays 11 or 12 (usually 12); anal-fin rays 12 or 13 (usually 12); pectoral-fin rays 20 to 23 (usually 21 or 22). Oblique scale rows slanting downward above lateral line about equal to number of lateral-line scales. Lateral-line scales 50 to 55 (usually 52 or 53), **anterior 13 to 33 scales bearing a small spine or ridge.** Scale pores of lateral line with 2 openings to the outside. **Colour:** brown above, whitish below, with about 7 vague dark bands crossing back in some; spinous dorsal fin dusky, with black blotches; soft dorsal fin clear with small brown spots on rays; anal fin pale, a few dark streaks on posterior rays; pectoral fins greyish below, with dark spots above; pelvic fins greyish; caudal fin brownish.

Size: Maximum total length about 26 cm, commonly to 18 cm.

Habitat, biology, and fisheries: Taken by trawls over mud and sand at depths to 132 m.

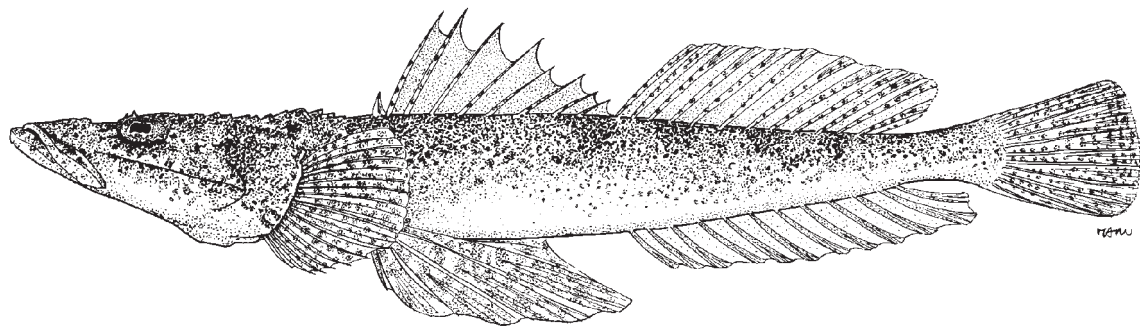
Distribution: Southern India and Sri Lanka to Malaysia, Gulf of Thailand, Hong Kong, Taiwan Province of China, Indonesia, Philippines, north-western shelf of Australia to Coral Sea.



Thysanophrys arenicola Schultz, 1966

Frequent synonyms / misidentifications: None / None.

FAO names: En - Broadhead flathead.



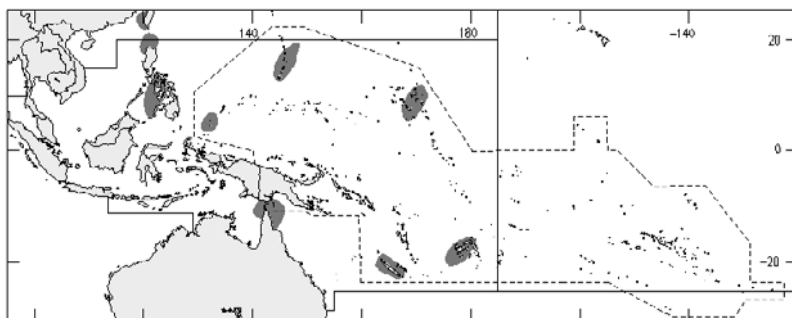
(after Masuda et al., 1984)

Diagnostic characters: Body elongate, head moderately depressed. **Rear edge of maxilla reaches to below front edge of eye. Lips smooth, lacking papillae on edges. Least interorbital width usually 3.5 times or less in greatest diameter of orbit.** Preopercular spines 2 or 3 (usually 3), upper spine longest, usually reaching less than half-way to opercular margin, accessory spine lacking. Supraorbital ridge smooth over anterior half of eye, with about 4 or 5 spines posteriorly. Suborbital ridge smooth anteriorly, with about 4 or 5 spines posteriorly. Preorbital spine rarely present; preocular spine 1. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Base of lower opercular spine concealed by scales. Iris lappet bearing short branches with bifurcate tips.** Interopercular flap absent. Total gill rakers on first gill arch 5 to 7 (usually 6). Dorsal-fin spines IX or I, VIII; **dorsal-fin rays 11 to 13 (usually 12); anal-fin rays 11 to 13 (usually 12);** pectoral-fin rays 19 to 22 (usually 21). Oblique scale rows slanting backward above lateral line about equal to number of lateral-line scales. Lateral-line scales 50 to 55 (usually 52 or 53), **anterior 1 to 3 scales (usually 1 or 2), bearing a small spine.** Scale pores of lateral line with 2 openings to the outside. **Colour:** body tan or greyish, back often covered with small dark flecks and 4 or 5 vague cross bands, some specimens with a marbled pattern of small dark and light blotches on dorsum, undersides whitish; fins flecked with small brown spots.

Size: Maximum total length about 37 cm, commonly to 25 cm.

Habitat, biology, and fisheries: Taken over sand associated with rocks and coral reefs to a depth of about 30 m.

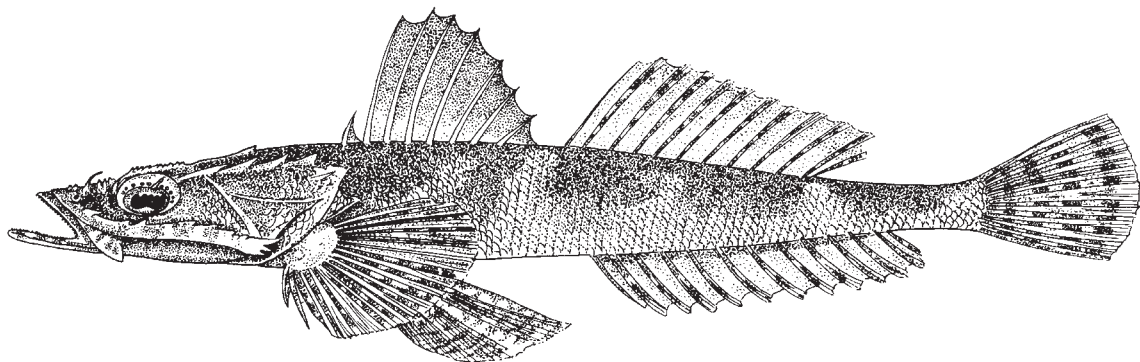
Distribution: Mozambique, Mauritius, Seychelles, Aden, Chagos Archipelago, Indonesia, Taiwan Province of China, Ryukyu Islands, Mariana and Marshall islands, Philippines, Torres Strait, and northern Queensland to New Caledonia and Fiji.



Thysanophrys carbunculus (Valenciennes in Cuvier and Valenciennes, 1833)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Papillose flathead.



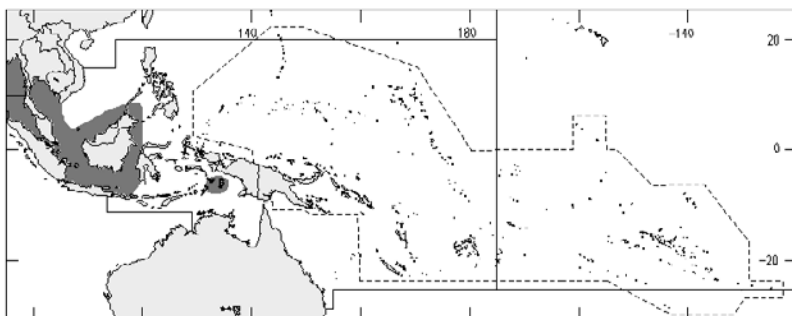
(after Bleeker, 1877-78)

Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to below front edge of eye. **Single row of papillae, often 7 to 9, on upper surface of eye, middle one elongate.** Preopercular spines 2 or 3 (usually 3), upper longest, not reaching to opercular margin, accessory spine present in most. Supraorbital ridge bearing spines throughout its length; suborbital ridge with 4 to 6 stout spines. Preorbital spine present, preopercular spine 1. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Base of lower opercular spine concealed by scales. Iris lappet crenate.** Interopercular flap absent. Total gill rakers of first gill arch 6. Dorsal-fin spines IX, I, VIII, or I, VII; dorsal-fin rays 10 to 12 (**usually 11**); anal-fin rays 11 to 13 (**usually 12**); pectoral-fin rays 18 or 19 (frequently 19). Oblique scale rows slanting backward above lateral line about equal to number of lateral-line scales. Lateral-line scales 50 to 54 (usually 52 or 53), **anterior 2 to 21 lateral-line scales bearing a small spine.** Scale pores of lateral line with 2 openings to the outside. **Colour:** body greenish above, whitish below, back crossed by 4 or 5 dark bands, a series of small dark blotches along lower side; spinous dorsal-fin with a broad submarginal dark band; soft dorsal, pectoral, and pelvic fins with numerous dark spots or blotches; anal fin white with a faint dark submarginal band; caudal fin pale with rows of dark spots forming several vertical bands.

Size: Maximum total length about 18 cm, commonly to 15 cm.

Habitat, biology, and fisheries: May be associated with aquatic vegetation at shallow depths.

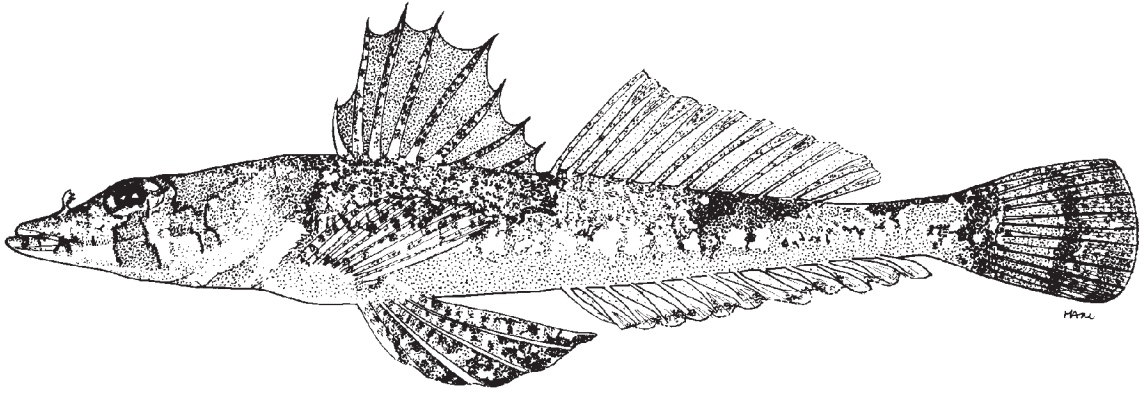
Distribution: From Bombay (India) to Singapore, Gulf of Thailand, North Borneo, and Indonesia.



Thysanophrys celebicus (Bleeker, 1854)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Celebes flathead.

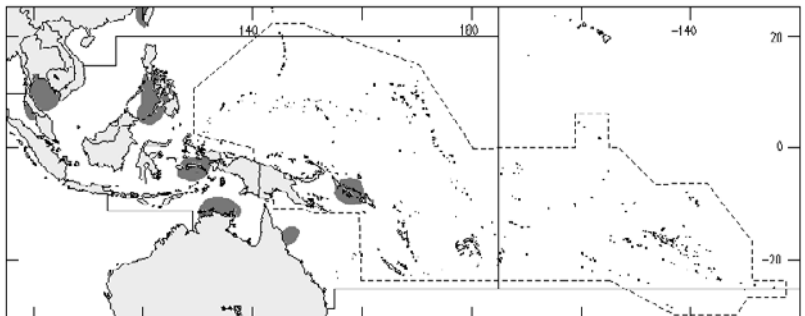


Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla reaches to below front edge of eye. **A single small unbranched papilla on posterior half of upper surface of eye.** Preopercular spines 3, upper longest, not reaching half-way to opercular margin, accessory spine present on base. Supraorbital ridge with spines throughout; suborbital ridge with 8 to 10 spines. Preorbital spines 2 or 3; preocular spine I. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Base of lower opercular spine concealed by scales. Iris lappet with very short branches.** Interopercular flap absent. Total gill rakers on first gill arch 5 to 7 (usually 5 or 6). Dorsal-fin spines IX, VIII, or I,VII (usually I,VII); **dorsal-fin rays 12; anal-fin rays 12 or 13 (usually 13);** pectoral-fin rays 18 to 20 (usually 19). Oblique scale rows slanting downward above lateral line about equal to number of lateral-line scales. Lateral-line scales 50 to 53 (usually 51 or 52), **anterior 2 to 6 lateral-line scales bearing a small spine.** Scale pores of lateral line with 2 openings to the outside. **Colour:** body brownish or greenish above, whitish below, back crossed by 4 or 5 dark bands; spinous dorsal-fin with a broad submarginal dark band; soft dorsal, pectoral, and pelvic fins with numerous dark spots; caudal fin with a basal dark band followed by a clear band and 4 dark narrow bands on distal part of fin; rear of head with a narrow dark band, a bold dark bar under eye.

Size: Maximum total length about 15 cm, commonly to 10 cm.

Habitat, biology, and fisheries: Inhabits shallow coastal areas and appears to be taken over sandy bottom with aquatic vegetation. Taken by trawls to a depth of 43 m, but usually taken during scuba diving at 20 m or less. Frequently taken near coral rubble and rock.

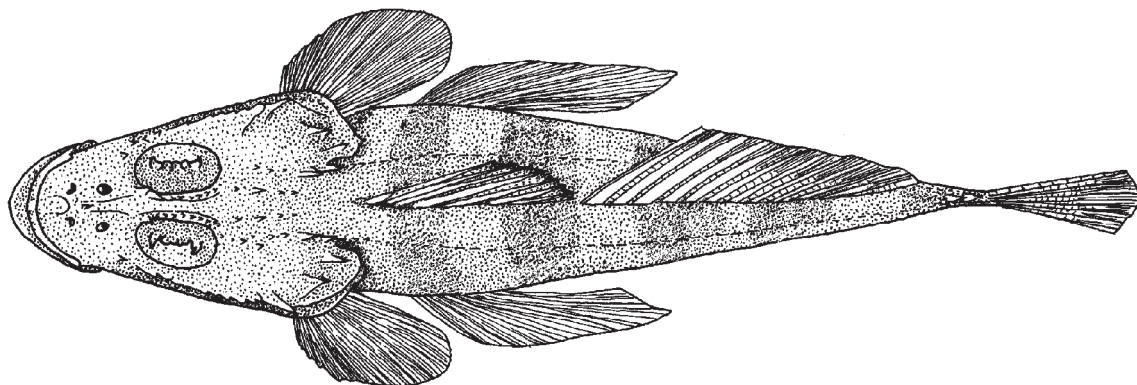
Distribution: From South Africa to Persian Gulf, Sri Lanka, southern India, Gulf of Thailand, Hong Kong, Taiwan Province of China, Philippines, Celebes, Irian Barat, Arafura Sea, northern Queensland, and the Solomon Islands.



Thysanophrys chiltonae (Schultz, 1966)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Longsnout flathead; Fr - Platycéphale clin d'oeil; Sp - Chato guiñón.

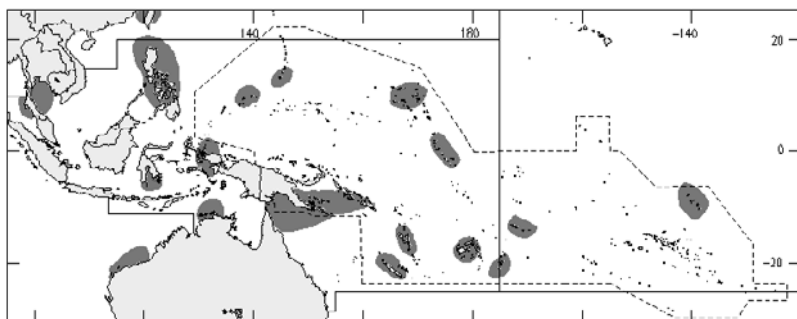


Diagnostic characters: Body elongate, head moderately depressed. Rear edge of maxilla is in front of anterior margin of eye. Preopercular spines 3, upper longest, accessory spine usually absent. Supraorbital ridge smooth over anterior half of eye, with serrations posteriorly; suborbital ridge with about 6 or 7 spines. **Least interorbital width 3.8 to 7.2 times in greatest eye diameter.** Preorbital spines 1 to 3; preocular spine 1. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Base of lower opercular spine concealed by scales. Iris lappet bearing short branches with bifurcate tips.** Interopercular margin incised, forming a broad lobe. Total gill rakers on first gill arch 5 to 7 (usually 6). Dorsal-fin spines IX, I, VIII, or I, VII; dorsal-fin rays 11 to 12 (usually 11); anal-fin rays 12; pectoral-fin rays 19 to 22 (usually 20 or 21). Oblique scale rows slanting downward above lateral line about equal to number of lateral-line scales. Lateral-line scales 50 to 54 (usually 52 or 53), **anterior 1 to 3 (usually 3) lateral-line scales, bearing a small spine.** Scale pores of lateral line with 2 openings to the outside. **Colour:** body light tan mottled with numerous white spots, white below, with about 5 to 7 brown bands crossing back; lips with alternating white and brown bands; a broad brown suborbital bar present; spinous dorsal fin with a large black submarginal blotch, a series of small white and brown spots on spines; soft dorsal fin with alternating white and brown spots on rays; anal fin pale; pectoral fins white below, with several small brown blotches in middle and a series of blackish blotches above; pelvic fins whitish, with a prominent blackish blotch near base and several small black blotches distally; caudal fin with rows of small white spots on rays separating 2 or 3 vertical dark bands.

Size: Maximum total length about 22 cm, commonly to 16 cm.

Habitat, biology, and fisheries: Inhabits sand areas adjacent to coral reefs to a depth of about 38 m, usually found at 18 m or less.

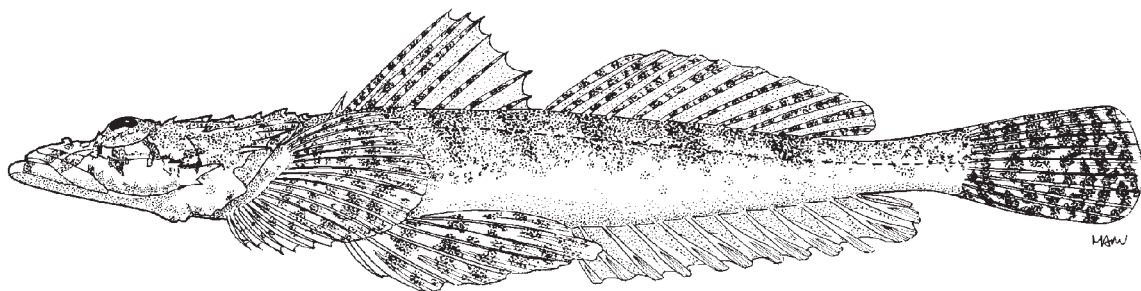
Distribution: Red Sea, Indian Ocean, Malaysia, Indonesia, northern Australia; Ryukyu Islands, Philippines, and from the Mariana and Marshall islands to the Marquesa Islands.



Thysanophrys otaitensis (Parkinson, in Cuvier and Valenciennes, 1829)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Fringelip flathead.

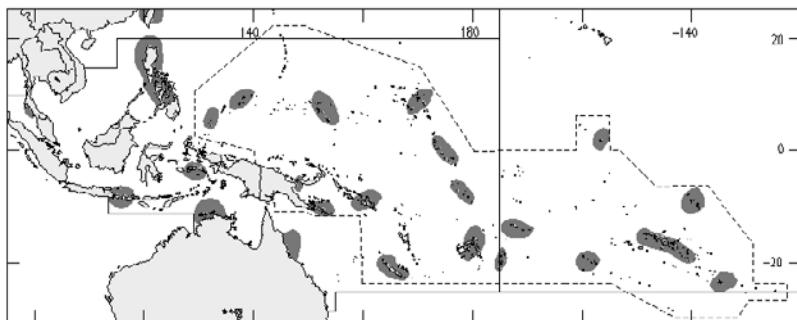


Diagnostic characters: Body elongate, head moderately depressed. **Rear edge of maxilla reaches past front edge of eye. Lips with a row of small fleshy papillae.** Preopercular spines 2 or 3, upper longest, extending about half-way to opercular margin, accessory spine absent. Supraorbital ridge smooth anteriorly, with stout serrations posteriorly; suborbital ridge bearing about 5 stout spines. Preorbital spine rarely present; preocular spine 1. Teeth on vomer in 2 separate patches. Lower side of head bicarinate. **Base of lower opercular spine concealed by scales. Iris lappet bearing short branches with bifurcate tips.** Interopercular flap absent. Total gill rakers on first gill arch 5 to 7 (usually 6). Dorsal-fin spines IX, I,VIII, or I,VII,I; **dorsal-fin rays 11 or 12 (usually 11);** anal-fin rays 11 or 12 (usually 12); pectoral-fin rays 19 to 22 (usually 20 or 21). Oblique scale rows slanting backward above lateral line about equal to number of lateral-line scales. Lateral-line scales 50 to 54 (usually 52 or 53), anterior 1 to 3 with a small spine. Scale pores of lateral line with 2 openings to the outside. **Colour:** back tan, mottled with white flecks or spots, 4 or 5 vague cross bands crossing back, undersides whitish; fins flecked with small brown spots, larger blotches frequently present on pectoral, pelvic, and caudal fins.

Size: Maximum total length about 25 cm, commonly to 19 cm.

Habitat, biology, and fisheries: Commonly taken over sand around coral reefs at depths of 10 m or less; maximum depth to about 40 m.

Distribution: Widespread from northern Natal, Madagascar, Comoros, Chagos Archipelago, Indonesia, Taiwan Province of China, southern Japan, Philippines, Timor Sea, Great Barrier Reef, Marshall and Caroline islands to the Marquesa and Tuamotu islands.

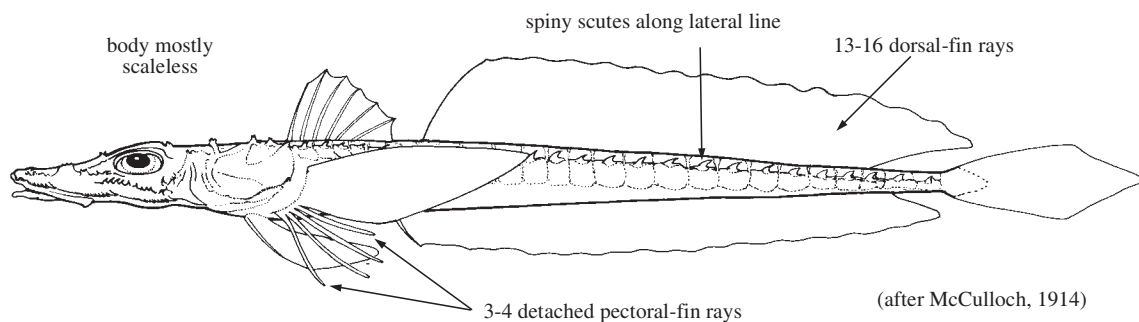


HOPLICHTHYIDAE

Ghost flatheads (spiny flatheads)

by M.A. McGrouther

Diagnostic characters: Flattened, small to medium-sized (to about 18 cm standard length) scorpaeniform fishes; body elongate; **mostly scaleless, with a row of spiny scutes along lateral line covering much of back and upper half of sides.** Head very wide and flat, much wider than deep, with variously developed ridges and spines. Eyes on dorsal surface, longer than wide (eyes of larvae lateral, moving dorsally with growth). Snout broad and greatly flattened. Mouth large. Teeth minute to villiform on jaws, vomer, palatines, and pharyngeals. First dorsal fin short-based, with V or VI spines; second dorsal fin long based, with 13 to 16 soft rays, some rays may be elongated in adult males; anal fin with I spine and 15 to 17 soft rays, about as long as second dorsal fin; caudal fin rounded to emarginate; **pectoral fins with 11 to 14 upper rays and 3 or 4 detached lower rays;** pelvic fins thoracic, with I spine and 5 soft rays. **Colour:** most species yellow, pinkish, or brown above and on sides, with varying spots and mottling, fading to pink, white, or silver below; pectoral fins yellowish brown to hyaline with various crossbars, spots, or mottling; first dorsal fin often dark posteriorly, or with wavy crosslines; caudal fin usually hyaline, although in some species with a dark distal margin or basal spots.



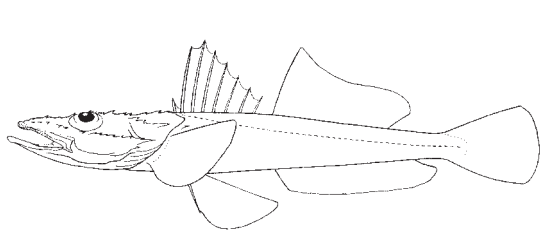
Habitat, biology, and fisheries: Occur on the continental shelf and slope at depths of 60 to 1 500 m. Larvae and juveniles collected in shallower water than adults. Feed on a range of crustaceans and fishes. Of no use in commercial fisheries. Flesh supposedly of good quality but even the largest fish have very little meat. *Hoplichthys haswelli* which occurs in southern Australian waters (outside the WCP area) grows to 43 cm.

Remarks: Currently, 11 species of hoplichthyids are recognized worldwide and 8 of these occur within the Western Central Pacific. The taxonomy of the family still requires some clarification (see footnote to species list below).

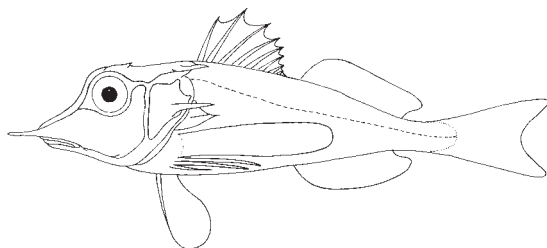
Similar families occurring in the area

Platycephalidae: superficially resemble hoplichthyids, but fully scaled on body, do not have detached pectoral-fin rays, and no spiny scutes along lateral line.

Triglidae: fully scaled on body; less spinose on sides of head; head and body not or less flattened.

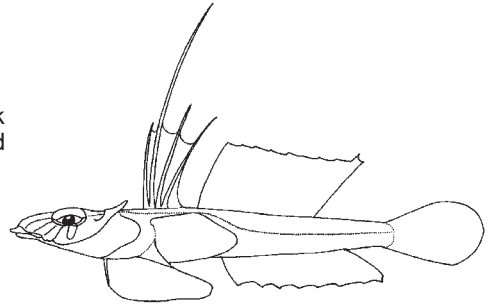


Platycephalidae



Triglidae

Callionymidae: also with strong preopercular spine, but lack lateral head spination, have no body scutes, and no detached pectoral-fin rays as found in hoplichthyids.



Callionymidae

Key to the species of Hoplichthyidae occurring in the area

- 1a. Lateral scutes each with 2 large spines of similar length (Fig. 1a) *Hoplichthys langsdorfii*
- 1b. Lateral scutes with 1 large spine and possibly several tiny spines below it (Fig. 1b) → 2
- 2a. Dorsal surface of head 2/3 to 1 eye length behind eye with a strong elevated ridge, or cluster of 2 or more stout spines (Fig. 2); more than 1 strong spine usually present immediately behind eye *Hoplichthys ogilbyi*
- 2b. Not as above, dorsal surface of head behind each eye with small spines in rows, or with a single large spine, or without spines → 3
- 3a. Interorbital width greater than or equal to 1/3 eye length → 4
- 3b. Interorbital width much less than 1/3 eye length → 6
- 4a. Interorbital width 1/3 to 1/2 eye length; pectoral-fin rays 4 to 6 of juveniles elongated, often crossed by 2 or 3 wavy bars . . . *Hoplichthys filamentosus*
- 4b. Interorbital width greater than eye length; pectoral-fin rays 4 to 6 not much longer than other rays → 5
- 5a. Dorsal profile of eyes partly covered by orbit when viewed from above (Fig. 3a); head length 5 times eye length *Hoplichthys fasciatus*
(only known from juvenile specimens, most likely a synonym of one of the other species)
- 5b. Dorsal profile of eyes not covered by orbit (Fig. 3b); head length 8 times eye length *Hoplichthys pectoralis*
(only known from juvenile specimens, most likely a synonym of one of the other species)

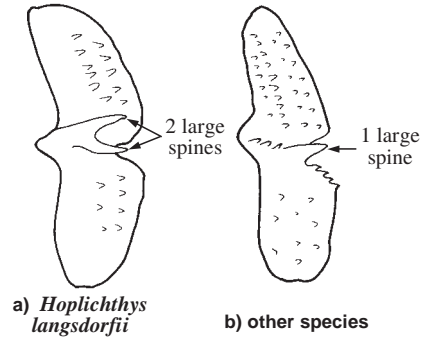


Fig. 1 lateral scutes (along lateral line)

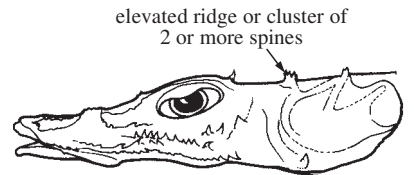


Fig. 2 *Hoplichthys ogilbyi*

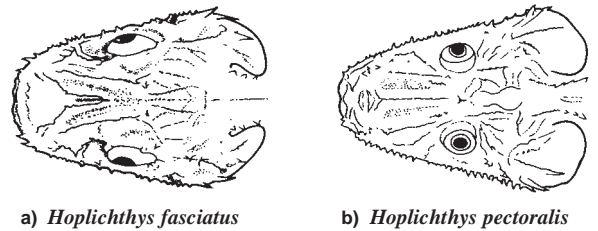


Fig. 3 dorsal view of head

- 6a. Lateral margin of head less spinose, weakly lobed, almost straight, with only a narrow gap between the spine rows below the eye (Fig. 4a) *Hoplichthys gilberti*
- 6b. Lateral margin of head strongly spinose, more strongly lobed, with a distinct gap between the spine rows below the eye (Fig. 4b) → 7

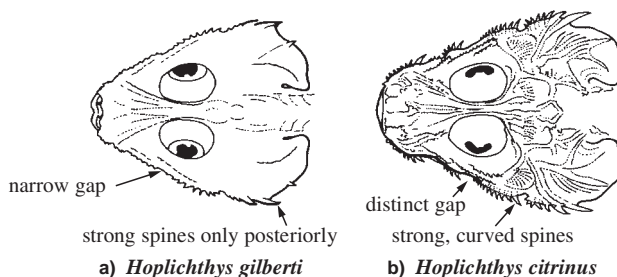


Fig. 4 dorsal view of head

- 7a. Free rays of pectoral fins equal in length to longest joined rays; total anal-fin elements (spines and soft rays) 16; fresh coloration unknown *Hoplichthys regani*
- 7b. Free rays of pectoral fins shorter than longest joined rays; total anal-fin elements 17; body bright lemon yellow when fresh *Hoplichthys citrinus*

List of species occurring in the area

- Hoplichthys citrinus* Gilbert, 1905
- ? *Hoplichthys fasciatus* Matsubara, 1937 ^{1/}
- Hoplichthys filamentosus* Matsubara and Ochiai, 1950
- Hoplichthys gilberti* Jordan and Richardson, 1908
- Hoplichthys langsdorfii* Cuvier and Valenciennes, 1829
- Hoplichthys ogilbyi* McCulloch, 1914
- ? *Hoplichthys pectoralis* (Fowler, 1943) ^{1/}
- Hoplichthys regani* Jordan, 1908

References

Matsubara, K. 1971. *Fish morphology and hierarchy*. Part II. Ishizaki - Shoten. Japan, pp. 791-1605 (relevant pages for Hoplichthyidae: 1123-1130).

Matsubara, K. 1971. *Fish morphology and hierarchy*. Part III (Plates). Ishizaki - Shoten. Japan, pls 1-135 (relevant plate for Hoplichthyidae pl. 125).

Matsubara, K. and A. Ochiai. 1950. Studies on Hoplichthyidae, a family of mail-cheeked fishes, found in Japan and its adjacent waters. II. *Japan. J. Ichthyol.*, 1(2):82-88.

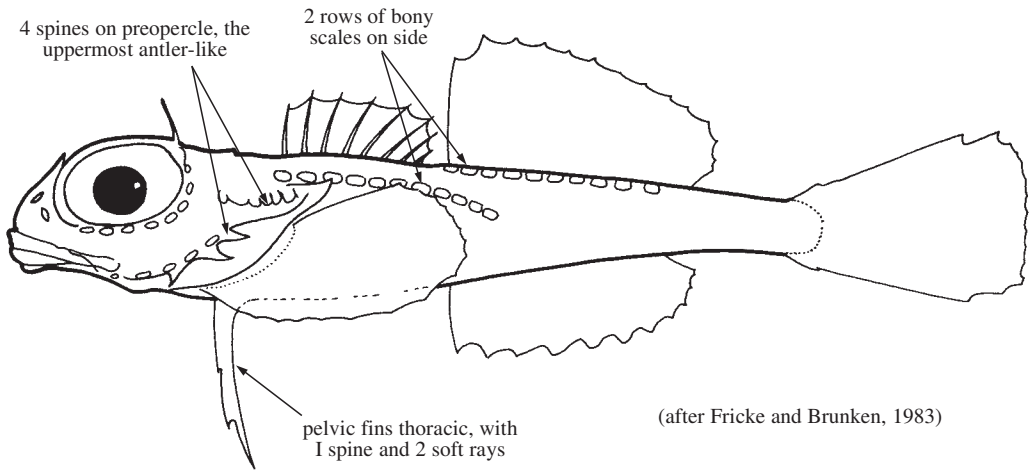
^{1/} Described from juveniles (about 7 cm) and show the juvenile character of a very wide interorbit. These species are quite likely conspecific with one of the other species in the area, but because of this uncertainty both have been included in the key above.

COTTIDAE

Sculpins

by J.S. Nelson and K.E. Carpenter

Diagnostic characters (for the 2 species occurring in the area): Small (to about 51 mm standard length) moderately elongate scorpaeniform fishes; body depth 15.8 to 20.7% of standard length. Head large, 38.5 to 41.2% of standard length. **Eye width much longer than snout length**, orbit length around 2 times snout length; snout length 7.25 to 8.3% of standard length. Long supraorbital cirrus present (possibly absent in *Antipodocottus mesembrinus*). **Preopercle with 4 posteriorly-directed spines, the uppermost antler-like**, with 3 to 5 secondary projections. Villiform teeth in jaws, vomer, and palatines. **Two dorsal fins**, the first with VIII spines, the second with 12 to 14 soft rays. Anal fin with 10 to 12 soft rays. Caudal fin slightly rounded. Pectoral fins with 17 to 20 soft rays. **Pelvic fins thoracic, with I spine and 2 soft rays**. **Two rows of modified bony scales on sides**, the uppermost directly beneath base of second dorsal fin, the second along the lateral line (careful examination required). **Colour:** live coloration unknown; in alcohol, body brownish or reddish brown, lighter ventrally, sides and head with irregularly spaced darker spots and blotches, sometimes a dark blotch at base of lower caudal-fin rays; dorsal fin with irregular dark markings, sometimes with distal end distinctly darker on spinous dorsal fin.



(after Fricke and Brunken, 1983)

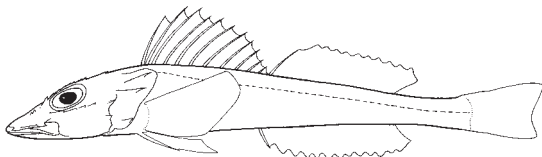
Habitat, biology, and fisheries: Deep water demersal, at depths between 150 and 765 m. Very little known about the biology of the species occurring in the area. No interest to fisheries. *Antipodocottus elegans* is known only from southernmost Queensland and Tasmania while *A. mesembrinus* is known only from off Indonesian New Guinea.

Remarks: Both the generic placement and specific status of the 2 species recorded from the area are questionable.

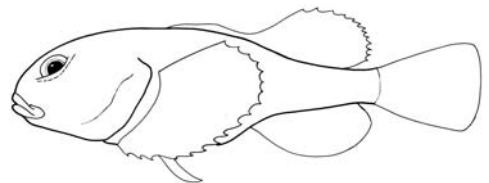
Similar families occurring in the area

Bembridae (compared to Cottidae in the area): head depressed (not depressed in Cottidae); snout length greater than or nearly equal to eye diameter (snout length much smaller than eye diameter in Cottidae).

Psychrolutidae (compared to Cottidae in the area): a single dorsal fin (2 dorsal fins in Cottidae); no preopercular spines (4 in Cottidae, the uppermost prominent and antler-like); no scales along lateral line (some scales in Cottidae).



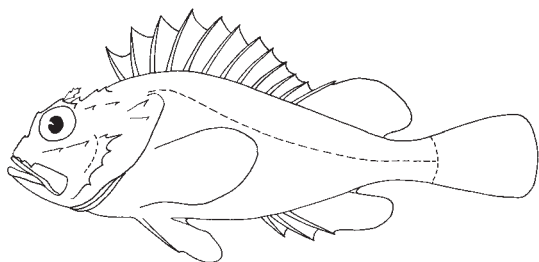
Bembridae



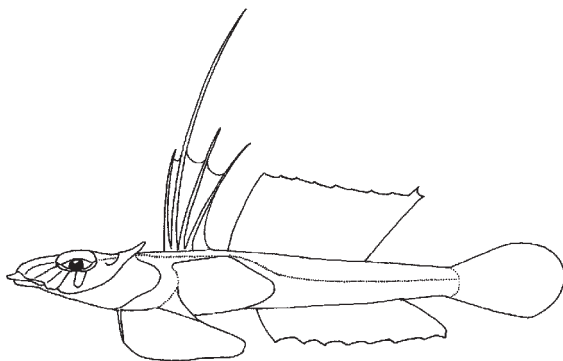
Psychrolutidae

Scorpaenidae (compared to Cottidae in the area): a single dorsal fin (2 dorsal fins in Cottidae).

Callionymidae (compared to Cottidae in the area): the cottids in the area superficially look like callionymids, however they can be distinguished by very restricted gill openings (broad gill openings in Cottidae); up to IV dorsal-fin spines (VIII in Cottidae); 1 stout preopercular spine (4 in Cottidae); pelvic fins subjugular (thoracic in Cottidae) with I spine and 5 soft rays (I spine and 2 soft rays in Cottidae); body scaleless (scales present in Cottidae).



Scorpaenidae



Callionymidae

List of species occurring in the area

Antipodocottus elegans Fricke and Brunken, 1984

Antipodocottus mesembrinus (Fricke and Brunken, 1983)

References

Fricke, R. and H. Brunken. 1984. A new cottid fish of the genus *Antipodocottus* (Teleostei: Scorpaeniformes) from eastern Australia, with a key to the species of the genera *Silengis* and *Antipodocottus*. *J. Nat. Hist.*, 18:41-46.

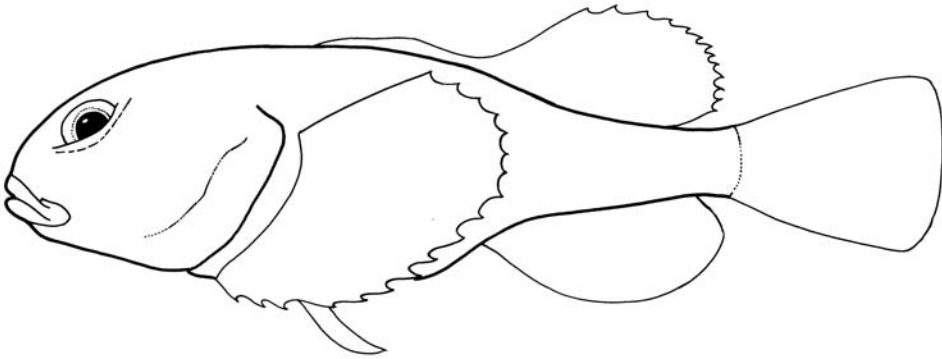
Nelson, J.S. 1990. Redescription of *Antipodocottus elegans* (Scorpaeniformes: Cottidae) from Australia, with comments on the genus. *Copeia*, 1990(3):840-846.

PSYCHROLUTIDAE

Fathead sculpins

by J.S. Nelson

Diagnostic characters: Small to moderate fishes (to about 65 cm standard length, commonly under 35 cm); **body** moderately elongate, **tadpole-shaped**, stout and robust in cross-section behind head, tapering and compressed posteriorly. Head very large, smooth, or with protruding spines or knobs, cirri sometimes present. Spines absent from preopercle in species in the area. **Interorbital space wide, greater than exposed eye diameter in species in the area.** Eye large. Mouth large, terminal, or nearly so. Teeth conical, generally reduced; premaxillae and dentary with several rows, prevomer with or without teeth; palatine without teeth. Branchiostegal rays 7. Gill rakers short spiny knobs. Dorsal fin continuous in species in the area. Dorsal fin with VI to XII slender weak spines and 12 to 21 soft rays; anal fin with 9 to 17 soft rays; caudal fin rounded to truncate; **pelvic fins (thoracic, closely spaced, small, and slender) with 1 spine and 3 soft rays;** pectoral fins with 15 to 26 (usually 19 to 26) rays. **Skin loose in most species, covering dorsal and anal fins in most,** making it difficult to count rays. **Body naked or variously with bony plates or prickles (cirri may be present or absent).** **Lateral line on trunk reduced, with 20 or fewer small pores.** **Bone covering cranial sensory canals in interorbital and suborbital areas reduced to well-developed but relatively narrow bony arches.** Postorbital bones 1 or 2. Vertebrae about 28 to 38. **Colour:** uniformly brown to grey or with irregular markings or spotted pattern of black, grey, brown, or white.

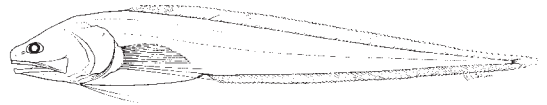


Habitat, biology, and fisheries: Mostly benthic, from inshore shallow water to depths of 2 800 m. Occurring primarily in cool waters of the North Pacific and North Atlantic and scattered parts of the southern hemisphere (e.g. off South America, South Africa, Australia, and New Zealand). Little is known of their biology; some have been found with gastropods in the stomach. Trawled incidentally, of no commercial value.

Remarks: Fathead sculpins are poorly represented in the area. The status of M. Weber's *Cottunculus gyrinoides* from the Flores Sea (south of Sulawesi) is uncertain. The related family Cottidae is also known in the area from 2 species of *Antipodocottus*.

Similar families occurring in the area

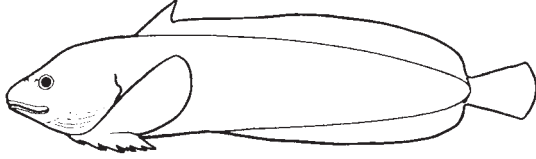
Aphyonidae, Batrachoididae, Bythitidae, and Ophiidiidae: distinguished from Psychrolutidae in having pelvic fins in front of pectoral fins.



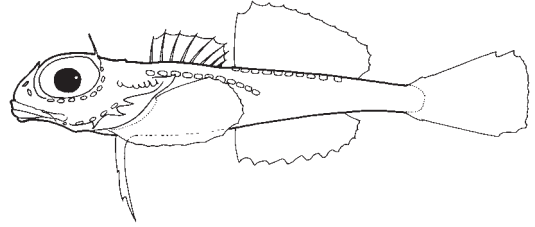
Ophiidiidae

Liparidae (known only from nearby WCP area): distinguished from Psychrolutidae in having pelvic fins modified into a sucking disc or in lacking these fins.

Cottidae: the 2 species occurring within and adjacent to area, *Antipodocottus mesembrinus* from Indonesia and *A. elegans* from off eastern Australia, differ from Psychrolutidae in having dorsal fins distinct and separated, some scales along lateral line, and 4 preopercular spines, uppermost especially prominent and antler-like.



Liparidae



Cottidae

Key to the species of Psychrolutidae occurring in or near the area

- 1a. Vomerine teeth present *Ebinania* spp.
- 1b. Vomerine teeth absent → 2

- 2a. Pectoral-fin rays usually 24 or 25; body uniform light grey; peritoneum jet black *Psychrolutes marcidus*
- 2b. Pectoral-fin rays 23 or fewer; body variously brownish; peritoneum may be darkish but not jet black → 3

- 3a. Cirri absent from head and body; total dorsal-fin rays 22 or 23 *Psychrolutes occidentalis*
- 3b. Cirri sparse but present; total dorsal-fin rays usually 24 to 26 → 4

- 4a. Median chin pore single *Psychrolutes inermis*
- 4b. Median chin pore paired *Psychrolutes macrocephalus*

List of species occurring in the area

Note: the taxa listed are known or reported from the area or nearby; additional species occur in, for example, New Zealand.

Ebinania spp.

Psychrolutes inermis (Vaillant, 1888) or *P. macrocephalus* (Gilchrist, 1904)

Psychrolutes marcidus (McCulloch, 1926)

Psychrolutes occidentalis Fricke, 1990

References

Jackson, K.L. and J.S. Nelson. 1998. *Ambophthalmos*, a new genus for “*Neophrynichthys*” *angustus* and “*Neophrynichthys*” *magnicirrus*, and the systematic interrelationships of the fathead sculpins (Cottoidei, Psychrolutidae). *Can. J. Zool.*, 76:in press.

Nelson, J.S. 1995. *Psychrolutes microporos*, a new species of cottoid (Teleostei: Scorpaeniformes) from New Zealand and Japan with biogeographical comments. *Proc. Zool. Soc., Calcutta*, 48(2):67-76.

Order PERCIFORMES

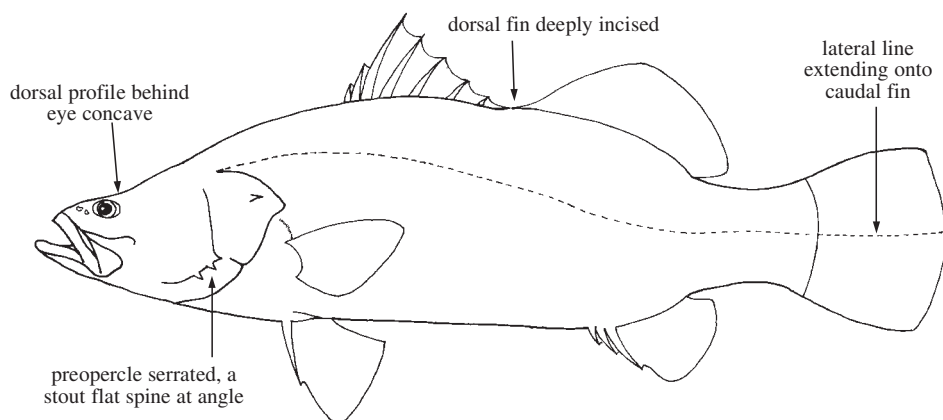
Suborder PERCOIDEI

CENTROPOMIDAE

Sea perches

by H.K. Larson

Diagnostic characters: Elongate, compressed, medium to large (to 2 cm) percoid fishes with **dorsal profile behind eyes concave or convex**. Eyes medium sized, relatively close to tip of snout and dorsal profile. **Preopercle with serrated posterior or ventral margins and a stout flat spine at angle**; opercle with small flat spine; serrated supracleithrum exposed, near beginning of lateral line. Snout rounded. **Mouth large**, almost horizontal, reaching at least to below eyes. **Teeth small, in villiform bands** on upper and lower jaws, vomer, and palatines (may be present on tongue). Branchiostegal rays 7. First gill arch with 3 to 7 gill rakers on upper limb, 9 to 14 on lower limb. **Dorsal fin deeply incised** before last dorsal-fin spine, or with distinct gap between spiny and soft portions of fin. **Caudal fin rounded**. Dorsal fin with VII to IX strong spines and 10 to 14 soft rays; anal fin with III spines and 7 to 9 soft rays; pelvic fins with axillary scale, and I spine and 5 soft rays; pectoral fins with 16 or 17 rays and spiny flap exposed just above fin base. **Scales large, ctenoid**; scale rows on body running horizontally; bases of caudal, soft dorsal, and anal fins covered with scales. Lateral-line scales 45 to 50; lateral line extends onto caudal fin, nearly to rear margin, in 1 or 3 series. Vertebrae 11+14=25. Three predorsal bones present. Five hypurals (all separate), 2 epurals, and 1 or 2 uroneurals. Swimbladder with strong ligament running anterodorsally to posttemporal. Supraoccipital extended forward, separating posterior portions of frontals. **Colour: adults greenish or silvery grey to brown**, juveniles with stripes; **eyes with characteristic red reflection**.

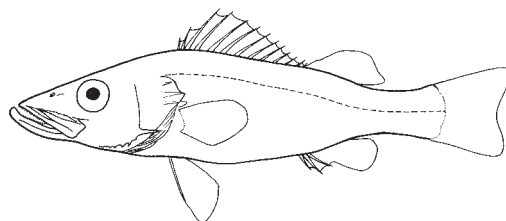


Habitat, biology, and fisheries: Contains 2 subfamilies, the Centropominae, with 9 species, and Latinae, with 9 species. Coastal marine and estuarine to fresh water, inhabiting mangrove estuaries and rocky to coral reefs. Feed on crustaceans (mostly prawns) and fishes. Solitary or in small groups. *Lates calcarifer* move up into brackish or fresh water during parts of their life cycle; other centropomids remain in the sea or fresh water. Popular and sought-after fishes, with some species of very considerable economic importance.

Similar families occurring in the area

Serranidae: preopercle smooth or serrated, usually without large flat spines or serrations; opercle with 3 flat spines; teeth conical, pointed, in rows; lateral line not extending onto caudal fin; dorsal fin single and not divided in most species. Most similar species in the area: *Nippon spinosus*.

Moronidae (*Lateolabrax japonicus*, occurs near the northern part of the area): usually forked caudal fin; opercle with 2 spines on upper part; preopercle serrated, several large flat spines along lower edge; pelvic fins without axillary scale; lateral line does not extend onto caudal fin.

Serranidae (*Nippon spinosus*)

Key to the species of Centropomidae occurring in the area

- 1a. Jaws reach back to rear of eyes (Fig. 1); lower edge of preopercle with 3 or 4 large flat spines *Lates calcarifer*
- 1b. Jaws reach back to under eyes (Fig. 2); lower edge of preopercle smooth, without spines, only 1 spine present at angle *Psammoperca vaigiensis*

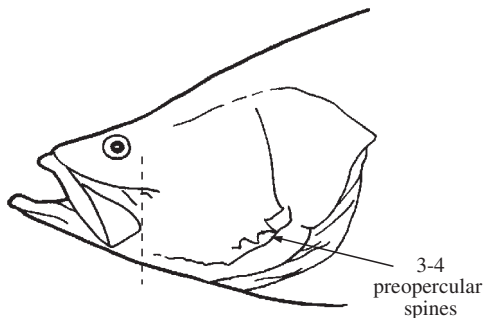


Fig. 1 *Lates calcarifer*

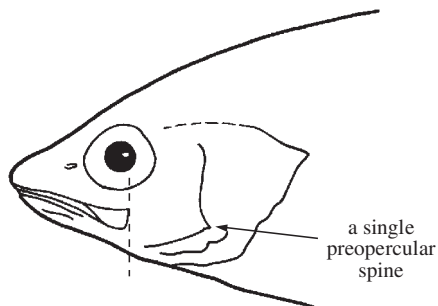




Fig. 2 *Psammoperca vaigiensis*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Lates calcarifer* (Bloch, 1790)
-  *Psammoperca vaigiensis* (Cuvier, 1828)

References

Copland, J.W. and D.L. Grey (eds). 1987. Management of wild and cultured sea bass/barramundi (*Lates calcarifer*). Canberra, Australian Centre for International Agricultural Research. *ACIAR Proceedings*, (20):210 p.

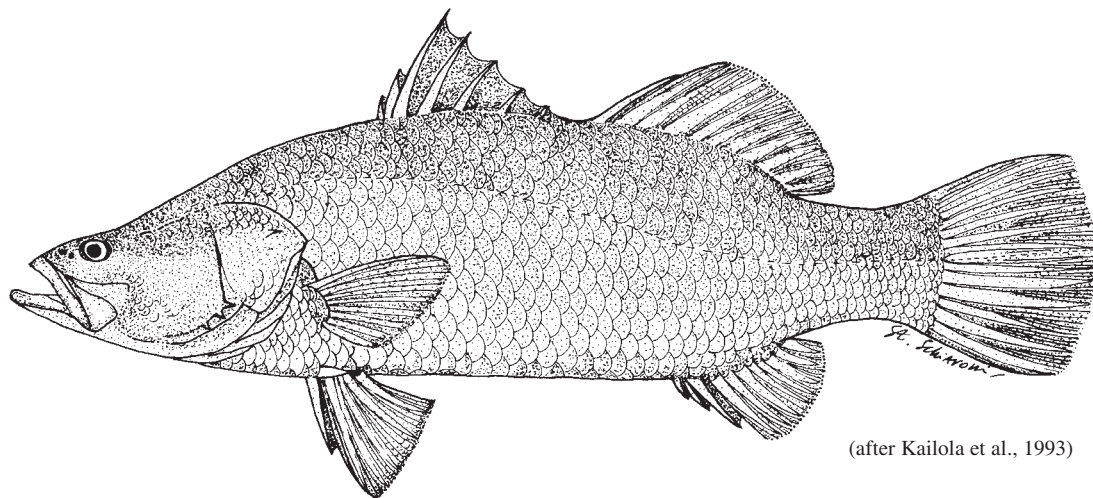
Greenwood, P.H. 1976. A review of the family Centropomidae (Pisces, Perciformes). *Bull. Brit. Mus. (Nat. Hist.) Zool.*, 29(1):1-81.

Lates calcarifer (Bloch, 1790)

GIP

Frequent synonyms / misidentifications: None / *Lateolabrax japonicus* (Cuvier 1828) (family Moronidae).

FAO names: En - Barramundi (= giant seaperch, Fishing Areas 57/72); Fr - Barramundi; Sp - Barramundi.



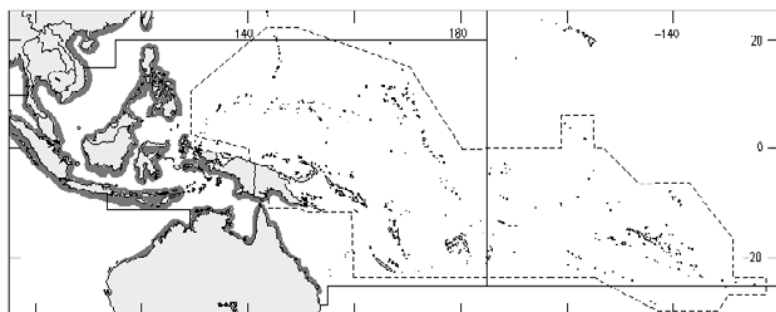
(after Kailola et al., 1993)

Diagnostic characters: Body moderately deep, elongate, and compressed; caudal peduncle distinct. **Dorsal profile concave anteriorly**, convex in front of dorsal fin; snout and jaws pointed. **Lower edge of preopercle with 3 or 4 (rarely more) large flat triangular spines. Nostrils on each side of head close together near eye. Mouth large, jaws reaching past eyes.** Lower limb of first gill arch with 16 or 17 gill rakers. **Dorsal fin deeply incised before last (small) dorsal-fin spine**, the fin with VII to IX spines and 10 or 11 soft rays. Anal fin with III spines and 7 or 8 soft rays. Caudal fin rounded. Scales firmly fixed, ctenoid. Lateral line extends onto caudal fin. Low scaly sheath at base of soft dorsal and anal fins. **Colour:** adults silver with olive-grey or grey-blue backs (fish from turbid waters are darker and duller); juveniles brown to greyish brown with 3 white stripes on head and scattered white patches on sides (white markings can be intensified or turned off at will); eyes brown to golden, with bright red reflective glow; fins without markings.

Size: Maximum total length over 2 m; commonly to 1.5 m and over 55 kg.

Habitat, biology and fisheries: Inhabits coastal marine and estuarine to fresh-water habitats; adults mainly in estuaries (mangroves and river mouths), younger fish extending up rivers into fresh water. Adults return to estuaries to breed, forming spawning aggregations. Barramundi change sex during their life cycle, with most fish maturing first as functional males then becoming females after 3 to 5 years of age. Feed on fishes and some crustaceans (mostly prawns). Popular and sought-after fishes of very considerable economic importance. From 1990 to 1995, the FAO Yearbook of Fishery Statistics reports a range of yearly catch of around 20 200 to 42 800 t of *Lates calcarifer* from the Western Central Pacific. Gill nets mostly used, but recreational fishery (rod-and-line) becoming increasingly important. Farming presently carried out, for example in Thailand, Indonesia, and Australia. Marketed mostly fresh.

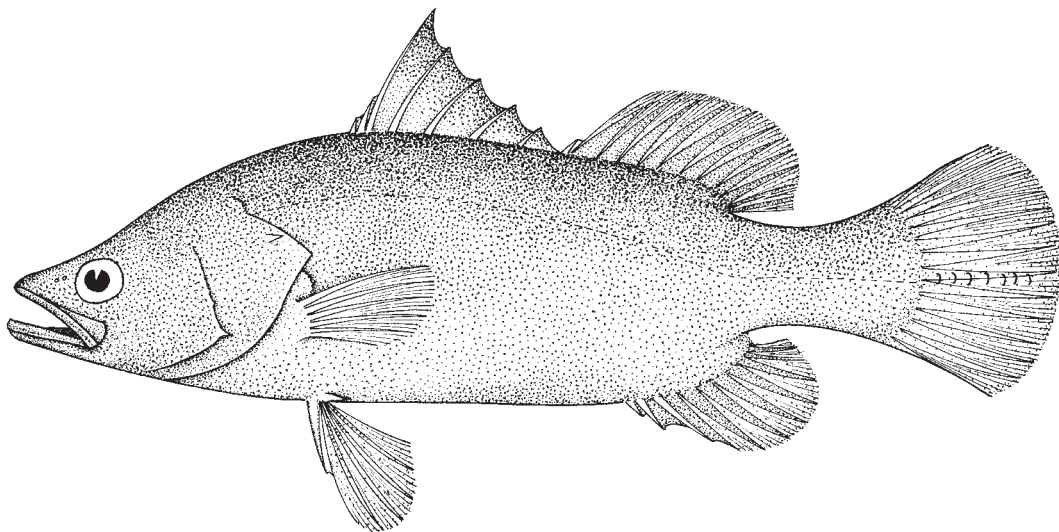
Distribution: Widely distributed in coastal areas of the Indo-West Pacific, from the eastern edge of the Persian Gulf to China and southern Japan, and southwards to northern Australia and southern Papua New Guinea.



Psammoperca vaigiensis (Cuvier, 1828)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Waigieu seaperch; Fr - Brochette de mer; Sp - Perca de mar.

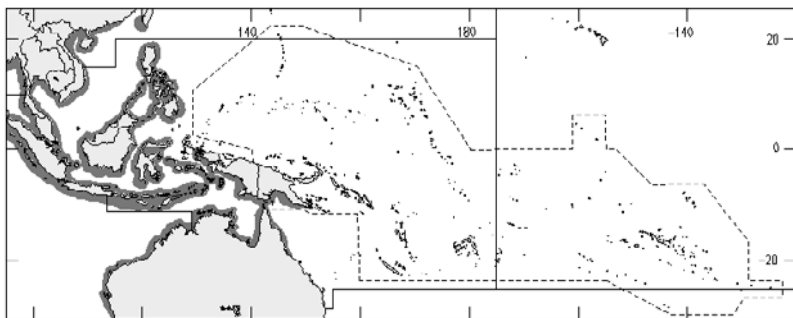


Diagnostic characters: Body moderately deep, elongate, and compressed; caudal peduncle distinct. **Dorsal profile concave anteriorly**, convex in front of dorsal fin; snout and jaws pointed, snout tip slightly rounded. **Lower edge of preopercle smooth, 1 large flat spine at rear angle of preopercle. Nostrils on each side of head widely separated. Mouth moderate, jaws reaching to below middle of eyes.** Lower limb of first gill arch with 12 to 14 gill rakers. **Dorsal fin deeply incised before last (small) dorsal-fin spine, the fin with VII or VIII spines and 12 to 14 soft rays.** Anal fin with III spines and 8 or 9 soft rays. Caudal fin rounded. Scales firmly fixed, ctenoid. Lateral line extends onto caudal fin. Low scaly sheath at base of soft dorsal and anal fins. **Colour:** light silvery grey to dark brown, usually coppery brown, paler ventrally, darker brown lines may follow scale rows along length of body; eyes golden-brown with distinct red reflection; fins unmarked.

Size: Maximum total length about 47 cm; commonly between 20 and 30 cm.

Habitat, biology, and fisheries: Coastal, marine, found on shallow rocky or coral reefs especially near algal beds (such as *Sargassum*). Secretive during the day, hiding in crevices or under overhangs. Hunts at night for small fishes and crustaceans. No fishery statistics available. Fished mostly with handlines, rod-and-line, or gill nets. Marketed mostly fresh.

Distribution: Distributed in the tropical east Indo-West Pacific, from Bay of Bengal, Indo-Australian Archipelago and northern Australia, Philippines, Japan, and the China Sea.



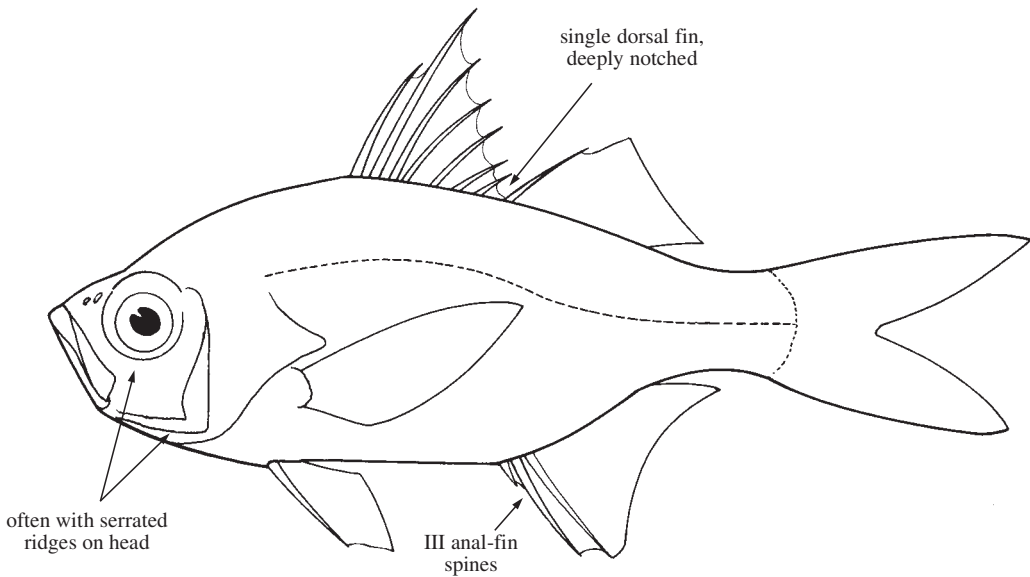
AMBASSIDAE

(= Chandidae)

Perchlets, glassfishes

by G.R. Allen

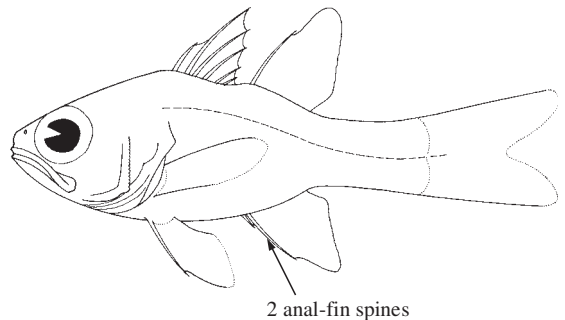
Diagnostic characters: Small (to 12 cm) percoid fishes; body oblong to oval-shaped and compressed. Eyes large, much greater than snout length. **Margins and ridges of preorbital, suborbital, supraorbital, preopercle, and interopercle frequently serrate.** Mouth moderately large, only slightly protractile, jaws equal or lower one slightly protruding; angle of jaw oblique, about 40° to horizontal. Bands of villiform teeth on jaws, vomer, and palatines. First gill arch with 16 to 29 gill rakers on lower limb. **A deeply notched dorsal fin,** the front portion of fin with VII spines, the rear portion with I spine and 8 to 11 soft rays. Anal fin with III spines and 8 to 11 soft rays. Caudal fin forked. Pelvic fins with I spine and 5 soft rays. Pectoral fins with 11 to 17 rays. Branchiostegal rays 6. Scales large and cycloid, extending onto head and base of median fins; cheeks and operculum scaly; lateral line continuous or interrupted in middle portion; scales in midlateral series 24 to 34. **Colour:** semitransparent, usually with dark scale outlines and silvery sheen on side of head and belly.



Habitat, biology, and fisheries: Mangrove shores, brackish estuaries, and fresh waters, always in shallow depths. Forms resting aggregations during the day among the roots of mangrove trees, log snags, and aquatic plants. They disperse at night to feed on micro-crustaceans (cladocerans, ostracods, and copepods), aquatic and terrestrial insects, and occasional fishes. Too small to be commercially important, although they are sometimes dried and salted; also used as bait fishes.

Similar families occurring in the area

Apogonidae: dorsal fin consisting of 2 completely separate parts; only II anal-fin spines.

**Apogonidae**

Key to marine and estuarine species of Ambassidae occurring in the area

Remarks on key characters: the serrated margins and ridges on various head bones are useful features for identifying ambassid fishes (Fig. 1).

- 1a. Supraorbital spines usually 3 to 5 (rarely 2); nasal spine well developed → 2
- 1b. Single suborbital spine; nasal spine well developed or absent → 4
- 2a. Hind margin of preopercle (i.e. vertical limb) with about 6 to 13 small serrae (Fig. 2) *Ambassis vachellii*
(Indo-Australian Archipelago)
- 2b. Hind margin of preopercle usually smooth or weakly crenate without distinct serrae (Figs 3 and 4) → 3

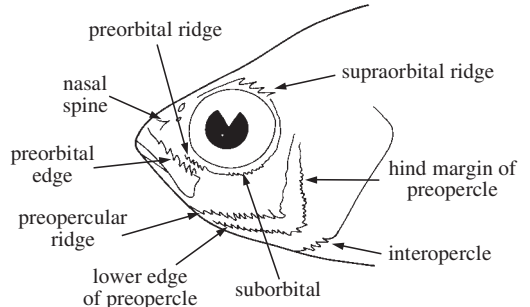


Fig. 1 serrated ridges and edges of head bones used in the identification key

- 3a. Soft anal-fin rays usually 10 (rarely 11); predorsal scales 16 to 18; eye relatively small, 10.7 to 12.7% of standard length; caudal peduncle relatively short and deep, its length and depth 16.1 to 20.8% and 14.4 to 16.3% of standard length, respectively (Fig. 3) *Ambassis marianus*
(southern Queensland and northern New South Wales, Australia)
- 3b. Soft anal-fin rays usually 9; predorsal scales 11 to 14; eye larger, 13 to 13.9% of standard length; caudal peduncle more slender, its length and depth 20.6 to 22.2% and 13 to 14.8% of standard length, respectively (Fig. 4) *Ambassis gymnocephalus*
(Indo-West Pacific)

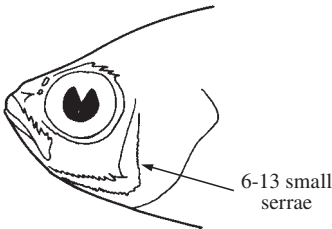


Fig. 2 *Ambassis vachellii*

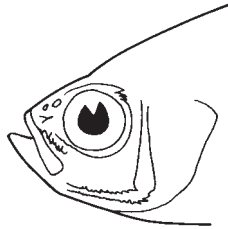


Fig. 3 *Ambassis marianus*

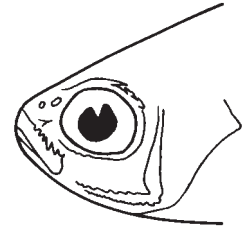


Fig. 4 *Ambassis gymnocephalus*

- 4a. Cheek with 1 row of scales (Fig. 5) *Ambassis urotaenia*
(Indo-Australian Archipelago)
- 4b. Cheek with 2 or more scale rows → 5
- 5a. Lateral line continuous from upper edge of gill opening to caudal-fin base → 6
- 5b. Lateral line interrupted in middle portion → 10
- 6a. Pectoral-fin rays usually 16 or 17 (rarely 15); nasal spine absent (Fig. 6); body relatively deep, maximum depth 45.3 to 50.6% of standard length *Ambassis nalua*
(India to New Guinea and Australia)
- 6b. Pectoral-fin rays 13 to 15; nasal spine present, but may be blunt and hidden under skin; body more slender, maximum depth 29.2 to 44.7% of standard length → 7

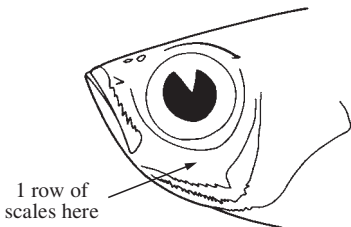


Fig. 5 *Ambassis urotaenia*

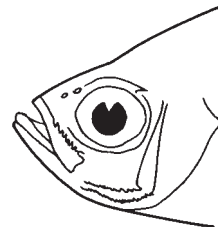


Fig. 6 *Ambassis nalua*

- 7a. Dorsal-fin spines relatively weak and flexible; soft dorsal-fin rays usually 10 (occasionally 9 or 11); soft anal-fin rays usually 8 or 9; body slender, maximum depth 29.2 to 33.2% of standard length; head length 32 to 34% of standard length (Fig. 7) *Ambassis jacksoniensis*
(New South Wales and southern Queensland, Australia)
- 7b. Dorsal-fin spines relatively strong and stiff; soft dorsal-fin rays usually 9 (rarely 10); soft anal-fin rays usually 9 or 10; body deeper, maximum depth 33.4 to 44.7% of standard length; head length 35.5 to 41.4% of standard length → 8
- 8a. Predorsal scales 17 to 22; horizontal scale rows from anal-fin origin to base of dorsal fin 12 or 13 (Fig. 8) *Ambassis macracanthus*
(Sumatra to New Guinea)
- 8b. Predorsal scales 8 to 15; horizontal scale rows from anal-fin origin to base of dorsal fin 9 to 11 → 9
- 9a. Predorsal scales 8 to 11; second dorsal-fin spine longer than third spine; horizontal scale row from anal-fin origin to base of dorsal fin 11 or 12 *Ambassis kopsi*
(Malay Peninsula, Kalimantan Sabah, and the Philippines)
- 9b. Predorsal scales 12 to 15; second dorsal-fin spine slightly shorter than third spine; horizontal scale row from anal-fin origin to base of dorsal fin 9 or 10 (Fig. 9) *Ambassis miops*
(India to Australia and New Guinea)

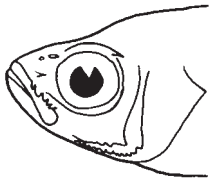


Fig. 7 *Ambassis jacksoniensis*

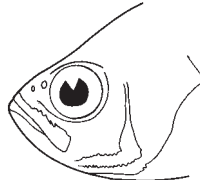


Fig. 8 *Ambassis macracanthus*



Fig. 9 *Ambassis miops*

- 10a. Margin of interopercle with 2 to 10 small serrae (Fig. 10); height of spinous dorsal fin 34 to 38% of standard length; maximum depth of body 37.2 to 47.8% of standard length *Ambassis interruptus*
(Andaman Islands to Vanuatu and New Caledonia)

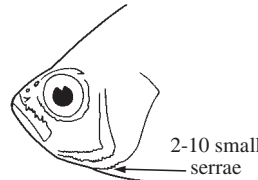


Fig. 10 *Ambassis interruptus*

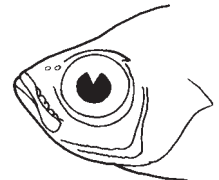


Fig. 11 *Ambassis buruensis*

- 10b. Margin of interopercle smooth (Fig. 11); height of spinous dorsal fin 27.6 to 32.7% of standard length; maximum depth of body 32.9 to 39.5% of standard length *Ambassis buruensis*
(Sumatra to New Guinea and the Philippines)

List of marine-estuarine species occurring in the area

- Ambassis buruensis* Bleeker, 1857
- Ambassis gymnocephalus* (Lacepède, 1802)
- Ambassis interruptus* Bleeker, 1852
- Ambassis jacksoniensis* (Macleay, 1881)
- Ambassis kopsi* Bleeker, 1858
- Ambassis macracanthus* Bleeker, 1849)
- Ambassis marianus* Günther, 1880
- Ambassis miops* Günther, 1871
- Ambassis nalua* (Hamilton, 1822)
- Ambassis urotaenia* Bleeker, 1852
- Ambassis vachellii* Richardson, 1846

References

Allen, G.R. and W.E. Burgess. 1990. A review of the glassfishes (Chandidae) of Australia and New Guinea. *Rec. West. Aust. Mus. Supplement*, 34:139-206.

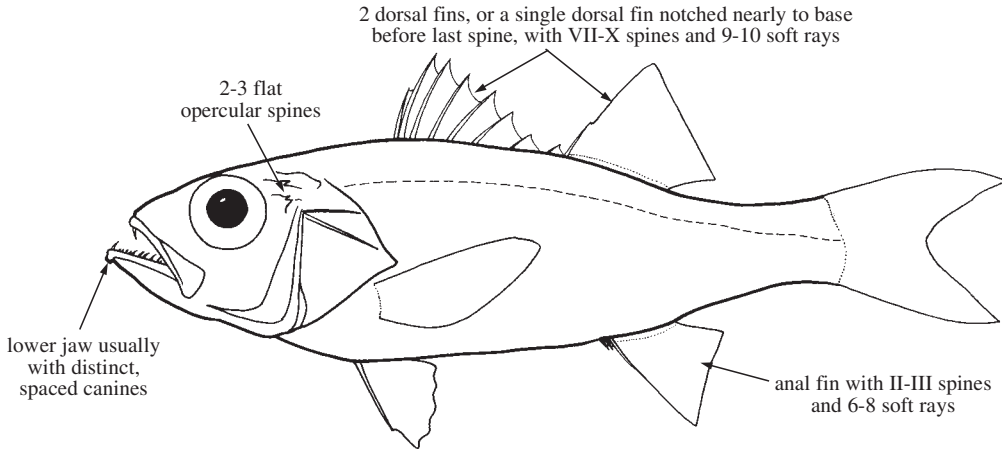
Fraser-Brunner, A. 1954. A synopsis of the centropomid fishes of the subfamily Chandinae, with descriptions of a new genus and two new species. *Bull. Raffles Mus.*, 25:185-213.

ACROPOMATIDAE

Temperate ocean-basses (lanternbellies, splitfins)

by K.E. Carpenter

Diagnostic characters: Body moderately compressed (size to about 40 cm). Eyes large, their diameter greater than snout length. **Usually 2, sometimes 3 flat spines on opercle.** Mouth subterminal, the lower jaw slightly projecting; small teeth present on jaws and usually on vomer and palatines; usually canine teeth in jaws; maxillae not covered by preorbitals, not scaly, and broadened distally. Gill membranes free from isthmus. Branchiostegal rays 7. **Separate spiny and soft dorsal fins, or dorsal fin notched to base before last spine; first dorsal fin with VII to X spines, and second fin with 0 to I spines and 8 to 10 soft rays. Anal fin with II or III spines and 6 to 8 soft rays.** Caudal fin usually forked, sometimes deeply forked or emarginate. Vertebrae with 10 precaudal and 16 caudal elements. **Colour:** body either pink or reddish and whitish or silvery ventrally, silvery, or mostly brownish or blackish; the 2 species of *Acropoma* have a light organ and their anus situated near pelvic-fin base.



Habitat, biology, and fisheries: Demersal, generally over soft bottom in deep water, found at depths between 20 and 700 m. Incidentally caught in deep bottom trawls and generally too small or not abundant enough to be exploited commercially; occasionally consumed, some are considered food fish in Japan.

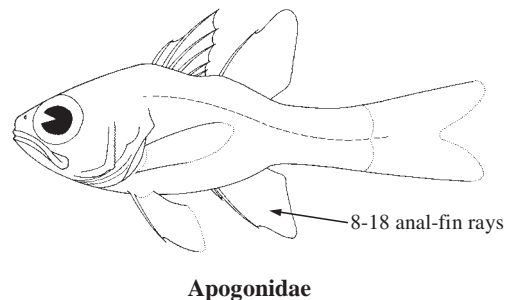
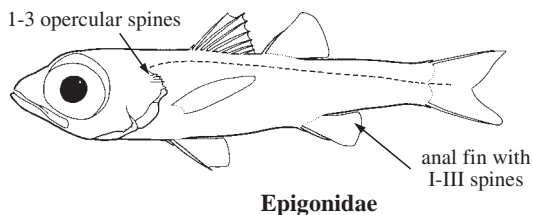
Remarks: The relationships and affinities of the Acropomatidae have been very much confused. Members of this family have variously been placed in the Percichthyidae, Apogonidae, Howellidae, and Polyprionidae. The Percichthyidae is now restricted to temperate fresh-water perches and the marine forms put in the Acropomatidae. A species included here under *Howella* is provisionally placed here and is perhaps better treated as a separate family (although sometimes also included under the Apogonidae). The species of *Polyprion* which apparently are restricted to temperate waters outside the WCP area, are also perhaps better treated in the separate family, Polyprionidae.

Similar families occurring in the area

Acropomatids are distinguishable from most other similar percoid fishes (including the Serranidae, their presumed close relatives) by their divided or nearly divided spinous and soft dorsal fins. Other similar-shaped families with this dorsal-fin configuration include:

Apogonidae: anal fin with 8 to 18 soft rays (6 to 8 in Acropomatidae); a single opercular spine (2 or 3 in Acropomatidae).

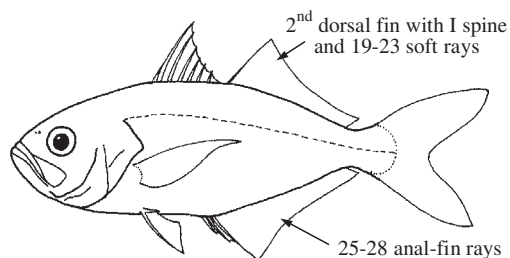
Epigonidae: anal fin with I to III spines (II or III in Acropomatidae); opercle with 1 or 3 spines (2 or 3 in Acropomatidae); maxilla narrow (tip of maxilla broad in Acropomatidae).



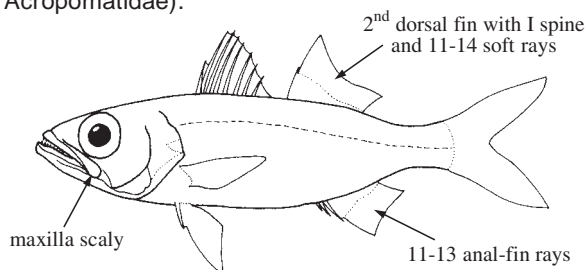
Lactariidae: second dorsal fin with I spine and 19 to 23 soft rays (0 to I spines and 8 to 10 soft rays in Acropomatidae); anal fin with 25 to 28 soft rays (6 to 8 soft rays in Acropomatidae).

Scombropidae: second dorsal fin with I spine and 11 to 14 soft rays (0 to I spines and 8 to 10 soft rays in Acropomatidae); anal fin with 11 to 13 soft rays (6 to 8 soft rays in Acropomatidae); maxilla scaly (not scaly in Acropomatidae).

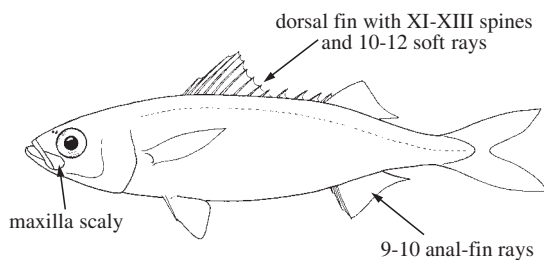
Emmelichthyidae: dorsal fin with XI to XIII spines and 10 to 12 soft rays (VII to X spines and 8 to 10 soft rays in Acropomatidae); anal fin with 9 or 10 soft rays (6 to 8 soft rays in Acropomatidae); broad, scaly maxilla (not scaly in Acropomatidae).



Lactariidae



Scombropidae



Emmelichthyidae

List of species occurring in the area

- Acropoma japonica* Günther, 1859
Acropoma lecorneti Fourmanoir, 1988
Apogonops anomalus Ogilby, 1896
Bathysphyraenops simplex Parr, 1933^{1/}
Doederleinia berycoides (Hilgendorf, 1879)
Doederleinia gracilispinis Fowler, 1943
Howella brodiei Ogilby, 1899
Malakichthys elegans Döderlein, 1883
Malakichthys sp.
Neoscombrops pacificus Mochizuki, 1979
Pseudohowella intermedia Fedoryako, 1976
Synagrops analis Katayama, 1957
Synagrops argyrea (Gilbert and Cramer, 1896)
Synagrops japonicus (Döderlein, 1884)
Synagrops malayanus Weber, 1913
Synagrops philippinensis Günther, (1880)
Synagrops serratospinosa Smith and Radcliffe, 1912

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- Paxton, J.R. and J.E. Hanley. 1989. Family Percichthyidae. *In Zoological catalogue of Australia 7. Pisces. Petromyzontidae to Carangidae*, edited by J.R. Paxton, D.F. Hoese, G.R. Allen, and J.E. Hanley. Canberra, Australian Government Publishing Service, 665 p.

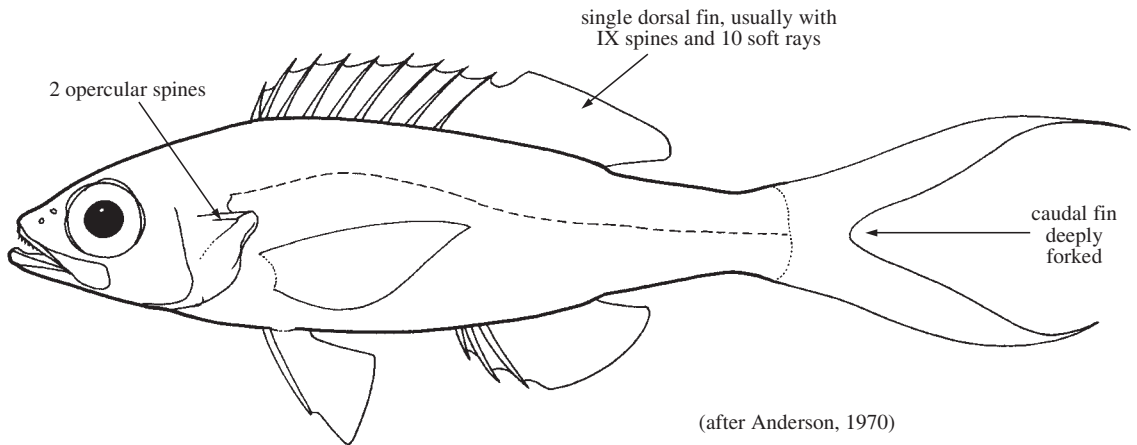
^{1/} Listed here provisionally, most recently considered 'incertae sedis' in the Percoidei.

SYMPHYSANODONTIDAE

Bunquelovelies (also wampeejawed fishes, slopefishes, and shelf beauties)

by W.D. Anderson, Jr.

Diagnostic characters: Body slender to moderately deep, somewhat compressed (size to about 17 cm). Head moderate. Eyes moderate to large, their diameter about equal to snout length to considerably longer than snout. **Suborbital extremely narrow, its height (width) about 1% of standard length.** Opercular spines 2. Snout relatively blunt. **Anterior ends of premaxillae incised, forming conspicuous symphyseal notch that receives anterior ends of dentaries.** Mouth terminal and oblique; jaws about equal. **Extreme dorsalmost margin of maxilla covered by very narrow suborbital with mouth closed.** Premaxilla with small teeth (usually larger anteriorly); symphyseal notch toothless. Dentary with small teeth usually extending from posterior elevation of the bone almost to symphysis; teeth on and near posterior elevation usually larger; **usually a number of relatively large exerted teeth at anterior end of dentary, these teeth fitting into symphyseal notch in premaxillae when mouth closed.** Teeth, when present, small on vomer, palatines, and pterygoids; no teeth on tongue. Branchiostegal rays 7. First gill arch with 9 to 14 gill rakers on upper limb and 20 to 29 on lower limb (total 29 to 42). Dorsal fin not incised at junction of spinous and soft rays. Caudal fin deeply forked. Both lobes of caudal fin and pelvic fins extremely produced in some individuals. **Dorsal fin usually with IX spines and 10 soft rays.** Anal fin with III spines and 7 or 8 soft rays. Principal caudal-fin rays 17 (9 in upper lobe, 8 in lower lobe); branched caudal-fin rays 15 (8 in upper lobe, 7 in lower lobe). Pectoral-fin rays 15 to 18 (usually 16 or 17). Pelvic fins with I spine and 5 soft rays. Dorsal and anal fins without scales, but with scaly sheaths at their bases. Axillary scales of pelvic fins and scaly interpelvic process well developed. **Most of head, including maxillae and dentaries, covered with scales.** Scales moderate, ctenoid. Tubed lateral-line scales 42 to 61. Vertebrae 10+15=25. **Colour:** mainly shades of red or orange.



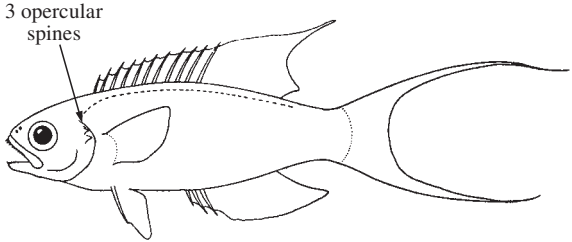
Habitat, biology, and fisheries: Bottom-associated fishes, known from depths of 50 to 500 m on the continental shelf and upper continental slope, around islands, and over reefs and submarine ridges. Probably planktivorous.

Remarks: Have been considered by various workers to be members of either the family Serranidae or the family Lutjanidae, but species of Symphysanodontidae possess characters that clearly distinguish them from serranids and lutjanids and lack characters that would associate them with either of those groups of fishes.

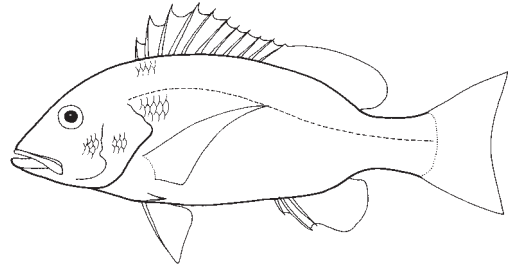
Similar families occurring in the area

Serranidae: 3 opercular spines (2 in Symphysanodontidae); dorsal-most margin of maxilla not covered by suborbital when mouth closed; vertebrae rarely 25, usually 24 or 26 (25 in Symphysanodontidae).

Lutjanidae: maxilla covered to considerable degree by suborbital when mouth closed; anterior ends of premaxillae not incised to form conspicuous symphysial notch that receives anterior ends of dentaries when mouth closed; X to XII dorsal-fin spines (almost always IX dorsal-fin spines in Symphysanodontidae); vertebrae 24 (25 in Symphysanodontidae).



Serranidae (subfamily Anthiinae)



Lutjanidae



Key to the species of Symphysanodontidae occurring in the area

Remarks on key characters: counts of lateral-line scales are of tubed scales along the body, excluding those posterior to the base of the caudal fin. Counts of gill rakers include rudiments, when present.

- 1a. Lateral-line scales 42 to 49; first gill arch with 9 to 11 gill rakers on upper limb and 20 to 26 on lower limb (total 29 to 37); length of pelvic fins 22 to more than 80% of standard length; length of upper caudal-fin lobe 29 to 75% of standard length; length of lower caudal-fin lobe 29 to 76% of standard length (individuals with well-produced to extremely produced caudal-fin lobes and pelvic fins are probably males). *Symphysanodon maunaloae*
- 1b. Lateral-line scales 52 to 55; first gill arch with 10 to 12 gill rakers on upper limb and 25 to 28 on lower limb (total 36 to 40); length of pelvic fins 22 to 26% of standard length; both lobes of caudal fin produced slightly, but apparently never extremely produced, as in some individuals of *S. maunaloae* *Symphysanodon typus*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Symphysanodon maunaloae* Anderson, 1970
-  *Symphysanodon typus* Bleeker, 1878

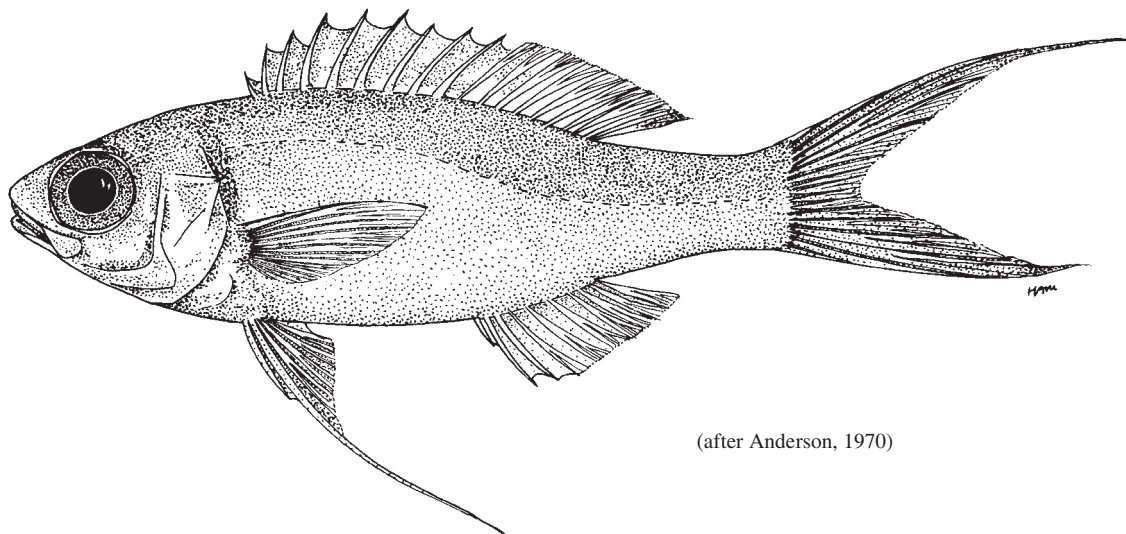
Reference

Anderson, W.D., Jr. 1970. Revision of the genus *Symphysanodon* (Pisces: Lutjanidae) with descriptions of four new species. *Fish. Bull.*, 68(2):325-346.

Symphysanodon maunaloae Anderson, 1970

Frequent synonyms / misidentifications: None / *Symphysanodon typus* Bleeker, 1878.

FAO names: En - Beautimous wampeejaw.



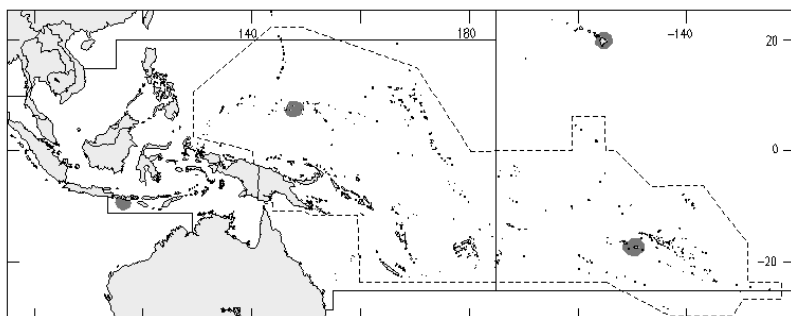
(after Anderson, 1970)

Diagnostic characters: Body slender to moderately deep, its depth 21 to 33% of standard length (depth tending to become relatively greater with increase in standard length). First gill arch with **9 to 11 gill rakers on upper limb and 20 to 26 on lower limb (total 29 to 37)**. Caudal fin deeply forked, both lobes produced; **length of upper caudal-fin lobe 29 to 75% of standard length; length of lower caudal-fin lobe 29 to 76% of standard length**. **Length of pelvic fins 22 to more than 80% of standard length**. (Individuals with well-produced to extremely produced caudal-fin lobes and pelvic fins are probably males.) **Lateral-line scales 42 to 49**. **Colour:** upper body and caudal fin light red; iris pink; dark bar between eyes; dark vertical bar just behind operculum.

Size: Maximum standard length about 16 cm; commonly to 9 cm.

Habitat, biology, and fisheries: Occurs in depths of 150 to 500 m. No other information available.

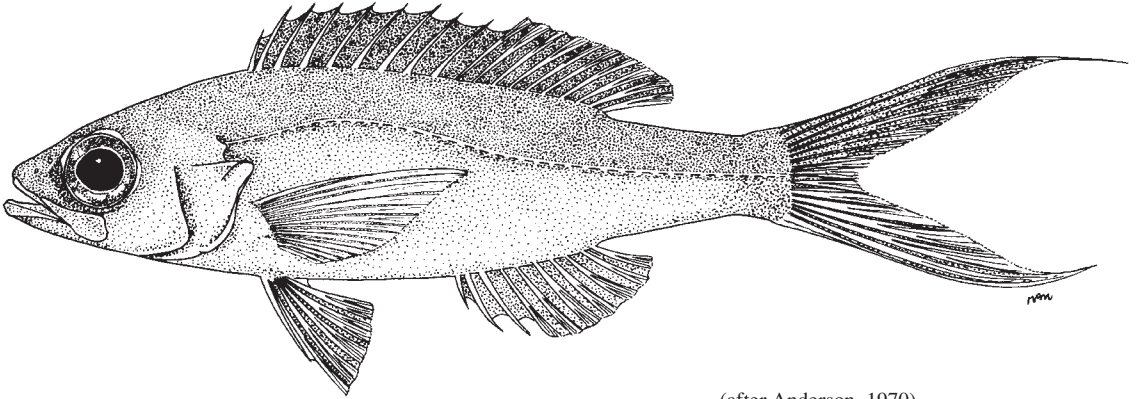
Distribution: Wide ranging from the eastern South Pacific (Sala y Gómez Ridge) and Hawaii to Indonesia (off Lombok) and the Kyushu-Palau Ridge.



***Symphysanodon typus* Bleeker, 1878**

Frequent synonyms / misidentifications: None / None.

FAO names: En - Aristocratic bunquelovely.



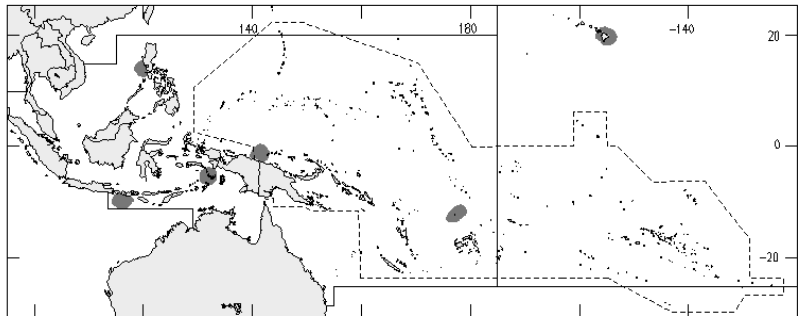
(after Anderson, 1970)

Diagnostic characters: Body slender, its depth 22 to 29% of standard length (depth tending to become relatively greater with increase in standard length). First gill arch with **10 to 12 gill rakers on upper limb and 25 to 28 on lower limb (total 36 to 40)**. Caudal fin deeply forked, both lobes produced, but apparently never produced into extremely long filaments. **Pelvic fins short, not reaching anal fin; length of pelvic fins 22 to 26% of standard length. Lateral-line scales 52 to 55. Colour:** (from literature descriptions) body rose above, silvery below; caudal fin yellowish; other fins apparently some shade of red.

Size: Maximum standard length about 17 cm.

Habitat, biology, and fisheries: Occurs in depths of 50 to 235 m. No other information available.

Distribution: Wide ranging from Hawaii to the Philippines (off Luzon) and Indonesia (off Lombok and the Kai Islands).

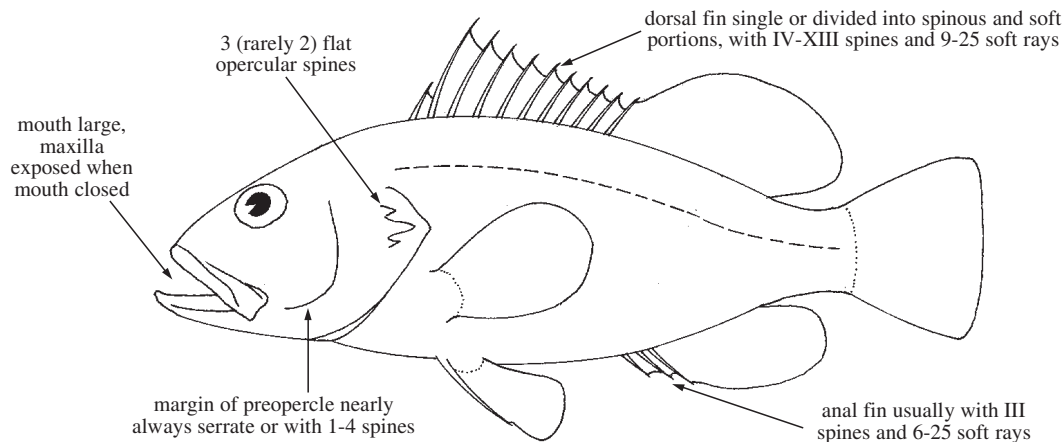


SERRANIDAE

Groupers and sea basses (also, soapfishes, anthiines, etc.)

by P.C. Heemstra and J.E. Randall

Diagnostic characters: Body variable in shape, from deep-bodied to elongate and little compressed (at least anteriorly) to notably compressed (size from a few to 250 cm). **Opercle with 3 (rarely 2) flat spines; margin of preopercle nearly always serrate (but serrae rudimentary in adults of a few species) or with 1 to 4 spines. Mouth large, terminal; maxilla exposed when mouth is closed; lower jaw usually projecting; bands of small, slender teeth in jaws; canines usually present at front of jaws and sometimes at side;** small teeth present on vomer and palatines of most species; no molars or incisiform teeth. Gill membranes separate, with 7 branchiostegal rays. **Dorsal fin single or divided into spinous and soft portions, with IV to XIII spines and 9 to 25 soft rays;** anal fin with III (rarely II) spines and 6 to 24 soft rays; last dorsal and anal-fin rays usually split to their base but counted as a single ray; caudal fin with 12 to 15 branched rays, the fin varying in shape from rounded to lunate; pelvic fins with I spine and 5 soft rays, inserted below or slightly anterior or posterior to base of pectoral fins; no scaly axillary process at base of pelvic fins. Scales small to moderate, adherent, ctenoid (or secondarily cycloid). A single complete lateral line (except *Pseudogrammini* and some species of *Plectranthias*), extending on caudal fin less than 1/2 length of middle caudal-fin rays. Vertebrae 24 to 30. **Colour:** variable with patterns of light or dark stripes, spots, vertical or diagonal bars, or nearly plain; many species are capable of rapid colour changes; xanthic (yellow) phases are known in some species and several species have distinctively coloured deep- and shallow-water forms; **colour patterns are generally the most useful field characters as the morphometric and meristic characters often overlap to a considerable degree.**

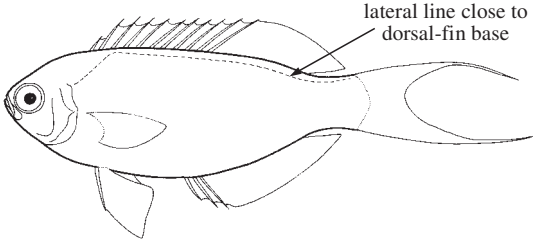
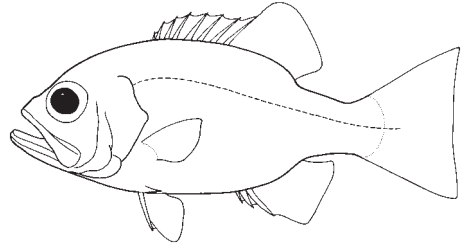


Habitat, biology, and fisheries: Serranids are benthic or bottom-oriented fishes, usually found on coral reefs or rocky substrata; the great majority of species occur on continental or insular shelves in depths less than 200 m. All are predaceous, the larger species feeding mainly on fishes, crustaceans, and cephalopods, while many of the smaller ones feed on zooplankton. Most serranids represented in the area are protogynous hermaphrodites, i.e. they first mature as females and, after spawning one or more times, they will then change sex, spawning thereafter as males. Fishes of the subfamily Serraninae are synchronous hermaphrodites, with both sexes combined (and functional) at the same time in a single individual. Although these synchronous hermaphrodites can fertilize their own eggs, they normally spawn in pairs and alternate the release of eggs or sperm in order to have their eggs fertilized by the other fish. Some groupers (subfamily Epinephelinae) form large aggregations at specific sites at the time of spawning, making them vulnerable to over-fishing. These spawning aggregations should be protected. Except for occasional spawning aggregations, most groupers are solitary fishes, and tagging studies have shown that they are generally resident on a particular reef for a long time (often years). This site specificity and the relatively slow growth rate of groupers make them particularly vulnerable to over-fishing. Groupers are among the most highly priced food fishes and are actively sought by commercial and sport fishermen. They are caught with hook-and-line, gill nets, spear, traps, and in trawls. For 1995, FAO's Yearbook of Fishery Statistics reports a total catch of around 45 600 t of Serranidae from the Western Central Pacific. Separate statistics per species are not available from the area. Some groupers are important in aquaculture, and a few species have been spawned in captivity. Several species are used in cage-culture operations. Some of the smaller serranids, particularly the colourful Anthiinae and Liopropomatini are of value as aquarium fishes.

Similar families occurring in the area

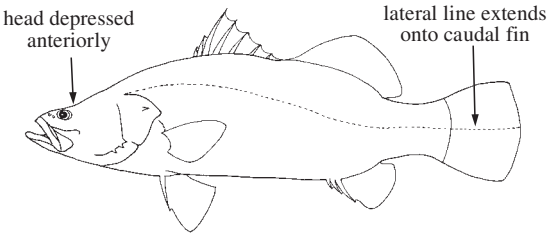
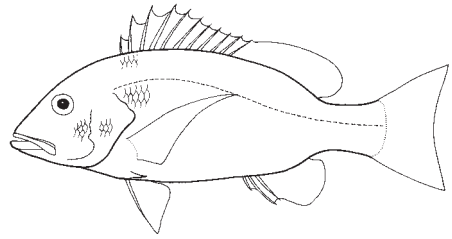
Callanthiidae: lateral line running close to dorsal-fin base and terminating on upper surface of caudal peduncle or below last dorsal-fin ray; nasal organ without lamellae; preopercle edge smooth; opercle with 1 or 2 spines.

Glaucosomatidae: rear edge of opercle with 2 small, flat points; scaly axillary process at base of pelvic fins well developed; dorsal-fin spines VIII.

**Callanthiidae****Glaucosomatidae**

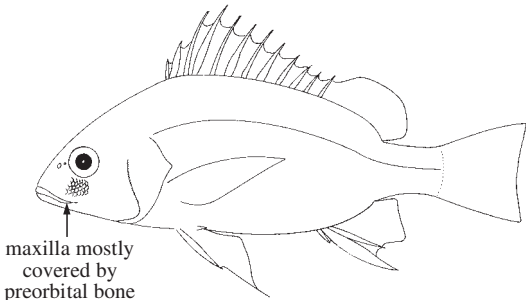
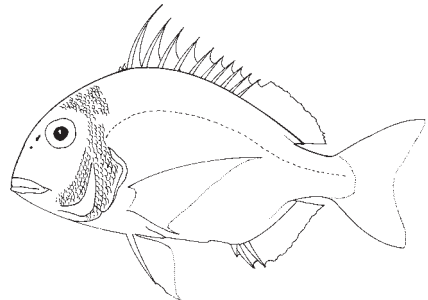
Centropomidae: head depressed anteriorly; pectoral fins shorter than pelvic fins; lateral line extends to rear margin of caudal fin; opercle with a single flat spine.

Lutjanidae: maxilla mostly covered by preorbital bone when mouth is closed; no spines on opercle; scaly axillary process at base of pelvic fins usually well developed.

**Centropomidae****Lutjanidae**

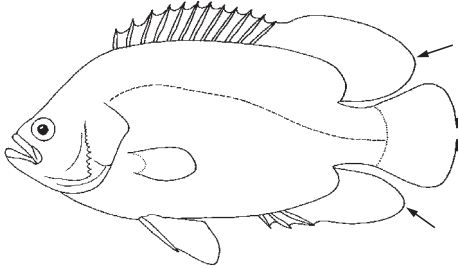
Haemulidae: maxilla mostly covered by preorbital bone when mouth is closed; no teeth on vomer or palatines; no spines on opercle.

Sparidae: jaws with incisiform and/or molariform teeth; maxilla mostly covered by preorbital bone when mouth is closed; no spines on opercle; edge of preopercle smooth.

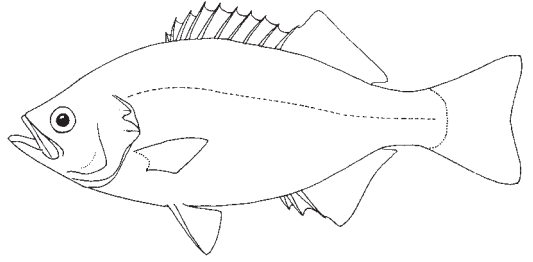
**Haemulidae****Sparidae**

Lobotidae: no spines on opercle; no teeth on vomer or palatines; soft dorsal and anal fins project well past caudal-fin base.

Kuhliidae: rear edge of opercle forming only 2 flat points; branchiostegal rays 6; scaly sheath at bases of dorsal and anal fins.

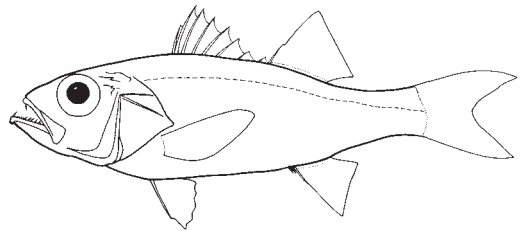


Lobotidae



Kuhliidae

Acropomatidae: rear edge of opercle forming 2 flat points, or the lower point developed as a cluster of sharp spines; dorsal fin deeply divided or as 2 separate spiny and soft-rayed fins, the first part with VII to X spines, the second with I spine and 9 or 10 soft rays; several distinct, spaced canines along lower jaw.



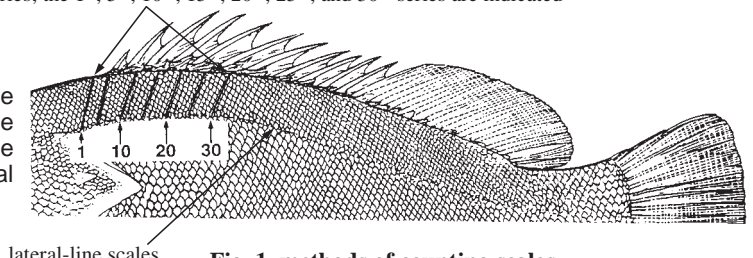
Acropomatidae

Moronidae (*Lateolabrax japonicus*, occurs near the northern part of the area): opercle ends in 2 flat points; vertebrae 34 to 37; swimbladder extends into hollow of first anal-fin pterygiophore.

lateral scale series; the 1st, 5th, 10th, 15th, 20th, 25th, and 30th series are indicated

Identification note

Lateral scale series are the oblique series of scales that run above the lateral line from the upper end of the gill opening to the base of the caudal fin (Fig.1).



Key to the genera of Serranidae occurring in the area

Note: species names are given when a genus contains a single species, or if only a single species of the genus is known from the area.

- 1a. Dorsal fin with XIII spines and 10 or 11 soft rays; preopercle with enlarged spine at corner, extending past subopercle (Fig. 2) *Niphon spinosus*
- 1b. Dorsal fin with IV to XIII spines and 10 to 25 soft rays, the rays more numerous than the spines; spine at corner of preopercle enlarged in some species, but not extending past subopercle → 2

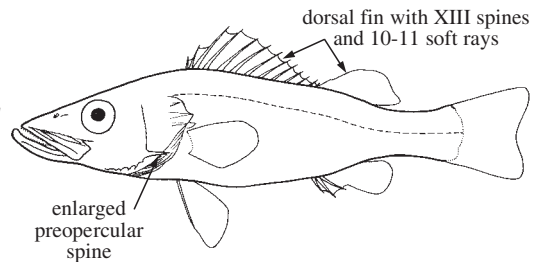


Fig. 2 *Niphon spinosus*

- 2a.** Scaly flap of skin joining base of upper pectoral-fin rays to body; oblique scale series more numerous than lateral-line scales; branched caudal-fin rays 15; dorsal-fin spines IV, or VI to XI (rarely X) → **3**
- 2b.** No scaly flap of skin joining base of upper pectoral-fin rays to body; oblique scale series not more numerous than lateral-line scales; branched caudal-fin rays 12 to 15; dorsal-fin spines VIII to XIII → **21**
- 3a.** Less than 1/2 of upper border of opercle joined to body by skin; dorsal-fin spines VII to XI. (**tribe Epinephelini**) → **12**
- 3b.** Most of upper border of opercle joined to body by skin; dorsal-fin spines IV, or VII to IX → **4**
- 4a.** Scales mainly ctenoid, not deeply embedded; preopercle edge strongly serrate; subopercle and interopercle serrate (**tribe Diploprionini**) → **5**
- 4b.** Scales cycloid, deeply embedded; preopercle edge smooth, except for a few short blunt spines dorsally; subopercle and interopercle smooth; pectoral fins longer than pelvic fins (**tribe Grammistini**) → **7**
- 5a.** Dorsal fin with VIII spines and 13 to 16 soft rays; body depth greater than head length and 2.0 to 2.4 times in standard length *Diploprion bifasciatum*
- 5b.** Dorsal fin with IX spines and 10 to 12 soft rays; body depth less than or equal to head length and 2.9 to 3.7 times in standard length → **6**
- 6a.** Dorsal fin cleft to base before last spine, which is more than twice length of eighth spine; dorsal-fin rays 10; anal fin with II spines and 8 soft rays; caudal fin truncate *Belonoperca chabanaudi*
- 6b.** Dorsal fin indented before soft-rayed part but not to base, the last 2 spines subequal; dorsal-fin rays 12; anal fin with III spines and 9 soft rays; caudal fin rounded *Aulacocephalus temmincki*
- 7a.** Lateral line interrupted; dorsal-fin rays 19 to 25; anal-fin rays 15 to 21 → **8**
- 7b.** Lateral line complete to caudal-fin base; dorsal-fin rays 10 to 16; anal-fin rays 8 to 13 → **10**
- 8a.** Lateral line double, upper part ends below middle dorsal-fin rays, lower line runs along midlateral part of body above anal fin; large spine on preopercle pointing dorsally; anal-fin rays 19 to 21; body of adults pale brown, with scattered, vertically-elongate dark brown spots *Aporops bilinearis*
- 8b.** Lateral line single, ending below middle dorsal-fin rays; large spine on rear edge of preopercle pointing ventrally; anal-fin rays 15 to 18, or 19 to 22 → **9**
- 9a.** Anal-fin rays 19 to 22; dorsal-fin rays 22 to 25; pale mid-dorsal stripe on head *Suttonia lineata*
- 9b.** Anal-fin rays 16 to 19; dorsal-fin rays 19 to 23; no pale mid-dorsal stripe on head *Pseudogramma*
- 10a.** No flap; body depth less than head length, 3.1 to 3.7 times in standard length; pectoral-fin rays 14 or 15 *Grammistops ocellatus*
- 10b.** A fleshy flap on chin; body depth about equal to head length, 2.2 to 2.7 times in standard length; pectoral-fin rays 16 to 18 → **11**
- 11a.** Chin flap large, about equal to eye diameter; anal fin with III spines and 8 soft rays; head and body brown, with numerous small dark-edged white spots; 4 triangular black saddle-blotches on body, the largest on nape, the smallest on front of caudal peduncle *Pogonoperca punctata*
- 11b.** Chin flap shorter than pupil diameter; anal fin with II spines and 9 soft rays; head and body dark brown or black with yellow stripes which break up into a series of dashes on large adults *Grammistes sexlineatus*

12a. Dorsal-fin spines VII or VIII; lower edge of preopercle with 1 to 3 enlarged spines (usually hidden by skin, but these spines can be detected by running a finger or probe along preopercle edge) → **13**

12b. Dorsal-fin spines IX to XI; lower edge of preopercle smooth (except for a few species of *Epinephelus* with 1 to 4 enlarged serrae) → **14**

13a. Anal-fin spines strong, all 3 distinct; preorbital depth 1/2 or less of eye diameter; head length 2.5 to 2.6 times in standard length (Fig. 3) *Saloptia powelli*

13b. Anal-fin spines weak, the first and second covered by skin; preorbital depth 0.7 to 2 times eye diameter; head length 2.8 to 3.1 times in standard length (Fig. 4) *Plectropomus*

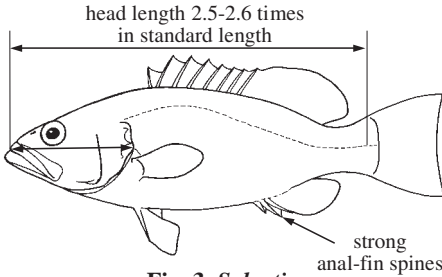


Fig. 3 *Saloptia*

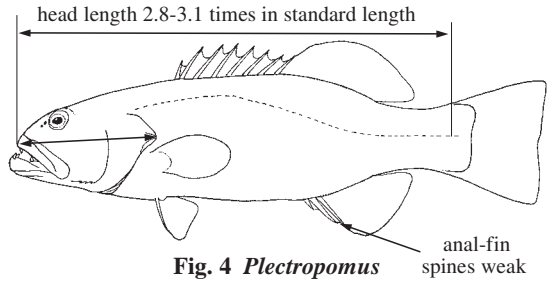


Fig. 4 *Plectropomus*

14a. Caudal fin deeply lunate or forked; dorsal-fin spines IX (Fig. 5) *Variola*

14b. Caudal fin rounded, truncate, or concave; dorsal-fin spines IX to XI → **15**

15a. No teeth on palatines; body and head elongate and markedly compressed, the greatest body width 11 to 15% of standard length and more than 3 times in head length (Fig. 6) *Anyperodon leucogrammicus*

15b. Palatines with teeth; body compressed in some species, but its width only 1.8 to 3 times in head length → **16**

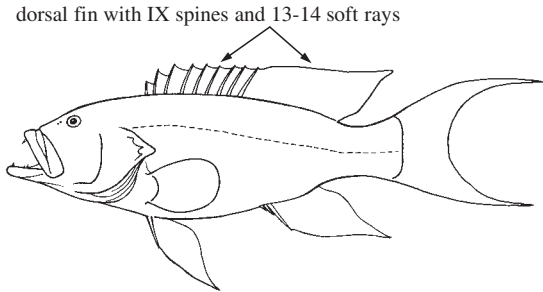


Fig. 5 *Variola*

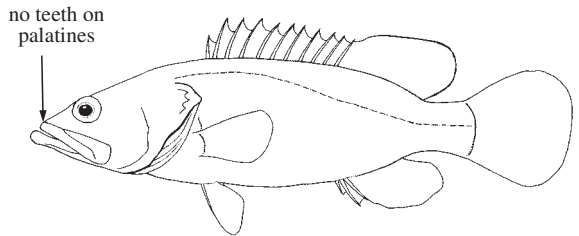


Fig. 6 *Anyperodon*

16a. Dorsal profile of head markedly concave; dorsal-fin spines X; rear nostrils of adults a long vertical slit (Fig. 7) *Cromileptes altivelis*

16b. Dorsal profile of head straight, convex or slightly concave; dorsal-fin spines IX or XI (rarely X); rear nostrils round or oblong → **17**

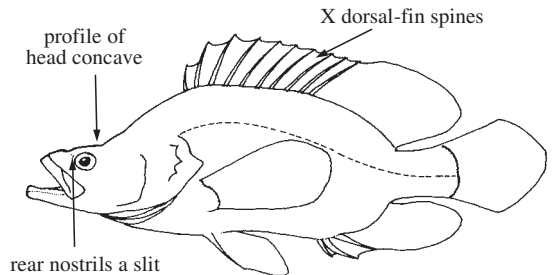


Fig. 7 *Cromileptes*

- 17a. Pectoral fins distinctly asymmetric, the fifth or sixth rays longest (Fig. 8a); dorsal fin with IX spines and 17 or 18 soft rays; caudal fin truncate (Fig. 9) *Aethaloperca rogaa*
- 17b. Pectoral fins symmetric or nearly so, the middle rays longest (Fig. 8b); dorsal fin with IX to XI spines and 12 to 21 soft rays; caudal fin rounded, truncate, or emarginate → 18

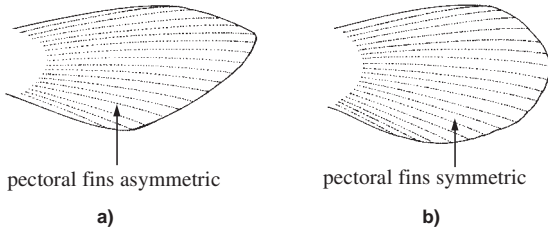


Fig. 8

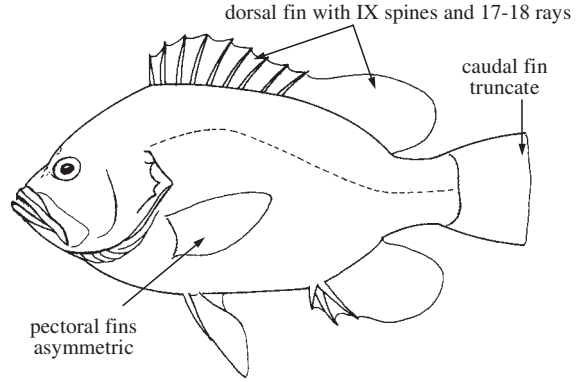


Fig. 9 *Aethaloperca*

- 18a. Dorsal-fin spines IX → 19
- 18b. Dorsal-fin spines XI → 20

- 19a. Caudal fin truncate; head small, 2.9 to 3.2 times in standard length; distal part of maxilla with step or hook-like process on lower edge (hidden by lip); dorsal-fin membranes not incised between spines (Fig. 10) *Gracila albomarginata*
- 19b. Caudal fin rounded (truncate in *Cephalopholis polleni*); head length 2.2 to 3.1 times in standard length; adults with a knob at lower rear corner of maxilla (hidden by upper lip); dorsal-fin membranes distinctly incised between spines (Fig. 11) *Cephalopholis*

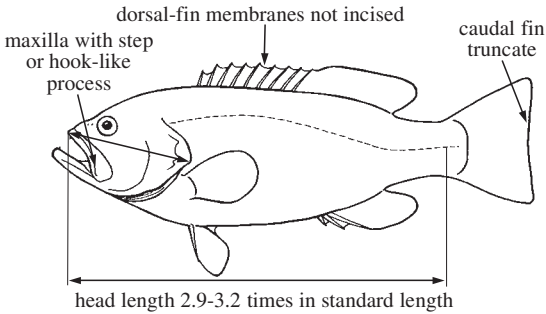


Fig. 10 *Gracila*

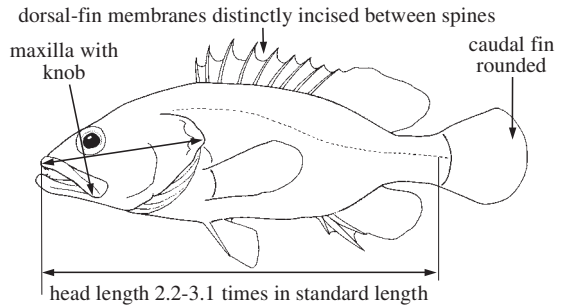


Fig. 11 *Cephalopholis*

- 20a. Body depth distinctly greater than head length and 2.4 to 2.7 times in standard length; dorsal fin with XI spines and 18 to 21 soft rays, the base of soft-rayed part longer than that of spinous part (Fig. 12) *Triso dermopterus*
- 20b. Body depth 2.4 to 4.1 times in standard length, usually less than head length; dorsal fin with XI spines and 12 to 19 soft rays, the base of soft-rayed part shorter than or equal to that of spinous part (Fig. 13) *Epinephelus*

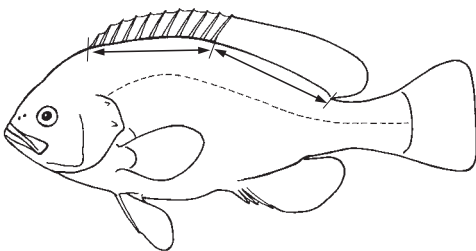


Fig. 12 *Triso*

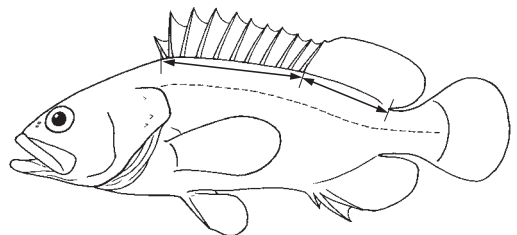


Fig. 13 *Epinephelus*

- 21a.** Dorsal fin with VIII spines and 11 to 14 soft rays; nostrils far apart, the anterior nostril tubular, at front of snout near upper lip; maxilla with well-developed supramaxillary bone (tribe *Liopropomatini*) → 22
- 21b.** Dorsal fin with IX to XIII spines and 9 to 21 soft rays; nostrils close together on rear half of snout; supramaxilla rudimentary or absent → 23
- 22a.** Body elongate, depth 5.4 to 5.7 times in standard length; caudal peduncle depth about 70% of body depth; pectoral fins short and rounded, about 1/2 head length . . . *Rainfordia opercularis*
- 22b.** Body depth 3 to 4.2 times in standard length; caudal peduncle depth 40 to 55% of body depth; pectoral fins long and pointed, more than 1/2 head length *Liopropoma*
- 23a.** Branched caudal-fin rays 15; dorsal fin with X spines and 9 or 10 soft rays; lateral line parallel to dorsal contour of body; maxilla naked; vertebrae 24 *Chelidoperca*
- 23b.** Branched caudal-fin rays 12 to 15 (usually 13); dorsal fin with X or XI spines and 13 to 20 soft rays or XIII spines and 15 soft rays; maxilla scaly or naked; vertebrae 25 to 28 (subfamily *Anthiinae*) → 24
- 24a.** Dorsal fin divided to base between spinous and soft portions; lateral-line scales 51 to 78; body elongate, its depth 3.3 to 5.3 times in standard length *Luzonichthys*
- 24b.** Dorsal fin continuous or deeply notched between spinous and soft portions; lateral-line scales 25 to 65 (when lateral line complete); body less elongate, its depth 1.9 to 4.2 times in standard length → 25
- 25a.** No teeth on vomer or palatines; body depth 3.4 to 4.2 times in standard length; dorsal-fin spines slender; in adult males, all dorsal-fin spines elongated to form a tall sail-like dorsal fin *Rabaulichthys altipinnis*
- 25b.** Teeth present on vomer and palatines; body depth 1.9 to 3.6 times in standard length → 26
- 26a.** Patch of teeth on vomer diamond-shaped; a patch of minute teeth present on tongue → 27
- 26b.** Patch of teeth on vomer triangular or V-shaped; no teeth on tongue → 28
- 27a.** Dorsal-fin rays 19 to 21; lateral-line scales 57 to 61; caudal fin rounded to slightly emarginate; no elongate fin spines or rays *Caprodon schlegelii*
- 27b.** Dorsal-fin rays 13 to 17; lateral-line scales 30 to 47; caudal fin forked; 1 or more fin spines or rays prolonged *Holanthias*
- 28a.** Dorsal-fin spines XIII *Acanthistius ocellatus*
- 28b.** Dorsal-fin spines X → 29
- 29a.** Dorsal fin distinctly notched between spinous and soft part; supramaxilla present (may be rudimentary); branched caudal-fin rays 12 to 15 (usually 15); maxilla scaly or naked → 30
- 29b.** Dorsal fin not notched between spinous and soft portions (except slightly notched in *Dactylanthias* and *Sacura*); supramaxilla absent; branched caudal-fin rays 13; maxilla scaly → 31
- 30a.** Lateral-line scales 41 to 65; anal-fin rays 7 to 9; maxilla naked *Hypoplectrodes*
- 30b.** Lateral-line scales 25 to 41; anal-fin rays 6 or 7; maxilla scaly or naked → 32
- 31a.** Total gill rakers on first gill arch 28 to 33; ascending process of premaxilla extending between frontals; anterior canines of lower jaw short, stout, and projecting obliquely outward *Selenanthias*
- 31b.** Total gill rakers on first gill arch 14 to 25; ascending process of premaxilla not extending between frontals; anterior canines not projecting obliquely outward *Plectranthias*

- 32a.** Serrae at corner of preopercle distinctly enlarged; posterior soft rays of dorsal and anal fins distinctly shorter than anterior soft rays; second to fourth dorsal-fin rays elongated in adults; third dorsal-fin spine greatly elongated in males. *Sacura*
- 32b.** Serrae at corner of preopercle not distinctly enlarged; posterior soft dorsal- and anal-fin rays not shorter than anterior soft rays, the second to fourth dorsal-fin rays not elongated → 33
- 33a.** Body deep, its depth 1.9 to 2.2 times in standard length; dorsal-fin rays 18 to 20; pectoral-fin rays 13 or 14 *Serranocirrhitis latus*
- 33b.** Body less deep, its depth 2.4 to 3.6 times in standard length; dorsal-fin rays 13 to 18; pectoral-fin rays 13 to 21 → 34
- 34a.** Pectoral-fin rays 16 to 21, middle rays, at least, branched; lateral-line scales 37 to 64. . . *Pseudanthias*
- 34b.** Pectoral-fin rays 13 to 18, all unbranched; lateral-line scales 31 to 39 → 35
- 35a.** Pectoral-fin rays 18; lateral-line scales 39; body depth 2.4 to 2.5 times in standard length *Dactylanthias haplodactylus*
- 35b.** Pectoral-fin rays 13 to 17; lateral-line scales 31 to 37; body depth 2.6 to 3.6 times in standard length → 36
- 36a.** Dorsal-fin rays 13 to 15; anal-fin rays 6 or 7; lateral-line scales 34 to 37; body elongate, its depth 3 to 3.6 times in standard length *Tosana niwae*
- 36b.** Dorsal-fin rays 17; anal-fin rays 8; lateral-line scales 31 to 33; body depth 2.6 to 2.7 times in standard length *Tosanoides flavofasciatus*

Key to the species of *Cephalopholis* occurring in the area

- 1a.** Caudal fin rounded; head length 2.2 to 2.7 times in standard length; colour pattern not of alternating stripes of blue and orange-yellow → 2
- 1b.** Caudal fin truncate to slightly emarginate; head small, 2.7 to 3.1 times in standard length; head and body with alternating stripes of blue and orange-yellow; juveniles golden-yellow, with wavy purple stripes along dorsal part of head and body, black spot on snout in front of eye and black maxillary streak *Cephalopholis polleni*
- 2a.** Body deep, its depth 2 to 2.4 times in standard length; body width 2.3 to 2.6 times in body depth; lateral line strongly arched above pectoral fin; head and body red with yellow bars; pelvic-fin tips black; juveniles with large black spot in dorsal fin *Cephalopholis igarashiensis*
- 2b.** Body depth 2.3 to 3.2 times in standard length; lateral line not strongly arched above pectoral fin; colour not as above → 3
- 3a.** Pelvic fins short, their length 2.3 to 2.5 times in head length; pectoral-fin rays 15 or 16; dorsal-fin rays 14; anal-fin rays 8; colour reddish brown with indistinct dark blotch basally on pectoral fins *Cephalopholis aitha*
- 3b.** Pelvic-fin length 1.5 to 2.3 times in head length; pectoral-fin rays 15 to 20; dorsal-fin rays 14 to 17; anal-fin rays 8 to 10; colour not as above → 4
- 4a.** Anal-fin rays usually 8; colour generally brown to dark brown → 5
- 4b.** Anal-fin rays 9 (rarely 10); colour generally red, orange, or yellow (except *C. argus* and some *C. urodeta* or *C. sonnerati*) → 8
- 5a.** Small dark spots or dark-edged pale blue spots on head and/or body → 6
- 5b.** No small dark spots or blue ocelli on head or body → 7

- 6a.** Dorsal-fin rays 14 to 16; lateral scale series 84 to 98; pectoral-fin length 1.4 to 1.5 times in head length; dark-edged blue spots only on head and anteriorly on body . . . *Cephalopholis microprium*
- 6b.** Dorsal-fin rays 15 to 17; lateral scale series 92 to 106; pectoral-fin length 1.5 to 1.8 times in head length; blue ocelli on head, body, and basally on median fins; juveniles greenish grey, the median fins yellow *Cephalopholis cyanostigma*
- 7a.** Pectoral fins short, their length 1.5 to 1.8 times in head length; colour generally brown or yellowish brown, with dark blue lines on head, body, and fins; black spot between upper 2 opercular spines *Cephalopholis formosa*
- 7b.** Pectoral-fin length 1.3 to 1.6 times in head length; body brown, with 7 or 8 more or less distinct dark bars; fins dark brown, with a pale blue line at corners of caudal fin . . *Cephalopholis boenak*
- 8a.** Dorsal-fin rays 15 to 17; lower limb of first gill arch with 17 to 19 gill rakers; auxiliary scales present on body; colour dark brown, covered with small dark-edged blue ocelli; 5 or 6 pale bars often visible on rear half of body *Cephalopholis argus*
- 8b.** Dorsal-fin rays usually 14 or 15; lower limb of first gill arch with 13 to 16 gill rakers; no auxiliary scales on body scales; colour not as above → 9
- 9a.** Lateral-line scales 66 to 80; lateral scale series 115 to 134; pectoral-fin rays 18 to 20; body depth 2.3 to 2.8 times in standard length; colour generally red to reddish brown (juveniles and some adults may be dark purple or brown) with widely scattered whitish blotches (Indian Ocean) or generally brownish, covered with small dark red to reddish brown spots and irregular white blotches (Pacific) *Cephalopholis sonnerati*
- 9b.** Lateral-line scales 45 to 68; lateral scale series 79 to 121; pectoral-fin rays 16 to 19; body depth 2.6 to 3.5 times in standard length; colour not as above → 10
- 10a.** Lateral-line scales 54 to 68; caudal fin blackish red, the corners broadly red, each set off by an oblique white stripe; pectoral fins red, shading to orange-yellow distally (Pacific); or caudal and pectoral fins uniformly blackish (Indian Ocean) *Cephalopholis urodeta*
- 10b.** Lateral-line scales 45 to 56; colour not as above → 11
- 11a.** Lateral scale series 79 to 90; head length 2.2 to 2.4 times in standard length; dark brown saddle spot on caudal peduncle, followed by a smaller spot; submarginal dark streak at corners of caudal fin *Cephalopholis leopardus*
- 11b.** Lateral scale series 90 to 121; head length 2.3 to 2.6 times in standard length; colour not as above → 12
- 12a.** Head, body, and fins covered with small blue ocelli → 13
- 12b.** No blue spots on head, body, or fins → 14
- 13a.** Body with 4 or 5 dark blotches along base of dorsal fin, a faint blotch on nape and 2 smaller ones on peduncle (blotches sometimes merging with or being replaced by dark red vertical bars); most specimens with dark-edged blue lines radiating from eyes *Cephalopholis sexmaculata*
- 13b.** No dark blotches on body or blue lines radiating from eyes *Cephalopholis miniata*
- 14a.** Edge of subopercle and interopercle distinctly serrate; pelvic fins usually reaching anus, their length 1.6 to 2 times in head length; colour generally orange-yellow to orange-red or golden, with red to orange dots on head and dorsally on body *Cephalopholis aurantia*
- 14b.** Subopercle and interopercle usually smooth (rarely with a few small serrae); pelvic fins not reaching anus, 1.9 to 2.2 times in head length; colour pale reddish orange, mottled with dark red or brownish red *Cephalopholis spiloparaea*

Key to the species of *Chelidoperca* occurring in the area

- 1a. Caudal fin truncate; interorbital area naked; body reddish orange, with 5 oblong black blotches along flanks *Chelidoperca pleurospilus*
- 1b. Caudal fin emarginate; interorbital area scaly → 2
- 2a. Scale rows from dorsal-fin origin to lateral line 3; no scales on anterior half of interorbital area *Chelidoperca margaritifera*
- 2b. Scale rows from dorsal-fin origin to lateral line 4 or 5; interorbital scales extend to front edge of eyes *Chelidoperca hirundinacea*

Key to the species of *Epinephelus* occurring in the area

- 1a. Caudal fin of adults emarginate to truncate (slightly rounded on some *E. bleekeri* and juveniles, and convex if broadly spread in adults) → 2
- 1b. Caudal fin rounded (truncate on some *E. fasciatus* from Oceania) → 12
- 2a. Interspinous membranes of dorsal fin not incised (Fig. 14a) → 3
- 2b. Interspinous membranes of dorsal fin incised (Fig. 14b) → 6

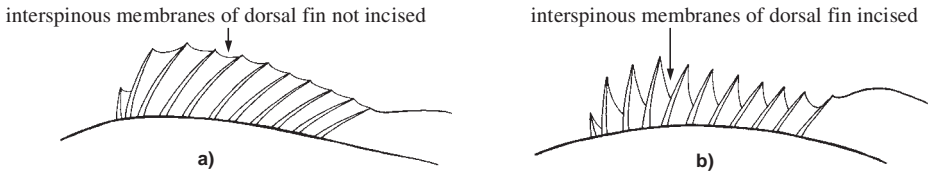


Fig. 14

- 3a. Gill rakers elongate, no rudiments, 20 to 23 rakers on lower limb of first gill arch; dorsal-fin rays 17 to 19; colour purplish to brownish grey with yellowish brown dots on head and longitudinal brown lines on dorsal part of body (lines usually lost on large adults) *Epinephelus undulosus*
- 3b. Gill rakers not elongate and rudiments often present, 13 to 18 rakers on lower limb of first gill arch; dorsal-fin rays 15 to 17; colour not as above → 4
- 4a. Second dorsal-fin spine of adults elongated, its length 1.8 to 2.4 times in head length; total gill rakers on first gill arch 20 to 23; body depth 2.7 to 3.2 times in standard length; body reddish brown with a white dot on each scale; broad dark red margin on spinous portion of dorsal fin. *Epinephelus irroratus*
- 4b. Second dorsal-fin spine not elongate (third or fourth spines longest); total gill rakers on first gill arch 24 to 28; body depth 2.3 to 2.9 times in standard length → 5
- 5a. Body dark purplish grey with scattered irregular whitish blotches; body depth 2.6 to 2.9 times in standard length *Epinephelus multinotatus*
- 5b. Head, body, and fins bluish grey with numerous blackish dots; large adults with scattered irregular blackish spots and blotches, most smaller than pupil; body depth 2.4 to 2.7 times in standard length *Epinephelus cyanopodus*
- 6a. Lateral-line scales 48 to 54; head and at least front of body with small spots, either yellow (pale in preservative) or brown → 7
- 6b. Lateral-line scales 56 to 76; spots on head and body dark brown or absent → 10

- 7a.** Caudal fin truncate to slightly rounded; body depth 3.0 to 3.5 times in standard length; head, body, dorsal fin, and upper third of caudal fin with small orange-yellow spots, the lower two-thirds of caudal fin dark grey; anal and paired fins dusky, without spots *Epinephelus bleekeri*
- 7b.** Caudal fin slightly emarginate (truncate on some *E. chlorostigma*); body depth 2.7 to 3.4 times in standard length; spots on head, body, and fins yellow or yellowish brown to dark brown; anal fin with spots. → 8
- 8a.** Head and front of body with small round well-separated bright yellow spots (pale in preservative); distal margin of caudal, soft dorsal, and anal fins with close-set, dark, yellowish brown spots *Epinephelus timorensis*
- 8b.** Head, body, and fins covered with small, close-set, yellowish brown to dark brown spots (dark in preservative) → 9
- 9a.** Dorsal-fin rays 15 to 17; anal fin of adults rounded to slightly angular, the longest soft ray 2.0 to 2.6 times in head length; 14 to 16 gill rakers on lower limb of first gill arch; pyloric caeca 11 to 17; dark spots on body of adults about equal to pupil *Epinephelus areolatus*
- 9b.** Dorsal-fin rays 16 to 18; anal fin of adults angular or pointed, the longest soft ray 1.9 to 2.3 times in head length; 15 to 18 gill rakers on lower limb of first gill arch; pyloric caeca 26 to 52; dark spots on body of adults distinctly smaller than pupil. *Epinephelus chlorostigma*
- 10a.** Anal-fin rays 9 or 10 (rarely 8); 1 to 4 small spines often present on ventral edge of preopercle near corner; dorsal-fin rays 14 or 15; rear nostrils of adults 2 to 4 times larger than anterior nostrils *Epinephelus ergastularius*
- 10b.** Anal-fin rays 8; no spines on lower edge of preopercle; dorsal-fin rays 14 to 17; rear nostrils not enlarged (except *E. darwinensis*) → 11
- 11a.** Caudal fin truncate to slightly convex; rear nostrils and anterior nostrils subequal; pectoral-fin rays 19 or 20; depth of caudal peduncle 3.2 to 3.8 times in head length; no scales on maxilla; margin of spinous dorsal-fin membranes dark red to black . . . *Epinephelus retouti*
- 11b.** Caudal fin slightly emarginate; rear nostrils of adults more than twice diameter of anterior nostrils; pectoral-fin rays 18; depth of caudal peduncle 3.9 times in head length; maxilla with small scales; no conspicuous markings on head, body or spinous dorsal fin . . *Epinephelus darwinensis*
- 12a.** Anal-fin rays 9 (rarely 10); body with 5 dark bars below dorsal fin, the last 2 bars as broad as preceding bars; 2 pale interspaces below soft dorsal fin *Epinephelus octofasciatus*
- 12b.** Anal-fin rays 8 (rarely 7 or 9); colour not as above. → 13
- 13a.** Dorsal-fin rays 12 to 14 → 14
- 13b.** Dorsal-fin rays 14 to 18 (rarely 13 in *E. bruneus*) → 15
- 14a.** Lateral-line scales 52; lateral body scales rough; rear nostrils twice as large as anterior nostrils; no obvious dark or light markings *Epinephelus perplexus*
(1 specimen, 46.5 cm standard length, from Queensland, Australia)
- 14b.** Lateral-line scales 56 to 65; lateral body scales smooth; rear nostrils and anterior nostrils subequal; juveniles with 2 broad, longitudinal, black-edged whitish bands that disappear in adults, the dark edges breaking into dashes and spots, which may be lost in large adults *Epinephelus latifasciatus*
- 15a.** Lateral-line scales with branched tubules; eye small, its diameter about 1/8 head length for specimens of 20 cm length, about 1/9 head length at 35 cm, and 1/13 head length at 145 cm standard length; interorbital wide, the width more than 1/5 head length for specimens of 23 to 153 cm standard length; maximum length about 270 cm; juveniles yellow, with 3 broad black bars on body and irregular black bands on head *Epinephelus lanceolatus*
- 15b.** Lateral-line scales with single tubule (except anterior scales of large *E. bruneus*, *E. coioides*, and *E. malabaricus*); eye diameter more than 1/7 head length for specimens of 20 cm length, and more than 1/8 head length at 35 cm; interorbital width less than 1/5 head length for specimen of 23 to 153 cm length; maximum length less than 150 cm (except *E. tukula*, which may reach 200 cm) → 16

- 16a. Head and body mostly covered with small dark spots (orange, russet, brown, or black in life and persist in preservative) → 17
- 16b. No distinct dark spots over most of head and body (yellow or orange spots may be present in life, but these usually do not persist in alcohol; or there may be some dark dots or scattered small dark spots, but not over most of head and body) → 40

- 17a. Lateral-line scales 46 to 53 → 18
- 17b. Lateral-line scales 55 to 74 (except *E. fuscoguttatus* with 52 to 58) → 29

- 18a. Midlateral body scales smooth, at least on adults (may be rough in area covered by pectoral fins) → 19
- 18b. Midlateral body scales rough (mostly smooth on adults of *E. socialis*) → 22

- 19a. Dorsal profile of head nearly straight; orange-red to brownish red spots on head, body, and median and pelvic fins; 3 or 4 prominent black spots or blotches dorsally on body, the first (and largest, greater than eye diameter) at base of middle of dorsal fin, the last blotch dorsally on caudal peduncle; no blackish maxillary streak (Pl. VI, 44)
 *Epinephelus trimaculatus*
 (Japan, Korea, China, Taiwan Province of China; not yet recorded from the area)
- 19b. Dorsal profile of head convex; spots on head, body, and fins dark brown to black; black blotches on body at base of dorsal fin present or absent; blackish maxillary streak usually present → 20

- 20a. Dorsal-fin rays 16 to 18; dark spots on pectoral fins progressively smaller distally; pelvic-fin length 2.2 to 2.6 times in head length *Epinephelus faveatus*
- 20b. Dorsal-fin rays 15 to 17; no dark spots on distal part of pectoral fins; pelvic fins 1.9 to 2.3 times in head length (for specimens of 10 to 25 cm standard length) → 21

- 21a. Eye-sized blackish blotch at base of last 3 dorsal-fin spines; dark spots on head, body, and fins numerous, 15 to 20 on soft dorsal fin of specimens 10 cm standard length, and 25 to 30 on soft dorsal fin of 28 cm specimens; total gill rakers on first gill arch 23 to 26 (modally 25); body width 1.7 to 2.2 times in body depth; jaws subequal *Epinephelus howlandi*
- 21b. No large blackish blotch at base of posterior dorsal-fin spines (though 1 to 3 spots at this location are usually darker than adjacent spots); dark spots on head, body, and fins less numerous, 5 to 7 on soft dorsal fin of 11 cm specimens, and 20 or 21 on soft dorsal fin of 29 cm specimens; total gill rakers on first gill arch 21 to 24 (modally 23); body width 1.4 to 1.8 times in body depth; lower jaw strongly projecting *Epinephelus macrospilos*

- 22a. Dark spots on body elongate, oblique, and more numerous posteriorly; dark spots on head separated by more than 2 spot diameters; ventral edge of maxilla of subadults (33 to 40 cm standard length) with a distinct step that develops into a bony knob in adults (Fig. 15a) *Epinephelus longispinis*
- 22b. Dark spots on body not elongate and not more numerous posteriorly; dark spots on head separated by less than a spot diameter (except *E. bontoides*); no distinct step on ventral edge of maxilla (Fig. 15b) → 23

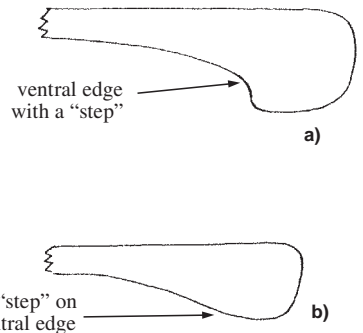
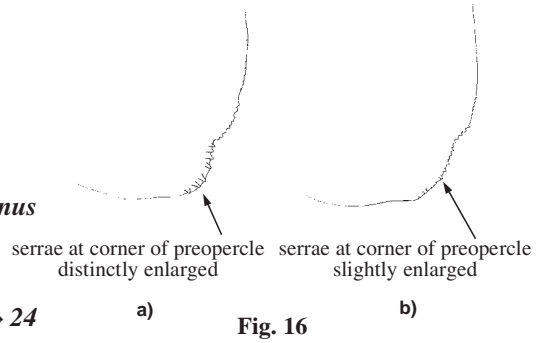


Fig. 15 left maxilla

23a. Pectoral fins large, their length 1.2 to 1.6 times in head length (except specimens from Northwest Australia); dorsal-fin rays 16 to 18; serrae at corner of preopercle distinctly enlarged (Fig. 16a); 2 oblique dark brown bands (or elongate dark blotches linked by narrow bands) on chest *Epinephelus quoyanus*

23b. Pectoral-fin length 1.5 to 2 times in head length; dorsal-fin rays 14 to 17; serrae at preopercle corner slightly enlarged (Fig. 16b); no oblique dark bands on chest → 24



24a. Lateral scale series 82 to 86; pectoral-fin rays 18 or 19; total gill rakers on first gill arch 20 to 22; head and body with small dark spots separated by spaces greater than 2 spot diameters; no dark spots on ventral parts of head and body; caudal, soft dorsal, and pectoral fins blackish brown with a pale yellow to white margin *Epinephelus bontoides*

24b. Lateral scale series 92 to 120; pectoral-fin rays 16 to 19; total gill rakers on first gill arch 23 to 27 (except *E. merra* with 21 to 25); dark spots on head and body extending ventrally, and most within a spot diameter of adjacent spots; fins not dark brown to black with a distinct pale margin → 25

25a. Dorsal-fin rays 14 or 15; length of longest dorsal-fin spines 2.7 to 3.3 times in head length; black saddle-blotch on caudal peduncle; head and body covered by small dark brown or orange-brown spots; head and dorsal part of body with irregular dark brown blotches superimposed over the dark spots *Epinephelus polyphkadion*

25b. Dorsal-fin rays 15 to 18; longest dorsal-fin spines 2.1 to 2.7 times in head length (except *E. merra*, 2.6 to 2.9 times in head length); colour not as above (especially, no black saddle on caudal peduncle) → 26

26a. Dark spots on head and body about 1/2 size of pupil; dark brown to black spots on fins (except spinous dorsal fin) much larger than those on body; maxilla not reaching vertical at rear edge of eye *Epinephelus miliaris*

26b. Dark spots on body larger than pupil and larger than spots on fins; maxilla usually reaching to or past vertical at rear edge of eye → 27

27a. Pectoral-fin rays 16 to 18; length of longest dorsal-fin spine 2.4 to 3.2 times in head length; some dark brown spots on body often joined to form short bands; pectoral fins with small black spots largely confined to fin rays *Epinephelus merra*

27b. Pectoral-fin rays 17 to 19; longest dorsal-fin spine 2.1 to 2.6 times in head length; no confluent dark spots on body; dark spots on pectoral fins not uniformly small and not confined to fin rays → 28

28a. Dorsal-fin rays 17 or 18; lateral scale series 94 to 102; 3 close-set pairs of dark brown to black spots on body at base of dorsal fin *Epinephelus bilobatus*

28b. Dorsal-fin rays 15 to 17; lateral scale series 102 to 120; no pairs of dark brown to black spots along base of dorsal fin; 2 large dusky to blackish areas on body and dorsal fin, these separated by a broad whitish (though still faintly spotted) area *Epinephelus maculatus*

29a. Dorsal-fin rays 17; pectoral-fin rays 20; lateral-line scales 73; body broadly marbled with brown and finely spotted with dark brown *Epinephelus lebretonianus*
(known only from 1 specimen, 24.8 cm standard length; locality unknown, but probably Indo-Pacific)

29b. Dorsal-fin rays 13 to 17 (only *E. corallicola* rarely with 17); pectoral-fin rays 17 to 20; lateral-line scales less than 71 (except *E. tauvina*) → 30

- 30a.** Most dark spots on body polygonal and close-set, separated only by pale lines (forming a reticulum) or white dots; midlateral body scales rough → **31**
- 30b.** Most dark spots on body round or oblong and well separated (except posteriorly on *E. socialis* where spots may be confluent to form irregular dark stripes); midlateral body scales rough or smooth → **33**
- 31a.** Second anal-fin spine 2.1 to 2.3 times in head length; longest dorsal-fin spine 2.5 to 2.8 times in head length; dorsal-fin rays 15 to 17; polygonal dark spots on body separated mainly by white dots at corners of spots; elongate yellow-brown blotch behind eye or on opercle *Epinephelus hexagonatus*
- 31b.** Second anal-fin spine 2.4 to 3.7 times in head length, longest dorsal-fin spine 2.8 to 3.8 times in head length; dorsal-fin rays 14 to 16; dark spots on body separated by network of pale lines; no yellow-brown blotch behind eye or on opercle → **32**
- 32a.** A single black blotch on body at base of posterior dorsal-fin spines and extending onto fin about half-way to margin; dark spots at front of upper lip in 1 or 2 irregular horizontal rows; caudal peduncle depth 3.2 to 3.7 times in head length *Epinephelus melanostigma*
- 32b.** Three or 4 black blotches (or groups of spots darker than others) at base of dorsal fin and 1 on top of peduncle; blotch at base of rear dorsal-fin spines not extending half-way to fin margin; small dark spots in 3 or 4 irregular rows along front of upper lip; caudal peduncle depth 3.7 to 4.3 times in head length *Epinephelus spilotoceps*
- 33a.** Dorsal-fin rays 13 to 15; total gill rakers on first gill arch 29 to 31; lateral-line scales 53 to 58; body depth 2.6 to 2.9 times in standard length; head and body pale yellowish brown, with irregular dark brown blotches and numerous small close-set dark brown spots; black saddle spot on caudal peduncle; midlateral body scales of adults smooth *Epinephelus fuscoguttatus*
- 33b.** Dorsal-fin rays 14 to 17; total gill rakers on first gill arch 22 to 29; lateral-line scales 53 to 74; body depth 2.7 to 3.7 times in standard length; colour not as above; midlateral body scales rough (except large *E. tauvina* which have mainly smooth scales) → **34**
- 34a.** Irregular black spots (less than 1/2 pupil size) on head, body, dorsal fin, and a few on caudal fin; no spots on ventral parts of head or body or on anal and paired fins; no auxiliary scales; maxilla not reaching past vertical at rear edge of eye . . . *Epinephelus magniscuttis*
- 34b.** Colour not as above; auxiliary scales present on body scales of adults; maxilla usually reaching past vertical at rear edge of eye → **35**
- 35a.** Dorsal-fin rays 15 to 17; rear nostrils (at standard length greater than 14 cm) vertically elongate, their length 2 to 3 times diameter of anterior nostrils; pectoral-fin length 1.5 to 1.7 times in head length; lateral scale series 88 to 109; grey, with well-separated black spots smaller than pupil on head, body and fins; 3 dusky to blackish blotches on body at base of rear half of dorsal fin, the largest at base of last 2 or 3 spines; dusky to blackish saddle spot on caudal peduncle; juveniles with black-edged white spots on head and body *Epinephelus corallicola*
- 35b.** Dorsal-fin rays 13 to 16; rear nostrils not vertically elongate or more than twice diameter of anterior nostrils; pectoral-fin length 1.6 to 2.5 times in head length; lateral scale series 95 to 130; colour not as above → **36**
- 36a.** Lateral-line scales 54 to 65, the anterior scales of large adults with branched tubules; numerous small bony platelets on side of first gill arch; body with 5 irregular dark bars which tend to bifurcate ventrally (bars may be faint or broken into series of 2 or 3 large blotches) → **37**
- 36b.** Lateral-line scales 62 to 74, none with branched tubules; no small bony platelets on side of first gill arch; dark bars not present on body (or only faintly on *E. tauvina*). → **38**

- 37a.** Head and body with numerous small well-separated black spots (largest spots about 2 times larger than rear nostrils); irregular white or pale spots or blotches usually present on head and body *Epinephelus malabaricus*
- 37b.** Head, body, and usually median fins with numerous orange, brownish orange or reddish brown spots (orange spots turn brown after death and poorly defined on preserved specimens; spots about 4 or 5 times larger than rear nostrils); no white or pale spots on head or body; orange spots become poorly defined and darker with growth; spots on head often coalesce and become elongated, arranged in irregular rows radiating from eye; fins brownish, with proximal parts spotted *Epinephelus coioides*
- 38a.** Body with several large round or oval dark brown spots, arranged in 5 or 6 subvertical series; head and fins with smaller dark brown spots and irregular dark streaks; lateral scale series 113 to 130; maximum total length 200 cm *Epinephelus tukula*
- 38b.** Colour not as above; lateral scale series 95 to 112; maximum total length 80 cm → 39
- 39a.** Head length 2.1 to 2.4 times in standard length; head, body, and fins with orange-red to dark brown spots (those on body nearly as large as eye in young, about pupil size in large specimens; spots usually absent in outer part of pectoral fins of adults); body often with faint oblique dark bars; blackish blotch often present at base of last 4 dorsal-fin spines and extending onto lower part of fin (more evident in young) *Epinephelus tauvina*
- 39b.** Head length 2.4 to 2.7 times in standard length; head and body with blackish brown spots much smaller than pupil, those posteriorly on body often coalescing to form irregular stripes; 4 blackish blotches often present at base of dorsal fin and 1 on caudal peduncle; caudal, dorsal, and anal fins with small white spots and white margins *Epinephelus socialis*
- 40a.** Membranes of spinous dorsal fin usually not incised (some specimens with membranes slightly to moderately incised); head and body dark brown or greenish brown, marbled with irregular pale spots and blotches; 1 or 2 faint dark streaks running posteriorly from eye; no dark spots on head, body or fins. *Epinephelus erythrurus*
- 40b.** Interspinous dorsal-fin membranes moderately to deeply incised; colour not as above → 41
- 41a.** Body pale greyish brown, with 5 dark bars; a narrow pale bar may be present within dark bars, nearly dividing them in 2; fins greyish, the median fins with several small dark spots; 13 to 15 gill rakers on lower limb of first gill arch *Epinephelus sexfasciatus*
- 41b.** Colour not as above; 14 to 19 gill rakers on lower limb of first gill arch → 42
- 42a.** Head, body, and median fins uniform dark grey; pectoral fins pale, pelvic fins blackish; body depth equal to head length, 2.4 times in standard length; lateral-line scales 67 to 69; dorsal-fin rays 16 or 17 *Epinephelus trophis*
(2 specimens taken off Western Australia in a depth of 130 m)
- 42b.** Colour not as above; body depth less than head length, 2.5 to 3.6 times in standard length; lateral-line scales 48 to 72; dorsal-fin rays 13 to 18 → 43
- 43a.** Body pale, with close-set wavy, brown or brownish orange stripes, the intervening pale lines forming a maze-like pattern; head greyish brown with numerous small close-set brownish orange spots; dorsal-fin rays 15 to 17; body depth 2.5 to 2.9 times in standard length; interorbital space convex. *Epinephelus undulatostratus*
- 43b.** Colour not as above; dorsal-fin rays 13 to 18; body depth 2.6 to 3.6 times in standard length → 44
- 44a.** Dorsal-fin rays 15 to 18 (rarely 15); body usually with vertical or slightly oblique broad dark bars (faint or absent on some species) → 45
- 44b.** Dorsal-fin rays 13 to 16 (rarely 16); body without dark vertical bars (except juvenile *E. bruneus* and *E. daemelii* which have dark oblique bars containing pale spots and streaks) → 53

45a. Head, body, and fins tan dorsally; belly and rear part of body whitish ventrally; chest and ventral part of head reddish orange; dark orange-brown to black dots (less than 2 mm diameter) on head (behind eye) and body (anteriorly); body with 5 faint, oblique, dark bars (midlateral part of each bar may be darker, representing a series of squarish dark blotches continued from the dark band running from eye to end of operculum) soft dorsal and caudal fins with narrow dark brown margin; dark line along base of soft dorsal fin; lateral-line scales 48 to 51. *Epinephelus stictus*

45b. No dark brown to black dots on body or head (some species with black spots, but these are larger than 2 mm); 48 to 75 lateral-line scales → **46**

46a. Margin of interspinous dorsal-fin membranes black (red in specimens from Western Australia and deep water); edge of orbit (around eye) narrowly black, surrounded by pale blue line; body usually with 5 faint dark bars often containing irregular pale spots. *Epinephelus fasciatus*

46b. Margin of spinous dorsal fin not black; rim of orbit not black; dark bars on body present or absent → **47**

47a. Nape and front of body above lateral line with minute cycloid scales and numerous pores; body scales with a whitish dot (may be lost in alcohol); semicircular dark red to reddish brown blotch at base of pectoral fin; dark pigment in groove along base of spinous dorsal fin; usually some violet lines and spots on cheek *Epinephelus rivulatus*

47b. Nape and dorsoanterior part of body without minute scales and numerous pores; colour not as above. → **48**

48a. Corner of preopercle with 1 to 6 large spines (2 or 3 times longer than serrae above corner) (Fig. 17a); dark bars on body vertical or nearly vertical → **50**

48b. Serrae at corner of preopercle only slightly to moderately enlarged (Fig. 17b); dark bars on body oblique (may be faint or absent) → **49**

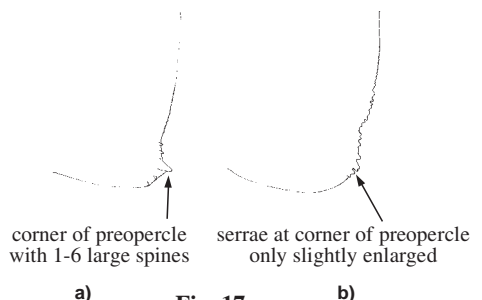


Fig. 17

49a. Head large, its length 2.1 to 2.4 times in standard length; adults with 4 dark brown bars on body and brown bands on head; small black spots on edges of brown bars and bands; no dark spots on fins; juveniles with black bars on body and small black spots on fins; 14 to 16 gill rakers on lower limb of first gill arch *Epinephelus amblycephalus*

49b. Head length 2.3 to 2.6 times in standard length; 4 dark bars (sometimes faint or absent) on dorsal part of body; head and body with numerous small yellow spots (but no black spots); body and median fins also with pale grey spots; rear margin of median fins with a broad yellow border; 16 to 18 gill rakers on lower limb of first gill arch *Epinephelus awoara*

50a. Head and body brownish grey, covered (except ventrally) with red, orange, or gold spots (pale in alcohol); dorsal-fin margin yellow or orange; dusky yellow or orange spots (1 per membrane) along middle of spinous dorsal fin and another row along base of fin; black blotch at base of last 3 dorsal-fin spines *Epinephelus akaara*

50b. Colour not as above. → **51**

51a. Head and body with numerous small dark brown, brownish yellow, or russet spots (dark in alcohol); body usually with 5 broad dark bars, the first 4 extend onto dorsal fin (first 2 bars darker dorsally, extending to margin of dorsal fin), the last bar on caudal peduncle *Epinephelus fasciatomaculosus*

51b. Colour not as above. → **52**

- 59a.** Large oval dark brown blotch (or group of small spots on larger specimens) on body at base of middle dorsal-fin spines, this blotch not joined to lower dark bands; broadly-curved dark bands or rows of spots on head and body paralleling curvature of isolated dark blotch; dark markings faint or absent on large adults *Epinephelus poecilnotus*
- 59b.** Dark brown blotch on body at base of middle dorsal-fin spines joined to dark brown band passing to upper edge of operculum; a second dark band from upper end of gill opening, bifurcating above pectoral fin, with branches to anterior and posterior dorsal-fin rays; 2 bands from eye, the upper branch to nape, the lower a broad curve or broken line to upper part of caudal peduncle *Epinephelus morrhua*
- 60a.** Head and body pale brownish or greenish grey, with small, brownish black spots on dorsolateral part of body and sometimes on rear part of head and median fins; body depth 3.0 to 3.3 times in standard length *Epinephelus epistictus*
- 60b.** Head and body with intricate pattern of irregular dark lines, spots, and blotches; body depth 2.6 to 3.0 times in standard length → **61**
- 61a.** Five irregular dark brown bands (with age only the edges remain dark) passing downward and forward from dorsal surface of body, the first from nape to eye, the second band from middle dorsal-fin spines to upper end of gill opening, third and fourth bands from dorsal-fin rays, branching as they pass ventrally, the fifth band on caudal peduncle *Epinephelus radiatus*
- 61b.** Dark markings on postorbital head and body forming a coarse broken reticulum, none passing downward and forward from dorsal surface of body *Epinephelus tuamotuensis*

Key to the species of *Holanthias* occurring in the area

- 1a.** Dorsal-fin rays 13 or 14; lateral-line scales 30 to 39; third dorsal-fin spine elongate in adult males; rear part of body with small silvery spots → **4**
- 1b.** Dorsal-fin rays 15 to 18; lateral-line scales 36 to 43; third dorsal-fin spine not elongate; no silvery spots on rear part of body → **2**
- 2a.** Body depth 2.0 to 2.3 times in standard length; dorsal-fin rays 17 or 18; lateral-line scales 39 to 43; body pink with large yellow to dark brown blotches (most larger than eye) *Holanthias borbonius*
- 2b.** Body depth 2.2 to 2.45 times in standard length; dorsal-fin rays 15 to 17; lateral-line scales 36 to 41; no large blotches on body → **3**
- 3a.** Caudal-fin lobes 1.3 to 1.6 times in standard length; total gill rakers on first gill arch 42 to 47; scales on top of head extending in front of nostrils; dorsal fin lavender, with yellow submarginal line in spinous part and yellow filamentous soft rays *Holanthias tapui*
- 3b.** Caudal-fin lobes 2.1 to 3.0 times in standard length; total gill rakers on first gill arch 39 to 41; no scales in front of nostrils; dorsal fin yellow, except for magenta spines and ray tips and purple spots in soft portion *Holanthias chrysostictus*
- 4a.** Dorsal-fin rays 14; lateral-line scales 35 to 39; no black and white bars at base of caudal fin *Holanthias unimaculatus*
- 4b.** Dorsal-fin rays 13; lateral-line scales 30 to 32; curved dark brown bar preceded by white bar at base of caudal fin *Holanthias rhodopeplus*

Key to the species of *Hypoplectrodes* occurring in the area

- 1a.** Body with 6 narrow, dark brown vertical bars, the last 2 on caudal peduncle; 2 similar bands from eye to eye over the nape; dorsal-fin rays 17 to 19; anal-fin rays 7 *Hypoplectrodes annulatus*
- 1b.** No narrow dark bars on body; dorsal-fin rays 17 to 21; anal-fin rays 7 to 9 → **2**
- 2a.** Body covered with close-set dark brown blotches; lateral-line scales 38 to 42; dorsal-fin rays 17 to 19 *Hypoplectrodes jamesoni*
- 2b.** Body pale pink to brownish red, with 5 broad dark saddle-blotches at base of dorsal fin; lateral-line scales 45 to 49; dorsal-fin rays 19 to 21 *Hypoplectrodes maccullochi*

Key to the species of *Liopropoma* occurring in the area

- 1a.** Dorsal fin continuous (though it may be deeply notched, all spines and soft rays are connected above their bases by membranes) → **2**
- 1b.** Dorsal fin divided into separate spinous and soft-rayed fins → **5**
- 2a.** First gill arch with 8 gill rakers on upper limb, and on lower limb 19 or 20 (only 2 rudiments); pectoral-fin rays 14; dorsal-fin rays 11 or 12; caudal fin truncate to slightly rounded; no scales on front of snout or on preorbital; head and body with 6 or 7 broad dark stripes; prominent dark ocellus in soft dorsal and anal fins *Liopropoma swalesi*
- 2b.** First gill arch with 5 to 7 gill rakers on upper limb, and on lower limb 11 to 16 (including 9 to 12 rudiments); pectoral-fin rays 14 to 16; dorsal-fin rays 12 to 14; caudal fin slightly to deeply emarginate; head covered with scales; no dark stripes on body; no ocelli in fins → **3**
- 3a.** Last dorsal-fin spine shorter than sixth and seventh spines; caudal fin with broadly rounded corners; anterior nostril tube not reaching lip; anal-fin rays 9; pectoral-fin rays 15 or 16 *Liopropoma erythraeum*
- 3b.** Last (eighth) dorsal-fin spine longer than sixth and seventh spines; caudal fin corners pointed; anterior nostril tube overlaps upper lip; anal-fin rays 8; pectoral-fin rays 14 or 15 → **4**
- 4a.** Body with scattered, small, dark brown spots (often semicircular); caudal concavity 4 or 5 times in head length; pectoral-fin rays 15 *Liopropoma lunulatum*
- 4b.** No dark spots on body; caudal concavity 12 or 13 times in head length; pectoral-fin rays 14 *Liopropoma incomptum*
- 5a.** Head and body with 4 to 8 dark brown longitudinal stripes → **6**
- 5b.** No dark longitudinal stripes on head and body → **7**
- 6a.** Body with 6 to 8 dark stripes; pectoral-fin rays 15 or 16 *Liopropoma susumi*
- 6b.** Body with 4 or 5 dark stripes; pectoral-fin rays 14 or 15 *Liopropoma collettei*
- 7a.** Pectoral-fin rays 15 or 16; no enlarged pore in front of rear nostrils; body reddish grey-brown anteriorly, dusky or brownish orange-red posteriorly, with faint brownish orange lines along scale rows *Liopropoma pallidum*
- 7b.** Pectoral-fin rays 13 to 15; 1 or 2 enlarged pores in front of each rear nostril; colour not as above → **8**
- 8a.** Two to 10 small pores in a group on each side of anterior interorbital space; scales rarely extend dorsally on snout more than half-way from rear nostrils to upper lip; body red to brownish red, often with faint lines following scale rows; yellow stripe from front of snout to eye, another between eyes, and 1 to 3 running posteriorly from eye *Liopropoma mitratum*
- 8b.** A pair of large pores, 1 on each side of interorbital space on a vertical through anterior edge of pupil; scales dorsally on snout extend more than half-way from rear nostrils to upper lip → **9**
- 9a.** Head, body, and fins immaculate yellow; pelvic fins short, 22% of standard length and 1.75 times in head length *Liopropoma flavidum*
- 9b.** Colour not entirely yellow; pelvic fins 23 to 28% of standard length, 1.4 to 1.7 times in head length → **10**
- 10a.** Body with 2 red bands separated by midlateral white stripe from head to caudal fin; body depth 3.5 to 3.7 times in standard length *Liopropoma tonstrinum*
- 10b.** Body dusky yellow with red lines following scale rows; caudal peduncle reddish, with midlateral white stripe; body depth 3.0 to 3.5 times in standard length *Liopropoma multilineatum*

Key to the species of *Luzonichthys* occurring in the area

- 1a.** Anal-fin rays with II spines and 9 soft rays; pectoral-fin rays 21 to 23; lateral-line scales 70 to 78; body elongate, its depth 4.2 to 5.3 times in standard length; some scales on head and dorsoanterior part of body with enlarged ctenii; body lavender-pink with a dark-edged orange-yellow stripe between lateral line and dorsal-fin base. . . . *Luzonichthys williamsi*
- 1b.** Anal fin with III spines and 7 soft rays; pectoral-fin rays 17 to 22; lateral-line scales 51 to 74; body depth 3.2 to 5.0 times in standard length; scale ctenii not enlarged; no dark-edged orange-yellow stripe on back → 2
- 2a.** Lateral-line scales 65 to 74; pectoral-fin rays usually 21 or 22; body depth 4.2 to 5.0 times in standard length; upper third of body yellow or orange-yellow, the lower two-thirds lavender-pink *Luzonichthys whiteleyi*
- 2b.** Lateral-line scales 51 to 68; pectoral-fin rays 17 to 20; body depth 3.2 to 4.1 times in standard length; colour not as above → 3
- 3a.** Pectoral-fin rays modally 20; lateral-line scales 59 to 68; caudal fin lunate, the caudal concavity 6.1 to 7.2 times in standard length; scales dorsally on snout not extending in front of nostrils *Luzonichthys earlei*
- 3b.** Pectoral-fin rays modally 19; lateral-line scales 51 to 60; caudal-fin lobes elongate, the caudal concavity 4.0 to 5.6 times in standard length; scales dorsally on snout extending in front of anterior nostrils → 4
- 4a.** Caudal peduncle depth 2.4 to 2.5 times in head length; snout length 3.7 to 4.1 in head length; pectoral-fin length 3.2 to 3.4 and pelvic-fin length 3.7 to 4.7 times in standard length; first gill arch with 7 to 10 gill rakers on upper limb, 20 to 22 on lower limb; no linear colour pattern *Luzonichthys waitei*
- 4b.** Caudal peduncle depth 2.6 to 2.7 times in head length; snout length 4.2 to 4.4 in head length; pectoral-fin length 3.5 to 3.7 and pelvic-fin length 4.6 to 4.9 times in standard length; first gill arch with 7 gill rakers on upper limb, 10 on lower limb; orange and pale yellow stripes on front of body *Luzonichthys taeniatus*

Key to the species of *Plectranthias* occurring in the area

- 1a.** Some pectoral-fin rays branched; lateral line complete → 2
- 1b.** No pectoral-fin rays branched; lateral line complete or incomplete → 15
- 2a.** Head, including maxilla and chin, covered with scales → 3
- 2b.** Head not completely scaly (most of snout, chin, and maxilla naked). → 4
- 3a.** Caudal fin rounded or truncate with rounded corners; no dorsal-fin rays elongated; no canine teeth in lower jaw; 10 to 12 gill rakers on lower limb of first gill arch; head and body nearly uniform light red *Plectranthias japonicus*
- 3b.** Caudal fin slightly emarginate, the second upper ray usually elongate; second dorsal-fin ray elongate; 2 stout canine teeth at front of lower jaw and another pair on side of jaw; 14 to 17 gill rakers on lower limb of first gill arch; dark red bars on body and a small red spot on upper basal part of caudal fin *Plectranthias kelloggi*
- 4a.** Body depth 3.4 times in standard length; eye diameter 2.9 times in head length; no canine teeth; preopercle smooth; colour mainly yellow *Plectranthias megalophthalmus*
- 4b.** Body depth 2.2 to 3.2 times in standard length; eye diameter 3.0 to 4.8 in head length; canine teeth present; preopercle serrate and lower margin with 2 antrorse spines; colour (when known) not mainly yellow → 5

- 5a.** Dorsal-fin rays 14 or 15; fourth or fifth dorsal-fin spines longest → **6**
- 5b.** Dorsal-fin rays 16 to 18; third or fourth dorsal-fin spine longest → **8**
- 6a.** Dorsal-fin rays 14; preopercle edge smooth; maxilla scaly *Plectranthias lasti*
- 6b.** Dorsal-fin rays 15; preopercle edge serrate; maxilla scaly or naked → **7**
- 7a.** Lateral-line scales 29; maxilla and lower jaw naked; pectoral-fin rays 14; body pink, with 3 orange-red bars below dorsal fin, a Y-shaped orange-red bar on nape, and 7 red spots on caudal peduncle. *Plectranthias rubrifasciatus*
- 7b.** Lateral-line scales 32 to 35; maxilla and rear part of lower jaw scaly; pectoral-fin rays 16; colour tan, becoming silvery white ventrally; first 4 lateral-line scales dusky . . . *Plectranthias robertsi*
- 8a.** Lateral-line scales 40 or 41; oblique rows of large scales on cheek between eye and corner of preopercle 8 or 9; body red, with no distinctive markings *Plectranthias taylori*
- 8b.** Lateral-line scales 28 to 36; oblique rows of large cheek scales 5 to 7; colour (when known) not entirely red → **9**
- 9a.** Fourth dorsal-fin spine longest, 2.9 times in head length; pectoral fins just reaching vertical at base of first anal-fin ray; body pale red with 2 rows of large dark red blotches dorsally; fins yellow *Plectranthias whiteheadi*
- 9b.** Third dorsal-fin spine longest, 1.8 to 2.9 times in head length; pectoral fins reaching past vertical at base of first anal-fin ray; colour not as above → **10**
- 10a.** Lateral-line scales 33 to 36; dorsal-fin rays 17 or 18 → **11**
- 10b.** Lateral-line scales 28 to 31; dorsal-fin rays 16 → **12**
- 11a.** Oblique rows of large cheek scales 5; body with 6 faint dark saddle blotches, first from nape to dorsal-fin origin, second below middle dorsal-fin spines, sixth at base of last 4 dorsal-fin rays; another 2 diffuse saddle blotches on caudal peduncle . . . *Plectranthias anthioides*
- 11b.** Cheek scale rows 7; body with 4 dark saddle-bars, first from nape to first 2 dorsal-fin spines, the fourth bar below twelfth to sixteenth dorsal-fin rays, and 2 more dark bars on rear half of peduncle *Plectranthias jothyi*
- 12a.** Inner teeth on side of lower jaw about twice as long as teeth in outer rows; length of longest caudal-fin ray about 1.4 times in head length; body pale, with red bar from middle of dorsal fin to front of anal fin and another on caudal peduncle *Plectranthias retrofasciatus*
- 12b.** Teeth on side of lower jaw equal in size; longest caudal-fin ray 1.6 to 1.9 times in head length → **13**
- 13a.** Pectoral-fin rays 14; eye diameter 3.35 times in head length *Plectranthias knappi*
- 13b.** Pectoral-fin rays 13; eye diameter 3.8 to 4.4 times in head length → **14**
- 14a.** Body depth 2.7 to 2.8 times in standard length; third dorsal-fin spine and second anal-fin spine 2.0 times in head length; life colour unknown *Plectranthias pallidus*
- 14b.** Body depth 2.6 to 2.65 times in standard length; third dorsal-fin spine 2.4 to 2.5 times in head length, second anal-fin spine 2.2 to 2.3 times in head length; body whitish, with large orange-red blotches suffused with yellow *Plectranthias wheeleri*
- 15a.** Lateral-line usually incomplete, 12 to 22 scales in anterior series → **16**
- 15b.** Lateral-line complete, 25 to 31 scales in series to caudal-fin base → **19**

- 16a.** Third dorsal-fin spine elongate, with a pennant-like flap near tip; edge of preopercle smooth or with a few weak serrae; pectoral fins reaching past anal-fin base, the length 2.2 to 2.5 times in standard length; body pale, with large close-set red blotches *Plectranthias inermis*
- 16b.** Fourth dorsal-fin spine longest; upper edge of preopercle strongly serrate and 2 antrorse spines on lower edge; pectoral-fin length 2.4 to 3.2 times in standard length; colour not as above → **17**
- 17a.** Pectoral-fin rays 12 or 13; lateral-line scales 12 to 15; subopercle with 2 to 7 coarse serrae and interopercle with 1 to 8 serrae; body pale, with brown blotches forming irregular bars; dark brown spot at rear end of dorsal-fin base, another at base of upper caudal-fin rays, a third at base of last anal-fin ray, and a fourth spot between second and third spots; small dusky spots along bases of dorsal and anal fins. *Plectranthias longimanus*
- 17b.** Pectoral-fin rays 14 to 18; lateral-line scales 14 to 22; subopercle serrae 0 to 2 (1 of 46 *P. nanus* with 4), and none on interopercle (a single *P. nanus* with 1); colour not exactly as above (but that of *P. nanus* similar) → **18**
- 18a.** Dorsal-fin rays 13 to 15; pectoral-fin rays 14 to 16; colour as in 17a except a vertical brown line on caudal-fin base separated by a pale zone from 2 dark spots on caudal peduncle *Plectranthias nanus*
- 18b.** Dorsal-fin rays 16 or 17; pectoral-fin rays 16 to 18; body mottled orange anteriorly, becoming red and white posteriorly, with red spot at dorsal-fin origin and white spot at base of last soft ray *Plectranthias winniensis*
- 19a.** Caudal fin emarginate, with 1 or more filamentous rays → **20**
- 19b.** Caudal fin truncate or rounded, without elongated rays → **21**
- 20a.** No antrorse spines on lower edge of preopercle; several rays of caudal-fin lobes filamentous; dorsal-fin rays 14 or 15, the second to fourth elongated; small dark blotches on nape, 5 or 6 at base of dorsal fin, and 2 dorsally on caudal peduncle; 2 dark blotches just below lateral line, 1 below last dorsal-fin spines and the other just behind head; 2 faint dark blotches on side of caudal peduncle (life colour unknown) *Plectranthias foresti*
- 20b.** Two large antrorse spines on lower edge of preopercle; only the second branched caudal-fin ray elongated; dorsal-fin rays 15 to 17, none elongated; body pale, mottled with red and yellow *Plectranthias sagamiensis*
- 21a.** Preopercle with 18 to 21 serrae; oblique rows of cheek scales 6; lower pectoral-fin rays not enlarged; caudal fin truncate; body rose, with blackish blotches dorsally; colour in alcohol essentially as in *P. foresti* *Plectranthias megalepis*
(1 specimen, 62 mm standard length, from Kai Islands, Indonesia)
- 21b.** Preopercle with 1 to 4 serrae; cheek scale rows 4 or 5; lower pectoral-fin rays enlarged; caudal fin rounded; dark bars on body and large black spot basally in anal fin → **22**
- 22a.** Palatine teeth absent; pectoral-fin rays 12 or 13, the long lower rays slightly enlarged; dorsal-fin rays 16 to 18; lateral-line scales 25; interorbital area without scales; body pale, with 4 or 5 brown bars, first in front of dorsal fin, last at base of caudal fin; 4 prominent black spots as follows: covering rear third of spinous dorsal fin, below base of last 6 dorsal-fin rays, at base of last 4 anal-fin rays and midventrally on abdomen. *Plectranthias fourmanoiri*
- 22b.** Palatine teeth present; pectoral-fin rays 14, the lower 6 rays about twice as thick as shorter upper rays; dorsal-fin rays 15; lateral-line scales 29 or 30; top of head scaled anterior to nostrils; body pale, with 6 broad brown bars, the first on nape, the last on caudal-fin base, the ones between tending to form double bars (upper ends extending into basal part of dorsal fin where darker); large dark spot at base of anal fin, another at pectoral-fin base, and 2 dark spots, one above the other, on caudal-fin base *Plectranthias cirrhitoides*

Key to the species of *Plectropomus* occurring in the area

- 1a. Anterior rays of soft dorsal and anal fins elevated, the fin margin with a distinct lobe anteriorly; longest dorsal-fin rays 1.6 to 2.1 times in head length; pectoral-fin rays 14 to 16; adults with vertical blue lines anteriorly on side of body and head . . . *Plectropomus oligacanthus*
- 1b. Anterior rays of dorsal and anal fins not elevated to form a lobe; longest dorsal-fin rays 2.2 to 3.2 times in head length; pectoral-fin rays 15 to 18; adults not coloured as above → 2

- 2a. Body uniform brown or brown marbled with olive-green, brownish orange, or white; juveniles brownish with pale horizontally elongate spots and streaks; pectoral-fin rays 16 to 18 *Plectropomus punctatus*
- 2b. Body with numerous blue spots or with saddle-like black blotches and a few blue spots; pectoral-fin rays 15 to 18 → 3

- 3a. Caudal fin truncate to slightly emarginate, the caudal concavity (difference between lengths of longest [upper] ray and shortest [middle] rays) 13 or more times in head length; interorbital area with small embedded scales; head, body (including ventral parts), and median fins covered with close-set, round to slightly oval, dark-edged blue spots; distance between spots subequal to spot diameters; 2 to 7 developed gill rakers on lower limb of first gill arch *Plectropomus areolatus*
- 3b. Caudal fin emarginate, the caudal concavity 5 to 12 times in head length; no scales on interorbital area; blue spots round to oblong; 4 to 10 developed gill rakers on lower limb of first gill arch → 4

- 4a. Pectoral-fin rays 16 to 18; caudal-fin length 1.5 to 1.8 times in head length; pectoral and pelvic fins 2.1 to 2.4 times in head length; head and body pale, with 4 or 5 saddle-like dark brown or black blotches and a few small blue spots, the fins yellow; or head and body brownish with numerous small blue spots and with or without faint dark saddle blotches *Plectropomus laevis*
- 4b. Pectoral-fin rays 15 to 17; caudal fin length 1.3 to 1.5 times in head length; pectoral and pelvic fins 1.7 to 2.3 times in head length; no dark saddle-like blotches on body → 5

- 5a. Head and body covered (except ventrally) with small blue spots, about size of nostrils, the distance between spots more than twice their diameter; median fins also covered with blue spots *Plectropomus leopardus*
- 5b. Most blue spots on head and body more than twice size of nostrils; some spots on head and body elongate (except juveniles) → 6

- 6a. Pelvic fins without blue spots; some spots on body of adults horizontally elongate; gill raker at angle of first gill arch longer than longest gill filaments; pelvic fins 1.7 to 2.1 times in head length; nostrils subequal *Plectropomus maculatus*
- 6b. Pelvic fins with blue spots; some spots on body of adults vertically elongate; gill raker at angle of first arch shorter than longest gill filaments; pelvic fins 1.9 to 2.3 times in head length; rear nostrils of adults over 50 cm distinctly larger than anterior nostrils *Plectropomus pessuliferus*

Key to the species of *Pseudanthias* occurring in the area

- 1a. Dorsal and anal fins nearly covered by small scales; auxiliary scales (small scales basally on large scales) present; third dorsal-fin spine longest, greatly elongated in males (longer than head length) → 2
- 1b. Dorsal and anal fins naked or with only a few small scales basally; auxiliary scales present or absent; third dorsal-fin spine, if longest, not longer than head → 3

- 2a.** Band from eye to middle of pectoral fins (band yellow in females, orange in males) as broad or broader than pupil and not distinctly edged in violet; outer edges of caudal-fin lobes broadly edged in blue or violet; first 2 soft rays and adjacent membranes of pelvic fins of males dark brownish red, in sharp contrast to pale rest of fins; spot on distal upper part of pectoral fins of males brownish red and smaller than eye *Pseudanthias huchtii*
- 2b.** Orange band from eye to middle of pectoral fins usually narrower than pupil and broadly edged in violet; outer edge of caudal-fin lobes narrowly blue or violet; pelvic fins of males not divided into outer brownish red and inner pale zones; spot on distal upper part of pectoral fins of males pink to magenta, much larger than eye *Pseudanthias squamipinnis*
- 3a.** Upper lip of males thickened at symphysis, forming a pointed fleshy protuberance (only slightly developed in *P. parvirostris*); patch of villiform teeth on vomer roundish or quadrangular; caudal fin of adults deeply forked → **4**
- 3b.** Upper lip of males not thickened at symphysis; vomerine tooth patch chevron-shaped or subtriangular; caudal fin of adults slightly emarginate, slightly forked, or lunate → **13**
- 4a.** Lateral-line scales 44 to 52; pectoral-fin rays 15 to 19; a series of prominent papillae along rear half of orbit → **5**
- 4b.** Lateral-line scales 53 to 64; pectoral-fin rays 18 to 22; papillae along rear half of orbit present or absent → **10**
- 5a.** Fourth to tenth dorsal-fin spines longest; 2 or 3 opercular spines → **6**
- 5b.** Third dorsal-fin spine longest; 3 opercular spines → **8**
- 6a.** Lateral-line scales 41 to 44; no auxiliary scales; 3 opercular spines; snout length 4.6 to 5.6 times in head length; caudal fin yellow, the upper and lower edges violet
. *Pseudanthias parvirostris*
- 6b.** Lateral-line scales 45 to 52; auxiliary scales present; 2 opercular spines; snout length 3.2 to 3.8 times in head length; caudal fin entirely violet or with yellow lobes → **7**
- 7a.** Lateral-line scales 45 to 49; pectoral-fin rays 15 to 17; females with a bright yellow band dorsally on body, and caudal-fin lobes broadly yellow *Pseudanthias tuka*
- 7b.** Lateral-line scales 48 to 52 (rarely 48); pectoral-fin rays 16 to 19; no yellow band on body, and no yellow on caudal fin *Pseudanthias pascalus*
- 8a.** Opercular spines 2; dorsal-fin rays 15; body lavender-pink with 2 red stripes dorsally, the lower as a series of contiguous blotches, and irregular yellow stripes on head which break up into rows of small yellow spots on side of body *Pseudanthias aurulentus*
- 8b.** Opercular spines 3; dorsal-fin rays 15 to 17; colour not as above → **9**
- 9a.** Lateral-line scales 44 to 48; body depth 3.1 to 3.3 times in standard length; body pink with small yellow spots dorsally, shading ventrally to pale lavender; yellow stripe near base of dorsal fin *Pseudanthias smithvanizi*
- 9b.** Lateral-line scales 49 to 52; body depth 3.4 to 4 times in standard length; body salmon pink, shading to pinkish white ventrally, with a row of red blotches dorsally (except anteriorly) and a broad red stripe along upper half of caudal peduncle *Pseudanthias lori*
- 10a.** No greatly elongated dorsal-fin spines (second dorsal-fin spine of males may be slightly elongate); 2 opercular spines; rear half of orbit with several papillae; dorsal fin primarily red *Pseudanthias dispar*
- 10b.** Second and/or third dorsal-fin spines of adults greatly elongate; 3 opercular spines; no orbital papillae; dorsal fin not primarily red → **11**

- 11a.** Second anal-fin spine slightly longer than third; second and third dorsal-fin spines elongated in adults (the 2 spines nearly equal and with yellow membranous tips in males); maximum number of preopercular serrae 36 (serrae increasing with size, in general); maximum total length about 15 cm *Pseudanthias bicolor*
- 11b.** Third anal-fin spine longer than second; second dorsal-fin spine elongated in adults (very long in males); maximum number of preopercular serrae 24; maximum total length about 9 cm. → **12**
- 12a.** Lateral-line scales 54 to 58; circumpeduncular scales 29 to 32; 3 to 5 irregular rows of small teeth on palatines at widest place; pelvic fins of large males not reaching past anal-fin base; dorsal and caudal fins yellow; head and body yellow dorsally, purple below *Pseudanthias bartlettorum*
- 12b.** Lateral-line scales 56 to 62; circumpeduncular scales 32 to 36; 2 irregular rows of teeth on palatines at widest place; pelvic fins of large males elongate, reaching past anal-fin base; females orange-yellow, becoming red posteriorly; males violet, with top of head and nape yellow *Pseudanthias regalis*
- 13a.** Anal-fin rays 9; first gill arch with 7 or 8 gill rakers on upper limb, 21 to 24 on lower limb; pelvic fins elongated, in males reaching past base of anal fin; females lavender-pink with broad yellow band dorsally on head and body and narrow magenta band across rear of interorbital area; fins yellow with magenta margins; males with dorsal yellow area invaded by lavender-magenta stripes and spots, and red and blue areas in dorsal and caudal fins *Pseudanthias ventralis*
(Central Pacific to Great Barrier Reef; subspecifically different in Hawaii)
- 13b.** Anal-fin rays 7 or 8; first gill arch with 8 to 12 gill rakers on upper limb, 22 to 29 on lower limb; pelvic fins of males not reaching past anal-fin base; colour not as above → **14**
- 14a.** Pectoral-fin rays 15; dorsal-fin rays 14; lateral-line scales 35 (39 other side); pale brown in alcohol with diffuse midlateral silvery stripe *Pseudanthias albofasciatus*
(1 specimen, 75 mm standard length, taken off Hong Kong in 114 m; not yet recorded from the area)
- 14b.** Pectoral-fin rays 16 to 20; dorsal-fin rays 15 to 18 (except *P. hutomoi* with 13 to 15 and *P. xanthomaculatus* with 14); lateral-line scales 38 to 54 → **15**
- 15a.** First dorsal-fin spine as long as second spine; females lavender-pink, shading to yellow posteriorly; median fins yellow; caudal fin of males orange, with large yellow elliptical spot in basal half *Pseudanthias pictilis*
- 15b.** First dorsal-fin spine distinctly shorter than second spine; caudal fin emarginate to lunate; colour not as above → **16**
- 16a.** Dorsal-fin rays 13 to 15 (modally 14) → **17**
- 16b.** Dorsal-fin rays 14 to 18 (none modally 14) → **18**
- 17a.** Eighth to thirteenth dorsal-fin rays with a single branch projecting as a short filament free of membrane; eye diameter 2.8 or more times in head length; body with 3 small white blotches dorsally, the first below last dorsal-fin spine; males develop a large irregular whitish area below rear dorsal-fin rays *Pseudanthias hutomoi*
- 17b.** Posterior dorsal-fin rays without free filamentous tips; eye diameter 2.6 times in head length; body rose with yellow blotch dorsally below middle of dorsal fin and another behind eye *Pseudanthias xanthomaculatus*
(1 specimen, 45 mm standard length, taken off New Caledonia in 200 m)
- 18a.** Third dorsal-fin spine of adults elongate, with a membranous filament at tip, 1.2 to 1.5 times in head length (spine of males, including filament, as long or longer than head length); dorsal profile of head of males straight; females orange, with dusky yellow spot on scales of upper two-thirds of body, the snout and chin yellow, the caudal fin yellow except orange at base and violet on outer edges of lobes; males fuchsia with 2 broad orange stripes, the dorsal, anal, and pelvic fins with a broad deep orange submarginal band (on anal fin only anteriorly) *Pseudanthias randalli*
- 18b.** Third dorsal-fin spine more than 1.5 times in head length; dorsal profile of head of males slightly to moderately convex; colour not as above → **19**

- 19a.** Lateral-line scales 38 to 43; dorsal-fin rays 15 or 16 → **20**
- 19b.** Lateral-line scales 41 to 54; dorsal-fin rays 16 to 18 → **21**
- 20a.** Body depth 3.2 times in standard length; pectoral-fin rays 18 or 19; first gill arch with 12 gill rakers on upper limb, 26 on lower limb; body orange-red anteriorly, shading to yellow posteriorly and on caudal fin; narrow rose band from snout to subopercle . . . *Pseudanthias cichlops*
(1 specimen, 72 mm standard length, from Sumatra)
- 20b.** Body depth 2.6 to 2.9 times in standard length; pectoral-fin rays 17 or 18; first gill arch with 9 to 11 gill rakers on upper limb, 22 to 25 on lower limb; pinkish orange with a pale yellow stripe, edged in violet, from front of upper lip through lower part of eye to pectoral-fin base *Pseudanthias lunulatus*
- 21a.** Third dorsal-fin spine clearly longest (at least in males and large females) → **22**
- 21b.** Third dorsal-fin spine not elongated (may be equal to longest spine) → **26**
- 22a.** Females with midlateral lavender-edged orange-red band from eye to caudal fin, body below band with alternating yellow and lavender-pink lines along scale rows, fins yellow; males yellowish, the front third of body reddish; soft dorsal, anal, and caudal fins with blue margin; lavender-edged red band from eye to pectoral-fin base; lateral-line scales 41 to 45; maximum size about 21 cm *Pseudanthias fasciatus*
- 22b.** Colour not as above; lateral-line scales 42 to 50; maximum size 15 cm → **23**
- 23a.** Lateral-line scales 42 to 45; pectoral-fin rays 17; lower limb of first gill arch with 24 or 25 gill rakers; body lavender-pink, the scale centres yellow; fins pale lavender, suffused with yellow *Pseudanthias engelhardi*
- 23b.** Lateral-line scales 44 to 50; pectoral-fin rays 17 to 19; lower limb of first gill arch with 24 to 29 gill rakers; body and/or fins with distinctive colour pattern, at least in males → **24**
- 24a.** Pelvic fins not reaching anal fin; dorsal-fin rays 15 to 17; lateral-line scales 44 to 48; lower limb of first gill arch with 24 to 27 gill rakers; female pale orange-red, the scale centres yellow to dusky yellow, the fins pale yellow; male with yellow-orange lines or rows of spots along dorsal scale rows of body, red spot in rear part of spinous dorsal fin, and broad red border on caudal fin *Pseudanthias luzonensis*
- 24b.** Pelvic fins reaching to or beyond anal-fin origin; dorsal-fin rays 16 to 18; lateral-line scales 45 to 50; lower limb of first gill arch with 25 to 29 gill rakers; colour not as above → **25**
- 25a.** Body of females yellow, the scale edges magenta, with 2 magenta lines from eye to pectoral-fin base thence to lower caudal peduncle; males orange-magenta with a large, nearly square, lavender blotch on side of body preceded by a broad orange band curving dorsally to nape *Pseudanthias pleurotaenia*
- 25b.** Coloration of females similar as above, but lighter yellow, and ventral part of body pale lavender; males also similarly coloured, but no lavender blotch on body *Pseudanthias sheni*
- 26a.** Lateral-line scales 50 to 54; female brownish yellow, shading to pale lavender ventrally, the scale centres pink, the dorsal-fin margin broadly lavender-pink; male lavender-orange, with narrow orange bar below eighth dorsal-fin spine between pectoral fins and lateral line *Pseudanthias mooreanus*
- 26b.** Lateral-line scales 43 to 50; colour not as above → **27**
- 27a.** Female with emarginate caudal fin, the caudal concavity 4 to 6 times in head length, the rear margin red; caudal fin of male convex to truncate, pink, shading distally to red, the corners lavender; male with red spot between seventh and tenth dorsal-fin spines; maximum length 19 cm *Pseudanthias hypselosoma*
- 27b.** Caudal fin emarginate to lunate, the caudal concavity 1 to 5 times in head length; colour not as above; maximum length about 16 cm → **28**

- 28a.** Dorsal-fin rays 15 or 16; caudal fin emarginate, the caudal concavity 2.3 to 4.6 times in head length; body depth 2.4 to 2.9 times in standard length; female pink, the scale centres yellow, forming irregular oblique lines on upper rear part of body; median fins yellow; male lavender-pink, the scales edged with orange (especially dorsally), the body ventrally with faint yellow stripes; caudal fin with irregular bars of orange-yellow and violet, the corners violet-blue with yellow tips; dorsal fin with a dark red spot on fourth and fifth interspinous membranes *Pseudanthias bimaculatus*
- 28b.** Dorsal-fin rays 16 to 18; caudal fin emarginate to lunate, the concavity 0.8 to 2.6 times in head length; body depth 2.7 to 3.2 times in standard length; colour not as above → 29
- 29a.** Last dorsal-fin spine usually longest (but fourth to last subequal); lateral-line scales 46 to 52; scales dusky yellow and lavender-pink; pale lavender line from below eye to lower pectoral-fin base; head and chest below this line whitish to lavender; first 4 dorsal-fin membranes fuchsia with broad oblique orange band (more evident in males); males with orange-red bar below lateral line and under ninth dorsal-fin spine; caudal-fin tips of females bright red; caudal fin of male largely red, the filamentous tips yellow and lavender *Pseudanthias cooperi*
- 29b.** Fourth dorsal-fin spine longest (but adjacent spines nearly as long); lateral-line scales 42 to 49; colour not as above → 30
- 30a.** No auxiliary scales; dorsal-fin rays 16; lateral-line scales 42 to 47; female pink with yellow spot or line on each scale, shading ventrally to whitish; rear edge of caudal fin narrowly red, this colour broadening onto pointed lobe tips; male with a lavender-edged red bar from below last 4 dorsal-fin spines to beneath pectoral fins, the body anterior to bar, lavender-pink, posterior to bar, yellow shading dorsally to lavender-pink; caudal fin yellow, upper and lower edges lavender, the lobe tips red *Pseudanthias rubrizonatus*
- 30b.** Auxiliary scales present on body; dorsal-fin rays 17 or 18; lateral-line scales 44 to 49; female olive-grey, with irregular horizontal rows of small orange-yellow spots laterally and ventrally; front of snout and chin reddish orange; dorsal fin orange-red distally; caudal fin yellow; male dark olive-grey with 3 orange squares in a row on front half of body, followed by horizontal series of small orange spots; caudal fin yellow with orange lobes edged with blue distally; dark red (almost black) spot distally in upper part of pectoral fins *Pseudanthias olivaceus*

Key to the species of *Pseudogramma* occurring in the area

- 1a.** Dermal tentacle on upper surface of eye; rows of red dots extending posteriorly from eye and forming a circle opercular ocellus *Pseudogramma australis*
- 1b.** No tentacle on top of eye; no rows of red dots behind eye → 2
- 2a.** Pectoral-fin rays 13, the middle rays unbranched; caudal-peduncle length (from anal-fin base to caudal-fin base) 6.2 to 6.9 times in head length; first gill arch with 10 gill rakers on lower limb → 3
- 2b.** Pectoral-fin rays 14 to 18, the rays branched except upper and lowermost rays of some specimens; caudal-peduncle length 4.3 to 5.5 times in head length; first gill arch with 10 to 13 gill rakers on lower limb → 4
- 3a.** Lateral scale series 43; pectoral-fin length 3.3 times in standard length; anal-fin rays 17; body red, with pale pink blotches *Pseudogramma erythreum*
- 3b.** Lateral scale series 52 or 53; pectoral-fin length 2.6 to 2.9 times in standard length; anal-fin rays 18 or 19; body yellow, with a faint brown reticulum *Pseudogramma pectoralis*
- 4a.** Dark brown spot on opercle; lateral-line scales of adults 31 to 41; rear ends of dorsal and anal fins not reaching past vertical at caudal-fin base; pectoral fins not reaching vertical at anal-fin origin *Pseudogramma polyacantha*
- 4b.** No dark spot on opercle; lateral-line scales 21 to 26; rear ends of dorsal and anal fins project well past vertical at caudal-fin base; pectoral fins reaching past anal-fin origin *Pseudogramma astignum*

Key to the species of *Sacura* occurring in the area

- 1a. Dorsal fin with X spines and 14 soft rays; body depth 2.2 to 2.3 times and pectoral fins 2.7 to 2.9 times in standard length *Sacura parva*
(2 specimens, 17 and 67 mm standard length, taken in Timor Sea in 130 m)
- 1b. Dorsal fin with X spines and 15 soft rays; body depth 2.0 to 2.1 times and pectoral fins 2.3 to 2.5 times in standard length *Sacura speciosa*
(1 specimen, 95 mm, off Sulawesi in 150 m)

Key to the species of *Selenanthias* occurring in the area

- 1a. Bony interorbital space wide, 3.4 to 3.8 times in head length; lower limb of first gill arch with 19 to 21 gill rakers; large black spot at rear of anal fin *Selenanthias analis*
- 1b. Interorbital width 4.3 to 5.0 times in head length; lower limb of first gill arch with 22 to 24 gill rakers; no black spot in anal fin → 2
- 2a. Body depth about 2.7 times in standard length; interorbital width 4.7 to 5.0 times in head length; oblique rows of large cheek scales 7; body rose, with dark orange spot at base of last 4 dorsal-fin spines; head orange, with oblique rose band across cheek . . . *Selenanthias barroi*
- 2b. Body depth 2.3 to 2.6 times in standard length; interorbital width 4.3 to 4.5 times in head length; cheek scale rows 6; life colour unknown *Selenanthias myersi*

Key to the species of *Variola* occurring in the area

- 1a. Rear margin of caudal fin with a black submarginal line and narrow white edge; dorsal, anal, and pectoral fins without a distinct yellow posterior border; 13 to 16 gill rakers on lower limb of first gill arch; pelvic fins usually not reaching anus; juveniles without a dark stripe on body dorsally and no dark spot at base of upper caudal-fin rays . . . *Variola albimarginata*
- 1b. Caudal, dorsal, anal, and pectoral fins with a broad yellow rear margin; 15 to 18 gill rakers on lower limb of first gill arch; pelvic fins reach beyond anus; juveniles with irregular dark brown stripe along dorsal part of body and a dark spot at base of upper caudal-fin rays *Variola louti*

List of species occurring in the area

The symbol ← is given when species accounts are included. A question mark indicates that presence in the area is uncertain.

Subfamily ANTHIINAE

- Acanthistius ocellatus* (Günther, 1859)
- Caprodon schlegelii* (Günther, 1859)^{1/}
- Dactylanthias haplodactylus* (Bleeker, 1858)^{2/}
- Holanthias borbonius* (Valenciennes, 1828)
- Holanthias chrysostictus* (Günther, 1871)
(= *Holanthias katayamai* Randall, Maugé, and Plessis, 1979)
- Holanthias rhodopeplus* (Günther, 1871)
- Holanthias tapui* Randall, Maugé, and Plessis, 1979
- Holanthias unimaculatus* (Tanaka, 1917)
- Hypoplectrodes annulatus* (Günther, 1859)
- Hypoplectrodes jamesoni* (Ogilby, 1908)
- Hypoplectrodes maccullochi* Whitley, 1929
- Luzonichthys earlei* Randall, 1981
- Luzonichthys taeniatus* Randall and McCosker, 1992
- Luzonichthys waitei* (Fowler, 1931)
- Luzonichthys whitleyi* (Smith, 1955)
- Luzonichthys williamsi* Randall and McCosker, 1992

1/ Not yet known from the area, but should be expected; occurs in New South Wales at 31°51'S, Western Australia at 24°25'S, Taiwan Province of China, and Hawaii.

2/ Known from a single specimen (17 cm standard length) from Ambon, Indonesia.

- Plectranthias anthioides* (Günther, 1871)
 (= *Plectranthias kamii* Randall, 1980)
Plectranthias cirrhitooides Randall, 1980
Plectranthias foresti Fourmanoir, 1977
Plectranthias fourmanoiri Randall, 1980
Plectranthias inermis Randall, 1980
Plectranthias japonicus (Steindachner, 1884)
Plectranthias jothyi Randall, 1996
Plectranthias kelloggi (Jordan and Evermann, 1903)
Plectranthias knappi Randall, 1996
Plectranthias lasti Randall and Hoese, 1995
Plectranthias longimanus (Weber, 1913)
Plectranthias megalepis (Günther, 1880)
Plectranthias megalophthalmus (Fourmanoir and Randall, 1979)
Plectranthias nanus Randall, 1980
Plectranthias pallidus Randall and Hoese, 1980
Plectranthias retrofasciatus Randall and Fourmanoir, 1979
Plectranthias robertsi Randall and Hoese, 1980
Plectranthias rubrifasciatus Randall and Fourmanoir, 1979
Plectranthias sagamiensis (Katayama, 1963)
Plectranthias taylori Randall, 1980
Plectranthias wheeleri Randall, 1980
Plectranthias whiteheadi Randall, 1980
 (= *Plectranthias chungchowensis* Shen and Lin, 1984)
Plectranthias winniensis (Tyler, 1966)
- ? *Pseudanthias albofasciatus* (Fowler and Bean, 1930)
Pseudanthias aurulentus Randall and McCosker, 1981
Pseudanthias bartlettorum Randall and Lubbock, 1981
Pseudanthias bicolor Randall, 1979
Pseudanthias bimaculatus (Smith, 1955)
Pseudanthias cichlops (Bleeker, 1853)
Pseudanthias cooperi (Regan, 1902)
 (= *Anthias kashiwae* Tanaka, 1918)
Pseudanthias dispar (Herre, 1955)
Pseudanthias fasciatus (Kamohara, 1954)
 (= *Anthias rubrolineatus* Fourmanoir and Rivaton, 1979)
Pseudanthias huchtii (Bleeker, 1857)
Pseudanthias hutomoi (Allen and Burhanuddin, 1976)
Pseudanthias hypselosoma Bleeker, 1878
 (= *Anthias truncatus* Katayama and Masuda, 1983)
Pseudanthias lori Randall and Lubbock, 1981
Pseudanthias luzonensis (Katayama and Masuda, 1983)
Pseudanthias mooreanus (Herre, 1935)
Pseudanthias olivaceus Randall and McCosker, 1981
Pseudanthias parvirostris Randall and Lubbock, 1981
Pseudanthias pascalus (Jordan and Tanaka, 1927)
Pseudanthias pictilis (Randall and Allen, 1978)
Pseudanthias pleurotaenia (Bleeker, 1857)
Pseudanthias randalli (Lubbock and Allen, 1978)
Pseudanthias regalis Randall and Lubbock, 1981
Pseudanthias rubrizonatus Randall, 1983
Pseudanthias sheni Randall and Allen, 1989
Pseudanthias smithvanizi Randall and Lubbock, 1981
Pseudanthias squamipinnis (Peters, 1855)
Pseudanthias tuka (Herre and Montalban, 1927)
Pseudanthias ventralis Randall, 1979
Pseudanthias xanthomaculatus (Fourmanoir and Rivaton, 1979)
- Rabaulichthys altipinnis* Allen, 1984

- Sacura parva* Heemstra and Randall, 1979
Sacura speciosa Heemstra and Randall, 1979
Selenanthias analis Tanaka, 1918
 (= *Plectranthias maculatus* Fourmanoir, 1982)
Selenanthias barroii (Fourmanoir, 1982)
Selenanthias myersi Randall, 1995
Serranocirrhitis latus Watanabe, 1949
Tosana niwae Smith and Pope, 1906
Tosanoides flavofasciatus Katayama and Masuda, 1980

Subfamily EPINEPHELINAE

Tribe EPINEPHELINI

- *Aethaloperca rogae* (Forsskål, 1775)
 ➤ *Anyperodon leucogrammicus* (Valenciennes, 1828)
 ➤ *Cephalopholis aitha* Randall and Heemstra, 1991
 ➤ *Cephalopholis argus* Bloch and Schneider, 1801
 ➤ *Cephalopholis aurantia* (Valenciennes, 1828)
 ➤ *Cephalopholis boenak* (Bloch, 1790)
 ➤ *Cephalopholis cyanostigma* (Valenciennes, 1828)
 ➤ *Cephalopholis formosa* (Shaw and Nodder, 1812)
 ➤ *Cephalopholis igarashiensis* Katayama, 1957
 ➤ *Cephalopholis leopardus* (Lacepède, 1801)
 ➤ *Cephalopholis microprion* (Bleeker, 1852)
 ➤ *Cephalopholis miniata* (Forsskål, 1775)
 ➤ *Cephalopholis polleni* (Bleeker, 1868)
 ➤ *Cephalopholis sexmaculata* (Rüppell, 1830)
 ➤ *Cephalopholis sonnerati* (Valenciennes, 1828)
 ➤ *Cephalopholis spiloparaea* (Valenciennes, 1828)
 ➤ *Cephalopholis urodeta* (Bloch and Schneider, 1801)
 ➤ *Cromileptes altivelis* (Valenciennes, 1828)
 ➤ ? *Epinephelus akaara* (Temminck and Schlegel, 1842)
 ➤ *Epinephelus amblycephalus* (Bleeker, 1857)
 ➤ *Epinephelus areolatus* (Forsskål, 1775)
 ➤ *Epinephelus awoara* (Temminck and Schlegel, 1842)
 ➤ *Epinephelus bilobatus* Randall and Allen, 1987
 ➤ *Epinephelus bleekeri* (Vaillant, 1877)
 ➤ *Epinephelus bontoides* (Bleeker, 1855)
 ➤ *Epinephelus bruneus* Bloch, 1793
 ➤ *Epinephelus caeruleopunctatus* (Bloch, 1790)
 ➤ *Epinephelus chlorostigma* (Valenciennes, 1828)
 ➤ *Epinephelus coioides* (Hamilton, 1822)
 ➤ *Epinephelus corallicola* (Valenciennes, 1828)
 ➤ *Epinephelus cyanopodus* (Richardson, 1846)
 ➤ *Epinephelus daemeli* (Günther, 1876)
 ➤ *Epinephelus darwinensis* Randall and Heemstra, 1991
 ➤ *Epinephelus epistictus* (Temminck and Schlegel, 1842)
 ➤ *Epinephelus ergastularius* Whitley, 1930
 ➤ *Epinephelus erythrurus* (Valenciennes, 1828)
 ➤ *Epinephelus fasciatomaculosus* (Peters, 1866)
 ➤ *Epinephelus fasciatus* (Forsskål, 1775)
 ➤ *Epinephelus faveatus* (Valenciennes, 1828)
 ➤ *Epinephelus fuscoguttatus* (Forsskål, 1775)
 ➤ *Epinephelus heniochus* Fowler, 1904
 ➤ *Epinephelus hexagonatus* (Forster, 1801)
 ➤ *Epinephelus howlandi* (Günther, 1873)

- ✦ *Epinephelus irroratus* (Forster, 1901)
- ✦ *Epinephelus lanceolatus* (Bloch, 1790)
- ✦ *Epinephelus latifasciatus* (Temminck and Schlegel, 1842)
- ✦ *Epinephelus longispinis* (Kner, 1864)
- ✦ *Epinephelus macrospilos* (Bleeker, 1855)
- ✦ *Epinephelus maculatus* (Bloch, 1790)
- ✦ *Epinephelus magniscuttis* Postel, Fourmanoir, and Guézé, 1963
- ✦ *Epinephelus malabaricus* (Bloch and Schneider, 1801)
- ✦ *Epinephelus melanostigma* Schultz, 1953
- ✦ *Epinephelus merra* Bloch, 1793
- ✦ *Epinephelus miliaris* (Valenciennes, 1830)
- ✦ *Epinephelus morrhua* (Valenciennes, 1833)
- ✦ *Epinephelus multinotatus* (Peters, 1876)
- ✦ *Epinephelus octofasciatus* Griffin, 1926
- ✦ *Epinephelus ongus* (Bloch, 1790)
- ✦ *Epinephelus perplexus* Randall, Last, and Hoese, 1991
- ✦ *Epinephelus poecilonotus* (Temminck and Schlegel, 1842)
- ✦ *Epinephelus polypekadion* (Bleeker, 1849)
- ✦ *Epinephelus polystigma* (Bleeker, 1853)
- ✦ *Epinephelus quoyanus* (Valenciennes, 1830)
- ✦ *Epinephelus radiatus* (Day, 1867)
- ✦ *Epinephelus retouti* Bleeker, 1868
- ✦ *Epinephelus rivulatus* (Valenciennes, 1830)
- ✦ *Epinephelus sexfasciatus* (Valenciennes, 1828)
- ✦ *Epinephelus socialis* (Günther, 1873)
- ✦ *Epinephelus spilotoceps* Schlultz, 1953
- ✦ *Epinephelus stictus* Randall and Allen, 1967
- ✦ *Epinephelus tauvina* (Forsskål, 1775)
- ✦ *Epinephelus timorensis* Randall and Allen, 1987
- ? *Epinephelus trimaculatus* (Valenciennes, 1828)
- ✦ *Epinephelus trophis* Randall and Allen, 1987
- ✦ *Epinephelus tuamotuensis* Fourmanoir, 1971
- ✦ *Epinephelus tukula* Morgans, 1959
- ✦ *Epinephelus undulatostratus* (Peters, 1867)
- ✦ *Epinephelus undulosus* (Quoy and Gaimard, 1824)
- ✦ *Gracila albomarginata* (Fowler and Bean, 1930)
- ✦ *Plectropomus areolatus* (Rüppell, 1830)
- ✦ *Plectropomus laevis* (Lacepède, 1801)
- ✦ *Plectropomus leopardus* (Lacepède, 1802)
- ✦ *Plectropomus maculatus* (Bloch, 1790)
- ✦ *Plectropomus oligacanthus* Bleeker, 1854
- ✦ *Plectropomus pessuliferus* Fowler, 1904
- ✦ *Saloptia powelli* Smith, 1964
- ✦ *Triso dermopterus* (Temminck and Schlegel, 1842)
- ✦ *Variola albimarginata* Baissac, 1952
- ✦ *Variola louti* (Forsskål, 1775)

Tribe NIPHONINI

- ✦ *Nippon spinosus* Cuvier, 1828

Tribe LIOPROPOMATINI

- Liopropoma collettei* Randall and Taylor, 1988
- Liopropoma erythraeum* Randall and Taylor, 1988
- Liopropoma flavidum* Randall and Taylor, 1988
- Liopropoma incomptum* Randall and Taylor, 1988
- Liopropoma lunulatum* (Guichenot, 1862)
- Liopropoma mitratum* Lubbock and Randall, 1978
- Liopropoma multilineatum* Randall and Taylor, 1988

Liopropoma pallidum (Fowler, 1938)
Liopropoma susumi (Jordan and Seale, 1906)
Liopropoma swalesi Fowler and Bean, 1930
Liopropoma tonstrinum Randall and Taylor, 1988

Rainfordia opercularis McCulloch, 1923

Tribe DIPLOPRIONI

Aulacocephalus temmincki Bleeker, 1857

Belonoperca chabanaudi Fowler and Bean, 1930

Diploprion bifasciatum Kuhl and van Hasselt, 1828

Tribe GRAMMISTINI

Aporops bilinearis Schultz, 1943

Grammistes sexlineatus (Thunberg, 1792)

Grammistops ocellatus Schultz, 1953

Pogonoperca punctata Valenciennes, 1830)

Pseudogramma astigmum Randall and Baldwin, 1997

Pseudogramma australis australis Randall and Baldwin, 1997

Pseudogramma erythreum Randall and Baldwin, 1997

Pseudogramma pectoralis Randall and Baldwin, 1997

Pseudogramma polyacantha (Bleeker, 1856)

Suttonia lineata Gosline, 1960

Subfamily SERRANINAE

Chelidoperca hirundinacea (Valenciennes, 1831)

Chelidoperca margaritifera Weber, 1913

Chelidoperca pleurospilos (Günther, 1860)

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Subfamily EPINEPHELINAE

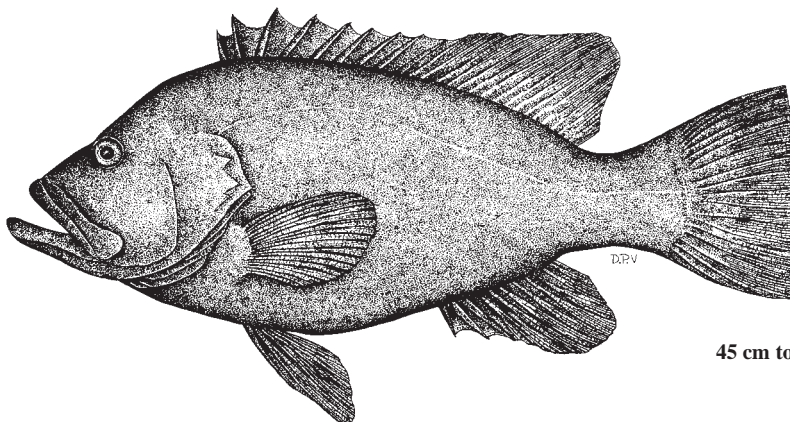
Tribe EPINEPHELINI

Aethaloperca rogae (Forsskål, 1775)

(Plate I, 1)

Frequent synonyms / misidentifications: *Cephalopholis rogae* (Forsskål, 1775) / None (rarely misidentified).

FAO names: En - Redmouth grouper; Fr - Vielle roga; Sp - Cherna roga.

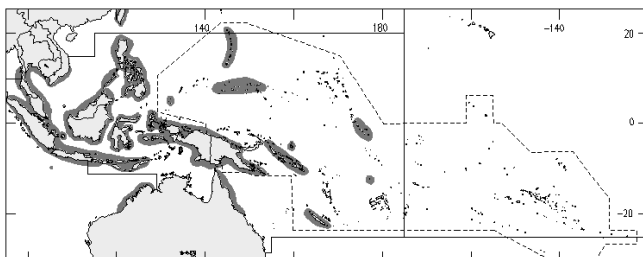


Diagnostic characters: Body deep and compressed, its depth greater than head length and 2.1 to 2.4 times in standard length; body width 2.3 to 2.8 times in body depth; head length 2.5 to 2.75 times in standard length. Dorsal head profile steep, straight, or slightly concave along snout and distinctly convex from eye to dorsal fin; preorbital depth 6.5 to 9.2 times in head length; preopercle finely serrate, the lower edge fleshy; rear nostrils round or oval, not much larger than front ones. Maxilla reaches past eye; small canines at front of jaws, none elsewhere; 2 to 4 rows of small slender teeth at side of lower jaw; palatine teeth present; ventroposterior corner of maxilla with a distinct bony protuberance; supramaxilla slender. First gill arch with 8 to 10 gill rakers on upper limb, 15 to 17 on lower limb; longest raker slightly longer than longest gill filaments. Dorsal fin with IX spines and 17 or 18 soft rays, the fin origin over opercle, and the third or fourth spines longest; dorsal-fin membranes slightly incised between the spines; anal fin with III spines and 8 or 9 soft rays; middle dorsal and anal-fin rays elongated in adults, giving these fins an angular profile, with the rear margin almost vertical; caudal fin truncate, with 8 branched rays in upper lobe and 7 in lower lobe; pectoral fins asymmetric, with 17 to 19 rays; pelvic fins subequal to pectoral fins, extending beyond anus. Scales on body rough, with auxiliary scales; lateral-line scales 48 to 54; lateral scale series 94 to 104. **Colour:** dark brown to black, occasionally with an orange cast, usually with a pale vertical bar on side of abdomen; distal part of spinous dorsal fin dark orange to brownish red; inside of mouth, gill cavity and upper jaw membranes reddish orange. Juveniles with a broad white posterior margin on caudal fin and a narrow white margin on soft dorsal fin.

Size: Maximum total length 60 cm.

Habitat, biology, and fisheries: Well-developed coral reefs in depths of 3 to at least 60 m. Usually seen in or near caves and holes in the reef. Small fishes (including *Pempheris* sp., a common cave dweller) are the primary food of this species, and it also feeds on stomatopods (*Pseudosquilla* sp.). Preliminary data indicate that it spawns at any time of the year and matures (females?) at a length of about 35 cm standard length. Occasionally seen in markets, but this species is not common. Caught with hook-and-line, spear, and probably in traps.

Distribution: Red Sea to South Africa and east to the Gilbert Islands in the Central Pacific; including Thailand, Japan, Philippines, Indonesia, Australia, Papua New Guinea, Palau, as well as Solomon, Caroline, and Gilbert islands.

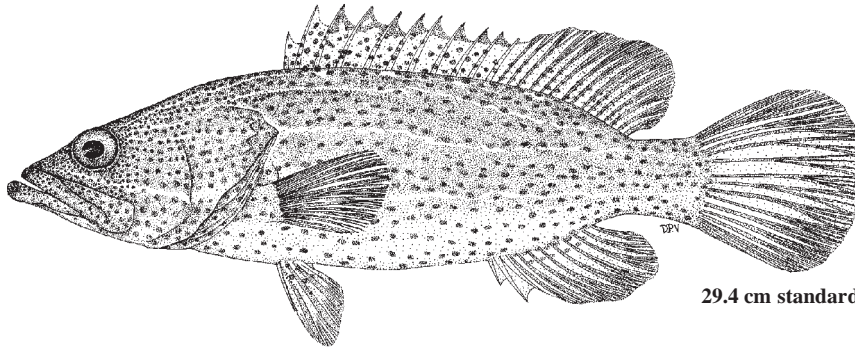


Anyperodon leucogrammicus (Valenciennes, 1828)

(Plate I, 2)

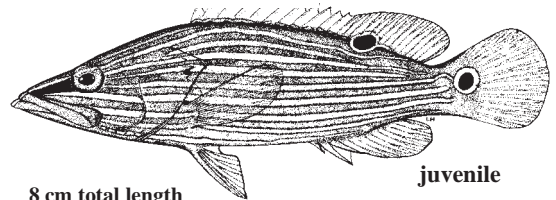
Frequent synonyms / misidentifications: *Serranus micronotatus* Rüppell, 1830; *S. urophthalmus* Bleeker, 1855 / None.

FAO names: En - Slender grouper; Fr - M rou  l gant; Sp - Mero elegante.



29.4 cm standard length

Diagnostic characters: Body and head elongate and markedly compressed, its depth distinctly less than head length, 3.1 to 3.7 times in standard length; body width 2.3 to 2.8 times in body depth. Head pointed, its length 2.3 to 2.5 times in standard length; dorsal head profile almost straight, the interorbital region slightly concave, flat or slightly convex; preorbital narrow, its depth 14 to 17 times in head length; preopercle rounded, finely serrate, the lower serrae only slightly enlarged, the lower edge fleshy; ventral edge of interopercle with a shallow indentation; upper edge of operculum distinctly convex; diameter of rear nostrils about twice that of anteriors. Maxilla reaches well past eye, the exposed part covered with tiny scales; **no teeth on palatines**; canines at front of jaws rudimentary or absent; teeth at sides of lower jaw subequal, in 2 or 3 irregular rows; no bony process on rear end of maxilla; supramaxilla well developed. First gill arch with 7 to 9 gill rakers on upper limb, 14 to 17 on lower limb; rakers subequal to gill filaments in length. Dorsal fin with XI spines and 14 to 16 soft rays, the fin origin over the opercle, the membranes distinctly incised between the spines; anal fin with III spines and 8 or 9 soft rays; caudal fin rounded, with 8 branched rays in upper lobe and 7 in lower lobe; pectoral fins short, thin, transparent, and symmetrical, with 15 to 17 rays; pelvic fins not reaching anus. Midlateral body scales rough; lateral-line scales 61 to 72; lateral scale series 106 to 125; auxiliary scales present on body scales. **Colour:** adults greenish to brownish grey with numerous orange-red spots on head (becoming smaller anteriorly), body, dorsal fin, and basally on caudal fin; 4 longitudinal whitish bands or series of streaks often visible on postorbital head and body; membranes of soft dorsal, anal, and caudal fins clear. Juveniles with longitudinal pale bluish grey stripes on a gold background; a blue-edged black spot (or double spot) at base of caudal fin and another at base of soft dorsal fin.



8 cm total length

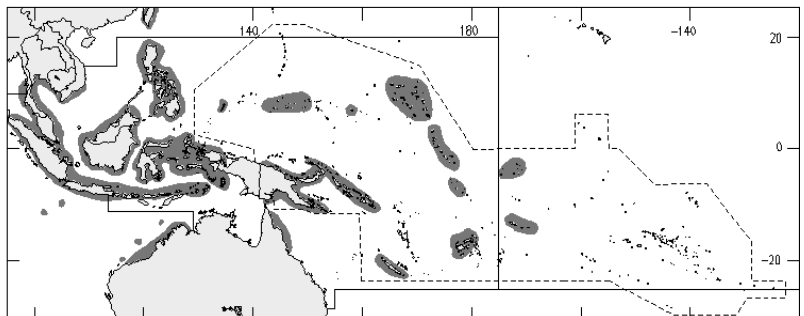
juvenile

(from Randall and Kuitert, 1989)

Size: Maximum total length at least 60 cm.

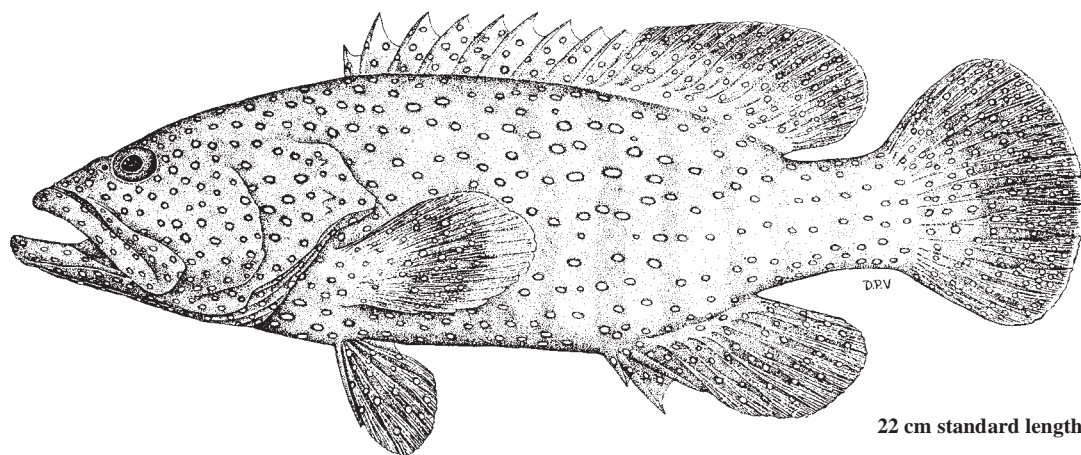
Habitat, biology, and fisheries: A coral-reef species usually found on protected reefs in depths of 5 to 80 m. Adults primarily piscivorous. The distinctive blue and gold striped juveniles are mimics of the wrasse *Halichoeres purpurascens* (Bloch and Schneider, 1801). Often seen in markets but not plentiful enough to be of commercial importance. Caught with hook-and-line, spear, and probably in traps.

Distribution: Red Sea to Mozambique and east to Samoa and the Phoenix Islands; including Japan, Philippines, Indonesia, Australia, and Papua New Guinea.



Cephalopholis argus Bloch and Schneider, 1801

(Plate I, 3)

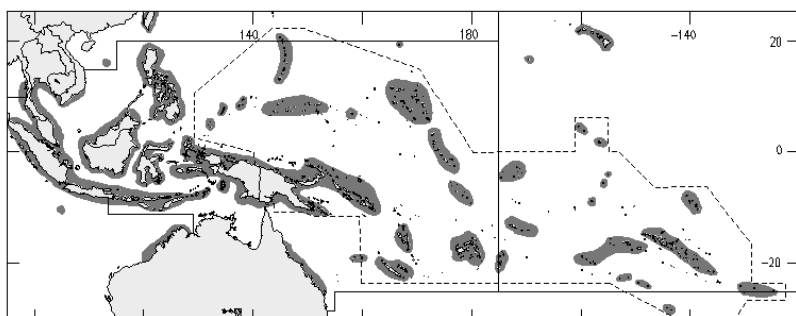
Frequent synonyms / misidentifications: None / *Cephalopholis cyanostigma* (non Valenciennes, 1828).**FAO names:** En - Peacock hind; Fr - Vielle ciosoer; Sp - Cherna pavo real.

Diagnostic characters: Body depth distinctly less than head length, 2.7 to 3.2 times in standard length (for specimens 10 to 40 cm standard length); head length 2.4 to 2.7 times in standard length. Eye small, its diameter distinctly less than snout length; interorbital area flat to slightly convex; preopercle rounded, finely serrate in young, virtually smooth in large adults, the lower edge fleshy; subopercle and interopercle smooth. Maxilla scaly, reaching well past eye. First gill arch with 9 to 11 gill rakers on upper limb, 17 to 19 on lower limb; rudimentary rakers on lower limb difficult to distinguish from intercalated bony plates. **Dorsal fin with IX spines and 15 to 17 soft rays, the membranes indented between the spines; anal fin with III spines and 9 soft rays; pectoral-fin rays 16 to 18; pectoral fins clearly longer than pelvic fins, 1.4 to 2.0 times in head length; pelvic fins not reaching anus, 1.9 to 2.4 times in head length; caudal fin well rounded. Lateral body scales rough, with a few auxiliary scales in adults; lateral-line scales 46 to 51; lateral scale series 95 to 110. Colour: dark brown, covered with small black-edged blue ocelli; often with 5 or 6 pale bars on rear part of body and a large pale area over the chest; rear margin of median fins usually with a narrow white edge; distal part of pectoral fins sometimes maroon brown; triangular membranes at tips of dorsal-fin spines orange-gold.**

Size: Maximum total length 55 cm.

Habitat, biology, and fisheries: A common tropical species found in a variety of coral reef habitats from tide pools to depths of at least 40 m. In the Gulf of Aqaba, *Cephalopholis argus* is found in social units comprising up to 12 adults, including 1 dominant male. Each group occupies a specific area (up to 2 000 m²) that is defended by the territorial male and subdivided into secondary territories, each inhabited by a single female. Primarily (75 to 95%) piscivorous, *C. argus* has been blamed for numerous cases of ciguatera in the Pacific region. This common and widespread species is important to artisanal fisheries throughout the Indo-West Pacific region. Caught with hook-and-line, spear, and in traps.

Distribution: *C. argus* is the most widely distributed of the groupers, occurring from the Red Sea to South Africa and east to French Polynesia and the Pitcairn Group, including Japan, northern Australia, Lord Howe Island, Marquesas, and throughout Micronesia. Recently introduced to Hawaii.

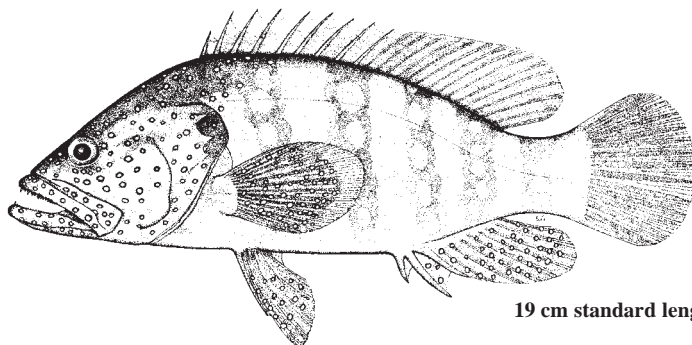


Cephalopholis cyanostigma (Valenciennes, 1828)

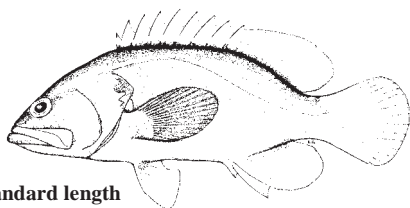
(Plate I, 4)

Frequent synonyms / misidentifications: *Cephalopholis kendalli* Evermann and Seale, 1907; *C. xanthopterus* Allen and Stark, 1975 / *Cephalopholis miniata* (non Forsskål, 1775); *C. argus* non Bloch and Schneider, 1801; *C. microprius* (non Bleeker, 1852).

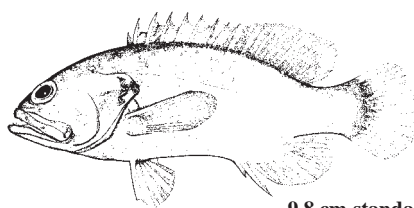
FAO names: En - Bluespotted hind; Fr - Vielle étoiles bleues; Sp - Cherna de pintas azules.



19 cm standard length



9.3 cm standard length



juveniles

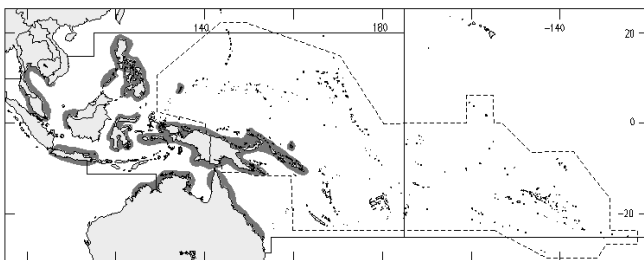
9.8 cm standard length

Diagnostic characters: Body somewhat compressed, its width 2.0 to 2.3 times in body depth; body depth less than head length, 2.6 to 3.0 times in standard length (for specimens 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. First gill arch with 7 to 9 gill rakers on upper limb, 14 to 18 on lower limb. **Dorsal fin with IX spines and 15 to 17 soft rays**, the fin membrane indented between the spines; **anal fin with III spines and 8 soft rays**; caudal fin well rounded; pectoral-fin rays 15 to 18, the fin length distinctly longer than pelvic-fin length, 1.5 to 1.8 times in head length; pelvic fins usually not reaching anus, 1.8 to 2.1 times in head length. Body scales rough, 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 two-thirds of pectoral fins with blue ocelli becoming smaller distally, the distal part of fin orange-yellow with a blackish edge or white edge and black submarginal line; median fins darker than body, the rear 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.

Size: Maximum total length 30 cm.

Habitat, biology, and fisheries: Coral reefs and seagrass and algal beds at depths of 1 to 50 m. Feeds on crustaceans and fishes. Probably of importance to artisanal fisheries. Caught with hook-and-line, gill nets, spear, and in traps.

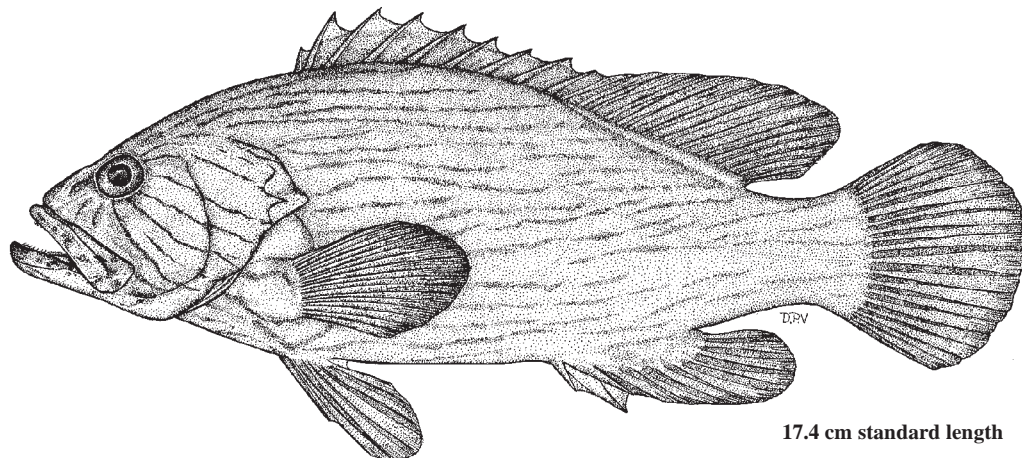
Distribution: Tropical western Pacific, including Philippines, Thailand, Indonesia, Papua New Guinea, Palau, New Britain, Solomon Islands, and north coast of Australia from Dampier Islands off Western Australia to Capricorn Islands of the southern Great Barrier Reef.



Cephalopholis formosa (Shaw and Nodder, 1812)

Frequent synonyms / misidentifications: None / "*Cephalopholis boelang*" (Valenciennes, 1828); *C. boenak* (non Bloch, 1790).

FAO names: En - Bluelined hind; Fr - Vielle lignes bleues; Sp - Cherna rayada.

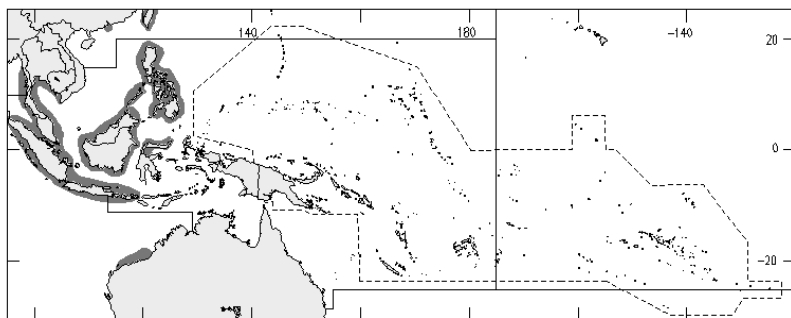


Diagnostic characters: Body depth 2.5 to 2.9 times in standard length (for specimens 10 to 26 cm standard length); head length 2.4 to 2.6 times in standard length. **Preorbital depth 3.6 to 4.3% of standard length, more than 1/2 maxilla width.** Interorbital area convex; preopercle rounded, finely serrate, the lower edge fleshy; subopercle and interopercle smooth; maxilla naked, reaching to or just past vertical at rear edge of eye. First gill arch with 8 to 10 gill rakers on upper limb, 14 to 18 on lower limb. Dorsal fin with IX spines and 15 to 17 soft rays, the membranes indented between the spines; **anal fin with III spines and 8 (rarely 7) soft rays, the second spine 12 to 14% of standard length, not reaching past tip of third spine;** caudal fin well rounded; pectoral-fin rays 16 to 18, pectoral fins usually longer than pelvic fins, 1.5 to 1.8 times in head length; pelvic fins reaching about to anus, 1.6 to 2.0 times in head length. Body scales rough, 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).**

Size: Maximum total length 34 cm.

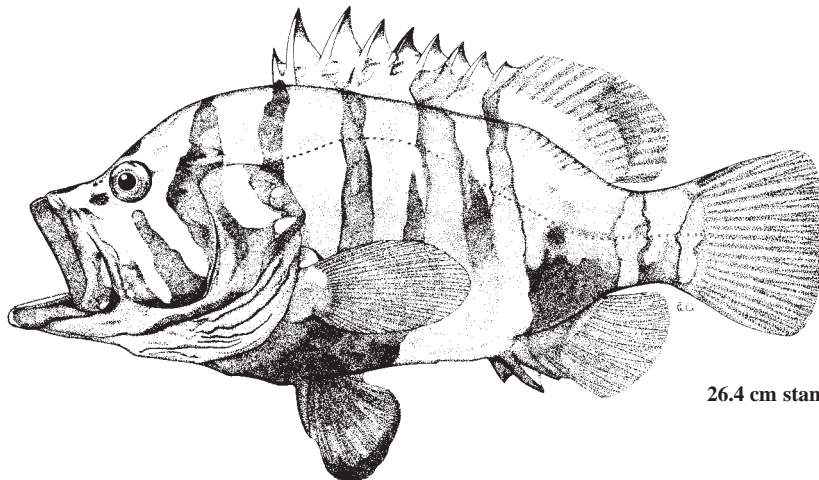
Habitat, biology, and fisheries: Like the chocolate hind (*Cephalopholis boenak*), the preferred habitat of the bluelined hind is shallow dead or silty reefs; and this may account for the primarily continental distributions of these 2 species. Too small to be of much commercial importance as a food fish, but often seen in markets. Caught with hook-and-line, gill net, traps, and in trawls.

Distribution: Primarily continental and seems to avoid atolls or oceanic islands. Occurs from western India to Thailand, Indonesia, Philippines, China, Taiwan Province of China, Japan (Honshu), and northern Australia.

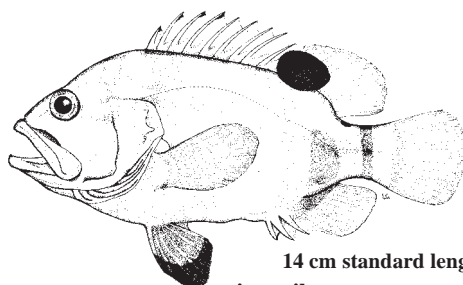


Cephalopholis igarashiensis Katayama, 1957

(Plate I, 5)

Frequent synonyms / misidentifications: None / None.**FAO names:** En - Garish hind; Fr - Vielle voyant; Sp - Cherna chillona.

26.4 cm standard length



14 cm standard length

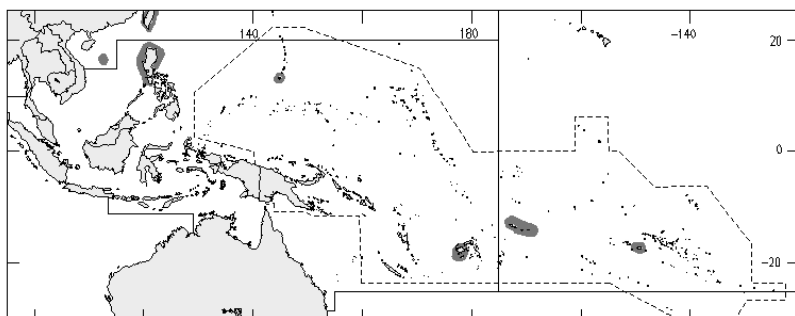
juvenile

Diagnostic characters: Body depth greater than head length, 2.0 to 2.4 times in standard length (for specimens 13 to 29 cm standard length); body width 2.3 to 2.6 times in body depth; caudal peduncle depth equal to or greater than its length; head length 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 reaching vertical at rear edge of eye. First gill arch with 8 or 9 gill rakers on upper limb, 16 or 17 on lower limb. Dorsal fin with IX spines and 14 soft rays, the membranes distinctly indented between the spines; anal fin with III spines and 9 soft rays; caudal fin rounded; pectoral-fin rays 18 or 19, the fin length 1.6 to 1.8 times in head length; pelvic fins reach to or beyond anus, 1.7 to 2.0 times in head length. Body scales rough, 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.

Size: Maximum total length about 43 cm.

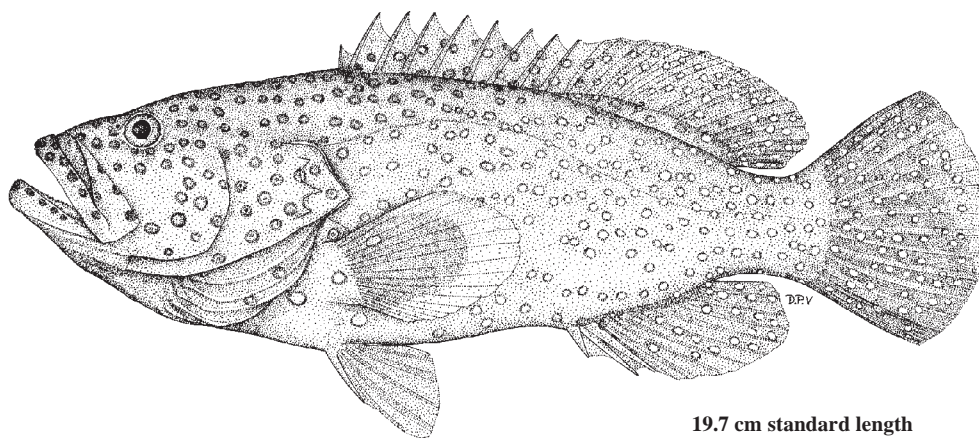
Habitat, biology, and fisheries: A rare, deep-water grouper; a specimen from Tahiti was taken in a depth of 250 m. Like most groupers, it is said to feed on fishes and crustaceans. This species seems too rare to be of commercial importance. Caught with hook-and-line and in traps; marketed fresh.

Distribution: Tropical western Pacific: southern Japan, Taiwan Province of China, Guam, Philippines, South China Sea, Samoa, and Tahiti.



Cephalopholis miniata (Forsskål, 1775)

(Plate I, 6)

Frequent synonyms / misidentifications: None / *Cephalopholis sexmaculata* (non Rüppell, 1830).**FAO names:** En - Coral hind; Fr - Vielle de corail; Sp - Cherna estrellada.

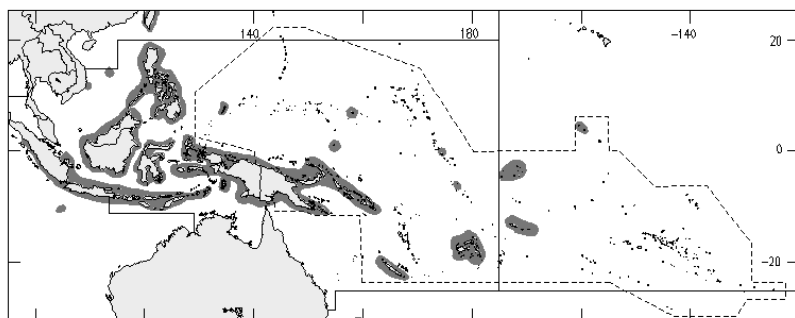
19.7 cm standard length

Diagnostic characters: Body depth 2.6 to 3.0 times in standard length (for specimens 10 to 30 cm standard length); head length 2.4 to 2.6 times in standard length. Interorbital area flat to slightly convex; preopercle rounded, finely serrate, the lower edge fleshy; upper edge of operculum very convex; maxilla scaly, reaching to or beyond vertical at rear edge of eye. First gill arch with 7 to 9 gill rakers on upper limb, 14 to 16 on lower limb. **Dorsal fin with IX spines and 14 to 16 soft rays, the membranes distinctly indented between the spines; anal fin with III spines and 9 (rarely 8) soft rays**, the fin margin rounded in adults; caudal fin well rounded; pectoral-fin rays 17 or 18, the fin length 1.4 to 1.75 times in head length; pelvic fins usually not reaching anus, 1.9 to 2.3 times in head length. Midlateral body scales ctenoid; no auxiliary scales; lateral-line scales 47 to 56; lateral scale series 94 to 114. **Colour: orange-red to reddish brown, covered with small (usually dark-edged) pale blue-grey spots; pectoral fins orange-yellow distally; soft dorsal, caudal, and anal fins often with a narrow blue margin and blackish submarginal line; pelvic fins orange-red, the distal edge dark bluish grey.** Juveniles more yellowish, with faint pale blue spots, fewer than in adults.

Size: Maximum total length about 40 cm.

Habitat, biology, and fisheries: Well-developed exposed coral reefs in clear water at depths of 2 to 150 m. Feeds mainly during early morning (07.00 to 09.00 h) and midafternoon (14.00 to 16.00 h). Most prey are fishes that school just above the reef (predominantly *Pseudanthias squamipinnis*), and most of these are caught by a quick rush ("ambush attack") from the bottom. *Cephalopholis miniata* forms harem groups comprising a dominant male and 2 to 12 females. These groups occupy territories of up to 475 m², subdivided into secondary territories, which are defended by a single female. Females are mature at 25 cm standard length. Although moderately small, *C. miniata* is a common species of considerable economic importance to local fisheries. Caught with hook-and-line, spear, and in traps.

Distribution: Tropical Indo-Pacific and Red Sea (but not the Persian Gulf or French Polynesia), from the African coast (south to Durban, South Africa) to the Line Islands in the Central Pacific, including most islands in Indian Ocean and western Central Pacific, southern Japan, Taiwan Province of China, Philippines, Indonesia, northern Australia, Papua New Guinea, New Caledonia, and the islands of Micronesia.

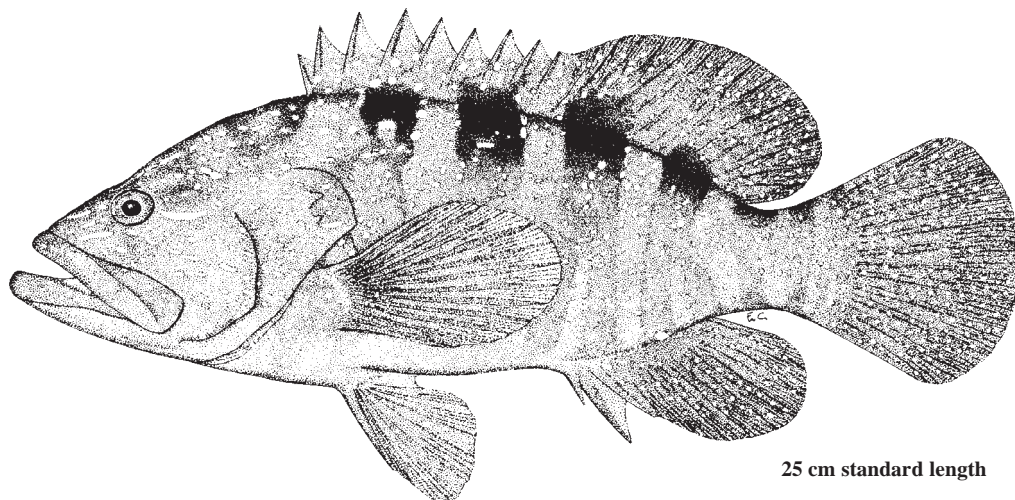


Cephalopholis sexmaculata (Rüppell, 1830)

(Plate I, 7)

Frequent synonyms / misidentifications: *Cephalopholis coatesi* Whitley, 1937; *C. gibbus* Fourmanoir, 1954 / *Cephalopholis miniata* (non Forsskål, 1775).

FAO names: En - Sixblotch hind; Fr - Vielle six taches; Sp - Cherna de seis manchas.



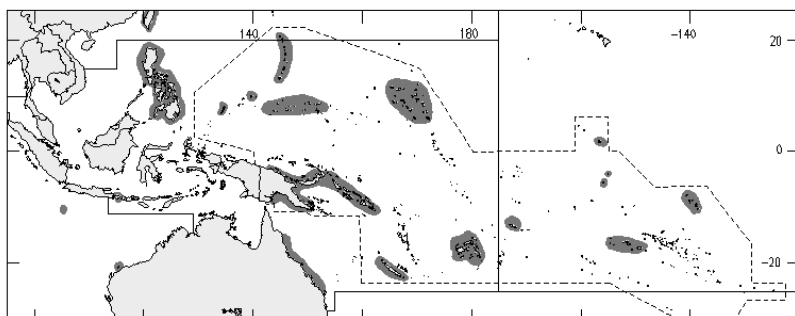
25 cm standard length

Diagnostic characters: **Body depth 2.5 to 3.0 times in standard length** (for specimens 13 to 39 cm standard length); **head length 2.3 to 2.5 times in standard length**. Interorbital area flat to slightly convex; dorsal head profile of large specimens (more than 30 cm standard length) distinctly concave above the eyes; preopercle rounded, finely serrate in young, virtually smooth in large adults, the lower edge fleshy; subopercle and interopercle with a few small serrae mostly hidden by skin; maxilla scaly, reaching past eye. First gill arch with 7 to 9 gill rakers on upper limb, 14 to 16 on lower limb. Dorsal fin with IX spines (the fin membranes distinctly indented between them) and 14 to 16 soft rays; anal fin rounded, with III spines and 9 soft rays; caudal fin well rounded; pectoral-fin rays 16 to 18, pectoral fins clearly longer than pelvic fins, 1.4 to 1.6 times in head length; pelvic fins 1.9 to 2.2 times in head length. Lateral body scales rough, without auxiliary scales (just a few in very large specimens); lateral-line scales 49 to 54; lateral scale series 95 to 108. **Colour:** orange-red, with small blue spots sparsely scattered on body but more densely on head and median fins; head also with elongated blue spots and lines; body with 4 dark bars (sometimes very faint) merging dorsally with blackish blotches at base of dorsal fin and extending onto the fin; 2 similar but smaller dark bar/blotches on caudal peduncle; the spaces between the dark body bars sometimes very pale; pectoral fins orange-red.

Size: Maximum total length at least 48 cm.

Habitat, biology, and fisheries: Coral reefs in depths of 10 to 150 m; a secretive species, generally seen hiding in caves and crevices on the outer reef slope. The sixblotch hind is more active nocturnally in shallow water and diurnally in deeper water. Feeds mainly on fishes. Probably of commercial interest to certain local fisheries. Caught with hook-and-line, traps, and spear.

Distribution: Red Sea and Indo-West Pacific region from South Africa to French Polynesia, including Christmas Island, Indonesia, South China Sea, Philippines, southern Japan, Palau, Queensland, New Guinea, Solomon Islands, Caroline Islands, Mariana Islands, Marshall Islands, Line Islands, Fiji Islands, Society Islands, and the Marquesas.

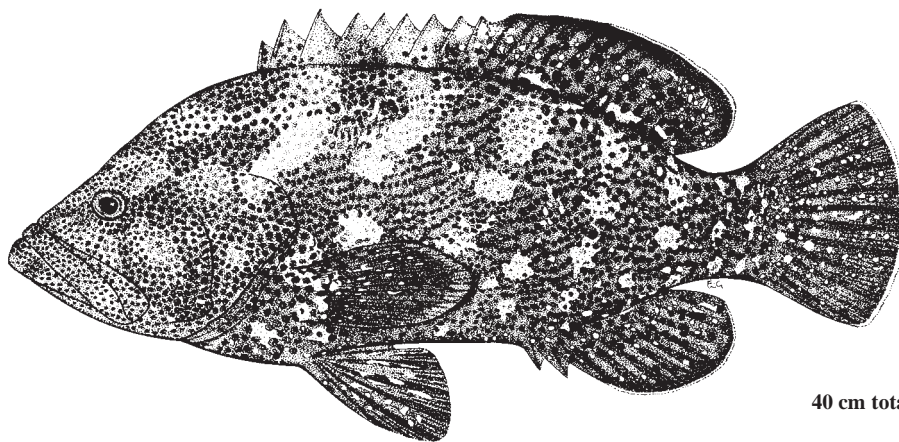


Cephalopholis sonnerati (Valenciennes, 1828)

(Plate I, 8)

Frequent synonyms / misidentifications: *Cephalopholis purpureus* Fourmanoir, 1966 / "*Cephalopholis aurantius*" (non Valenciennes, 1828), *C. formosanus* (Tanaka, 1911).

FAO names: En - Tomato hind; Fr - Vielle ananas; Sp - Cherna piña.



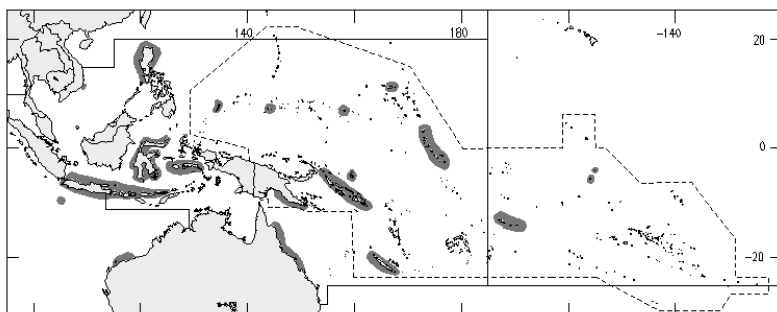
40 cm total length

Diagnostic characters: Body depth greater than or subequal to head length, 2.3 to 2.7 times in standard length (for specimens 9 to 41 cm standard length); head length 2.5 to 2.7 times in standard length. **Dorsal head profile of adults straight to concave, the nape distinctly convex;** interorbital area flat to slightly convex; preopercle rounded, finely serrate, with a shallow notch just above the "corner", the lower edge serrate or irregular with broad spinules, usually exposed; subopercle and interopercle finely serrate; maxilla reaches past eye. First gill arch with 7 to 9 gill rakers on upper limb, 14 to 16 on lower limb. Dorsal fin with IX spines and 14 to 16 soft rays, the membranes distinctly indented between the spines; anal fin with III spines and 9 soft rays; caudal fin rounded; pectoral-fin rays 18 to 20; **pectoral fins subequal to pelvic fins, 1.5 to 1.7 times in head length for specimens of 15 to 40 cm length (in specimens larger than 40 cm, the pelvic fins are longer than the pectoral fins); pelvic fins reaching to beyond anus.** Lateral body scales rough; lateral-line scales 66 to 80; lateral scale series 115 to 134. **Colour:** adults from Pacific Ocean generally pale reddish to yellowish brown, covered with small brownish red or dark brown spots. Juveniles dark reddish brown to nearly black, the rear margin of caudal fin and sometimes pectoral fins whitish; or body brownish orange with scattered pale greenish spots, and black spot between upper and middle opercular spines; adults from Indian Ocean with orange-red to reddish brown body, often with scattered small whitish or purple spots; purple network on head, maxilla, and lips; pectoral fins orange distally; membranes of soft dorsal, caudal, anal, and pelvic fins dusky; dorsal-fin rays orange distally; pelvic-fin tips blackish.

Size: Maximum total length 57 cm.

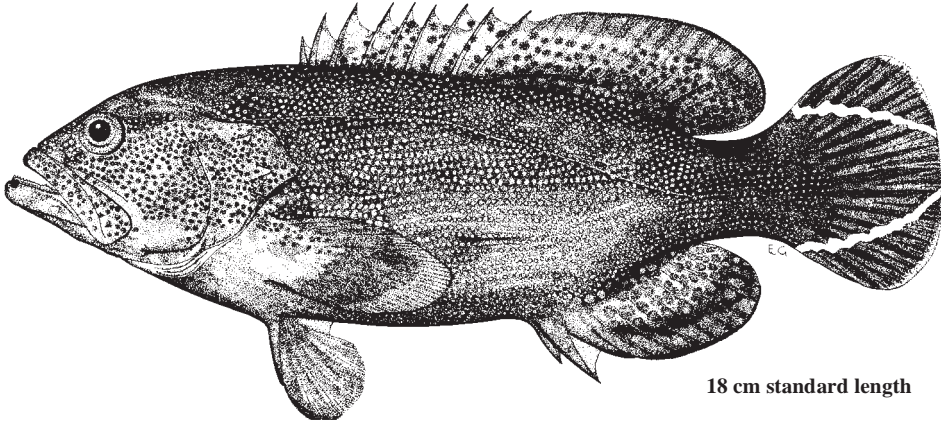
Habitat, biology, and fisheries: Coral reefs in depths of 20 to 100 m. Feeds on fishes and crustaceans. Females mature at about 28 cm standard length and males at about 34 cm. A common and widespread species of commercial importance throughout most of its range. Caught with hook-and-line, spear, and in traps.

Distribution: Indo-Pacific from east coast of Africa to the Line Islands in the Central Pacific; in the western Pacific, *Cephalopholis sonnerati* ranges from southern Japan to southern Queensland. Known from both continental and insular localities, including most islands in the tropical Indian and Pacific Oceans, but not reported from the Red Sea or Persian Gulf.



Cephalopholis urodeta (Bloch and Schneider, 1801)

(Plate II, 9)

Frequent synonyms / misidentifications: *Cephalopholis nigripinnis* (Valenciennes, 1828) / None.**FAO names:** En - Darkfin hind; Fr - Vielle alle noire; Sp - Cherna alinegra.

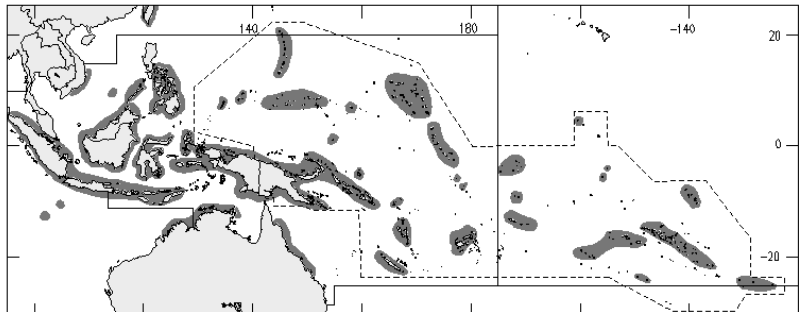
18 cm standard length

Diagnostic characters: Body depth less than head length, 2.7 to 3.3 times in standard length (for specimens 9 to 21 cm standard length); head length 2.4 to 2.7 times in standard length. Interorbital area convex; preopercle rounded, finely serrate, the lower edge fleshy; subopercle and interopercle usually smooth; maxilla reaching well past eye; snout and maxilla with minute cycloid scales. First gill arch with 7 to 9 gill rakers on upper limb, 15 to 17 on lower limb. Dorsal fin with IX spines and 14 to 16 soft rays; anal fin with III spines and 9 (rarely 8) soft rays; caudal fin rounded; pectoral-fin rays 17 to 19, pectoral fins distinctly longer than pelvic fins, 1.3 to 1.7 times in head length; pelvic fins usually not reaching anus, 1.8 to 2.3 times in head length. Lateral body scales rough, without auxiliary scales; **lateral-line scales 54 to 68**; lateral scale series 88 to 108. **Colour:** reddish brown to brownish red, darker posteriorly; body sometimes with small pale spots and/or 4 faint, irregular, dark bars that bifurcate ventrally and another 2 dark bars on caudal peduncle; head with numerous, small, close-set orange/red spots (more evident on paler parts of head) and sometimes with irregular reddish brown blotches; dark spot between upper and middle opercular spines (more evident on juveniles); a pair of small dark spots on edge of lower lip in line with the pair of anterior canine teeth; **soft dorsal and anal fins with small orange-red spots; outer triangular part of interspinous dorsal-fin membranes orange;** pelvic fins orange-red, usually with a dark blue edge. **Caudal fin with 2 white to bluish white bands that converge posteriorly, the area between the bands dark, often with pale spots, the outer corners of the fin red, with a whitish margin. Pectoral fins reddish brown basally, becoming yellow distally.**

Size: Maximum total length 28 cm.

Habitat, biology, and fisheries: A common coral reef species, usually seen in outer reef areas, but also found in lagoons, back-reef areas and on the reef-top. Depth range 1 to 60 m. Feeds mainly on fishes (68%) and crustaceans. Because of its small size, the darkfin hind is not of much interest as a food fish (except perhaps to subsistence fisheries), but it does well in an aquarium and may find a market as an aquarium fish. Caught with hook-and-line, gill nets, and in traps.

Distribution: Indo-West Pacific region from South Africa to French Polynesia and the Pitcairn Islands, probably occurs at all tropical islands and shallow banks of this region; also known from southern Japan to northern coast of Australia.

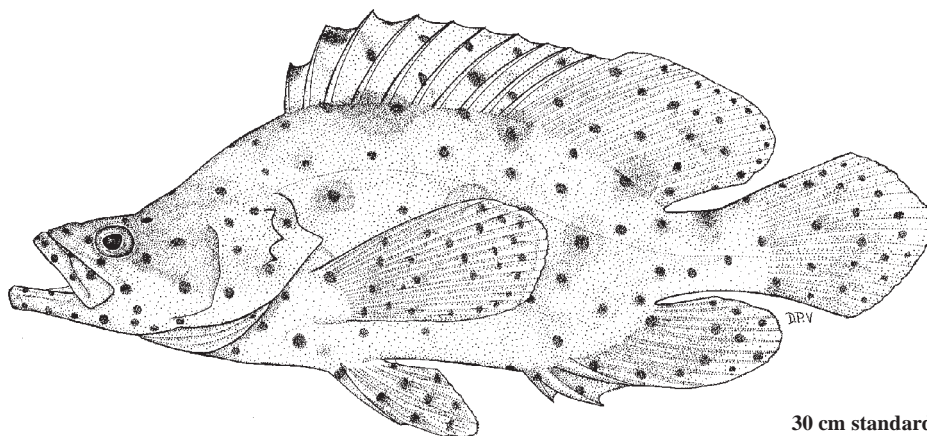


Cromileptes altivelis (Valenciennes, 1828)

(Plate II, 10)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Humpback grouper; Fr - Mérou bossu; Sp - Mero jorobado.



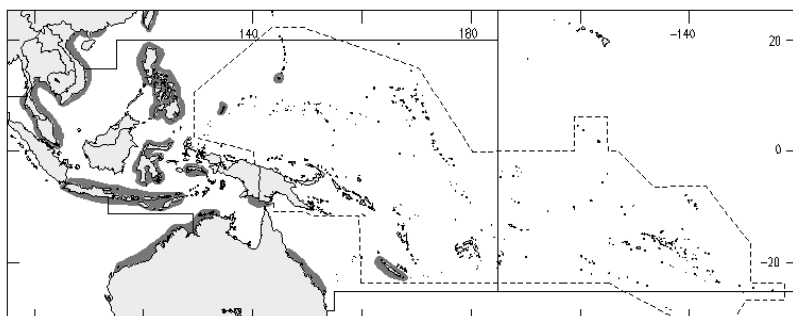
30 cm standard length

Diagnostic characters: Body compressed, its depth less than head length, and 2.6 to 3.0 times in standard length; body width 2.4 to 2.6 times in body depth; head length 2.5 to 2.8 in standard length; **head depressed anteriorly, the dorsal profile distinctly concave, rising steeply at the nape;** preorbital narrow, its depth 3.0 to 5.0 times in eye diameter and 15 to 32 times in head length. Anterior nostril tubular; **posterior nostril a large, crescentic, vertical slit.** Jaws with bands of villiform teeth; no canines; palatines with teeth; no step or knob on ventral edge of maxilla; supramaxilla well developed. Preopercle finely serrate, the serrae at the angle slightly enlarged, the lower edge smooth; opercle with middle spine inconspicuous, the upper and lower spines rudimentary. Gill rakers short; first gill arch with 8 to 11 rakers on upper limb, and 13 to 17 on lower limb. **Dorsal fin with X spines and 17 to 19 soft rays**, the fin origin over opercle, the fin membranes not incised between the spines, the posterior spines longest and the soft rays even longer; anal fin with III spines and 9 or 10 soft rays; caudal fin rounded, with 8 branched rays in upper lobe and 7 in lower lobe; pectoral-fin rays 17 or 18. Scales on body smooth (the ctenii greatly reduced); lateral-line scales 54 to 62; lateral scale series 106 to 122. Supraneural bones slender, the second more than 1/2 length of first; no trisegmental pterygiophores in dorsal or anal fins; rear edge of first dorsal pterygiophore slightly excavated; epipleural ribs on vertebrae 1 to 8. Cranium elongate, depressed anteriorly and elevated posteriorly; least interorbital width about 10% of cranium length; postorbital part of cranium elongated, 60% or more of cranium length; supraoccipital crest not extending onto frontals. **Colour: pale greenish brown, with widely spaced small black spots on head, body, and fins;** some spots on body and base of median fins overlain by a large dusky blotch.

Size: Maximum total length 70 cm.

Habitat, biology, and fisheries: Well-developed coral reefs as well as dead or silty reef areas, from tide pools to depths of 40 m. Growth in captivity is very slow. Juveniles are prized as aquarium fishes, and adults are one of the most expensive fishes in fish markets. Caught with hook-and-line, spear, and in traps.

Distribution: Western Pacific from southern Japan to Palau, New Caledonia, and southern Queensland (Australia); in the eastern Indian Ocean from the Nicobars to Broome, Western Australia. Reports from the western Indian Ocean are unsubstantiated. Records from Hawaii are probably based on released aquarium fishes.

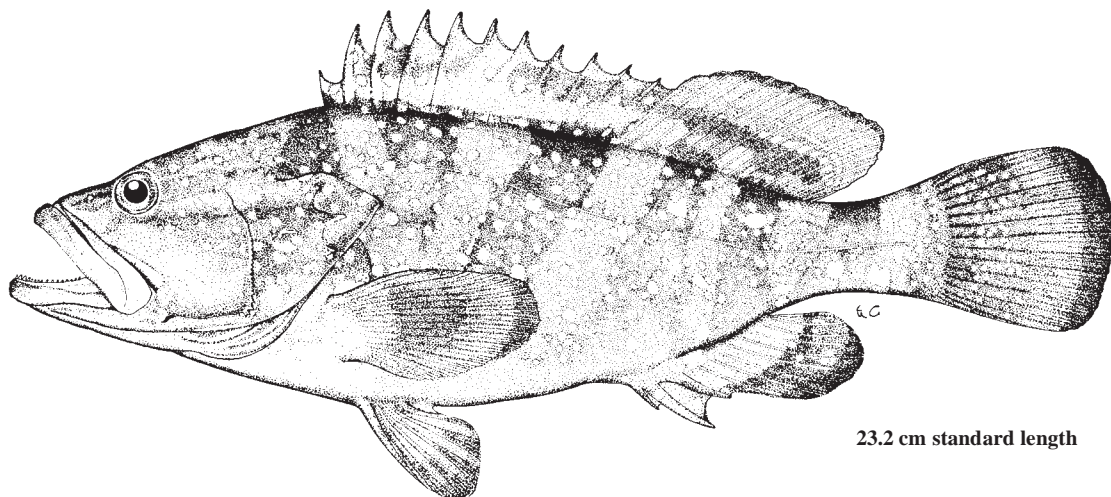


Epinephelus akaara (Temminck and Schlegel, 1842)

(Plate II, 11)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Redspotted grouper; Fr - Mérou rouge tacheté; Sp - Mero de pintas rojas.

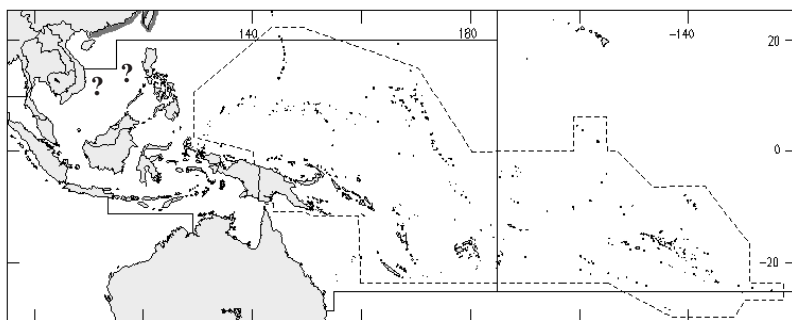


Diagnostic characters: Body depth less than head length, 2.7 to 3.2 times in standard length (for specimens 11 to 38 cm standard length); head length 2.3 to 2.6 times in standard length. **Preopercle with enlarged serrae at angle; upper edge of operculum straight;** nostrils subequal; maxilla reaching about to vertical at rear edge of eye; midside of lower jaw with 2 rows of teeth. First gill arch with 23 to 25 gill rakers, of which 8 or 9 on upper limb and 15 to 17 on lower limb. Dorsal fin with XI spines and 15 to 17 soft rays, the third to sixth spines longest, 2.4 to 3.8 times in head length, the interspinous membranes incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 17 to 19, the fin length 1.5 to 2.1 times in head length; **pelvic fins not reaching anus, 1.9 to 2.3 times in head length.** Lateral body scales rough, with auxiliary scales in adults; lateral-line scales 50 to 54; lateral scale series 92 to 106. **Colour:** head and body pale brownish grey, covered (except ventrally) with small red, orange, or gold spots; 6 faint oblique dark bars usually visible on body (at least dorsally), the first bar on nape, the third bar confluent with a dark brown or black blotch on body at base of last 3 dorsal-fin spines, and the last bar on caudal peduncle; dark body bars extend only onto base of dorsal fin; **dorsal-fin margin yellow or orange; a row of dusky yellow or orange spots (1 per membrane) along middle of spinous dorsal fin and another row along base of fin;** soft dorsal, caudal, and anal fins with faint red or orange spots basally, the distal parts of these fins dusky with small faint white spots.

Size: Maximum total length 51 cm.

Habitat, biology, and fisheries: In Japanese waters, this species is common in rocky areas. Spawning of pairs in shallow culture ponds has been reported, but the high mortality of larvae has hampered its use in aquaculture. The redspotted grouper is of considerable commercial importance in Hong Kong and Japan where it brings a high price in markets, and live specimens are sold for an even better price.

Distribution: Western Pacific: from southern China, Taiwan Province of China, East China Sea, Korea, and southern Japan (Kyushu to about 38°N on both coasts of Honshu). Reported from Viet Nam, but the illustration appears to be the rock grouper (*Epinephelus fasciatus*). Records of *E. akaara* from the Philippines and India are unsubstantiated. May occur in the area.

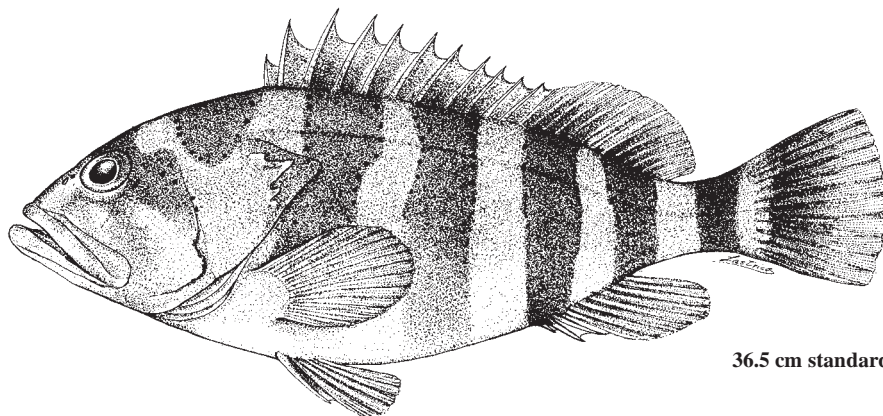


Epinephelus amblycephalus (Bleeker, 1857)

(Plate II, 12)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Banded grouper; Fr - Mérou bande; Sp - Cabrilla venda.



36.5 cm standard length



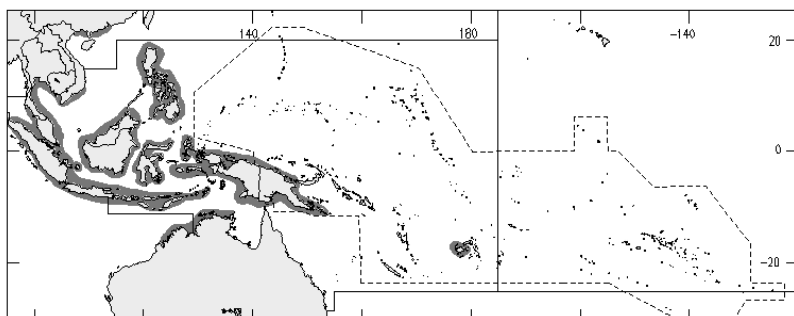
5.7 cm standard length
juvenile

Diagnostic characters: Body depth less than head length, 2.5 to 3.0 times in standard length (for specimens 12 to 35 cm standard length); head length 2.1 to 2.4 times in standard length. **Preopercle with 3 to 6 enlarged serrae at the "corner"**; upper edge of operculum slightly convex; nostrils subequal or posterior nostril larger than anterior; maxilla scaly, reaching about to vertical at rear edge of eye; midside of lower jaw with 2 rows of teeth. First gill arch with 22 to 24 gill rakers, of which 8 on upper limb and 14 to 16 on lower limb. Dorsal fin with XI spines and 15 or 16 soft rays, the third or fourth spine longest, 2.7 to 3.2 times in head length, the interspinous membranes only slightly incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral fins with 18 or 19 rays, the fin length equal to pelvic fins, 1.7 to 2.3 times in head length. Lateral body scales ctenoid, with a few auxiliary scales in adults; lateral-line scales 47 to 52; lateral scale series 90 to 121. **Colour:** head, body, and median fins pale grey; **body with 4 broad dark brown bars, the first 2 extending into spinous part of dorsal fin, the third and fourth bars extending into soft dorsal and anal fins; a fifth dark bar at base of caudal fin; small black spots on dorsal parts of body bars (mainly along the edges of the bars); dark brown saddle blotch on nape, with small black spots mainly along edge of this blotch;** cheeks, snout, interorbital area, jaws, and chest mostly dark brown, with 2 or 3 white bands radiating from eye; irregular black bar on middle of caudal fin; maxillary groove yellow; ventral parts of head and body often with a pinkish tinge. **Small juveniles (6 cm standard length) white, with black bars on body as described for adults, the fins pale yellow with small black spots.**

Size: Maximum total length 50 cm.

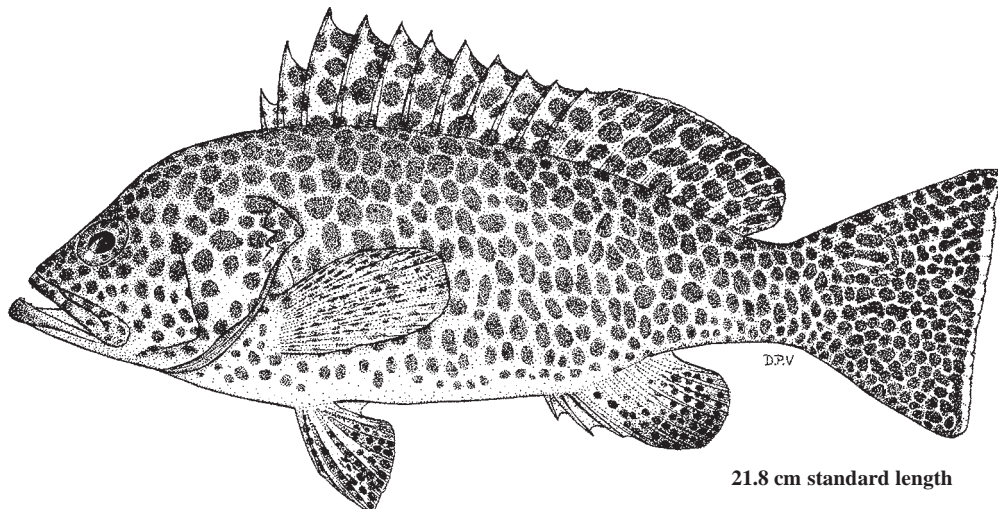
Habitat, biology, and fisheries: Usually found on offshore coral and rocky reefs in depths of 80 to 130 m. The banded grouper is a popular and commercially important species in Hong Kong, but in Singapore it is not a popular grouper in the market. Caught with hand lines. Sold fresh.

Distribution: Eastern Indian Ocean and central western Pacific from the Andaman Sea to southern Japan, Taiwan Province of China, China, Philippines, Viet Nam, Malaysia, Thailand, Indonesia, New Guinea, and north-western Australia; but unknown east of New Guinea except for one record from Fiji.



Epinephelus areolatus (Forsskål, 1775)

(Plate II, 13)

Frequent synonyms / misidentifications: None / *Epinephelus chlorostigma* (non Valenciennes, 1828).**FAO names:** En - Areolate grouper; Fr - Mérouaréolé; Sp - Mero areolado.

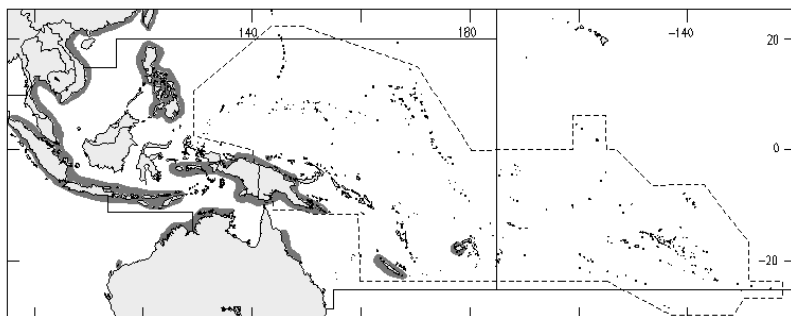
21.8 cm standard length

Diagnostic characters: Body depth less than head length, 2.8 to 3.3 times in standard length (for specimens 14 to 31 cm standard length); head length 2.4 to 2.8 times in standard length. Interorbital area convex; preopercle angular, with 2 to 7 enlarged serrae at the angle; upper edge of operculum straight or slightly convex; nostrils subequal; maxilla extending to below rear half of eye, the lower edge with a distinct step posteriorly; maxilla, lower jaw, and gular area scaly; midlateral part of lower jaw with 2 rows of teeth. **First gill arch with 23 to 25 gill rakers, of which 8 to 10 on upper limb and 14 to 16 on lower limb.** Pyloric caeca 11 to 17. **Dorsal fin with XI spines and 15 to 17 soft rays**, the third or fourth spines longest and about equal to longest soft ray, the interspinous membranes moderately incised; anal fin with III spines and 8 soft rays, the margin rounded or angular; **caudal fin slightly convex in juveniles, truncate or slightly emarginate in adults**; pectoral-fin rays 17 to 19; pectoral fins longer than pelvic fins, 1.5 to 1.8 times in head length; pelvic fins 1.7 to 2.1 times in head length, reaching to or nearly to anus. Lateral body scales rough; adults with auxiliary scales. **Lateral-line scales 49 to 53**; lateral scale series 97 to 116. **Colour:** head, body, and fins pale, covered with numerous close-set brown, brownish yellow or greenish yellow spots, the largest about size of pupil, those on front of head smaller than those on operculum. Pectoral fins pale, with small dark spots on the rays. Posterior edge of caudal fin with a distinct white margin.

Size: Maximum total length about 40 cm.

Habitat, biology, and fisheries: Usually found in seagrass beds or on fine sediment bottoms near rocky reefs, dead coral, or alcyonarians. It has been taken in depths of 6 to 200 m. At New Caledonia, the areolate grouper was reported to feed on penaeid prawns. Common in the markets of Hong Kong, Singapore, and probably throughout its range. Caught with hook-and-line, traps, and in trawls.

Distribution: Indo-West Pacific from South Africa to Fiji, including Andaman Islands, Thailand, Malaysia, Viet Nam, Indonesia, Philippines, Hong Kong, China, Taiwan Province of China, Japan, northern Australia (and nearby islands), Papua New Guinea, and New Caledonia. It appears to be absent from Micronesia, Polynesia, and most islands of the western Indian Ocean.

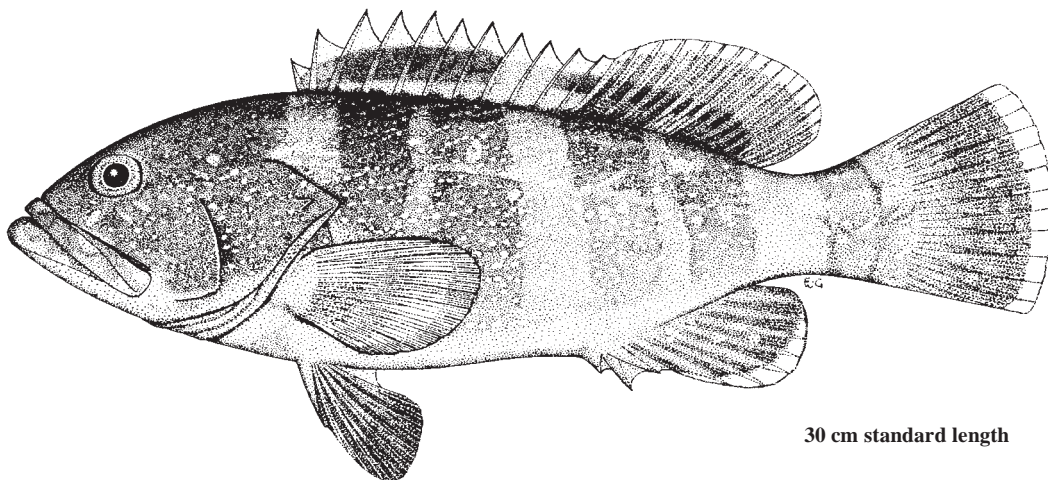


Epinephelus awoara (Temminck and Schlegel, 1842)

(Plate II, 14)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Yellow grouper; Fr - Mérou jaune; Sp - Mero amarillo.



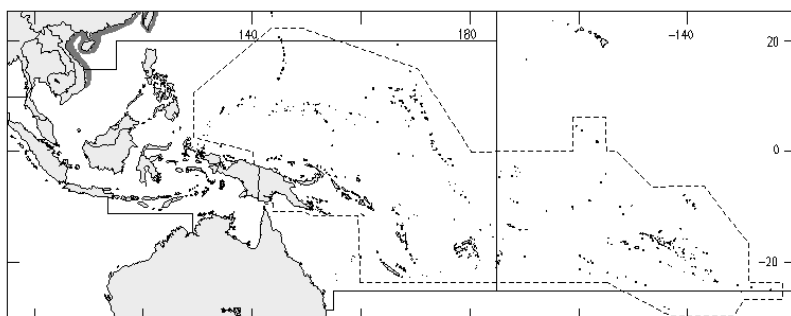
30 cm standard length

Diagnostic characters: Body depth 2.7 to 3.3 times in standard length (for specimens 13 to 31 cm standard length); **head length 2.3 to 2.6 times in standard length**. Interorbital area convex; dorsal head profile strongly convex; **preopercle subangular, with 2 to 5 strong spines at the angle; upper edge of operculum straight, the uppermost spine rudimentary**; maxilla reaches about to vertical at rear edge of eye; midlateral part of lower jaw with 2 rows of small, subequal teeth. **First gill arch with 22 to 26 gill rakers, of which 8 or 9 on upper limb and 16 to 18 on lower limb**. Pyloric caeca 12, in 3 bundles. Dorsal fin with XI spines and 15 or 16 soft rays, the third or fourth spine longest but shorter than the longest soft ray, the interspinous membranes deeply incised; anal fin with III spines and 8 soft rays; caudal fin convex; pectoral-fin rays 17 to 19, the fin longer than pelvic fins, 1.6 to 1.9 times in head length. Lateral body scales distinctly rough, with auxiliary scales in specimens larger than 30 cm standard length; lateral-line scales 49 to 55; lateral scale series 92 to 109. **Colour:** head and body pale greyish brown dorsally, usually golden yellow ventrally; **4 broad dark bars on dorsal part of body, 1 on caudal peduncle and another often visible on nape; head and body with numerous small yellow spots; body and median fins also with small greyish white spots; soft dorsal, caudal, and sometimes the anal fin with prominent yellow margin**; paired fins dusky yellow. Dark bars on body may be faint or absent in large adults.

Size: Maximum total length at least 60 cm.

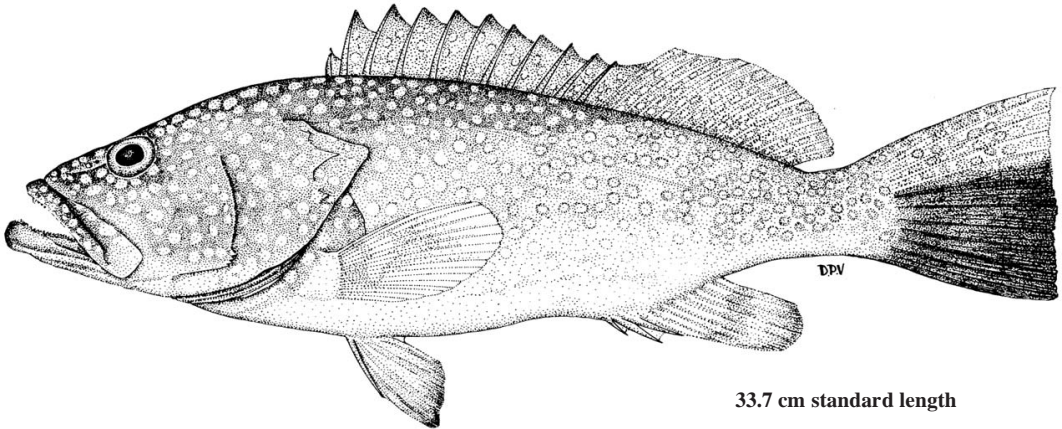
Habitat, biology, and fisheries: Occurs in rocky areas as well as on sandy-mud bottoms; juveniles are common in tidepools, and adults are caught in depths of 10 to 50 m. In captivity, the yellow grouper is an aggressive fish, spending much of its time chasing and biting other fishes, especially members of its own species. Valuable food fish, caught with trawls or hook-and-line. Eggs have been artificially fertilized, with the longest survival time for the larvae of 15 days.

Distribution: Western North Pacific: Korea, Japan, Taiwan Province of China, China, Viet Nam, and islands in the South China Sea.



Epinephelus bleekeri (Vaillant, 1877)

(Plate II, 15)

Frequent synonyms / misidentifications: None / None.**FAO names:** En - Duskytail grouper; Fr - Mérou demideuil; Sp - Mero medioluto.

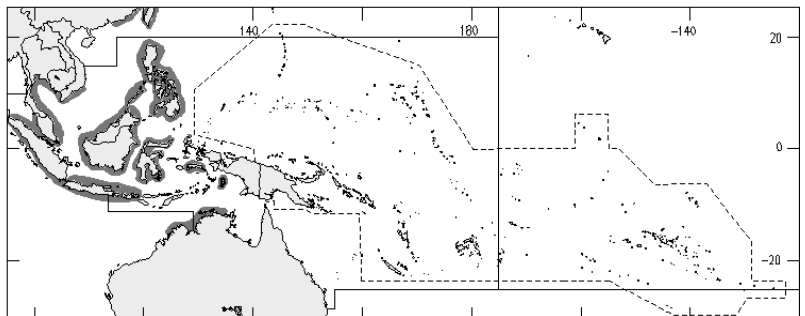
33.7 cm standard length

Diagnostic characters: Body elongate, its depth 3.0 to 3.5 times in standard length (for specimens 11 to 52 cm standard length); head length 2.4 to 2.7 times in standard length. Interorbital area flat to slightly convex; **preopercle angle with 2 to 9 enlarged serrae; adults with a notch above preopercle angle; upper edge of operculum straight;** maxilla scaly, reaching to or beyond vertical at rear edge of eye; midlateral part of lower jaw with 2 rows of subequal teeth. First gill arch with 25 to 28 gill rakers, of which 9 to 11 on upper limb and 16 to 18 on lower limb. Dorsal fin with XI spines and 16 to 18 soft rays, third to fifth spines longest, the interspinous membranes incised; anal fin with III spines and 8 or 9 (rarely 9) soft rays; **caudal fin truncate or slightly convex;** pectoral-fin rays 17 to 19, the fin length 1.6 to 2.1 times in head length; pelvic fins 1.9 to 2.5 times in head length. Lateral body scales rough; adults with a few small auxiliary scales; **lateral-line scales 49 to 53;** lateral scale series 99 to 104. **Colour:** head and body brownish, reddish brown or purplish grey, covered (except ventrally) with numerous reddish orange, gold, or yellow spots; dorsal fin and upper third of caudal fin with spots like those on body; lower two-thirds of caudal fin dusky; spots on body of some fish with a faint dark margin; pectoral and pelvic fins and distal part of anal fin dusky; dark streak along maxillary groove. Juveniles (less than 11 cm standard length) with 7 faint dark bars dorsally on body, the first 2 on nape, the last on caudal peduncle; all bars more or less demarcated by small dark spots; no dark spots on head or fins.

Size: Maximum total length about 76 cm.

Habitat, biology, and fisheries: Occurs on shallow rocky banks, but not reported from well-developed coral reefs. Depth range reported as 30 to 104 m. An excellent eating fish, but apparently not abundant. Caught with hook-and-line, longlines, and trawls.

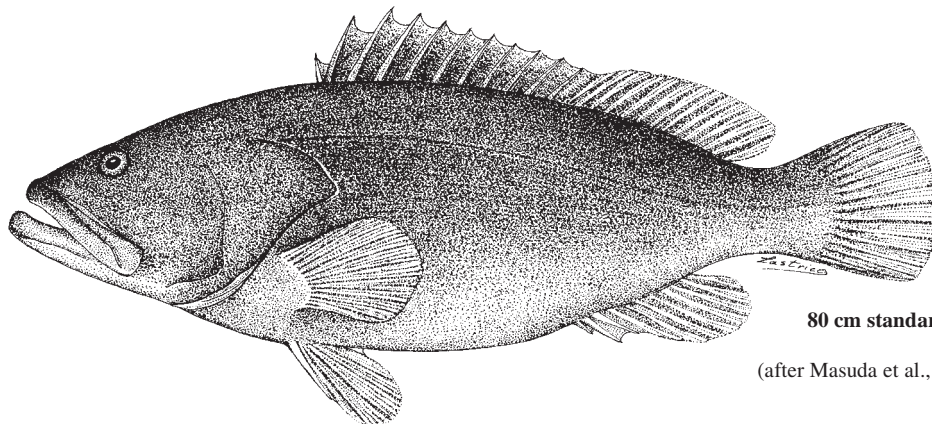
Distribution: An Indo-West Pacific species occurring from the Persian Gulf to Thailand, Cambodia, Indonesia, Borneo, Philippines, China (including Hong Kong and Taiwan Province), and north coast of Australia. It is not known from Japan, New Guinea, or any of the islands of Micronesia or Polynesia.



***Epinephelus bruneus* Bloch, 1793**

Frequent synonyms / misidentifications: *Serranus moara* Temminck and Schlegel, 1842 / None.

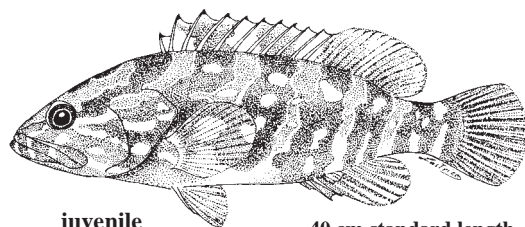
FAO names: En - Longtooth grouper; Fr - M  rou longues dents; Sp - Mero diente largo.



80 cm standard length

(after Masuda et al., 1984)

Diagnostic characters: Body elongate, its depth 3.0 to 3.6 times in standard length; head length 2.3 to 2.5 times in standard length. Interorbital area convex; **preopercle angular, with the serrae at angle distinctly enlarged**; upper spine on opercle inconspicuous; upper edge of operculum convex; maxilla reaches past vertical at rear edge of eye; tiny embedded scales on maxilla; no step on ventral edge of maxilla; **midlateral part of lower jaw with 2 rows of well-developed canines, those along sides of upper jaw slightly smaller**; nostrils small, subequal. Gill rakers shorter than gill filaments; first gill arch with 24 to 27 rakers, of which 9 to 11 on upper limb and 16 to 18 on lower limb. **Dorsal fin with XI spines and 13 to 15 soft rays**, the third or fourth spine longest, but shorter than the longest soft ray, the interspinous membranes deeply incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 17 to 19, the fin length 1.9 to 2.5 times in head length; pelvic fins 2.2 to 2.6 times in head length and ending well short of anus. Midlateral body scales rough; no auxiliary scales on body; **lateral-line scales 64 to 72; some anterior lateral-line scales on adults with branched tubes**; lateral scale series 93 to 126. **Colour:** juveniles pale yellowish brown, the body with 6 irregular, oblique dark bars containing irregular pale spots; first bar extends from nape to eye, the last on caudal peduncle; 3 dark brown bands radiating from lower part of eye; some specimens with distal part of interspinous membranes greenish yellow. Adults (larger than 40 cm standard length) dark greyish brown, the bars and bands replaced by faint dorsal blotches or absent altogether, the body covered with small pale grey spots forming short horizontal lines and a mottled pattern; lower margin of anal fin and lower corner of caudal fin with white edge.



juvenile

40 cm standard length

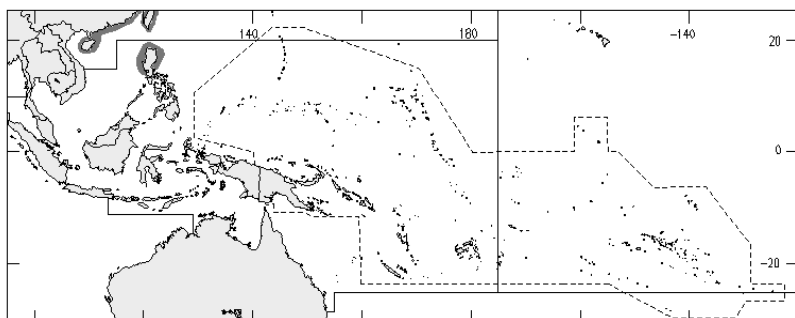
Size: Maximum total length about 100 cm.

Habitat, biology, and fisheries: Rocky reefs and mud bottom; adults found in depths of 20 to 200 m; juveniles occur in shallow water. An excellent eating fish. In 1968, *Epinephelus bruneus* was one of the most abundant species in Hong Kong waters. Caught with handlines, longlines, and trawls.

Size: Maximum total length about 100 cm.

Habitat, biology, and fisheries: Rocky reefs and mud bottom; adults found in depths of 20 to 200 m; juveniles occur in shallow water. An excellent eating fish. In 1968, *Epinephelus bruneus* was one of the most abundant species in Hong Kong waters. Caught with handlines, longlines, and trawls.

Distribution: Known only from Korea, Japan (north to Hegura-jima Island, 37°50'N), China (south to Hong Kong and Hainan Island), Taiwan Province of China, and Luzon, Philippines. May be more widespread in the area.

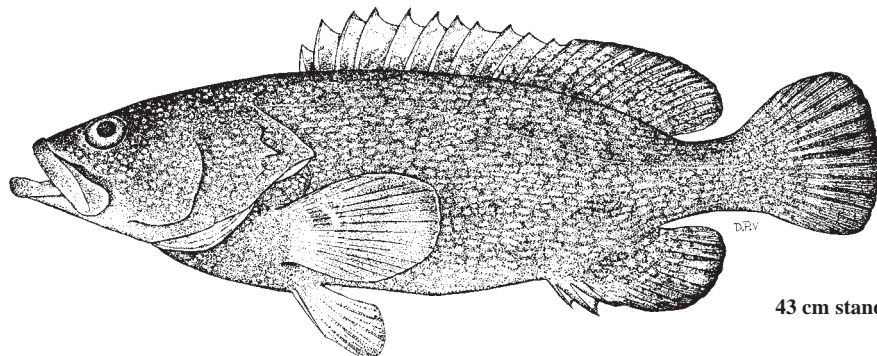


Epinephelus caeruleopunctatus (Bloch, 1790)

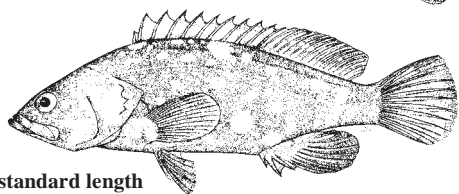
(Plate II, 16)

Frequent synonyms / misidentifications: None / *Epinephelus ongus* (non Bloch, 1790); *E. summana* (non Forsskål, 1775); *E. corallicola* (non Valenciennes, 1828).

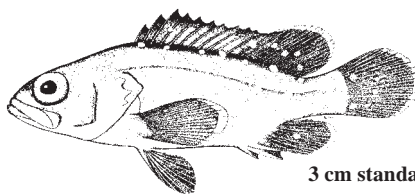
FAO names: En - Whitespotted grouper; Fr - Vielle taches blanches; Sp - Mero nevero.



43 cm standard length



17 cm standard length



3 cm standard length

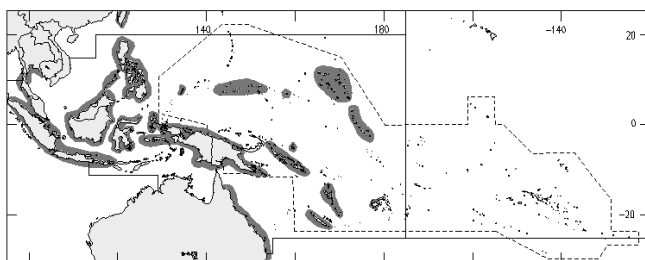
juveniles

Diagnostic characters: Body depth distinctly less than head length, 2.9 to 3.4 times in standard length (for specimens 11 to 47 cm standard length); head length 2.3 to 2.5 times in standard length. **Head pointed and the dorsal profile almost straight; preopercle rounded, finely serrate; opercular spines inconspicuous; upper edge of operculum straight, sinuous or slightly convex; maxilla naked, mostly covered by upper lip; canines at front of jaws small or absent; midlateral part of lower jaw with 3 to 5 rows of small teeth. In specimens more than 45 cm, the rear nostrils become vertically elongate, its length 5 or 6 times greater than diameter of anterior nostrils.** First gill arch with 8 to 10 gill rakers on upper limb, 13 to 17 on lower limb (juveniles); specimens larger than 25 cm with only 4 to 8 developed rakers on lower limb, the rudiments difficult to count because of intercalated bony tooth plates; gill rakers shorter than gill filaments, the raker at angle of gill arch about twice as long as adjacent rakers. Dorsal fin with XI spines and 15 to 17 soft rays, the third or fourth spines longest, 2.7 to 3.6 times in head length, the interspinous membranes incised; anal fin with III spines and 8 soft rays; caudal fin rounded; **pectoral fins large and fleshy, with 17 to 19 rays, the fin length 1.5 to 2.1 times in head length;** pelvic fins end well short of anus, their length 2.0 to 2.7 times in head length. Lateral body scales rough (1 specimen, 50 cm, with "mostly smooth" lateral body scales), with auxiliary scales; lateral-line scales 51 to 61; lateral scale series 86 to 109. **Colour:** adults brownish grey, the body covered with small pale spots overlain with large pale blotches; oblique black saddle on rear half of peduncle; 4 or 5 indistinct black blotches at base of dorsal fin; prominent black streak on maxillary groove. Large adults brownish, covered with small, indistinct, contiguous pale spots. Juveniles (less than 25 cm) dark grey to black, covered with prominent pupil-size white spots and smaller white dots.

Size: Largest specimen examined 59 cm total length; reported to 76 cm.

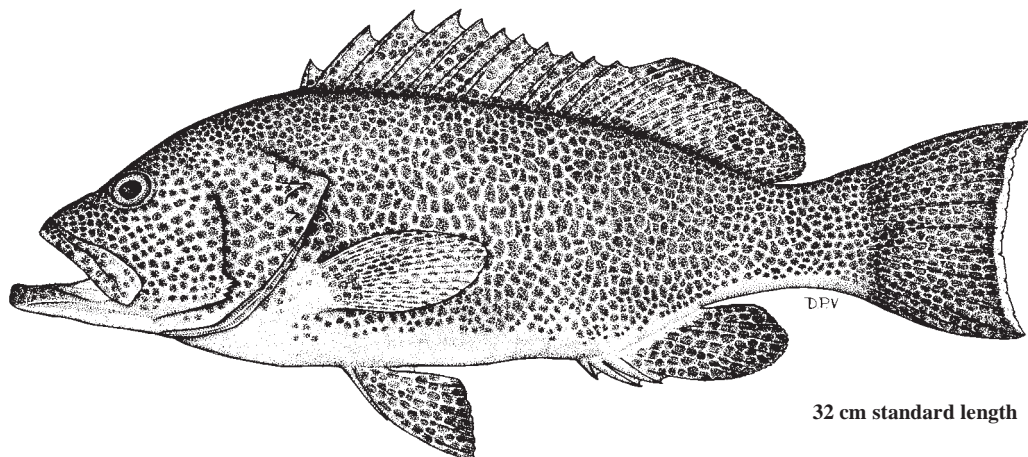
Habitat, biology, and fisheries: Coral reefs, usually in or near caves; juveniles found in tidepools. Caught with hook-and-line, spear, and in traps. Probably of some importance to fisheries in areas where it is common.

Distribution: Indo-West Pacific, from South Africa to Fiji, including Thailand, Indonesia, Philippines, Taiwan Province of China, Japan, Papua New Guinea, Australia (Queensland to New South Wales), Palau, Solomon Islands, New Caledonia, Vanuatu Caroline Islands, Marshall Islands, and Gilbert Islands.



Epinephelus chlorostigma (Valenciennes, 1828)

(Plate III, 17)

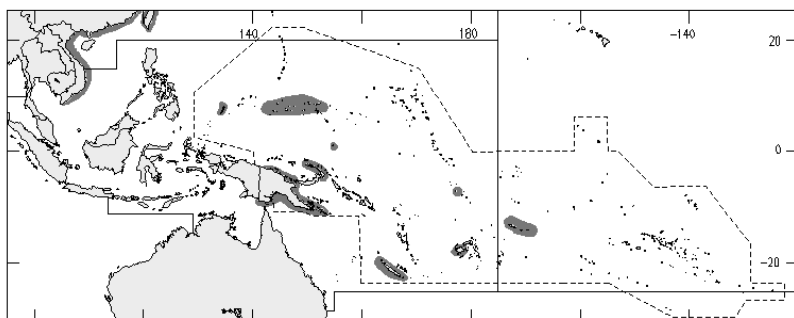
Frequent synonyms / misidentifications: None / *Epinephelus areolatus* (non Forsskål, 1775).**FAO names:** En - Brownspeckled grouper; Fr - Mérou pintade; Sp - Mero pintado.

Diagnostic characters: Body depth 2.8 to 3.3 times in standard length (for specimens 12 to 51 cm standard length); body width 1.8 to 2.2 times in body depth; head length 2.4 to 2.7 times in standard length; caudal peduncle depth 3.0 to 3.6 times in head length. Interorbital slightly convex; preopercle angular, with 4 to 7 enlarged serrae at angle; upper edge of operculum straight; maxilla reaches about to vertical at rear edge of eye; maxilla scaly, with a low step on posterior part of ventral edge; midlateral part of lower jaw with 2 to 4 rows of teeth, the inner ones about twice size of outer teeth; rear nostrils not noticeably larger than anterior nostrils. First gill arch with 23 to 29 gill rakers, of which 8 to 11 on upper limb and 15 to 18 on lower limb; gill rakers longer than gill filaments. Pyloric caeca 26 to 52. Dorsal fin with XI spines and 16 to 18 soft rays, the third or fourth spines longest, 2.4 to 3.2 times in head length, the interspinous membranes slightly to moderately incised; anal fin rounded or angular, with III spines and 8 soft rays, the third spine longer than second; caudal fin truncate or slightly emarginate; pectoral-fin rays 17 to 19; pectoral fins usually slightly longer than pelvic fins, 1.6 to 2.0 times in head length; pelvic fins 1.8 to 2.3 times in head length. Lateral body scales rough, with auxiliary scales; lateral-line scales 48 to 53; lateral scale series 96 to 122. **Colour:** head, body, and fins with small, irregular, close-set dark brown spots, the ground colour forming a pale network; caudal fin usually with white line along rear margin; spots on pectoral fins mainly confined to rays.

Size: Maximum total length at least 75 cm; maximum weight 7 kg.

Habitat, biology, and fisheries: Coral reefs and also (in the South China Sea) on mud bottoms; depth range 4 to 280 m. Feeds on fishes and crustaceans (mainly stomatopods and crabs). Females are mature at 23 to 29 cm total length, and sexual transition occurs between 35 and 45 cm, but all females do not change sex. Common in markets of Singapore and Hong Kong. Caught with hook-and-line, spear, traps, and trawls.

Distribution: Red Sea to South Africa and eastwards to southern Japan, Papua New Guinea, New Caledonia, New Ireland, Caroline Islands, American Samoa, and Fiji. The wide distribution of *Epinephelus chlorostigma* has some puzzling gaps. There are no verifiable records from the Comoros, the continental shelf between Oman and Cambodia, Indonesia, Philippines, Taiwan Province of China, and Australia. Records from the Persian Gulf are apparently misidentifications of *E. polylepis*.

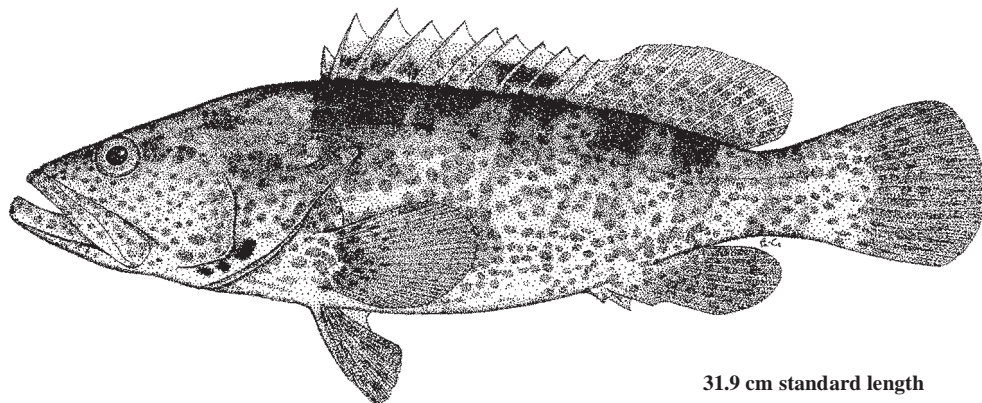


Epinephelus coioides (Hamilton, 1822)

(Plate III, 18)

Frequent synonyms / misidentifications: *Epinephelus suillus* (Valenciennes, 1828) / *Epinephelus malabaricus* (non Bloch and Schneider, 1801); *E. tauvina* (non Forsskål, 1775).

FAO names: **En** - Orangespotted grouper; **Fr** - Mérou taches oranges; **Sp** - Mero de pintas naranjas.



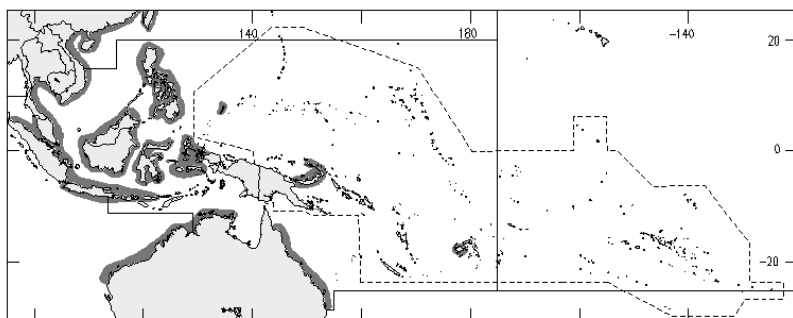
31.9 cm standard length

Diagnostic characters: Body elongate, its depth 2.9 to 3.7 times in standard length (for specimens 10 to 78 cm standard length); body width 1.4 to 2.0 times in body depth; head length 2.3 to 2.6 times in standard length. **Interorbital width 5.0 to 6.2 times in head length;** preopercle with enlarged serrae at angle and a broad shallow notch just above angle; upper edge of operculum straight or somewhat convex; maxilla reaches to or slightly past a vertical at rear edge of eye; **upper jaw length 17 to 20% of standard length;** midlateral part of lower jaw with 2 or 3 rows of subequal teeth; nostrils subequal. First gill arch with 23 to 26 gill rakers, of which 8 to 10 on upper limb and 14 to 17 on lower limb; adults with small bony platelets on lateral side of first gill arch. Pyloric caeca 50 to 60. Dorsal fin with XI spines and 14 to 16 soft rays, the third or fourth spines longest, 2.9 to 4.0 times in head length; anal fin with III spines and 8 soft rays, the third spine usually longer than the second; caudal fin rounded; pectoral-fin rays 18 to 20. **Lateral body scales rough, with minute auxiliary scales; lateral-line scales 58 to 65; lateral-line tubes of anterior scales branched in adults;** lateral scale series 100 to 118. **Colour:** head and body tan dorsally, shading to whitish ventrally; **numerous small brownish orange or reddish brown spots on head, body, and median fins; body with 5 faint, irregular, oblique, dark bars which bifurcate ventrally;** first dark bar below anterior dorsal-fin spines, last bar on caudal peduncle; 2 dark spots on interopercle and another 1 or 2 at junction of sub- and interopercles. Orange spots turn brown on exposure to air and become fainter (more diffuse) in preservative.

Size: Maximum length at least 95 cm.

Habitat, biology, and fisheries: Estuaries and offshore to depths of 100 m. Feeds on fishes, shrimps, crabs, and cephalopods. Females mature at 25 to 30 cm (2 to 3 years old), and sexual transition occurs at 55 to 75 cm. The subject of much recent research in aquaculture, the orangespotted grouper is often misidentified as "*Epinephelus tauvina*" or "*E. malabaricus*" in the literature. Common and expensive in markets of the region; sold fresh and kept alive at restaurants in Hong Kong and Taiwan Province of China. Caught with hook-and-line, traps, trawls, and lift nets.

Distribution: Continental shores and large islands from Red Sea to South Africa and east to the western Pacific, where it ranges from the Ryukyu Islands of Japan to Australia and out to the islands of Palau and Fiji.

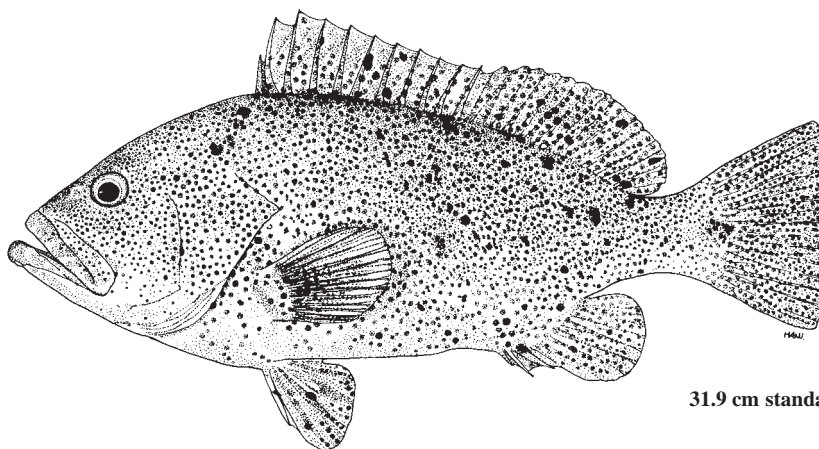


Epinephelus cyanopodus (Richardson, 1846)

(Plate III, 19)

Frequent synonyms / misidentifications: *Epinephelus hoedtii* (Bleeker, 1855); *E. kohleri* Schultz, 1953 / None.

FAO names: En - Speckled grouper; Fr - M rou bleu; Sp - Mero azul.



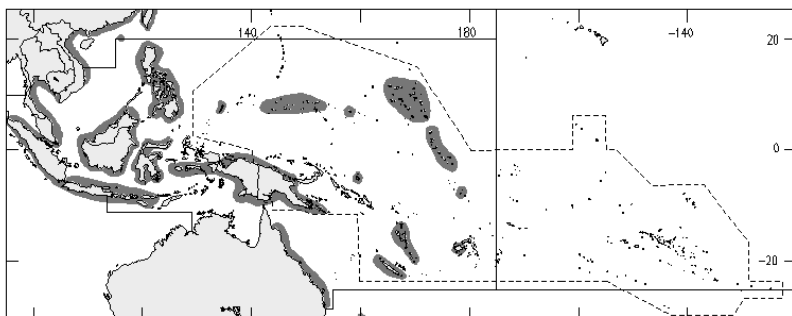
31.9 cm standard length

Diagnostic characters: Body deep and compressed, its depth subequal to head length, 2.4 to 2.7 times in standard length (for specimens 11 to 43 cm standard length); body width 1.9 to 2.8 times in body depth. Dorsal head profile steep, the interorbital area distinctly convex; preopercle subangular, finely serrate, serrae at rounded corner slightly enlarged; opercular spines inconspicuous; upper edge of operculum straight; maxilla reaches about to vertical at rear edge of eye; midlateral part of lower jaw with 2 to 4 rows of teeth; rear nostrils of adults 2 or 3 times larger than anterior nostrils. **First gill arch with 24 to 27 gill rakers**, of which 9 or 10 on upper limb and 15 to 17 on lower limb. Pyloric caeca very numerous. **Dorsal fin with XI spines and 16 or 17 soft rays, the third or fourth spines longest, 2.2 to 2.8 times in head length, the interspinous membranes not or only slightly incised;** anal fin with III spines and 8 soft rays; **caudal fin truncate or slightly emarginate;** pectoral fins thin (not fleshy), with 18 to 20 rays, subequal to pelvic fins, their length 1.7 to 2.0 times in head length. Lateral body scales rough, with auxiliary scales; **lateral-line scales 63 to 75; lateral scale series 128 to 147.** **Colour:** adults usually pale bluish grey, covered with black dots and a few scattered, irregular black spots; broad black submarginal band on caudal fin of some large juveniles; pelvic fins usually black tipped. Juveniles with yellow fins; body of small juveniles (to 12 cm standard length) mainly yellow, the head and front part of body with a wash of bluish grey and faint dark dots.

Size: Maximum length 120 cm.

Habitat, biology, and fisheries: Usually found on isolated coral heads in lagoons or bays, but also caught at depths to 150 m on outer reef area. Swims out in the open, several metres above the bottom, and is readily caught by anglers at night. Feeds on fishes and calappid crabs. In the 1960's, the speckled grouper was abundant at Macclesfield Bank and Pratas Reef in the South China Sea. It is caught with trawls, handlines, and longlines. Marketed fresh.

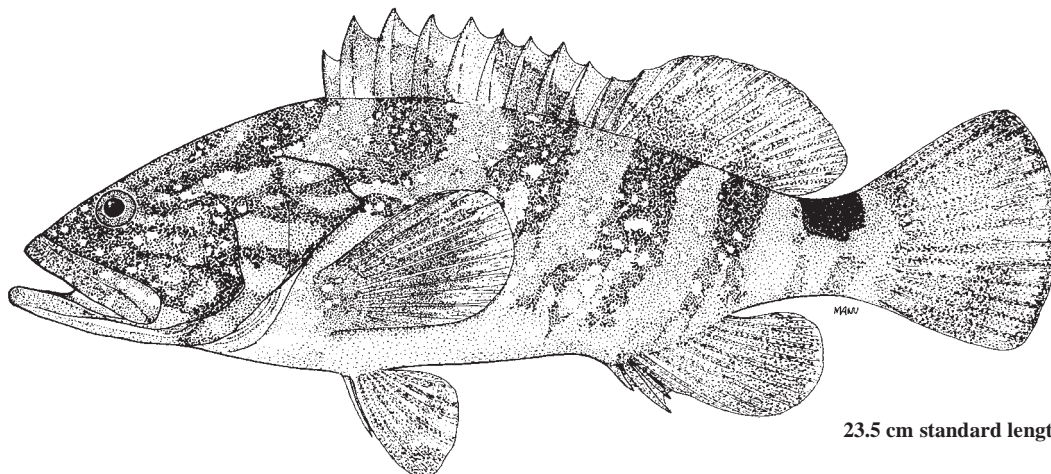
Distribution: Western Pacific, from southern Japan to southern Queensland and east to Fiji and islands of Micronesia; also known from Taiwan Province of China, Hong Kong, Viet Nam, Gulf of Thailand, Indonesia, Philippines, Papua New Guinea, New Caledonia, and Lord Howe Island. The only record from the Indian Ocean (a specimen in the Vienna Museum, NMW 40520, 29.3 cm standard length, from Western Australia) is dubious; the species is not known from Western Australia, and there are no specimens from there in the Western Australian Museum.



Epinephelus daemeli (Günther, 1876)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Saddletail grouper; Fr - Mérrou troussequin; Sp - Mero montado.



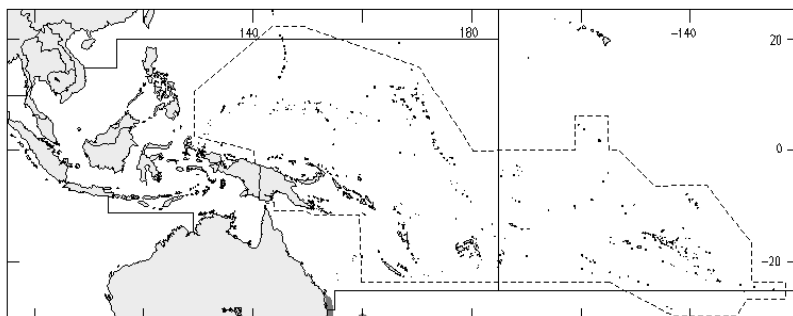
23.5 cm standard length

Diagnostic characters: Body depth 2.9 to 3.3 times in standard length (for specimens 11 to 45 cm standard length); head length 2.3 to 2.5 times in standard length. Interorbital area flat to slightly convex; dorsal head profile almost straight; **preopercle rounded, finely serrate; opercular spines inconspicuous; upper edge of operculum distinctly convex.** Maxilla reaches well past eye; **canines at front of jaws well developed, particularly the inner depressible teeth at symphysis of upper jaw; midlateral part of lower jaw with 2 rows of large teeth.** Rear nostrils of adults 2 to 4 times larger than anterior nostrils. First gill arch with 25 to 28 gill rakers, of which 9 to 12 on upper limb and 15 to 19 lower limb; longest gill raker shorter than longest gill filaments. **Dorsal fin with XI spines and 14 soft rays**, third to last spines subequal and shorter than longest dorsal-fin rays, the interspinous membranes incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral fins fleshy, with 17 to 19 rays, the fin length 1.6 to 2.1 times in head length; pelvic fins not reaching anus, their length 2.1 to 2.5 times in head length. Lateral body scales smooth (except for area covered by pectoral fins), with auxiliary scales; **lateral-line scales 63 to 71; lateral scale series 111 to 126.** **Colour: variable, can change quickly from uniformly dark brown or black to a pale greyish or brown with 4 irregular, oblique, dark bands; first band from anterior dorsal-fin spines to upper edge of operculum; bands darkest dorsally, where they contain small, irregular pale spots; ventrally, the bands break up into irregular dark markings; a fifth dark band from nape to eye and a black saddle blotch on peduncle; median and pelvic fins with narrow white margins on some fish.** Large adults often uniformly dark brown or black (especially in estuaries), the underside of head pale and a few pale spots on cheeks. Small juveniles with dark spots on edges of dark body bars and extend onto median fins.

Size: Maximum length at least 122 cm; maximum weight 64 kg.

Habitat, biology, and fisheries: Rocky reefs from near shore to depths of at least 50 m. An aggressive territorial species that may occupy a particular cave for life. Sex change (from female to male) occurs at a length of 100 to 110 cm. Juveniles feed on crabs and fishes. An esteemed food fish, avidly sought by anglers and spearfishermen.

Distribution: Temperate and subtropical waters of south-western Pacific: Australia (from southern Queensland to South Australia), Lord Howe Island, Norfolk Island, Kermadec Islands, and New Zealand (North Island and Poor Knights Islands).

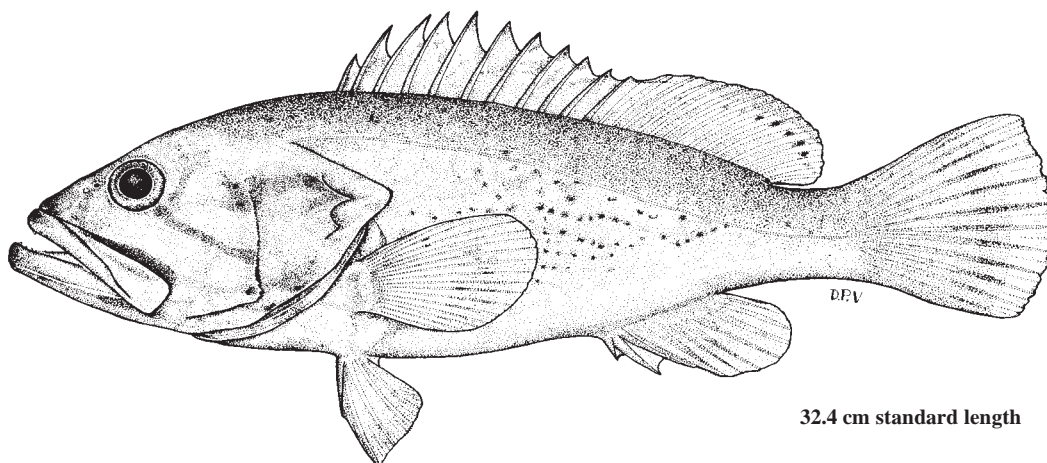


Epinephelus epistictus (Temminck and Schlegel, 1842)

(Plate III, 20)

Frequent synonyms / misidentifications: *Epinephelus praeopercularis* Boulenger, 1887 / *Epinephelus magniscuttis* non Postel, Fourmanoir, and Guézé, 1963; *E. heniochus* non Fowler, 1904.

FAO names: En - Dotted grouper; Fr - Mérrou pâle; Sp - Mero palido.

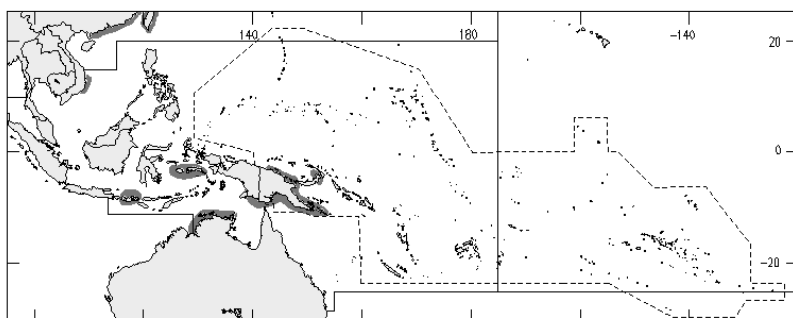


Diagnostic characters: Body depth 3.0 to 3.3 times in standard length (for specimens 12 to 50 cm standard length); head length 2.2 to 2.5 times in standard length. Interorbital area and dorsal head profile slightly convex; **preopercle angle produced, with 3 to 5 distinctly enlarged serrae; upper edge of operculum straight or slightly convex;** maxilla reaches to, almost to, or slightly past vertical at rear edge of eye; adults with a step or abrupt bend on ventral edge of maxilla; midlateral part of lower jaw with 2 rows of teeth, the inner ones slightly larger; nostrils of adults subequal, or rear nostrils about twice as large as anteriors. First gill arch with 7 to 10 gill rakers on upper limb, 15 to 19 on lower limb; length of longest gill raker subequal to longest gill filaments. Pyloric caeca 7 to 10. **Dorsal fin with XI spines and 14 or 15 soft rays**, the third or fourth spines longest, usually shorter than longest soft ray, the interspinous membranes deeply incised; anal fin with III spines and 8 soft rays; caudal fin slightly to moderately rounded; pectoral-fin rays 17 to 19, the fin length 1.6 to 2.1 times in head length; pelvic fins end well short of anus, their length 2.0 to 2.6 times in head length. Lateral body scales rough, with a few auxiliary scales in adults; **lateral-line scales 57 to 70; lateral scale series 105 to 127.** **Colour:** head and body pale brownish or greenish grey, with conspicuous, small, brownish black spots on dorsolateral part of body, rear part of head, and on median fins; some specimens with faint dark band from eye to end of operculum, another from eye to notch of preopercle, and third a continuation of maxillary streak; pectoral-fin rays brownish, the membranes clear. Juveniles with dark spots on head and body arranged in 3 longitudinal rows.

Size: Maximum total length about 80 cm; maximum weight 7 kg.

Habitat, biology, and fisheries: Rocky and trawlable bottoms in depths of 71 to 290 m. Nothing has been published on the biology of *Epinephelus epistictus*. Probably of some commercial importance, but separate catch statistics are not available for this species. Caught with trawls and handlines.

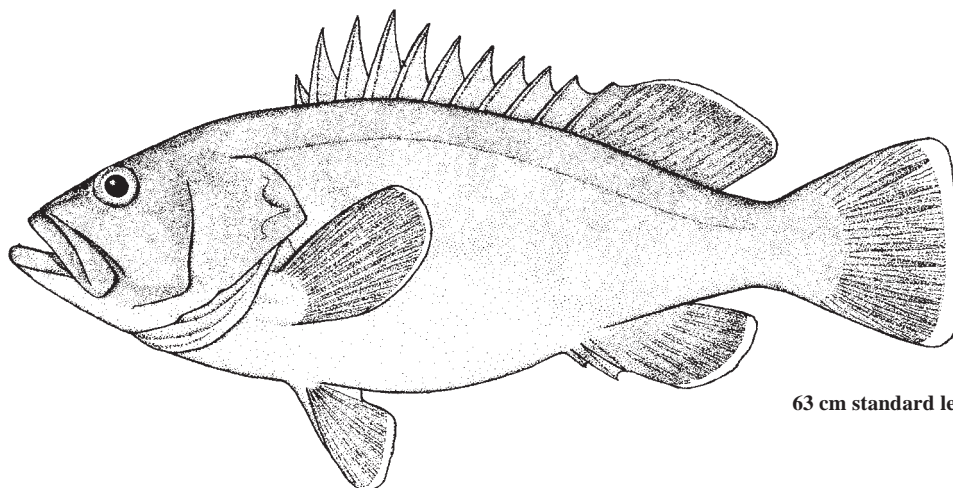
Distribution: Mainly continental localities in the tropical Indo-West Pacific region: from Red Sea to South Africa and across northern Indian Ocean to Viet Nam, China (including Hong Kong and Fujian and Taiwan provinces), Korea, Japan, Ogasawara Islands, Indonesia, Papua New Guinea, and northern Australia.



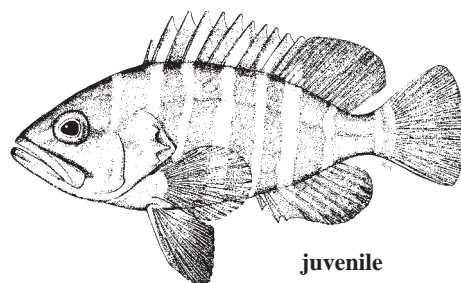
***Epinephelus ergastularius* Whitley, 1930**

Frequent synonyms / misidentifications: None / *Epinephelus septemfasciatus* (non Thunberg, 1793); *E. octofasciatus* non Griffin, 1926.

FAO names: En - Sevenbar grouper; Fr - Mérou sept raies; Sp - Mero de siete bandas.



63 cm standard length



juvenile

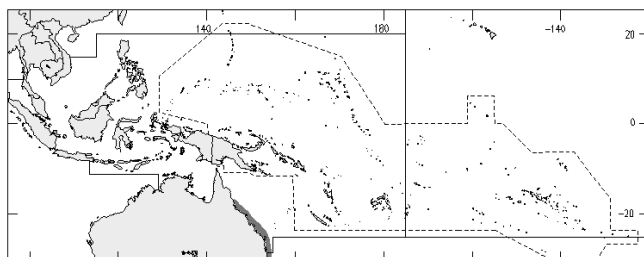
Diagnostic characters: Body depth 2.6 to 2.9 times in standard length (for specimens 19 to 89 cm standard length); head length 2.4 to 2.6 times in standard length. Interorbital area and dorsal head profile slightly convex; **preopercle finely serrate, the serrae on the rounded corner not enlarged and the ventral edge with 1 to 4 small serrae**; upper edge of operculum almost straight; maxilla reaches to or almost to vertical at rear edge of eye; midlateral part of lower jaw with 2 rows of teeth; **rear nostrils of adults 2 to 4 times larger than anterior nostrils.**

First gill arch with 7 to 9 gill rakers on upper limb, 14 or 15 on lower limb; outer side of first gill arch with small bony tooth plates. **Dorsal fin with XI spines and 14 or 15 soft rays**, the third spine usually longest, 2.6 to 3.2 times in head length and subequal to length of longest soft ray, the interspinous membranes deeply incised; **anal fin with III spines and 9 or 10 soft rays**; caudal fin slightly rounded in juveniles, truncate to slightly emarginate in adults; pectoral-fin rays 18 or 19; the fin length 1.7 to 2.4 times in head length; pelvic fins distinctly shorter than pectoral fins. Lateral body scales rough; no auxiliary scales; **lateral-line scales 63 to 70**; **lateral scale series 103 to 116.** **Colour:** body of juveniles brown, with 7 broad dark bars, the first from dorsal-fin origin to upper edge of operculum, the last bar covering most of caudal peduncle, its upper half black; the pale spaces separating second and third dark bars and that between fourth and fifth dark bars are narrower than those between third and fourth or fourth and fifth and sixth dark bars; prominent black maxillary streak; median and pelvic fins dark brown; pectoral fins hyaline brown, pelvic fins blackish brown. Adults pinkish grey, with no trace of dark bars; fins darker than body and with white margins (except along spinous part of dorsal fin).

Size: Maximum total length at least 157 cm; maximum weight about 66 kg.

Habitat, biology, and fisheries: Adults are caught in depths of 108 to 370 m; juveniles are found in depths of 15 to 128 m. Commonly caught with hook-and-line off the coast of New South Wales.

Distribution: Known only from east coast of Australia between 18° and 36°S.

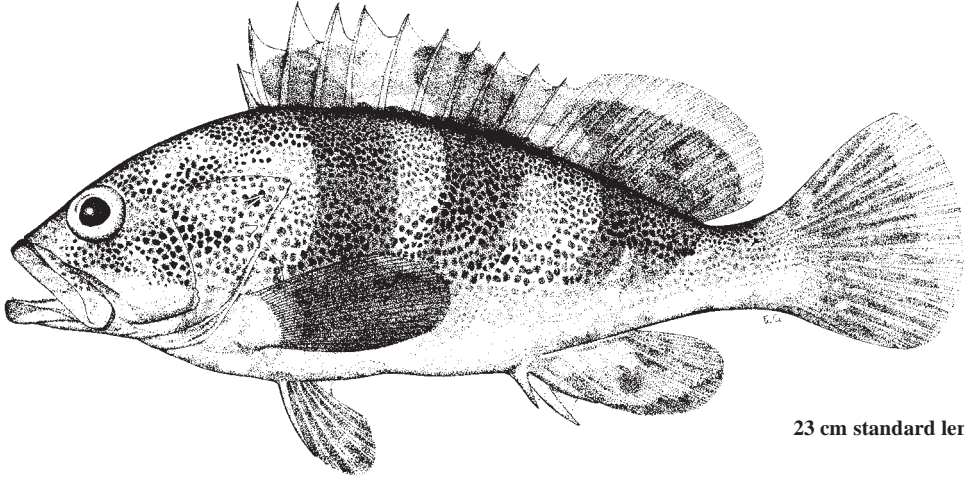


Epinephelus fasciatomaculosus (Peters, 1866)

(Plate III, 21)

Frequent synonyms / misidentifications: *Epinephelus fasciatomaculatus* (Peters, 1866) (misspelling) / *Epinephelus akaara* (non Temminck and Schlegel, 1842); *E. diacanthus* (non Valenciennes, 1828); *E. sexfasciatus* (non Valenciennes, 1828).

FAO names: En - Rock grouper; Fr - Mérou rocaille; Sp - Mero de las piedras.



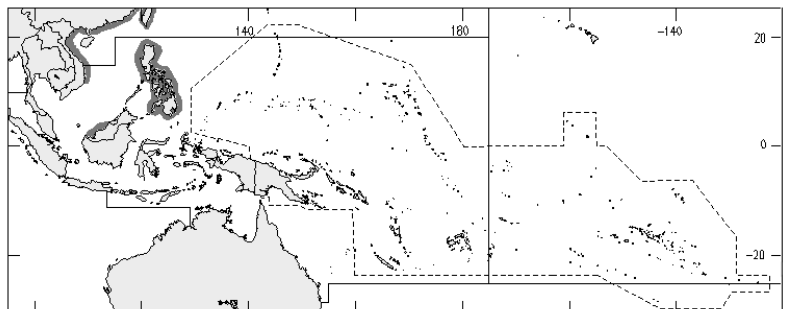
23 cm standard length

Diagnostic characters: Body depth 2.8 to 3.3 times in standard length (for specimens 9 to 29 cm standard length); head length 2.4 to 2.6 times in standard length. Interorbital area and dorsal head profile slightly convex; **preopercle angular, the serrae at the angle slightly enlarged; upper edge of operculum straight;** maxilla reaches about to below rear third of eye or a little past eye; midlateral part of lower jaw with 2 or 3 rows of subequal teeth; nostrils subequal. First gill arch with 7 or 8 gill rakers on upper limb, 14 to 16 on lower limb. Dorsal fin with XI spines and 15 to 17 soft rays, the third or fourth spines longest, 2.5 to 3.1 times in head length, and a little shorter than longest dorsal-fin rays, the interspinous membranes incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 17 to 19, the fin length 1.5 to 1.8 times in head length; pelvic fins not reaching past anus, their length 1.9 to 2.3 times in head length. Lateral body scales rough, with auxiliary scales; **lateral-line scales 48 to 52; lateral scale series 92 to 106.** **Colour:** head and body pale greyish brown, with numerous small dark brown, brownish yellow or russet spots; 5 slightly oblique broad dark bars usually visible on body, the last covering peduncle, the first 4 extending into dorsal fin; the first 2 bars are darker dorsally and extend to the margin of spinous dorsal fin; ventral parts of head and body whitish or pinkish; soft dorsal, caudal, and anal fins with faint pale spots and streaks; minute gold tag often visible at tips of some dorsal-fin spines. Dark body bars faint in adults and may be lost in preservative, except for dorsal part of first 2 bars.

Size: Maximum total length about 30 cm.

Habitat, biology, and fisheries: Shallow rocky areas. Feeds on fishes, prawns, crabs, worms, and gastropods. Females mature at 12.5 cm standard length, and most sexual transition occurs in fish 2 or 3 years old (14 to 16 cm). Maximum age is 6 years. Of some commercial importance in Hong Kong and Taiwan Province of China. Although a small species, it is excellent as a food fish and brings a good price. Caught with trawls, gill nets, and hook-and-line.

Distribution: Western Pacific from southern Japan to Malaysia, including Taiwan Province of China, Philippines, Viet Nam, China, Hong Kong, Hainan, and Sarawak.

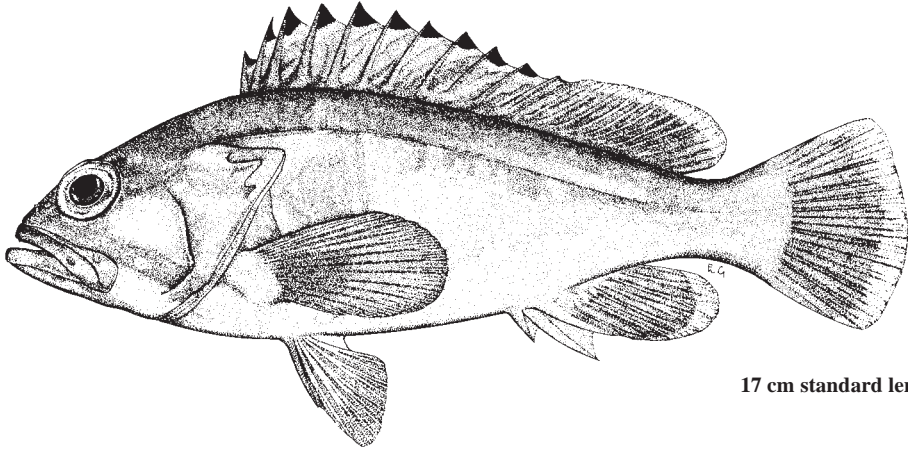


Epinephelus fasciatus (Forsskål, 1775)

(Plate III, 22)

Frequent synonyms / misidentifications: *Epinephelus emoryi* Schultz, 1853 / *Epinephelus retouti* non Bleeker, 1868.

FAO names: En - Blacktip grouper; Fr - M rou oriflamme; Sp - Mero banderilla.



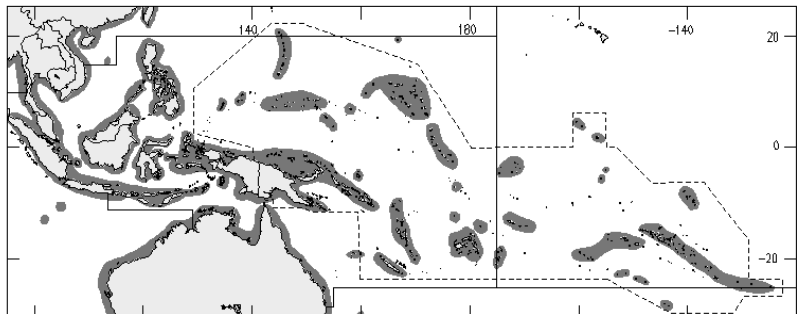
17 cm standard length

Diagnostic characters: **Body depth 2.8 to 3.3 times in standard length** (for specimens 10 to 26 cm standard length); head length 2.3 to 2.6 times in standard length. Preopercle rounded, the rear edge serrate; upper edge of operculum straight; midlateral part of lower jaw with 2 to 4 rows of teeth; nostril subequal. First gill arch with 6 to 8 gill rakers on upper limb, 15 to 17 on lower limb. Pyloric caeca 10 to 16. Dorsal fin with XI spines and 15 to 17 soft rays, the third to eleventh spines subequal and slightly shorter than longest dorsal-fin ray, the interspinous membranes distinctly incised; anal fin with III spines and 8 soft rays; **caudal fin slightly to moderately rounded; Central-Pacific specimens often with truncate caudal fins;** pectoral-fin rays 18 to 20, the fin length 1.5 to 2.0 in head length; pelvic fins not reaching past anus. **Lateral body scales rough, with numerous auxiliary scales; nape and dorsoposterior part of head densely covered with minute auxiliary scales;** lateral-line scales 49 to 75; lateral scale series 92 to 135. **Colour:** ground colour pale greenish grey, to pale reddish yellow to scarlet; **body often with 5 or 6 faint dark bars, the last on peduncle; body scales (except ventrally) with pale centre and dark rear margin, producing a faint checked pattern;** usually with irregular pale blotches and spots on body (a midlateral series diminishing in size posteriorly from behind pectoral-fin base to caudal peduncle) and dark brown line along crease of dorsal-fin base; dorsal part of head and nape, including upper jaw, dark red or reddish brown or with bands and blotches of similar colour; most specimens with dark band from below eye to interopercle; rim of orbit black and often bordered by a pale bluish line. Fins reddish orange, pale yellowish green or greenish brown, **the outer triangular part of interspinous membranes of dorsal fin black (dark red in fish from Western Australia and in some specimens from deep water), with pale yellow or white spot behind tip of each spine.**

Size: Maximum total length about 40 cm.

Habitat, biology, and fisheries: Coral reefs and rocky bottom from shore to depths of 160 m. Feeds during day and night on brachyuran crabs, fishes, shrimps, galatheid crabs, stomatopods, ophiuroids, and octopus. Abundant in shallow water and widely used for food. Readily caught with hook-and-line, spear, traps, and gill nets.

Distribution: Indo-West Pacific region from Red Sea to Pitcairn Islands; in the western Pacific from Japan (south of 33°) and Korea to southern Queensland and Lord Howe Island, and including virtually all tropical islands of the region.

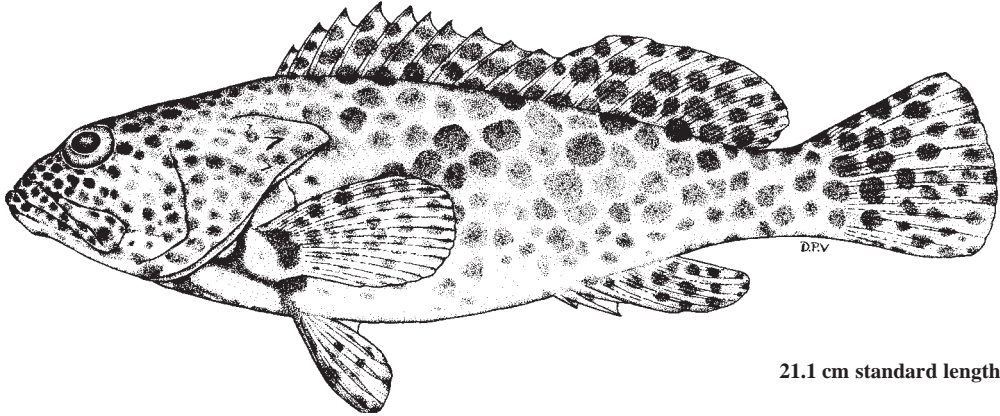


Epinephelus faveatus (Valenciennes, 1828)

(Plate III, 23)

Frequent synonyms / misidentifications: None / *Epinephelus macrospilos* (non Bleeker, 1855); *E. quoyanus* (non Valenciennes, 1830); *E. merra* non Bloch, 1793; *E. spilotoceps* non Schultz, 1953; *E. hexagonatus* (non Forster, 1801).

FAO names: En - Barredchest grouper; Fr - Mérou écharpe; Sp - Mero bandeado.



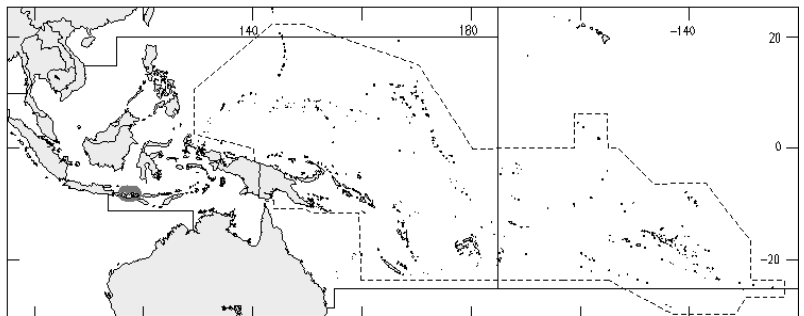
21.1 cm standard length

Diagnostic characters: Body depth 3.0 to 3.5 times in standard length (for specimens 9 to 26 cm standard length); head length 2.3 to 2.6 times in standard length; caudal peduncle depth 3.8 to 4.3 times in head length. Interorbital area flat or slightly concave, the dorsal head profile convex; preopercle rounded, with shallow indentation just above corner and slightly enlarged serrae at the corner; upper edge of operculum slightly convex; maxilla reaches past vertical at rear edge of eye; midlateral part of lower jaw with 2 rows of teeth; nostrils subequal. First gill arch with 7 to 10 gill rakers on upper limb, 14 to 16 on lower limb. Pyloric caeca about 25. **Dorsal fin with XI spines and 16 to 18 soft rays, the third or fourth spine longest, 2.6 to 3.9 times in head length and shorter than longest dorsal-fin rays, the interspinous membranes incised; anal fin with III spines and 8 soft rays, the second and third spines subequal, 3.6 to 4.3 times in head length; caudal fin rounded, length of middle rays 1.65 to 1.9 times in head length; pectoral-fin rays 17 to 19, the fin length 1.7 to 2.2 times in head length; pelvic fins reaching anus, 2.2 to 2.6 times in head length. Lateral body scales smooth (except for area covered by pectoral fin), with numerous auxiliary scales; lateral-line scales 48 to 52; lateral scale series 83 to 98. **Colour:** head, body, and fins pale, covered with close-set roundish brown spots of unequal size, most of those on body larger than pupil; 4 groups of 2 or 3 spots at base of dorsal fin darker than other spots on body; 2 oblique dark bands on side of chest; pectoral fins dusky, with dark blotch at base and obscure dark spots, more distinct on inner surface of fin; spots on median fins darker than those on body.**

Size: Maximum total length 40 cm.

Habitat, biology, and fisheries: Shallow-water coral reefs and rocky areas. Apparently a small species; females are mature at 17 cm standard length. Separate statistics are not available for this species, but undoubtedly of importance in artisanal fisheries. Caught with hook-and-line, gill nets, lift nets, traps, and spear.

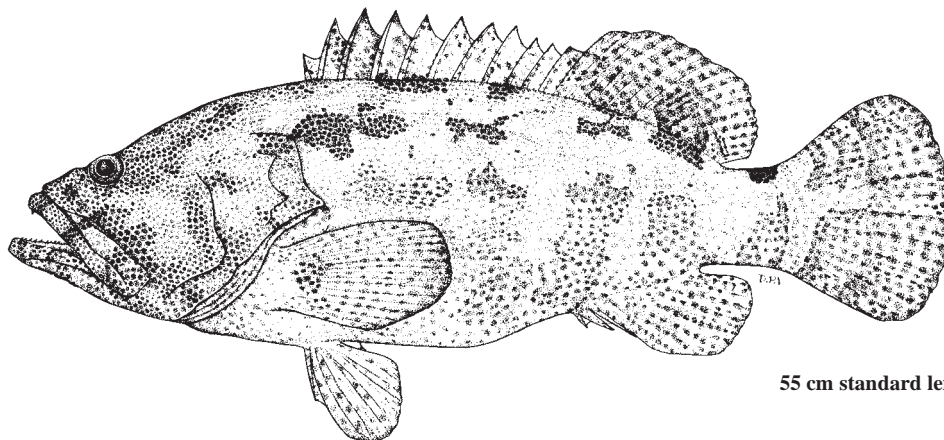
Distribution: Northeastern Indian Ocean: Southern India, Sri Lanka, and southern Indonesia (Bali and Lombok). *Epinephelus faveatus* has only recently been recognized and distinguished from similar species, so it is likely that its distribution is continuous from Pakistan to Indonesia.



Epinephelus fuscoguttatus (Forsskål, 1775)

Frequent synonyms / misidentifications: None / *Epinephelus polyphkadion* (non Bleeker, 1849) (= *E. microdon* (Bleeker, 1856)).

FAO names: En - Brownmarbled grouper; Fr - Mérou marron; Sp - Mero manchado.

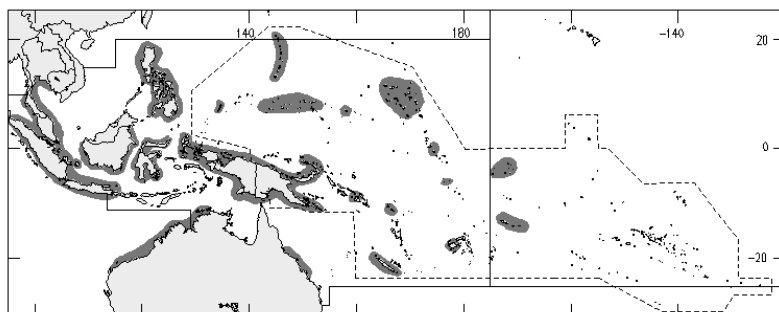


Diagnostic characters: Body depth 2.6 to 2.9 times in standard length (for specimens 11 to 55 cm standard length); head length 2.3 to 2.5 times in standard length. Interorbital area flat or slightly concave; dorsal head profile of adults indented at eyes and distinctly convex from there to dorsal-fin origin; upper edge of operculum distinctly convex, descending almost vertically to rear end of operculum; ventral edge of preorbital bone indented below nostrils. Maxilla extends well posterior to eye; midlateral part of lower jaw with 3 or 4 rows of teeth, the inner teeth about twice length of outer teeth; canines inconspicuous; nostrils close together; posterior nostrils triangular, 4 to 7 times larger than anteriors in adults. First gill arch with 10 to 12 gill rakers on upper limb, 17 to 21 on lower limb (but rudiments often difficult to count); gill rakers short and stout, raker at angle subequal to longest gill filaments, other rakers distinctly shorter. Dorsal fin with XI spines and 14 or 15 soft rays, the third or fourth spines longest, 2.9 to 3.5 times in head length and obviously shorter than longest dorsal-fin rays, the interspinous membranes distinctly incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 18 to 20, the fin length 1.7 to 2.1 times in head length; pelvic fins not reaching anus, 2.0 to 2.5 times in head length. Lateral body scales smooth, with auxiliary scales; lateral-line scales 52 to 58; lateral scale series 102 to 115. **Colour:** pale yellowish brown, with 5 vertical series of dark brown blotches that are very irregular in outline; head, body, and fins covered with close-set small brown spots, those on the dark blotches much darker than spots in between blotches; small black saddle spot on rear half of peduncle; 2 or 3 faint, dark bars at side of jaws.

Size: Maximum total length at least 95 cm (120 cm and 11 kg in the Philippines).

Habitat, biology, and fisheries: Shallow coral reefs and rocky bottoms to depths of 60 m; juveniles in seagrass areas. Feeds on fishes, crabs, and cephalopods. Implicated in ciguatera fish poisonings at some Pacific localities. Occasionally seen in local markets. Used in cage culture operations in Singapore. Caught with hook-and-line, traps, and spear.

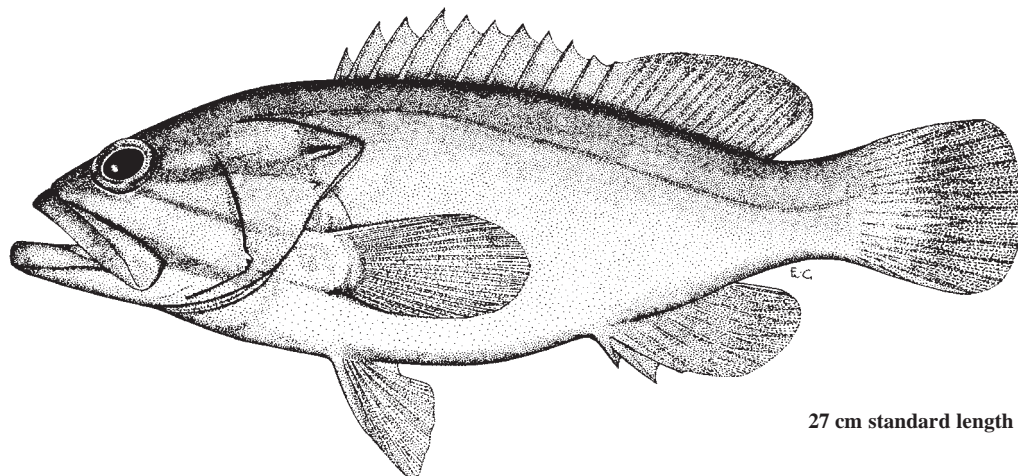
Distribution: Indo-West Pacific region from Red Sea to Phoenix Islands, including Indonesia, Japan, Philippines, New Guinea, tropical coast of Australia, New Caledonia, and most tropical islands of the region; not known from Persian Gulf, Asian mainland, Hawaii or French Polynesia.



Epinephelus heniochus Fowler, 1904

Frequent synonyms / misidentifications: *Epinephelus hata* Katayama, 1953 / *Epinephelus epistictus* (non Temminck and Schlegel, 1842).

FAO names: En - Bridled grouper; Fr - Mérrou bride; Sp - Mero embridado.



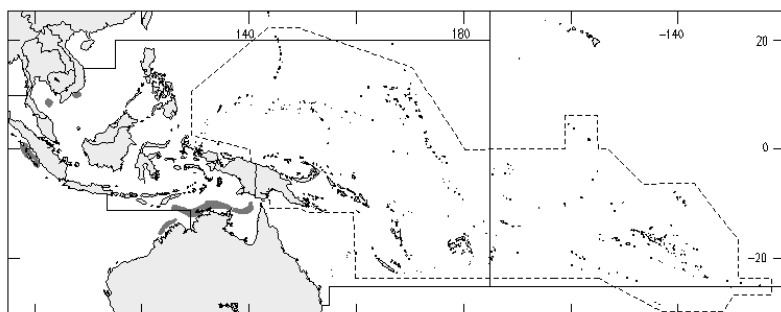
27 cm standard length

Diagnostic characters: Body depth 2.7 to 3.2 times in standard length (for specimens 10 to 27 cm standard length); head length 2.2 to 2.4 times in standard length. Interorbital area slightly convex; dorsal head profile convex; **preopercle angular, with 2 to 4 distinctly enlarged serrae at the angle; upper edge of operculum approximately straight;** maxilla usually reaches to or slightly past a vertical at rear edge of eye; **lower edge of maxilla with a step-like bend in adults;** canines at front of jaws well developed, especially in upper jaw; midlateral part of lower jaw with 2 rows of teeth; rear nostrils about twice as large as anterior nostrils. **First gill arch with 7 to 9 gill rakers on upper limb, 14 to 16 on lower limb.** Pyloric caeca 7 or 8. Dorsal fin with XI spines and 14 or 15 soft rays, the third or fourth spines longest, 3.0 to 3.8 times in head length and shorter than longest dorsal-fin rays; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 16 to 18, the fin length 1.6 to 1.9 times in head length; and pelvic fins 1.9 to 2.4 times in head length. **Lateral body scales rough, without auxiliary scales; lateral-line scales 54 to 60; lateral scale series 89 to 100.** **Colour:** head and body pale brown dorsally, shading to whitish or pale pink ventrally; some specimens with minute brownish black dots on body and rear part of head; faint dark brown stripe from eye to end of operculum, another darker stripe from lower edge of eye to subopercle and a third from edge of preorbital to interopercle; pectoral fins hyaline greyish yellow; lower part of caudal fin sometimes darker than rest of fin; margin of interspinous dorsal fin membranes yellow.

Size: Maximum total length at least 43 cm.

Habitat, biology, and fisheries: Most specimens have been taken with trawls on mud or silty sand bottom in depths of 40 to 235 m. Nothing has been published on the biology of this species. Reported as "common but not abundant" in the South China Sea, and "not a very popular food fish" in the markets of Singapore. Caught with trawls and vertical longlines.

Distribution: Tropical western Pacific: Singapore, Indonesia, the Philippines, Gulf of Thailand, Viet Nam, northern Australia, and New Britain. Although Katayama's type-specimens of *Epinephelus hata* were purchased from the Nagasaki fish market, the absence of other records of *E. heniochus* from Japan indicates that the types of *E. hata* may have been caught south of Japan.

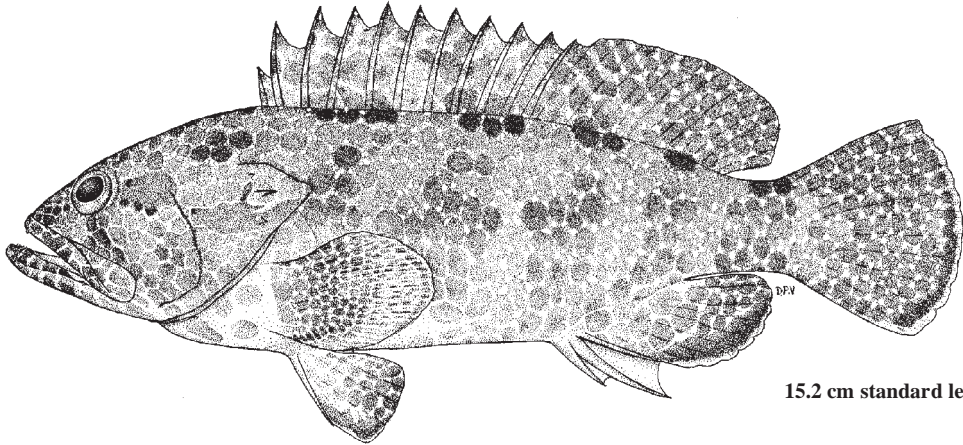


Epinephelus hexagonatus (Forster, 1801)

(Plate III, 24)

Frequent synonyms / misidentifications: None / *Epinephelus merra* non Bloch, 1793; *E. macrospilos* (non Bleeker, 1855); *E. spilotoceps* non Schultz, 1953; *E. quoyanus* (non Valenciennes, 1830).

FAO names: En - Starspotted grouper; Fr - M erou m elif ere; Sp - Mero mielero.



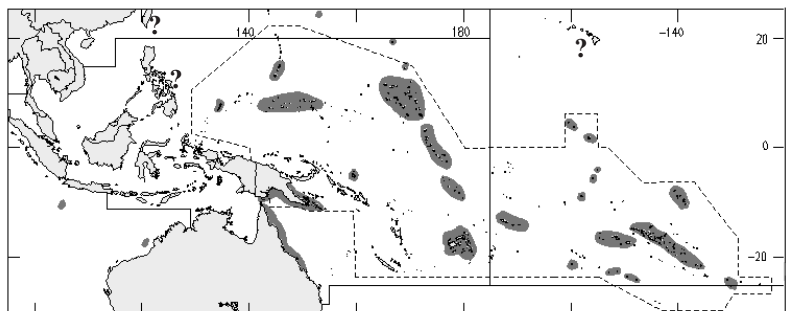
15.2 cm standard length

Diagnostic characters: Body depth 2.8 to 3.4 times in standard length (for specimens 10 to 17 cm standard length); head length 2.5 to 2.6 times in standard length. Preopercle rounded, the ventral serrae slightly enlarged; upper edge of operculum convex; midlateral part of lower jaw with 3 to 5 rows of teeth; nostrils subequal. First gill arch with 7 to 9 gill rakers on upper limb, 17 to 19 on lower limb. Dorsal fin with XI spines and 15 to 17 soft rays, the **fifth to ninth spines subequal (2.5 to 2.8 times in head length)** and slightly shorter than longest soft rays; anal fin with III spines and 8 soft rays, **the second spine 2.1 to 2.5 times in head length, distinctly longer than third spine or depth of peduncle**; caudal fin rounded; **pectoral-fin rays 17 to 19, the fin length 1.6 to 1.9 times in head length**; pelvic fins not reaching past anus, 1.8 to 2.1 times in head length. Lateral body scales rough, with auxiliary scales; **lateral-line scales 61 to 70**; lateral scale series 93 to 114. **Colour:** head and body covered with polygonal (mostly hexagonal) brown spots that tend to merge, leaving only conspicuous triangular white dots at corners of the polygons; dark spots on belly and ventral part of head more rounded and separated, and often reddish brown; 4 or 5 brownish black saddle blotches (formed by groups of darker spots) on dorsal part of body and caudal peduncle, the first 4 extending onto base of dorsal fin; irregular dark bar, formed by darker polygonal spots, on lower part of body below each saddle blotch; large brown or olive spot just behind eye, often joined to similar spot on opercle; fins with close-set dark brown or reddish brown spots and white dots, except distal half of pectoral fins with faint dark spots and no white dots; pelvic and anal fins with pale edge and dark brown submarginal band; interspinous dorsal-fin membranes with dark brown triangle and short white or pale yellow filament behind tip of each spine.

Size: Maximum total length about 26 cm.

Habitat, biology, and fisheries: A common coral-reef species, usually found in shallow outer-reef areas exposed to surge. Feeds mainly on fishes and crustaceans. Too small to be of commercial importance except as a food fish in artisanal fisheries. Caught with hook-and-line, traps, spear, and gill nets.

Distribution: Tropical Indo-West Pacific region from Kenya to the Pitcairn Group. Known from most tropical Indo-Pacific islands (both on and off the Pacific Plate), including islands of the Great Barrier Reef, but no verifiable records from the mainland coast of Australia, Indonesia, the Philippines, Taiwan Province of China, or Hawaii.

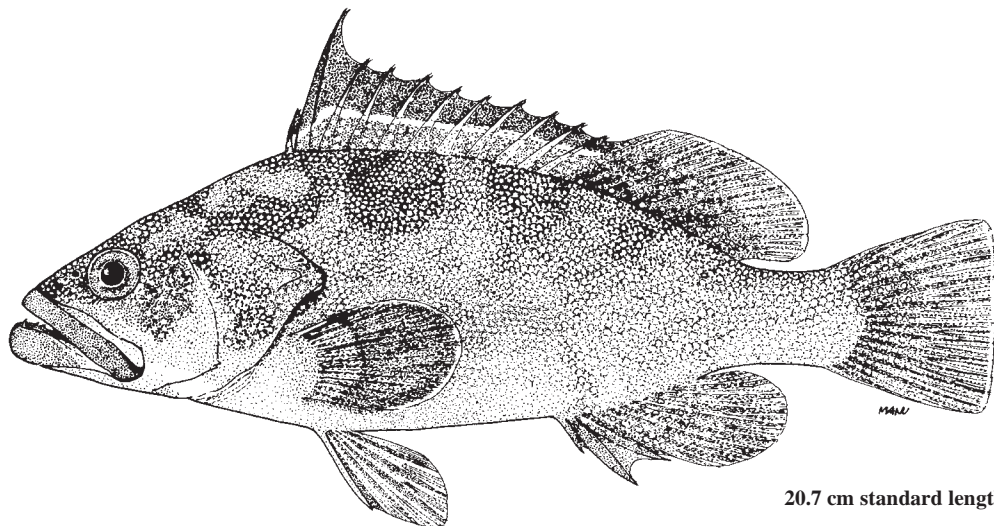


Epinephelus irroratus (Forster, 1801)

(Plate IV, 25)

Frequent synonyms / misidentifications: *Epinephelus spiniger* Günther, 1859; *E. albopunctulatus* Boulenger, 1895 / None.

FAO names: En - Marquesan grouper; Fr - Mériou Marquesises; Sp - Mero marquesano.



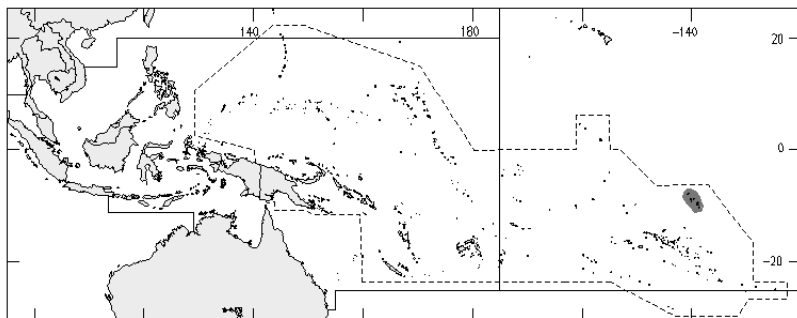
20.7 cm standard length

Diagnostic characters: Body depth 2.7 to 3.3 times in standard length (for specimens 14 to 28 cm standard length); head length 2.4 to 2.6 times in standard length. Interorbital area and dorsal head profile slightly convex; preopercle corner rounded and slightly indented, the lower serrae scarcely enlarged; upper edge of operculum almost straight; maxilla reaching to or just past vertical at rear edge of eye; midlateral part of lower jaw with 2 to 4 rows of teeth; rear nostril about twice size of anterior nostril. First gill arch with 6 to 8 gill rakers on upper limb, 13 to 16 on lower limb. Dorsal fin with XI spines and 16 soft rays, the **second spine elongated in adults, more than twice length of third spine, the interspinous membranes not or only slightly incised**; anal fin with III spines and 8 soft rays; caudal fin truncate to slightly rounded; pectoral-fin rays 18 to 20, the fin length 1.6 to 1.9 times in head length; pelvic fins not reaching past anus, 1.8 to 2 times in head length. Lateral body scales rough, with auxiliary scales; **lateral-line scales 70 to 75; lateral scale series 117 to 136. Colour:** reddish brown with white dot on each scale (dots may not persist in preservative); maxillary streak dark reddish brown; spinous dorsal fin with prominent dark red margin; white line along rear edges of median and pectoral fins.

Size: Maximum total length at least 34 cm.

Habitat, biology, and fisheries: Abundant in shallow water around fringing coral reefs. Nothing has been published on the biology of this species, but it is of considerable interest to the artisanal fishery of the Marquesas Islands. Caught with hook-and-line, spear, and traps.

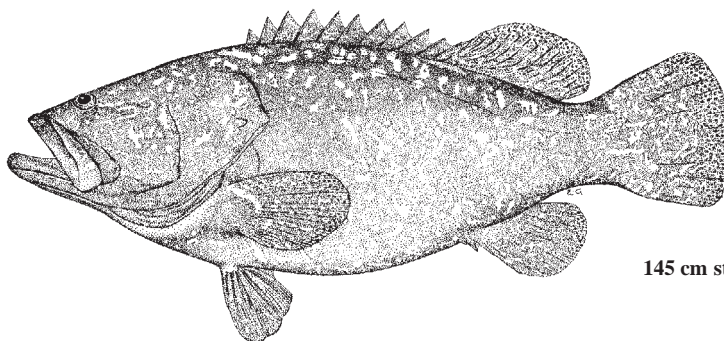
Distribution: Known only from the Marquesas Islands and from a single specimen taken at Minami Tori Shima (Marcus Island), but the latter record may be erroneous.



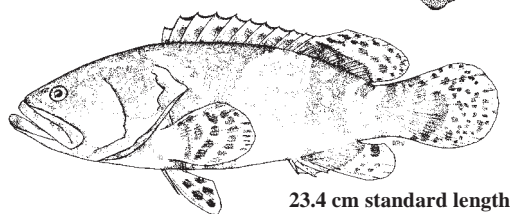
Epinephelus lanceolatus (Bloch, 1790)

Frequent synonyms / misidentifications: *Promicrops lanceolatus* (Bloch, 1790) / *Epinephelus tauvina* (non Forsskål, 1775).

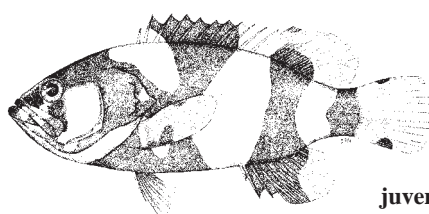
FAO names: En - Giant grouper; Fr - Mèrou lancéolé; Sp - Mero lanceolado.



145 cm standard length



23.4 cm standard length

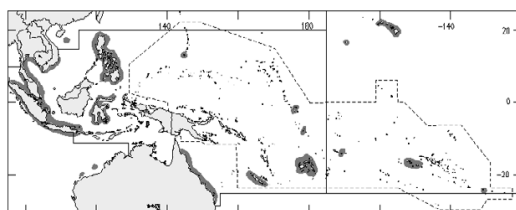
juvenile
3 cm standard length

Diagnostic characters: Body robust, its width 1.5 to 1.75 times in body depth; body depth 2.4 to 3.4 times in standard length (for specimens 12 to 179 cm standard length); head length 2.2 to 2.7 times in standard length; eye diameter 5.8 to 14 times in head length; interorbital width 3.3 (at 177 cm standard length) to 6.2 (at 12 cm standard length) times in head length. Interorbital area flat to slightly convex, the dorsal head profile convex; preopercle finely serrate, the corner rounded; upper edge of operculum convex; maxilla reaching past eye; midlateral part of lower jaw with 2 or 3 rows of teeth (at 20 to 25 cm standard length) increasing to 15 or 16 rows in a specimen of 177 cm standard length; canine teeth at front of jaws small or absent; nostrils subequal. First gill arch of juveniles with 8 to 10 gill rakers on upper limb and 14 to 17 on lower limb; rudiments in adults are difficult to distinguish from bony platelets covering gill arch. Dorsal fin with XI spines and 14 to 16 soft rays, the third to eleventh spines subequal, shorter than longest soft rays and 3.1 to 5.7 times in head length; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 18 to 20, the fin length 1.8 to 2.2 times in head length; pelvic fins not reaching anus, 2.1 to 2.6 times in head length. Lateral body scales smooth, with auxiliary scales; lateral-line scales 54 to 62, the anterior scales with branched tubules (except small juveniles); lateral scale series 95 to 105. **Colour:** small juveniles (less than 15 cm) yellow, with 3 irregular black areas, the first from spinous dorsal fin to belly and chest and extending onto head, the second from base of soft dorsal fin to anal fin and the last at base of caudal fin; subadults (25 to 60 cm) with irregular white or yellow spots on the black areas and fins with black spots; adults (90 to 165 cm) dark brown with faint mottling, the fins with numerous small black spots; large adults (180 to 250 cm) dark brown, fins darker.

Size: One of the largest groupers, attains 260 cm total length; maximum weight 288 kg.

Habitat, biology, and fisheries: Occurs in caves on coral reefs and around wrecks; juveniles and adults also found in estuaries and harbours. Caught at depths of 100 m, but more often in shallow water. Feeds on crustaceans (mainly spiny lobsters and large crabs), a variety of fishes including sharks and batoids, and juvenile sea turtles. Not common enough to be of commercial importance; rare in some places due to spearfishing. Caught with hook-and-line and spear.

Distribution: Indo-Pacific region from Red Sea to South Africa and eastwards to Hawaiian and Pitcairn islands, including Japan, Taiwan Province of China, Philippines, Indonesia, Thailand, Australia, and islands of the Central Pacific.

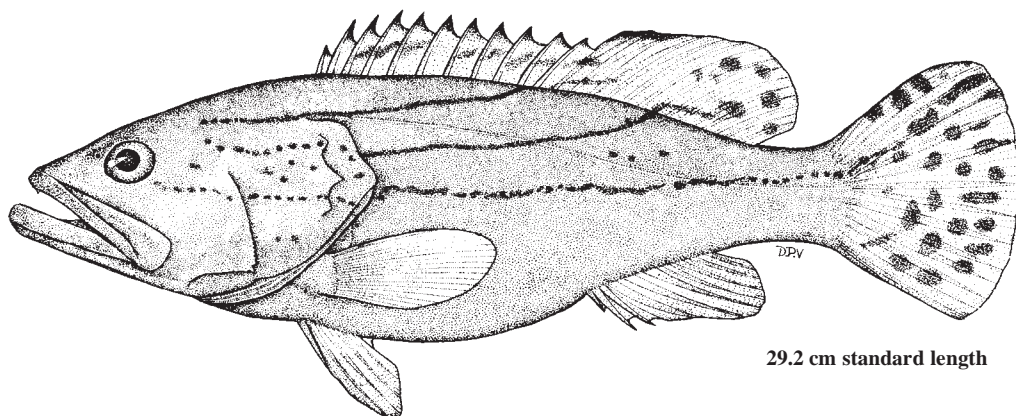


Epinephelus latifasciatus (Temminck and Schlegel, 1842)

(Plate IV, 26)

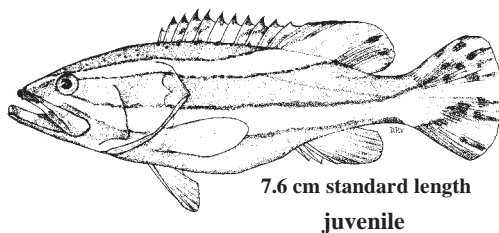
Frequent synonyms / misidentifications: *Epinephelus grammicus* (Day, 1867) / *Epinephelus epistictus* (non Temminck and Schlegel, 1842); *E. poecilonotus* (non Temminck and Schlegel, 1842).

FAO names: En - Striped grouper; Fr - M rou   bandes; Sp - Mero abanderado.



29.2 cm standard length

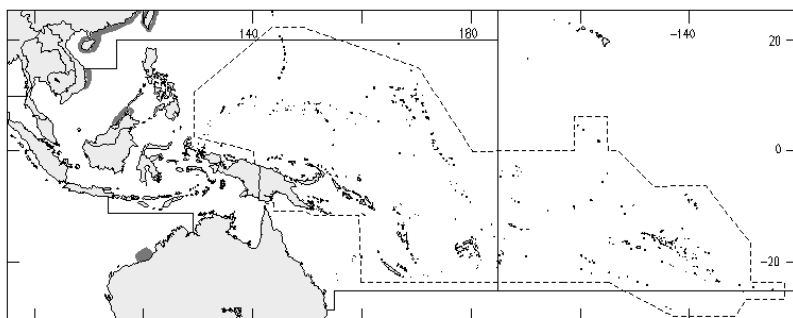
Diagnostic characters: Body depth 2.9 to 3.4 times in standard length (for specimens 13 to 62 cm standard length); head length 2.3 to 2.6 times in standard length. Interorbital area convex, the dorsal head profile convex; preopercle angular, with 3 to 7 distinctly enlarged serrae at angle; upper edge of operculum distinctly convex; maxilla reaches past vertical at rear edge of eye; midlateral part of lower jaw with 2 or 3 rows of teeth; nostrils subequal. First gill arch with 8 to 11 gill rakers on upper limb, 15 to 18 on lower limb. Dorsal fin with XI spines and 12 to 14 soft rays, the third or fourth spine longest, 2.9 to 3.9 times in head and not much shorter than longest soft rays, the interspinous membranes incised; anal fin with III spines and 8 soft rays; caudal fin truncate in large adults, the rear margin convex in juveniles; pectoral-fin rays 17 to 19, the fin length 1.8 to 2.2 times in head length; pelvic fins not reaching anus, 2.2 to 2.6 times in head length. Lateral body scales smooth; lateral-line scales 56 to 65; lateral scale series 91 to 106. **Colour:** juveniles lavender-grey or pale brownish, shading to whitish ventrally; 2 black-edged white longitudinal bands, the upper band from above eye to anterior dorsal-fin rays, and the lower band from below eye to lower caudal-fin rays; dorsal and caudal fins with black spots and streaks; white bands disappearing on adults, the dark edges breaking into dashes and spots; head and body of large adults uniformly grey.

7.6 cm standard length
juvenile

Size: Maximum total length 157 cm; maximum weight 58.6 kg.

Habitat, biology, and fisheries: The preferred habitat seems to be bottoms of low relief; adults are taken on coarse sand or rocky areas, while juveniles are found on silty-sand and mud bottom. Depths range from 20 to at least 230 m. Common in markets of the Persian Gulf, Hong Kong, Singapore, and Japan. Caught with hook-and-line, longlines, trawls, and traps.

Distribution: Indo-West Pacific region, including the Red Sea, Persian Gulf, Gulf of Oman, Pakistan, coast of India, Viet Nam, Hong Kong, China (Shanghai), Korea, southern Japan, Taiwan Province of China, and northwest Australia. The banded grouper seems to prefer continental localities, but it is not known from the east coast of Africa, islands of the Indian Ocean, Philippines, or New Guinea.

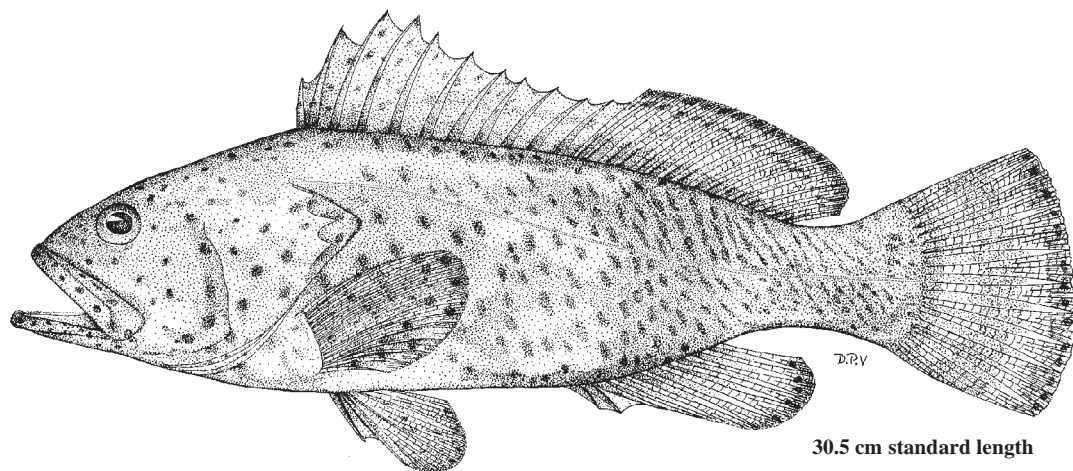


Epinephelus longispinis (Kner, 1864)

(Plate IV, 27)

Frequent synonyms / misidentifications: None / *Epinephelus gaimardi* (Valenciennes, 1830); *E. fario* (nomen dubium); *E. maculatus* (non Bloch, 1790).

FAO names: En - Longspine grouper; Fr - Méroutongues épines; Sp - Mero espigón.

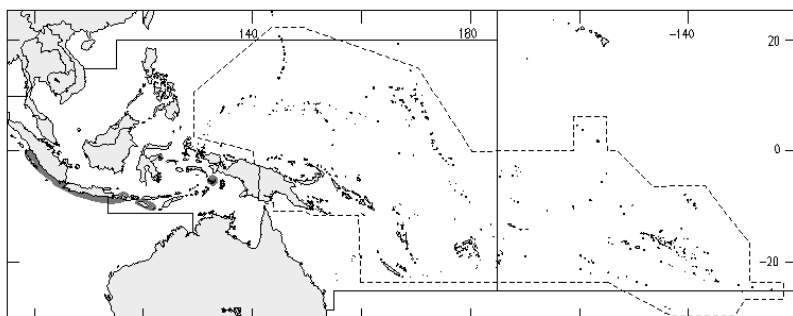


Diagnostic characters: Body depth 2.8 to 3.3 times in standard length (for specimens 13 to 35 cm standard length); head length 2.4 to 2.6 times in standard length. Interorbital area flat to slightly convex, the dorsal head profile convex; **preopercle corner with enlarged serrae and a shallow indentation just above the corner**; upper edge of operculum straight or slightly convex; maxilla reaches to or past vertical at rear edge of eye, the **ventral edge with a blunt hook-like process distally in fishes larger than 35 cm standard length**; midlateral part of lower jaw with 2 rows of teeth; posterior nostrils not much larger than anteriors. First gill arch with 8 to 11 gill rakers on upper limb, 15 to 17 on lower limb. Dorsal fin with XI spines and 16 or 17 soft rays, the **third or fourth spine longest, 2.1 to 2.6 times in head length and distinctly longer than longest dorsal-fin rays, the interspinous membranes slightly incised between anterior spines and not incised between posterior spines**; anal fin with III spines and 8 soft rays; caudal fin convex; pectoral-fin rays 17 to 19, the fin length 1.5 to 1.9 times in head length; pelvic fins not reaching anus, 1.8 to 2.2 times in head length. Lateral body scales rough, with numerous auxiliary scales; lateral-line scales 49 to 53; lateral scale series 98 to 121. **Colour:** head and body pale greyish brown, covered with small, dark reddish brown spots that are round and widely spaced on head and front half of body, but obliquely elongated, closer together and darker posteriorly; fins with similar dark brown spots; a row of dark spots along distal margin of soft dorsal and caudal fins. Juveniles with fewer dark spots on head and body, and 2 to 4 dark blotches on body at base of dorsal fin and extending onto fin; ventral part of head and body with irregular white spots; white blotch on upper part of operculum.

Size: Maximum total length at least 55 cm.

Habitat, biology, and fisheries: Usually found on coral reefs or rocky areas and occasionally on sandy bottom; depths of capture range from 1 to 70 m. Feeds mainly on crustaceans, especially crabs and stomatopods, and rarely on fish and squid. Caught with hook-and-line, spear, traps, and in trawls.

Distribution: Continental and insular localities in Indian Ocean from Kenya to South Africa and east to the Watubela Group of the eastern Banda Sea. Not known from the Red Sea or Persian Gulf.

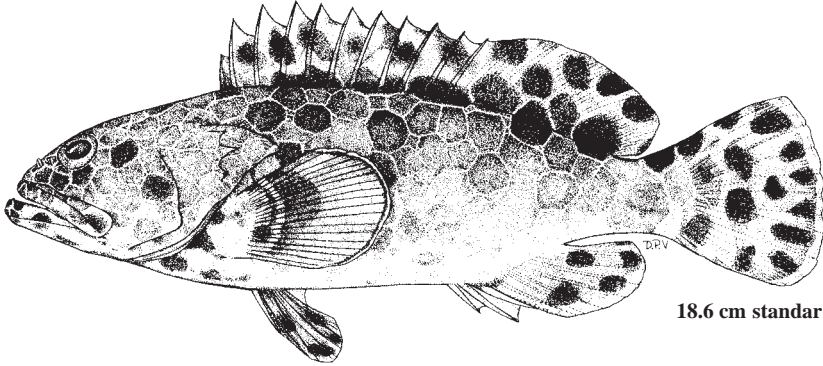


Epinephelus macrospilos (Bleeker, 1855)

(Plate IV, 28)

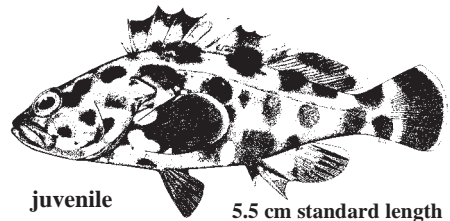
Frequent synonyms / misidentifications: None / *Epinephelus quoyanus* (non Valenciennes, 1830); *E. faveatus* (non Valenciennes, 1828); *E. corallicola* (non Valenciennes, 1828); *E. howlandi* (non Günther, 1873).

FAO names: En - Snubnose grouper; Fr - Mérou tapis; Sp - Mero alfombrado.



18.6 cm standard length

Diagnostic characters: Body depth 3.0 to 3.6 times in standard length; head length 2.3 to 2.6 times in standard length; caudal peduncle depth 3.2 to 3.7 times in head length. Interorbital area flat or slightly concave, the dorsal head profile of adults with a ventral bend at orbits; **preopercle rounded, with minute serrae mostly covered by skin and a shallow indentation just above the "corner"; upper edge of operculum straight or slightly convex;** maxilla reaches to or past vertical at rear edge of orbit, the ventral edge smoothly curved at distal expansion; lower jaw strongly projecting, the midlateral part with 2 to 4 rows of teeth; rear nostrils usually distinctly larger than anterior nostrils. First gill arch with 21 to 26 gill rakers, of which 7 to 9 on upper limb and 14 to 17 on lower limb. Pyloric caeca 25 to 27. **Dorsal fin with XI spines and 15 to 17 soft rays**, the third or fourth spines longest, 2.3 to 3.4 times in head length and shorter than longest dorsal-fin rays; anal fin with III spines and 8 soft rays, **the second and third spines subequal, 2.8 to 4.2 times in head length;** caudal fin rounded, **length of middle rays 1.5 to 2.0 times in head length;** pectoral-fin rays 17 to 20, the fin length 1.5 to 2 times in head length; **pelvic-fin length 1.8 to 2.5 times in head length. Lateral body scales smooth, except for area covered by pectoral fins; lateral-line scales 48 to 52; lateral scale series 86 to 103. Colour:** head and body pale greyish brown, with dark brown spots (centre of spots darker than the diffuse edges) that are large and well-separated in young, becoming relatively smaller, more numerous and closer together in adults; median and pelvic fins with similar dark spots; pectoral fins usually dusky with a few dark spots and white line along the edge; some specimens with faint oblique dark line across lower part of chest; median fins with narrow pale margin posteriorly; no dark spots on underside of lower jaw. Juveniles with prominent white blotches as shown in figure.



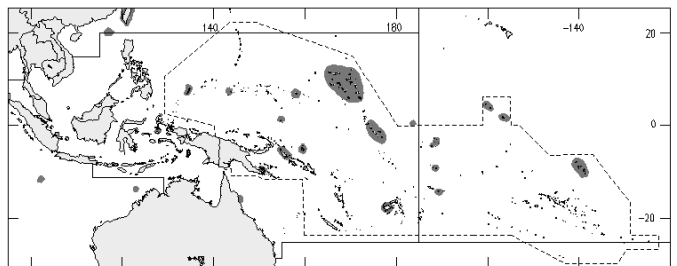
juvenile

5.5 cm standard length

Size: Maximum total length at least 51 cm.

Habitat, biology, and fisheries: Coral reefs to depths of at least 44 m. Feeds on crustaceans (mainly crabs), fishes, octopus, and squid. Common in some areas and important in artisanal fisheries. Caught with hook-and-line, spear, and traps.

Distribution: Indo-Pacific region from Africa (Kenya to South Africa) to Central Pacific, including Cocos-Keeling, Indonesia, Okinawa, Western Australia (Scott Reef), Great Barrier Reef, Marquesas, and most western Pacific islands (both on and off the Pacific Plate). Not known from Red Sea, Persian Gulf, Asian continent, or Hawaii.

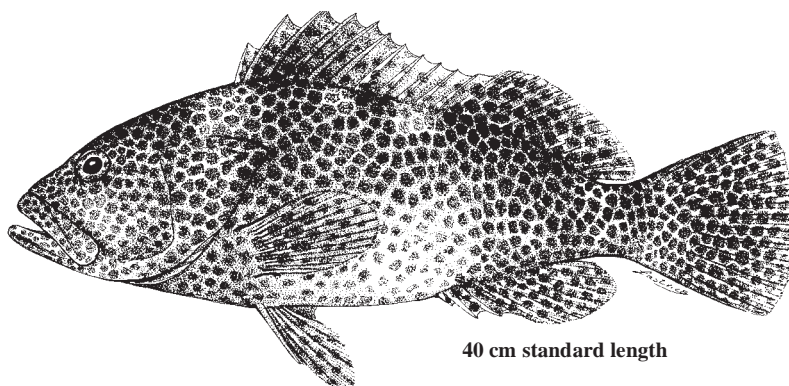


Epinephelus maculatus (Bloch, 1790)

(Plate IV, 29)

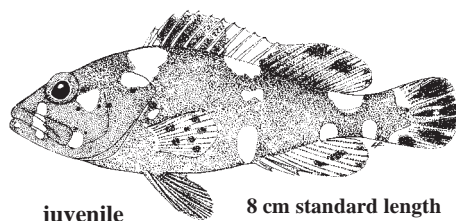
Frequent synonyms / misidentifications: *Epinephelus medurensis* (Günther, 1873) / *Epinephelus macrospilus* (non Bleeker, 1855).

FAO names: En - Highfin grouper; Fr - Mérout haute voile; Sp - Mero aleta alta.



40 cm standard length

Diagnostic characters: Body depth 2.8 to 3.1 times in standard length; head length 2.4 to 2.6 times in standard length. Interorbital area flat to slightly convex, the dorsal head profile convex; **preopercle with a shallow indentation just above the enlarged serrae at the corner; upper edge of operculum straight or slightly convex;** maxilla reaches to or past vertical at rear edge of eye, the **ventral edge with a blunt hook-like process distally in fishes larger than 35 cm standard length;** midlateral part of lower jaw with 2 rows of teeth; nostrils subequal. First gill arch with 8 to 10 gill rakers on upper limb, 15 to 17 on lower limb. Pyloric caeca 30 to 45. Dorsal fin with XI spines and 15 to 17 soft rays, the **third or fourth spine longest, 2.1 to 2.6 times in head length and distinctly longer than dorsal-fin rays, the interspinous membranes slightly incised between anterior spines and not incised posteriorly;** anal fin with III spines and 8 soft rays, **the third spine longest, 3.3 to 4.1 times in head length and not longer than caudal peduncle depth;** caudal fin convex or rounded; pectoral-fin rays 17 to 19, the **fin length 1.5 to 1.9 times in head length;** pelvic fins reaching to or near anus, 1.7 to 2.0 times in head length. Lateral body scales distinctly rough, with numerous auxiliary scales; lateral-line scales 49 to 52; lateral scale series 102 to 120. **Colour:** head, body, and fins of adults pale brown, covered with small, round to hexagonal, close-set, dark brown spots, extending onto ventral parts of body and head; 2 large diffuse dusky areas on dorsal part of body and dorsal fin, the largest, extending over dorsal fin from second to fifth spines, the second dark blotch from tenth spine to second soft ray, the dorsal fin pale between these dark blotches, but with small dark spots. One resting colour phase is broadly mottled with large dark and pale areas; in the pale areas, the usual dark brown spots are mostly whitish, with small dark brown centres. Small juveniles (5 to 10 cm) yellowish brown, with well-separated small black spots (mainly on head and fins) and prominent, white blotches and spots, the largest on middle of dorsal fin.



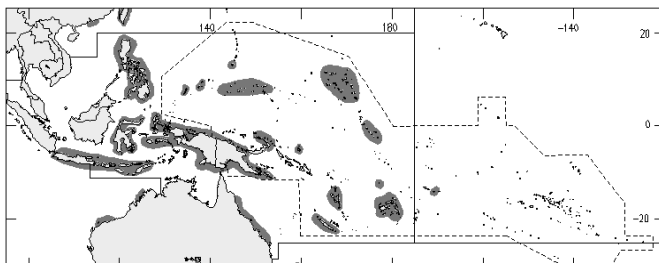
juvenile

8 cm standard length

Size: Maximum total length at least 57 cm.

Habitat, biology, and fisheries: Coral reefs at depths of 2 to 100 m. Prey comprises mainly small fishes, crabs, and octopuses. Not common, but of some interest in artisanal fisheries. Caught with hook-and-line, spear, and traps.

Distribution: Eastern Indian Ocean and Western Pacific from Cocos-Keeling Islands, Indonesia, Hong Kong, Ryukyu Islands, Ogasawara Islands, Philippines, New Guinea, Great Barrier Reef, Lord Howe Island, New Caledonia, New Ireland, Fiji, Samoa, Palau, Caroline Islands, Marshall Islands, and Gilbert Islands.

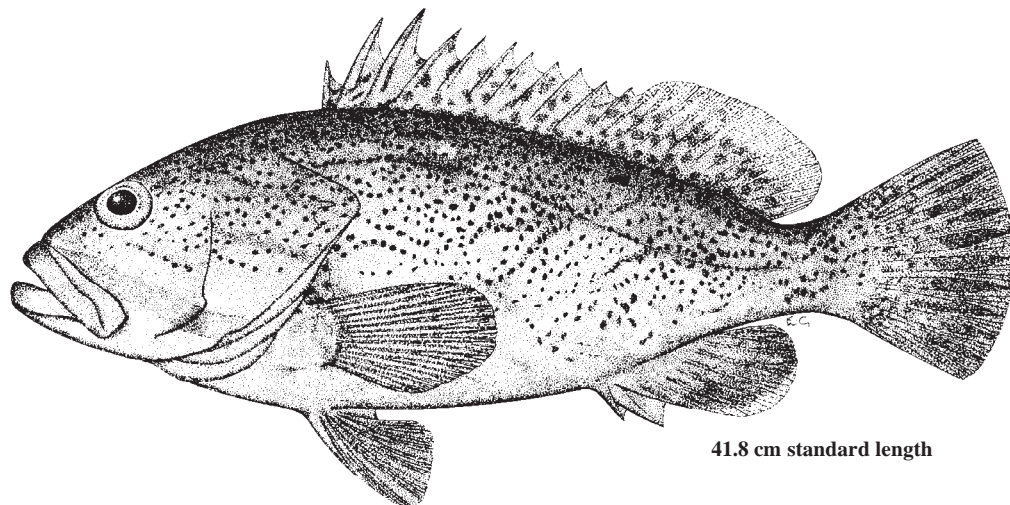


Epinephelus magniscuttis Postel, Fourmanoir, and Guézé, 1963

(Plate IV, 30)

Frequent synonyms / misidentifications: *Epinephelus pseudomorrhua* Postel, Fourmanoir, and Guézé, 1963 / *Epinephelus epistictus* (non Temminck and Schlegel, 1842); *E. poecilonotus* (non Temminck and Schlegel, 1842).

FAO names: En - Spotted grouper; Fr - Mérou grandes écailles; Sp - Mero bacalao.

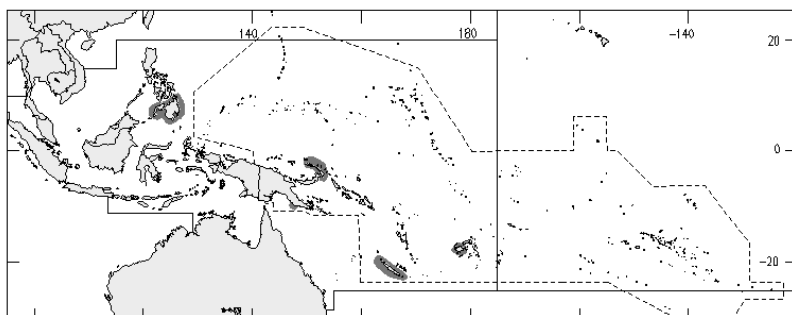


Diagnostic characters: Body depth 2.7 to 3.2 times in standard length; head length 2.2 to 2.4 times in standard length. Interorbital area flat to convex, the dorsal head profile almost straight; **preopercle angular, with 2 to 4 distinctly enlarged serrae at angle; upper edge of operculum slightly convex;** maxilla reaches to below rear half of eye, the ventral edge with a low step at the distal expansion; midlateral part of lower jaw with 2 rows of teeth, the inner teeth larger than outer ones; posterior nostrils not much larger than anteriors. First gill arch with 8 or 9 gill rakers on upper limb, 16 or 17 on lower limb. Pyloric caeca 7. **Dorsal fin with XI spines and 14 or 15 soft rays, the third or fourth spines longest, 2.5 to 3.0 times in head length and longer than longest dorsal-fin rays,** the interspinous membranes deeply incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 17 to 19, the fin length 1.7 to 2.0 times in head length; pelvic fins not reaching anus, 2.1 to 2.3 times in head length. Lateral body scales distinctly rough and without auxiliary scales; lateral-line scales 55 to 62; lateral scale series 103 to 122. **Colour: generally pale brown, with small dark brown (or greyish green) spots unevenly scattered on dorsolateral parts of head (posterior to eyes) and body, dorsal fin, and caudal fin; no spots on body below level of pectoral fins or on anal and paired fins.** Juveniles are said to have 6 or 7 dark lines running horizontally along the body and these disappear with age.

Size: Maximum total length 150 cm; maximum weight about 50 kg.

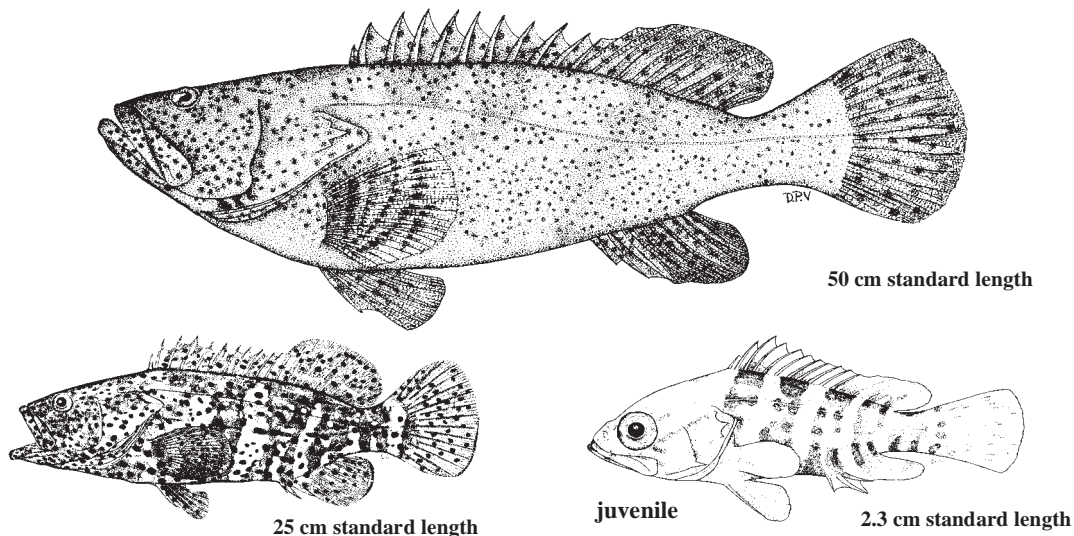
Habitat, biology, and fisheries: Deep water (128 to 300 m) in the vicinity of coral reefs. Biology unknown. An excellent food fish but apparently rare in the western Pacific region. Probably of some importance in artisanal fisheries.

Distribution: Indo-West Pacific from South Africa, Mozambique, Réunion, Mauritius, New Caledonia, Philippines, New Guinea, New Ireland, and Fiji.



Epinephelus malabaricus (Bloch and Schneider, 1801)

(Plate IV, 31)

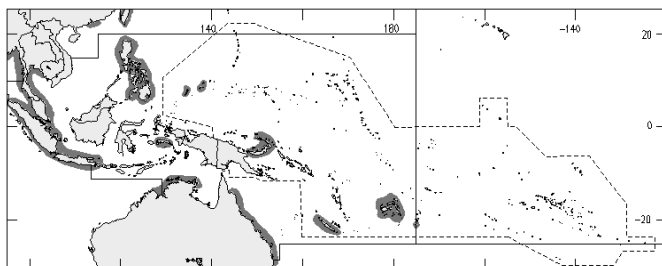
Frequent synonyms / misidentifications: None / *Epinephelus tauvina* (non Forsskål, 1775).**FAO names:** En - Malabar grouper; Fr - M rou malabare; Sp - Mero malab rico.

Diagnostic characters: Body elongate, its depth 3.0 to 3.7 times in standard length; body width 1.4 to 1.9 times in body depth; head length 2.3 to 2.6 times in standard length; interorbital width 4.5 to 6.5 times in head length, and 2.1 to 3.2 times in upper jaw length; preopercle with enlarged serrae at the angle; upper edge of operculum almost straight; maxilla extends past vertical at rear edge of orbit; upper jaw length 17 to 22% of standard length; snout length 1.7 to 2.0 times in upper jaw length; midlateral part of lower jaw with 2 to 5 rows of teeth; large adults with rear nostrils slightly larger than anterior nostrils. First gill arch with 23 to 27 gill rakers, of which 8 to 11 on upper limb and 14 to 18 on lower limb; rudiments difficult to distinguish from small bony platelets on gill arch. Pyloric caeca numerous (more than 80 branches). Dorsal fin with XI spines and 14 to 16 soft rays, the third to fifth spines usually slightly longer than posterior spines, 3.1 to 4.0 times in head length and distinctly shorter than longest soft rays; anal fin with III spines and 8 soft rays, the third spine usually longest; caudal fin rounded; pectoral-fin rays 18 to 20, the fin length 1.7 to 2.2 times in head length; and pelvic fins 2.1 to 2.6 times in head length. **Lateral body scales rough, with auxiliary scales; lateral-line scales 54 to 64;** anterior lateral-line tubes of large adults with 2 to 4 branches; lateral scale series 101 to 117. **Colour:** head and body brownish, covered with small, well-separated, blackish brown spots which extend onto chest, lower jaw and gular area, and roof of mouth; head and body also with scattered white spots and blotches; 5 irregular, oblique, dark brown bars (more or less interrupted by pale spots) often visible on body; fins with scattered small black spots.

Size: Maximum size uncertain because of confusion with other species of large groupers; attains at least 115 cm total length and a weight of 25 kg.

Habitat, biology, and fisheries: Coral and rocky reefs, tidepools, estuaries, mangrove swamps, and sandy/mud bottom from shore to a depth of 150 m. Feeds on fishes, crustaceans, and octopuses. One of the most common groupers in markets of the Indo-West Pacific region, and widely used in the aquaculture industry. Caught with trawls, longlines, traps, spear, and hook-and-line.

Distribution: Indo-Pacific area from Red Sea and South Africa to Japan, Australia, Palau, Yap, and Fiji. Occurs in continental and insular localities: Indonesia, Singapore, Philippines, Taiwan Province of China, China, Papua New Guinea, New Ireland, Caroline Islands, New Caledonia, and Tonga. In Australia, it ranges from the Northern Territory to New South Wales. Recently found in eastern Mediterranean.

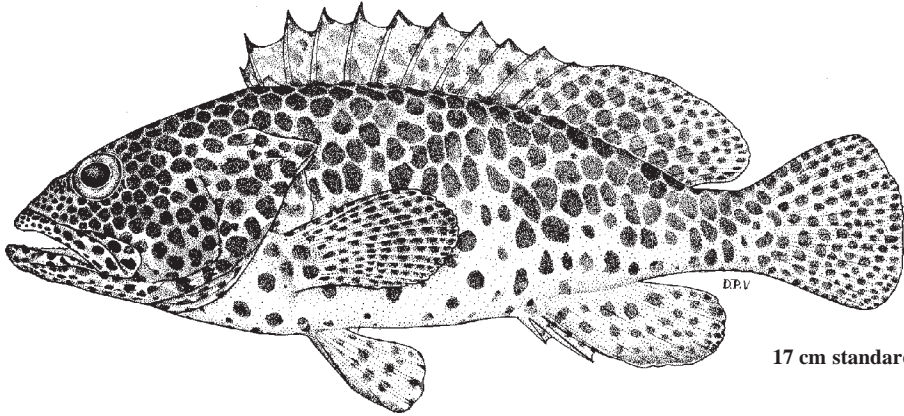


Epinephelus merra Bloch, 1793

(Plate IV, 32)

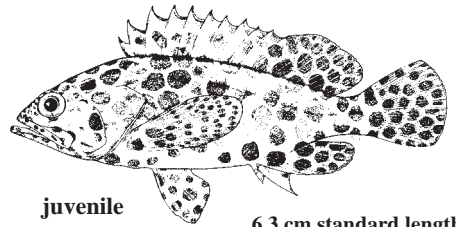
Frequent synonyms / misidentifications: None / *Epinephelus macrospilos* (non Bleeker, 1855); *E. hexagonatus* (non Forster, 1801); *E. melanostigma* non Schultz, 1953; *E. spilotoceps* non Schultz, 1953; *E. faveatus* (non Valenciennes, 1828); *E. quoyanus* (non Valenciennes, 1830).

FAO names: En - Honeycomb grouper; Fr - M erou g ateau de cire; Sp - Mero panal.



17 cm standard length

Diagnostic characters: Body depth 2.8 to 3.3 times in standard length; head length 2.3 to 2.6 times in standard length; caudal peduncle depth 3.2 to 4.1 times in head length. Preopercle rounded or subangular, the serrae at angle enlarged; upper edge of operculum almost straight; maxilla reaches past eye; midlateral part of lower jaw with 2 to 4 rows of teeth, the inner teeth about twice length of outer ones; nostrils subequal or rear nostrils larger. First gill arch with 6 to 9 gill rakers on upper limb, 14 to 17 on lower limb. Pyloric caeca 8.



juvenile

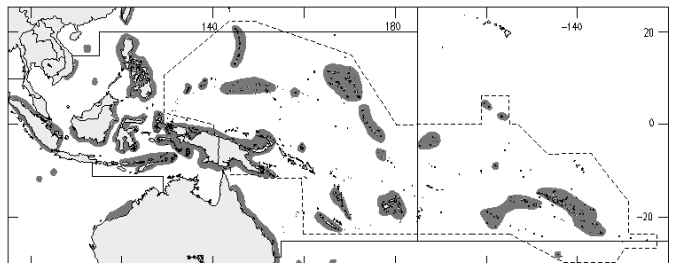
6.3 cm standard length

Dorsal fin with XI spines and 15 to 17 soft rays, the third to last spines subequal, the longest 2.4 to 3.2 times in head length; anal fin with III spines and 8 soft rays, second and third spines subequal, 2.1 to 3.0 times in head length and longer than depth of peduncle; caudal fin rounded; pectoral-fin rays 16 to 18, the fin length 1.5 to 1.8 times in head length; pelvic fins 1.8 to 2.2 times in head length. Lateral body scales rough, with auxiliary scales; lateral-line scales 48 to 54; lateral scale series 98 to 114. **Colour:** head, body, and fins pale, covered with close-set, dark brown or reddish brown spots, the interspaces forming an irregular pale reticulum; spots on ventral part of body paler, more widely spaced and diffuse; some midlateral spots often joined to form horizontal bands; 5 irregular dark bars may be displayed by differential darkening of some body spots, but black dorsal blotches never present; dark spots on median fins become smaller distally; pectoral fins covered with distinct small black spots, largely confined to the rays (the best diagnostic colour character for *Epinephelus merra*); tips of interspinous dorsal-fin membranes white or pale yellow, with a small submarginal black spot.

Size: Maximum total length 32 cm.

Habitat, biology, and fisheries: A coral-reef species typically found around patch reefs in depths less than 20 m, but occasionally seen at 50 m. Feeds on fishes, crustaceans, and cephalopods. Females mature at 14 cm standard length and sexual transition occurs at 18 to 21 cm. Important to artisanal fisheries because of its abundance in shallow water. Caught with handlines, fish traps, and spear.

Distribution: Indo-Pacific region from South Africa to French Polynesia. Primarily an insular species; not known from the Red Sea or Persian Gulf. Occurs at most tropical islands in the Indian Ocean and western Central Pacific, both on and off the Pacific Plate, and ranges from Japan to northwestern Australia, Queensland, Lord Howe Island, and eastwards to the Tuamotu Archipelago.

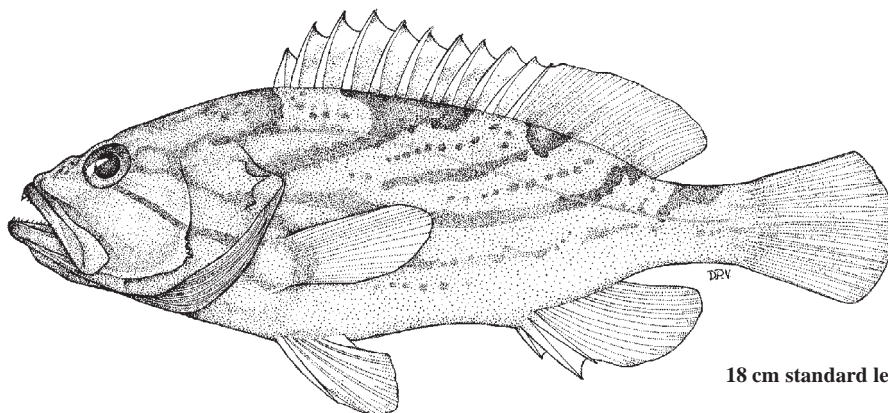


Epinephelus morrhua (Valenciennes, 1833)

(Plate V, 33)

Frequent synonyms / misidentifications: *Epinephelus cometae* Tanaka, 1927 / *Epinephelus poecilnotus* (non Temminck and Schlegel, 1842); *E. radiatus* (non Day, 1867); *E. tuamotuensis* non Fourmanoir, 1971.

FAO names: En - Comet grouper; Fr - Mérou comète; Sp - Mero cometa.



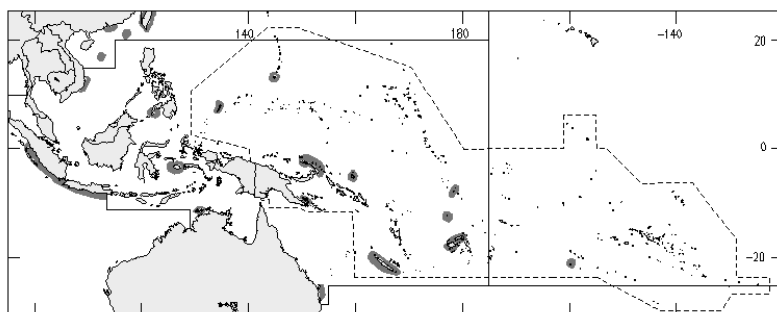
18 cm standard length

Diagnostic characters: Body depth 2.8 to 3.1 times in standard length; head length 2.3 to 2.5 times in standard length. Preopercle with a shallow indentation just above enlarged serrae at the corner; upper edge of operculum almost straight; maxilla reaches to or past vertical at rear edge of eye; midlateral part of lower jaw with 2 rows of teeth. Adults with rear nostrils 2 or 3 times larger than anterior nostrils. First gill arch with 8 to 10 gill rakers on upper limb, 15 to 18 on lower limb; longest gill rakers shorter than longest gill filaments. Dorsal fin with XI spines and 14 or 15 soft rays, third or fourth spines longest, 2.6 to 3.3 times in head and about equal to longest dorsal-fin rays; anal fin with III spines and 7 or 8 soft rays, second and third spines subequal; caudal fin convex; pectoral-fin rays 17 or 18, the fin length 1.8 to 2.2 times in head length; pelvic fins not reaching anus, 2.0 to 2.7 times in head length. Lateral body scales rough, some specimens with a few auxiliary scales; lateral-line scales 55 to 64; lateral scale series 108 to 125. **Colour:** head and body buff, with dark brown bands as follows: a bifurcate band begins behind eye, the upper branch joining a dark brown saddle blotch on nape, the lower branch running to lower opercular spine and continuing on body as a midlateral band that bifurcates above pectoral fin, the upper branch running to a dark blotch at base of third to seventh dorsal-fin rays, the lower branch curving up to base of last 4 dorsal-fin rays; another dark band from upper edge of operculum to base of fifth to ninth dorsal-fin spines; dark band from lower edge of eye to pectoral-fin base, thence as a broken band along lower part of body, curving up to dorsal part of peduncle; dark band from maxillary groove to rear end of interopercle. Small dark brown spots often present in pale areas between bands and usually arranged in series paralleling the bands; fins generally unmarked; pectoral fins hyaline yellow.

Size: Maximum total length 73 cm; maximum weight 5 kg.

Habitat, biology, and fisheries: A common deep-reef species usually found in depths of 80 to 370 m. Sexual transition probably occurs at about 40 to 45 cm standard length. Caught with hand-line, long-line, gill net, and trawls.

Distribution: Red Sea and western Indian Ocean to Central Pacific, including Andaman Sea, Indonesia, Viet Nam, Philippines, Hong Kong, southern Japan, Ogasawara Islands, Mariana Islands, Palau, Guam, Papua New Guinea, Australia (Northern Territory to southern Queensland), New Ireland, New Caledonia, Rotuma, Fiji, and Cook Islands.

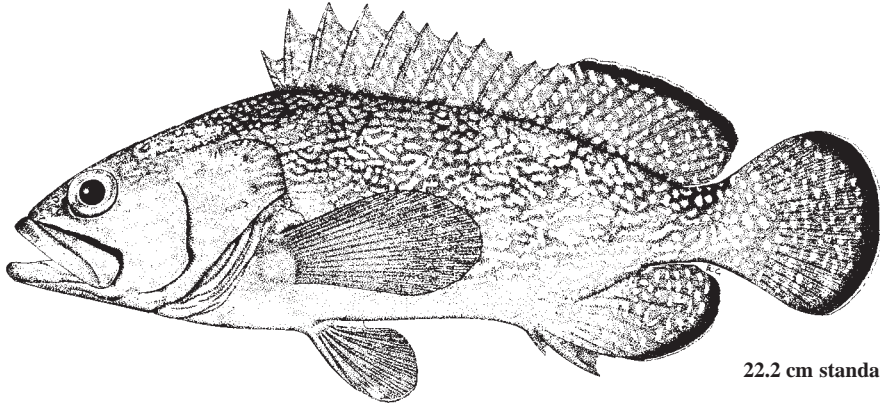


Epinephelus ongus (Bloch, 1790)

(Plate V, 34)

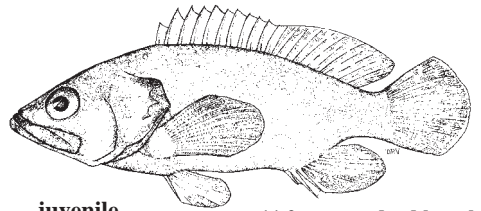
Frequent synonyms / misidentifications: *Epinephelus slacksmithi* Whitley, 1959 / *Epinephelus summana* (non Forsskål, 1775); *E. caeruleopunctatus* (non Bloch, 1790).

FAO names: En - Whitestreaked grouper; Fr - Mèrou à flocons; Sp - Mero nubifero.



22.2 cm standard length

Diagnostic characters: Body depth 2.7 to 3.2 times in standard length; head length 2.3 to 2.5 times in standard length. Dorsal head profile slightly convex; interorbital area flat; **preopercle rounded, the serrae small and mostly covered by skin; upper edge of operculum strongly convex, the rear edge almost vertical, the upper spine extending posterior to lower spine;** maxilla reaches to or slightly past vertical at rear edge of eye; small, embedded scales on maxilla; teeth small, 2 to 4 rows at midlateral part of lower jaw; canines at front of jaws small or absent. **Rear nostril diameter about twice that of anterior nostril.** First gill arch with 8 to 10 gill rakers on upper limb, 15 to 18 on lower limb (including 6 to 8 rudiments on each limb). Dorsal fin with XI spines and 14 to 16 soft rays, the third or fourth spine longest, 2.6 to 3.4 times in head length, the interspinous membranes incised; anal fin with III spines and 8 soft rays; caudal fin rounded; **pectoral fins large and fleshy, with 15 to 17 rays, the fin length 1.4 to 1.7 in head length;** pelvic fins end well short of anus, their length 2.0 to 2.3 times in head length. Lateral body scales rough, with auxiliary scales; **lateral-line scales 48 to 53; lateral scale series 95 to 109.** **Colour:** body brown, with numerous small white spots which, in specimens larger than 10 cm standard length, are horizontally elongate and, in adults, tend to form wavy white lines; several round or irregular pale blotches (eye-sized or larger) usually superimposed over small white spots; head brown, with numerous small white spots dorsally behind eyes; black maxillary streak usually hidden by maxilla; median fins with small white spots and streaks, the posterior margin blackish with a white edge; paired fins greyish brown. Juveniles of about 6 cm standard length are brown, covered with small, dark-edged white spots which are round, except on front part of dorsal fin where they are elongated; white spots on paired fins become fewer and fainter with growth, and are absent in adults.



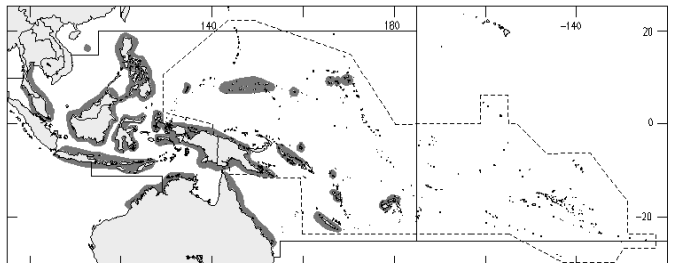
juvenile

11.2 cm standard length

Size: Maximum total length about 32 cm.

Habitat, biology, and fisheries: Occurs in shallow water on coral reefs and rocky substrata, primarily on inner coastal and lagoon reefs, even in brackish water, where it frequents ledges and caves at depths of 5 to 25 m. Although this cryptic species is not very common, it is of some interest to fisheries in Japan (and probably elsewhere). Caught with hook-and-line, spear, and traps.

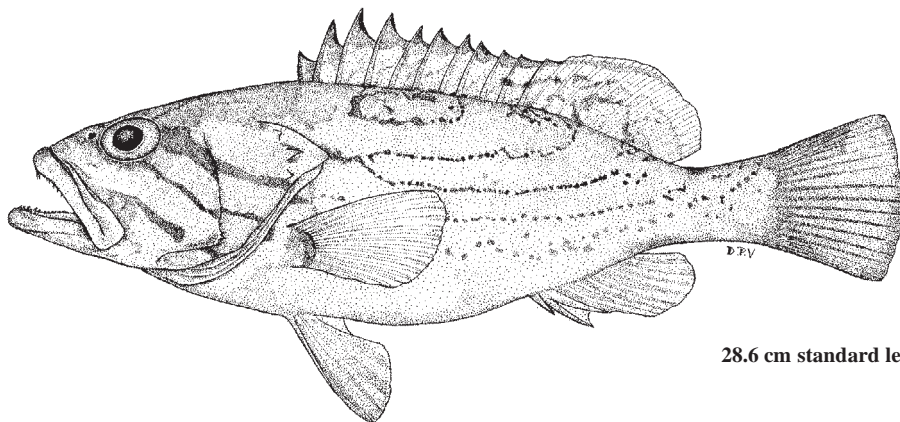
Distribution: Indo-Pacific region, from Africa to the Ryukyu and Marshall islands and south to Fiji, New Caledonia, and northern Australia.



Epinephelus poecilonotus (Temminck and Schlegel, 1842)

Frequent synonyms / misidentifications: None / *Epinephelus morrhua* (non Valenciennes, 1833); *E. epistictus* (non Temminck and Schlegel, 1842); *E. magniscuttis* non Postel, Fourmanoir, and Guézé, 1963; *E. radiatus* (non Day, 1867); *E. tuamotuensis* non Fourmanoir, 1971.

FAO names: En - Dotdash grouper; Fr - Mérou morse; Sp - Mero punto y línea.



28.6 cm standard length

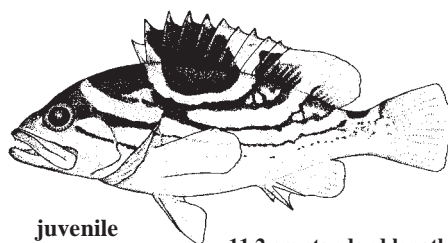
Diagnostic characters: Body depth less than head length, 2.6 to 3.1 times in standard length. Preopercle angle with 2 to 5 enlarged serrae; upper edge of operculum slightly convex; adults with a step on ventral edge of maxilla; midside of lower jaw with 2 rows of teeth. First gill arch with 8 to 10 gill rakers on upper limb, 15 to 18 on lower limb; longest raker about equal to longest gill filaments. Pyloric caeca 8 or 9. Dorsal fin with XI spines and 14 or 15 soft rays, the third or fourth spines longest, 2.6 to 3.1 times in head length and subequal to longest dorsal-fin ray, the interspinous membranes deeply incised; anal fin with III spines and 8 soft rays; caudal fin convex; pectoral fins not fleshy, with 17 to 19 rays, the fin length 1.7 to 2.1 and pelvic fins 2.0 to 2.6 times in head length. Lateral body scales rough, with auxiliary scales on adults; lateral-line scales 54 to 63; lateral scale series 110 to 121.

Colour: small juveniles (5 to 12 cm standard length) pale yellowish grey, with oval black blotch on body between bases of third to ninth dorsal-fin spines and extending to edge of fin between first and seventh spines; a semicircular pale band passes ventrally round the oval black blotch and isolates it from a dark brown band that begins broadly on nape and bifurcates just behind operculum, the upper branch curving dorsally and expanding over basal half of dorsal fin between ninth spine and fourth soft ray, the lower branch also curving dorsally and expanding at base of last 4 dorsal-fin rays. Second curved brown band, parallel to the one above, runs from interorbital area and eye to a black saddle-spot on caudal peduncle. Third (and narrowest) dark brown band runs from lower edge of eye to subopercle, thence as a series of dark dots along ventral part of body to caudal fin. Fins pale yellow, except where dark markings occur on dorsal fin. On specimens of 20 to 30 cm, the oval black blotch at base of dorsal-fin spines and the dark brown bands on body break into series of black spots; faint dark band from dark maxillary streak to corner of preopercle. On specimens 40 to 50 cm, most dark spots on body are faint or have disappeared and the dark bands on head are fading too; the fins are yellowish brown, the triangular interspinous dorsal fin margins abruptly orange-yellow or brownish yellow; soft dorsal, anal, and caudal fins blackish distally with a bluish white edge.

Size: Maximum total length at least 63 cm; maximum weight at least 4 kg.

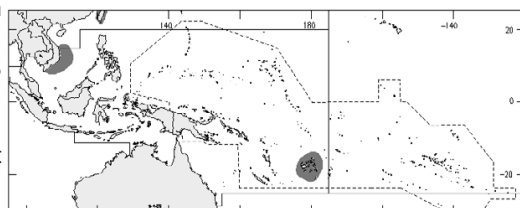
Habitat, biology, and fisheries: Occurs in depths of 45 to 375 m. Females are mature at 35 cm standard length. Caught with hook-and-line, vertical longline, and trawls.

Distribution: Indo-West Pacific: South Africa to Viet Nam, Japan, Korea, and Fiji.



juvenile

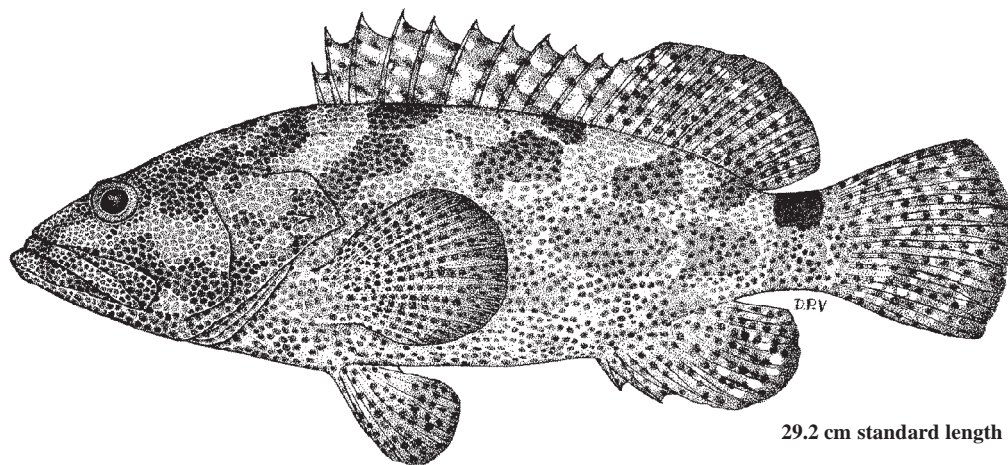
11.2 cm standard length



Epinephelus polyphekadion (Bleeker, 1849)

Frequent synonyms / misidentifications: *Epinephelus microdon* Bleeker, 1856; *E. dispar* var. B (Playfair, 1867) / *Epinephelus fuscoguttatus* (non Forsskål, 1775).

FAO names: En - Camouflage grouper; Fr - Merou camouflage; Sp - Mero disfrazado.

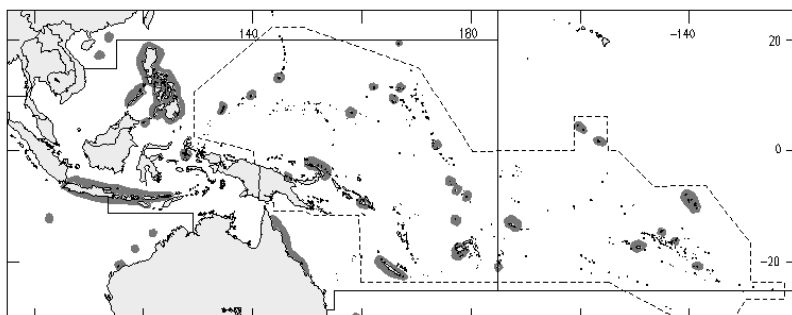


Diagnostic characters: Body depth 2.7 to 3.1 times in standard length. **Interorbital area flat, the dorsal head profile evenly convex; preopercle rounded, finely serrate; upper edge of operculum distinctly convex;** maxilla reaches to or beyond vertical at rear edge of eye; midlateral part of lower jaw with 2 or 3 rows of teeth; fixed canines at front of jaws inconspicuous. **Rear nostril diameter about twice diameter of front nostrils. First gill arch with 24 to 27 gill rakers, of which 8 to 10 on upper limb and 15 to 17 on lower limb. Dorsal fin with XI spines and 14 or 15 soft rays, third or fourth spines longest, 2.7 to 3.3 times in head and distinctly shorter than longest dorsal-fin ray; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 16 to 18, the fin length 1.7 to 2.1 times, pelvic fins 1.9 to 2.4 times in head length. Lateral body scales rough, with auxiliary scales. Lateral-line scales 47 to 52; lateral scale series 95 to 113. **Colour:** head, body, and fins pale brown, covered with small dark brown spots; head and body with irregular dark blotches (more distinct on live specimens) superimposed over the dark spots; prominent black saddle blotch on caudal peduncle; dark spots extend all over head, including lower jaw, lips, branchiostegal membranes, gular area, and inside of mouth; numerous small white spots on fins (more distinct on live fish) and a few on head and body. Juveniles with a pair of blackish spots on each side of snout and a black spot at margin of second and third interspinous dorsal membranes.**

Size: Maximum total length at least 75 cm; maximum weight at least 4 kg.

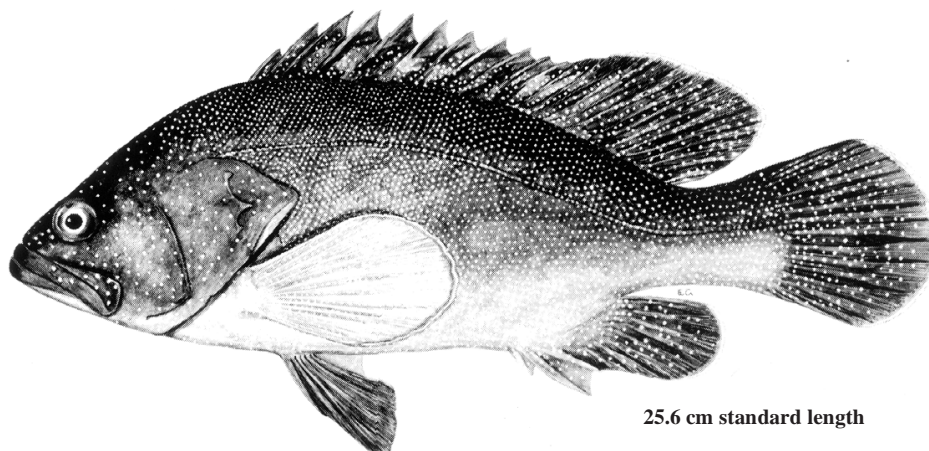
Habitat, biology, and fisheries: Coral reefs; most abundant at islands, particularly atolls. Feeds mainly on crustaceans (primarily portunid crabs, but also some scyllarid and panularid lobsters) and fishes; molluscs are less important food items. Females mature at 38 cm standard length, and sex change occurs at about 42 cm standard length. Important in artisanal fisheries, but occasionally implicated in cases of ciguatera. Now uncommon at localities with heavy spearfishing. Currently popular in the aquaculture industry of Singapore, where it is known as "marble grouper". Caught with hook-and-line, spear, and traps.

Distribution: Tropical Indo-West Pacific region from Red Sea and Mozambique to French Polynesia. In the western Pacific it ranges from southern Japan to Taiwan Province of China, Indonesia, southern Queensland, and Lord Howe Island and eastwards to the Tuamotus. Reported from most islands of the western Central Pacific.



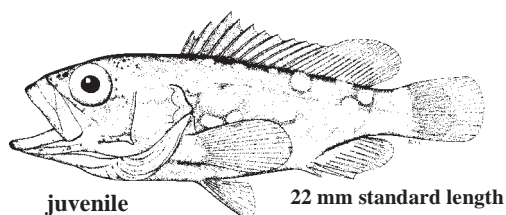
Epinephelus polystigma (Bleeker, 1853)

(Plate V, 35)

Frequent synonyms / misidentifications: *Epinephelus rahanus* Popta, 1918 / None.**FAO names:** En - Whitedotted grouper; Fr - M erou points blancs; Sp - Mero punteado blanco.

25.6 cm standard length

Diagnostic characters: Body depth 2.6 to 2.9 times in standard length. Interorbital area flat; snout short, its length subequal to eye diameter; preorbital depth less than greatest width of upper lip; preopercle rounded, finely serrate; upper edge of operculum mostly straight. Anterior nostrils funnel shaped, the rear margin expanded as a flap reaching rear nostril; rear nostril diameter 2 to 4 times larger than front nostril diameter; maxilla reaches past vertical at rear edge of eye, the lower edge with a rounded step at front of widest part; midlateral part of lower jaw with 2 or 3 rows of small subequal teeth; 2 short stout canines at front of both jaws. First gill arch with 21 to 24 gill rakers, of which 8 or 9 on upper limb and 13 to 16 on lower limb; gill rakers shorter than gill filaments. Pyloric caeca 8. Dorsal fin with XI spines and 15 or 16 soft rays, the third or fourth spines longest, 2.7 to 3.3 times in head length and distinctly shorter than longest dorsal-fin rays, the interspinous membranes distinctly incised; anal fin with III spines and 8 soft rays; caudal fin well rounded; pectoral-fin rays 16 to 18, the fin length 1.6 to 1.8 times in head length; pelvic fins 2.0 to 2.2 times in head length. Lateral body scales rough, with auxiliary scales. Lateral-line scales 49 to 55; lateral scale series 81 to 91. **Colour:** head, body, and fins dark brown, covered (except on pelvic fins) with white or pale yellow dots (dots may be absent in preserved specimens); soft dorsal, anal, caudal, and pectoral fins with a narrow orange-red margin. Juveniles (8 to 9 cm standard length) with some larger, dark-edged, round or horizontally elongate, white spots on body (in addition to white dots); a smaller juvenile (2.2 cm standard length) taken in the same collection has dark-edged white spots, as large or larger than pupil, in about 3 irregular rows on body.



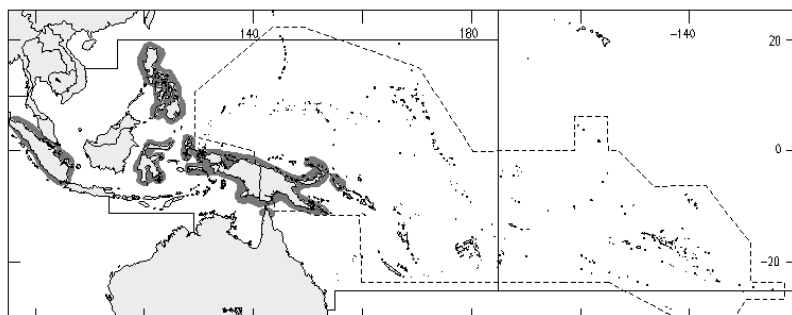
juvenile

22 mm standard length

Size: Maximum total length at least 48 cm total length.

Habitat, biology, and fisheries: Known only from brackish or fresh-water areas; the usual habitat seems to be mangrove-lined estuaries. A female of 19 cm standard length contained ripe ovaries. Appears to be a rare species; consequently, of little interest to fisheries. Caught with hook-and-line, spears, and traps.

Distribution: Known only from the western Pacific: Philippines, Indonesia, Papua New Guinea, New Ireland, Solomon Islands, and Cape York, Queensland.

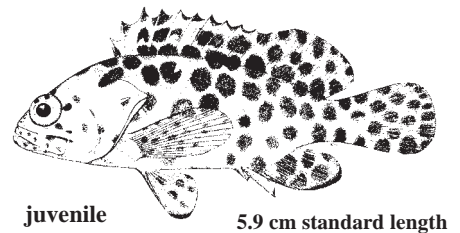
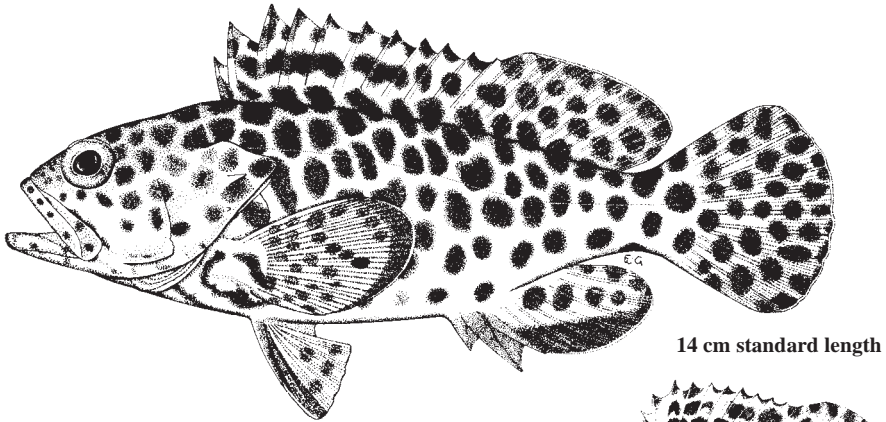


Epinephelus quoyanus (Valenciennes, 1830)

(Plate V, 36)

Frequent synonyms / misidentifications: *Epinephelus megachir* (Richardson, 1846) / *Epinephelus macrospilos* (non Bleeker, 1855); *E. hexagonatus* (non Forster, 1801); *E. faveatus* (non Valenciennes, 1828); *E. pilotoiceps* non Schultz, 1853.

FAO names: En - Longfin grouper; Fr - M  rou longues ailes; Sp - Mero aleta larga.

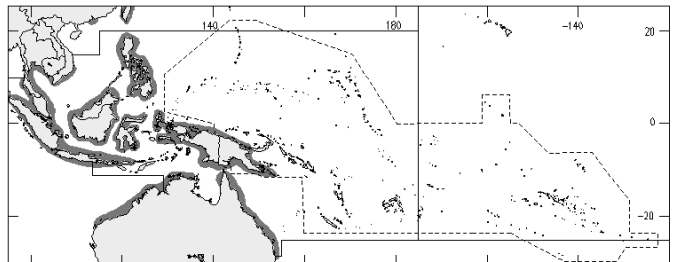


Diagnostic characters: Body depth 2.8 to 3.2 times in standard length; **caudal-peduncle depth 3.1 to 3.6 times in head length**. Preopercle rounded or subangular; upper edge of operculum almost straight; **midlateral part of lower jaw with 2 or 3 rows of teeth; lower jaw barely projecting in front of upper jaw**. Rear nostrils diameter about twice that of anterior nostrils. First gill arch with 6 to 8 gill rakers on upper limb, 14 to 16 on lower limb. Pyloric caeca 21. Dorsal fin with XI spines and 16 to 18 soft rays, the fourth spine usually longest, 2.3 to 3.0 times in head length and shorter than longest dorsal-fin rays; anal fin with III spines and 8 soft rays, the **second and third spines subequal, 2.8 to 3.8 times in head length, subequal to depth of peduncle**; caudal fin rounded, middle rays 1.35 to 2.0 times in head length; pectoral-fin rays 17 to 19, **middle rays 26 to 35% of standard length, 1.2 to 1.7 times in head length**; **pelvic fins 1.6 to 2.1 times in head length**. Lateral body scales rough; auxiliary scales present; lateral-line scales 48 to 52; lateral scale series 80 to 96. **Colour:** head and body pale, with large, close-set, hexagonal to roundish, dark brown spots (some spots reddish brown or black), dorsally the spots are so close together that the pale interspaces form a reticulum, but ventrally the spots are more separated and their margins more diffuse; similar dark spots on median fins; chest with 2 dark brown bands joining below pectoral-fin bases and nearly joined anteriorly to enclose a large pale area ventrally and another pale area between upper dark band and dark blotch on pectoral-fin base; dark spots on head smaller anteriorly, but still 3 or 4 times larger than nostrils; ventral edge of anal and caudal fins and leading edge of pelvic fins with white line and blackish submarginal band; pectoral fins mostly dusky with faint dark spots (more distinct on Australian fish).

Size: Maximum total length 40 cm.

Habitat, biology, and fisheries: Usually found on inshore silty reefs; no records below 50 m. The enlarged fleshy pectoral fins appear to be related to its habit of sitting on the substrate, with its pectoral fins in contact with the bottom. Feeds on crustaceans, fishes, and worms. Of some economic importance at Hong Kong and Taiwan Province of China. Usually caught with gill nets and handlines.

Distribution: Western Pacific; from southern Japan to tropical coast of Australia, including China (also Taiwan Province of China and Hong Kong), Philippines, Viet Nam, Thailand, Indonesia, New Guinea. Not known from islands of Micronesia, Melanesia, or the Central Pacific.

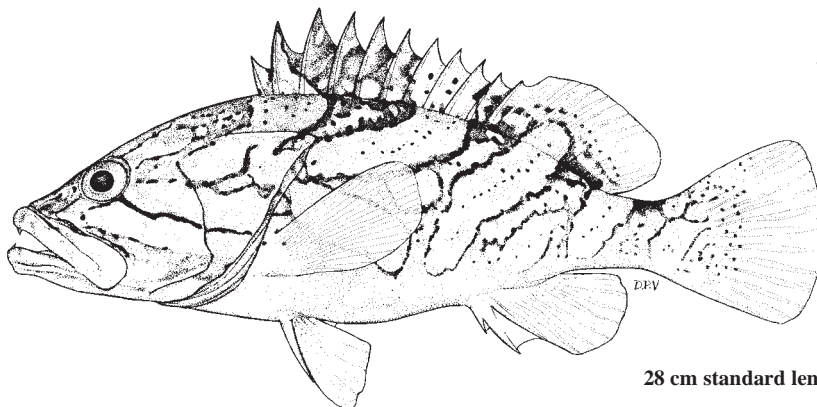


Epinephelus radiatus (Day, 1867)

(Plate V, 37)

Frequent synonyms / misidentifications: *Epinephelus döderleinii* Franz, 1910 / *Epinephelus morrhua* (non Valenciennes, 1833); *E. poecilnotus* (non Temminck and Schlegel, 1842).

FAO names: **En** - Obliquebanded grouper; **Fr** - Mérou zébré; **Sp** - Mero acebrado.

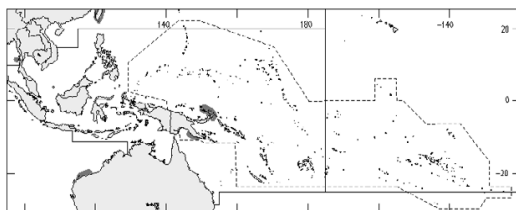


Diagnostic characters: Body depth 2.6 to 3 times in standard length; head length 2.1 to 2.3 times in standard length. **Preopercle angle with 2 to 5 enlarged serrae**; upper edge of operculum almost straight; midlateral part of lower jaw with 2 rows of teeth. Adults with rear nostril diameter 2 or 3 times that of front nostrils. First gill arch with 8 or 9 gill rakers on upper limb, 16 to 18 on lower limb; longest gill raker shorter than longest gill filaments. Dorsal fin with XI spines and **13 to 15 soft rays, the third spine longest, 2.6 to 3.0 times in head length and longer than soft rays**, the interspinous membranes deeply incised; anal fin with III spines and 8 soft rays, second and third spines subequal; caudal fin convex to moderately rounded; pectoral-fin rays 17 or 18, the fin almost transparent, its length 1.7 to 2.2 times in head length; pelvic fins 2.1 to 2.8 times in head length. Lateral body scales rough, without auxiliary scales; lateral-line scales 52 to 66; lateral scale series 102 to 120. **Colour:** **small adults (25 to 50 cm) buff, with 5 oblique dark-edged pale bands as follows: first band from upper half of eye, curving and broadening on nape; second band branching from first band just behind eye, bifurcating on operculum, the upper branch continuing dorsally, broadening on body and extending more broadly over middle of spinous dorsal fin; third band continued as lower branch of second band, curving dorsally from end of operculum and expanding at base of last 2 spines and first 3 or 4 soft rays of dorsal fin (this band with a ventral extension from an included pale circle covered by tip of pectoral fin); fourth band runs from rear end of dorsal fin, branching at midside, with 1 branch going towards anal-fin origin, the other to rear end of anal-fin base; fifth band on caudal peduncle (sometimes divided into 2 short branches at lower edge of peduncle); dark bands include small black spots and pale blotches, especially dorsally; pale interspaces (between dark bands) with small dark brown spots, mainly in a row along middle of interspaces; dark brown line from lower edge of eye to edge of subopercle; faint dark band from maxillary groove and continuing to edge of interopercle. Large adults (50 to 65 cm) with dark-edged bands replaced by series of dark spots (except for dark line running posteriorly from lower edge of eye); no spots on ventral third of body; dorsal fin and most of caudal fin covered with small dark spots. Juveniles (12 to 25 cm) dark brown with black-edged pale brown bands (= white markings on smaller fish) enclosing numerous small black spots. Small juveniles (5 to 10 cm) dark greenish brown, with dark-edged immaculate white bands represent in the pale interspaces on larger specimens; fins translucent white, except spinous dorsal fin coloured like body.**

Size: Maximum total length about 70 cm.

Habitat, biology, and fisheries: Adults occur in depths of 80 to 383 m; juveniles found in depths of 18 to 20 m. Apparently rare but of some commercial importance in Japan. Caught with handlines and vertical longlines.

Distribution: From Red Sea to Japan, including Gulf of Aden, Gulf of Oman, India, Sri Lanka, Réunion, Mauritius, Chagos, northwestern Australia, Papua New Guinea, Philippines, Taiwan Province of China, and Japan.

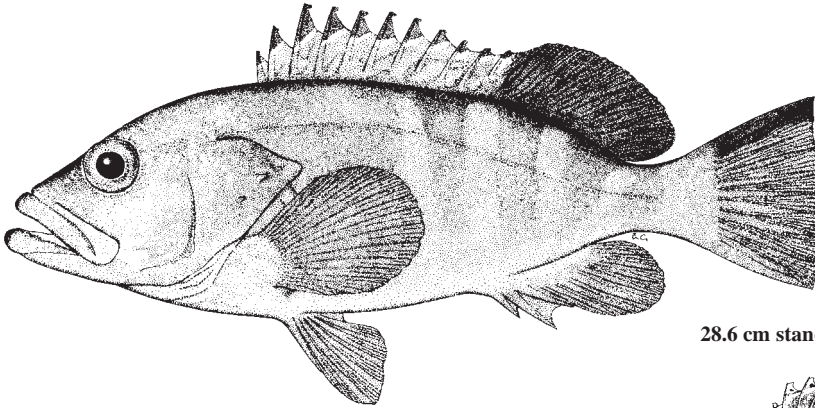


Epinephelus retouti Bleeker, 1868

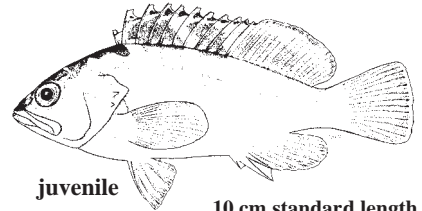
(Plate V, 38)

Frequent synonyms / misidentifications: *Epinephelus truncatus* Katayama, 1957 / *Epinephelus fasciatus* (non Forsskål, 1775); *E. irroratus* (non Forster, 1801).

FAO names: En - Redtipped grouper; Fr - Mérrou à bout rouge; Sp - Mero punteado.



28.6 cm standard length



juvenile

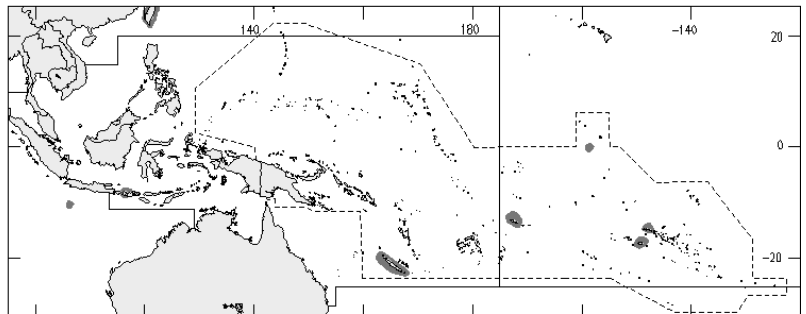
10 cm standard length

Diagnostic characters: Body depth 2.5 to 3.1 times in standard length; head length 2.4 to 2.6 times in standard length. Interorbital flat to slightly convex, the dorsal head profile slightly convex; **preopercle rounded, finely serrate; upper edge of operculum sinuous; snout length 3.5 to 3.9 times in head length;** maxilla reaches below rear half of eye; midlateral part of lower jaw with 3 or 4 rows of teeth; a pair of short fixed canines at front of both jaws. Nostrils subequal. First gill arch with 21 to 24 gill rakers, of which 6 to 8 on upper limb and 15 to 17 on lower limb. Pyloric caeca numerous (more than 40). Dorsal fin with XI spines and 16 or 17 soft rays, the **third to fifth spines longest, 2.4 to 3.1 times in head length;** anal fin with III spines and 8 soft rays; **caudal fin truncate to slightly convex;** pectoral fins fleshy, with 19 to 20 rays, the fin length 1.5 to 1.8 times in head length; pelvic fins 1.8 to 2.2 times in head length. Lateral body scales rough, with numerous auxiliary scales; **lateral-line scales 64 to 76; lateral scale series 120 to 141.** **Colour:** adults dull yellowish orange to brownish red, each scale on dorsolateral part of body with a dark greenish grey spot; usually 5 faint dark bars on body, the second and third bars extending onto spinous dorsal where they are dark brown; dorsal fin greenish brown, the soft-rayed part darker than rest of fin, the outer triangular part of interspinous membranes dark red, set off from rest of fin by an orange-yellow stripe; dorsal margin of caudal fin dark greenish brown; dark red or brown line along base of dorsal fin; orbit narrowly edged, except anteriorly, with dark red (pale in preservative); pale blue line adjacent to red rim of orbit and completely surrounding eye. Juveniles with dorsal part of first 3 dark bars on body black, the second and third bars extending into dorsal fin; dorsal part of head also black, with 4 irregular transverse whitish bands across dorsal surface.

Size: Maximum total length 50 cm; maximum weight about 2 kg.

Habitat, biology, and fisheries: Adults are found on coral reefs and outer reef slopes in depths of 70 to 220 m; juveniles occur in 20 to 40 m. Apparently rare, but may be of importance to artisanal fisheries. Caught with handlines and vertical longlines.

Distribution: Islands of tropical Indo-Pacific region: from western Indian Ocean to Tuamotus, including Christmas Island (eastern Indian Ocean), Indonesia (Bali Sea off Lombok), South China sea, Taiwan Province of China, Japan (Okinawa, Izu Islands), Palau, New Caledonia, Line Islands, American Samoa, and Society Islands.

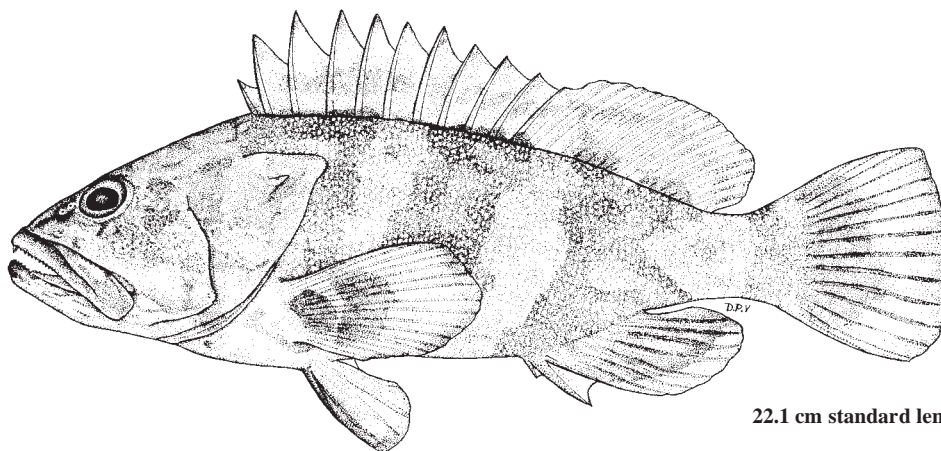


Epinephelus rivulatus (Valenciennes, 1830)

(Plate V, 39)

Frequent synonyms / misidentifications: *Epinephelus rhyncholepis* (Bleeker, 1852); *E. grammatophorus* Boulenger, 1903; *E. homosinensis* Whitley, 1944; *E. spiramen* Whitley, 1945 / None.

FAO names: En - Halfmoon grouper; Fr - Mérrou demi-lune; Sp - Mero medialuna.



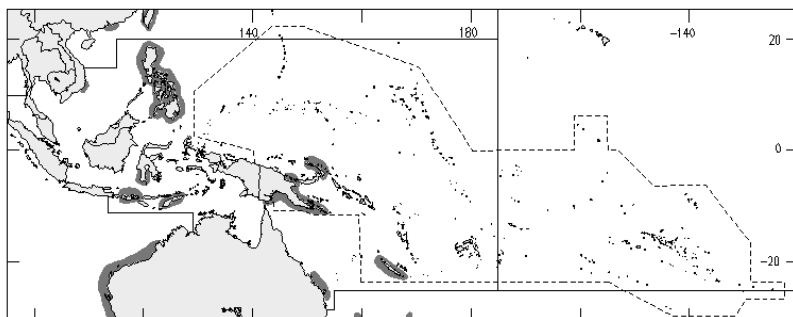
22.1 cm standard length

Diagnostic characters: Body depth 2.7 to 3.2 times in standard length; head length 2.3 to 2.6 times in standard length. Preopercle angular, with enlarged serrae at angle; upper edge of operculum straight, almost horizontal; ventral edge of maxilla with a slight step at distal expansion; midlateral part of lower jaw with 2 or 3 rows of teeth. Nostrils subequal. First gill arch with 20 to 24 gill rakers, of which 6 to 8 on upper limb and 14 to 16 on lower limb. Pyloric caeca 26. Dorsal fin with XI spines and 16 to 18 soft rays, the third or fourth spines longest, 2.4 to 3.2 times in head length, the interspinous membranes distinctly incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral fins fleshy, with 17 to 19 rays, the fin length 1.5 to 1.9 times in head length; pelvic fins 1.9 to 2.4 times in head length. Lateral body scales rough, with auxiliary scales; nape and front of body above lateral line with minute auxiliary scales and numerous pores; lateral-line scales 48 to 53; lateral scale series 86 to 98. **Colour:** body generally reddish to greenish brown, with a small white or pale blue spot (about size of nostrils) on each scale; 4 irregular dark bars usually visible on body and extending onto base of dorsal fin, and a fifth dark bar on peduncle, the third and fourth bars run from soft dorsal fin to anal fin and are usually joined midlaterally; pectoral fins dusky, with a dark red or reddish brown semicircular blotch on base of rays; 2 dark red or reddish brown bands on chest and a dark brown spot on front of isthmus. Head mostly dark brown or pale reddish, with irregular pale blotches and pale blue or violet vermiculations; 4 white or pale spots along lower part of head (2 on side of lower jaw and upper lip, 1 just behind end of maxilla and last on interopercle); fins greenish yellow or greyish brown; dorsal fin usually with dark brown to black streak along base (may be only along base of spinous part); margin of interspinous dorsal-fin membranes yellow to reddish next to spine, becoming transparent posteriorly, with a pale stripe below triangular part of fin. Some fish with white dots on operculum like those on body.

Size: Maximum total length at least 45 cm; maximum weight at least 2 kg.

Habitat, biology, and fisheries: Rocky bottoms or coral reefs in depths of 10 to 150 m. Females mature at 22 cm, males at 25 cm standard length. Feeds on small fishes and crabs. Caught with handlines, longlines, gill nets, traps, and spear.

Distribution: South Africa to tropical western Pacific and temperate waters of Australia and New Zealand, including Indonesia, Philippines, Taiwan Province of China, and Japan.

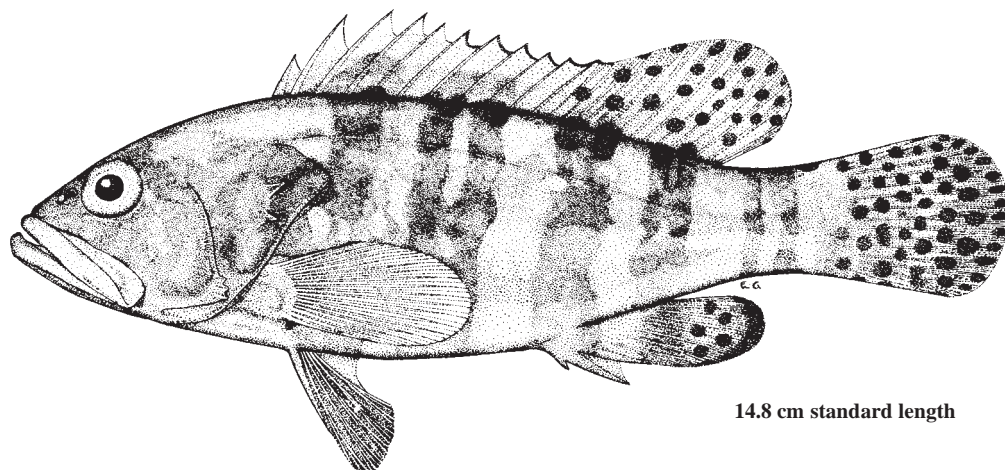


Epinephelus sexfasciatus (Valenciennes, 1828)

(Plate V, 40)

Frequent synonyms / misidentifications: None / *Epinephelus diacanthus* (non Valenciennes, 1828).

FAO names: En - Sixbar grouper; Fr - M erou six raies; Sp - Mero de seis bandas.



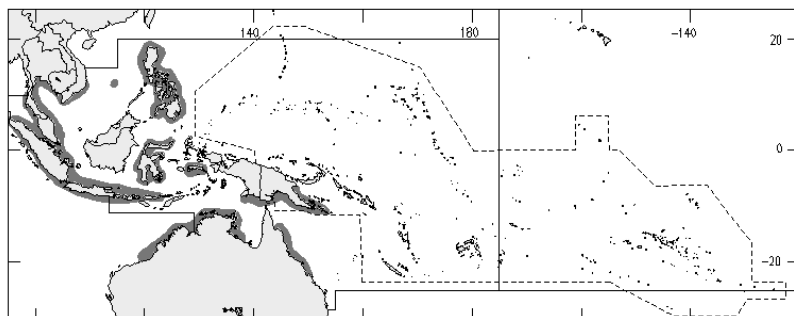
14.8 cm standard length

Diagnostic characters: Body depth 2.7 to 3.2 times in standard length; head length 2.4 to 2.6 times in standard length; caudal peduncle depth 2.6 to 3.4 times in head length. Interorbital area flat or slightly convex, the dorsal head profile convex; preopercle with 2 to 4 greatly enlarged serrae at the angle; upper edge of operculum straight; maxilla reaches to or slightly past vertical at rear edge of eye; midlateral part of lower jaw with 2 rows of subequal teeth. Nostrils subequal. First gill arch with 20 to 23 gill rakers, of which 7 or 8 on upper limb and 13 to 15 on lower limb; longest gill raker shorter than longest gill filaments. Pyloric caeca 7 or 8. Dorsal fin with XI spines and 14 to 16 soft rays, the third or fourth spines longest, 2.3 to 2.7 times in head length and about equal to longest soft ray, the interspinous membranes distinctly incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral fins not fleshy, with 17 to 19 rays, the fin length 1.5 to 1.7 times in head length; pelvic fins 1.8 to 2.2 times in head length. Lateral body scales rough, with a few auxiliary scales; lateral-line scales 46 to 51; lateral scale series 82 to 96. **Colour:** head and body pale greyish brown; 5 dark brown bars on body and 1 on nape (dark bars usually more or less divided vertically by a narrow pale bar); scattered pale spots may be present on body, and some faint small brown spots are often visible on the edges of the dark bars; soft dorsal, caudal, and pelvic fins dusky grey, the pectoral fins greyish or dusky orange-red; jaws and ventral parts of head sometimes pale reddish brown.

Size: Maximum total length 28 cm.

Habitat, biology, and fisheries: Usually found on silty sand or muddy bottoms at depths of 10 to 80 m. This preference for soft-bottom habitats may account for its restricted distribution and absence at oceanic islands. Females are mature at 13 cm standard length. Feeds on small fishes and crustaceans. Although the sixbar grouper is a small species, it is common and readily caught in trawls; consequently, it is often seen in local markets.

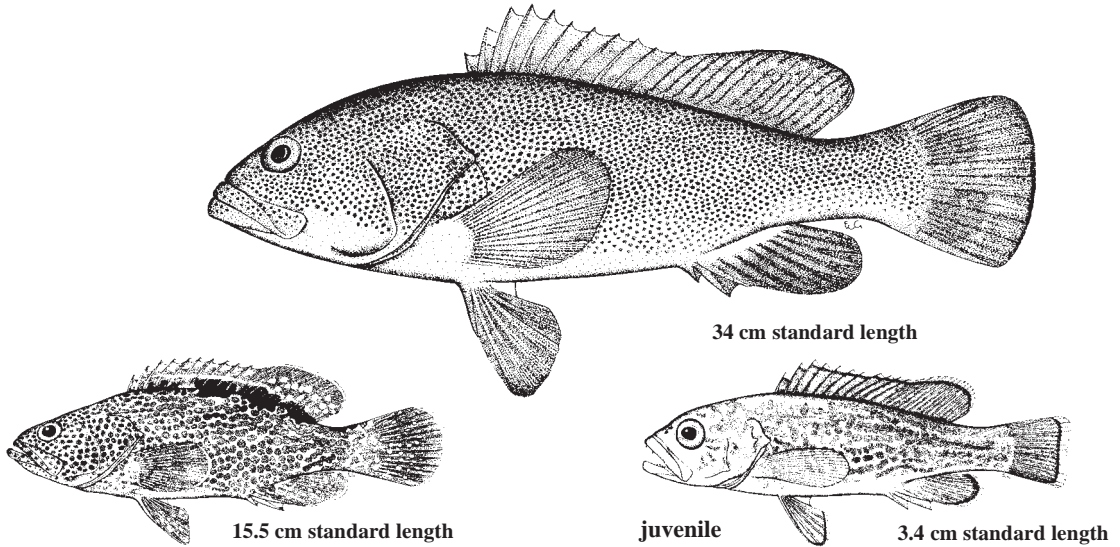
Distribution: Tropical western Pacific Ocean: Indonesia (Sumatra, Java, Bali, Lombok, Celebes, Moluccas), Singapore, Malaysia, Thailand, Viet Nam, Philippines, Papua New Guinea, Louisiade Archipelago, and Australia (north coast from Western Australia to Queensland).



Epinephelus socialis (Günther, 1873)

Frequent synonyms / misidentifications: None / *Epinephelus ongus* (non Bloch, 1790).

FAO names: En - Surge grouper; Fr - M rou houleux; Sp - Mero oleado.

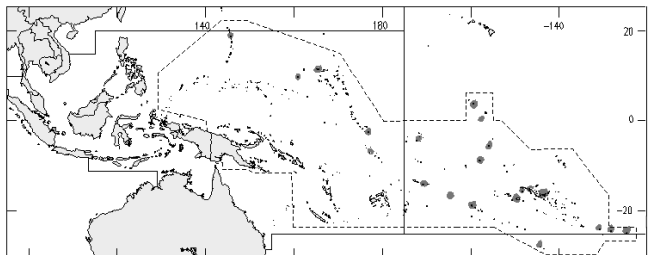


Diagnostic characters: Body depth 2.9 to 3.4 times in standard length; head length 2.4 to 2.7 times in standard length. Interorbital area flat or slightly convex, the dorsal head profile convex; **preopercle rounded, finely serrate; upper edge of operculum sinuous**; maxilla reaches past vertical at rear edge of eye; midlateral part of lower jaw with 3 or 4 rows of teeth. Nostrils subequal. First gill arch with 25 to 28 gill rakers, of which 8 to 10 on upper limb and 16 to 20 on lower limb. Pyloric caeca about 20. Dorsal fin with XI spines and 14 to 16 soft rays, the third or fourth spines longest, 2.6 to 3.6 times in head length, the interspinous membranes moderately incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral fins fleshy, with 18 or 19 rays, the fin length 1.6 to 1.9 times in head length; pelvic fins 1.8 to 2.2 times in head length. Lateral body scales of juveniles rough; lateral body scales of subadults not so rough and with some auxiliary scales; body scales of adults smooth (mostly embedded) with numerous auxiliary scales; lateral-line scales 64 to 70; **lateral scale series 97 to 111**. **Colour:** head and body whitish, covered (except ventral part of head, chest, and abdomen) with small close-set blackish brown spots, those on rear part of body often coalesced to form irregular longitudinal bands; the dark spots become relatively smaller with growth, and on a fish of 21 cm they are black dots about the size of the rear nostrils; 4 large blackish blotches usually visible on body at base of dorsal fin and a fifth black saddle blotch on peduncle. Median fins colored like body basally, becoming dark greyish brown distally, the soft dorsal, caudal and anal fins with a white margin, small white spots, and usually a black submarginal band; pectoral fins dark greyish brown with a white margin posteriorly and small whitish spots; pelvic fins dark greyish brown, with a white leading edge.

Size: Maximum total length at least 52 cm.

Habitat, biology, and fisheries: A shallow-water species of coral reefs; more common on atolls than high islands, and usually in outer reef areas exposed to heavy surge. Juveniles and occasionally adults occur in tidepools. Feeds on crustaceans, (mainly grapsid crabs), octopuses, and fishes. Caught with spears, traps, and handlines.

Distribution: Central-West Pacific: Marcus Island, Marshall Islands, Phoenix Islands, American Samoa, Cook, Line and Society islands, Rapa, Tuamotus, and the Pitcairn Group. Widely distributed over Pacific Plate, but not known at Hawaii, Marquesas, Caroline Islands, or at any Melanesian islands. Reported from 2 localities off the Pacific Plate: Ogasawara (Bonin) Islands, and Mariana Islands.

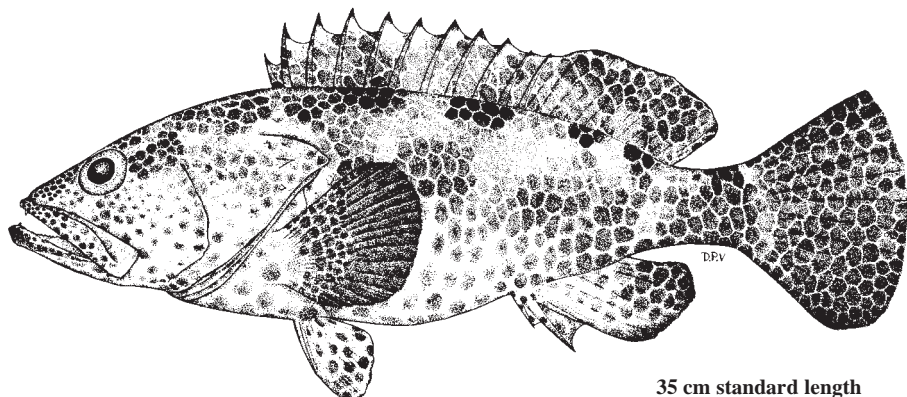


Epinephelus spilotoceps Schultz, 1953

(Plate VI, 41)

Frequent synonyms / misidentifications: *Epinephelus salonotus* Smith and Smith, 1963 / *Epinephelus hexagonatus* (non Forster, 1801); *E. macrospilos* (non Bleeker, 1855); *E. melanostigma* non Schultz, 1953; *E. merra* non Bloch, 1793; *E. quoyanus* (non Valenciennes, 1830).

FAO names: En - Foursaddle grouper; Fr - Mérou quatre selles; Sp - Mero cuatro monturas.



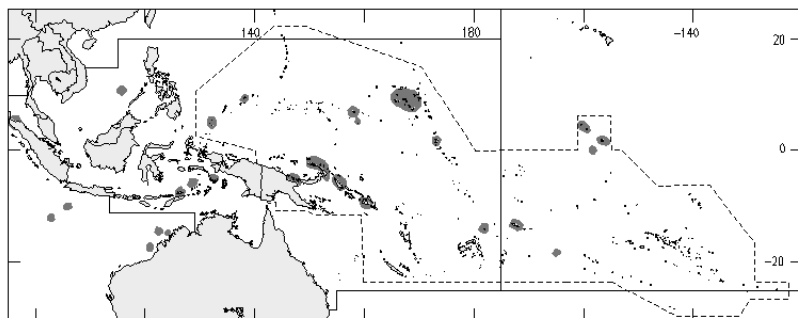
35 cm standard length

Diagnostic characters: Body depth 3.1 to 3.6 times in standard length; caudal-peduncle depth 3.7 to 4.3 times in head length. Preopercle rounded, with a shallow notch, below which the serrae are enlarged but covered with skin; upper edge of operculum almost straight; midlateral part of lower jaw with 2 to 4 rows of teeth. Nostrils subequal. First gill arch with 6 to 9 gill rakers on upper limb, 16 to 18 on lower limb. Dorsal fin with XI spines and 14 to 16 soft rays, the **third or fourth spine longest, 2.8 to 3.6 times in head length and distinctly shorter than longest dorsal-fin rays**; anal fin with III spines and 8 soft rays, the **second spine usually longest, 2.4 to 3.7 times in head length and usually more than caudal-peduncle depth**; caudal fin rounded, middle caudal-fin rays 1.7 to 2.0 times in head length; pectoral-fin rays 17 to 19, **middle rays 21 to 24% of standard length, 1.7 to 2.1 times in head length**; pelvic fins 1.9 to 2.4 times in head length. Lateral body scales rough, with auxiliary scales; **lateral-line scales 59 to 69**; lateral scale series 86 to 100. **Colour:** head, body, and median fins pale, mostly covered with close-set dark brown, olive, or reddish brown polygonal spots, the pale interspaces forming a white reticulum; spots on ventral part of head and body more rounded, more separated and often more reddish; **large blackish brown saddle-blotch at base of last 4 dorsal-fin spines; 2 similar but smaller dark blotches at base of soft dorsal-fin rays and a third on rear end of peduncle; these dark saddle-blotches uniformly pigmented (on juveniles) or comprising a group of extra dark spots separated by the white reticulum (on adults); spots on head progressively smaller and darker anteriorly, those on snout blackish brown and about size of nostrils, with 3 or 4 irregular rows along front of upper lip**; pectoral fins with close-set reddish brown spots, larger and more distinct towards base of fin, distal part of fin dull yellowish green; tips of dorsal-fin spines blackish, with a short white filament.

Size: Maximum total length 31 cm.

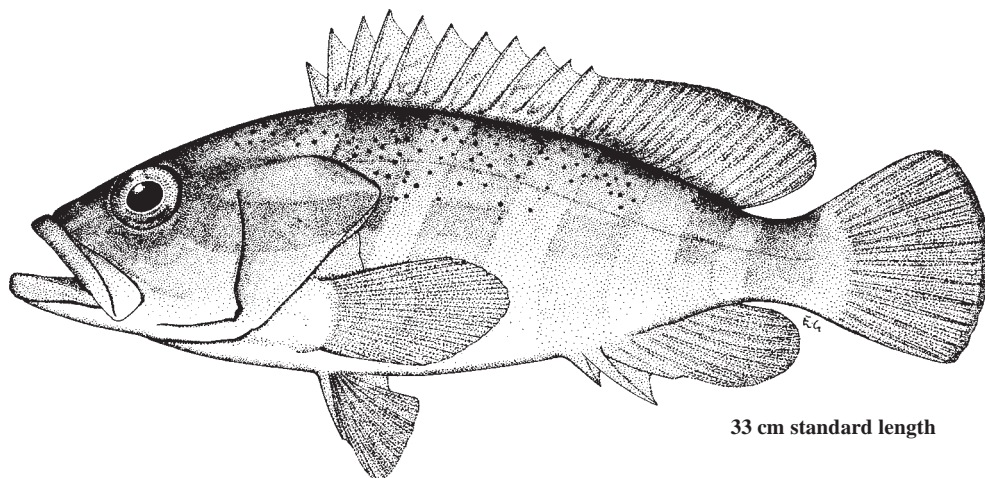
Habitat, biology, and fisheries: A shallow-water coral-reef species. No information on biology or fishery statistics available for this species.

Distribution: Most (probably all) islands of tropical Indo-West Pacific region, from Mozambique to the Central Pacific (Line Islands). Primarily an insular species; except for a single specimen from Hong Kong, there are no records from the Asian mainland, nor from the Red Sea, Persian Gulf, Sri Lanka, Philippines, Taiwan Province of China, Japan, or Australia (though it is found at Rowley Shoals off Western Australia).



Epinephelus stictus Randall and Allen, 1987

(Plate VI, 42)

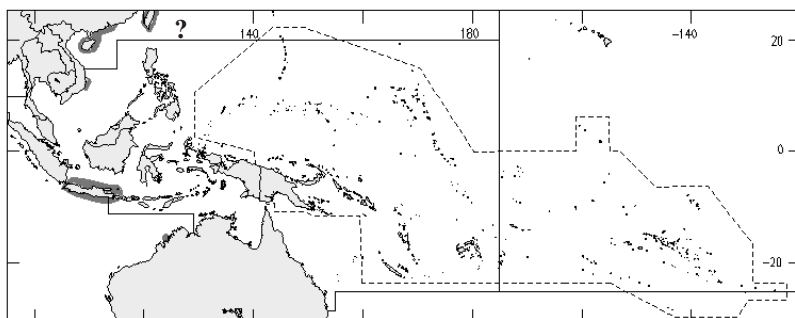
Frequent synonyms / misidentifications: None / *Epinephelus diacanthus* (non Valenciennes, 1828).**FAO names:** En - Blackdotted grouper; Fr - Mérou pointe noirs; Sp - Mero punteado negro.

Diagnostic characters: Body depth 2.9 to 3.4 times in standard length; head length 2.2 to 2.4 times in standard length; caudal-peduncle depth 3.8 to 4.2 times in head length. Preopercle with 1 to 4 distinctly enlarged serrae at the angle; upper edge of operculum straight; maxilla reaches to or slightly past vertical at rear edge of eye; midlateral part of lower jaw with 2 rows of teeth. Nostrils subequal. First gill arch with 7 or 8 gill rakers on upper limb, 14 to 16 on lower limb. Pyloric caeca 12. Dorsal fin with XI spines and 15 or 16 soft rays, the third or fourth spines longest, 2.7 to 3.4 times in head length and shorter than longest soft rays, the interspinous membranes incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral fins not fleshy, with 18 to 20 rays, the fin length 1.7 to 1.9 times in head length; pelvic fins 2.1 to 2.6 times in head length. Lateral body scales rough, without auxiliary scales; lateral-line scales 48 to 51; lateral scale series 84 to 96. **Colour:** body and head yellowish brown dorsally; belly and rear part of body whitish ventrally; chest and ventral parts of head pale reddish orange; body with 5 faint oblique dark bars (may be lost in preservative); midlateral part of each bar may be darker, representing a series of squarish dark blotches continued from the dark band running from eye to end of operculum; numerous dark brown to black dots on dorsolateral parts of head and body, sometimes concentrated within dark bars and bands. Fins pale, the rays darker than membranes; soft dorsal and caudal fins with narrow dark brown margin; pelvic and anal fins often darker than other fins; anal fin may also have a narrow dark margin; dark line along base of dorsal fin (indistinct anteriorly).

Size: Maximum total length 41 cm.

Habitat, biology, and fisheries: Mud or sand bottom in depths of 60 to 142 m. Although one of the most common species of grouper caught by trawlers in the vicinity of Hong Kong in the 1960's, the black-dotted grouper was not of much commercial importance. The low price in the markets is a result of the small size and poor edible quality of this species.

Distribution: Southern Japan, Hong Kong, Hainan Island, Viet Nam, "South China Sea", and northwest Australia. The Japanese records as "*Epinephelus diacanthus*" may be based on the single specimen reported from Kochi City in 1954. The 1960 record from Taiwan Province of China is dubious, as this species has not been found there in recent surveys of Taiwanese serranids.

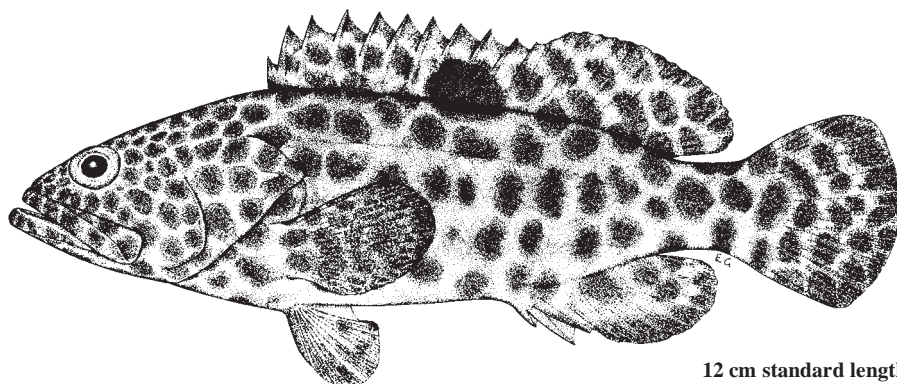


Epinephelus tauvina (Forsskål, 1775)

(Plate VI, 43)

Frequent synonyms / misidentifications: *Epinephelus elongatus* Schultz, 1953; *E. chewa* Morgans, 1966 / *Epinephelus coioides* (non Hamilton, 1822); *E. malabaricus* (non Bloch and Schneider, 1801); *E. lanceolatus* (non Bloch, 1790).

FAO names: En - Greasy grouper; Fr - Mérou loutre; Sp - Mero lutra.



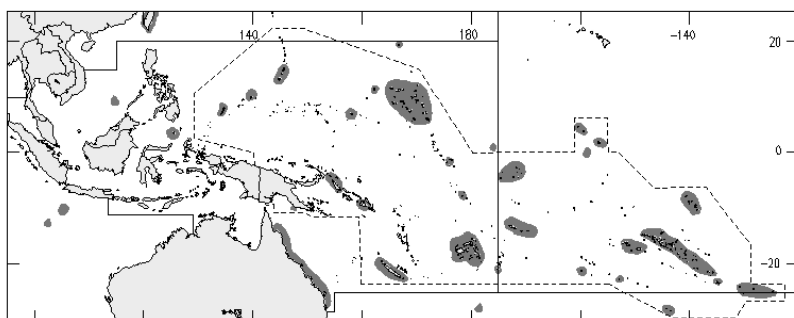
12 cm standard length

Diagnostic characters: Body elongate, its depth 3.0 to 3.6 times in standard length; head large, its length 2.1 to 2.4 times in standard length. Interorbital area narrow, flat to slightly concave, its width 6.8 to 8.1 times in head length; serrae at corner of preopercle slightly enlarged; upper edge of operculum almost straight; maxilla reaching well past eye, the greatest width about twice suborbital depth (least distance from eye to maxilla) and 5.4 to 6.5% of standard length; midlateral part of lower jaw with 2 to 5 rows of teeth. Rear nostrils distinctly larger than anterior nostrils. First gill arch with 8 to 10 gill rakers on upper limb, 17 to 20 on lower limb; no bony platelets on gill arch. Pyloric caeca 16 to 18. Dorsal fin with XI spines and 13 to 16 soft rays, the third to fifth spines longest, 3.1 to 4.7 times in head length and shorter than longest dorsal-fin rays; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 18 or 19. Midlateral body scales rough in juveniles, smooth in adults, except for small patch covered by pectoral fin; lateral-line scales 63 to 74; lateral scale series 95 to 112. **Colour:** head and body pale greenish grey or brown, covered with dull orange-red to dark brown spots; spots on head progressively smaller anteriorly; large black blotch (or group of black spots) often visible at base of last 4 dorsal-fin spines and extending onto lower part of fin; 5 faint subvertical dark bars may be present on body, 4 below dorsal fin and fifth on caudal peduncle (these bars may be represented by dusky blotches at base of dorsal fin and a dark saddle-blotch on caudal peduncle); fins also covered with dark spots, those on pectoral fins becoming smaller and less distinct distally; rear margin of caudal, anal, and pectoral fins often with white edge; dark spots on median fins of juveniles are so close set that the pale interspaces form a white reticulum.

Size: Maximum total length 75 cm; reports of larger sizes are probably based on misidentifications of *Epinephelus coioides*, *E. malabaricus*, or *E. lanceolatus*.

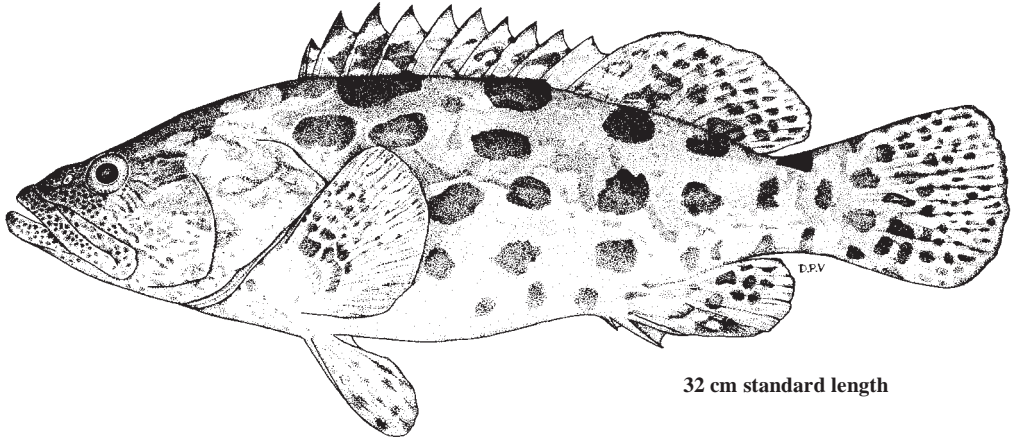
Habitat, biology, and fisheries: Clear water areas on coral reefs; juveniles on reef flats and in tidepools, but adults occur down to 50 m. Adults primarily piscivorous. Important to artisanal fisheries. Caught with hook-and-line, spear, and traps. Sold fresh in local markets. Also important in aquaculture. From 1990 to 1995, the reported yearly aquaculture production of *E. tauvina* in Malaysia ranged from 144 to 1 006 t (FAO Aquaculture Production Statistics).

Distribution: From Red Sea to South Africa and eastwards to Pitcairn Group; in western Pacific, from Japan to New South Wales and Lord Howe Island. More common at islands than along continental shores. No verifiable records from Persian Gulf, Asia mainland, the Philippines, Indonesia, northern or western Australia.



Epinephelus tukula Morgans, 1959

(Plate VI, 45)

Frequent synonyms / misidentifications: *Serranus dispar* var. A Playfair, 1867 / None.**FAO names:** En - Potato grouper; Fr - M erou patate; Sp - Mero patata.

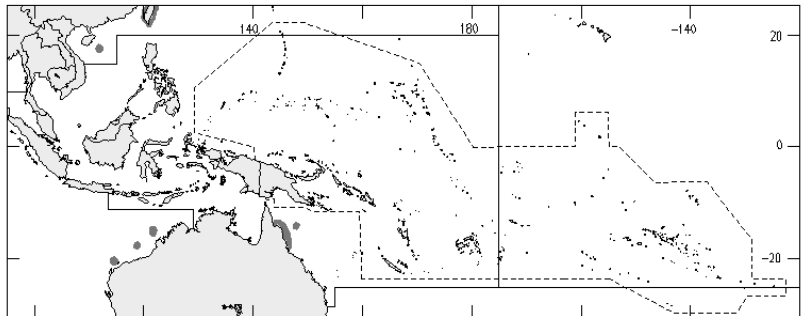
32 cm standard length

Diagnostic characters: Body depth 2.9 to 3.5 times in standard length; head length 2.3 to 2.6 times in standard length. Interorbital area slightly convex; the dorsal head profile straight; preopercle rounded or subangular, the serrae at corner slightly enlarged; upper edge of operculum almost straight; maxilla reaches to or beyond vertical at rear edge of eye; midlateral part of lower jaw with 2 to 6 rows of teeth. Nostrils subequal. First gill arch with 8 to 10 gill rakers on upper limb, 15 to 18 on lower limb. Dorsal fin with XI spines and 14 or 15 soft rays, the third or fourth spines longest, 3.1 to 3.8 times in head length and distinctly shorter than longest dorsal-fin rays; interspinous dorsal-fin membranes distinctly incised; anal fin with III spines and 8 soft rays; caudal fin rounded; pectoral-fin rays 18 to 20, the fin length 1.6 to 2.1 times in head length; pelvic fins usually not reaching anus, 1.9 to 2.4 times in head length. Lateral body scales rough, with auxiliary scales in adults; **lateral-line scales 62 to 70; lateral scale series 113 to 130.** **Colour:** body pale brownish grey with several dark brown to black widely-spaced blotches, mostly larger than eye and varying in shape from round to oval or dumbbell-shaped; head with smaller dark brown spots and streaks (many radiating from eye, especially posteriorly); dark spots on fins, smaller distally. Large adults may be nearly black.

Size: One of the largest groupers; maximum total length 200 cm, weight to 90 kg.

Habitat, biology, and fisheries: Coral-reefs; juveniles in tidepools, and adults occur in depths of 10 to 150 m. Maturity occurs at 90 cm standard length. Feeds on a wide variety of reef fishes, skates, crabs, and spiny lobsters. *Epinephelus tukula* is "exceedingly territorial, and is very aggressive towards unwelcome intruders." The large size and territorial behaviour of *E. tukula* make it especially vulnerable to spearfishermen, hence spearfishing for this species is illegal in South African waters. Although it is not common, it is an important species in the sportfishery of South Africa and Australia. Caught with hook-and-line and spear.

Distribution: From the western Indian Ocean and Red Sea to the western Pacific, including Japan (Okinawa and Honshu), Taiwan Province of China, South China Sea (Paracel Islands), Western Australia, and Queensland. It is surprising that there are no records of this distinctive species from Indonesia, the Philippines, or New Guinea.

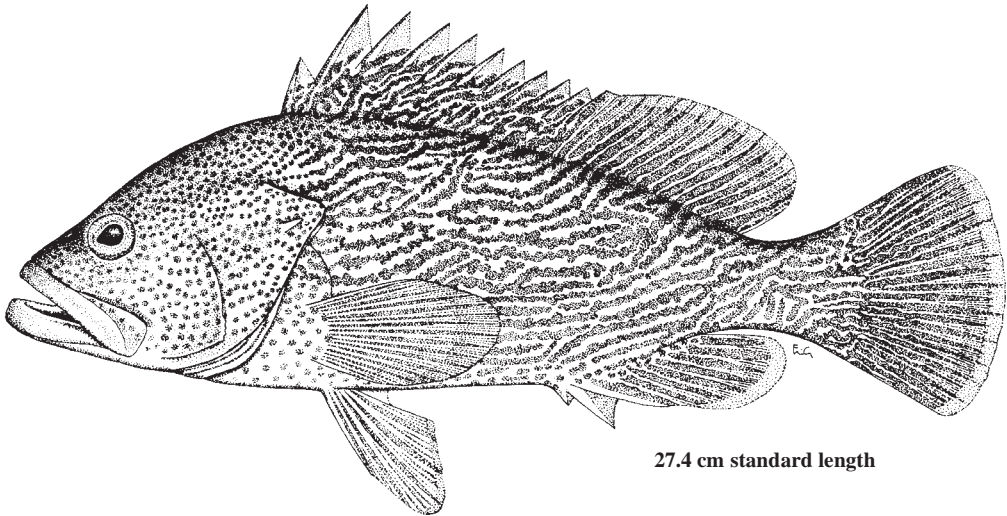


Epinephelus undulatostratus (Peters, 1867)

(Plate VI, 46)

Frequent synonyms / misidentifications: *Serranus guttulatus* Macleay, 1879 / None.

FAO names: En - Maori grouper; Fr - M rou Maori; Sp - Mero Maori.



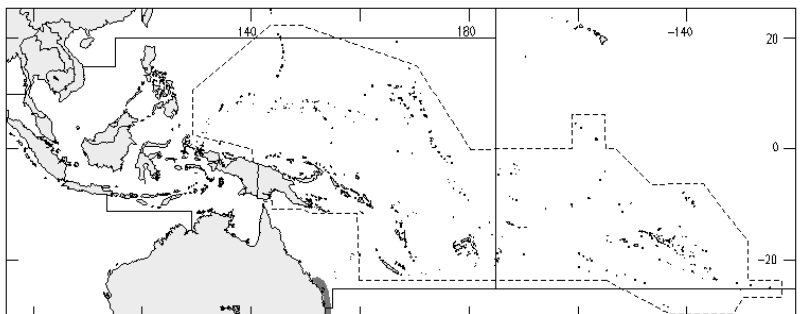
27.4 cm standard length

Diagnostic characters: Body depth 2.5 to 2.9 times in standard length; head length 2.3 to 2.5 times in standard length. Interorbital area convex, the dorsal head profile almost straight; preopercle subangular, the serrae at corner slightly enlarged; upper edge of operculum almost straight; maxilla reaches to or slightly past vertical at rear edge of eye; midlateral part of lower jaw with 2 rows of teeth. Nostrils subequal. First gill arch with 9 or 10 gill rakers on upper limb, 15 or 16 on lower limb. Pyloric caeca 11. Dorsal fin with XI spines and 15 to 17 soft rays, the third or fourth spine longest, 2.2 to 2.8 times in head length and longer than longest dorsal-fin rays; interspinous dorsal-fin membranes distinctly incised; anal fin with III spines 8 soft rays; **caudal fin rounded; pectoral fins fleshy, with 17 to 19 rays, the fin length 1.6 to 2.0 times in head length;** pelvic fins not reaching anus (except in small juveniles), 1.8 to 2.0 times in head length. Lateral body scales rough, with auxiliary scales; lateral-line scales 48 to 55; lateral scale series 98 to 108. **Colour:** body buff, covered with close-set wavy longitudinal brownish orange, golden brown, or reddish brown stripes; some stripes broken into series of small spots; head pale greyish brown, covered with small spots like those on body; maxillary streak orange brown; fin rays pale, with small brown spots, the interradial membranes dark brown; median fins with narrow yellow margin; pectoral fins diffusely yellow distally.

Size: Maximum total length 61 cm; maximum weight about 6 kg.

Habitat, biology, and fisheries: Coral reefs and rocky areas in depths of 27 to 80 m. An active swimmer that will leave the bottom to take a floating bait. Feeds on fishes. An esteemed food fish and important species in the hook-and-line fishery of Australia's east coast. Caught with hook-and-line and spear.

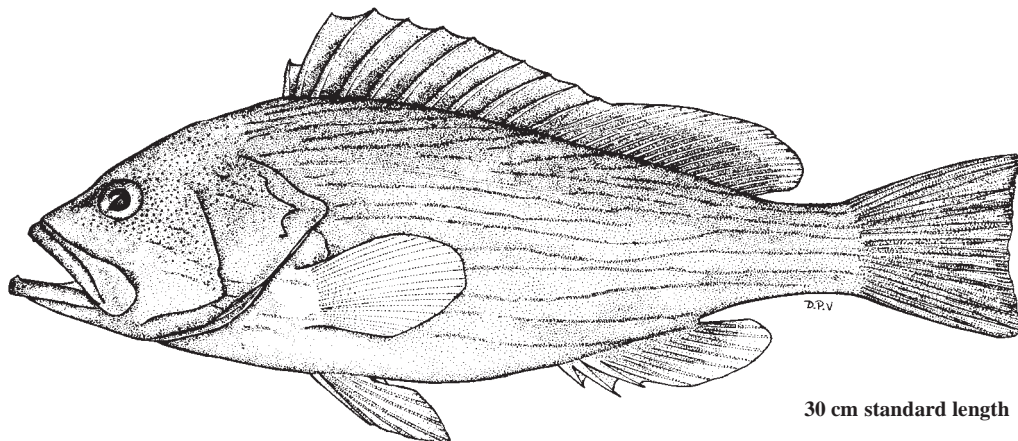
Distribution: Endemic to Australia, from southern Queensland (most northern record, One Tree Island, Great Barrier Reef at 23°30'S) to Bateman's Bay (35°44'S) New South Wales. One specimen was reported from Kangaroo Island, South Australia.



Epinephelus undulosus (Quoy and Gaimard, 1824)

Frequent synonyms / misidentifications: *Serranus lineatus* Valenciennes, 1828, *S. amboinensis* Bleeker, 1852 / None.

FAO names: En - Wavylined grouper; Fr - M  rou ondul  ; Sp - Mero ondulado.

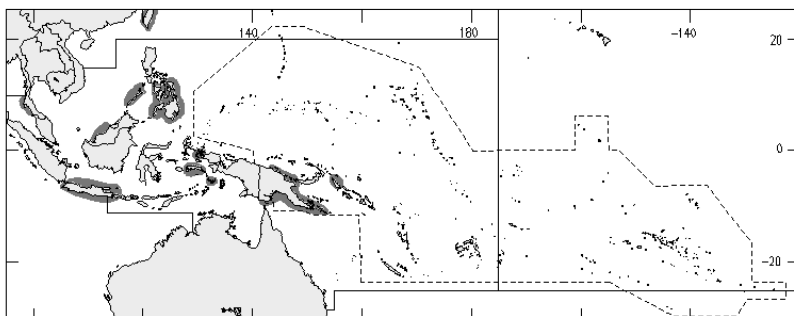


Diagnostic characters: Body depth 2.7 to 3.1 times in standard length; head length 2.5 to 2.7 times in standard length. Interorbital area convex; preopercle angular, with a notch above the corner and serrae at the corner enlarged; upper edge of operculum straight or slightly concave; maxilla reaches to vertical at rear edge of eye; **adults with a prominent knob or hook-like process on ventral edge of maxilla (covered by upper lip)**; midlateral part of lower jaw with 2 rows of teeth. Nostrils subequal or the posteriors slightly larger. **Gill rakers longer and more numerous than other species of *Epinephelus***; first gill arch with 32 to 38 rakers, of which 12 to 16 on upper limb and 20 to 23 on lower limb; 1 or 2 rudimentary rakers in juveniles, but none in adults. Dorsal fin with XI spines and 17 to 19 soft rays, **the third or fourth spines longest, 2.5 to 3.4 times in head length and longer than longest dorsal-fin ray**; interspinous membranes of dorsal fin not incised; anal fin with III spines and 8 soft rays; **caudal fin truncate to emarginate**; pectoral-fin rays 18 or 19, the fins shorter than pelvic fins, 1.7 to 2.3 times in head length; pelvic fins not reaching anus (except for juveniles), 1.6 to 2.2 times in head length. Lateral body scales distinctly rough, with numerous auxiliary scales; lateral-line scales 63 to 76; lateral scale series 124 to 150. **Colour: head, body, and fins purplish grey to brownish grey, with brown to golden-brown dots on head and wavy longitudinal lines of the same colour on dorsal part of body (lines faint or absent on large specimens); margin of spinous dorsal fin narrowly blackish.**

Size: Maximum total length at least 73 cm (reported to attain 122 cm); maximum weight at least 7 kg.

Habitat, biology, and fisheries: Usually found on offshore banks (rather than coral reefs) at depths of 24 to 90 m. Feeds on a variety of small fishes, small crustaceans (especially stomatopods), shrimps, and pelagic tunicates (*Thalia* and *Pyrosoma* sp.). Females were estimated to be mature at 55 cm total length. Caught with hook-and-line, vertical long lines, and trawls.

Distribution: Northern Indian Ocean and western Central Pacific: Indonesia, Sarawak, New Guinea, Solomon Islands, and the Philippines. Not known from the Red Sea, Persian Gulf, or Australia.

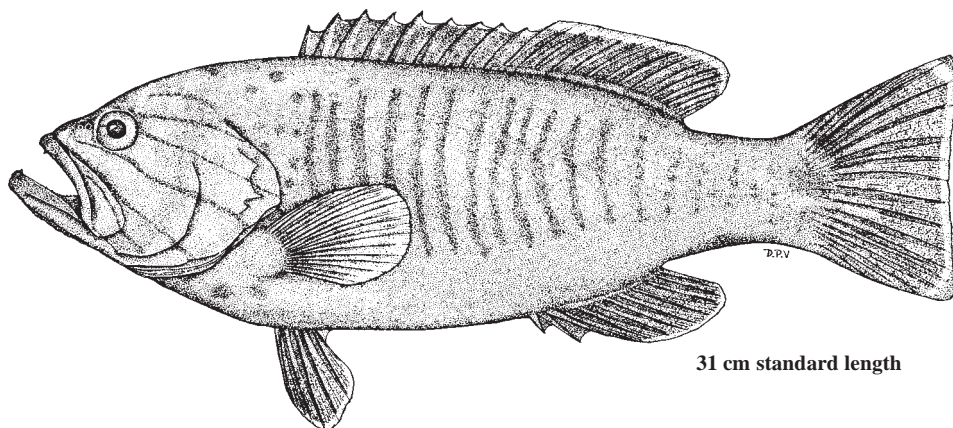


Gracila albomarginata (Fowler and Bean, 1930)

(Plate VI, 47)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Masked grouper; Fr - Mérou bord rouge; Sp - Mero paranjero.

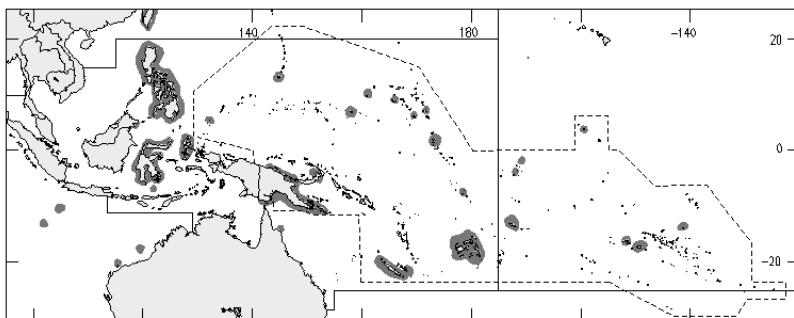


Diagnostic characters: Body oblong, somewhat compressed, its depth 2.6 to 3.3 times in standard length, body width 1.8 to 2.3 times in body depth; **head smaller than most other groupers, 2.9 to 3.2 times in standard length**; dorsal head profile evenly convex; interorbital area slightly convex and wide, its width greater than eye diameter; preorbital narrow, its depth distinctly less than eye diameter, 10 to 15 times in head length; preopercle rounded, finely serrate, the lower edge smooth and fleshy; ventral edge of subopercle and interopercle smooth; upper edge of operculum distinctly convex; nostrils subequal. A pair of small canines at front of both jaws; palatine teeth present; **distal part of maxilla in adults with a hook-shaped or step-like expansion on ventral edge**; supramaxilla well developed. First gill arch with 8 to 10 gill rakers on upper limb, 14 to 16 on lower limb. **Dorsal fin with IX slender spines and 14 to 16 soft rays, the fin origin over rear end of operculum**; anal fin with III spines and 9 or 10 soft rays; caudal fin truncate to slightly emarginate, with 8 branched rays in upper lobe and 7 in lower lobe; **soft dorsal and anal fins rounded**; dorsal-fin membranes not (adults) or slightly (juveniles) incised between the spines; pectoral fins rounded, with 18 or 19 rays, the middle rays longest. Midlateral body scales rough. **Colour:** adults greenish or reddish brown to grey, with several narrow curved dark bars on flanks and dark brown spot on side of caudal peduncle; 3 to 5 blue lines (often broken into spots) across the head (the upper 2 lines may serve as margins for a mask-like dark band from snout to end of opercle, enclosing eye); region under maxilla and along edge of gill opening often orange; soft dorsal and anal fins with narrow blue margin. **A transient colour phase has the caudal peduncle white, with a prominent black spot, and a large white area flanked by black areas on dorsal part of body. Juveniles brown or violet, with a bright reddish orange stripe in dorsal and anal fins and along upper and lower edges of caudal peduncle and fin.**

Size: Maximum total length about 60 cm.

Habitat, biology, and fisheries: Usually found on outer reef slope at depths of 15 to 120 m. An active swimmer that roams over the reef during the day. An excellent food fish, but not common enough to be of commercial importance. Caught with hook-and-line, gill nets, and spear.

Distribution: Tropical Indo-West Pacific from northern Mozambique to French Polynesia, including Taiwan Province of China, Philippines, Indonesia, New Guinea, New Britain, New Caledonia, Society Islands, Phoenix Islands, Marshall Islands, Minami Tori Shima, Guam, Caroline Islands, Palau Islands, Loyalty Islands, Samoa Islands, Takaroa, Tuamotus, and Fanning Island.

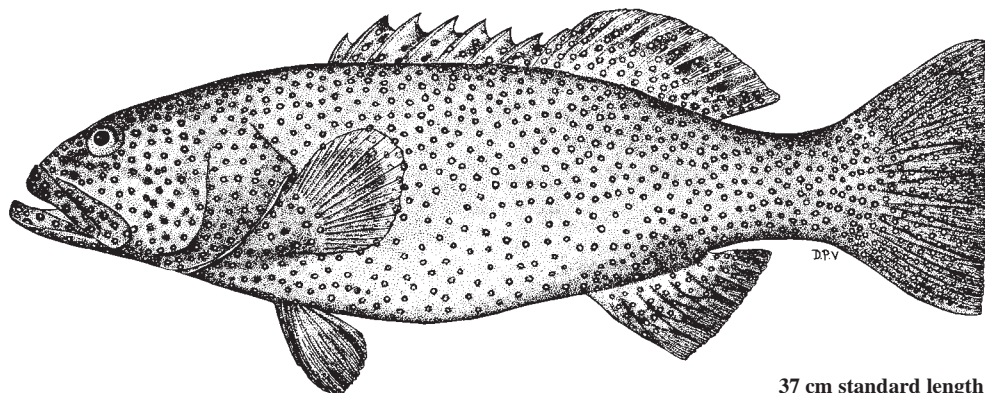


Plectropomus areolatus Rüppell, 1830

(Plate VI, 48)

Frequent synonyms / misidentifications: *Plectropoma maculatum* ? (non Bloch, 1790); *Plectropomus truncatus* Fowler and Bean, 1930 / None.

FAO names: En - Squaretail coralgroupier; Fr - Mériou queue carrée; Sp - Mero troncon.



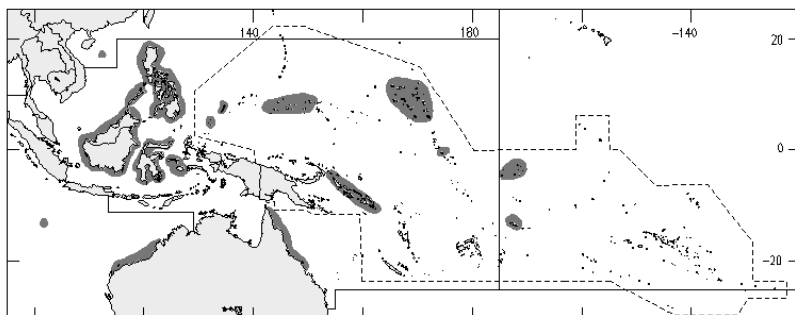
37 cm standard length

Diagnostic characters: Body elongate, robust, its depth 2.9 to 3.9 times in standard length; head length 2.7 to 3.1 times in standard length; snout 2.8 to 3.6 times in head length; suborbital depth 5.6 to 10 times in head length. Interorbital area flat (rounded at edges of orbits), with small, embedded scales; preopercle broadly rounded, with 3 large, ventrally-directed spines along lower half; interopercle and subopercle smooth; opercle with 3 flat spines, the upper and lower spines covered by skin. Midlateral part of lower jaw with 1 to 4 enlarged fixed canines. Nostrils subequal, set in a shallow groove running forward from eye. First gill arch with 2 to 7 developed gill rakers on lower limb; gill raker at angle shorter than gill filaments at angle. Dorsal fin with VII or VIII slender spines and 10 to 12 soft rays, the third or fourth spines longest, 3.2 to 4.2 times in head length, the longest soft ray 2.3 to 2.6 times in head length; base of spinous part of dorsal fin subequal to that of soft-rayed part; anal fin with III slender spines and 8 soft rays, the first 1 or 2 spines embedded and difficult to see in large fish; **caudal fin truncate to slightly emarginate, the caudal concavity more than 13 times in head length; pectoral-fin rays 15 or 16;** pectoral fins subequal to pelvic fins, 2.0 to 2.4 times in head length. Lateral-line scales 83 to 97. **Colour: head, body, and median fins greenish grey to brown or brownish red, with numerous round to oval dark-edged blue spots (the largest about equal to pupil); most spots within a spot diameter of adjacent spots;** pelvic fins with dark brown to blackish membranes; rear margin of caudal fin with a white edge and often with a blackish submarginal band.

Size: Maximum total length about 100 cm.

Habitat, biology, and fisheries: Coral reefs in lagoons and on outer reef at depths of 2 to 20 m. Feeds on fishes. A wary grouper, difficult for a diver to approach. It is reported that for a few days before new moon in May, large numbers gather in the seaward end of Ulong Channel, Palau to spawn and males may display pale bodies with about 5 irregular dark saddles and dark dorsal and anal fins. Undoubtedly of interest to artisanal fisheries. Caught with hook-and-line.

Distribution: Indo-Pacific; except for the Red Sea and Australia, records are limited to insular localities: Chagos, Maldives, Cocos-Keeling, Rowley Shoals (Western Australia), Indonesia, Philippines, Taiwan Province of China, Ryukyus, Paracel Islands (South China Sea), Palau, Great Barrier Reef, Caroline, Marshall, Samoa, and Phoenix islands.

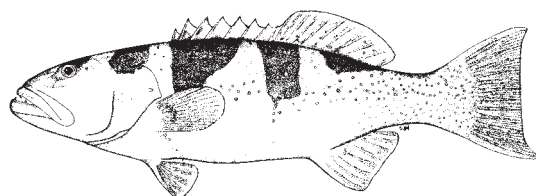


Plectropomus laevis (Lacepède, 1801)

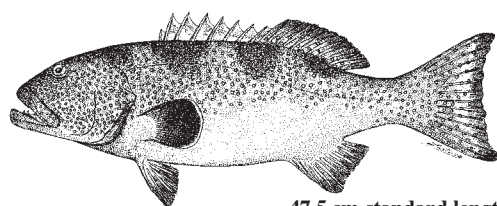
(Plate VII, 49)

Frequent synonyms / misidentifications: *Plectropomus melanoleucus* (Lacepède, 1802) / *Plectropomus maculatus* (non Bloch, 1790).

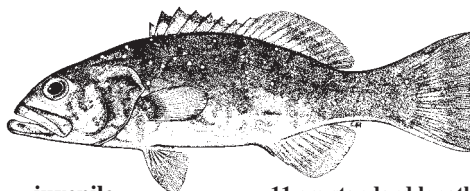
FAO names: En - Blacksaddled coralgroupier; Fr - Mérou sellé; Sp - Mero ensillado.



59.7 cm standard length



47.5 cm standard length



juvenile

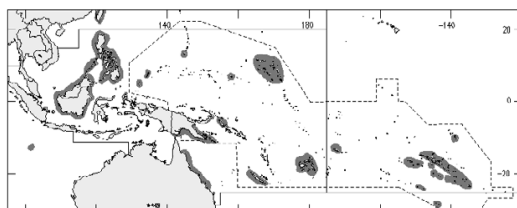
11 cm standard length

Diagnostic characters: Body elongate, robust, its depth 2.9 to 3.9 times in standard length; head length 2.7 to 3.1 times in standard length; suborbital depth 5.6 to 10 times in head length. Interorbital area without scales; preopercle broadly rounded, with 3 large, ventrally-directed spines along lower half; interopercle and subopercle smooth; opercle with 3 flat spines, the upper and lower spines covered by skin. Midlateral part of lower jaw with 1 to 4 enlarged fixed canines. Nostrils subequal, set in a shallow groove running forward from eye. First gill arch with 4 to 10 developed gill rakers on lower limb; gill raker at angle shorter than gill filaments at angle. Dorsal fin with VII or VIII slender spines and 10 to 12 soft rays, the third or fourth spines longest, 3.2 to 4.2 times in head length, the longest soft ray 2.3 to 3.3 times in head length; anal fin with III slender spines and 8 soft rays, the first 1 or 2 spines embedded and difficult to see in large fish; **caudal fin emarginate, the caudal concavity 5 to 10 times in head length; pectoral-fin rays 16 to 18**, the fin length about equal to pelvic fins, 2.1 to 2.4 times in head length. Lateral-line scales 83 to 97. **Colour:** 2 colour forms: the pale black-saddled form is whitish or pale yellowish with 5 dark brown to black, saddle-like or wedge-shaped bars or blotches on dorsal part of head and body, the first just behind eyes, the second on nape, the third to fifth under dorsal fin; small dark-edged blue spots may be visible on body (mainly posteriorly); fins, caudal peduncle, snout, and jaws yellow; black blotch centrally at base of paired fins; small juveniles (10 to 20 cm) with membranes between first and fifth dorsal-fin spines mostly blackish. The dark form is brown, olivaceous, red, or nearly black, the dark bars (as on pale form) are usually faint or absent; numerous, round, dark-edged blue spots (about 1/2 pupil diameter) on head, body (except ventrally), soft dorsal, caudal, and anal fins, and base of pectoral fins; pectoral fins dark brown distally, the rays darker than membranes, the rear edge white.

Size: Maximum total length about 125 cm; maximum weight 18 kg.

Habitat, biology, and fisheries: Coral reefs of Indo-West Pacific region in depths of 4 to 90 m. The pale black-saddled juveniles may be mimics of the pufferfish *Canthigaster valentini*. Juveniles of both forms [pale and dark] less than about 20 cm normally employ the pectoral fins for propulsion, holding the caudal fin distinctly folded and the front section of the spinous dorsal erect. When swimming in this manner, juveniles of *Plectropomus laevis* look remarkably similar to *Canthigaster valentini*. The pale black-saddled form of *P. laevis* is usually smaller (8 to 57 cm standard length) than the dark reddish brown phase (15 to 100 cm standard length), and the smaller pale phase may be juveniles and females, with the larger dark phase being males. This hypothesis would agree with a protogynous type of hermaphroditism which seems to be the usual system for groupers and is known for *P. leopardus*. Maturity (at least for females) "seems to occur" at 50 to 52 cm standard length (2.8 to 3.2 kg). The blacksaddled coralgroupier feeds on a variety of large reef fishes, including groupers. This diet of large fishes is responsible for the high concentrations of ciguatera toxins found in some specimens of this species. Despite the danger of ciguatera poisoning, *P. laevis* is commonly used for food. Caught with hook-and-line, spear, and in fish traps.

Distribution: Indo-Pacific, from southern Mozambique to the Tuamotus, Austral Islands, and Rapa, but not in the Red Sea or Persian Gulf. Except for the east coasts of Africa and Australia, records of *P. laevis* are from insular localities, from Japan (Ryukyu Islands) to southern Great Barrier Reef and most islands in the central and western Pacific. Not recorded from the Asian coast or Indonesia.

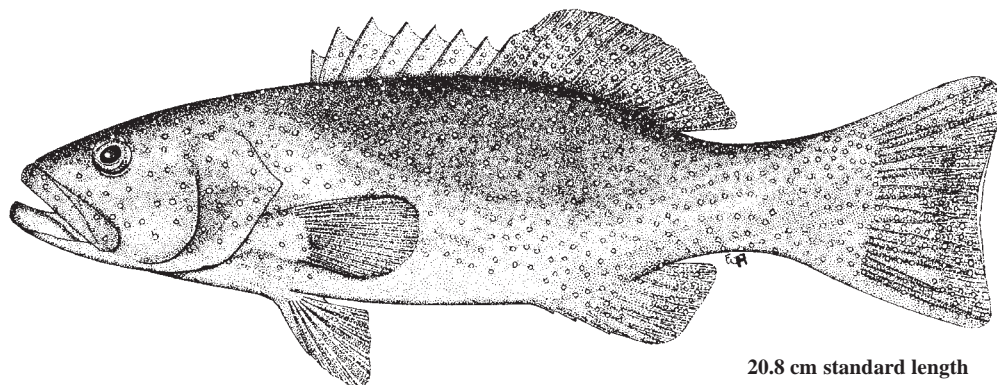


Plectropomus leopardus (Lacepède, 1802)

(Plate VII, 50)

Frequent synonyms / misidentifications: *Plectropoma leopardinus* Cuvier, 1828 / *Plectropoma maculatus* (non Bloch, 1790).

FAO names: En - Leopard coralgroupier; Fr - Saumonée léopard; Sp - Mero celestrial.

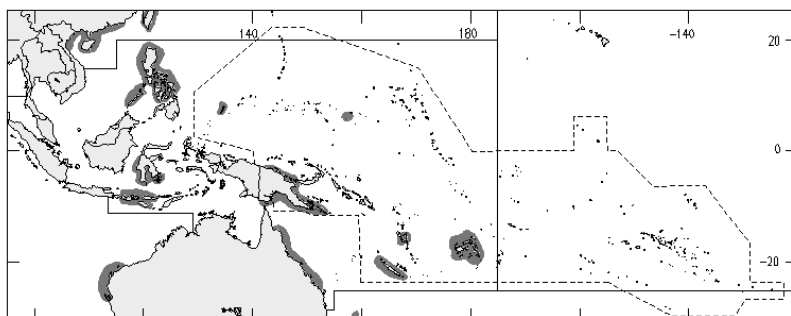


Diagnostic characters: Body depth 2.9 to 3.9 times in standard length; head length 2.7 to 3.1 times in standard length; suborbital depth 5.6 to 10 times in head length. Interorbital area without scales; preopercle broadly rounded, with 3 large, ventrally-directed spines along lower half; interopercle and subopercle smooth; opercle with 3 flat spines, the upper and lower spines covered by skin. Midlateral part of lower jaw with 1 to 4 enlarged fixed canines. Nostrils subequal for specimens less than 50 cm (at larger sizes, the rear nostrils may be enlarged). First gill arch with 6 to 10 developed gill rakers on lower limb; gill raker at angle longer than gill filaments at angle. Dorsal fin with VII or VIII slender spines and 10 to 12 soft rays, the third or fourth spines longest, 3.2 to 4.2 times in head length, the longest soft ray 2.2 to 2.7 times in head length; anal fin with III slender spines and 8 soft rays, the first 1 or 2 spines embedded in large fish; **caudal fin emarginate, the caudal concavity 5 to 12 times in head length and the fin length 1.3 to 1.5 times in head length; pectoral-fin rays 15 to 17, the fin length about equal to pelvic-fin length, 1.9 to 2.2 times in head length.** Lateral-line scales 89 to 99. **Colour:** olivaceous to reddish brown, orange-red, or red, with numerous, small blue spots (nostril sized and usually dark-edged) on head and body (except ventrally) and median fins; more than 10 spots on cheek (below and behind eye to rear edge of preopercle); blue ring (dark brown in alcohol) on edge of orbit (sometimes broken into segments); pectoral fins reddish or hyaline with darker rays; an indistinct dark band at rear margin of caudal fin and a white line usually visible along middle of rear edge.

Size: Maximum total length about 70 cm.

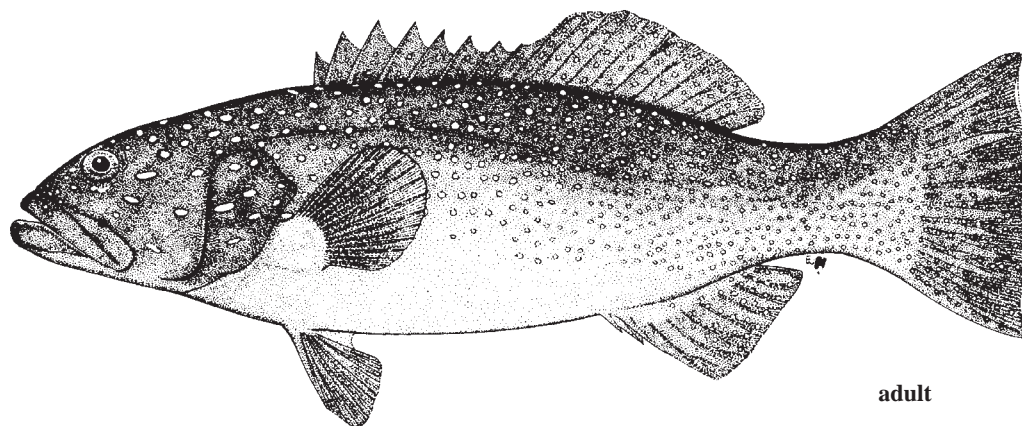
Habitat, biology, and fisheries: Coral reefs at depths of 3 to 100 m. The leopard coralgroupier is a protogynous hermaphrodite. On the Great Barrier Reef, the smallest mature female (21 cm standard length) was estimated to be 2 years old, and the largest female (47 cm standard length) was age 4; the smallest mature male (30 cm standard length) was age 3, and the largest male (54 cm standard length) was estimated to be 5 years old. Spawning occurred in late November and early December. Feeds throughout the day and is inactive at night; 96% of the prey comprised fishes. Small juveniles included a few benthic crustaceans in their diet, but adults fed only on fishes, primarily atherinid and scarid fishes. A popular food fish that rarely causes ciguatera. Caught with hook-and-line, spear, traps, and trawls.

Distribution: Western Pacific, from southern Japan to Australia (Queensland and Western Australia) and eastwards to the Caroline Islands and Fiji, including Hong Kong, Viet Nam, Philippines, Indonesia, Palau, Papua New Guinea, and New Caledonia.



Plectropomus maculatus (Bloch, 1790)

(Plate VII, 51)

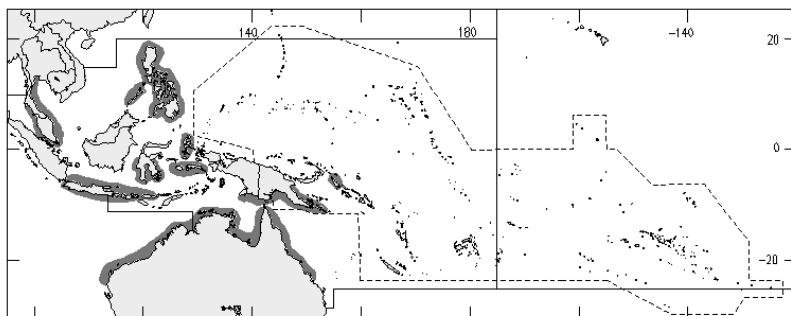
Frequent synonyms / misidentifications: None / None.**FAO names:** En - Spotted coralgroupers; Fr - Vielle Saint-Silac; Sp - Mero con pintas.

Diagnostic characters: Body elongate, robust, its depth 2.9 to 3.9 times in standard length; head length 2.7 to 3.1 times in standard length; suborbital depth 5.6 to 10 times in head length. Interorbital area without scales; preopercle broadly rounded, with 3 large, ventrally-directed spines along lower half; interopercle and subopercle smooth; opercle with 3 flat spines, the upper and lower spines covered by skin; midlateral part of lower jaw with 1 to 4 enlarged fixed canines. Nostrils subequal, set in a shallow groove running forward from eye. First gill arch with 6 to 9 developed gill rakers on lower limb; gill raker at angle distinctly longer than gill filaments at angle. Dorsal fin with VII or VIII slender spines and 10 to 12 soft rays, the third or fourth spines longest, 3.2 to 4.2 times in head length, the longest soft ray 2.2 to 2.5 times in head length; base of spinous part of dorsal fin subequal to that of soft-rayed part; anal fin with III slender spines and 8 soft rays, the first 1 or 2 spines embedded in large fish; **caudal fin emarginate, the caudal concavity 5 to 10 times and the fin length 1.3 to 1.5 times in head length; pectoral-fin rays 15 to 17; the fin length about equal to pelvic-fin length, 1.7 to 2.2 times in head length.** Lateral-line scales 83 to 97. **Colour:** head, body, and median fins greenish grey, brown, red, or orange-red, with dark-edged blue spots; spots on head and anterior part of body about 1/2 pupil diameter or larger (and many are oval or horizontally elongated), becoming much smaller, more uniformly round, and more numerous on rear part of body and on fins; few spots on head, 3 to 7 on cheeks (below and behind eye to rear edge of preopercle); no blue spots on ventral parts of head and body; usually a single blue spot on pectoral-fin base and another in axil; no blue spots on pelvic fins; rear margin of caudal fin with a white edge.

Size: Maximum total length about 125 cm; maximum weight at least 25 kg.

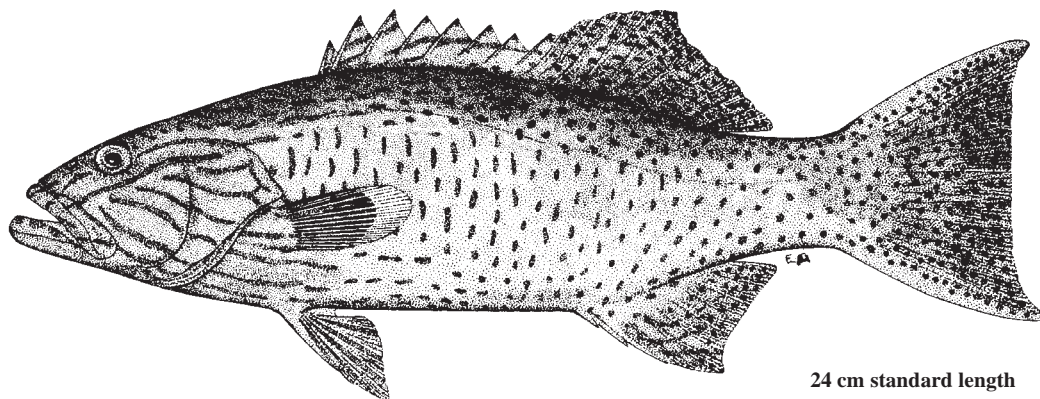
Habitat, biology, and fisheries: Coral reefs at depths of 5 to 50 m. Common in markets. Caught with hook-and-line, spear, and in trawls.

Distribution: Known only from the western tropical Pacific: Thailand, Singapore, Philippines, Indonesia, Papua New Guinea, Solomon Islands, and Australia (Western Australia to southern Queensland).



Plectropomus oligacanthus Bleeker, 1854

(Plate VII, 52)

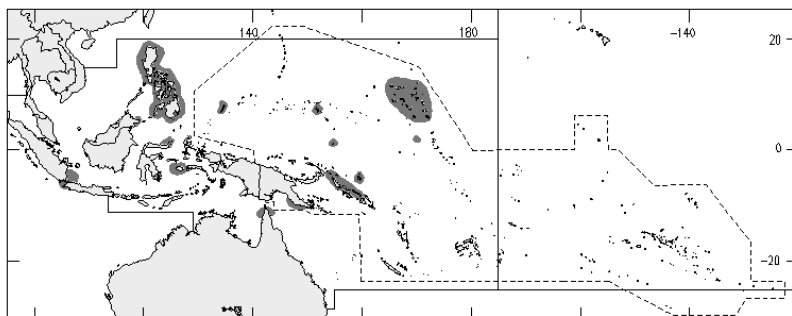
Frequent synonyms / misidentifications: *Plectropoma variegatum* Castelnau, 1875 / None.**FAO names:** En - Highfin coralgrouper; Fr - Mérou-loche cacatois; Sp - Mero vela.

Diagnostic characters: Body elongate, robust, its depth 2.9 to 3.9 times in standard length; head length 2.7 to 3.1 times in standard length; suborbital depth 3.3 to 7.2 times in head length. Interorbital area without scales; preopercle broadly rounded, with 3 large ventrally-directed spines along lower half; interopercle and subopercle smooth; opercle with 3 flat spines, the upper and lower spines covered by skin. Midlateral part of lower jaw with 1 to 4 enlarged fixed canines. First gill arch with 7 to 9 developed gill rakers on lower limb, gill raker at angle subequal to gill filaments at angle. Dorsal fin with VII or VIII slender spines and 10 to 12 soft rays, the third or fourth spines longest, 3.2 to 4.2 times in head length; **soft dorsal and anal fins pointed anteriorly, the second to fourth rays elongated, 1.5 to 2.1 times in head length**; anal fin with III slender spines and 8 soft rays, the first 1 or 2 spines embedded and difficult see in large fish; **caudal fin emarginate, the caudal concavity 3 to 7 times in head length**; **pectoral-fin rays 14 to 16**; the fin shorter than pelvic fins, 2.1 to 2.4 times in head length. Lateral-line scales 86 to 96. **Colour:** head, body, and fins reddish brown to red, with horizontal to oblique blue lines on rear of head and anterodorsally on body; vertical blue lines (or dashes) anteriorly on side of body (at least in adults), and numerous blue spots elsewhere on body and on caudal fin; dorsal and anal fins with blue lines and spots; pectoral fins pale yellowish, with basal two-thirds of rays dark brown and a few blue lines at base of fin; pelvic fins with brownish red rays and blue membranes.

Size: Maximum total length 75 cm.

Habitat, biology, and fisheries: Coral reefs in depths of 4 to 40 m. Very little has been published on the biology of this rare species. Sometimes groups of 2 or 3 often forage together for rock- and sand-living crustaceans and fishes. Well known in the Philippines, but it seems to be rare elsewhere. Of minor importance in artisanal fisheries, and it has been implicated in cases of ciguatera fish poisonings. Caught with hook-and-line, spear, and in traps.

Distribution: Known only from western Pacific Ocean: Philippines, Indonesia, New Guinea, northeastern Australia (Cape York to northern Great Barrier Reef), Palau, Truk, Caroline Islands, Marshall Islands, and the Solomon Islands.

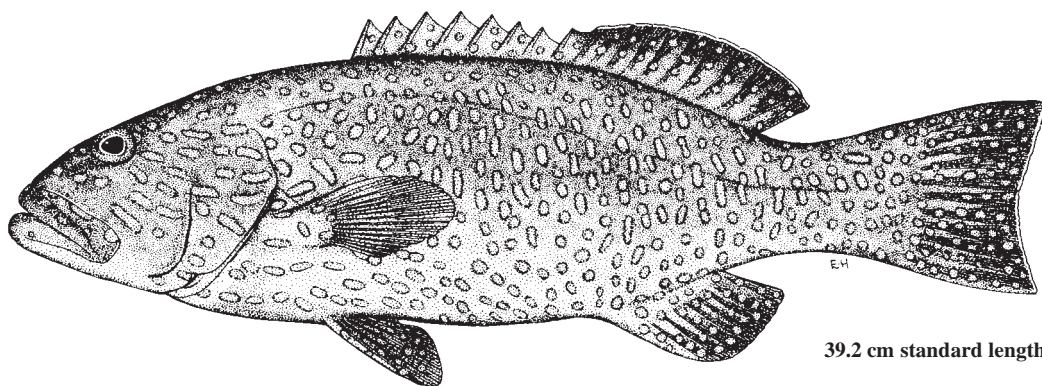


Plectropomus pessuliferus Fowler, 1904

(Plate VII, 53)

Frequent synonyms / misidentifications: *Perca miniata* var. C Forsskål, 1775; *Plectropoma maculatum* var. D Playfair and Günther, 1867, *P. maculatum* var. A (in part) Boulenger, 1895 / *Plectropoma maculatus* (non Bloch, 1790).

FAO names: **En** - Roving coralgroupier; **Fr** - Mérrou-loche vagabonde; **Sp** - Mero errante.

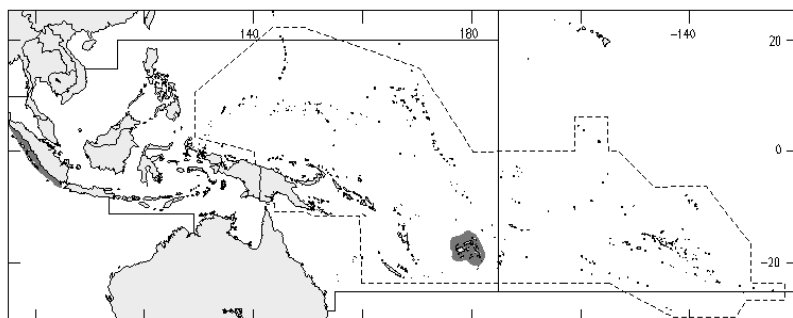


Diagnostic characters: Body elongate, robust, its depth 2.9 to 3.9 times in standard length; head length 2.7 to 3.1 times in standard length; suborbital depth 5.6 to 10 times in head length. Interorbital area without scales; preopercle broadly rounded, with 3 large, ventrally-directed spines along lower half; interopercle and subopercle smooth; opercle with 3 flat spines, the upper and lower spines covered by skin. Midlateral part of lower jaw with 1 to 4 enlarged fixed canines. Nostrils set in a shallow groove running forward from eye, nostrils subequal at less than about 30 cm standard length, the rear nostrils often enlarged in larger fish. First gill arch with 7 to 10 developed gill rakers on lower limb; gill raker at angle shorter than gill filaments at angle. Pyloric caeca 3, large and finger-like. Dorsal fin with VII or VIII slender spines and 10 to 12 soft rays, the third or fourth spines longest, 3.2 to 4.2 times in head length, the longest soft ray 2.3 to 3.0 times in head length; anal fin with III slender spines and 8 soft rays, the first 1 or 2 spines embedded and difficult see in large fish; **caudal fin emarginate (truncate in juveniles), the caudal concavity 4.6 to 6.2 times in head length; pectoral-fin rays 15 or 16, the fin about equal to pelvic fins, 1.9 to 2.3 times in head length.** Lateral-line scales 85 to 104. **Colour:** head, body, and fins brown to orange-red, with numerous small dark-edged blue spots; some spots on head and sides of body of adults are elongated (those on body usually vertically elongate); spots few or absent on ventral part of body; edge of orbit often blue (may be broken into segments).

Size: Maximum total length uncertain, at least 63 cm, perhaps 120 cm.

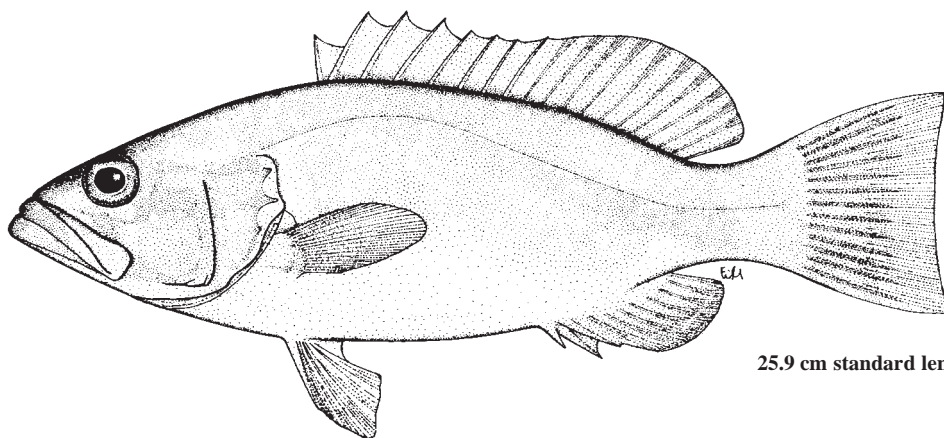
Habitat, biology, and fisheries: Coral reefs at depths of 25 to 147 m. Caught with hook-and-line, spear, and in trawls.

Distribution: Red Sea, Zanzibar, Maldives, St. Brandon's Shoals, Sri Lanka, Chagos, Andaman Islands, Nazareth Bank, Sumatra, and Fiji.



Saloptia powelli Smith, 1964

(Plate VII, 54)

Frequent synonyms / misidentifications: None / None.**FAO names:** En - Golden grouper; Fr - M rou d'or; Sp - Mero dorado.

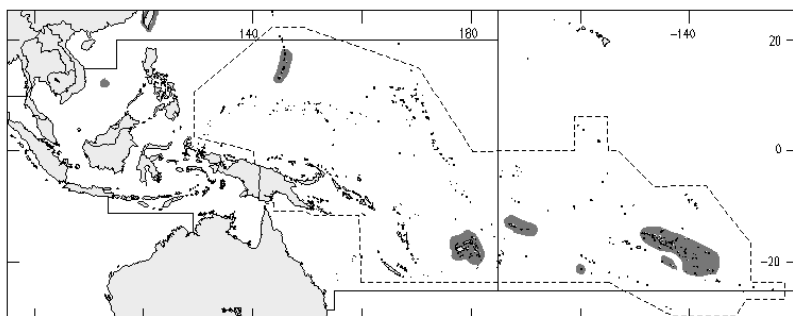
25.9 cm standard length

Diagnostic characters: Body oblong, robust, its depth less than head length and 2.6 to 3.0 times in standard length; body width 2.2 times in body depth; head length 2.5 to 2.6 times in standard length; dorsal head profile slightly convex; interorbital area flat; suborbital depth 0.4 to 0.5 times eye diameter and 13 times in head length. **Preopercle subangular, with 3 large curved spines (mostly hidden by skin) on lower edge**, the rear edge with minute serrae near the angle. Opercle with 3 flat, equidistant spines; upper edge of operculum distinctly convex; subopercle and interopercle serrate. A pair of canines at front of both jaws; lower jaw with 2 rows of teeth, but no enlarged canines at midside of jaw; vomer and palatines with teeth; posterior part of maxilla evenly expanded (no step, hooks, or knob on ventral edge); supramaxilla well developed. First gill arch with 8 or 9 on upper limb, 16 or 17 on lower limb. **Dorsal fin with VIII spines and 11 soft rays**, the fin origin behind vertical at rear end of operculum, the fin membranes slightly incised between the spines, the third spine longest; length of dorsal-fin base less than 50% of standard length; anal fin with III spines and 8 soft rays; dorsal- and anal-fin spines strong, the anal-fin spines quite distinct; caudal fin emarginate, with 7 branched rays in upper lobe and 6 in lower lobe; **pectoral fins short and rounded, the middle rays longest, subequal to pelvic fins, 2.2 to 2.4 times in head length**. Body scales small, distinctly rough, even on belly; no auxiliary scales; lateral-line scales 70 to 78; lateral scale series 115 to 133. A single curved supraneural bone anterior to tip of first neural spine; dorsal fin with 2 trisegmental pterygiophores, anal fin with 3; rear edge of first dorsal pterygiophore incised at tip of third neural spine; epipleural ribs on vertebrae 1 to 9. **Colour:** head, body, and fins yellow to orange-yellow, shading ventrally to white or pink, the snout, lips, and dorsal part of head suffused with red; dorsal-fin spines of some specimens streaked with red.

Size: Maximum total length about 50 cm.

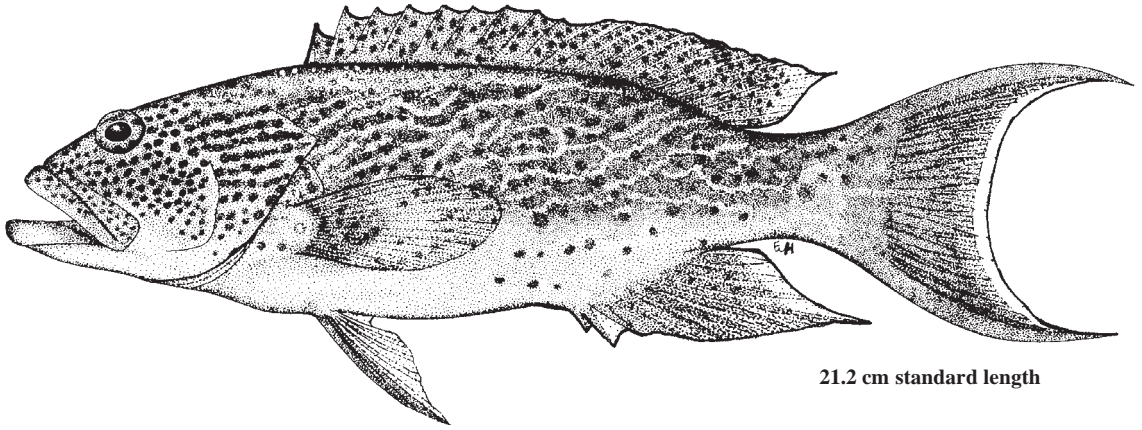
Habitat, biology, and fisheries: Rocky reefs at depths of 140 to 367 m. Biology unknown. Although it is not abundant, the golden grouper is an important food fish in the Ryukyu Islands of southern Japan and also in the Mariana Islands.

Distribution: Western Pacific to French Polynesia, including Okinawa, Taiwan Province of China, South China Sea, Mariana Islands, Society Islands, Cook Islands, American Samoa, Fiji, and Tuamotus.



Variola albimarginata Baissac, 1952

(Plate VII, 55)

Frequent synonyms / misidentifications: None / *Variola louti* (non Forsskål, 1775).**FAO names:** En - White-edged lyretail; Fr - Croissant queue blanche; Sp - Mero rabiblanco.

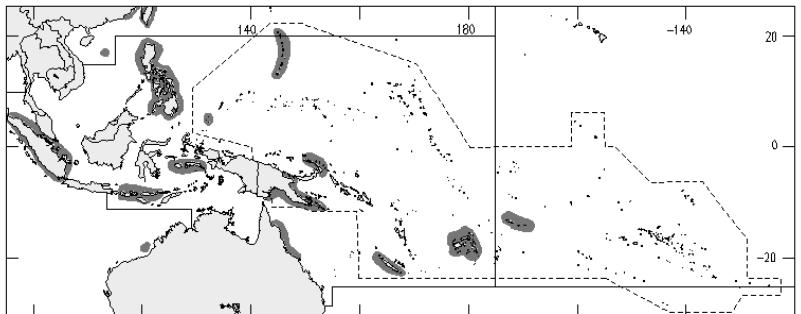
21.2 cm standard length

Diagnostic characters: Body oblong, its depth less than head length and 2.8 to 3.5 times in standard length; head length 2.6 to 2.8 times in standard length; interorbital area of adults convex; dorsal head profile slightly convex; preorbital depth 0.6 to 1.4 times eye diameter and 6 to 10 times in head length; preopercle rounded, finely serrate, the lower edge fleshy; opercle with 3 flat spines; upper edge of operculum almost straight; subopercle and interopercle smooth; rear nostrils not much bigger than anterior nostrils. Maxilla of adults with a distinct step on ventral edge; supramaxilla well developed; both jaws with a pair of large canines at the front; **1 to 3 large canines at midside of lower jaw**; palatines and vomer with teeth. First gill arch with 7 to 9 gill rakers on upper limb, 13 to 16 lower limb (including 4 to 7 rudiments on each limb). **Dorsal fin with IX spines and 14 soft rays**; anal fin with III spines and 8 soft rays; **caudal fin lunate, the upper and lower lobes produced, about twice length of middle rays**; pectoral-fin rays 17 to 19, the middle rays longest, 1.6 to 1.8 times in head length; pelvic fins usually not reaching anus, 1.4 to 1.8 times in head length. Midlateral body scales rough, without auxiliary scales; lateral-line scales 66 to 76; lateral scale series 109 to 127. **Colour:** body brownish orange or reddish purple, with irregular red bands alternating with yellow lines, the red bands containing small irregular pale blue to pink spots; head orange-yellow, densely spotted with red; median fins with small pink and red spots; rear margin of caudal fin usually dusky, with a narrow white edge; rear margin of dorsal and anal fins hyaline, without trace of yellow; pectoral fins yellow, the basal half of rays often reddish or dark brown. Juveniles similar in colour to adults, but with relatively fewer and larger pale blue or pink spots.

Size: Appears to be smaller than *V. louti*, the largest known specimen was 47 cm total length; probably does not grow larger than 55 cm total length, at a maximum weight of 1 kg.

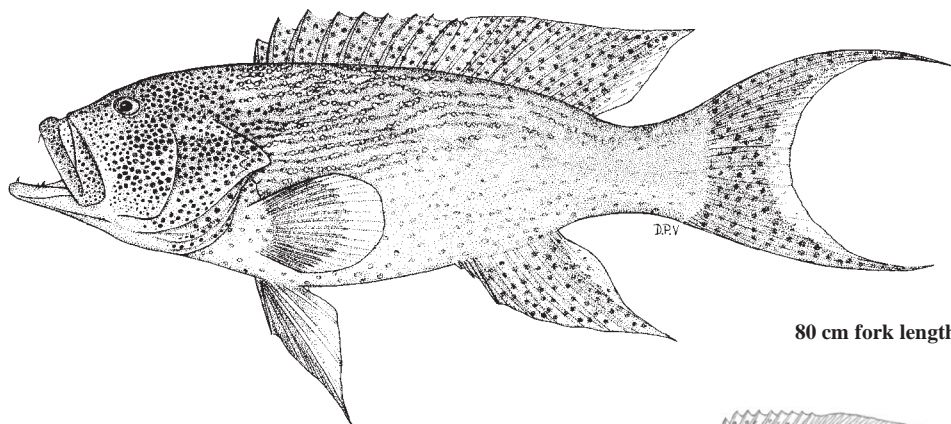
Habitat, biology, and fisheries: Coral reefs at depths of 4 to 200 m. Feeds on fishes. Females mature at 32 cm standard length. Because of its small size and rarity, of little interest to fisheries. Flesh excellent. Caught with handline, traps, and spear.

Distribution: From east coast of Africa (Zanzibar and Mafia Island, Tanzania) to Samoa, including South China Sea, Indonesia, Philippines, Taiwan Province of China, Ryukyu Islands, tropical coast of Australia, Papua New Guinea, New Ireland, New Caledonia, Guam, Palau Islands, Mariana Islands, Fiji, and Samoa.



Variola louti (Forsskål, 1775)

(Plate VII, 56)

Frequent synonyms / misidentifications: None / None.**FAO names:** En - Yellowedged lyretail; Fr - Croissant queue jaune; Sp - Mero luna creciente.

80 cm fork length

Diagnostic characters: Body oblong, its depth less than head length and 2.8 to 3.3 times in standard length; head length 2.5 to 2.8 times in standard length; interorbital area of adults convex; dorsal head profile slightly convex; preorbital depth 0.6 to 1.4 times eye diameter and 6 to 10 times in head length; preopercle rounded, finely serrate, the lower edge fleshy; opercle with 3 flat spines; upper edge of operculum almost straight; subopercle and interopercle smooth. Maxilla of adults with a distinct step on ventral edge; supramaxilla well developed; both jaws with a pair of large canines at the front; **1 to 3 large canines at midside of lower jaw**; palatines and vomer with teeth. First gill arch with 7 to 10 gill rakers on upper limb, 15 to 18 lower limb (including 6 to 8 rudiments on each limb).

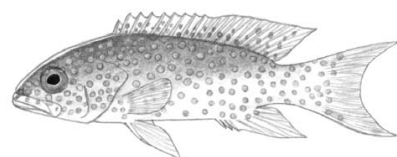
Dorsal fin with IX spines and 13 or 14 soft rays; anal fin with III spines and 8 soft rays; **caudal fin lunate, the upper and lower lobes produced, about twice length of middle rays**; pectoral-fin rays 16 to 19, the fin 1.6 to 1.8

times in head length; pelvic fins of adults reach past anus, 1 to 1.7 times in head length. Midlateral body scales rough, without auxiliary scales; lateral-line scales 66 to 77; lateral scale series 113 to 135. **Colour:** head, body, and median fins yellowish brown to orange-red (specimens from deep water more reddish) with numerous small round or elongate spots of blue, lavender or pink; **rear margin of median fins broadly yellow**; **pectoral-fin rays red to brown, the distal third abruptly yellow**. **Large juveniles (10 to 25 cm) with irregular black band along dorsal part of body ending below rear of dorsal fin and continuing on head (up to eye) as 3 irregular black spots**; **black blotch at base of upper caudal-fin rays**; **head and body (including black band) with small pale blue to pink spots**; **a pale yellow or white stripe middorsally on head from tip of lower jaw to dorsal-fin origin**. **Small juveniles (less than 7 cm standard length) lack the black band and black spots on dorsal part of head and body.**

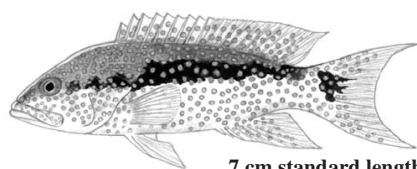
Size: Maximum total length 100 cm; maximum weight 12 kg.

Habitat, biology, and fisheries: Coral reefs at depths of 3 to 240 m; usually seen at depths below 15 m. Prefers islands and offshore reefs, rather than continental shores. Feeds primarily on fishes, including a variety of coral-reef species. Females mature at 33 cm standard length. Common and important food fish, but often causes ciguatera fish poisoning. Caught with handlines, spear, and traps.

Distribution: Tropical Indo-Pacific region from Red Sea to Pitcairn Islands; known from most (probably all) tropical islands of the Indian Ocean and western Central Pacific. In the western Pacific, it ranges from Japan (southern Honshu) to the northern half of Australia (from Shark Bay round to New South Wales).

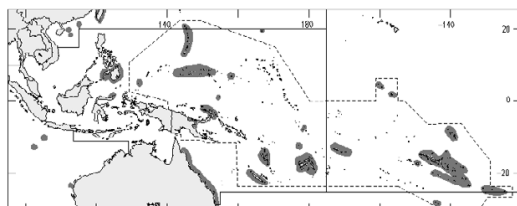


< 7 cm standard length



7 cm standard length

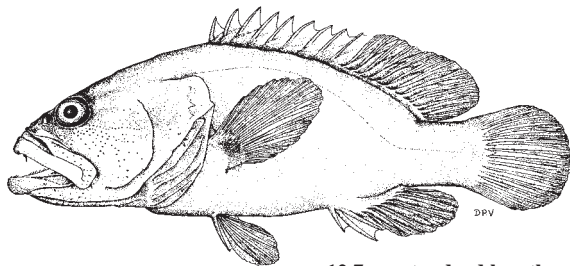
juveniles



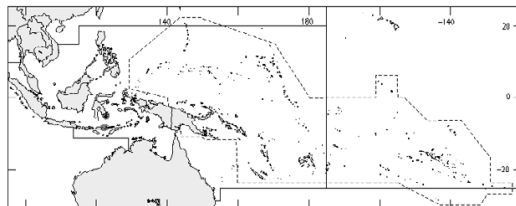
Cephalopholis aitha Randall and Heemstra, 1991

En - Rusty hind; **Fr** - Vielle rouillé; **Sp** - Cherna herrumbrosa.

Maximum total length about 18 cm. Inshore, in protected or silty reef areas at depths of 5 to 33 m. Possibly taken in subsistence fisheries, but of no commercial importance. Caught in trawls and gill nets. Papua New Guinea, Indonesia (Sulawesi, Flores), and the Philippines.



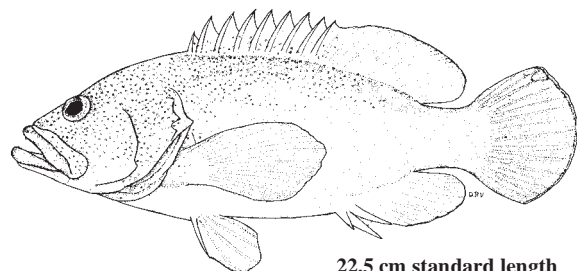
12.7 cm standard length



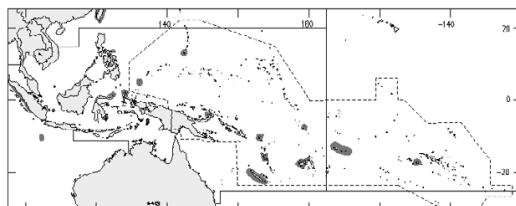
Cephalopholis aurantia (Valenciennes, 1828)

En - Golden hind; **Fr** - Vielle dorée; **Sp** - Cherna dorada.

Maximum total length at least 30 cm. Usually caught in depths over 100 m. Specimens are rare in museums. Because of its small size and occurrence in moderately deep water, the golden hind is of little commercial importance as a food fish. South Africa and islands of the western Indian Ocean to the Central Pacific and Japan. Except for a single specimen caught off the coast of South Africa, there are no confirmed records from continental localities.



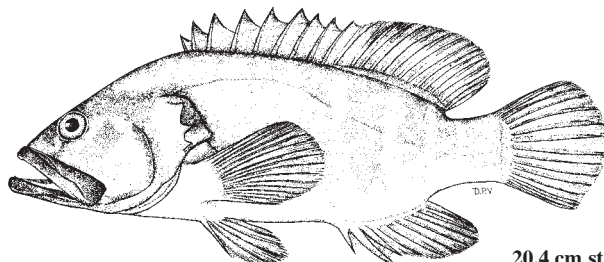
22.5 cm standard length



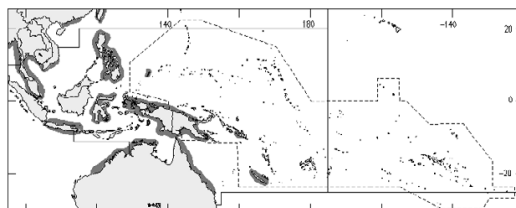
Cephalopholis boenak (Bloch, 1790)

En - Chocolate hind; **Fr** - Vielle chocolat; **Sp** - Cherna chocolate.

Maximum total length 26 cm. Usually found in depths of 4 to 30 m on silty dead reefs in protected waters; also taken in trawls to depths of 64 m. Feeds primarily on crustaceans. Spawns in pairs. Too small to be of commercial importance as a food fish. Caught with hook-and-line, gill nets, traps, and in trawls. Primarily continental in its distribution, occurring from Kenya to southern Mozambique and eastwards to the western Pacific (Ryukyu Islands, Taiwan Province of China, China, Philippines, Indonesia, Papua New Guinea, New Caledonia, and eastern Australia). Not known from the Red Sea, Persian Gulf nor the islands of Micronesia or Polynesia, except for Palau.

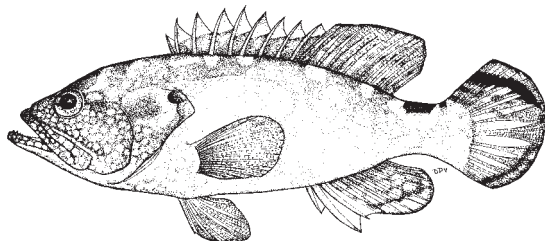


20.4 cm standard length

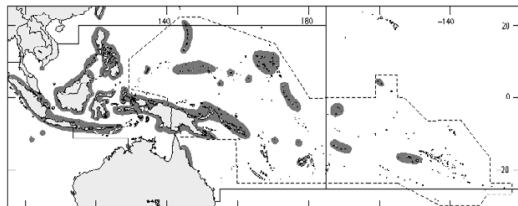


Cephalopholis leopardus (Lacepède, 1801)**En** - Leopard hind; **Fr** - Vielle léopard; **Sp** - Cherna leopardo.

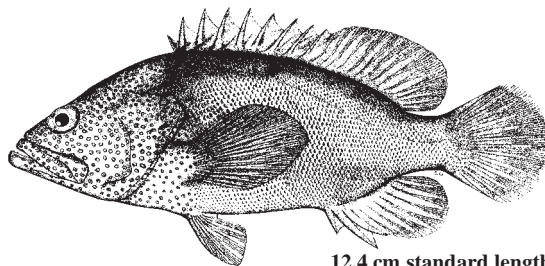
Maximum total length 20 cm (larger sizes reported in the literature are unsubstantiated). Well-developed coral reefs in depths of 3 to 38 m. Feeds on crustaceans. Like most small groupers, this is a secretive species, which is usually seen hiding in caves and crevices in the reef; too small to be of interest to fisheries. African coast to Central Pacific, including most islands of the Indian Ocean, Viet Nam, Indonesia, Philippines, Taiwan Province of China, Okinawa, Papua New Guinea, northern Australia, and most islands of the western Central Pacific.



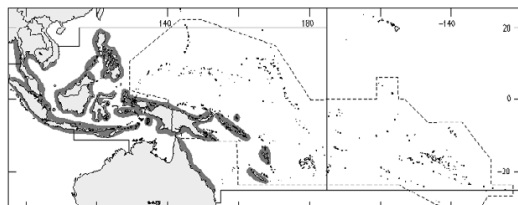
11.4 cm standard length

***Cephalopholis microprion*** (Bleeker, 1852)**En** - Freckled hind; **Fr** - Vielle tache de rousseur; **Sp** - Cherna pecosa.

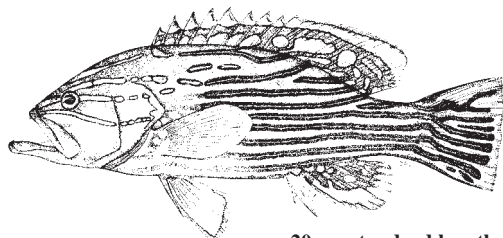
Maximum total length about 24 cm. Shallow-water silty reefs. Because of its small size, this species is of minor importance to fisheries. Caught with hook-and-line and probably in traps. Tropical eastern Indian Ocean and western Pacific: Andaman Sea, Gulf of Thailand, Indonesia, Philippine, Papua New Guinea, Great Barrier Reef, Solomon Islands, and New Caledonia.



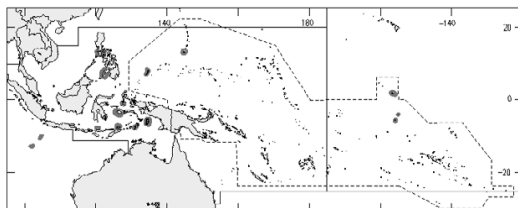
12.4 cm standard length

***Cephalopholis polleni*** (Bleeker, 1868)**En** - Harlequin hind; **Fr** - Vielle arlequin; **Sp** - Cherna arlequin.

Maximum total length 43 cm. Coral reefs in clear water on the edge of steep dropoffs; rarely seen in depths less than 30 m, it has been taken at 120 m and undoubtedly occurs deeper. Probably valuable as an attractive aquarium fish, but the species is apparently too rare and too small to be of commercial importance as a food fish. Caught with hook-and-line and traps. Islands of the Indo-Pacific region, from the western Indian Ocean to the Central Pacific (Palau and Line Islands); also reported from the Cocos-Keeling Islands, Christmas Island, Indonesia (small islands), Philippines, Okinawa, Guam, and New Britain. Not known from the Red Sea, Sri Lanka, Australia, larger islands of Indonesia, or New Guinea.



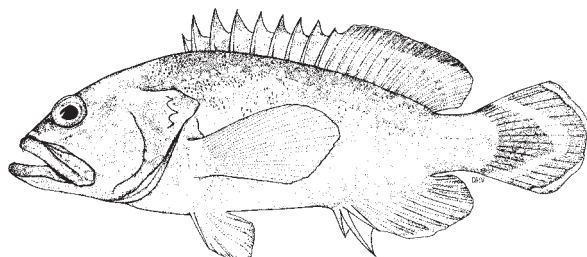
20 cm standard length



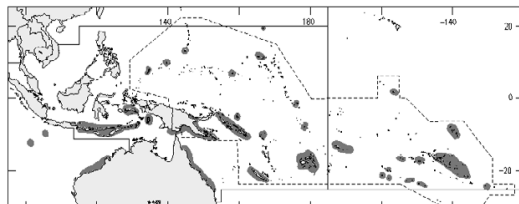
Cephalopholis spiloparaea (Valenciennes, 1828)

En - Strawberry hind; **Fr** - Vielle fraise; **Sp** - Cherna frutillera.

Maximum total length 22 cm. Common on coral reefs in depths of 15 to 108 m. Nothing published on the biology of this species. Because of its small size and relatively deep habitat, the strawberry hind is of little commercial importance. Indo-Pacific from Pinda, Mozambique (15°S) to French Polynesia and the Pitcairn Group; ranges from the Ryukyu Islands to Heron Island at the southern end of the Great Barrier Reef. Except for the Pinda specimens, this species is known only from insular localities.



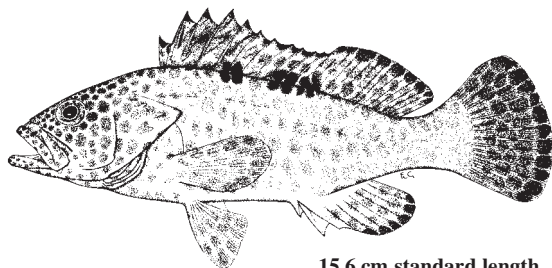
12.7 cm standard length



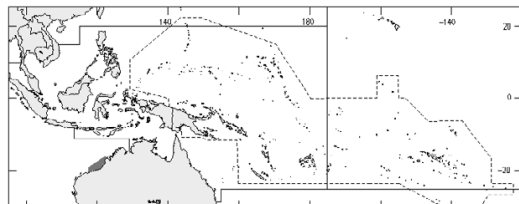
Epinephelus bilobatus Randall and Allen, 1987

En - Twinspot grouper; **Fr** - Mérou gemine; **Sp** - Mero de pintas gemelas.

Maximum total length at least 33 cm. Coral reefs and rocky bottom in depths of 4 to 50 m. There is no published information on the biology of this species, or of its interest to fisheries. *Epinephelus bilobatus* is known only from northwestern Australia.



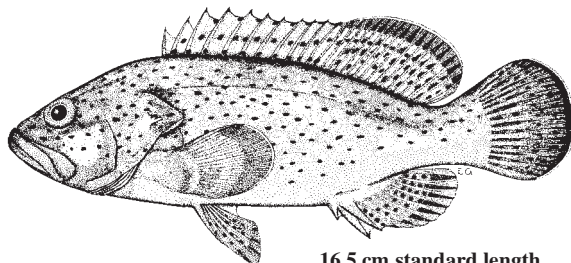
15.6 cm standard length



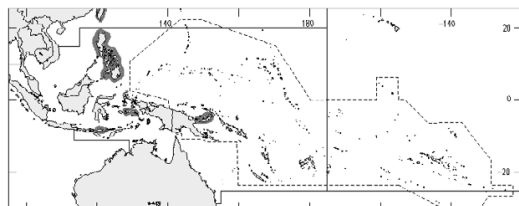
Epinephelus bontoides (Bleeker, 1855)

En - Palemargin grouper; **Fr** - Mérou bord clair; **Sp** - Mero de margenes palidos.

Maximum total length at least 30 cm. Mud or rocky/cobble bottoms in depths of 2 to 30 m. Appears to be rare. Nothing has been published on the biology of this species. Probably caught with hook-and-line, trawls, and in traps. Not of interest to commercial fisheries. Western Pacific: Indonesia, Philippines, Taiwan Province of China, and New Britain.



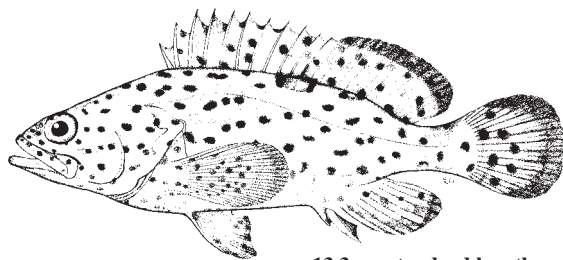
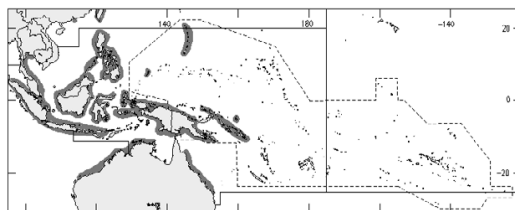
16.5 cm standard length



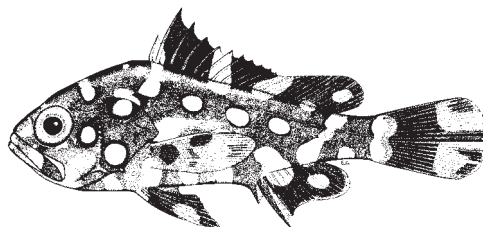
Epinephelus corallicola (Valenciennes, 1828)

En - Coral grouper; **Fr** - Mérrou corail; **Sp** - Mero de coral.

Maximum total length at least 49 cm total length. Shallow silty reefs and estuarine areas. Ovary well developed in a specimen of 30 cm standard length. Apparently too rare to be of commercial importance. Western Pacific from Thailand, Hong Kong, and Taiwan Province of China to Australia and eastward to the Solomon and Mariana islands, including Indonesia, Philippines, Papua New Guinea, and Palau.



13.3 cm standard length

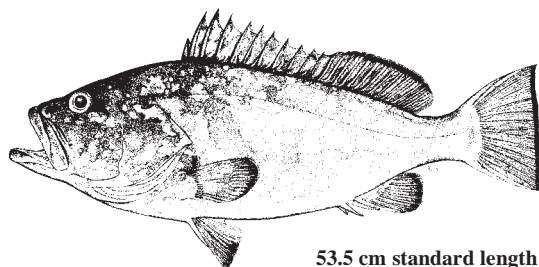
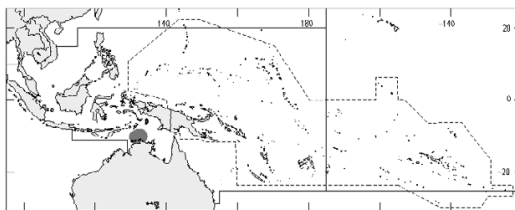


juvenile 16.2 cm standard length

Epinephelus darwinensis Randall and Heemstra, 1991

En - Darwin grouper; **Fr** - Mérrou Darwin; **Sp** - Mero de Darwin.

Maximum total length at least 62 cm. Depth of capture 107 m. Biology and interest to fisheries unknown. Apparently rare; a single specimen caught off Darwin, Australia.

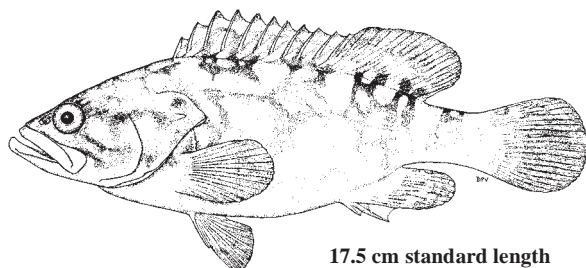
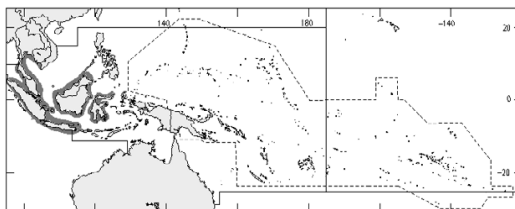


53.5 cm standard length

Epinephelus erythrurus (Valenciennes, 1828)

En - Cloudy grouper; **Fr** - Mérrou nébuleux; **Sp** - Mero nublado.

Maximum total length about 43 cm. In harbours and estuaries with muddy or silty-sand bottoms. Nothing has been published on the biology of this species; females mature at 15 cm. This species is of minor commercial importance. Caught with trawls, hook-and-line, and traps. Known from Pakistan, India, Laccadive (Lakshadweep) Islands, Sri Lanka, Gulf of Thailand, Indonesia, and Singapore.

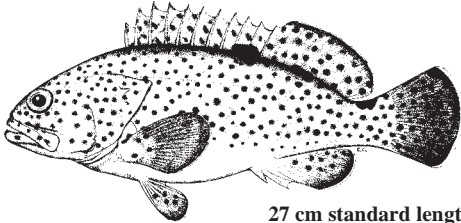


17.5 cm standard length

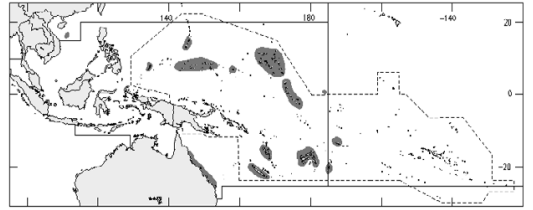
***Epinephelus howlandi* (Günther, 1873)**

En - Blacksaddle grouper; **Fr** - Mérou selle noir; **Sp** - Mero montura negra.

Maximum total length at least 44 cm. Usually found in rocky areas or on coral reefs at depths of 1 to 37 m. Biology unknown. Appears to be rare and is thus of little commercial importance. Tropical western Central Pacific from Ryukyu Islands to New Guinea, the Great Barrier Reef, Lord Howe Island, New Caledonia, Vanuatu, Caroline Islands, Palau, Marshall and Mariana islands, Howland Island, and Samoa.

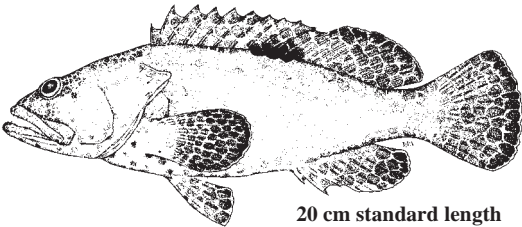


27 cm standard length

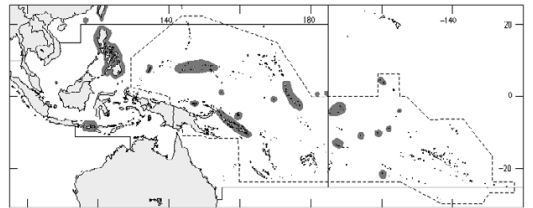
***Epinephelus melanostigma* Schultz, 1953**

En - Oneblotch grouper; **Fr** - Mérou dossard; **Sp** - Mero espaldaron.

Maximum total length at least 33 cm. Shallow coral reefs, also taken over soft bottom. Because of its small size and apparent rarity, *Epinephelus melanostigma* is of little or no commercial importance; caught with handlines, traps, and trawls. Indo-West Pacific from South Africa to Central Pacific, including Indonesia, Philippines, Hong Kong, Taiwan Province of China, Okinawa, Papua New Guinea (Bougainville), Solomon Islands, Palau, Caroline Islands, Gilbert Islands, Samoa, Phoenix Islands, Baker, Howland, Cook Islands, and Line Islands. Reports from Australia have not been verified.

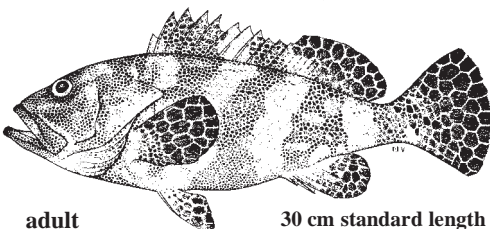


20 cm standard length

***Epinephelus miliaris* (Valenciennes, 1830)**

En - Netfin grouper; **Fr** - Mérou abeille; **Sp** - Mero colmenar.

Maximum total length 53 cm. Juveniles (10 to 25 cm standard length) over mud bottom, in seagrass beds, mangrove swamps and on coral reefs in depths of 1 to 16 m; adults on coral reefs in depths of 18 to 180 m. Females mature at 25 cm standard length. Apparently rare, hence of minor importance in local fisheries. Western Indian Ocean to the Gilbert Islands and Samoa. An insular species reported from East Burma Sea, Andaman Islands, Indonesia (Sulawesi [Celebes] only), South China Sea, Ryukyu Islands, New Guinea, New Ireland, New Georgia, Solomon and Santa Cruz islands, Palau, Caroline Islands, and Fiji.



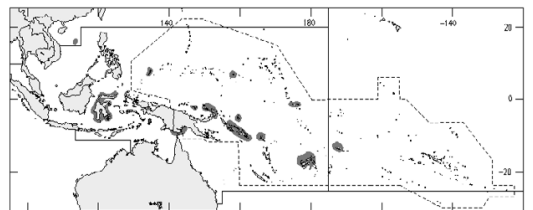
adult

30 cm standard length



juvenile

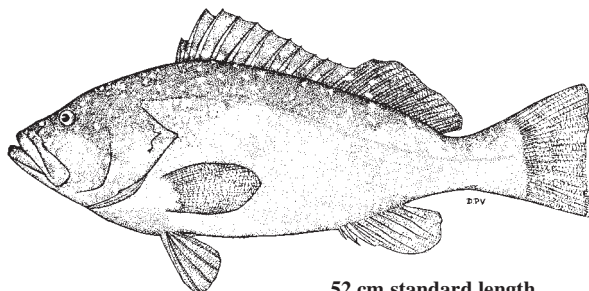
28 mm standard length



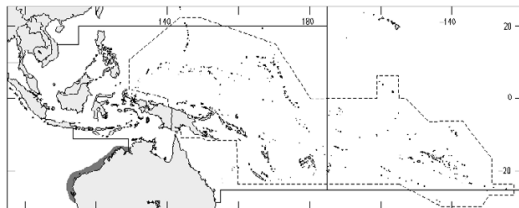
Epinephelus multinotatus (Peters, 1876)

En - Whiteblotched grouper; **Fr** - Vielle plate grise; **Sp** - Mero de lunares.

Maximum total length 100 cm. Juveniles on inshore coral reefs, and adults to depths of 90 m. Females mature at 46 cm standard length. Feeds on fishes and crabs. Probably of some commercial importance in local fisheries. Caught with hook-and-line and traps. Known only from Indian Ocean (but not Red Sea) including Western Australia (from Monte Bello Islands to Shark Bay).

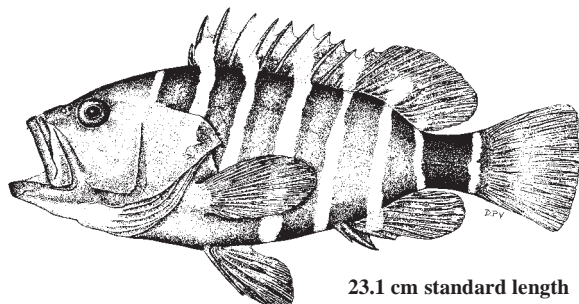


52 cm standard length

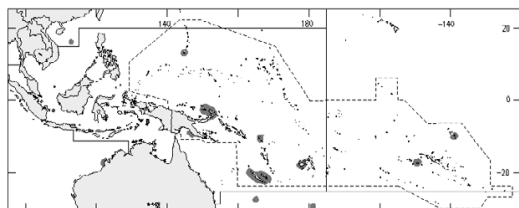
***Epinephelus octofasciatus*** Griffin, 1926

En - Eightbar grouper; **Fr** - Mérou huit raies; **Sp** - Mero de ocho bandas.

Maximum total length at least 130 cm; maximum weight about 80 kg. Occurs in depths of 150 to 350 m. The apparent rarity of this species may be due to its deep-water habitat. Caught with vertical longlines. Indo-West Pacific from South Africa to Japan, Australia, and New Zealand.

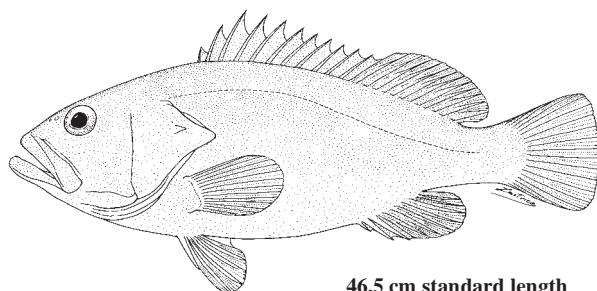


23.1 cm standard length

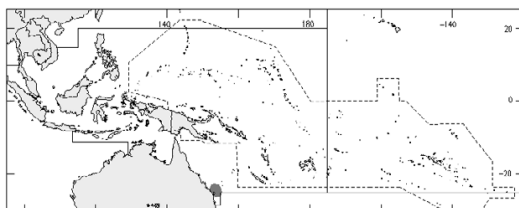
***Epinephelus perplexus*** Randall, Last, and Hoese, 1991

En - Puzzling grouper; **Fr** - Mérou curieux; **Sp** - Mero acertijo.

Maximum total length at least 55 cm. Known from a single specimen caught in a depth between 129 and 137 m off southern Queensland, Australia.



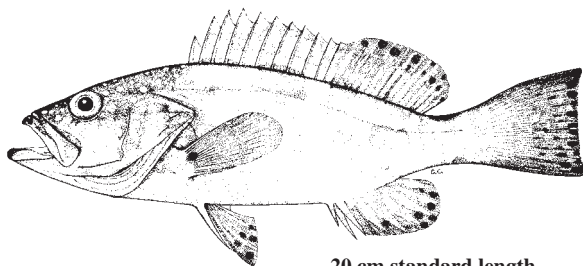
46.5 cm standard length



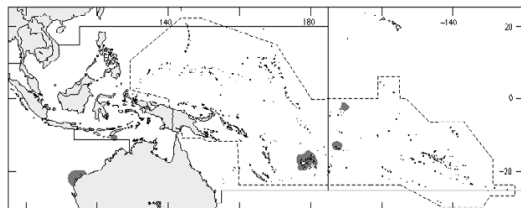
Epinephelus timorensis Randall and Allen, 1987

En - Yellowspotted grouper; **Fr** - Mérou taches jaunes; **Sp** - Mero de pintas amarillas.

Maximum total length at least 32 cm. Known from depths of 73 to 210 m off coral reefs. Nothing published on biology or fishery of this rare species. Western Australia, American Samoa (Tutuila), and Phoenix Islands (Canton Island).



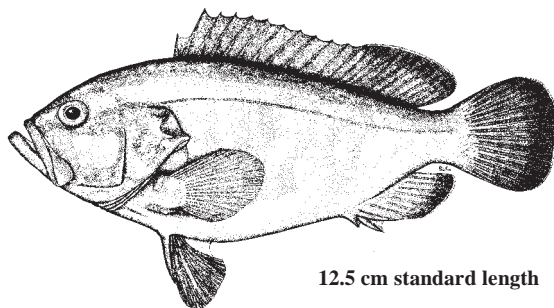
20 cm standard length



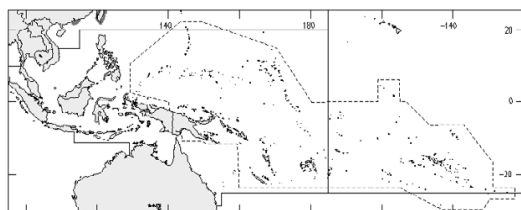
Epinephelus trophis Randall and Allen, 1987

En - Plump grouper; **Fr** - Mérou rondelet; **Sp** - Mero rollizo.

Maximum total length unknown. Only 2 specimens known, from the base of drilling rig at a depth of 130 m on Dillon Shoals in the Timor Sea off Western Australia.



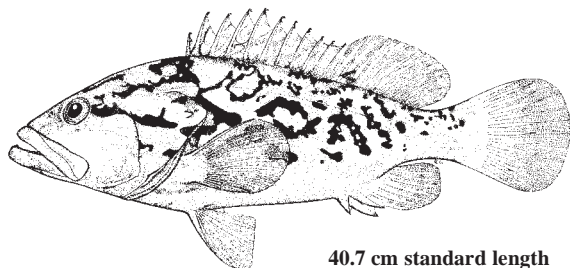
12.5 cm standard length



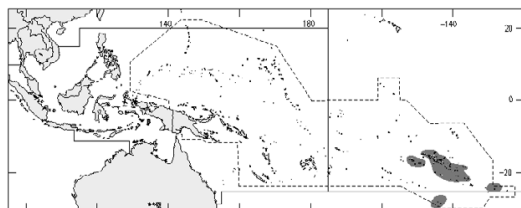
Epinephelus tuamotuensis Fourmanoir, 1971

En - Reticulate grouper; **Fr** - Mérou réseau; **Sp** - Mero reticular.

Maximum total length at least 76 cm. Outer slope of coral reefs in depths of 120 to 250 m. Feeds on fishes. Probably of some importance in artisanal fisheries, but not commonly caught because of its preference for deep water. Tuamotu Islands, Society Islands, Pitcairn Group, and Rapa.



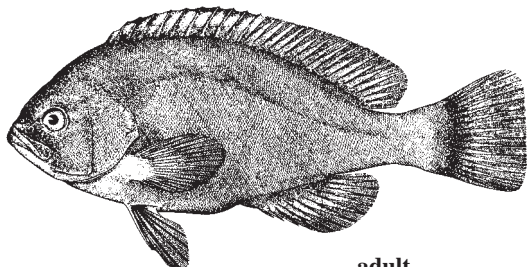
40.7 cm standard length



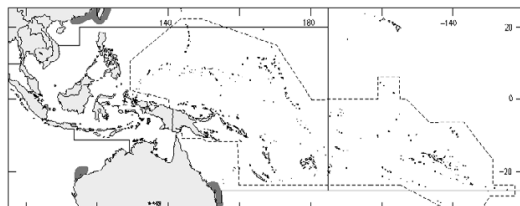
Triso dermatopus (Temminck and Schlegel, 1842)

En - Oval grouper; **Fr** - Mérrou ovale; **Sp** - Mero ovalado.

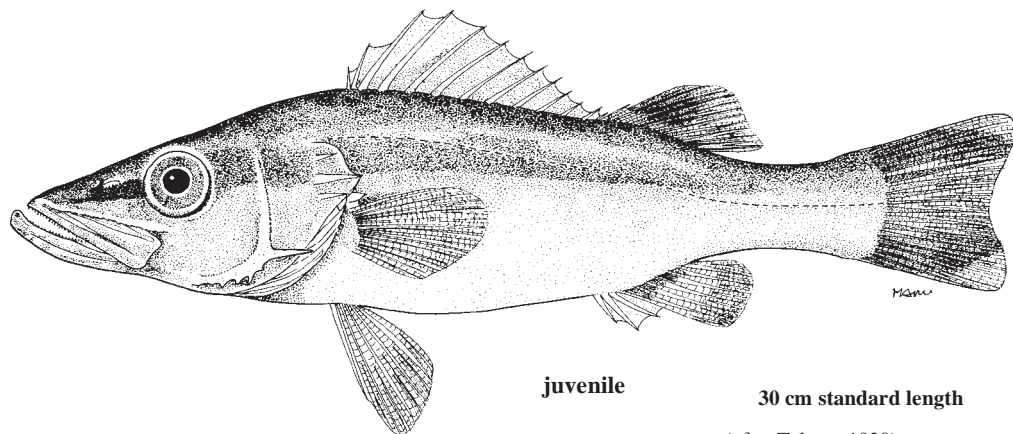
Maximum total length at least 68 cm. Found on rocky or soft (silty sand or mud) bottoms at depths of 22 to 103 m. Juveniles feed in the water column on zooplankton. Feeding by adults has not been observed. Of minor importance in the commercial fishery of Japan and Hong Kong. No data are available on the landings of this species. Caught with hook-and-line and trawls. Anti-tropical in the eastern Indian Ocean and western Pacific; known from Korea, Japan, Hong Kong, and Fujian and Taiwan provinces of China, off the coast of Western Australia (north of 19°30'S) and off eastern Australia between 25° and 32°S.



adult



Tribe NIPHONINI

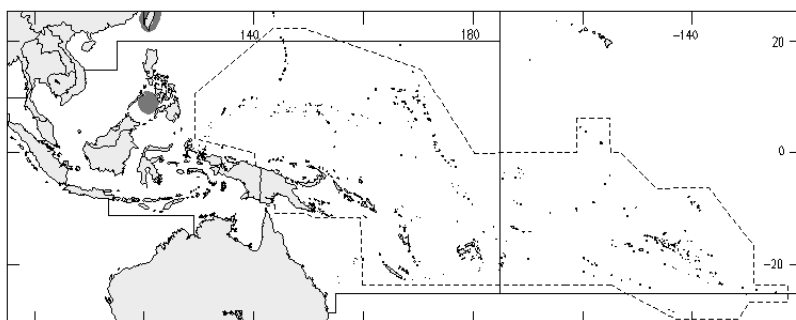
Nippon spinosus Cuvier, 1828**Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Rough grouper; Fr - M rou rugueux; Sp - Mero aspero.

juvenile

30 cm standard length

(after Takara, 1930)

Diagnostic characters: Body elongate, compressed, its depth 2.9 to 4.2 times in standard length; head large, 2.5 to 2.8 times in standard length; dorsal head profile straight; interorbital area slightly convex, its width 4.9 to 6.8 times in head length; preorbital serrate; opercle with 3 strong spines; upper edge of operculum convex; **preopercle angular, the rear edge serrate, with a large posteriorly-directed spine at angle and a few smaller spines on lower edge**; **suborbital depth less than eye diameter**, 11 times in head length. Rear nostril an elongate slit, close to anterior nostril. Mouth large, lower jaw projecting; band of villiform teeth on jaws, vomer, and palatines; no teeth on tongue. No supramaxilla. Gill rakers long and slender, 7 to 9 on upper limb, 13 to 16 on lower limb. **Dorsal fin with XIII spines and 10 or 11 soft rays, the fin divided to base before last spine**, which is much longer than twelfth spine; fourth spine longest, longer than longest dorsal-fin ray and 2 to 2.6 times in head length; anal fin with III spines and 6 to 8 soft rays; **caudal fin emarginate, with rounded corners**, 8 branched rays in upper lobe and 7 in lower lobe; pectoral-fin rays 15 to 17, the fin length about equal to pelvic fin, 1.8 to 2.4 times in head length. Scales small and rough; lateral-line scales 84 to 93; lateral scale series 140 to 163. **Colour:** Head and body brownish grey, the fins darker; juveniles silvery with dark lateral band from snout through eye to upper part of caudal peduncle and another, median, dark band from snout along top of head, dorsal part of body, and continued over front half of soft-dorsal fin; upper and lower thirds of caudal fin dusky, the corners and middle part of fin white.

Size: Maximum total length 100 cm.**Habitat, biology, and fisheries:** Rocky bottom in depths of 50 to 100 m. Nothing published on the biology or fisheries of this species. Of some importance as a food fish in Japan. Caught with trawls and longlines.**Distribution:** Japan, Korea, Taiwan Province of China, and the Philippines (Sulu Sea).

CENTROGENIIDAE

(= Centrogenysidae)

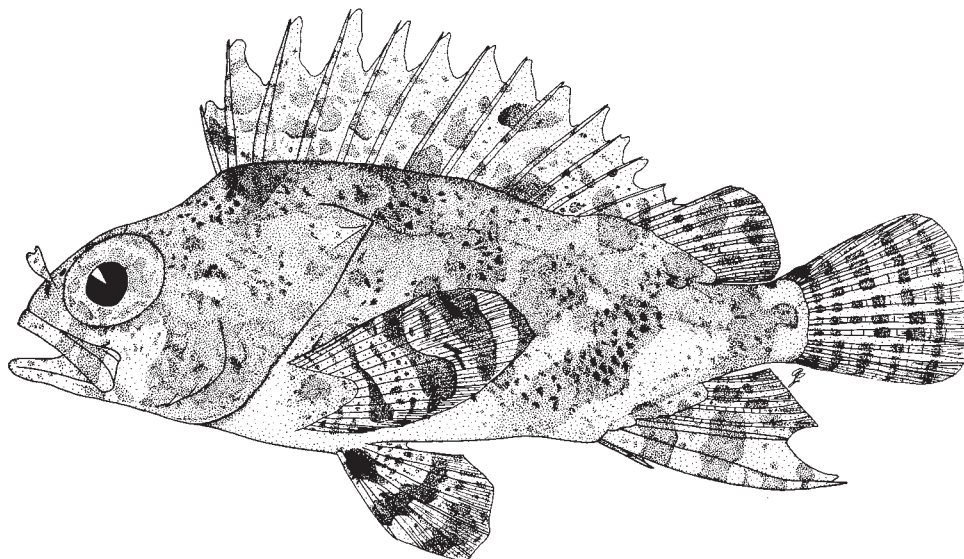
False scorpionfish

by A.C. Gill

A single species in this family.*Centrogenys vaigiensis* (Quoy and Gaimard, 1824)

Frequent synonyms / misidentifications: *Centropristes scorpaenoides* Cuvier in Cuvier and Valenciennes, 1829; *Sebastes stoliczkae* Day, 1875 (including combinations of these in *Myriodon*, *Gennadius*, and *Rhabdosebastes*) / None.

FAO names: En - False scorpionfish.



Diagnostic characters: A perch-like species; moderately deep bodied (greatest body depth 34 to 39% standard length). Head large, 42 to 44% standard length. **Posterior rim of anterior nostril with large fringed flap.** Opercle with 2 spines, the lower spine strong and conspicuous, the upper spine (near dorsal edge of operculum) weak and concealed by skin and scales; **preopercle finely serrate posteriorly, with 3 or 4 large, antrorse (forward pointing) spines on ventral margin.** Mouth moderately large and protrusible, reaching to anterior half of eye; supramaxilla present. A band of villiform teeth in each jaw; a chevron-shaped band of villiform teeth on vomer; an elongate patch of villiform teeth on each palatine; no teeth on tongue. Seven branchiostegal rays; branchiostegal membranes not united. Gill rakers short or rudimentary, the first gill arch with 15 to 19 gill rakers, of which 3 to 6 on upper limb, and 12 to 14 on lower limb. **Dorsal fin with XIII or XIV spines and 9 to 11 branched, segmented rays, the origin of fin situated over middle of head above posterior edge of preopercle;** dorsal-fin membranes project slightly beyond spine tips. **Anal fin short based, with III spines and 5 branched, segmented rays; second anal-fin spine strong and very long (28 to 32% standard length), reaching to or beyond posterior margin of anal fin when depressed. Caudal fin rounded to truncate, with 6 (rarely 5) and 6 branched rays in upper and lower part, respectively, and 4 to 6 unbranched rays in upper and lower part. Pelvic fins positioned behind pectoral fins, consisting of I spine and 5 branched, segmented rays, the inner ray broadly bound to body by membrane. Pectoral-fin rays 12 to 14, with only the upper ray unbranched.** Scales on body ctenoid, extending onto snout; lateral line relatively low on body, extending from gill opening to caudal-fin base, consisting of 36 to 44 tubed scales, with additional 4 to 6 tubed scales on caudal fin; tubed scales on body each with a dorsal branch of tube extending to edge of scale; soft portions of dorsal and anal fins with basal covering of scales. Vertebrae 11+14; lower hypurals (hypurals 1 and 2) fused into a single plate. Tooth plates of fifth ceratobranchials broadly overlapping and

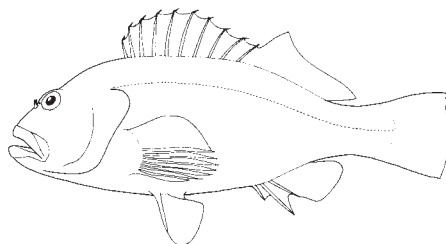
asymmetrical. **Colour:** head and body pale grey to pale brown, paler ventrally, with dark grey to brown mottling; fins pale grey or pale brown to white or clear, with large dark grey to dark brown spots, these forming irregular bands (particularly on pectoral and pelvic fins, and on anterior part of anal fin).

Similar families occurring in the area

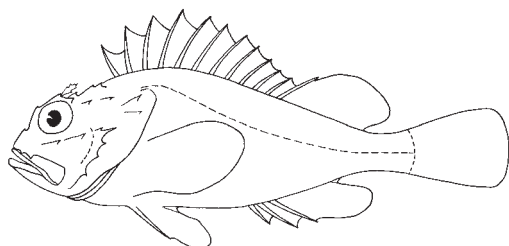
Cirrhitidae: similar in general appearance, but easily distinguished in having X dorsal-fin spines, cycloid scales, branchiostegal membranes joined and forming a free fold across isthmus, 6 branchiostegal rays, 10+16 vertebrae, the lower 5 to 7 pectoral-fin rays unbranched and usually thickened with deeply incised membranes, and in lacking large antrorse spines on the ventral edge of the preopercle.

Scorpaenidae: distinguished by the more extensive head spination/ornamentation, particularly in having a suborbital stay (or ridge), a spine-like extension of third infraorbital bone toward the preopercle (usually bound to the preopercle in most species).

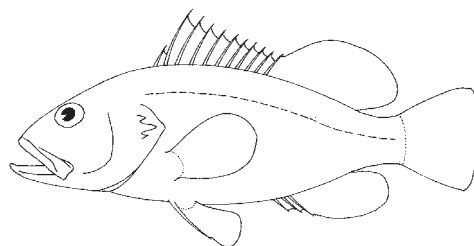
Serranidae: sometimes resemble *Centrogenys* (particularly certain benthic anthiines), but easily distinguished in having 3 opercular spines, 6 to 22 segmented anal-fin rays, usually fewer dorsal-fin spines (usually XI or fewer; only *Niphon* and *Acanthistius* have as many as XIII), and at least some canine teeth in the jaws.



Cirrhitidae



Scorpaenidae

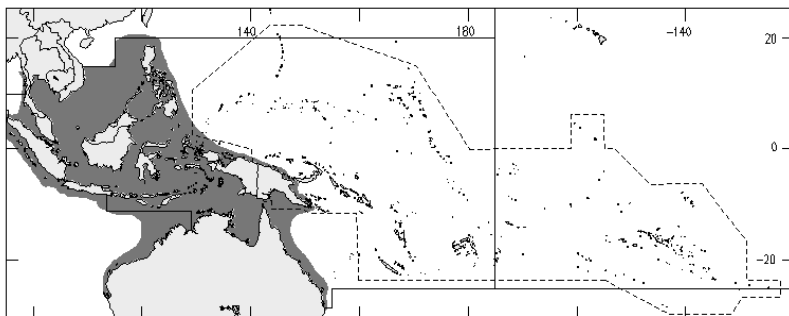


Serranidae

Size: Maximum total length about 25 cm.

Habitat, biology, and fisheries: A sedentary species that occurs on rocky reefs and rubble bottoms in shallow coastal waters. Feeds during the day on small fishes, shrimps, and crabs. Of no commercial importance, although occasionally enters the aquarium fish trade.

Distribution: West Pacific and eastern Indian oceans, from Nicobar Islands east to New Guinea and northern Australia, north to the Ryukyu Islands.



Reference

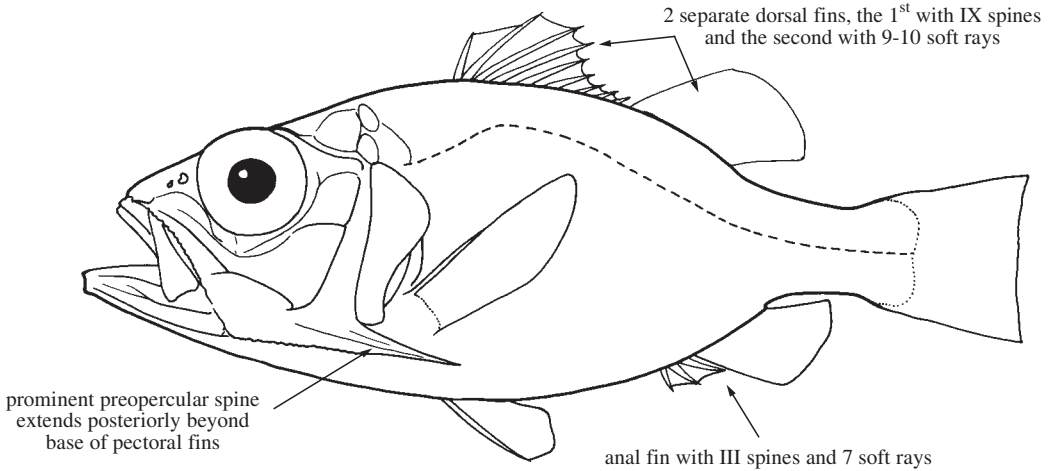
Weber, M. and L.F. de Beaufort. 1931. *The fishes of the Indo-Australian Archipelago*. Vol. 6. Leiden, E.J. Brill, 448 p.

OSTRACOBERYCIDAE

Ostracoberycids

by K.E. Carpenter

Diagnostic characters: Body ovoid and moderately compressed (size to around 19 cm standard length), its height 37 to 44% of standard length. Eye large, longer than snout length; **a very strong spine extending back from lower limb of preopercle beyond base of pectoral fins**; juveniles up to 10 cm standard length with a median supraoccipital spine. Gill rakers on first gill arch 4 to 9 on upper limb and angle, and 9 to 17 on lower limb. **Two separate (but close) dorsal fins, the first with IX spines and the second with 9 or 10 soft rays.** **Anal fin with III spines and 7 soft rays.** Caudal fin truncate. Lateral line with 48 to 58 scales. **Colour:** brownish on upper sides and whitish on lower sides; fins mostly hyaline, without prominent markings, the first dorsal fin more dusky.



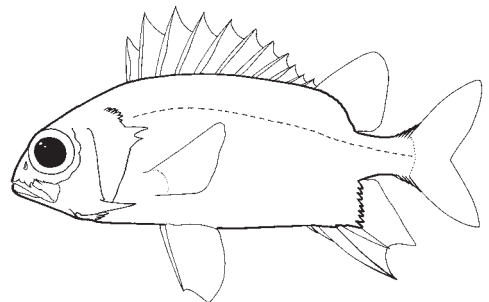
Habitat, biology, and fisheries: Demersal or near bottom on the continental slope at depths between 250 and 710 m. Very little is known about the biology of these fishes. Caught incidentally in deep-bottom trawls.

Similar families occurring in the area

The prominent spine extending posteriorly from the preopercle, general body shape, 2 distinct dorsal fins, and pelvic-fin formula distinguishes ostracoberycids from all other fishes in the area. Other fishes with a prominent preopercular spine either have a single dorsal fin and very different body shape (e.g. some Engraulidae and Pomacanthidae) or an armoured head and very different body shape (e.g. Dactylopteridae and Triglidae of the subfamily Peristediinae), or different pelvic- and anal-fin spine and ray counts.

Ostracoberycids superficially resemble fishes of the order Beryciformes but have the typical perciform pelvic-fin configuration of I spine and 5 soft rays not found in beryciforms. They also differ from all beryciforms with the combination of an elongate preopercular spine, and 2 separate dorsal fins or anal fin with III spines.

Ostracoberycids most closely resemble holocentrid fishes of the genus *Sargocentron* and some *Neoniphon* that also possess an elongate preopercular spine. However, the preopercular spine in these beryciform fishes does not extend beyond the base of the pectoral fins and, they possess IV anal-fin spines (III in ostracoberycids), a pelvic-fin ray configuration of I spine and 7 soft rays (I spine and 5 soft rays in ostracoberycids), and forked caudal fins (truncate in ostracoberycids). In addition, holocentrids with prominent preopercular spines are nearshore fishes while ostracoberycids are found on the continental slope.



Sargocentron (Holocentridae)

Key to the species of Ostracoberycidae occurring in the area

- 1a. Lower limb of first gill arch with 9 to 13 gill rakers; juveniles with median supraoccipital spine that curves forward *Ostracoberyx paxtoni*
(southern Queensland)
- 1b. Lower limb of first gill arch with 15 to 17 gill rakers; juveniles with median supraoccipital spine that curves slightly posteriorly *Ostracoberyx dorygenys*
(southern Japan, Philippines, western Indian Ocean)

List of species occurring in the area

- Ostracoberyx dorygenys* Fowler, 1934
- Ostracoberyx paxtoni* Quero and Ozouf-Costaz, 1991

Reference

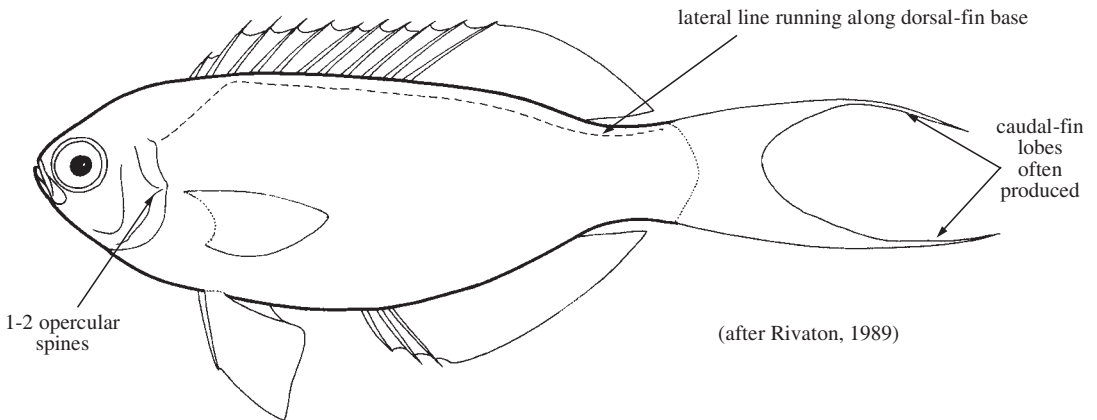
Quero, J.-C. and C. Ozouf-Costaz. 1991. *Ostracoberyx paxtoni*, nouvelle espèce des côtes est de l'Australie. Remarques sur les modifications morphologiques des *Ostracoberyx* au cours de leur croissance (Perciformes, Ostracoberycidae). *Cybium*, 15(1):43-54.

CALLANTHIIDAE

Groppos (also goldies and splendid perchés)

by W.D. Anderson, Jr.

Diagnostic characters: Body oblong, somewhat compressed (size to about 25 cm). Eyes moderate to large, their diameter longer than snout length. **Nasal organ without lamellae.** **Opercular spines 1 or 2.** Mouth terminal and oblique; jaws almost equal. Jaws with caniniform, conical, and villiform teeth; vomer usually with teeth; palatine with or without teeth; pterygoids and tongue without teeth. **Branchiostegal rays 6.** First gill arch with 7 to 12 gill rakers on upper limb and 17 to 28 on lower limb (total 24 to 38). Dorsal fin not incised at junction of spinous and soft rays. Soft rays of dorsal and anal fins somewhat elongated, posteriormost rays sometimes noticeably produced. Caudal fin lunate to almost truncate, upper and lower lobes frequently produced in larger individuals. **Dorsal fin with XI spines and 9 to 11 soft rays.** Anal fin with III spines and 9 to 11 soft rays. Principal caudal-fin rays 15 (8 in upper lobe, 7 in lower lobe), or 17 (9 in upper lobe, 8 in lower lobe). Pectoral-fin rays 17 to 23 (usually 19 to 22). Pelvic fins with I spine and 5 soft rays. Membranes of dorsal and anal fins without scales. Axillary scales of pelvic fins and scaly interpelvic process typically well developed. Most of head, including maxillae and usually dentaries, covered with scales. Scales moderate to large, ctenoid, without ctenial bases in posterior field. **Series of modified scales with unique ornamentation along body midlaterally.** **Lateral line running along base of dorsal fin and terminating near base of ultimate soft dorsal-fin ray or continuing posteriorly on dorsolateral surface of caudal peduncle.** Tubed lateral-line scales 14 to 42. Vertebrae 10+14=24. **Colour:** magnificently coloured, with various shades of red, orange, yellow, blue, and purple being prominent.

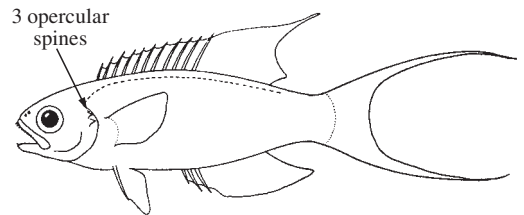


Habitat, biology, and fisheries: Usually found near the bottom over rocky areas and on reefs (frequently near a reef-sand boundary) in depths of 4 to 660 m. Carnivorous. Probably protogynous hermaphrodites.

Remarks: In the past considered as members of the family Serranidae, but species of Callanthiidae share derived characters that are not found in the Serranidae.

Similar families occurring in the area

Serranidae: 3 opercular spines (versus 1 or 2 in Callanthiidae); nasal organ with lamellae (versus nasal organ devoid of lamellae); 6 or 7 branchiostegal rays (versus 6); midlateral body scales without ornamentation (versus series of midlateral body scales with unique ornamentation); lateral line running at least a few scale rows below dorsal fin, usually uninterrupted and usually extending to at least base of caudal fin (versus lateral line running along base of dorsal fin and terminating near base of ultimate soft dorsal-fin ray or continuing posteriorly on dorsolateral surface of caudal peduncle).




Serranidae (subfamily Anthiinae)

Key to the species of Callanthiidae occurring in the area

Remarks on key characters: counts of lateral-line scales are of tubed scales along the body.

- 1a. Lateral-line scales 34 to 41 (usually 35 to 40); dorsal fin with XI spines and 10 or 11 soft rays (almost always 11); anal fin with III spines and 10 or 11 soft rays (almost always 11); first gill arch with 7 to 10 gill rakers on upper limb and 23 to 28 on lower limb (total 30 to 38, usually 32 to 36); principal caudal-fin rays 17 (9 in upper lobe, 8 in lower lobe); 2 opercular spines *Callanthias australis*
- 1b. Lateral-line scales 14 to 17; dorsal fin with XI spines and 9 soft rays; anal fin with III spines and 9 soft rays; first gill arch with 8 or 9 gill rakers on upper limb and 18 to 20 on lower limb (total 26 to 29); principal caudal-fin rays 15 (8 in upper lobe, 7 in lower lobe); 1 opercular spine *Grammatonotus crosnieri*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Callanthias australis* Ogilby, 1899
-  *Grammatonotus crosnieri* (Fourmanoir, 1981)

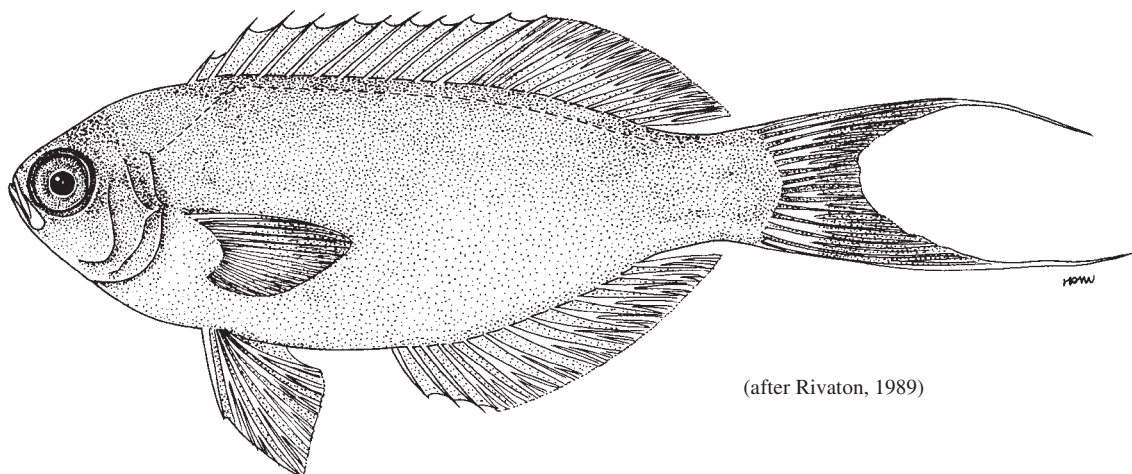
Reference

Anderson, W.D., Jr. and G.D. Johnson. 1984. A new species of *Callanthias* (Pisces: Perciformes: Percoidae: Callanthiidae) from the southeastern Pacific Ocean. *Proc. Biol. Soc. Wash.*, 97(4):942-950.

Callanthias australis Ogilby, 1899

Frequent synonyms / misidentifications: *Callanthias platei australis* Ogilby, 1899 / *Callanthias allporti* Günther, 1876.

FAO names: En - Glorious groppo.



(after Rivaton, 1989)

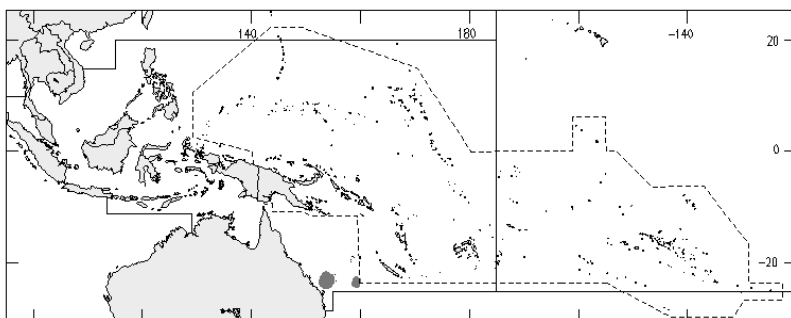
Diagnostic characters: Body slender to moderately deep. Head moderate. Eyes moderate. **Opercular spines 2. First gill arch with 7 to 10 gill rakers on upper limb and 23 to 28 on lower limb (total 30 to 38, usually 32 to 36). Dorsal fin with XI spines and 10 or 11 soft rays (almost always 11). Anal fin with III spines and 10 or 11 soft rays (almost always 11). Principal caudal-fin rays 17 (9 in upper lobe, 8 in lower lobe); branched caudal-fin rays 15 (8 in upper lobe, 7 in lower lobe); both lobes of caudal fin well produced in some specimens (these possibly males). Pectoral-fin rays 18 to 23 (usually 21 or 22). Tubed lateral-line scales 34 to 41 (usually 35 to 40). Colour:** body and head rose, mostly orange with admixture of yellow, or mostly yellow; dorsal, anal, and pelvic fins yellow or mostly yellow; caudal fin yellow proximally and rosy or purplish distally or almost entirely purplish red; dorsalmost and ventralmost caudal-fin rays, when produced, yellow distally or for their entire lengths; pectoral fins yellow, or with considerable yellow basally and most of fins rosy or purplish red.

Size: Maximum standard length about 25 cm; commonly to 18 cm.

Habitat, biology, and fisheries: Occurs in depths of 15 to 365 m. A schooling species that seeks the cover of caves and crevices at night and when disturbed. Presumably feeds on plankton. No information available on fisheries.

Distribution: Occurs in waters off New Zealand and in temperate waters off Australia; also known from a collection made northeast of Rockhampton (Queensland) and from another collection in the Chesterfield Island region of the Coral Sea; may reach Indonesian waters.

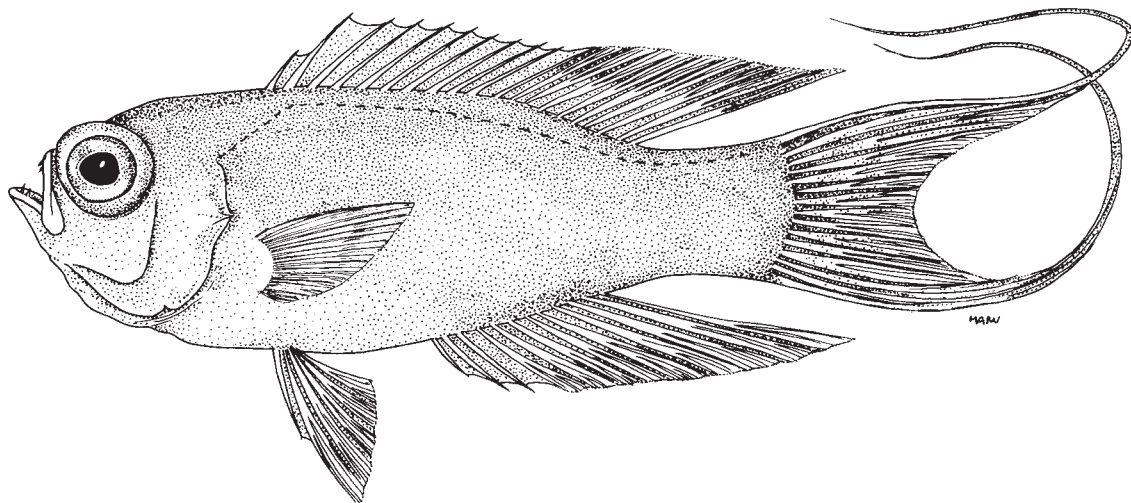
Remarks: Closely related to *Callanthias japonicus* from Japanese waters and *C. platei* from the eastern South Pacific; all 3 taxa may be subspecies of a single wide-ranging species.



Grammatonotus crosnieri (Fourmanoir, 1981)

Frequent synonyms / misidentifications: *Callanthias crosnieri* Fourmanoir, 1981 / None.

FAO names: En - Uncle Phoo's groppo.

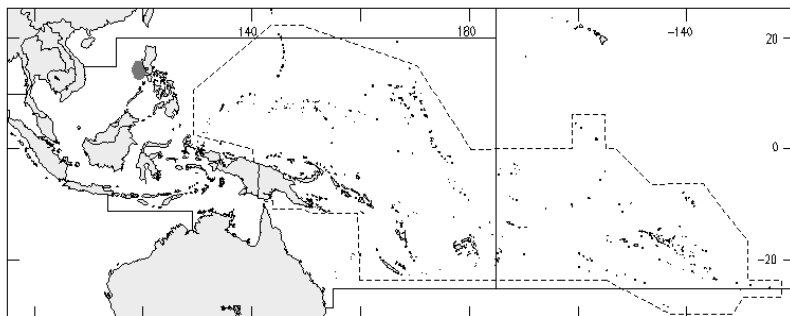


Diagnostic characters: Body depth moderate to fairly deep. Head moderate. Eyes fairly large. **One opercular spine. First gill arch with 8 or 9 gill rakers on upper limb and 18 to 20 on lower limb (total 26 to 29).** Both lobes of caudal fin extremely well produced in some specimens (these possibly males). **Dorsal fin with XI spines and 9 soft rays. Anal fin with III spines and 9 soft rays. Principal caudal-fin rays 15 (8 in upper lobe, 7 in lower lobe); branched caudal-fin rays 13 (7 in upper lobe, 6 in lower lobe).** Pectoral-fin rays 18 to 20. **Tubed lateral-line scales 14 to 17.** **Colour:** upper body dull orange or yellow, lower body pale to rosy; head orange or yellow above, pale below; fins mostly dull orange to yellow.

Size: Maximum standard length 12 cm.

Habitat, biology, and fisheries: Known from depths of 170 to 210 m. No other information available.

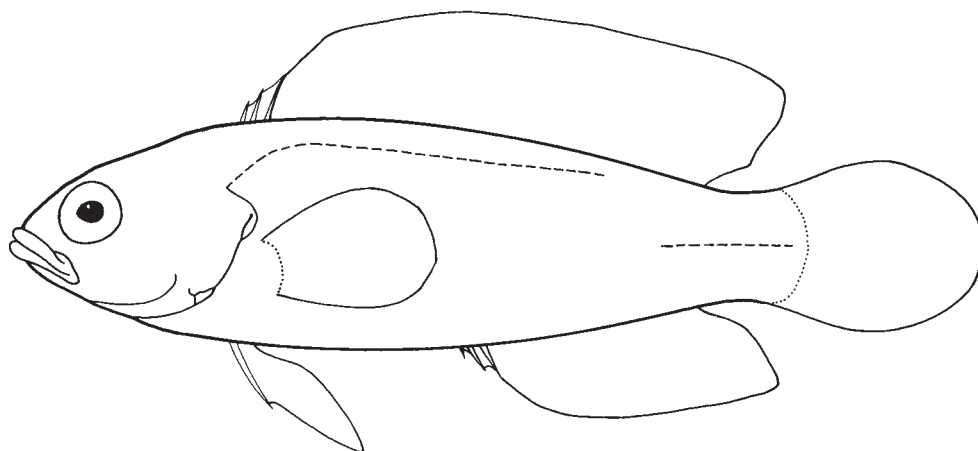
Distribution: Known only from the Philippines, off the southwestern coast of Luzon.



PSEUDOCHROMIDAE**Dottybacks (eelblennies)**

by A.C. Gill

Diagnostic characters: Perch-like to eel-like fishes (size to 45 cm), moderately deep bodied to elongate, usually moderately compressed. Mouth moderate, weakly protrusible; maxilla usually not extending posteriorly beyond middle of eye. **Branchiostegal rays 6, with a single ray articulating with the posterior ceratohyal (epihyal).** **Dorsal fin long based, composed of III or fewer spines (very rarely IV spines in some species) and 21 to 74 segmented rays.** **Lateral line modified (disjunct, posteriorly truncated or multiple).** Adductor mandibulae (jaw) musculature with a superficial, strap-like A₁ section, which inserts on the medial face of the maxilla and originates on the vertical part of the preopercle. Hypurals 1 and 2 fused to each other; hypurals 3 and 4 fused to each other and to urostylar complex; no interarcual cartilage between epibranchial 1 and infrapharyngobranchial 2; anterior part of suspensorium weakly attached to posterior part.



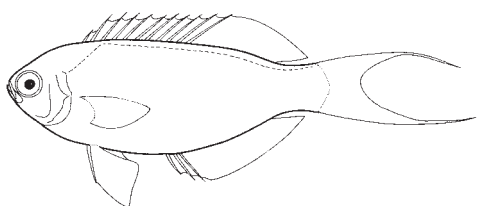
Habitat, biology, and fisheries: Cryptic diurnal inhabitants of coral reefs and rock bottoms; a few species live in large sponges; occur from shallow intertidal areas to depths of about 100 m. Most are generalist micropredators feeding on small fishes, crustaceans, small molluscs, and worms. Usually occur singly or in pairs. Many if not most species are sequential hermaphrodites. Eggs are ornamented with filaments and, sometimes, hook-like structures; eggs are arranged in a ball or mass, owing to the filaments of adjacent eggs entangling with each other; the egg mass is guarded by the male in a burrow or cave until the larvae hatch and become free swimming. The brighter coloured species (particularly *Pseudochromis diadema*, *P. paccagnellae*, and *P. porphyreus*) are of commercial importance in the aquarium fish trade.

Remarks: The generic assignment of species should be regarded as provisional; some species presently included herein in *Pseudochromis* and *Pseudoplesiops* will eventually be assigned to new genera.

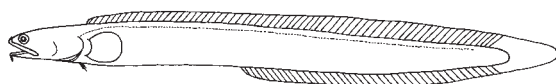
Similar families occurring in the area

Callanthiidae: resemble some pseudochromids, but have more dorsal-fin spines (X or XI versus III or fewer).

Notograptiidae: resemble some pseudochromids, but have mostly spinous rays in the dorsal and anal fins, a larger mouth (extending well beyond the posterior margin of the eye versus to anterior or middle of eye), and a conspicuous barbel-like lobe on the middle of the lower lip.



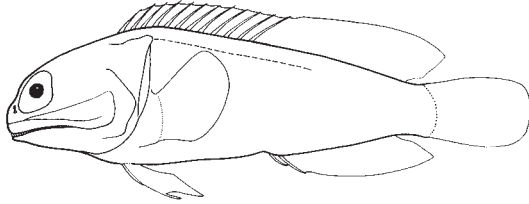
Callanthiidae



Notograptiidae

Opistognathidae: resemble some pseudochromids, but have more dorsal-fin spines (IX to XII versus III or fewer), a much larger mouth (extending well beyond posterior edge of eye versus to anterior or middle of eye), and a different configuration of the pelvic fins (composed of 1 spine and 5 segmented rays, the inner 3 weak and branched, the outer 2 stout and unbranched).

Pholidichthyidae: resemble some pseudochromids, but have a slightly inferior mouth (lower jaw projecting in pseudochromids), and a single nostril (versus 2 in pseudochromids) on each side of the head.



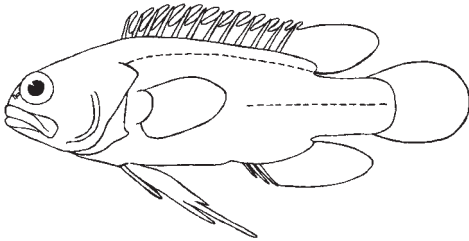
Opistognathidae



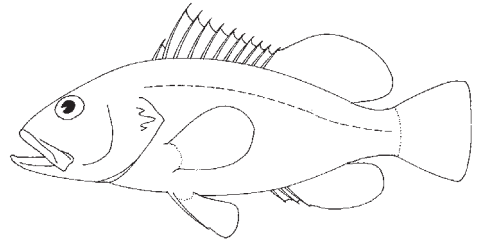
Pholidichthyidae

Plesiopidae: resemble some pseudochromids, but have more dorsal-fin spines (IX to XXVI versus III or fewer), and usually larger mouth (extending to posterior part of eye or beyond versus to anterior or middle of eye).

Serranidae: resemble certain pseudochromids, but usually have more dorsal-fin spines (VII to XIII in species within the area versus III or fewer in pseudochromids; among serranids, only *Rypticus* from the east Pacific and Atlantic has fewer than VII [II to IV] dorsal-fin spines), have 6 or 7 branchiostegal rays, and usually 3 (sometimes only 2 apparent) spines on opercle.



Plesiopidae



Serranidae

Key to the genera of Pseudochromidae occurring in the area

Remarks on key characters: generic characters given in the key are based only on species occurring in the area.

- 1a. Body elongate, body depth at anal-fin origin less than 16% standard length; segmented dorsal-fin rays 49 to 74; segmented anal-fin rays 38 to 66; pectoral-fin rays 9 to 11; branchiostegal membranes united posteriorly → 2
- 1b. Body not elongate, body depth at anal-fin origin greater than 20% standard length; segmented dorsal-fin rays 21 to 38; segmented anal-fin rays 10 to 21; pectoral-fin rays 15 to 20; branchiostegal membranes not united posteriorly → 4
- 2a. Pelvic fins present *Blennodesmus*
- 2b. Pelvic fins absent → 3
- 3a. Dorsal fin with none or I spine, and with 57 to 74 segmented rays; ocellated black spot either absent or on opercle *Congrogadus*
- 3b. Dorsal fin with II spines (second minute and buried in flesh behind first spine) and 49 segmented rays; ocellated spot on shoulder above gill opening *Haliophis*

- 4a.** Anterior lateral line consisting of a single tubed scale, and an intermittent series of centrally pitted scales; posterior lateral line consisting of an intermittent series of centrally pitted scales; pelvic fins with I spine and 3 or 4, usually unbranched, segmented rays *Pseudoplesiops*
- 4b.** Anterior lateral line consisting of a series of tubed scales; posterior lateral line consisting of a series of tubed scales; pelvic fins with I spine and 5 branched, segmented rays → 5
- 5a.** Vomerine teeth small and arranged in broad triangular patch; segmented dorsal-fin rays 31 to 38; dorsal and anal fins with well-developed scaly sheaths *Ogilbyina*
- 5b.** Vomerine teeth relatively large and arranged in a chevron-shaped patch; combination of other characters not as above → 6
- 6a.** Tubed scales in anterior lateral line 43 to 62 *Labracinus*
- 6b.** Tubed scales in anterior lateral line 17 to 40 → 7
- 7a.** Opercle with serrations ventral to subopercle junction; at least some scales on cheek and/or operculum ctenoid; vertebrae 11+17 (rarely 11+18); supraneural bones 2, or 3 with the third much smaller than other 2 *Assiculus*
- 7b.** Combination of first 2 characters not as above; vertebrae 10+16; supraneural bones 3, of approximately equal size → 8
- 8a.** Dark oblique lines present on at least some anterior body scales; segmented dorsal-fin rays 23 (rarely 22 or 24); segmented anal-fin rays 14 (rarely 13 or 15); circumpeduncular scales 16 (rarely 14, 15, or 17) *Cypho*
- 8b.** No dark oblique lines on anterior body scales; combination of meristic characters not as above *Pseudochromis*

Key to the species of Pseudochromidae occurring in the area

Remarks on key characters: "scales in lateral series" refer to the number of scales in the anterior lateral line plus the number of posteroventrally sloping scale rows on the midside of the caudal peduncle, the latter beginning with the scale row immediately following the row including the last anterior lateral-line scale, and ending with the row including the scale at the hypural edge.

- 1a.** Body elongate, body depth at anal-fin origin less than 16% standard length; segmented dorsal-fin rays 49 to 74; segmented anal-fin rays 38 to 66; pectoral-fin rays 9 to 11; branchiostegal membranes united posteriorly → 2
- 1b.** Body usually not elongate, body depth at anal-fin origin usually greater than 20% standard length (15% in *Pseudoplesiops* sp. 3); segmented dorsal-fin rays 21 to 38; segmented anal-fin rays 10 to 21; pectoral-fin rays 15 to 20; branchiostegal membranes not united posteriorly → 8
- 2a.** Pelvic fins present *Blennodesmus scapularis*
- 2b.** Pelvic fins absent → 3
- 3a.** Dorsal fin with none or I spine, and with 57 to 74 segmented rays; ocellated black spot either absent or on opercle → 4
- 3b.** Dorsal fin with II spines (second minute and buried in flesh behind first spine) and 49 segmented rays; ocellated spot on shoulder above gill opening *Haliophis aethiopus*
- 4a.** Pale round spots present on body; gill membranes fused to isthmus → 5
- 4b.** No pale round spots on body; gill membranes fused together but free from isthmus → 7

- 5a.** White horizontal stripe from eye to lateral-line origin *Congrogadus spinifer*
- 5b.** No white horizontal stripe from eye to lateral-line origin, although a few horizontally aligned white spots sometimes present → **6**
- 6a.** Anterior part of body with 5 or 6 rows of pupil-diameter sized pale spots, the ventralmost row of spots not encroaching onto anal-fin ray bases *Congrogadus malayanus*
- 6b.** Anterior part of body with 3 or 4 rows of eye-diameter sized pale spots, the ventralmost row of spots encroaching onto anal-fin ray bases *Congrogadus amplimaculatus*
- 7a.** Dorsal fin without spines, with 68 to 76 segmented rays; sensory pores on head not surrounded by black spots *Congrogadus subducens*
- 7b.** Dorsal fin with I spine and 58 to 62 segmented rays; each sensory pore on head surrounded by small black spot *Congrogadus hierichthys*
- 8a.** Anterior lateral line consisting of a single tubed scale, and an intermittent series of centrally pitted scales; posterior lateral line consisting of an intermittent series of centrally pitted scales; pelvic fins with I spine and 3 or 4, usually unbranched, segmented rays → **9**
- 8b.** Anterior lateral line consisting of a series of tubed scales; posterior lateral line consisting of a series of tubed scales (sometimes absent in juveniles of some species); pelvic fins with I spine and 5 branched, segmented rays → **21**
- 9a.** Scales with distinct centres and radii in all fields → **10**
- 9b.** Scales without distinct centres, with radii confined to anterior field → **11**
- 10a.** Dorsal fin with I weak spine and 22 or 23 segmented rays; anal fin with I weak spine and 13 or 14 segmented rays; transverse scale rows from gill opening to base of caudal fin 26 to 29; posterior rim of eye broadly edged with dark grey to black *Pseudoplesiops rosae*
- 10b.** Dorsal fin with II weak spines and 24 to 26 segmented rays; anal fin with II or III weak spines and 14 to 16 segmented rays; transverse scale rows from gill opening to base of caudal fin 33 to 39; narrow red to grey or black ring around edge of eye *Pseudoplesiops typus*
- 11a.** Posterior body scales ctenoid; transverse scale rows from upper edge of gill opening to base of caudal fin 30 to 42 → **12**
- 11b.** All body scales cycloid; transverse scale rows from upper edge of gill opening to base of caudal fin 53 to 66 → **18**
- 12a.** Segmented dorsal-fin rays 23 or 24; segmented anal-fin rays 13 to 15 (usually 14) → **13**
- 12b.** Segmented dorsal-fin rays 25 to 29; segmented anal-fin rays 15 to 18 → **14**
- 13a.** Predorsal scales extending anteriorly to or almost to posterior part of eyes; eye diameter 10 to 13% standard length *Pseudoplesiops knighti*
- 13b.** Predorsal scales extending anteriorly to above posterior edge of preopercle; eye diameter 8 to 10% standard length *Pseudoplesiops howensis*
- 14a.** A prominent fleshy keel or flap on chin → **15**
- 14b.** No prominent fleshy keel or flap on chin, at most a weak ridge → **16**
- 15a.** Large dark spot on opercle *Pseudoplesiops revellei*
- 15b.** No large dark spot on opercle *Pseudoplesiops sp. 1*
- 16a.** Circumpeduncular scales 20; 2 dark, oblique bars on head and anterior part of body *Pseudoplesiops collare*
- 16b.** Circumpeduncular scales 16; head without dark oblique bars → **17**
- 17a.** Segmented dorsal-fin rays 25 or 26 (usually 25); segmented anal-fin rays 14 to 16 (usually 15); dark spots, if present, on bases of each segmented ray of dorsal and anal fins; pelvic fins usually with small, conspicuous dark spots *Pseudoplesiops annae*
- 17b.** Segmented dorsal-fin rays 27 to 29 (usually 28); segmented anal-fin rays 16 to 18; dark spots present on bases of alternate segmented rays of dorsal and anal fins; pelvic fins without dark spots *Pseudoplesiops sp. 2*

- 18a.** Body depth at dorsal-fin origin 15% standard length; vertebrae 14+18 *Pseudoplesiops* sp. 3
- 18b.** Body depth at dorsal-fin origin 19 to 29% standard length; vertebrae 12-13+17-18 (rarely 19) = 30 (rarely 31) → 19
- 19a.** Four anal-fin pterygiophores precede second haemal spine; vertebrae 13+17; body depth at dorsal-fin origin 19 to 21% standard length *Pseudoplesiops* sp. 4
- 19b.** Three (rarely 2) anal-fin pterygiophores precede second haemal spine; vertebrae usually 12+18 (rarely 13+17 or 12+19); body depth at dorsal-fin origin 21 to 29% standard length → 20
- 20a.** Two (rarely 1) anal-fin pterygiophores precede first haemal spine; body depth at dorsal-fin origin 21 to 25% standard length; pectoral-fin rays 16 to 18 (usually 17) *Pseudoplesiops multisquamatus*
- 20b.** One (rarely 2) anal-fin pterygiophores precede first haemal spine; body depth at dorsal-fin origin 25 to 29% standard length; pectoral-fin rays 17 to 19 *Pseudoplesiops* sp. 5
- 21a.** Vomerine teeth small and arranged in broad triangular patch; segmented dorsal-fin rays 31 to 38; dorsal and anal fins with well-developed scaly sheaths → 22
- 21b.** Vomerine teeth relatively large and arranged in a chevron-shaped patch; combination of other characters not as above → 24
- 22a.** Scales above anal-fin origin 15 to 20 (formula: 14 to 16 + 1 + 2 or 3 = 15 to 20); circumpeduncular scales 19 or 20; dark brown (bright blue to dark purple or black in life) spots present on cheeks, operculum, pectoral-fin base, and breast *Ogilbyina salvati*
- 22b.** Scales above anal-fin origin 21 to 28 (formula: 17 to 23 + 1 + 2 to 5 = 21 to 28); circumpeduncular scales 22 to 26; coloration not as above → 23
- 23a.** Body relatively shallow, dorsal-fin origin to pelvic-fin origin 25 to 31% standard length; gill rakers on lower limb of first gill arch 10 to 12 (usually 11); first dorsal-fin pterygiophore inserted either between first and second neural spines or anterior to first neural spine *Ogilbyina novaehollandiae*
- 23b.** Body relatively deep, dorsal-fin origin to pelvic-fin origin 32 to 36% standard length; gill rakers on lower limb of first gill arch 11 to 13 (usually 12); first dorsal-fin pterygiophore inserted between second and third neural spines *Ogilbyina queenslandiae*
- 24a.** Tubed scales in anterior lateral line 43 to 62 → 25
- 24b.** Tubed scales in anterior lateral line 17 to 40 → 26
- 25a.** Horizontal scale rows above anal-fin origin to dorsal-fin base 30 to 31; pseudobranch filaments 23 or 24; circumpeduncular scales 32; in preservative a series of narrow (less than 1 scale wide) dark brown oblique bars on sides of body beneath posterior two-thirds of dorsal fin; a large (subequal to pupil) dark brown spot positioned on basal third of dorsal fin between segmented rays 21 and 24 *Labracinus atrofasciatus*
- 25b.** Horizontal scale rows above anal-fin origin to dorsal-fin base 23 to 30 (usually 24 to 28); pseudobranch filaments 12 to 20; circumpeduncular scales 24 to 30 (usually 26 to 28); bars on sides of body, if present, broad (several scales wide) and confined to beneath anterior half of dorsal fin; spots if present at posterior of dorsal fin small (less than 1/2 pupil diameter) *Labracinus cyclophthalmus*
- 26a.** Opercle with serrations ventral to subopercle junction; at least some scales on cheek and/or operculum ctenoid; vertebrae 11+17 (rarely 11+18); supraneural bones 2, or 3 with the third much smaller than other 2 *Assiculus punctatus*
- 26b.** Combination of first 2 characters not as above; vertebrae 10+16; supraneural bones 3, of approximately equal size → 27

- 27a.** Dark oblique lines present on at least some anterior body scales; segmented dorsal-fin rays 23 (rarely 22 or 24); segmented anal-fin rays 14 (rarely 13 or 15); circumpeduncular scales 16 (rarely 14, 15, or 17) → **28**
- 27b.** No dark oblique lines on anterior body scales; combination of meristic characters not as above → **29**

- 28a.** Central dark lines on scales on anterior part of body aligning to form oblique bars
 *Cypho purpurascens*
- 28b.** Central dark lines on scales not aligning to form oblique bars *Cypho sp.*

- 29a.** Segmented dorsal-fin rays 20 to 22 (usually 22); segmented anal-fin rays 10 to 13 (usually 11 or 12); total gill rakers on first gill arch 18 to 24, of which 5 to 8 on upper limb, and 13 to 17 on lower limb → **30**
- 29b.** Combination of meristic characters not as above → **35**

- 30a.** Posterior part of body uniformly blue grey or reddish purple to magenta in life → **31**
- 30b.** Posterior part of body entirely or partly bright yellow in life (yellow area usually noticeably paler than anterior or dorsoanterior part of body in preservative) → **32**

- 31a.** Head and body uniformly reddish purple to magenta in life (pale brown to purplish grey or brown in preservative). *Pseudochromis porphyreus*
- 31b.** Snout, dorsal contour of head, and sometimes dorsal contour of body to beneath posterior part of dorsal fin bright yellow in life (pale brown in preservative), the remainder of head and body dark blue-grey to magenta (brown in preservative) *Pseudochromis aurifrons*

- 32a.** Dorsal contour of head and body magenta in life (greyish brown in preservative), the remainder of head and body bright yellow (pale brown in preservative) . . . *Pseudochromis diadema*
- 32b.** Head entirely reddish purple to magenta in life → **33**

- 33a.** Posterior part of body bright purple (pinkish grey in preservative) with bright yellow (pale yellow in preservative) saddle-like marking extending from anterior part of dorsal fin to upper caudal-fin rays *Pseudochromis ehippiatus*
- 33b.** Head and body anterior to a more or less vertical line through vicinity of anal-fin origin magenta in life (greyish brown to brown or grey in preservative), the remainder of body bright yellow (pale brown to brown or pale greyish brown in preservative) → **34**

- 34a.** Scales in lateral series 33 to 39 (usually 34 to 38) *Pseudochromis paccagnellae*
- 34b.** Scales in lateral series 36 to 42 (usually 38 to 42) *Pseudochromis sp. 1*

- 35a.** Segmented dorsal-fin rays 22; segmented anal-fin rays 13; scales in lateral series 28 to 32; dorsal and anal fins with well-developed scaly sheaths *Pseudochromis marginatus*
- 35b.** Character combination not as above → **36**

- 36a.** Dorsal fin with II spines and 25 or 26 (usually 26) segmented rays; segmented anal-fin rays 16 *Pseudochromis veliferus*
- 36b.** Character combination not as above → **37**

- 37a.** At least some scales on cheek and/or operculum ctenoid → **38**
- 37b.** All scales on cheek and operculum cycloid → **40**

- 38a.** Curved dark brown to black bar extending from nape through eye to interopercle
 *Pseudochromis splendens*
- 38b.** Coloration not as above → **39**


- 39a.** Predorsal scales 17 to 22, extending anteriorly to point ranging from above midanterior part of eye to just behind posterior nostrils; caudal fin rounded to truncate *Pseudochromis* sp. 2
- 39b.** Predorsal scales 16 to 30, and 25 to 30 in specimens larger than 3 cm standard length, extending anteriorly to point ranging from above midanterior part of eye to slightly anterior of anterior nostrils (anterior to posterior nostrils in specimens larger than 3 cm standard length); caudal fin emarginate in small (less than 3 cm) specimens, becoming strongly emarginate to lunate in larger specimens *Pseudochromis polynemus*
- 40a.** Pectoral fins black; well-developed denticles on outer ceratobranchial-1 gill rakers mainly confined to raker tips; 3 or 4 (usually 4) dorsal-fin pterygiophores inserting anterior to neural spine 4 → 41
- 40b.** Combination of first 2 characters not as above; 3 dorsal-fin pterygiophores inserting anterior to neural spine 4 → 42
- 41a.** Pectoral-fin rays 17 to 19 (usually 18 or 19); horizontal scale rows above anal-fin origin to anterior lateral line 14 to 17; circumpeduncular scales 18 to 21 *Pseudochromis paranox*
- 41b.** Pectoral-fin rays 16 or 17; horizontal scale rows above anal-fin origin to anterior lateral line 12 or 13; circumpeduncular scales 16 *Pseudochromis* sp. 3
- 42a.** Palatine tooth patches directed strongly inward behind posterolateral arms of vomerine tooth patch → 43
- 42b.** Palatine tooth patches more or less contiguous with posterolateral arms of vomerine tooth patch → 48
- 43a.** Upper part of body with a dark longitudinal stripe → 44
- 43b.** No dark stripe on upper part of body → 45
- 44a.** Dark stripe on upper part of body extends below anterior lateral line to upper caudal-fin rays; scales in lateral series 33 or 34; scales between lateral lines 3; circumpeduncular scales 16 *Pseudochromis colei*
- 44b.** Dark stripe on upper part of body crosses middle of anterior lateral line to join basal stripe on midposterior part of dorsal fin; scales in lateral series 38 to 42; scales between lateral lines 4 to 6; circumpeduncular scales 20 to 24 *Pseudochromis perspicillatus*
- 45a.** No prominent dark spot in front of each anterior nostril; posterodorsal corner of operculum without dark spot; caudal fin rounded *Pseudochromis quinquedentatus*
- 45b.** A prominent dark spot in front of each anterior nostril; indistinct to distinct grey to black spot present on posterodorsal corner of operculum; caudal fin rounded, becoming strongly emarginate in large specimens → 46
- 46a.** Anal fin with broad dark distal stripe; pelvic fins pale, with anterior margin broadly dark; pale bar extending from behind eye to posterior edge of upper jaw *Pseudochromis steenei*
- 46b.** Coloration not as above → 47
- 47a.** Dark spot on operculum indistinct and small, smaller than pupil; preopercle edge not dark *Pseudochromis howsoni*
- 47b.** Dark spot on operculum distinct and large, approximately equal to eye size; preopercle edge dark *Pseudochromis moorei*
- 48a.** Circumpeduncular scales 16 to 23 (rarely fewer than 18) → 49
- 48b.** Circumpeduncular scales 15 to 18 (usually 16) → 56
- 49a.** Segmented dorsal-fin rays 23 to 25 (usually 24) → 50
- 49b.** Segmented dorsal-fin rays 25 to 31 (usually 26 to 30) → 52








- 50a.** Anal-fin spines slender and weakly pungent to flexible, the second spine about as stout as the third *Pseudochromis flammicauda*
- 50b.** Anal-fin spines relatively stout and pungent, the second spine much stouter than the third → 51
- 51a.** Segmented anal-fin rays 12 or 13 (usually 13); scales in lateral series 31 to 36; predorsal scales 18 to 24; scales of body behind pectoral-fin base each with a large pale yellow to pale brown central spot *Pseudochromis* sp. 4
- 51b.** Segmented anal-fin rays 13 or 14 (usually 14); scales in lateral series 36 to 39; predorsal scales 14 to 18; no large pale spots on body scales *Pseudochromis ransonneti*
- 52a.** Body with 8 to 15 brown (black in life) straight-edged stripes *Pseudochromis cometes*
- 52b.** If dark stripes present on body, these consisting of closely spaced spots so that stripes wider at base of each scale → 53
- 53a.** Well-developed denticles on ceratobranchial-1 outer rakers arranged in 2 rows running most of raker lengths; dorsal and anal fins usually with weakly to well-developed scaly sheaths present on at least posterior part of fins *Pseudochromis fuscus*
- 53b.** Well-developed denticles on ceratobranchial-1 outer rakers mainly confined to raker tips; dorsal and anal fins without scaly sheaths → 54
- 54a.** Segmented anal-fin rays 15 *Pseudochromis pictus*
- 54b.** Segmented anal-fin rays 13 to 15 (usually 14) → 55
- 55a.** Second anal-fin spine much stouter than the third *Pseudochromis bitaeniatus*
- 55b.** Second anal-fin spine about as stout as the third *Pseudochromis wilsoni*
- 56a.** Segmented dorsal-fin rays 21 to 23 (usually 22); segmented anal-fin rays 12 to 14 (rarely 12 or 14); 2 epurals → 57
- 56b.** Combination of fin-ray counts not as above; 3 epurals → 60
- 57a.** Males with dark grey to black horseshoe-shaped mark on caudal fin; females with conspicuous dark grey to black spot covering posttemporal pores (immediately above gill opening); scales in lateral series 27 to 34 (usually 29 to 32); predorsal scales 10 to 15 (usually 11 to 13) *Pseudochromis tapeinosoma*
- 57b.** Males without dark horseshoe-shaped mark on caudal fin; females with inconspicuous grey to dusky grey spot covering posttemporal pores; scales in lateral series 29 to 40 (usually 30 to 38); predorsal scales 11 to 19 (usually 13 to 16) → 58
- 58a.** Scales in lateral series 33 to 40 (usually 35 to 38); anterior lateral-line scales 28 to 34 (usually 29 to 33); scales below anterior lateral line 11 to 14 (usually 12 or 13) *Pseudochromis coccinicauda*
- 58b.** Scales in lateral series 29 to 37 (usually 31 to 35); anterior lateral-line scales 23 to 31 (usually 24 to 29); scales below anterior lateral line 9 to 13 (usually 10 to 12) → 59
- 59a.** Males with lower part of head and breast and scales of ascending portion of anterior lateral line and of scale row immediately below horizontal portion of anterior lateral line abruptly yellowish brown to bright yellow (pale brown to brown in preservative), the remainder of head and body dark grey to black (dark brown to black in preservative); scales in lateral series 30 to 37 (usually 31 to 36) *Pseudochromis cyanotaenia*
- 59b.** Males dark grey to black (dark brown to black in preservative), with lower part of head and body in front of anal fin yellowish (pale brown to brown in preservative); scales in lateral series 29 to 35 (usually 30 to 33) *Pseudochromis* sp. 5

- 60a.** Segmented dorsal-fin rays 25 to 27 (usually 26), with only the last 2 to 9 rays branched → **61**
- 60b.** Character combination not as above → **62**
- 61a.** Body more or less uniformly pale to dark; horizontal scales above anal-fin origin to dorsal-fin base 14 to 16 *Pseudochromis elongatus*
- 61b.** Body pale with 5 to 8 dark stripes; horizontal scales above anal-fin origin 11 or 12 *Pseudochromis striatus*
- 62a.** Fin spines weakly pungent to flexible; second anal-fin spine about as stout as the third; lower lip varying from incomplete with weak symphyseal interruption to complete → **63**
- 62b.** Fin spines stout; second anal-fin spine slightly to much stouter than the third; lower lip incomplete → **65**
- 63a.** Anterior lateral-line scales 25 or 26; anterior lateral line terminating beneath segmented dorsal-fin ray 15 or 16; 4 consecutive dorsal-fin pterygiophores inserting in a 1:1 association with interneural spaces immediately behind neural spine 4 *Pseudochromis kolythrus*
- 63b.** Anterior lateral-line scales 26 to 34 (usually 28 to 31); anterior lateral line terminating beneath segmented dorsal-fin ray 17 to 25 (usually 19 to 24); 1 to 4 (usually 1 to 3) consecutive dorsal-fin pterygiophores inserting in a 1:1 association with interneural spaces immediately behind neural spine 4 → **64**
- 64a.** Dorsoanterior part of caudal peduncle usually with indistinct to distinct grey to black spot; 1 or 2 (modally 1) consecutive dorsal-fin pterygiophores inserting in a 1:1 association with interneural spaces immediately behind neural spine 4; pectoral-fin rays 18 to 20 *Pseudochromis jamesi*
- 64b.** Coloration not as above; 2 or 3 (modally 3) consecutive dorsal-fin pterygiophores inserting in a 1:1 association with interneural spaces immediately behind neural spine 4; pectoral-fin rays 16 to 19 (usually 17 or 18) *Pseudochromis luteus*
- 65a.** Third anal-fin spine length 10 to 14% standard length; distance from dorsal-fin origin to pelvic-fin origin 30 to 35% standard length; scales in lateral series 30 to 34 *Pseudochromis fowleri*
- 65b.** Third anal-fin spine length 6 to 9% standard length; distance from dorsal-fin origin to pelvic-fin origin 23 to 32% standard length; scales in lateral series 33 to 42 → **66**
- 66a.** Segmented anal-fin rays 16; scales below anterior lateral line 10 to 12 (usually 10 or 11) *Pseudochromis flavopunctatus*
- 66b.** Segmented anal-fin rays 11 to 15; scales below anterior lateral line 11 to 15 (usually 12 to 14) → **67**
- 67a.** Caudal fin rounded in small (less than 3.5 cm) specimens, becoming pointed (rounded with middle rays produced) in larger specimens; in preservative, predorsal contour and nape pale pinkish brown; dorsal contour of body and caudal peduncle with dark, grey-brown reticulation surrounding pale spots *Pseudochromis reticulatus*
- 67b.** Caudal fin rounded, truncate, or emarginate; coloration not as above → **68**
- 68a.** Segmented anal-fin rays 11 to 14 (usually 13) *Pseudochromis marshallensis*
- 68b.** Segmented anal-fin rays 13 to 15 (usually 14 or 15) → **69**
- 69a.** Segmented dorsal-fin rays 22 to 25 (usually 24) *Pseudochromis andamanensis*
- 69b.** Segmented dorsal-fin rays 25 to 27 → **70**
- 70a.** No dark spot on axil of pectoral fins; segmented dorsal-fin rays 25 *Pseudochromis litus*
- 70b.** Dark spot on axil of pectoral fins; segmented dorsal-fin rays usually 26 or 27 (rarely 25) → **71**

- 71a.** Head and anterior part of body bright golden-orange (yellowish brown in preservative), becoming bluish grey posteriorly, with caudal fin bluish grey basally (brown in preservative); segmented dorsal-fin rays 27; distance from anal-fin origin to middle dorsal-fin ray (spines included in enumerating middle ray) 27 to 29% standard length; caudal peduncle depth (measured between bases of last dorsal- and anal-fin rays) 16 to 17% standard length *Pseudochromis aurulentus*
- 71b.** Head and body bluish grey (brown in preservative), paler ventrally, with caudal fin, caudal peduncle, and posterior part of body behind middle of anal fin abruptly bright yellow (pale brown in preservative); segmented dorsal-fin rays 25 to 27 (usually 26); distance from anal-fin origin to middle dorsal-fin ray (spines included in enumerating middle ray) 22 to 27% standard length; caudal peduncle depth (measured between bases of last dorsal- and anal-fin rays) 14 to 16% standard length *Pseudochromis pylei*

List of species occurring in the area

The symbol  is given when species accounts are included.

-  *Assiculus punctatus* Richardson, 1846
Blennodesmus scapularis Günther, 1871
Congrogadus amplimaculatus (Winterbottom, 1980)
Congrogadus heirichthys Jordan and Richardson, 1908
Congrogadus malayanus (Weber, 1909)
Congrogadus spinifer (Borodin, 1933)
 *Congrogadus subducens* (Richardson, 1843)
 *Cypho purpurascens* (De Vis, 1884)
Cypho sp.
Haliophis aethiopus Winterbottom, 1985
Labracinus atrofasciatus (Herre, 1933)
 *Labracinus cyclophthalmus* (Müller and Troschel, 1849)
Ogilbyina novaehollandiae (Steindachner, 1880)
 *Ogilbyina queenslandiae* (Saville-Kent, 1893)
Ogilbyina salvati (Plessis and Fourmanoir, 1966)
Pseudochromis andamanensis Lubbock, 1980
Pseudochromis aurifrons Lubbock, 1980
Pseudochromis aurulentus Gill and Randall, 1998
Pseudochromis bitaeniatus (Fowler, 1931)
Pseudochromis coccinicauda (Tickell, 1888)
Pseudochromis colei Herre, 1933
Pseudochromis cometes Gill and Randall, 1998
 *Pseudochromis cyanotaenia* Bleeker, 1857
Pseudochromis diadema Lubbock and Randall, 1978
Pseudochromis elongatus Lubbock, 1980
Pseudochromis ephippiatus Gill, Pyle, and Earle, 1996
Pseudochromis flammicauda Lubbock and Goldman, 1976
Pseudochromis flavopunctatus Gill and Randall, 1998
Pseudochromis fowleri Herre, 1934
 *Pseudochromis fuscus* Müller and Troschel, 1849
Pseudochromis howsoni Allen, 1995
Pseudochromis kolythrus Gill and Winterbottom, 1993
Pseudochromis litus Gill and Randall, 1988
Pseudochromis luteus Aoyagi, 1943
Pseudochromis marginatus Lubbock, 1980
Pseudochromis marshallensis Schultz, 1953
Pseudochromis moorei Fowler, 1931
Pseudochromis paccagnellae Axelrod, 1973
Pseudochromis paranox Lubbock and Goldman, 1976

- Pseudochromis perspicillatus* Günther, 1862
Pseudochromis pictus Gill and Randall, 1998
 ✦ *Pseudochromis polynemus* Fowler, 1931
 ✦ *Pseudochromis porphyreus* Lubbock and Goldman, 1974
Pseudochromis pylei Randall and McCosker, 1989
Pseudochromis quinquedentatus McCulloch
Pseudochromis ransonneti Steindachner, 1870
Pseudochromis reticulatus Gill and Woodland, 1992
Pseudochromis splendens Fowler, 1931
Pseudochromis steenei Gill and Randall, 1992
Pseudochromis striatus Gill, Shao, and Chen, 1995
Pseudochromis tapeinosoma Bleeker, 1853
Pseudochromis veliferus Lubbock, 1980
Pseudochromis wilsoni (Whitley, 1929)
Pseudochromis sp. 1
Pseudochromis sp. 2
Pseudochromis sp. 3
Pseudochromis sp. 4
Pseudochromis sp. 5

Pseudoplesiops annae (Weber, 1913)
Pseudoplesiops collare Gill, Randall, and Edwards, 1991
Pseudoplesiops howensis Allen, 1987
Pseudoplesiops knighti Allen, 1987
Pseudoplesiops multisquamatus Allen, 1987
Pseudoplesiops revillei Schultz, 1953
Pseudoplesiops rosae Schultz, 1943
 ✦ *Pseudoplesiops typus* Bleeker, 1858
Pseudoplesiops sp. 1
Pseudoplesiops sp. 2
Pseudoplesiops sp. 3
Pseudoplesiops sp. 4
Pseudoplesiops sp. 5

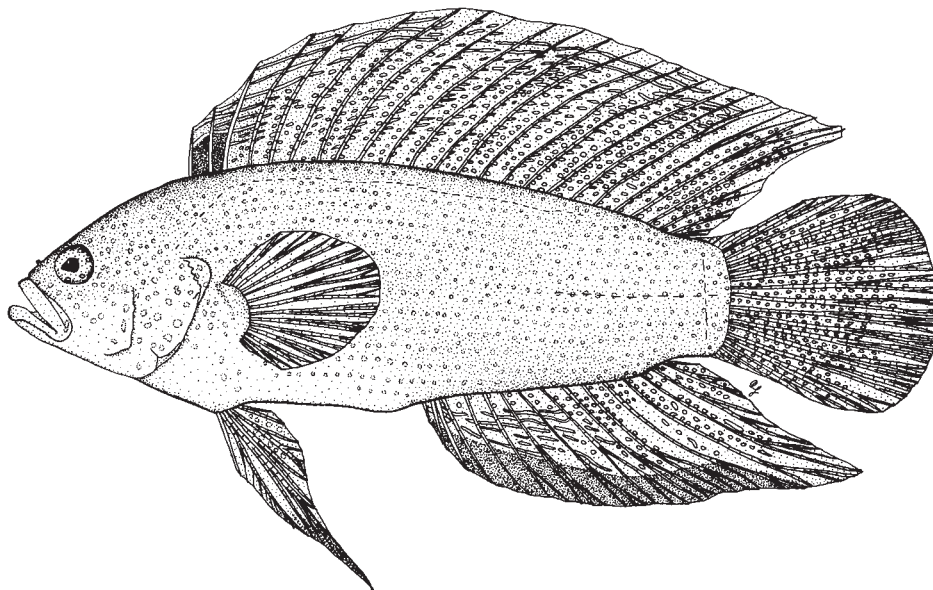
References

- Fowler, H.W. 1931. Contributions to the biology of the Philippine Archipelago and adjacent regions. The fishes of the families Pseudochromidae, Lobotidae, Pempheridae, Priacanthidae, Lutjanidae, Pomadasysidae, and Theraponidae, collected by the United States Bureau of Fisheries Steamer "Albatross", chiefly in Philippine seas and adjacent waters. *Bull. U.S. Natl. Mus.*, 100(11):1-388.
- Wintersbottom, R. 1986. Revision and vicariance biogeography of the subfamily Congrogadinae (Pisces: Perciformes: Pseudochromidae). *Indo-Pac. Fishes*, (9):34 p.

Assiculus punctatus Richardson, 1846

Frequent synonyms / misidentifications: *Pseudochromis punctatus* (Richardson, 1846) / None.

FAO names: En - Bluespotted dottyback.

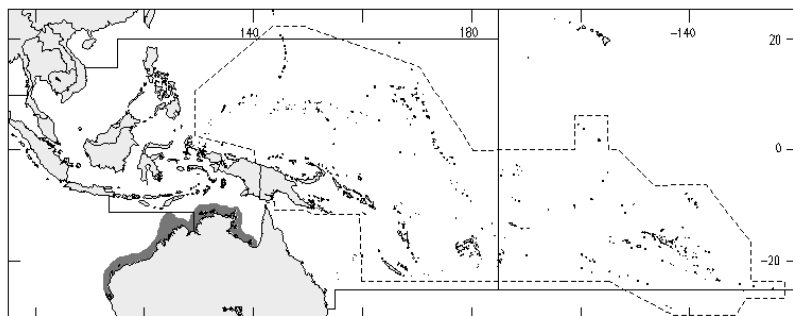


Diagnostic characters: Body moderately deep; distance from dorsal-fin origin to pelvic-fin origin 29 to 34% standard length. **Lower lip uninterrupted at symphysis.** Vomerine teeth relatively large, arranged in a chevron. Total gill rakers on first gill arch 13 to 17, of which 4 to 6 on upper limb, and 9 to 11 on lower limb. **Dorsal fin with III spines and 23 (rarely 22 or 24) mostly unbranched, segmented rays.** **Anal fin with III spines and 13 (rarely 12 or 14) mostly unbranched, segmented rays.** **Caudal fin rounded, the upper part with 5 (rarely 4) procurrent rays and 9 principal rays, the lower part with 4 (rarely 5) procurrent rays and 8 principal rays.** Pectoral fins with 17 or 18 (rarely 15 or 16) segmented rays. Pelvic fins with I spine and 5 branched, segmented rays. **Lateral line disjunct, consisting of an anterodorsal series of 33 to 43 (usually 36 to 40) tubed scales extending from gill opening, and a peduncular series of 6 to 9 (rarely 5 or 10) tubed scales.** **Circumpeduncular scales 17 to 21 (usually 19 or 20).** Dorsal and anal fins without distinct scaly sheaths. Vertebrae 11+17 (rarely 11+18); supraneural (predorsal) bones either 2, or 3 with the third a rudiment. **Colour:** head, body, and fins either uniformly grey to dark grey or brown to olive, sometimes with ventral part of head and breast reddish brown to bright yellow; **small, bright blue spots on head and body;** dorsal, anal, caudal, and pelvic fins with bright blue spots or bright blue irregular stripes and short streaks; pectoral fins clear.

Size: Maximum total length 8 cm.

Habitat, biology, and fisheries: Inhabits coastal reefs and weedbed areas, often in relatively silty waters, at depths ranging to 30 m. A cryptic reef species, usually found in association with highly eroded limestone reef and rocks. Of considerable potential as an aquarium fish.

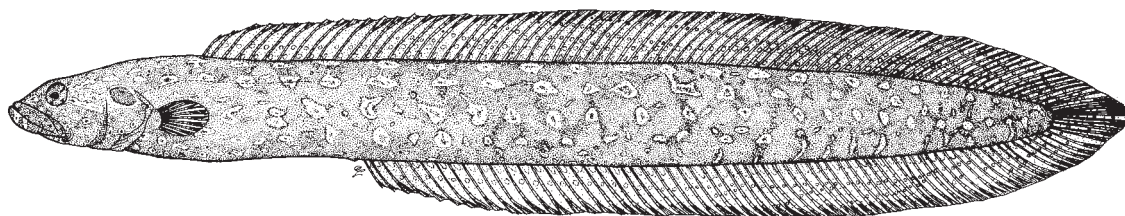
Distribution: Northwestern Australia, from Shark Bay to the Gulf of Carpentaria.



Congrogadus subducens (Richardson, 1843)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Carpet eelblenny.

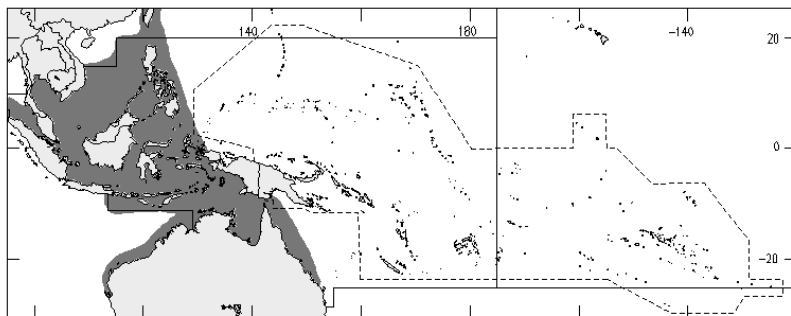


Diagnostic characters: Body elongate and laterally compressed; body depth at anal-fin origin 7 to 16% standard length. **Dorsal fin without spines, with 68 to 76 branched, segmented rays. Anal fin without spines, with 57 to 66 branched, segmented rays.** Caudal fin confluent with dorsal and anal fins, with 5 branched rays in upper part, and 5 branched rays in lower part of fin; no unbranched rays. Pectoral fins with 9 to 11 segmented rays. **Pelvic fins absent.** Lateral line composed of 42 to 68 pored scales extending from gill opening. Cheek, opercle, and body covered with small, elliptical cycloid scales. **Colour:** head and body variegated green or reddish brown to brown, with irregular pale spots (up to eye diameter in size); pale spots sometimes forming reticulations or bands; **large ocellated dark spot usually present on opercle;** dorsal, anal, and caudal fins similar to body coloration; pectoral fins clear.

Size: Maximum total length 45 cm.

Habitat, biology, and fisheries: Cryptic inhabitant of shallow coral and rock reefs, often in silty areas adjacent to seagrass beds. Sometimes enters the aquarium fish trade.

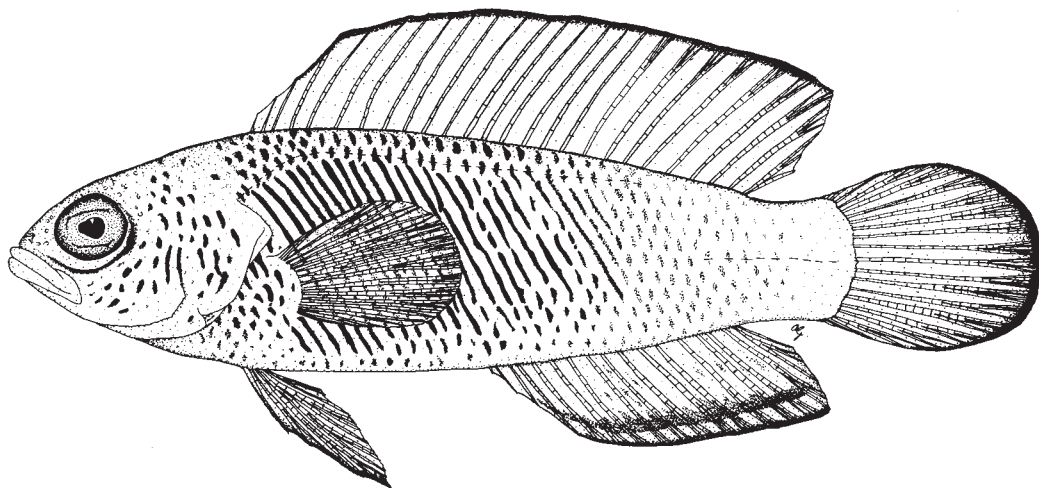
Distribution: Nicobar Islands to southern coast of Queensland, Australia, north to the Ryukyu Islands and south to the central coast of Western Australia.



Cypho purpurascens (De Vis, 1884)

Frequent synonyms / misidentifications: *Pseudochromis mccullochi* Myers, 1932; *P. mccullochi perpulcher* Whitley, 1959 / None.

FAO names: En - Obliquelined dottyback.

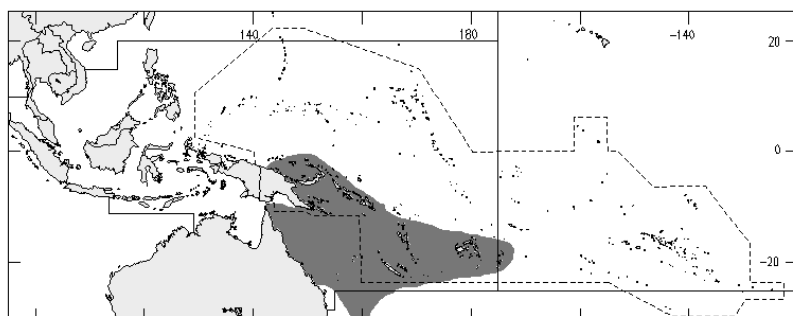


Diagnostic characters: Body moderately slender; distance from dorsal-fin origin to pelvic-fin origin 27 to 30% standard length. **Lower lip either uninterrupted at symphysis or with weak interruption only.** Vomerine teeth relatively large, arranged in a chevron. Total gill rakers on first gill arch 14 to 19 (usually 15 or 16), of which 4 to 7 (usually 4 or 5) on upper limb, and 10 to 13 (usually 11 or 12) on lower limb. **Dorsal fin with III slender spines and 23 (rarely 22 or 24) segmented rays, with at least some anterior rays unbranched.** Anal fin with III slender spines and 14 (rarely 13 or 15) segmented rays. Caudal fin rounded, the upper part with 6 (rarely 5 or 7) procurrent rays and 9 principal rays, the lower part with 5 or 6 (rarely 4) procurrent rays and 8 principal rays. Pectoral fins with 17 to 19 segmented rays. Pelvic fins with I spine and 5 branched, segmented rays. **Lateral line disjunct, consisting of an anterodorsal series of 23 to 32 (usually 25 to 29) tubed scales extending from gill opening, and a peduncular series of 3 to 9 (usually 5 to 7) tubed scales.** Circumpeduncular scales 16 (rarely 17). **Dorsal and anal fins without distinct scaly sheaths.** Vertebrae 10+16; supraneural (predorsal) bones 3, of approximately equal size. **Colour:** head and body either bright orange to bright red (males) or brown to olive with large pink to red area above anterior part of anal fin (females); scattered pink to bright green spots on top of head and snout; mauve to bright blue line extending around posteroventral edge of eye; cheek and operculum with scattered mauve to dark blue bars and irregular markings; females usually with large bright yellow spot on cheek behind eye; **blue to magenta or black bars following oblique scale rows on anterior part of body**, these becoming broken and indistinct posteriorly; dorsal, anal, and caudal fins similar to adjacent body coloration, often adorned with blue, red, or brown stipes and/or spots; males sometimes with 1 to 3 large, gold-edged black spots on midanterior part of dorsal fin.

Size: Maximum total length 7.5 cm.

Habitat, biology, and fisheries: Cryptic inhabitant of coral and rock reefs, occurring in tidal pools, lagoonal reefs, and reef slopes to depths of at least 40 m. Sometimes enters the aquarium fish trade.

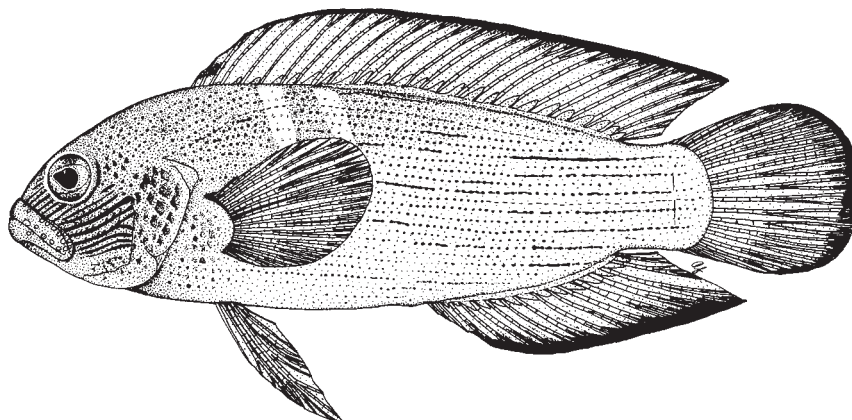
Distribution: Southwest Pacific, from the Great Barrier Reef and Papua New Guinea east to Tonga.



Labracinus cyclophthalmus (Müller and Troschel, 1849)

Frequent synonyms / misidentifications: *Cichlops melanotaenia* Bleeker, 1852; *C. spilopterus* Bleeker, 1853; *C. hellmuthii* Bleeker, 1854; *C. japonicus* Gill, 1859; *C. trispilos* Bleeker, 1855; *Dampiera melanostigma* Fowler, 1931; *D. ocellifera* Fowler, 1946 (including various combinations of these in *Cichlops*, *Dampiera*, and *Labracinus*) / *Labracinus lineatus* (Castenau, 1875); *Pseudochromis fuscus* Müller and Troschel, 1849.

FAO names: En - Red dottyback.

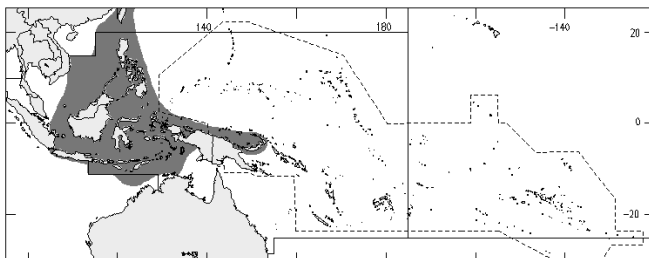


Diagnostic characters: Body moderately deep to deep; distance from dorsal-fin origin to pelvic-fin origin 31 to 38% standard length. **Lower lip uninterrupted at symphysis. Vomerine teeth relatively large, arranged in a chevron.** Total gill rakers on first gill arch 18 to 22 (rarely 17 or 23), of which 6 to 9 (rarely 10) on upper limb, and 11 to 14 (rarely 15) on lower limb. **Dorsal fin with II slender spines and 25 (rarely 24 or 26) mostly branched, segmented rays.** Anal fin with III spines and 14 (rarely 15) branched, segmented rays. Caudal fin rounded, the upper part with 5 or 6 (usually 6) procurrent rays and 9 principal rays, the lower part with 5 (rarely 4 or 6) procurrent rays and 8 principal rays. Pectoral fins with 18 or 19 (rarely 17 or 20) segmented rays. **Pelvic fins with I spine and 5 branched, segmented rays. Lateral line disjunct, consisting of an anterodorsal series of 43 to 62 (usually 48 to 62) tubed scales extending from gill opening, and a peduncular series of 12 to 24 (usually 18 to 22) tubed scales. Circumpeduncular scales 24 to 30 (usually 26 to 28).** Dorsal and anal fins with distinct scaly sheaths. Vertebrae 11+17; supraneural (predorsal) bones 3, of approximately equal size. **Colour:** head and body varying from pale grey to dark grey, olive, or bright red, usually darker dorsally; cheeks and preorbital area usually with blue to dark grey oblique bars; scales of dorsoanterior part of body each with a bluish to black spot; dark spots sometimes coalescing to form stripes along dorsal-fin base or along alternate scale rows on posterior part of body; upper part of body sometimes with a series of white to bright yellow, short, oblique bars; dorsal fin greyish to dark grey or bright red, usually with outer margin blue to dark grey, and with a series of reddish to black rows of spots anteriorly, which align posteriorly to form stripes; females often with spots forming comma-shaped markings; males sometimes with 1 to several large, dark grey to black, horizontally elongate blotches on anterior part of dorsal fin; anal fin brownish or bluish to dark grey or red, usually with 3 to 12 pale stripes and blue to dark grey outer margin; caudal fin bluish to bright red or black with blue to black margin.

Size: Maximum total length 22 cm.

Habitat, biology, and fisheries: Inhabits rock and coral reefs in various habitats, from tidal pools and lagoonal reefs to reef slopes, often in relatively silty areas, to depths of at least 20 m. Frequently enters the aquarium fish trade, and has been bred in captivity.

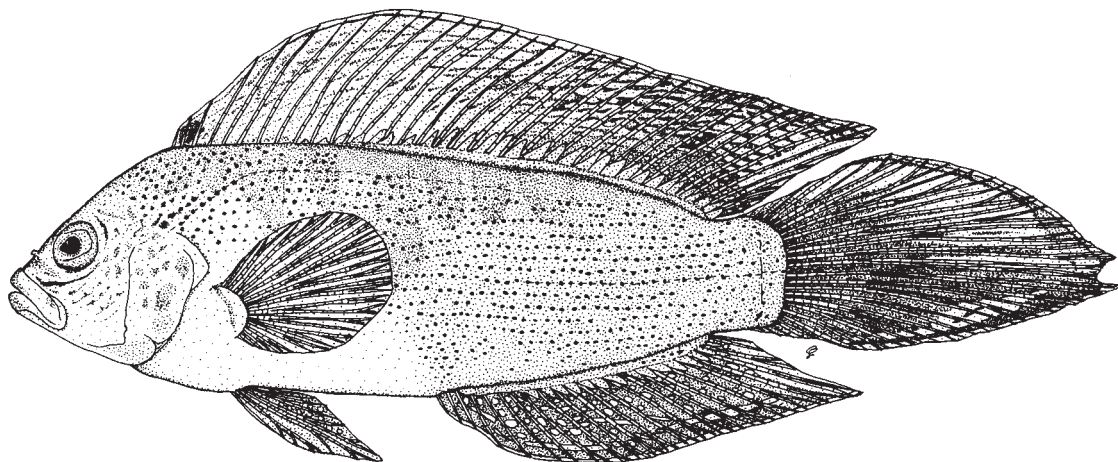
Distribution: Widely distributed throughout the Indo-Malaysian Archipelago, from southern Japan south to the Northwest Shelf of Australia, and east to New Ireland, Papua New Guinea.



Ogilbyina queenslandiae (Saville-Kent, 1893)

Frequent synonyms / misidentifications: None / *Dampieria longipinna* Ogilby, 1908; *Pseudochromis novaehollandiae* Steindachner, 1879; *P. veliferus* Lubbock, 1980.

FAO names: En - Queensland dottedback.

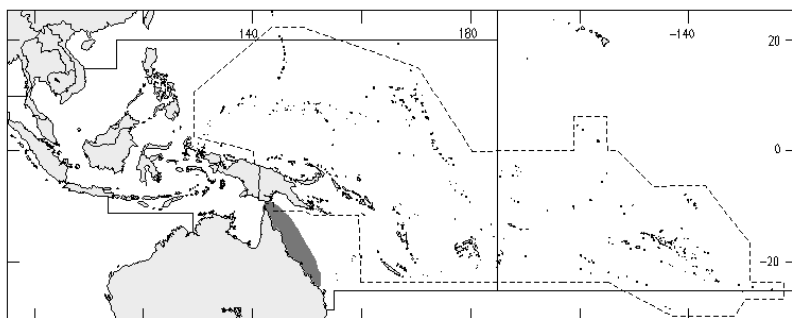


Diagnostic characters: Body moderately deep to deep; distance from dorsal-fin origin to pelvic-fin origin 32 to 36% standard length. Lower lip uninterrupted at symphysis. Vomerine teeth small, arranged in a broad, triangular patch. Total gill rakers on first gill arch 16 to 20 (usually 18 or 19), of which 5 to 8 (usually 6 or 7) on upper limb, and 11 to 13 (usually 12) on lower limb. Dorsal fin with III (rarely IV) slender spines and 32 to 37 (usually 34 to 36) mostly unbranched, segmented rays. Anal fin with III slender spines and 18 to 21 (usually 19 or 20) segmented rays. Caudal fin usually rounded to spade-shaped, often with posterior margin truncate or irregular, the upper part with 6 (rarely 7) procurent rays and 9 principal rays, the lower part with 5 (rarely 6) procurent rays and 8 principal rays. Pectoral fins with 18 to 20 (usually 19) segmented rays. Pelvic fins with I spine and 5 branched, segmented rays. Lateral line disjunct, consisting of an anterodorsal series of 38 to 50 (usually 40 to 45) tubed scales extending from gill opening, and a peduncular series of 4 to 18 (usually 10 to 14) tubed scales. Circumpeduncular scales 24 to 26. Dorsal and anal fins with distinct scaly sheaths. Vertebrae 10+16; supraneural (predorsal) bones 2. **Colour:** males with head and anterior part of body reddish, often with short dark bars extending from beneath anterior part of dorsal fin, the posterior part of body olive to dark grey; females brown to dark grey anteriorly, often with short dark bars extending from beneath anterior part of dorsal fin, and reddish posteriorly, with area above anal fin bright yellow to orange; dorsal, anal, and caudal fins similar to adjacent body coloration, often with blue or red stripes and/or spots, and irregular yellow markings on caudal fin.

Size: Maximum total length 15 cm.

Habitat, biology, and fisheries: Inhabits rocky and coral reefs in various habitats, including tidal pools, lagoon areas, and reef slopes, at depths ranging to 15 m. Frequently enters the aquarium fish trade, and has been bred in captivity.

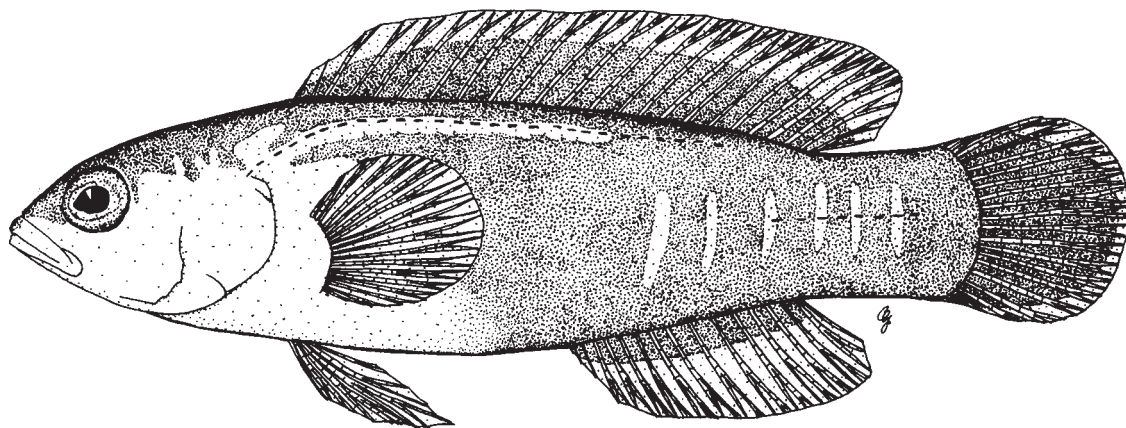
Distribution: Great Barrier Reef and adjacent coast of Queensland, Australia.



***Pseudochromis cyanotaenia* Bleeker, 1857**

Frequent synonyms / misidentifications: *Pseudochromis kikai* Aoyagi, 1941 / *Pseudochromis tapeinosoma* Bleeker, 1853.

FAO names: En - Bluebarred dottyback.

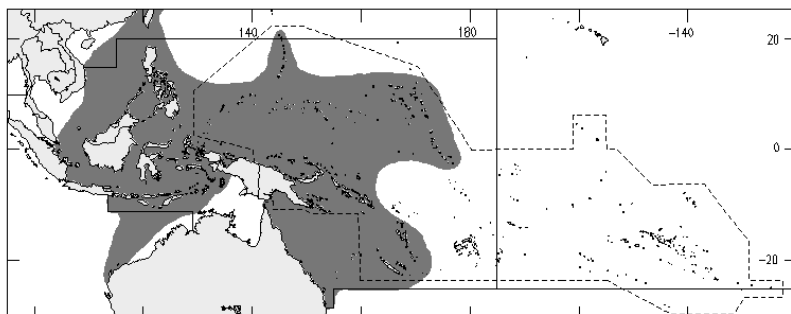


Diagnostic characters: Body relatively slender; distance from dorsal-fin origin to pelvic-fin origin 25 to 28% standard length. **Lower lip either uninterrupted at symphysis, or with weak interruption only.** Vomerine teeth relatively large, arranged in a chevron. Total gill rakers on first gill arch 13 to 16, of which 3 to 5 on upper limb, and 10 or 11 (rarely 9 or 12) on lower limb. **Dorsal fin with III slender spines (anterior spine easily overlooked) and 22 (rarely 21 or 23) mostly branched, segmented rays.** **Anal fin with III slender spines (anterior spine easily overlooked) and 13 (rarely 12) mostly branched, segmented rays.** Caudal fin rounded, the upper part with 7 or 8 (rarely 6) procurent rays and 9 principal rays, the lower part with 6 or 7 (rarely 8) procurent rays and 8 principal rays. Pectoral fins with 17 to 19 (rarely 16 or 20) segmented rays. **Pelvic fins with I spine and 5 branched, segmented rays.** **Lateral line disjunct, consisting of an anterodorsal series of 24 to 31 (usually 25 to 29) tubed scales extending from gill opening, and a peduncular series of 6 to 11 tubed scales.** **Circumpeduncular scales 16.** Dorsal and anal fins without distinct scaly sheaths. Vertebrae 10+16; supraneural (predorsal) bones 3, of approximately equal size. **Colour:** females and juveniles with head and body brownish to greyish brown, paler ventrally on head and breast, sometimes becoming reddish on caudal peduncle; dorsal and anal fins greyish basally and clear on outer parts; caudal fin yellowish grey to bright orange-red basally, becoming bright yellow to clear posteriorly; **males with lower part of head and lower part of body anterior to about middle of pectoral fins yellowish grey to bright yellow; scales of ascending portion of anterior lateral line and of scale row beneath horizontal portion of anterior lateral line yellowish grey to bright yellow; remainder of head and body dark grey to black,** often with bluish or greenish sheen, and sometimes with several short, bluish grey to bright blue bars above anal fin and on caudal peduncle; dorsal, anal, and caudal fins dark grey to black basally, with remainder of fin pale blue to clear.

Size: Maximum total length 6.5 cm.

Habitat, biology, and fisheries: Inhabits various reef habitats, including tidal pools, lagoonal patch reefs, and reef slopes, at depths ranging to 30 m; usually most abundant in high current or surge areas. Frequently enters the aquarium fish trade, and has been bred in captivity.

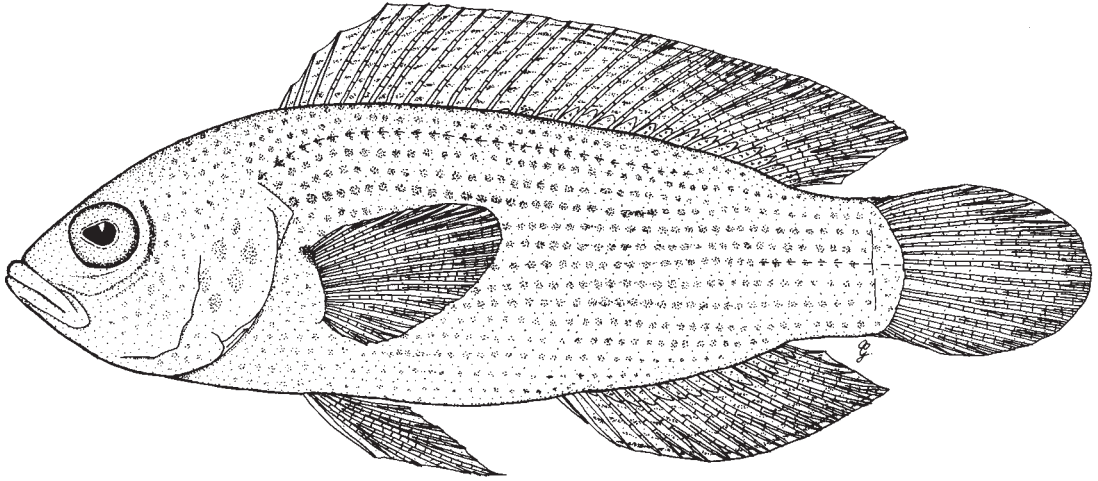
Distribution: Peninsular Malaysia north to Hong Kong and the Ryukyu Islands, south to Western Australia, and east to Vanuatu and the Gilbert Islands.



Pseudochromis fuscus (Müller and Troschel, 1849)

Frequent synonyms / misidentifications: *Pseudochromis aureus* Seale, 1910; *P. xanthochir* Bleeker, 1855 / *Labracinus cyclophthalmus* (Müller and Troschel, 1849); *L. lineatus* (Castenau, 1875).

FAO names: En - Brown dottyback.

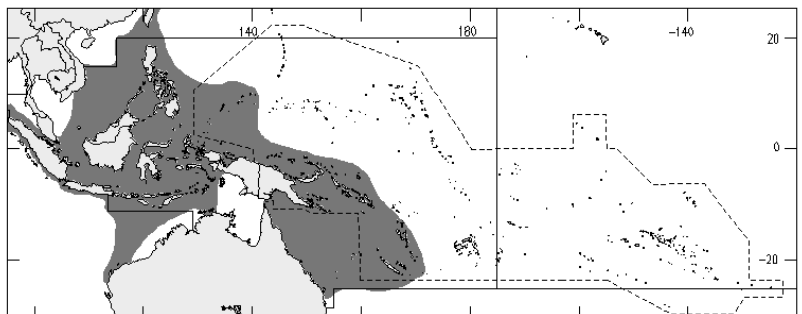


Diagnostic characters: Body moderately deep to deep; distance from dorsal-fin origin to pelvic-fin origin 30 to 36% standard length. **Lower lip interrupted at symphysis.** Total gill rakers on first gill arch 17 to 21 (rarely 16), of which 5 to 7 (rarely 8 or 9) on upper limb, and 12 to 14 (rarely 11 or 15) on lower limb. **Dorsal fin with III relatively stout spines and 25 to 29 (usually 26 or 27) segmented rays, usually with at least some anterior rays unbranched. Anal fin with III stout spines and 14 (rarely 13 or 15) segmented rays.** Caudal fin rounded to truncate or emarginate, the upper part with 6 or 7 (rarely 5) procurrent rays and 9 principal rays, the lower part with 5 or 6 (rarely 4 or 7) procurrent rays and 8 principal rays. Pectoral fins with 18 or 19 (rarely 17 or 20) segmented rays. **Pelvic fins with I spine and 5 branched, segmented rays. Lateral line disjunct, consisting of an anterodorsal series of 17 to 36 (usually 25 to 33) tubed scales extending from gill opening, and a peduncular series of 4 to 14 (usually 6 to 11) tubed scales. Circumpeduncular scales 20 (rarely as few as 16 or as many as 23). Dorsal and anal fins with weakly to strongly developed scaly sheaths.** Vertebrae 10+16; supraneural (predorsal) bones 3. **Colour:** bright yellow to dark grey, usually with blue spots on nape and at least anterior part of body; upper part of body and dorsal fin sometimes abruptly yellow; caudal peduncle and fin sometimes abruptly pale.

Size: Maximum total length 9 cm.

Habitat, biology, and fisheries: Known from a variety of reef habitats, from tidal pools and shallow lagoon reefs, to outer reef slopes, at depths ranging to 30 m. Usually found in association with branching corals (e.g. *Acropora* and *Pocillopora*). Sometimes enters the aquarium fish trade.

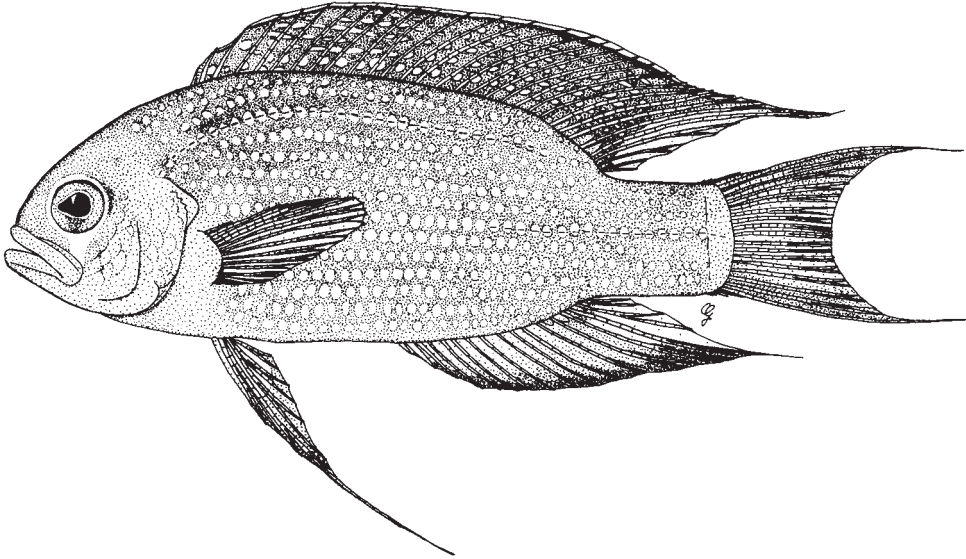
Distribution: Sri Lanka east to Vanuatu, north to at least Hong Kong and the Ryukyu Islands, and south to the central coast of Western Australia and the southern Great Barrier Reef.



***Pseudochromis polynemus* Fowler, 1931**

Frequent synonyms / misidentifications: None / None.

FAO names: En - Threadfined dottyback.

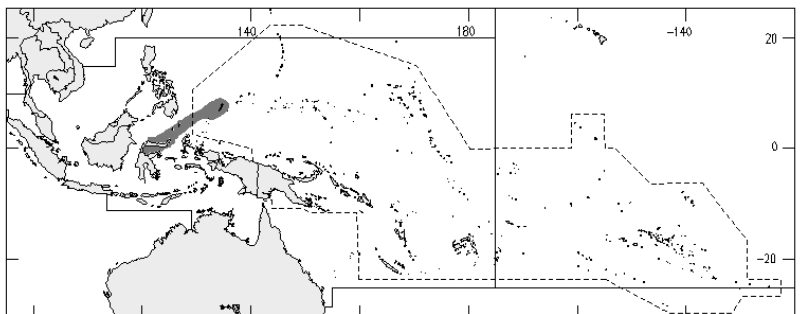


Diagnostic characters: Body moderately deep to deep; distance from dorsal-fin origin to pelvic-fin origin 32 to 36% standard length. **Lower lip interrupted at symphysis.** Total gill rakers on first gill arch 17 or 18, of which 4 or 5 on upper limb, and 12 or 13 on lower limb. **Dorsal fin with III relatively stout spines and 27 to 29 mostly unbranched, segmented rays.** **Anal fin with III stout spines and 14 or 15 segmented rays.** **Caudal fin emarginate to lunate,** the upper part with 6 procurrent rays and 9 principal rays, the lower part with 6 procurrent rays and 8 principal rays. Pectoral fins with 16 to 18 segmented rays. **Pelvic fins with I spine and 5 branched, segmented rays.** **Lateral line disjunct, consisting of an anterodorsal series of 27 to 32 tubed scales extending from gill opening, and a peduncular series of 8 to 17 tubed scales.** **Circumpeduncular scales 16.** Dorsal and anal fins usually with indistinct scaly sheaths posteriorly. Vertebrae 10+16; supraneural (predorsal) bones 3, of approximately equal size. **Colour:** head and body brownish to bluish grey, paler ventrally, with scales of cheek, operculum and body excluding dorsal contour of nape each with a large, central dull yellow to bright orange spot; spots becoming paler ventrally on body and tending to coalesce to form stripes; **pale yellow to bright yellow ring around orbit, ending ventrally in short broad bar, which extends behind and below posterior edge of upper jaw;** dorsal and anal fins grey with series of white to yellow spots, and posterior part of fins abruptly white or clear; caudal fin bluish grey basally, becoming clear or whitish posteriorly; pectoral fins clear; pelvic fins white to grey with large bright yellow to bright red spot basally.

Size: Maximum total length 10.5 cm.

Habitat, biology, and fisheries: Occurs around corals and rocks on reef slopes and dropoffs in depths of 2 to 50 m, often in association with large sponges. Of considerable potential as an aquarium fish.

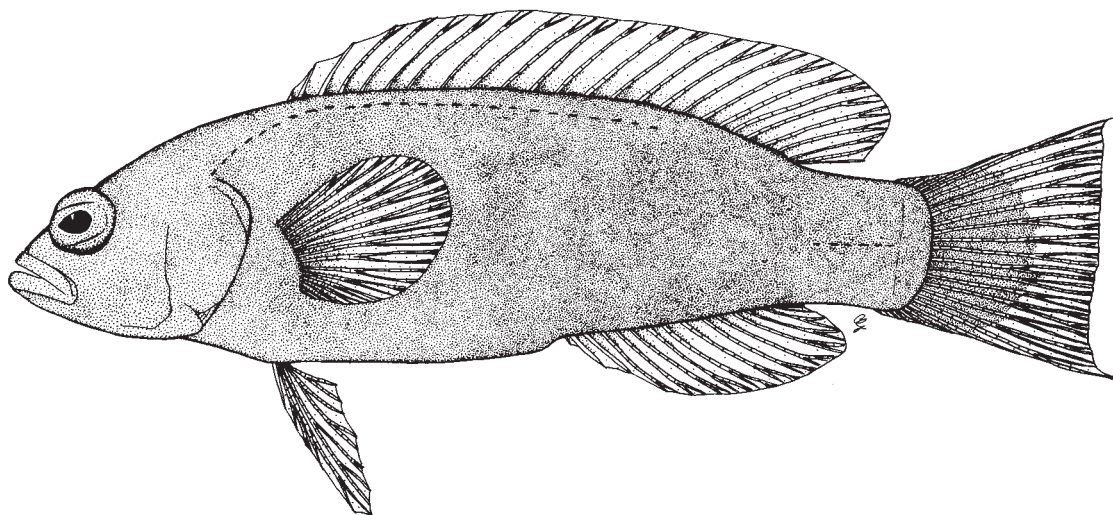
Distribution: Currently known only from northern Sulawesi and Belau.



Pseudochromis porphyreus Lubbock and Goldman, 1974

Frequent synonyms / misidentifications: None / None.

FAO names: En - Strawberry dottyback.

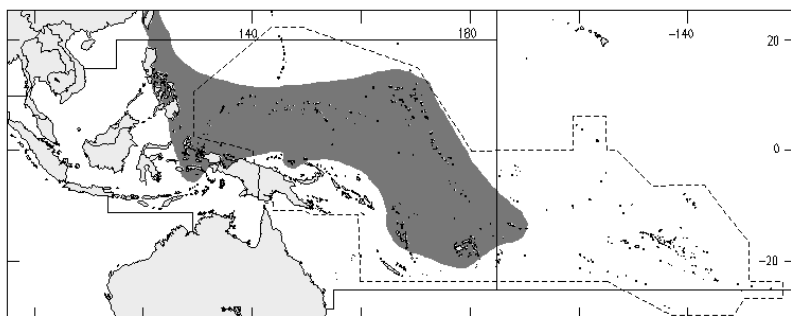


Diagnostic characters: Body moderately deep; distance from dorsal-fin origin to pelvic-fin origin 27 to 32% standard length. **Lower lip interrupted at symphysis. Total gill rakers on first gill arch 19 to 22** (rarely 18 or 23), of which 5 to 8 on upper limb, and 13 to 16 on lower limb. **Dorsal fin with III spines and 22** (rarely 21) mostly branched, segmented rays. **Anal fin with III spines and 12** (rarely 10 or 11) mostly branched, segmented rays. Caudal fin truncate to emarginate, the upper part with 6 or 7 (usually 6) procurrent rays and 9 principal rays, the lower part with 6 (rarely 5 or 7) procurrent rays and 8 principal rays. Pectoral fins with 16 to 18 (rarely 19) segmented rays. Pelvic fins with I spine and 5 branched, segmented rays. **Lateral line disjunct, consisting of an anterodorsal series of 19 to 28 (usually 21 to 25) tubed scales extending from gill opening**, and a peduncular series of 0 to 10 tubed scales. **Circumpeduncular scales 16** (rarely 18). **Dorsal and anal fins without distinct scaly sheaths.** Vertebrae 10+16; supraneural (predorsal) bones 3, of approximately equal size. **Colour:** head and body reddish purple to magenta; basal parts of dorsal and anal fins pink to magenta, the outer parts clear; basal and central part of caudal fin magenta, the remainder of fin clear, giving rounded appearance to fin.

Size: Maximum total length of captured specimens about 6.5 cm; aquarium specimens known to grow to at least 8 cm total length.

Habitat, biology, and fisheries: Lives in small caves and among rubble and coral on reef slopes and dropoffs at depths ranging from 3 to 65 m. This species and 2 of its close relatives (*Pseudochromis diadema* and *P. paccagnellae*) are popular aquarium fishes.

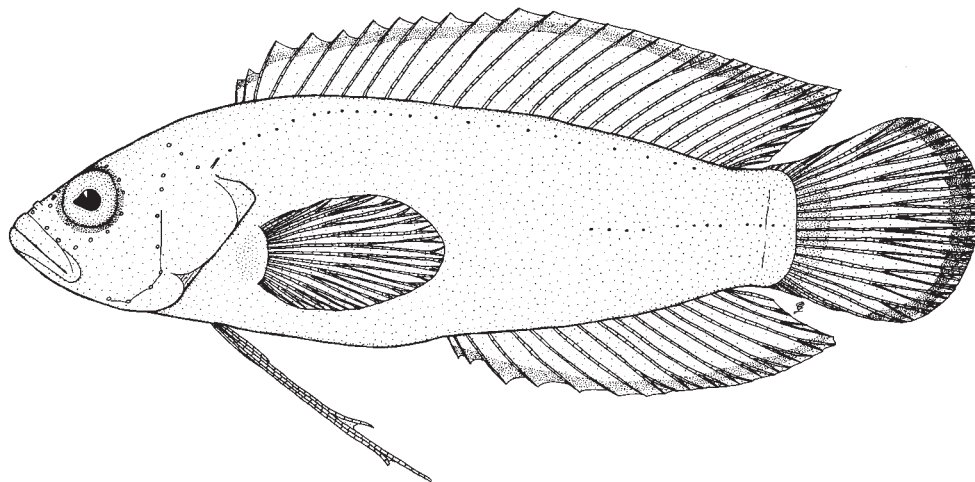
Distribution: Central and western Pacific, from the Ryukyu Islands south to eastern Indonesia, and east to American Samoa.



Pseudoplesiops typus Bleeker, 1858

Frequent synonyms / misidentifications: *Pseudoplesiops sargenti* Schultz, 1953 / None.

FAO names: En - Ringeyed dottyback.

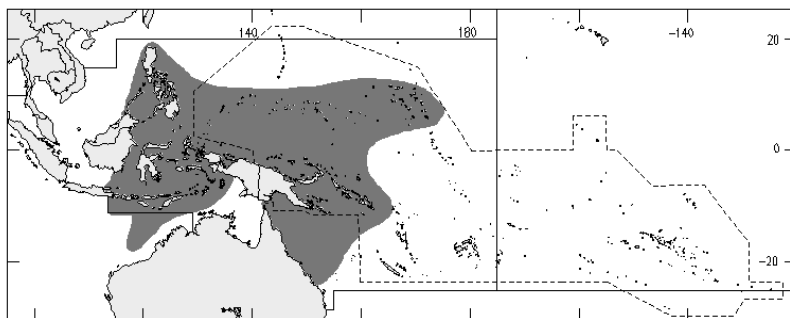


Diagnostic characters: Body moderately deep; distance from dorsal-fin origin to pelvic-fin origin 27 to 32% standard length. **Lower lip uninterrupted at symphysis.** Total gill rakers on first gill arch 11 to 16 (usually 12 to 14), of which 2 to 4 (usually 3 or 4) on upper limb, and 9 to 12 (usually 9 or 10) on lower limb. **Dorsal fin with II slender spines (easily overlooked) and 24 (rarely 25 or 26) mostly unbranched, segmented rays.** Anal fin with II or III spines (easily overlooked) and 14 to 16 (usually 15) mostly unbranched, segmented rays. Caudal fin rounded, the upper part with 4 (rarely 5) procurrent rays and 9 principal rays, the lower part with 3 or 4 procurrent rays and 8 principal rays. Pectoral fins with 16 to 18 segmented rays. **Pelvic fins with I spine and 4 unbranched, segmented rays.** **Lateral line represented by a single tubed scale at gill opening,** followed by an intermittent series of centrally pitted scales extending beneath base of dorsal fin, and a second intermittent series of centrally pitted scales on caudal peduncle; **transverse scale rows from upper edge of gill opening to base of caudal fin 33 to 39.** **Circumpeduncular scales 20 (rarely 19 or 22).** **Predorsal scales 10 to 16, extending anteriorly to about midway between dorsal-fin origin and posterior edge of eye.** Dorsal and anal fins without distinct scaly sheaths. **Posterior body scales ctenoid in small specimens, becoming cycloid in specimens larger than about 3.5 cm standard length, with distinct centres and radii in all fields.** Vertebrae 11+17 to 18; supraneural (predorsal) bones 3, of approximately equal size. **Colour:** head and body pale bluish grey to pale yellow or bright pink; **narrow red to dark grey or black ring around eye;** dorsal, anal, and caudal fins similar to body coloration, often with blue or red edging on fins; pectoral fins clear; pelvic fins pale blue to white.

Size: Maximum total length 7 cm.

Habitat, biology, and fisheries: Cryptic inhabitant of coral reefs, in depths ranging from 1 to at least 30 m. Of some potential as an aquarium fish.

Distribution: Indonesia and the Philippines south to the Northwest Shelf of Australia, and east to the Marshall and Solomon islands.

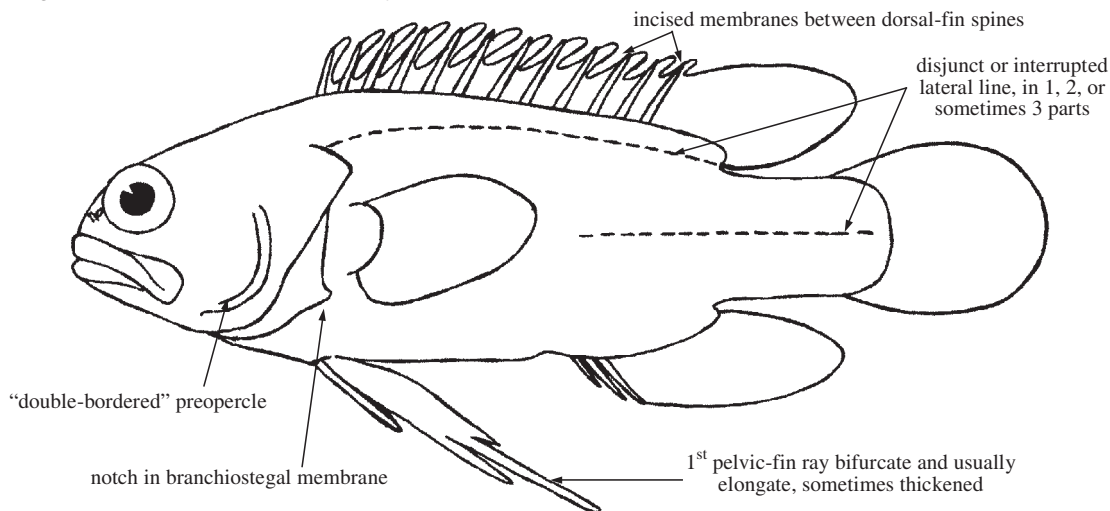


PLESIOPIDAE

Roundheads (prettyfins, longfins)

by R.D. Mooi

Diagnostic characters: Small to medium-sized fishes (3 to 30 cm total length); body elongate to oblong. Snout short. **Preopercular sensory canal open** (except in *Beliops* and *Acanthoplesiops*), **giving the preopercle a “double-bordered” appearance (not always obvious externally)**. No opercular spines. **Notch in the posterolateral margin of branchiostegal membranes just dorsal to third branchiostegal ray** (not obvious in *Calloplesiops*). A single dorsal fin with IX to XXVI spines and 2 to 11 segmented rays, **some species with deeply incised fin membranes between the spines** (not in *Assessor* or *Calloplesiops*); anal fin with III to XVI spines and 2 to 11 segmented rays; caudal fin usually rounded, sometimes elongate to lanceolate or forked; **pelvic fins with I spine and 2 or 4 segmented rays, the first ray bifurcate, often elongate and sometimes considerably thickened**; pectoral fins with 14 to 30 rays; Branchiostegal rays 6. Scales often cycloid anteriorly and ctenoid posteriorly; scales in lateral series 23 to more than 100; **lateral line disjunct and in 2 or more parts, with a more anterior dorsal lateral line running near dorsal-fin base, a posterior lateral line running midlaterally onto caudal peduncle, and occasionally a ventral lateral line as well** (except *Steeneichthys* with a single pored lateral-line scale and the remainder almost wholly replaced by scales with sensory papillae, and *Acanthoplesiops* with a single dorsal lateral line). Parasphenoid keel present; **dorsal-fin pterygiophores articulate with spines via closed bony ring** (except in some species of *Paraplesiops*); each pelvic bone with a well-developed subpelvic shelf as well as a subpelvic concavity posterior to subpelvic processes visible in ventral view; extensor proprius pelvis muscle inserts onto second to fourth pelvic-fin rays (except in the subfamily *Acanthoclininae* where the muscle is absent); hypurals 1 and 2 (and sometimes parhypural) fused into autogenous plate, hypurals 3 and 4 fused to each other and to urostylar complex. **Colour:** variable, even changeable for individuals from solid or spotted body colour to barred, but usually dark background colour on body (although *Fraudella* is orange); dorsal-fin spines often with yellow or red tips.



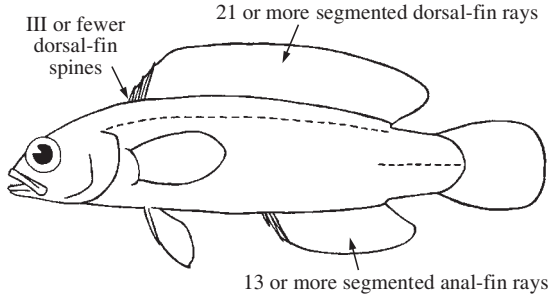
Habitat, biology, and fisheries: On coral reefs and tide pools; occur near the surface in the surf zone to a depth of 30 m, sometimes deeper. Some species mostly nocturnal, feeding on crustaceans and molluscs. Can be schooling in caves and overhangs, in loose aggregations or schools around coral heads, or mostly solitary. Eggs with hair-like filaments that either entangle with one another to form a mass or adhere eggs to a hard surface; eggs are guarded by male in a crevice or cave, or are mouthbrooded. No commercial catch, although some of the larger Australian species take baited line. Some species, particularly the comet or marine betta (*Calloplesiops*), are popular in the aquarium trade and have been successfully bred in captivity.

Remarks: Two of the listed species (*Acanthoplesiops psilogaster* and *Beliops batanensis*) have been reported just north of the area at Batan Island, Philippines, but are included because they might occur. Based on colour variation, some authors have suggested that there are 2 species of *Calloplesiops*: *C. altivelis* (figured here) with larger spots which do not merge into longitudinal stripes on the dorsal and anal fins, and *C. argus* with smaller spots which merge to produce longitudinal stripes on the dorsal and anal fins. These colour morphs co-occur, and an indepth study has yet to be undertaken to determine specific status; such information might be important for conservation of this popular aquarium fish.

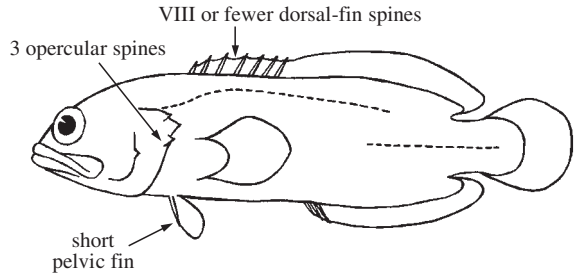
Similar families occurring in the area

Pseudochromidae: superficially similar in having a disjunct lateral line or lateral line reduced to a single anterior pored scale, some members with a reduced number of pelvic-fin rays and with pelvic fins frequently elongate. But this family is markedly different in having 3 or fewer dorsal-fin spines, and these often weak; 21 or more segmented dorsal-fin rays and 13 or more segmented anal-fin rays.

Serranidae: 3 opercular spines; lateral line complete, except some members of the tribe Grammistini (*Pseudogramma*, *Aporops*, *Suttonia*). The latter have been misidentified as Plesiopidae, but differ in having VIII or fewer dorsal-fin spines, short pelvic fins with I spine and 5 rays, 3 opercular spines, and 1 preopercular spine.



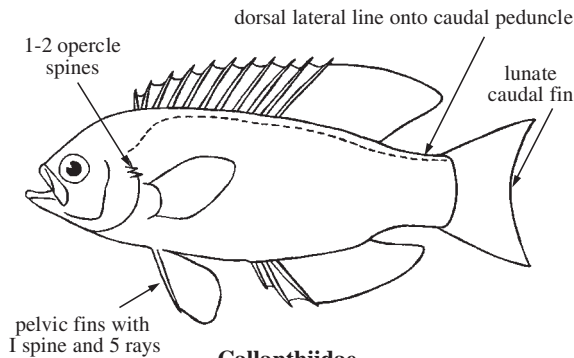
Pseudochromidae



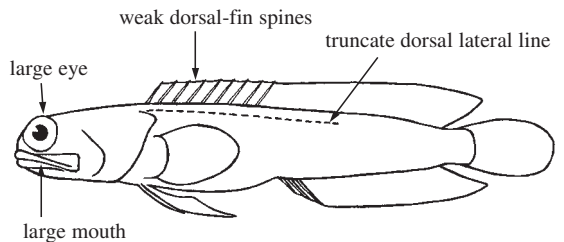
Serranidae (tribe Grammistini)

Callanthiidae: somewhat similar in having a dorsally placed lateral line which runs near base of the dorsal fin and can continue along dorsal margin of caudal peduncle, with a series of posterior midlateral scales with sensory papillae giving the appearance of a disjunct lateral line in 2 parts. Readily differentiated by pelvic fins with I spine and 5 segmented rays which are not elongate; caudal fin lunulate; 1 or 2 opercular spines; tubed lateral line short (*Grammatonotus*, 14 to 18 scales) or extending beyond dorsal-fin base onto dorsal portion of caudal peduncle (*Callanthias*).

Opistognathidae: lateral line high on body, close to dorsal-fin base and ending below middle of fin, pelvic fins with I spine and 5 segmented rays but outer 2 unbranched, hence giving appearance of 4 branched rays only. Otherwise easily distinguished from Plesiopidae by the following: head and mouth large, with maxilla extending well beyond eye, eyes relatively large and high on head, dorsal fin with weak spines.



Callanthiidae



Opistognathidae

Key to the species of Plesiopidae occurring in the area

- 1a. Dorsal fin with more than XV spines; anal fin with more than VI spines → 2
- 1b. Dorsal fin with fewer than XV spines; anal fin with III spines → 6

- 2a. Three lateral lines with tubed scales: 1 dorsal line near base of dorsal fin, 1 midlateral, and 1 ventral line near base of anal fin (Fig. 1); body pale to dark brown with a number of narrow dark bars, opercle with a dark brown ocellus, head dark brown dorsally and sharply delimited through the eye and bordered by a white stripe or merging with the pink to red cheeks and throat, dorsal and anal fins red or brown with pale tips (Fig. 1) *Belonepterygion fasciolatum*
- 2b. One or 2 lateral lines with tubed scales: 1 dorsal line near base of dorsal fin and 1 midlateral line (Fig. 2) → 3

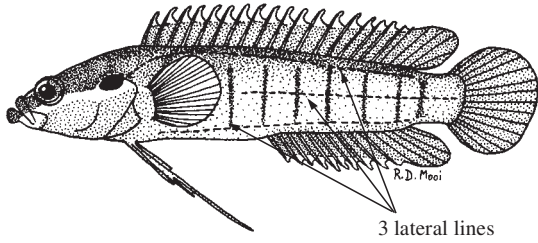


Fig. 1 *Belonepterygion fasciolatum*

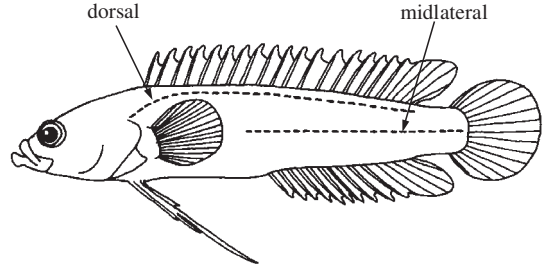


Fig. 2 possible positions of lateral line

- 3a. Two lateral lines with tubed scales, the dorsalmost extending from upper angle of opercle to base of last dorsal-fin ray, the midlateral line extending forward from middle of caudal-fin base to about level of anus; body scales with membranous central lobe without cteni (Fig. 3a); no pale spot on pectoral-fin base; live coloration unknown (Fig. 4) *Beliops batanensis*
- 3b. Single lateral line with tubed scales extending from upper angle of opercle to no more than half-way along dorsal-fin base; body scales without central lobe or, if present, supported by elongate cteni (Fig. 3b); pectoral-fin base with pale spot (*Acanthoplesiops*) → 4

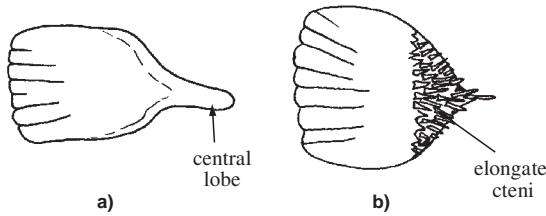


Fig. 3 body scales

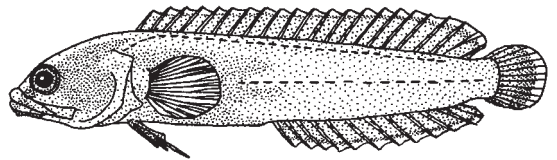


Fig. 4 *Beliops batanensis*

- 4a. Dark band of about eye diameter originating on upper jaw, continuing through eye to middle of spinous dorsal fin, giving appearance of a mask; most scales on posterior half of body with a flap-like lobe supported by elongate cteni (Fig. 3b), and at least some midlateral scales bilobed; belly completely scaled; live coloration unknown (Fig. 5) *Acanthoplesiops echinatus*

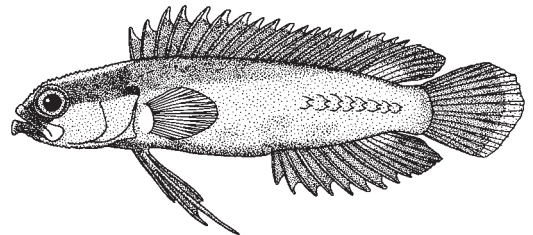
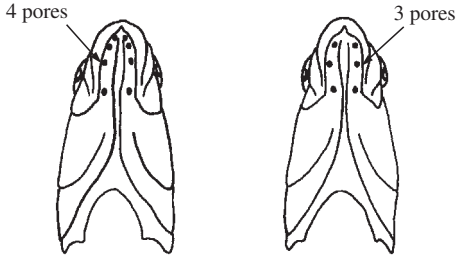


Fig. 5 *Acanthoplesiops echinatus*

- 4b. Body uniformly dark laterally, without dark stripe through eye; scales on posterior half of body typically ctenoid, without flap-like lobes; belly completely scaled or anterior two-thirds of belly unscaled → 5

- 5a. Belly completely scaled; symphysis of lower jaw with terminal pair of pores (each dentary with 4 pores) (Fig. 6a); live coloration unknown (Fig. 7) *Acanthoplesiops hiatti*
- 5b. Anterior two-thirds of belly unscaled; symphysis of lower jaw without terminal pair of pores (each dentary with 3 pores) (Fig. 6b); body olive-grey, dorsal, anal, and pelvic fins olive-grey with yellow-orange tips, caudal-fin grey with yellow-orange margin; colour in ethanol similar to *Acanthoplesiops hiatti* *Acanthoplesiops psilogaster*



a) *Acanthoplesiops hiatti* b) *Acanthoplesiops psilogaster*

Fig. 6 ventral view of head

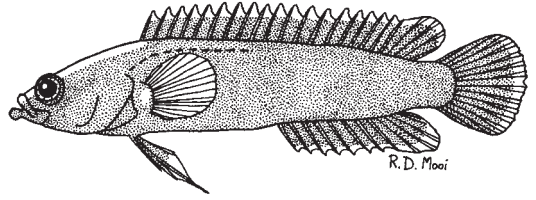


Fig. 7 *Acanthoplesiops hiatti*

- 6a. Dorsal fin with IX spines; a single tubed lateral-line scale at upper end of operculum (Fig. 8) *Steeneichthys plesiopsus*
- 6b. Dorsal fin with XI to XIII spines; 2 disjunct lateral lines with tubed scales, 1 from upper end of operculum to last dorsal-fin ray, the other midlateral on caudal peduncle → 7

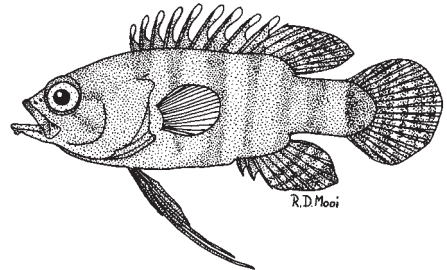


Fig. 8 *Steeneichthys plesiopsus*

- 7a. Head scaled forward to, but not onto, snout; maxilla scaled; caudal fin forked; vomer toothless (*Assessor*) → 8
- 7b. Head scaled only to occiput; maxilla unscaled; caudal fin rounded or elongate; vomer toothed → 9

- 8a. Head, body, and all fins except pectoral fins dark blue; total gill rakers on first gill arch 33 to 36, of which 23 to 24 on lower limb (Fig. 9) *Assessor macneilli*
- 8b. Head, body, and all fins except pectoral fins bright yellow, with an orange stripe from eye to opercular angle, dorsal and anal fins with submarginal orange stripe and black margin; total gill rakers on first gill arch 23 to 27, of which 16 to 19 on lower limb (Fig. 10) *Assessor flavissimus*

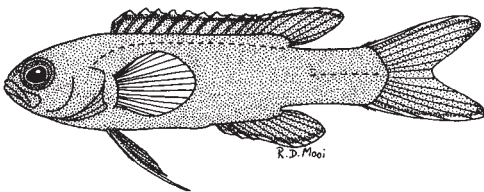


Fig. 9 *Assessor macneilli*

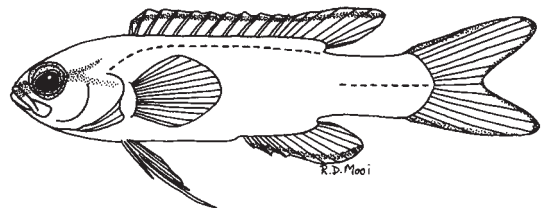


Fig. 10 *Assessor flavissimus*

- 9a. Preopercular margin serrated with numerous teeth along its length; dorsal fin with XIII spines (sometimes XII); teeth on tongue; body orange (Fig. 11) *Fraudella carassiops*
- 9b. Preopercular margin smooth, or at most denticulate at angle (overlying skin sometimes fimbriate giving appearance of serration, but bone is smooth); dorsal fin with XII or fewer spines; tongue without teeth in all remaining genera except *Paraplesiops* → 10

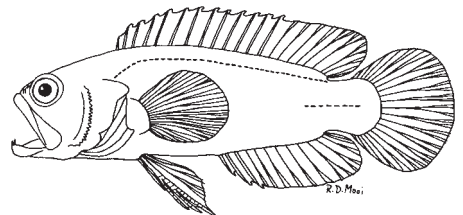


Fig. 11 *Fraudella carassiops*

10a. Head, body, and fins (except pectoral fins) black with white spots; posterior rays of dorsal fin with black ocellus bordered by yellow; dorsal-fin membranes weakly incised; no teeth on tongue (Fig. 12) *Calloplesiops altivelis*

10b. Head, body, and fins often dark, but never black; posterior rays of dorsal fin never with ocellus; membranes between dorsal-fin spines deeply incised; tongue with or without teeth → **11**

11a. Tongue with teeth; upper lateral-line scales 28 to 40; scales with normal circulae and radiating lines in anterior field only (Fig. 13a); segmented dorsal-fin rays 9 or 10 (rarely 9) (*Paraplesiops*) → **12**
(Great Barrier Reef only)

11b. Tongue without teeth; fewer than 24 upper lateral-line scales; scales with distinctive unmarked centres and radiating lines in all fields (Fig. 13b); segmented dorsal-fin rays 7 or 8 (*Plesiops*) → **13**

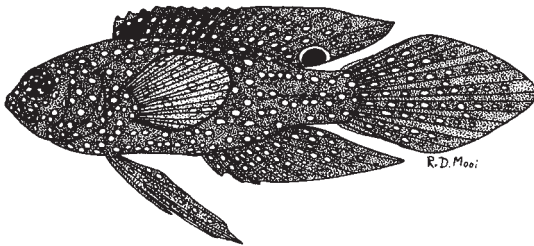


Fig. 12 *Calloplesiops altivelis*

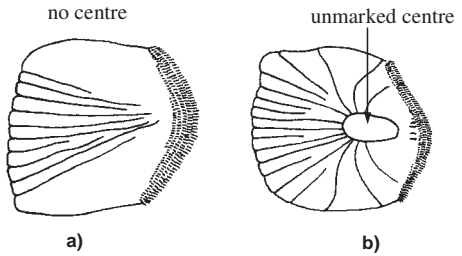


Fig. 13

12a. Body dark brown with 8 to 10 narrow black vertical bands, wider than interspaces; head with several blue spots smaller than pupil diameter on cheek and opercle, and a larger blue ocellus of pupil diameter ventrally on operculum; upper lateral line with 28 to 32 tubed scales; 7 to 12 predorsal scales (Fig. 14) *Paraplesiops poweri*

12b. Body with 4 broad black bands, interspace bands white; head with numerous small iridescent blue spots smaller than pupil diameter; small iridescent blue spots along bases of dorsal and anal fins; pectoral and caudal fins yellow; upper lateral line with 34 to 40 tubed scales; 20 to 29 predorsal scales (Fig. 15) *Paraplesiops bleekeri*

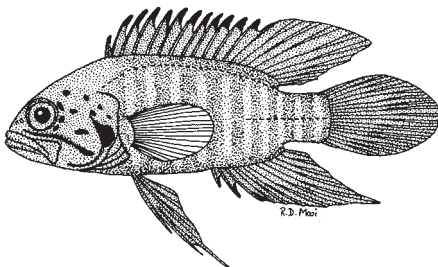


Fig. 14 *Paraplesiops poweri*

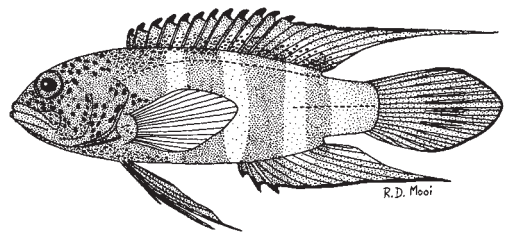


Fig. 15 *Paraplesiops bleekeri*

13a. Dark blue ocellus of slightly less than eye diameter on ventral portion of opercle; head, body, and caudal fin with small blue spots (Fig. 16) *Plesiops corallicola*
(throughout area except far east, New Caledonia, and Great Barrier Reef)

13b. No ocellus on opercle; occasionally pale spots scattered on head, but no spots on body or caudal fin → **14**

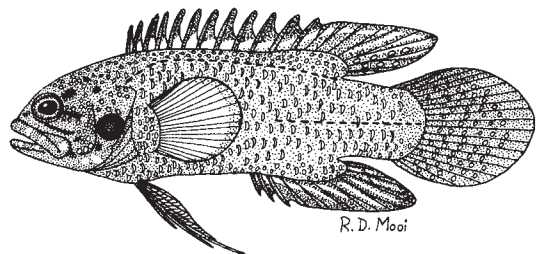


Fig. 16 *Plesiops corallicola*

- 14a. Dorsal fin with XI spines (very rarely X or XII, but always only 1 supernumerary spine on first pterygiophore); total number of branches on 6 ventralmost pectoral-fin rays fewer than 15, usually 12 (very rarely more than 15) → 15
- 14b. Dorsal fin with XII spines (very rarely XI or XIII, but always 2 supernumerary spines on first pterygiophore); total number of branches on 6 ventralmost pectoral-fin rays usually more than 15 → 16
- 15a. Pectoral fins with 19 to 24 rays; total gill rakers on first gill arch usually 11 or 12 (sometimes 15); 6 to 8 predorsal scale rows (very rarely 5) (Fig. 17) *Plesiops coeruleolineatus*
- 15b. Pectoral fins with 26 to 28 rays; total gill rakers on first gill arch 13 to 18; 5 or 6 predorsal scale rows (usually 5) (Fig. 18) *Plesiops polydactylus*

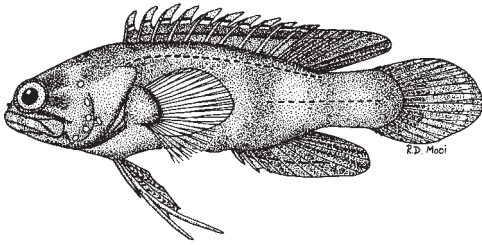


Fig. 17 *Plesiops coeruleolineatus*

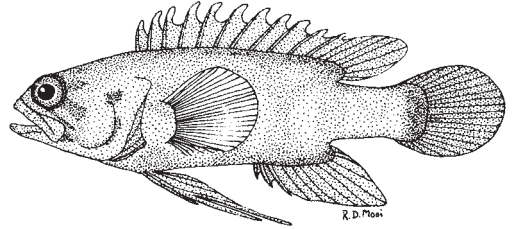


Fig. 18 *Plesiops polydactylus*

- 16a. Pectoral fins with 25 to 27 rays; 4 to 6 predorsal scale rows (usually 5); dark spot at dorsal angle of opercle (Fig. 19) *Plesiops auritus*
- 16b. Pectoral fins with 24 or fewer rays (very rarely 25); 6 to 11 predorsal scale rows (infrequently 6); no dark spot at dorsal angle of opercle → 17

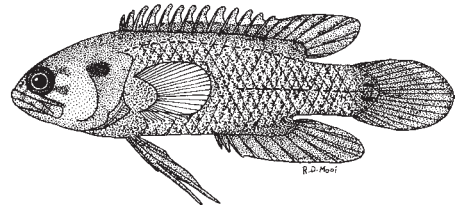


Fig. 19 *Plesiops auritus*

- 17a. Three or more posterior upper lateral-line scales with anterior pore not covered by preceding scale (Fig. 20); pectoral-fin rays 17 to 19 (sometimes 20); number of dentary pores on 1 side usually fewer than 20, always fewer than 25 → 18
- 17b. Three or fewer upper lateral-line scales with anterior pore not covered by preceding scale; pectoral-fin rays usually 20 or more (sometimes 19); usually more than 20 dentary pores on 1 side when greater than 3.5 cm standard length → 20

- 18a. Anterior part of head densely speckled with small brown spots; sensory pores on head sparse and large, especially those of the interorbital (about 1 mm); only 5 large pores on each dentary (Fig. 21) *Plesiops facicavus*
- 18b. Anterior part of head not speckled; sensory pores relatively numerous and small, especially in the interorbital area; 6 or more dentary pores (very rarely 5) → 19

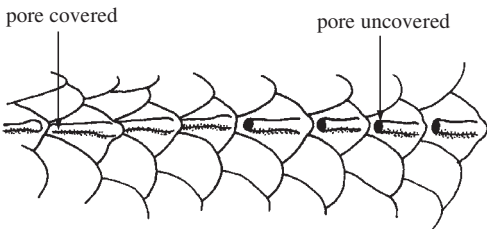


Fig. 20 lateral-line scales

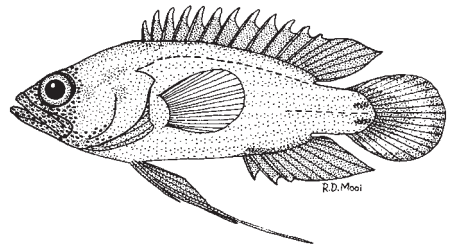


Fig. 21 *Plesiops facicavus*

- 19a. Predorsal scale rows 9 to 11 (usually 10 or 11); cheek scale rows 4 or 5 (usually 5); 5 to 9 sensory pores on each dentary (rarely more than 7); anteroventral preopercular sensory pore enlarged (Figs 22a, 23) *Plesiops gracilis*
- 19b. Predorsal scale rows 6 to 8; cheek scale rows 3 or 4; 5 to 23 sensory pores on each dentary (usually more than 7); anteroventral preopercular sensory pore not enlarged (Figs 22b, 24) *Plesiops cephalotaenia*

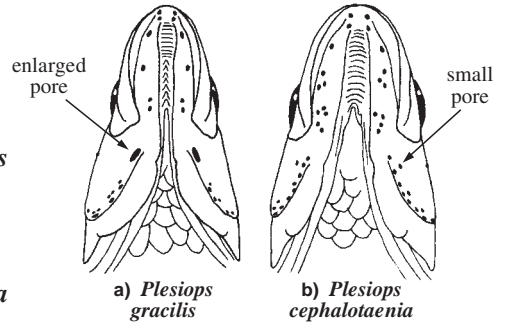


Fig. 22 ventral view of head

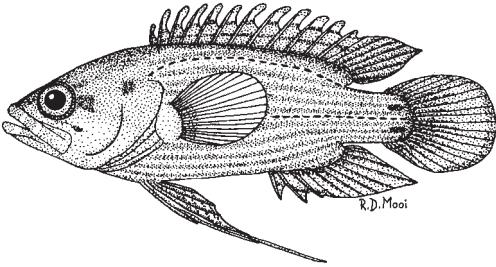


Fig. 23 *Plesiops gracilis*

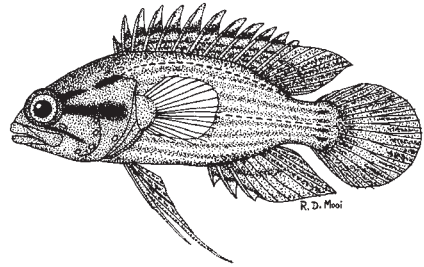


Fig. 24 *Plesiops cephalotaenia*

- 20a. Nape with a mottled or dendritic pattern; body usually pale with dark spots, often congregated to form 4 to 6 bands, 4 on body and 2 on caudal peduncle (body sometimes dark); tips of dorsal-fin spines yellow; pectoral fins with 19 to 21 rays (usually 20); predorsal scale rows 8 to 11 (usually 9 or 10) (Fig. 25) *Plesiops oxycephalus*
- 20b. Nape without a mottled or dendritic pattern; body usually dark without bars; tips of dorsal-fin spines red or pale, not yellow; pectoral fins with 20 to 24 rays (rarely 19 or 25), usually 22 or more; predorsal scale rows 6 to 8 (usually 7) → 21
- 21a. Tips of dorsal-fin spines red (except in specimens 3 cm standard length); total number of branches on ventral 6 pectoral-fin rays rarely more than 20 (usually 12); branches on ventralmost pectoral-fin ray 1 or 2 (very rarely 3) (Fig. 26) *Plesiops verecundus*
- 21b. Tips of dorsal-fin spines pale, but not red; total number of branches on ventral 6 pectoral-fin rays 20 to 35, very rarely fewer than 20; branches on ventralmost pectoral-fin ray 2 to 5 (usually 3 or 4) → 22

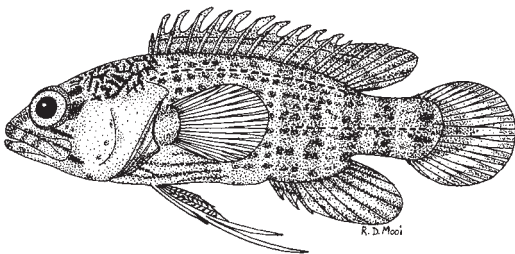


Fig. 25 *Plesiops oxycephalus*

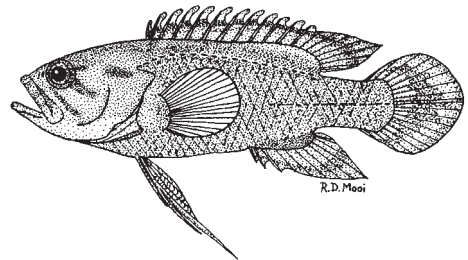
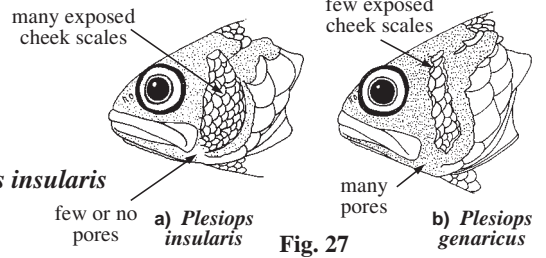


Fig. 26 *Plesiops verecundus*

22a. Skin bearing sensory pores posterior to eye and on skin of preopercle not expanded (Fig. 27a); cheek scale rows 5 (4 to 6), visible as far anteriorly as posterior tip of maxilla; few sensory pores immediately posterior to tip of maxilla, suborbital sensory pore series not continuous with those of preopercle or dentary (Fig. 28) *Plesiops insularis*



22b. Skin bearing sensory pores posterior to eye and on skin of preopercle expanded, resulting in a smaller area of visible cheek scales (Fig. 27b); cheek scale row 4 (3 to 5), not visible as far anteriorly as posterior tip of maxilla; many sensory pores present immediately posterior to maxilla, resulting in a continuous preopercular, dentary, and suborbital pore series (Fig. 29) *Plesiops genaricus*

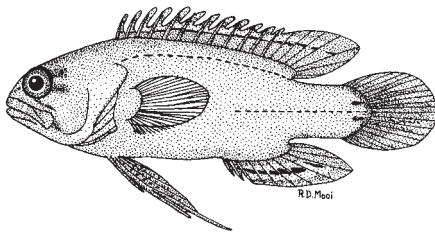


Fig. 28 *Plesiops insularis*

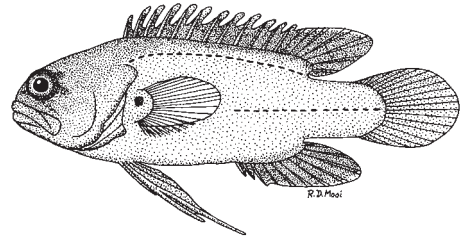


Fig. 29 *Plesiops genaricus*

List of species occurring in the area

- Acanthoplesiops echinatus* Smith-Vaniz and Johnson, 1990
Acanthoplesiops hiatti Schultz, 1953
Acanthoplesiops psilogaster Hardy, 1985
Assessor flavissimus Allen and Kuitert, 1976
Assessor macneilli Whitley, 1935
Beliops batanensis Smith-Vaniz and Johnson, 1990
Belonepterygion fasciolatum (Ogilby, 1889)
Calloplesiops altivelis (Steindachner, 1903)
Fraudella carassiops Whitley, 1935
Paraplesiops bleekeri Günther, 1861
Paraplesiops poweri Ogilby, 1908
Plesiops auritus Mooi, 1996
Plesiops cephalotaenia Inger, 1955
Plesiops coeruleolineatus Rüppell, 1835
Plesiops corallicola Bleeker, 1853
Plesiops facicavus Mooi, 1996
Plesiops genaricus Mooi and Randall, 1991
Plesiops gracilis Mooi and Randall, 1991
Plesiops insularis Mooi and Randall, 1991
Plesiops oxycephalus Bleeker, 1855
Plesiops polydactylus Mooi, 1996
Plesiops verecundus Mooi, 1996
Steneichthys plesiopsus Allen and Randall, 1985

References

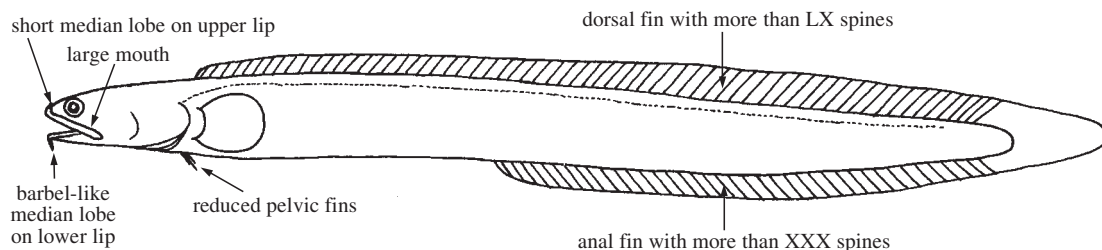
- Mooi, R.D. 1993. Phylogeny of the Plesiopidae (Pisces: Perciformes) with evidence for the inclusion of the Acanthoclinidae. *Bull. Mar. Sci.*, 52(1):284-326.
Mooi, R.D. 1996. Revision, phylogeny, and discussion of biology and biogeography of the fish genus *Plesiops* (Perciformes: Plesiopidae). *Roy. Ontario Mus. Life Sci. Contrib.*, (159):108 p.
Smith-Vaniz, W. and G.D. Johnson. 1990. Two new species of Acanthoclininae (Pisces: Plesiopidae) with a synopsis and phylogeny of the subfamily. *Proc. Acad. Natl. Sci. Philadelphia*, 142:211-260.

NOTOGRAPTIDAE

Bearded eelblennies

by R.D. Mooi

Diagnostic characters: **Body elongate, eel-like** (to about 20 cm total length). Head somewhat flattened and long, with eye appearing to be far forward. **Mouth large, with maxilla extending well beyond posterior margin of eye.** Teeth small and conical, forming broad toothed surfaces on palatines and jaws. **Upper and lower lips complete (i.e. not interrupted at symphysis), each with a median lobe, the lower of which is elongate and barbel-like.** Branchiostegal rays 6. **Gill rakers absent.** **Dorsal, anal, and caudal fins confluent; dorsal fin with LXII to LXIX spines and 1 or 2 segmented rays; anal fin with XXXVII to XLIII spines and 1 or 2 segmented rays;** spines in dorsal and anal fins increase in stoutness posteriorly; **caudal-fin rays reduced to a single unsegmented ray dorsally and ventrally and 6 dorsal and 5 ventral segmented rays; pelvic fins with 1 spine and 2 segmented rays, usually unbranched** (often incorrectly reported as 1 branched ray). Lateral line of enlarged dermal ossicles high on body along length of dorsal fin; remaining scales very small and cycloid, deeply embedded in skin. Skeleton highly modified; median ethmoid laterally compressed and plate-like, extending anterior of vomer; most suspensorial bones horizontally elongate, with palatine extending far posteriorly beneath ectopterygoid; hyomandibula weakly associated with remainder of suspensorium; only 4 infraorbital bones; gill arches reduced, remaining bones elongate; no supraneural bones; dorsal-fin pterygiophores insert in 1:1 ratio with interneural spaces; all spine-bearing dorsal- and anal-fin pterygiophores articulate with spines via a complete, interlocking bony ring; **71 to 75 total vertebrae;** epineural ribs confined to first 3 vertebrae, pleural ribs usually confined to vertebrae 3 to 6; caudal elements reduced, parhypural and hypurals 1 and 2 fused into a single element, hypurals 3 and 4 fused to each other and to urostylar complex, there are no free uroneurals, hypural 5 absent, epurals absent, free caudal cartilages absent. Gut a simple tube. **Colour:** variable, from pale with numerous spots to dark-bodied.



Habitat, biology, and fisheries: Inshore reefs, rocky crevices, and sand-weed areas. Seldom seen. At least some species appear to specialize on alpheid shrimps. Eggs with long filaments from hook-like protuberances, a similar morphology to other reef groups that exhibit egg-guarding, suggesting that notograptids might share this behaviour. No commercial catch, and not encountered frequently enough to be important for the aquarium trade.

Remarks: There are 5 nominal species, *Notograptus gregoryi*, *N. guttatus*, *N. kauffmani*, *N. livingstonei*, and *Blanchardia maculata*. The latter was considered a synonym of *N. guttatus* by Ogilby, and this status will be maintained here; the family contains only a single genus, *Notograptus*. The validity of the remaining species has not been recently investigated. *N. kauffmani* is based on a small specimen that differs only in colour, and is very likely a juvenile of *N. guttatus*. Recognition of *N. livingstonei* is based on what appear to be minor colour differences from *N. guttatus*. *N. gregoryi* is not recorded from the area (presently known only from Western Australia), but is included in the key because accurate distribution data for these seldomly encountered fishes are not available. The family is found on the coasts of southern Papua New Guinea and northern Australia.

Similar families occurring in the area

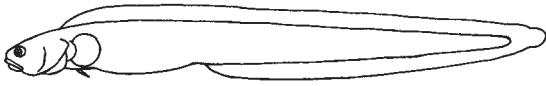
Pseudochromidae: members of the pseudochromid sub-family Congrogadinae resemble notograptids in having an elongate, eel-like body form, long dorsal and anal fins that are confluent with the caudal fin in some species, and reduced (often absent) pelvic fins. Congrogadines are easily distinguished by the 2 or fewer spines in the dorsal fin, lack of spines in the anal fin, a smaller mouth which does not reach the posterior margin of eye or extends only slightly beyond, a short, toothless palatine, and no barbel-like median lobes on the lips.



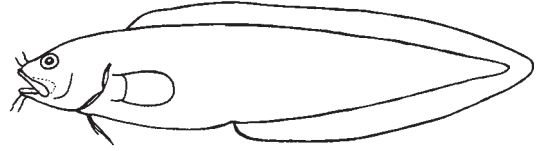
Congrogadinae

Pholidichthyidae: superficially similar to notograptrids with an elongate, eel-shaped body, reduced pelvic fins, long dorsal and anal fins confluent with caudal fin. They are readily differentiated by their lack of dorsal- or anal-fin spines (segmented rays only), smaller mouth, single nostril on each side (rather than 2), presence of gill rakers, lack of palatine teeth, and no barbel-like median lobes on the lips.

Ophidiidae and Bythitidae: elongate with long dorsal and anal fins that can be confluent with the caudal fin; pelvic fins reduced and often far forward, even under chin; some species with true barbels in pairs, not associated with lips as in notograptrids; dorsal and anal fins without spines; body shape less eel-like than in notograptrids.



Pholidichthyidae



Ophidiidae

Blenniidae: conceivably, some elongate members of this family with long dorsal and anal fins (e.g. *Xiphastia*) could be confused with notograptrids, but all differ in having II or fewer spines in the anal fin, dorsal-fin spines are usually flexible, and barbel-like median lobes on the lips absent.

Key to the species of Notograptidae occurring in the area

- 1a. Body a uniform chocolate brown without spots; median fins also dark except for pale margins; paired fins yellowish; head paler with cheeks and opercle with a few oblong spots (Fig. 1) *Notograpthus gregoryi*
(Western Australia; not yet recorded from the area)
- 1b. Body spotted or with wide longitudinal stripes → 2
- 2a. Body with 2 dark wide stripes or bands on a paler background: a dorsal band extending from top of head onto dorsal fin to caudal fin, and a lateral band extending from eye gradually angling downward onto anal fin to caudal fin; head without spots, a small bar from ventral eye onto maxilla and lower lip (Fig. 2) *Notograpthus kauffmani*
- 2b. Body spotted; numerous oblong spots on cheek and dorsal portion of head → 3
- 3a. Dorsal fin without spots or with spots only on anterior membranes (Fig. 3) . . . *Notograpthus guttatus*
- 3b. Dorsal fin with spots over entire length *Notograpthus livingstonei*

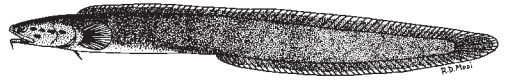


Fig. 1 *Notograpthus gregoryi*

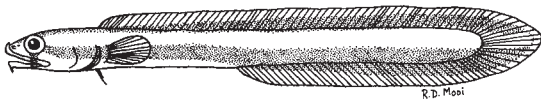


Fig. 2 *Notograpthus kauffmani*

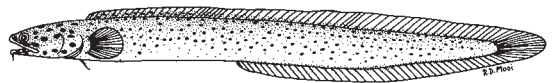


Fig. 3 *Notograpthus guttatus*

List of species occurring in the area

- Notograpthus guttatus* Günther, 1867
- Notograpthus kauffmani* Tyler and Smith, 1970
- Notograpthus livingstonei* Whitley, 1931

Reference

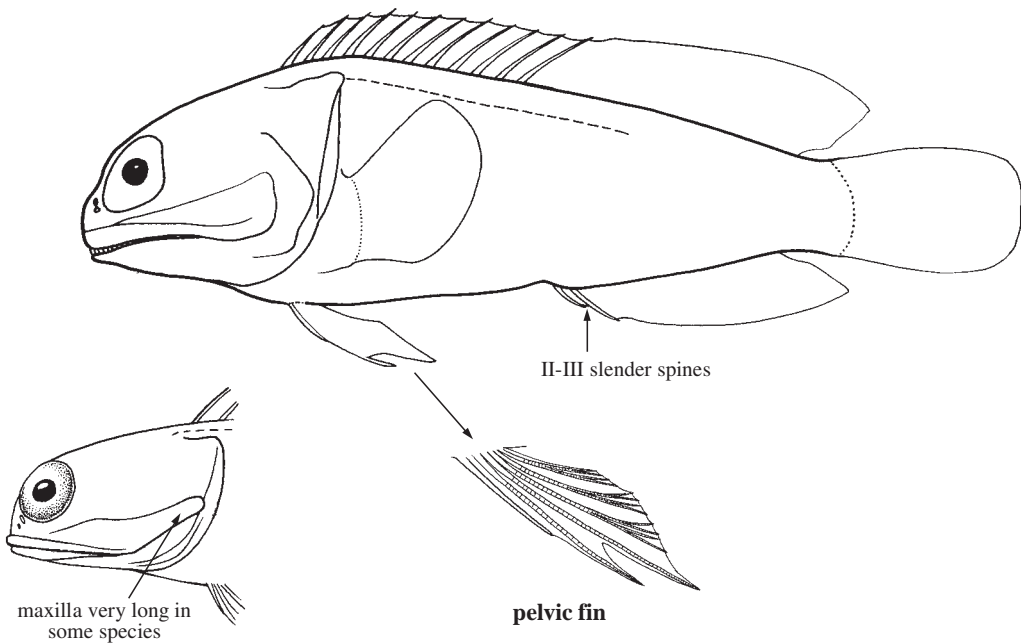
Gill, A.C. and R.D. Mooi. 1993. Monophyly of the Grammatidae and of the Notograptidae, with evidence for their phylogenetic positions among perciforms. *Bull. Mar. Sci.*, 52(1):327-350.

OPISTOGNATHIDAE

Jawfishes

by W.F. Smith-Vaniz

Diagnostic characters: Generally small, moderately elongate fishes (most under 12 cm total length, a single species to about 50 cm), **with a tapering narrow body. Head bulbous.** Eyes relatively large and high on head. **Mouth large;** in some species the maxilla extends to or well beyond posterior margin of gill flap. Moderate canine-like teeth in a single row along sides of jaws; several rows of smaller teeth may also be present anteriorly. **Dorsal fin shallowly notched (if at all) between spinous and soft portions, with IX to XII usually flexible spines** and 10 to 22 segmented rays; anal fin with II or III slender spines and 10 to 20 segmented rays; caudal fin rounded, the middle 12 to 14 rays branched in most species; **pelvic fins positioned anterior to pectoral fins,** with I spine and 5 segmented rays, the **outer 2 segmented rays unbranched and stout, the inner rays branched and weaker.** Lateral line high on body, incomplete, and usually ending below about middle of dorsal fin; **lateral-line tubes or canals usually embedded in skin,** rather than occurring on scales. Scales cycloid (smooth), usually absent from cheeks. **Colour:** most species mottled with various shades of brown; a black spot on spinous dorsal fin often present.



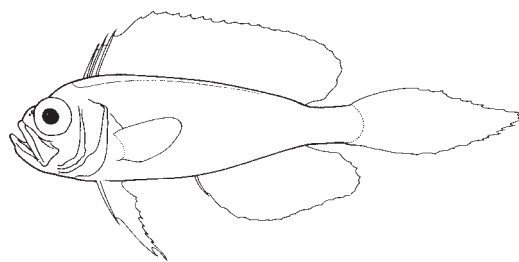
Habitat, biology, and fisheries: Most jawfishes occur in relatively shallow depths (2 to 30 m) on sandy substrates adjacent to coral reefs, but some species have been trawled in depths exceeding 200 m. Jawfishes live in burrows, which they construct themselves, and usually are found with only their heads protruding from the burrow. They normally venture from their burrows only a short distance to feed on crustaceans, zooplankton, and/or other invertebrate prey, or to defend their territories from conspecific intruders. When threatened by potential predators they nearly always back tail first into their burrows. Some species are solitary but most live in small colonies. All species are mouth brooders and their eggs, which clump together in a sticky egg ball, can be set down in the burrow by the parent during brief feeding forays; once the eggs hatch no additional care is provided. Jawfishes are not of commercial importance, although they are occasionally caught by hook-and-line fishermen, taken in trawls, or by spear fishermen. They are reported to be good to eat.

Remarks: No key to species of *Opistognathus* is given here because there are 16 undescribed species known from the area that are currently under study. These new species will be treated in a separate publication by the present author. The 12 species of *Stalix* are all small (22 to 60 mm standard length) and rare, with fewer than 35 total collections known.

Similar families occurring in the area

The arrangement of the pelvic-fin rays, consisting of I spine and 5 segmented rays (the outer 2 unbranched and stout, inner 3 branched and weak), will distinguish the jawfishes from all other families. Additional distinguishing characters of the superficially similar Cepolidae are the following:

Cepolidae (including Owstoniidae): dorsal-fin spines 0 to IV (IX to XII in Opisthognathidae); caudal fin moderately to strongly lanceolate (rounded in Opisthognathidae).



Cepolidae

Key to the genera of Opisthognathidae occurring in the area

- 1a. First 5 to 9 dorsal-fin spines transversely forked distally (posteriorly spines successively less deeply and more narrowly forked); skin covering spinous dorsal fin forming a broad dorsal hood to accommodate transversely forked spines (Fig. 1) *Stalix*
- 1b. Anterior dorsal-fin spines not transversely forked; skin covering spinous dorsal fin not forming a broad dorsal hood (Fig. 2) *Opisthognathus*

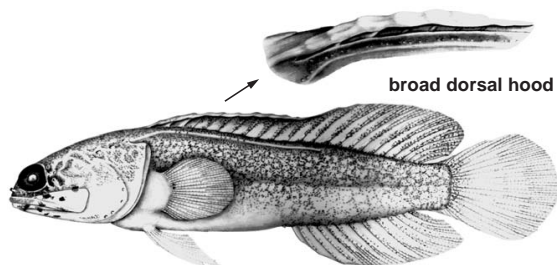


Fig. 1 *Stalix moenensis* (3.9 cm standard length)

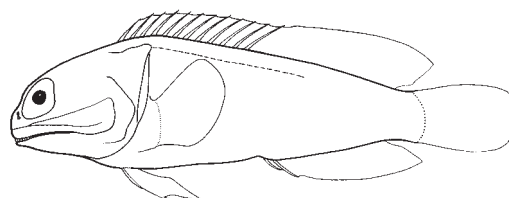


Fig. 2 *Opisthognathus*

List of species occurring in the area

- Opisthognathus castelnaui* Bleeker, 1859
- Opisthognathus darwinensis* Macleay, 1878
- Opisthognathus decorus* Smith-Vaniz and Yoshino, 1972
- Opisthognathus dendriticus* (Jordan and Richardson, 1908)
- Opisthognathus evermanni* (Jordan and Snyder, 1902)
- Opisthognathus eximus* (Ogilby, 1908)
- Opisthognathus jacksoniensis* Macleay, 1881
- Opisthognathus latitabundus* (Whitley, 1937)
- Opisthognathus macrolepis* Peters, 1866
- Opisthognathus nigromarginatus* Rüppell, 1830
- Opisthognathus papuensis* Bleeker, 1868
- Opisthognathus reticulatus* (McKay, 1969)
- Opisthognathus solorensis* Bleeker, 1853
- Stalix dicra* Smith-Vaniz, 1989
- Stalix eremia* Smith-Vaniz, 1989
- Stalix histrio* Jordan and Snyder, 1902
- Stalix immaculata* Xu and Zhan, 1980
- Stalix moenensis* (Popta, 1922)
- Stalix versluysi* (Weber, 1913)

References

Smith-Vaniz, W.F. 1989. Revision of the jawfish genus *Stalix* (Pisces: Opisthognathidae), with descriptions of four new species. *Proc. Acad. Nat. Sci. Phila.*, 141:375-407.

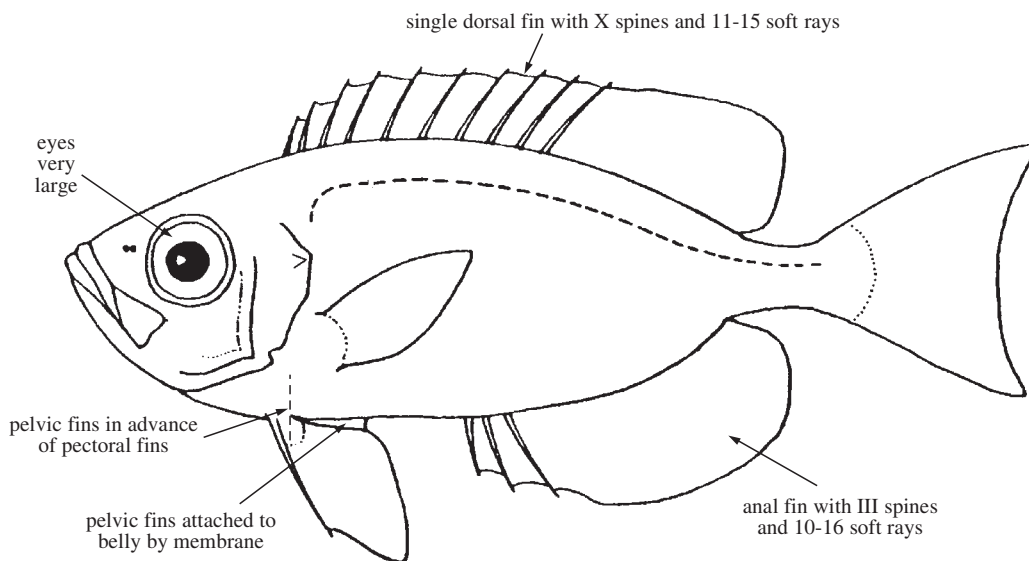
Smith-Vaniz, W.F. and T. Yoshino. 1985. Review of Japanese jawfishes of the genus *Opisthognathus* (Opisthognathidae) with description of two new species. *Japan. J. Ichthyol.*, 32(1):18-27.

PRIACANTHIDAE

Bigeyes

by W.C. Starnes

Diagnostic characters: Deep-bodied, laterally compressed percoid fishes (size to 36 cm) with **extremely large eyes** (about 1/2 head length) and **upturned mouth**. Weak spine on posterior opercle and **prominent to remnant spine at angle of preopercle**. Branchiostegal rays 6. Total gill rakers on first gill arch 17 to 32. Dorsal fin with X spines and 11 to 15 soft rays; spinous and soft-rayed portions of fin continuous, relatively short to long, soft-rayed portion broadly rounded to broadly pointed. Anal-fin rays relatively short to long and broadly rounded to broadly pointed; anal fin with III 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 with I spine and 5 soft rays, the fins short to very long, **broadly attached to belly by membrane and positioned in advance of pectoral fins**. 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 on fin spines.** Scales in lateral series (all 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 bars; fins reddish to dusky or black, occasionally yellowish in some species; some species with dark spots or speckling on fin membranes.



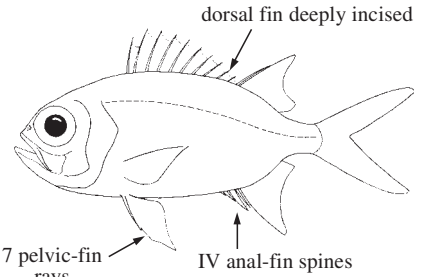
Habitat, biology, and fisheries: Generally epibenthic fishes occurring near coral reefs or rock formations but occasionally in more open areas at depths of 5 to 400 m, or deeper. Probably most active nocturnally but known to feed diurnally as well. Feed primarily on crustaceans, small cephalopods, polychaetes, and small fishes. Eggs, larvae, and early juvenile stages pelagic, transforming on settling to suitable habitats. Occur solitarily or in small aggregations, but some species may form large aggregations at times based on 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 good quality. From 1990 to 1995, the FAO Yearbook of Fishery Statistics reports a range of yearly catch of around 23 100 to 52 000 t of *Priacanthus* spp. from the Western Central Pacific (Indonesia, Thailand).

Similar families occurring in the area

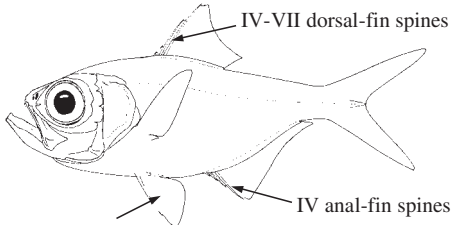
Holocentridae: also with large eyes (particularly in *Myripristis*) and reddish colour, but readily distinguishable from bigeyes by spines on opercular margin, spinous and soft-rayed portions of dorsal fin nearly separate, deeply forked caudal fin with 18 or 19 rays, pelvic fins with origin behind pectoral-fin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

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

Pempheridae: also with large eyes and reddish to coppery colour but with dorsal-fin base short, IV or V spines and 8 or 9 soft rays, and anal fin with very long base, III spines and 22 or more soft rays.

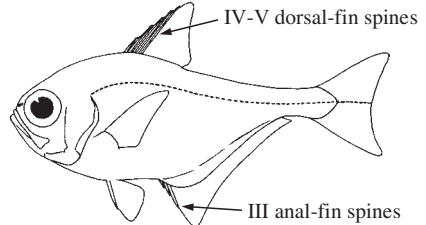


Holocentridae



7-13 pelvic-fin rays

Berycidae



Pempheridae

Identification note

Scales in lateral series are counted in straight line at midbody from behind opercle onto caudal fin, joining lateral line in anterior peduncle area and including all pored scales onto caudal-fin base (Fig. 1)

Key to the species of Priacanthidae occurring in the area

Note: some specimens which would be key to *Priacanthus macracanthus* herein may represent problematic forms which resemble that species but may comprise 1 or more additional taxa (see remarks in species account of *P. macracanthus*).

- 1a. Body profile very deep and broadly ovate, its depth 1.7 to 1.9 times in standard length; anal-fin rays 10 or 11; dorsal-fin rays 11 or 12; scales in lateral series 36 to 51. (*Pristigenys*) → 2
- 1b. Body profile less deep, its depth 2 to 3.1 times in standard length; anal-fin rays 13 to 16; dorsal-fin rays 12 to 15; scales in lateral series 56 to 115 → 3
- 2a. Dorsal-fin rays 12; anal-fin rays 11; midlateral scales with 8 to 20 spinules on posterior margin; sides light coloured with numerous narrow red bars (Fig. 1) *Pristigenys meyeri*
- 2b. Dorsal-fin rays 11; anal-fin rays 10; midlateral scales with 24 to 42 spinules on posterior margin; sides red with widely spaced light bars (Fig. 2) *Pristigenys nipponia*

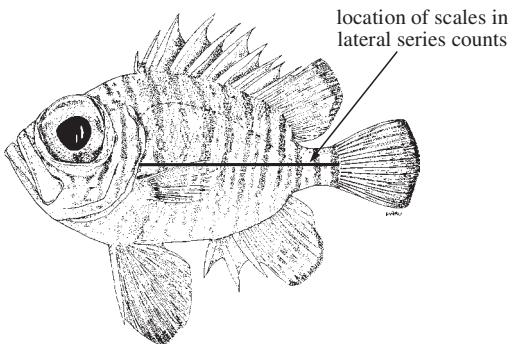


Fig. 1 *Pristigenys meyeri*

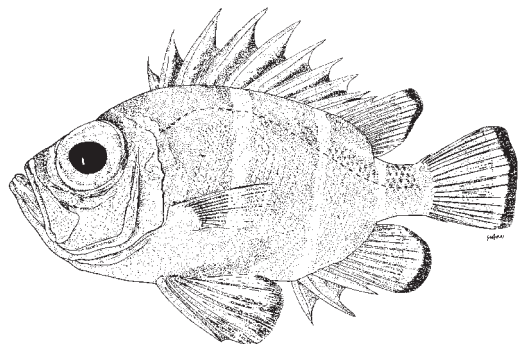


Fig. 2 *Pristigenys nipponia*

- 3a. Scale rows between dorsal fin and lateral line at highest point 16 to 20; pelvic fins very long except in large adults (30 cm standard length or larger) exceeding head length (Fig. 3); soft dorsal and anal fins long and broadly pointed except in very large specimens *Cookeolus japonicus*
- 3b. Scales rows between dorsal fin and lateral line at highest point fewer than 16; pelvic fins short, less than or equal to head length; soft dorsal and anal fins moderately long, broadly rounded to very broadly pointed (Fig. 4) → 4

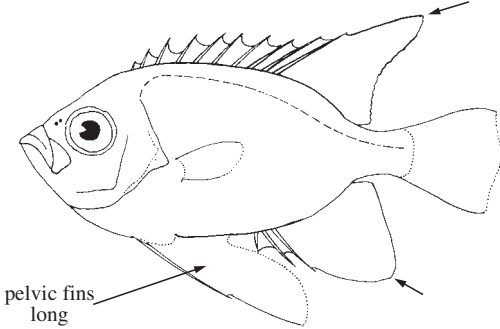


Fig. 3 *Cookeolus*

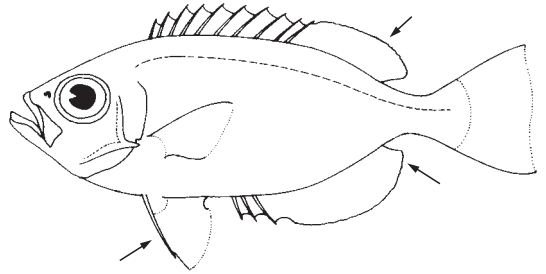


Fig. 4

- 4a. Posterior portion of preopercle lacking scales (Fig. 5a) and notably striate; anterior profile nearly symmetrical, extremity of lower jaw when mouth tightly closed about level with midline of body (Fig. 6); soft dorsal, anal, and caudal fins usually with small dark specks in membranes *Heteropriacanthus cruentatus*
- 4b. Posterior portion of preopercle with scales (Fig. 5b); anterior profile more asymmetrical, extremity of lower jaw usually above level of midline of body (Fig. 7); fins plain or with larger dusky spots → 5

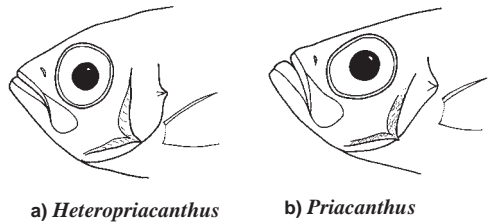


Fig. 5

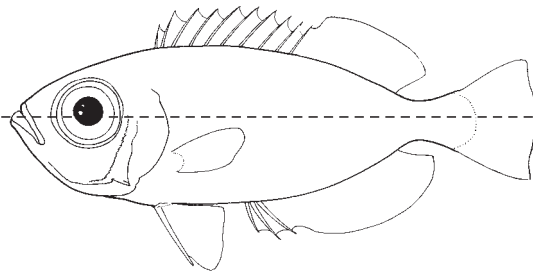


Fig. 6 *Heteropriacanthus cruentatus*

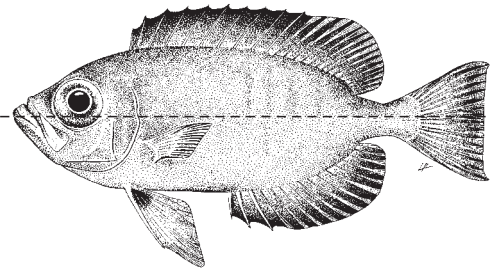


Fig. 7 *Priacanthus hamrur*

- 5a. Pelvic-fin membranes with several large purplish black spots (Fig. 8); dorsal-fin rays usually 12 . . . *Priacanthus tayenus*
- 5b. Pelvic-fin membranes lacking spots or with single dark basal blotch; dorsal-fin rays usually 13 or more → 6

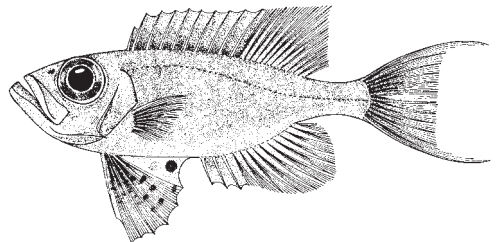


Fig. 8 *Priacanthus tayenus*

- 6a. Pelvic fins usually with a dark blotch basally (Fig. 7); preopercular spine very short, virtually lacking in specimens over 12 cm total length (Fig. 9a) → 7
- 6b. Pelvic fins lacking dark blotch basally; preopercular spine reaching to or beyond opercular margin (Fig. 9b) → 12
- 7a. Caudal-fin margin concave, outer rays slightly (Fig. 7) to much longer than remainder of rays; anal-fin rays usually 15 or 16 → 8
- 7b. Caudal-fin margin truncate, convex (Fig. 12), or very slightly emarginate; anal-fin rays usually 14 or less → 9
- 8a. Total gill rakers on first gill arch 24 to 26; body depth at sixth dorsal-fin spine about 2.6 to 2.8 times in standard length (Fig. 7) *Priacanthus hamrur*
- 8b. Total gill rakers on first gill arch 29 to 31; body depth at sixth dorsal-fin spine 3 or more times in standard length (Fig. 10) *Priacanthus prolixus*
(Indian Ocean, perhaps also Hong Kong; not yet recorded from the area)
- 9a. Total gill rakers on first gill arch 25 to 28; pectoral fins bright yellow in life. *Priacanthus zaiserae*
- 9b. Total gill rakers on first gill arch 23 or fewer; pectoral fins not bright yellow. → 10
- 10a. First 2 spinous dorsal-fin membranes with black blotch (Fig. 11); length of second dorsal-fin spine about 2 times in length of tenth spine; scales in lateral series 67 to 74. *Priacanthus sagittarius*
- 10b. First 2 spinous dorsal-fin membranes not darker than succeeding; length of second dorsal-fin spine 1.5 to 1.7 times in length of tenth spine; scales in lateral series 72 to 93 → 11

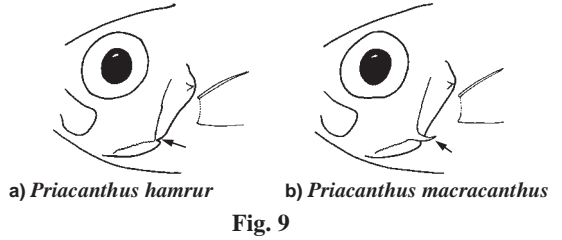


Fig. 9

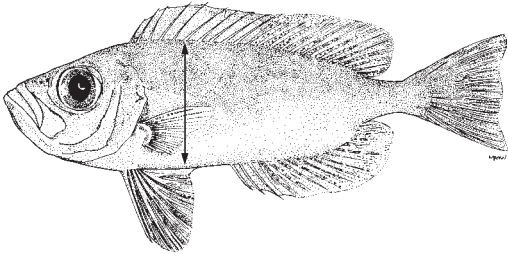


Fig. 10 *Priacanthus prolixus*

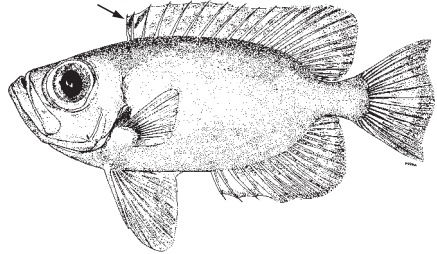


Fig. 11 *Priacanthus sagittarius*

- 11a. Length of pectoral fins about 1.9 to 2.2 times in head length (measured from tip of upper jaw to tip of opercular spine, Fig. 12); body depth at sixth dorsal-fin spine 2.6 to 2.9 (usually about 2.7) times in standard length *Priacanthus blochii*
- 11b. Length of pectoral fins about 1.3 to 1.6 times in head length (Fig. 13); body depth at sixth dorsal-fin spine 2.3 to 2.7 (usually about 2.5) times in standard length. *Priacanthus alalaua*

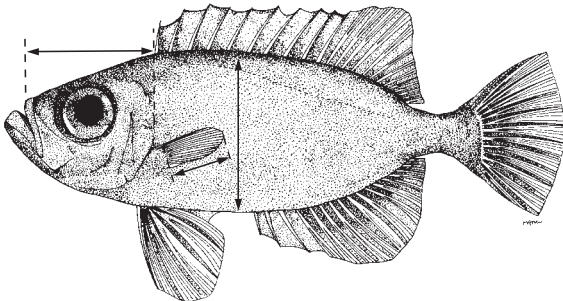


Fig. 12 *Priacanthus blochii*

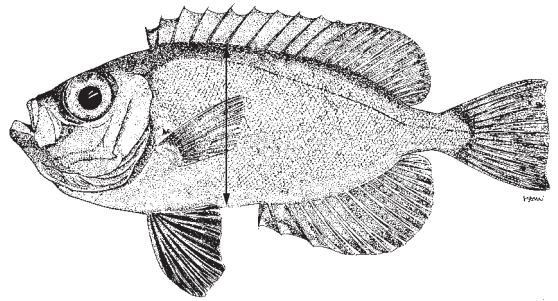


Fig. 13 *Priacanthus alalaua*

- 12a.** Dorsal-, anal-, and pelvic-fin membranes with yellow-brown spots (grey in preservative); soft portions of dorsal and anal fins not distinctly whiter posteriorly; body not tapering from just behind head (Fig. 14) *Priacanthus macracanthus*^{1/}
- 12b.** Dorsal-, anal-, and pelvic-fin membranes lacking spots; soft portions of dorsal and anal fins creamy white on posterior half; body generally tapering from just behind head (Fig. 15) *Priacanthus fitchi*

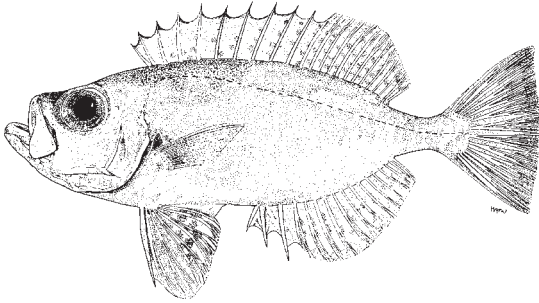


Fig. 14 *Priacanthus macracanthus*

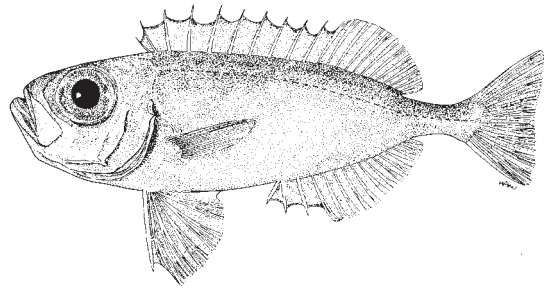
















Fig. 15 *Priacanthus fitchi*

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 alalaua* Jordan and Evermann, 1904
-  *Priacanthus blochii* Bleeker, 1853
-  *Priacanthus fitchi* Starnes, 1988
-  *Priacanthus hamrur* (Forsskål, 1775)
-  *Priacanthus macracanthus* Cuvier, 1829^{1/}
- ?  *Priacanthus prolixus* Starnes, 1988^{2/}
-  *Priacanthus sagittarius* Starnes, 1988
-  *Priacanthus tayenus* Richardson, 1846
-  *Priacanthus zaiseræ* Starnes and Moyer, 1988
-  *Pristigenys meyeri* (Günther, 1871)
-  *Pristigenys nipponia* (Cuvier, 1829)

References

- Senta, T. 1977. Species and size composition of priacanthid fishes in the South China Sea and adjacent waters. *Bull. Pac. Fish.*, 42:25-31.
- Starnes, W.C. 1984. Priacanthidae. In *FAO species identification sheets for fishery purposes. Western Indian Ocean (Fishing Area 51)*, edited by W. Fischer and G. Bianchi. Vol. 3. Rome, FAO (unpaginated).
- Starnes, W.C. 1988. Revision, phylogeny, and biogeographic comments on the circumglobal marine percoid fish family Priacanthidae. *Bull. Mar. Sci.*, (43(2):117-203.

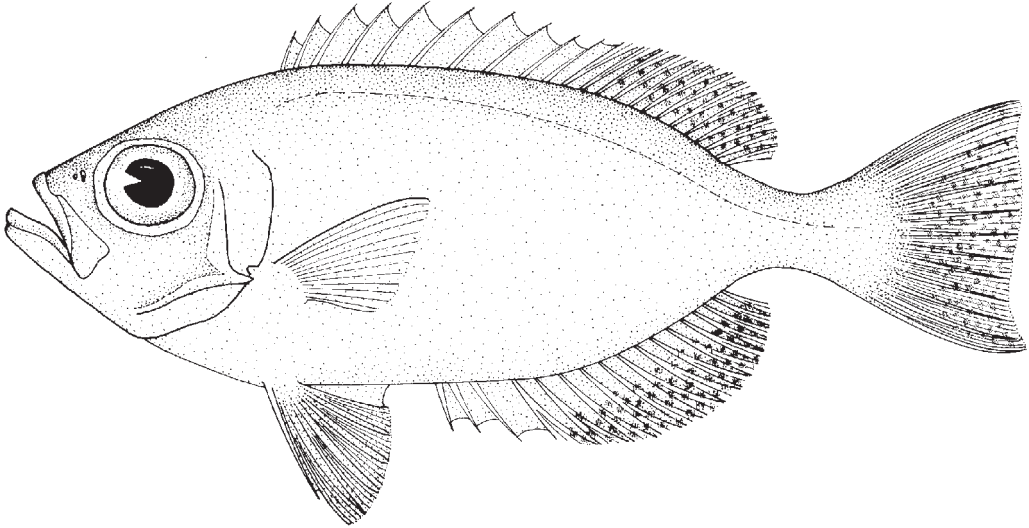
^{1/} See remarks on species account.

^{2/} Occurrence in the area questionable; based on a specimen ostensibly from Hong Kong; all other known records are from the northwestern Indian Ocean.

Heteropriacanthus cruentatus (Lacepède, 1801)

Frequent synonyms / misidentifications: *Priacanthus cruentatus* (Lacepède, 1801) / Various *Priacanthus* spp.

FAO names: En - Glasseye; Fr - Beauclaire de roche; Sp - Catalufa de roca.

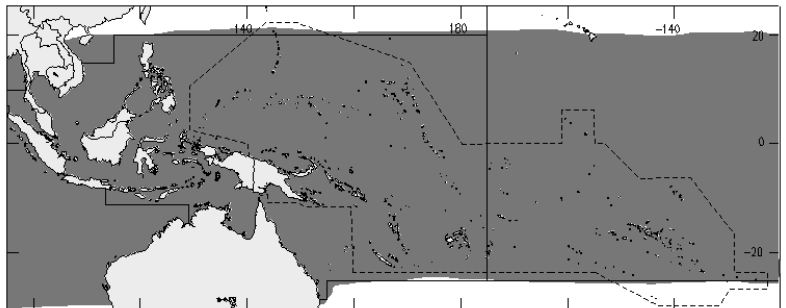


Diagnostic characters: Body deep, ovate, and laterally compressed. **Anterior profile symmetrical, tip of protruding lower jaw about on level with midline of body** when mouth tightly closed. Well-developed spine at angle of preopercle. Small teeth on dentaries, vomer, palatines, and premaxillaries. Total gill rakers on first gill arch 21 to 25. Dorsal fin with X spines and 11 to 13 soft rays. Anal fin with III spines and 13 or 14 soft rays. Caudal fin truncate. Pectoral fins 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 above a separate flange, broadly pointed, with spinules confined to posterior margin.** Scales in lateral series 78 to 96; pored lateral-line scales 63 to 81; 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, 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 it may be common in both lagoons and seaward areas, commonly at depths of 20 m or less. Secretive by day and foraging at night. Feeds on octopuses, shrimps, stomatopods, crabs, small fishes, and polychaetes. Caught primarily on hook-and-line and in traps. Marketed mostly fresh.

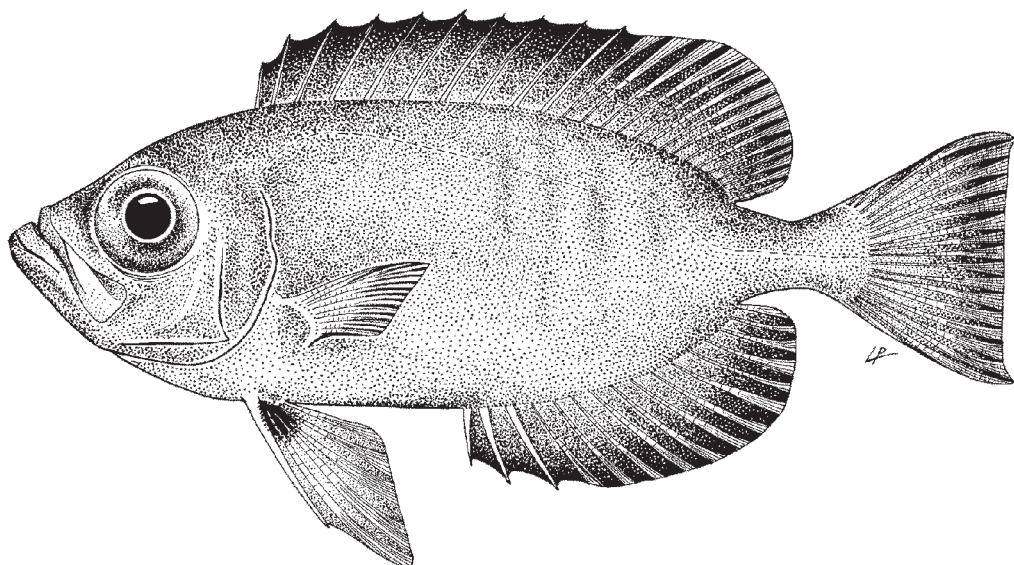
Distribution: Circumtropical and into subtropical waters. Young occasionally in temperate waters due to postlarval transport.



Priacanthus hamrur (Forsskål, 1775)

Frequent synonyms / misidentifications: None / Possibly *Priacanthus prolixus* Starnes, 1988.

FAO names: En - Moontail bullseye; Fr - Beauclair miroir; Sp - Catalufa espejuelo.

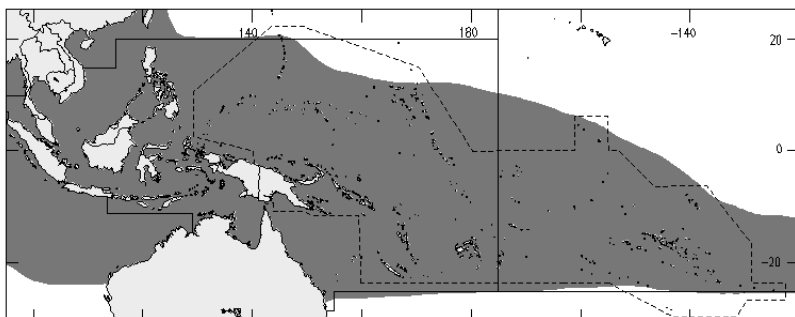


Diagnostic characters: Body deep, ovate, and laterally compressed; **body depth 2.6 to 2.8 times in standard length.** Anterior profile slightly asymmetrical, tip of protruding lower jaw usually above midline of body. Small teeth on dentaries, vomer, palatines, and premaxillaries. **Spine at angle of preopercle reduced or non-existent in specimens over 12.5 cm total length. Total gill rakers on first gill arch 24 to 26. Dorsal fin with X spines and 13 to 15 soft rays. Anal fin with III spines and 13 to 16 soft rays. Caudal fin with concave margin, slightly emarginate to lunate.** Pectoral-fin rays 17 to 20. 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 surface and posterior margin.** Scales in lateral series 79 to 96; pored lateral-line scales 70 to 90. **Vertical scale rows (dorsal-fin origin to anus) 48 to 57. 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; sometimes 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 light dusky to nearly black in dorsal-, anal-, and caudal-fin membranes; fins occasionally with yellow.

Size: Maximum total length about 36 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. Prefers outer reef slopes to more sheltered environments. Occasionally taken in moderate numbers in trawls and by hook-and-line. Marketed mostly fresh.

Distribution: Widespread in the Indo-West Pacific from Red Sea and South Africa to northern Australia and southern Japan and eastward to at least Tuamotu in French Polynesia.

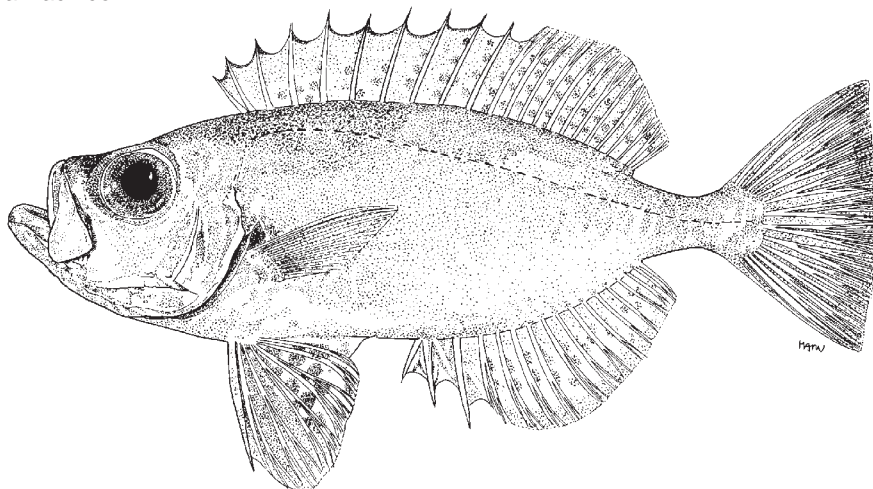


Priacanthus macracanthus Cuvier, 1829

BIR

Frequent synonyms / misidentifications: None / May represent 2 or more forms (see **Remarks**).

FAO names: **En** - Brownsport bigeye (formerly reported as "red bigeye"); **Fr** - Beauclaire Pacifique; **Sp** - Catalufa Pacifico.



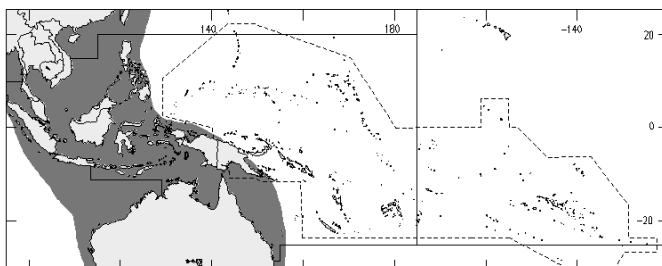
Diagnostic characters: Body relatively deep, ovate, and laterally compressed. Anterior profile slightly asymmetrical, tip of protruding lower jaw generally slightly above midline of body. Small teeth on dentaries, vomer, palatines, and premaxillaries. **Spine at angle of preopercle well developed in specimens of all sizes.** First gill arch with 23 to 29 gill rakers (highest gill-raker count in eastern Australian waters). Dorsal fin with X spines and 12 to 14 soft rays. Anal fin with III spines and 13 or 14 soft rays. Caudal-fin margin truncate to very slightly concave. Pectoral fins generally short but averaging longer in some Indonesian specimens; pectoral-fin rays 18 or 19. Scales covering most of body, head, and caudal-fin base. **Scales modified with posterior field elevated as a separate flange with spinules both on surface and posterior edge.** Scales in lateral series 79 to 87; pored lateral-line scales 72 to 82. Vertical scale rows (dorsal-fin origin to anus) 45 to 52. **Swimbladder with both anterior and posterior projections**, the former associated with specialized recessed areas on rear of skull. **Colour:** body, head, and iris silvery pink to reddish; fins light pinkish; **dorsal, anal, and pelvic fins with rusty brown spots** which are about 1/2 diameter of pupil of eye; specimens tentatively referable to this species from off eastern Australia have smaller spots.

Size: Maximum total length possibly 35 cm.

Habitat, biology, and fisheries: As presently construed, *Priacanthus macracanthus* occurs over a range of depths from 15 to 400 m or more. Occurs, at times, both in reef or rocky areas and in more open bottom areas. Occasionally important in trawl fisheries of South China and Andaman seas and to lesser extent in southern Australia; separate statistics are available from Taiwan Province of China, but not from the Western Central Pacific. Most commonly taken at dusk and dawn; also taken by hook-and-line. Juvenile aggregations in midwater are reported from the Philippines. Marketed fresh, dried, salted, and as fish balls.

Distribution: As presently construed, in Indo-West Pacific and generally confined to region from both east and west coasts of Australia northward to Andaman Sea and southern Japan.

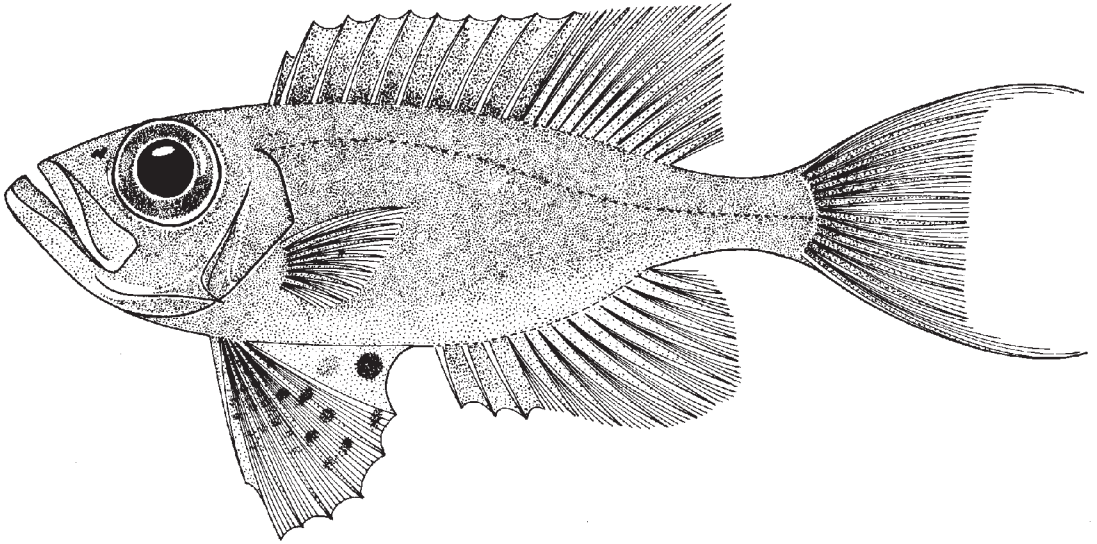
Remarks: The variation in pectoral-fin size, gill rakers, and fin coloration described above plus other morphological and ecological factors may be indicative of polytypy among populations collectively treated here as *P. macracanthus*. Some specimens may represent problematic forms which resemble *P. macracanthus* but may comprise 1 or more additional taxa. Problematic specimens are generally from deeper trawl (e.g. 400 m) collections (thus far from northern and eastern Australian waters) as opposed to those from shallower stations which are more "typical" *macracanthus*. Resolution of this problem has been hampered by insufficient material.



Priacanthus tayenus Richardson, 1846

Frequent synonyms / misidentifications: None / None.

FAO names: En - Purplespot bigeye; Fr - Beauclaire tache pourpre; Sp - Catalufa mota purpúreo.

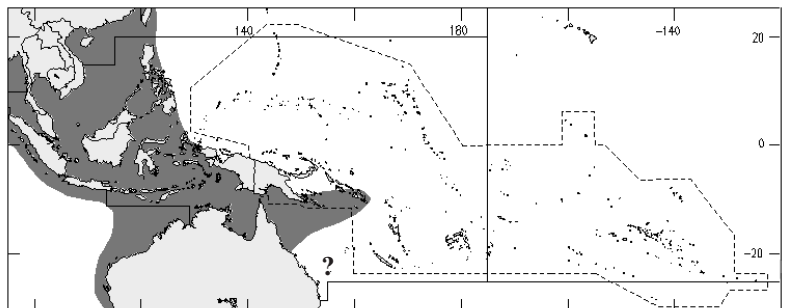


Diagnostic characters: Body moderately deep, moderately elongate, and laterally compressed. Anterior profile slightly asymmetrical, extremity of protruding lower jaw usually slightly above level of midline of body. Small teeth on dentaries, vomer, palatines, and premaxillaries. **Well-developed spine at angle of preopercle.** Total gill rakers on first gill arch 21 to 24. Dorsal fin with X spines and 11 to 13 soft rays. Anal fin with III spines and 12 to 14 soft rays. **Caudal fin** more or less truncate in smaller specimens but becoming **very lunate in some (possibly males) but not all larger specimens.** Pectoral-fin rays 17 to 19. Scales covering most of body, head, and caudal-fin base. Scales modified; **scales of midlateral region with elevated posterior field reduced and lacking spinules in larger specimens.** Scales in lateral series 56 to 73; pored lateral-line scales 51 to 67. Vertical scale rows (dorsal-fin origin to anus) 40 to 50. Swimbladder with both anterior and posterior projections, the former associated with modified recesses in skull. **Colour:** body, head, and iris of eye pink to reddish or silvery white with pink tinges; fins pinkish; **pelvic fins with characteristic small deep purple to inky black spots in membranes with 1 or 2 larger spots in connective membrane to belly.**

Size: A smaller species, maximum total length perhaps 29 cm.

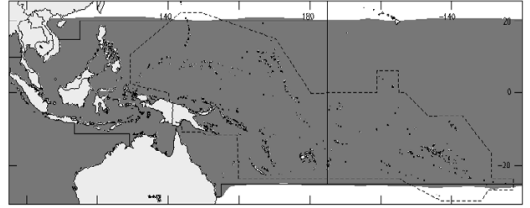
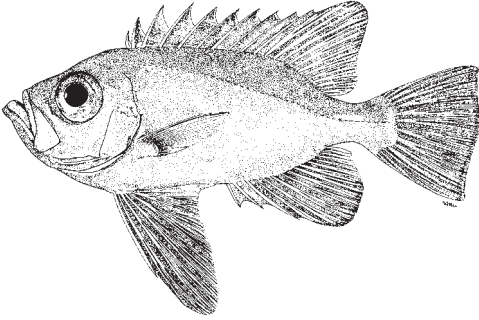
Habitat, biology, and fisheries: Inhabits coastal waters in both rocky reef and, occasionally, more open areas at depths of 20 to 200 m or more. Adults apparently aggregate at times and are periodically relatively common in the trawl fisheries of the Andaman and South China seas. Recruit, at least periodically, into aggregations at about 12 cm total length and attain about 24 cm by following year. Marketed fresh, dried, and as fish balls.

Distribution: In coastal areas of northern Indian Ocean from Persian Gulf eastward and into West Pacific from northern Australia and Solomon Islands northward to Taiwan Province of China.

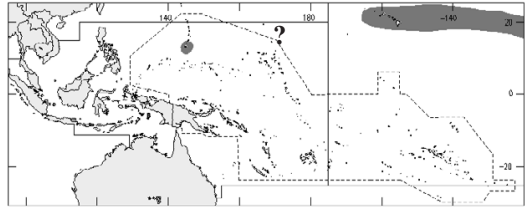
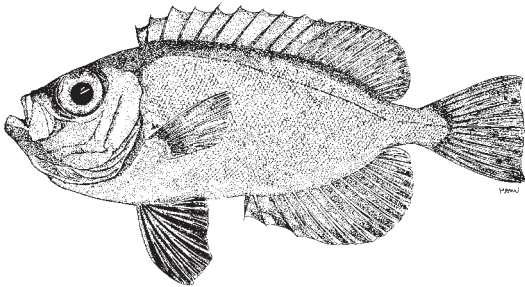


Cookeolus japonicus (Cuvier, 1829)**En** - Longfin bulleye; **Fr** - Beauclaire longue aile; **Sp** - Catalufa aleta larga.

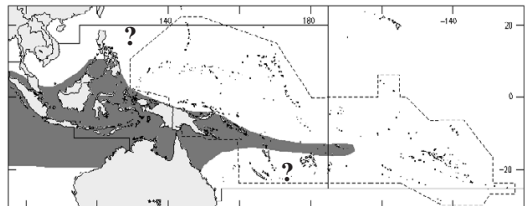
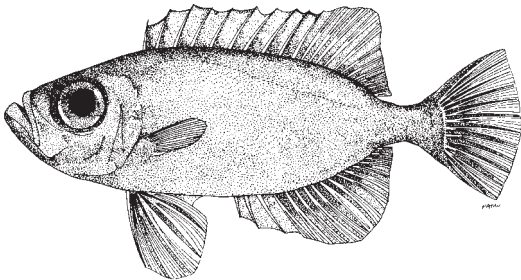
Maximum total length about 60 cm (largest member of family). In deeper waters off rocky coasts or insular areas in association with holes and ledges at depths of 60 to 400 m. Feeds on crustaceans and small fishes; lifespan of 9 or more years. Principally caught incidentally on deep handlines or other rigs; probably rare in markets. Circumtropical into subtropical regions; young occasionally occurring in temperate waters as result of postlarval transport.

***Priacanthus alalaua*** Jordan and Evermann, 1904**En** - Alalaua; **Fr** - Beauclaire alalaua; **Sp** - Catalufa alalaua.

Maximum total length about 32 cm (eastern Pacific, probably less in western Pacific). Inhabits deeper reefs or rocky areas usually at depths of 100 to 275 m; occasionally taken at depths of 10 to 50 m at night. Also trawled from relatively open bottom areas in Hawaiian waters. Apparently rare in western Pacific region, occasionally taken on hook-and-line. Tropical eastern Pacific and Hawaii. In the western Pacific, thus far known only from Guam.

***Priacanthus blochii*** Bleeker, 1853**En** - Shortfin bigeye; **Fr** - Beauclaire aile court; **Sp** - Catalufa aleta corto.

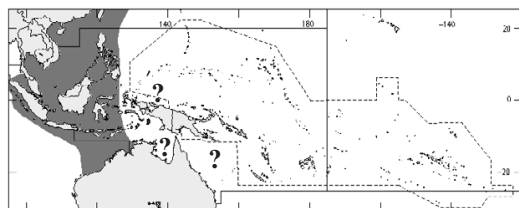
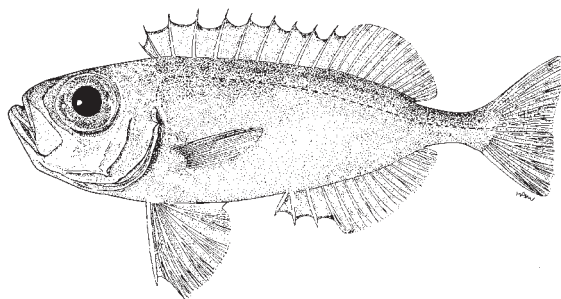
Maximum total length about 30 cm. Coastal in shallow reef and rocky areas at depths of 15 to 30 m. Probably rare in trawl catches; occasionally taken by hook-and-line. Frequently misidentified as *Priacanthus hamrur*, *P. sagittarius*, or *Heteropriacanthus cruentatus*. Widespread in Indo-West Pacific from Gulf of Aden (and perhaps Red Sea) and Seychelles eastward to Samoa.



Priacanthus fitchi Starnes, 1988

En - Whitefin bigeye; **Fr** - Beauclaire aile blanc; **Sp** - Catalufa aleta blanca.

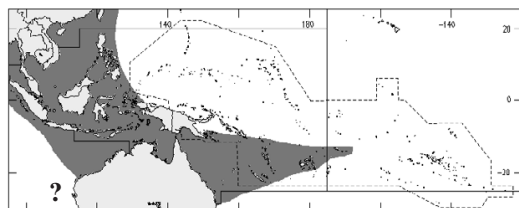
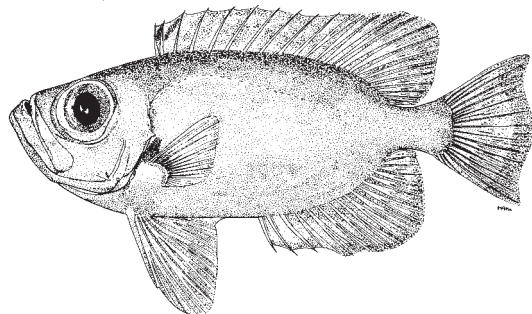
So far as known, a small species, not exceeding about 24 cm total length. A deeper water species known from depths of 150 to 400 m or more. Occasionally taken in deeper trawls in moderate numbers, particularly along the northwestern shelf of Australia. Presently known in Indo-West Pacific from northwestern Australia and western Sumatra to southern Japan; also known from near Mascarene Islands in western Indian Ocean.



Priacanthus sagittarius Starnes, 1988

En - Arrowfin bigeye; **Fr** - Beauclaire aile sagitté; **Sp** - Catalufa aleta saeta.

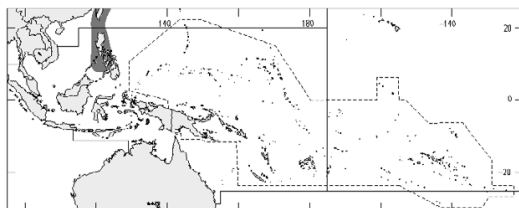
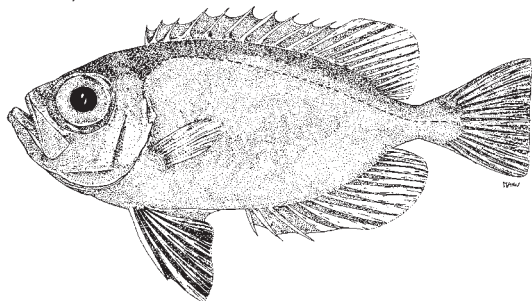
Maximum total length about 34 cm. Occurs in rocky and reef areas and occasionally in more open areas at depths of 60 to 100 m or more. Moderate numbers occasionally taken in trawls, particularly juveniles in 10 to 15 cm total length range. Frequently misidentified as *Priacanthus blochii* (Bleeker, 1853). Wide ranging in Indo-West Pacific from Red Sea and Reunion eastward to Japan, eastern Australia, and Samoa.



Priacanthus zaiseræ Starnes and Moyer, 1988

En - Yellowfin bigeye; **Fr** - Beauclaire aile juane; **Sp** - Catalufa aleta amarillo.

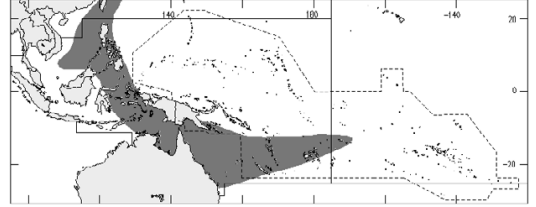
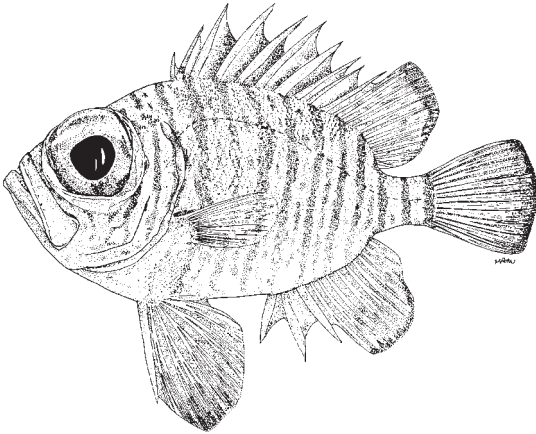
Maximum total length perhaps 30 cm. Reported in rocky areas from depths of 30 to over 320 m. Occasionally taken by hook-and-line and sometimes appears in markets in Philippines. So far as known, restricted to western Pacific in area of southern Japan southward into Philippines.



Pristigenys meyeri (Günther, 1871)

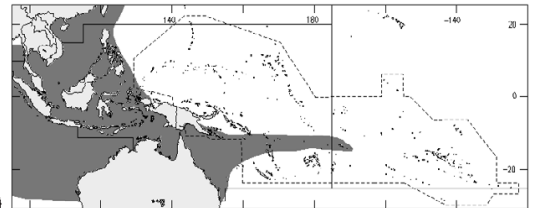
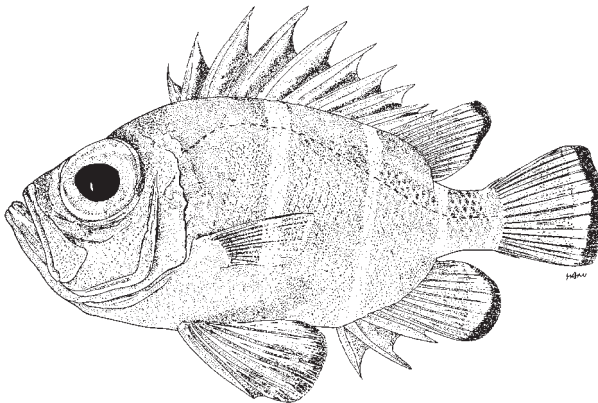
En - Redstripe bigeye; **Fr** - Beauclaire raie rouges; **Sp** - Catalufa raya roja.

Maximum total length perhaps 30 to 34 cm. The few specimens known are from rocky areas at depths of 100 to 200 m. May be taken uncommonly by deep hook-and-line fishing. *Pristigenys multifasciata* Yoshino and Iwai, 1973 is a junior synonym. Thus far known from only the western Pacific from southern Japan southward to New Guinea and eastward to Samoa.

***Pristigenys nipponia*** (Cuvier, 1829)

En - Whiteband bigeye; **Fr** - Beauclaire bande blanc; **Sp** - Catalufa faja blanca.

Maximum total length about 34 cm. Occurs at depths of 80 to 100 m or more in rocky habitats. Taken occasionally by hook-and-line and possibly trawls. Widely distributed in Indo-West Pacific from Red Sea and South Africa eastward to southern Japan, eastern Australia, and Samoa.

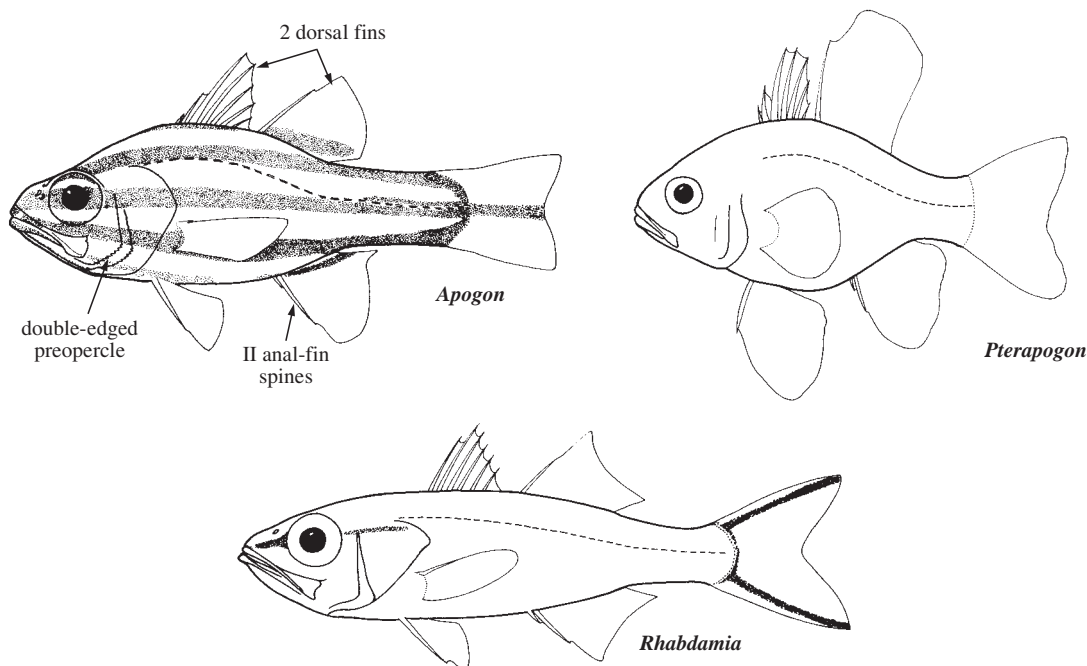


APOGONIDAE

Cardinalfishes

by G.R. Allen

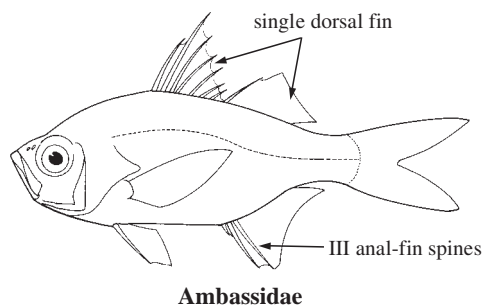
Diagnostic characters: Small (to 20 cm, usually under 12 cm) percoid fishes; body ovate to elongate, moderately compressed. Eyes large, their diameter exceeding snout length. **Rear margin of cheek (preopercle) with characteristic double edge, which is variously serrated or smooth.** Mouth large, lower 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.



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
- 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

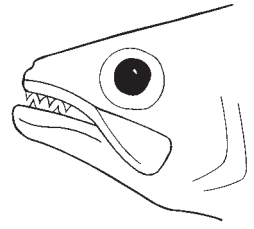


Fig. 1

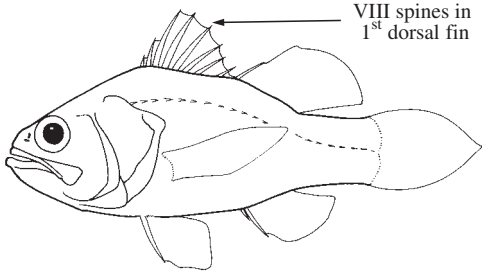


Fig. 2 *Neamia*

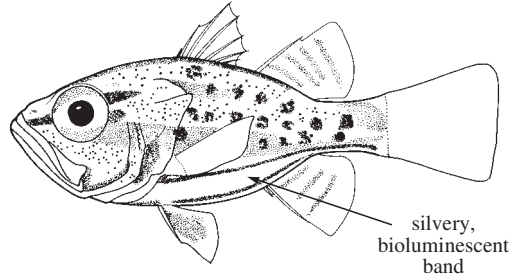


Fig. 3 *Siphamia*

- 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
- 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*

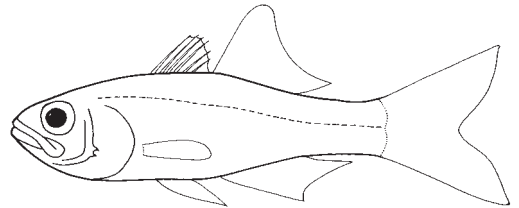


Fig. 4 *Lachneratus*

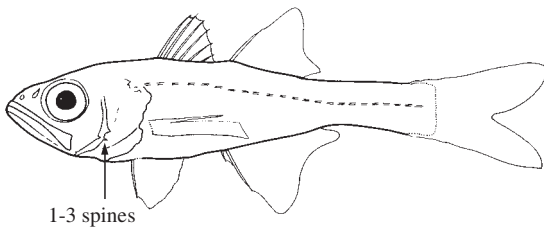


Fig. 5 *Cercamia*

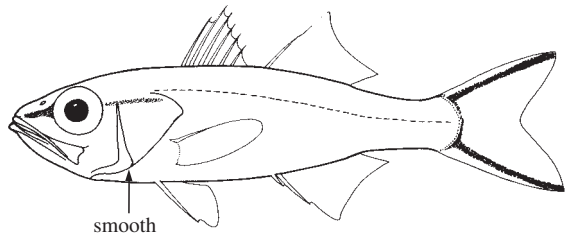


Fig. 6 *Rhabdamia*

- 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*

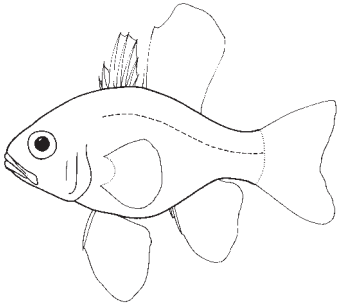


Fig. 7 *Pterapogon*

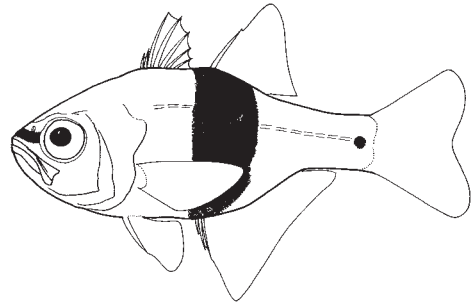


Fig. 8 *Archamia*

- 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

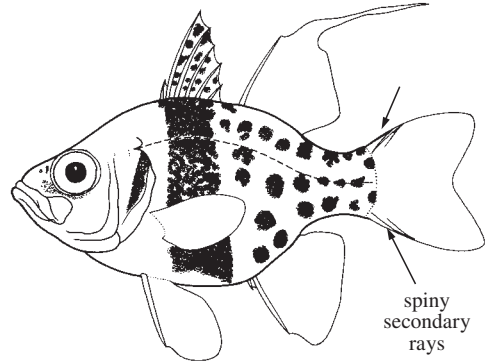


Fig. 9 *Sphaeramia*

- 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

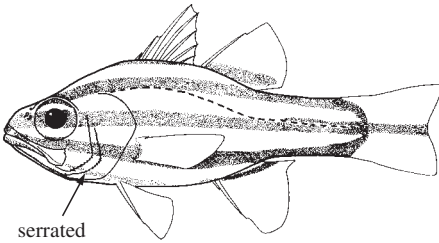


Fig. 10 *Apogon*

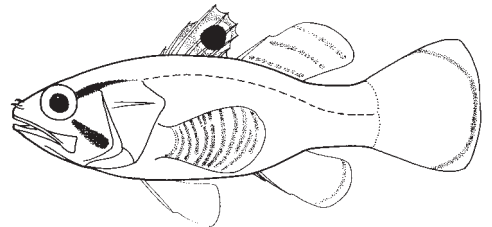


Fig. 11 *Apogonichthys*

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



Fig. 12 *Foa*

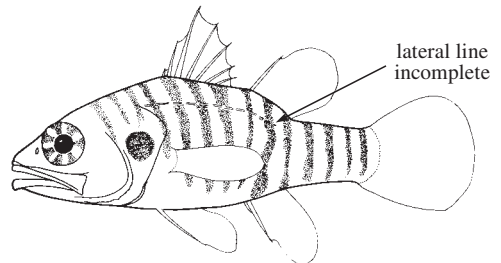


Fig. 13 *Fowleria*

- 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

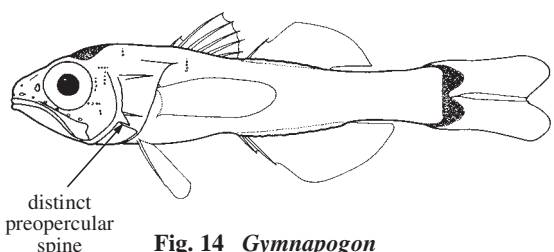


Fig. 14 *Gymnapogon*

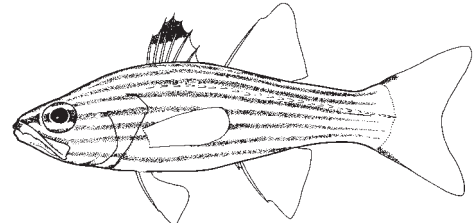


Fig. 15 *Cheilodipterus*

- 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*

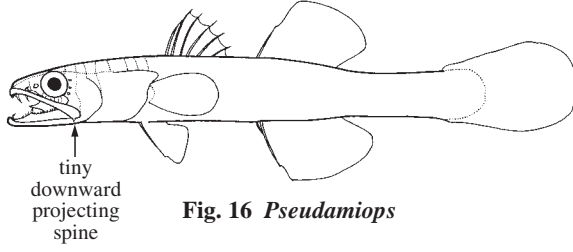


Fig. 16 *Pseudamiops*

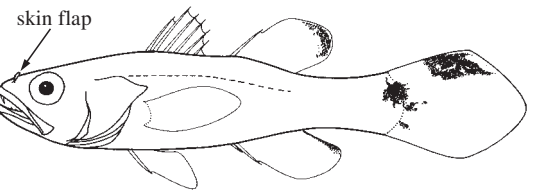


Fig. 17 *Pseudamia*

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, Kuitert, 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, Kuitert, and Randall, 1994
Apogon neotes Allen, Kuitert, 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, Kuitert, 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, Kuitert, and Randall, 1994
Apogonichthys ocellatus (Weber, 1913)
Apogonichthys perdx 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 singaporensis 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 Kuitert, 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)

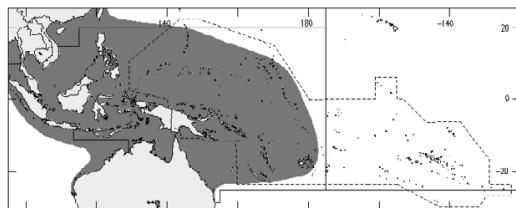
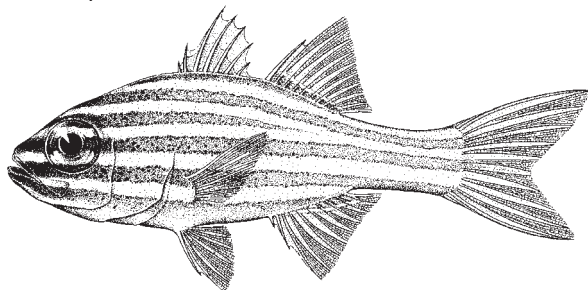
References

- 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

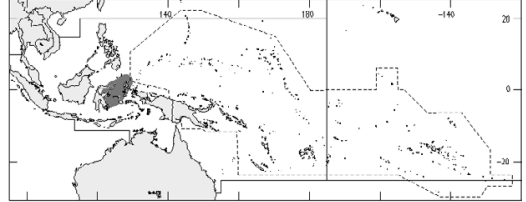
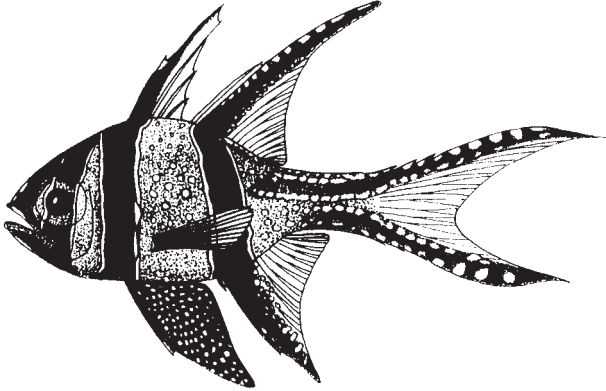
En - Yellowstriped cardinalfish.

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.

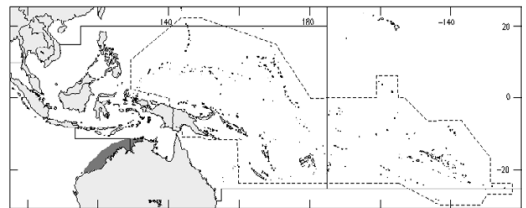
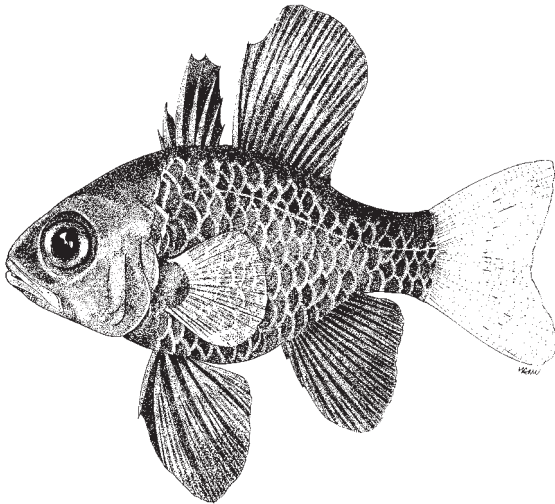


Pterapogon kauderni (Koumans, 1933)**En** - Banggai cardinalfish.

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.

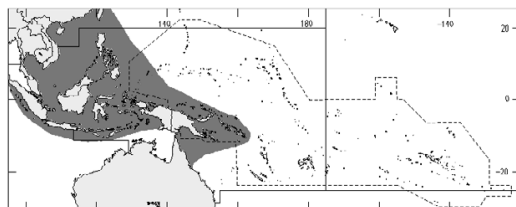
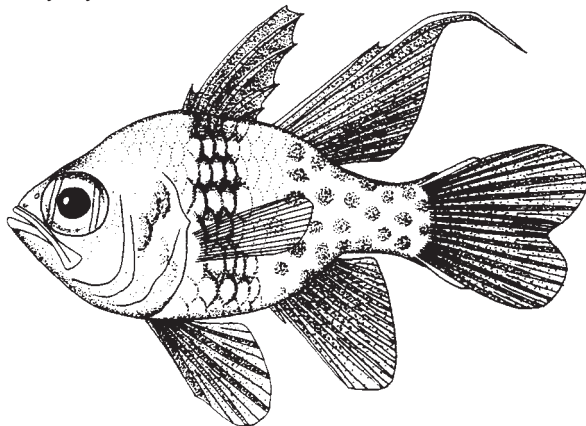
Maximum total length about 13 cm. Coral reefs of lagoons and sheltered inshore areas at depths to about 15 m. Occurs solitarily or in pairs; shelters among live coral or reef crevices during the day; feeds on small shrimps and crabs. Sometimes seen in the aquarium trade; captured with hand nets or surround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



Sphaeramia nematoptera (Bleeker, 1856)

En - Pajama cardinalfish.

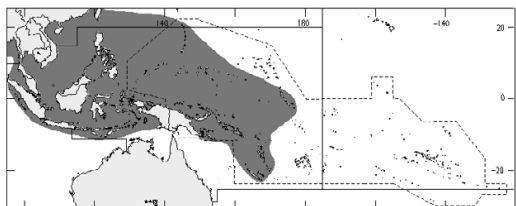
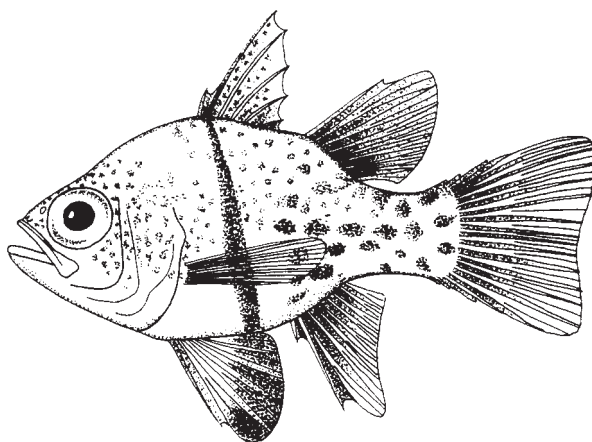
Maximum total length about 8 cm. Coral reefs of lagoons and sheltered inshore areas at depths to about 12 m. Usually in small aggregations that shelter among live coral during the day; feeds on small benthic shrimps and crabs, also zooplankton. A popular aquarium fish; captured with hand nets or surround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

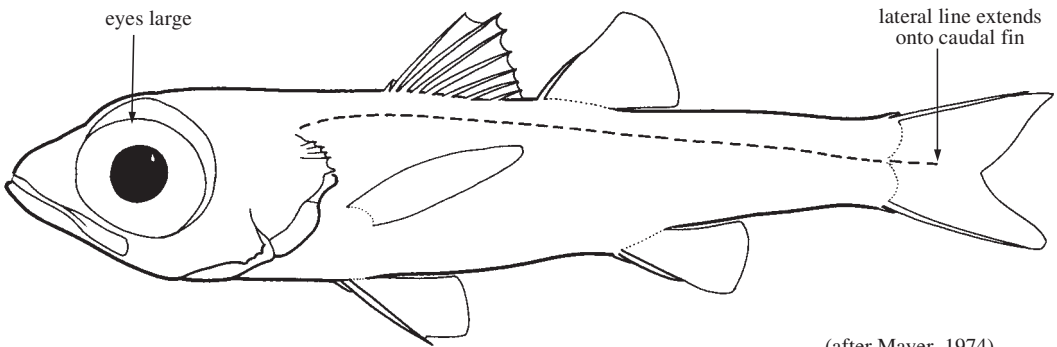


EPIGONIDAE

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.



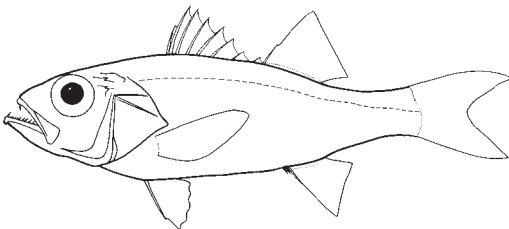
(after Mayer, 1974)

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

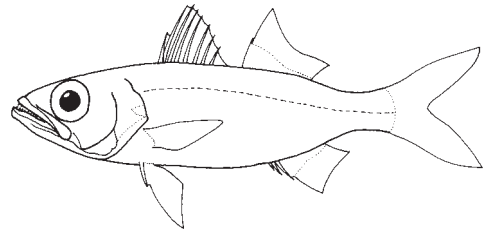
Similar families and genera in the area

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.



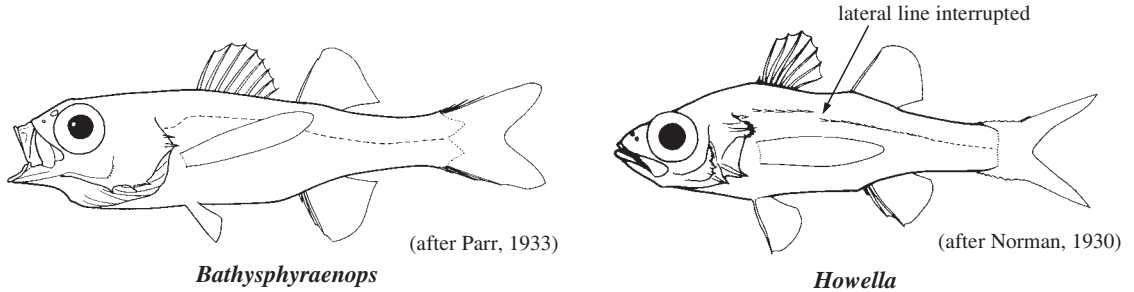
Acropomatidae



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.



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
- 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*

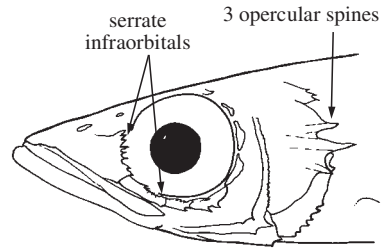


Fig. 1 *Sphyraenops bairdianus*
(adapted from Suda and Tominaga, 1983)

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

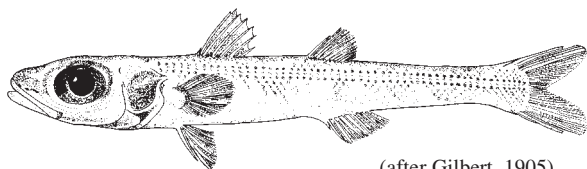
References

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

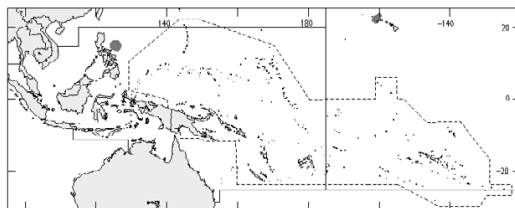
Mayer, G.F. 1974. A revision of the cardinal fish genus *Epigonus* (Perciformes, Apogonidae), with descriptions of two new species. *Bull. Mus. Comp. Zool.*, 146(3):147-203.

Epigonus atherinoides (Gilbert, 1905)**En** - Slender deepwater cardinalfish.

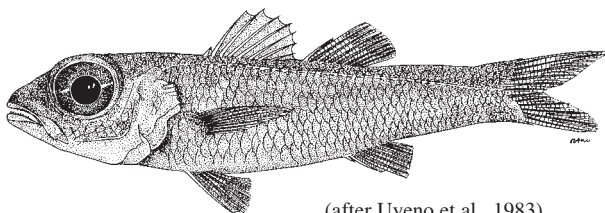
Maximum standard length at least 16 cm. Depth range 410 to 630 m. Occurs near the Philippines (east of Luzon); also known from Hawaii.



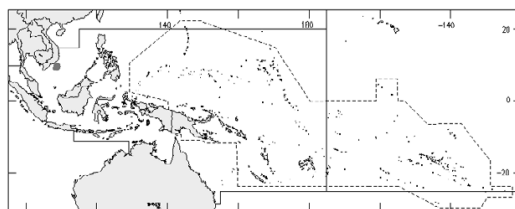
(after Gilbert, 1905)

***Epigonus macrops*** (Brauer, 1906)**En** - Luminous deepwater cardinalfish.

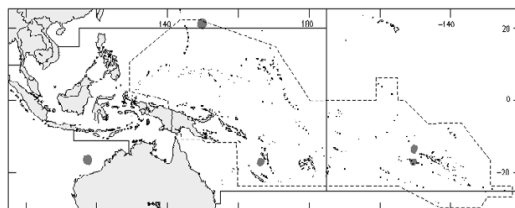
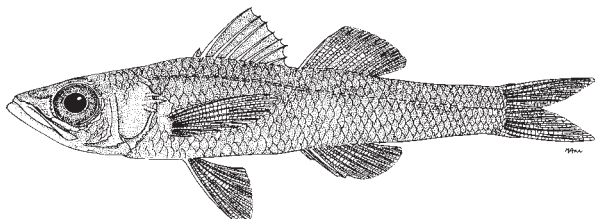
Maximum standard length at least 21 cm. Depth range 550 to 1 300 m, usually from 640 to 920 m; juveniles pelagic and found at 120 to 550 m. In the area, found off southern Viet Nam.



(after Uyeno et al., 1983)

***Sphyaenops 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.

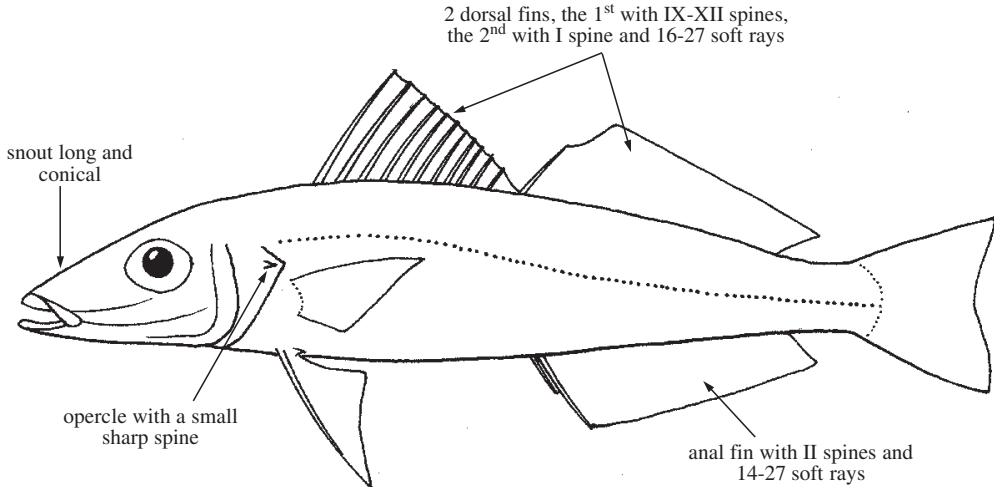


SILLAGINIDAE

Sillagos

by R.J. McKay

Diagnostic characters: Moderate-sized (to 51 cm), elongate perciform fishes. Opercle with small sharp spine; **lower part of preopercle horizontal**. Snout long and conical. Mouth small, terminal; end of upper jaw sliding below preorbital bone. Teeth villiform, in broad bands; small teeth on roof of mouth restricted to anterior part of vomer, none on palatines. Two separate dorsal fins, the first with 9 to 12 slender spines; the second with I spine and 16 to 27 soft rays; **anal fin long, with II weak spines** and 14 to 27 soft rays. Scales small, ctenoid; lateral line slightly arched. Swimbladder frequently complex. **Colour:** silvery to sandy grey or green, sometimes with black spots on body and pectoral-fin base.



Habitat, biology, and fisheries: The family is widespread throughout the Indian Ocean and the western Pacific Ocean. All species are inshore, bottom-dwelling, schooling fishes with a few species found in deeper water to about 180 m. They are commonly taken by beach seine net and line in shallow sandy bays and frequently enter estuaries, penetrating into fresh water for brief periods. Their flesh is very white, tender, and of exceedingly delicate flavour. It contains very little oil and is easily digested. Steamed sillago fillets are highly esteemed as food for invalids and infants. From 1990 to 1995, the FAO Yearbook of Fishery Statistics reports a range of yearly catch of around 12 100 to 16 600 t from the Western Central Pacific.

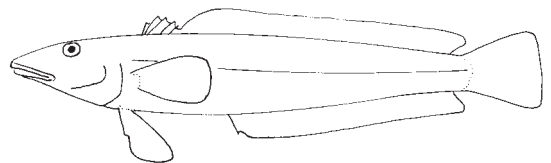
Similar families occurring in the area

Branchiostegidae: a single continuous dorsal fin; mouth large with fleshy lips.

Pinguipedidae (= Parapercaidae, Mugiloididae): dorsal-fin spines short; spinous dorsal fin sometimes joined to soft dorsal fin; pelvic-fin base in advance of pectoral-fin base.



Branchiostegidae



Pinguipedidae

Key to the species of Sillaginidae occurring in the area

- 1a. Pelvic-fin spine very small and situated at base of a thickened club-shaped outer pelvic-fin ray (Fig. 1a); swimbladder reduced, no duct-like process (Fig. 1b); no modified caudal vertebrae present (subgenus *Sillaginopodys*). *Sillago chondropus*
- 1b. No club-shaped outer pelvic-fin ray → 2

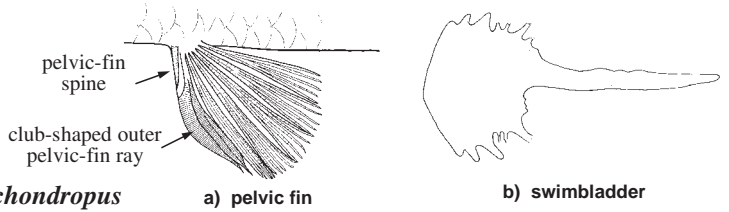


Fig. 1 *Sillago chondropus*

- 2a. Swimbladder divided posteriorly into 2 tapering extensions projecting below vertebral column into tail musculature (Fig. 2) (subgenus *Sillago*) → 3
- 2b. Swimbladder with a single posterior extension below vertebral column and entering the tail section (Figs 3 and 4) (subgenus *Parasillago*) → 4

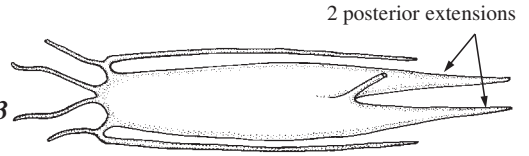


Fig. 2 swimbladder (subgenus *Sillago*)

- 3a. Body with a longitudinal row of dark spots below lateral line and a series of dark saddle-like blotches on back *Sillago intermedius*
- 3b. Body uniform in coloration *Sillago sihama*

- 4a. A dark brown, dusky, or blue-black spot or blotch on or just preceding pectoral-fin base → 5
- 4b. No dark mark at pectoral-fin base → 8

- 5a. Body with dark blotches → 6

- 5b. Body uniform colour in adults (juveniles to 9 cm have darker blotches along sides and back) with snout bluish in some large specimens; first dorsal fin with XI spines, second dorsal fin with I spine and 16 to 18 soft rays; anal fin with II spines and 15 to 17 soft rays; lateral-line scales 60 to 69; vertebrae 14-15 + 5-8 + 11-14 (total 32 to 34); swimbladder with rudimentary tubules projecting anteriorly and a series of sawtooth-like pockets laterally (Fig. 3a) *Sillago ciliata* (eastern Australia)

- 6a. Upper and lower dark blotches on sides joined at least posteriorly; first dorsal fin with XI spines, second dorsal fin with I spine and 19 to 21 soft rays; anal fin with II spines and 19 or 20 soft rays; lateral-line scales 71 to 75; vertebrae 34 to 36; swimbladder with a short median extension anteriorly and a complex anterolateral extension that continues posteriorly to the duct-like process (Fig. 3b) *Sillago maculata* (eastern Australia)

- 6b. Upper and lower dark blotches separate; swimbladder without complex anterolateral extensions extending well posteriorly to end of abdomen → 7

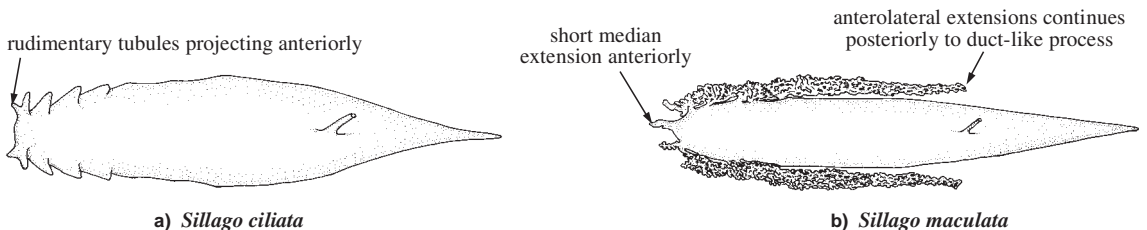
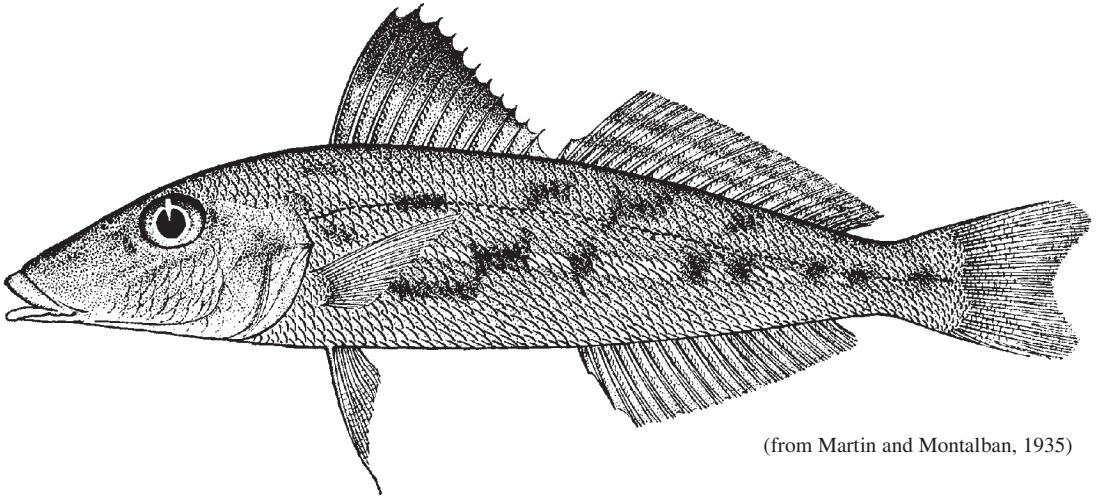


Fig. 3 swimbladder

Sillago aeolus Jordan and Evermann, 1902

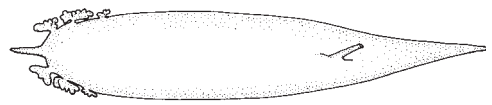
Frequent synonyms / misidentifications: None / *Sillago maculata* Quoy and Gaimard, 1824.

FAO names: En - Oriental sillago; Fr - Pêche-madame oriental; Sp - Silago oriental.



(from Martin and Montalban, 1935)

Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 18 to 20 soft rays; anal fin with II slender spines and 17 to 19 (**usually 18**) soft rays. Lateral line with 67 to 72 scales. Vertebrae 13-14 + 4-7 + 14-16 (**total 34**). **Swimbladder with 3 rudimentary anterolateral extensions instead of 4**; differs from *Sillago maculata* in lacking well-developed anterolateral extensions reaching to level of anus. **Colour:** very similar to *S. berrus* in coloration but has the most posterior midlateral dark brown blotch elongate and reaching caudal flexure.

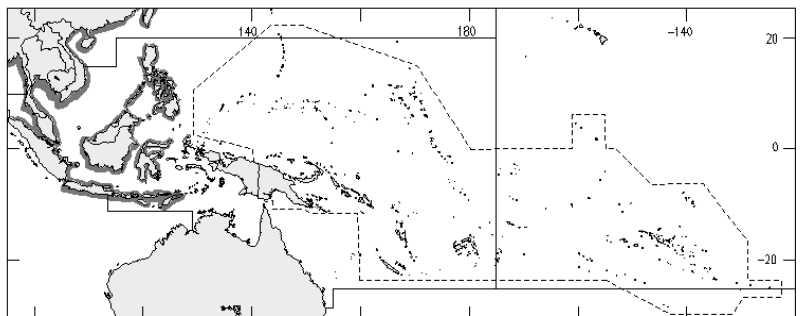


swimbladder

Size: Maximum standard length 30 cm.

Habitat, biology, and fisheries: Coastal inshore waters, most common in embayments on silty bottom. Juveniles burrow in the sand. Small local fisheries exist throughout the range of this species, particularly where bottom trawls are employed. The flesh is prone to spoil rapidly and the Oriental sillago is not considered as highly as the inshore sillago's.

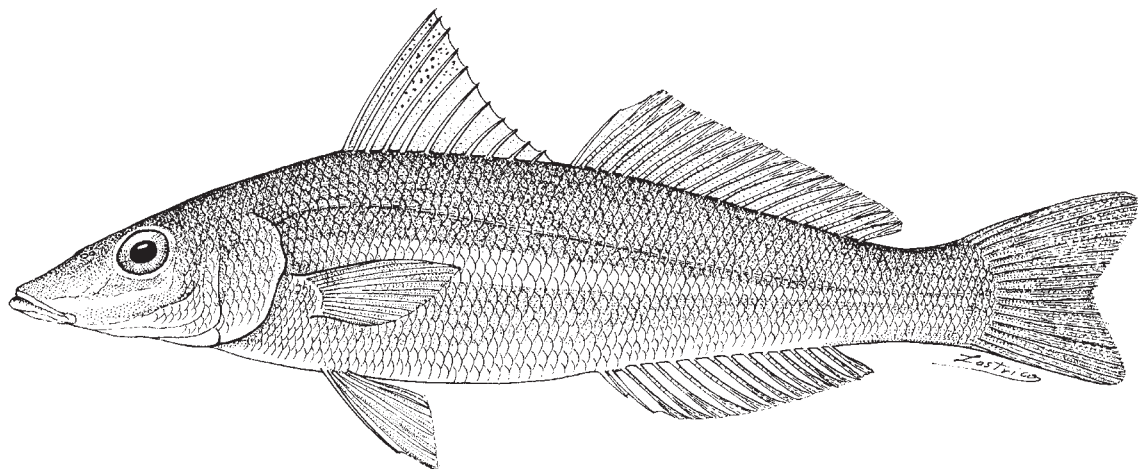
Distribution: Singapore, Thailand, China (including Hong Kong and Taiwan Province), Philippines, and southern Japan. Possibly distributed throughout the Indo-West Pacific from Delagoa Bay (South Africa) to Okinawajima (Japan), but not recorded from Australia or southern New Guinea.



Sillago analis Whitley, 1943

Frequent synonyms / misidentifications: *Sillago nierstraszi* Hardenberg, 1941 (possible senior synonym) / None.

FAO names: En - Goldenlined sillago; Fr - Pêche-madame doré; Sp - Silago aureolineado.



Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 16 to 18 soft rays; **anal fin with II slender spines and 14 to 17 soft rays. Lateral line with 54 to 61 scales.** Vertebrae 13-14 + 4-8 + 11-15 (total 33 to 34). **Colour:** no dark spot at pectoral-fin base; body light silvery, slightly darker to dusky above; a dull golden-silver to golden-yellow band longitudinally on sides below lateral line; pelvic and anal fins pale yellow to bright yellow; pectoral fins with a darker dusting of fine black-brown spots.

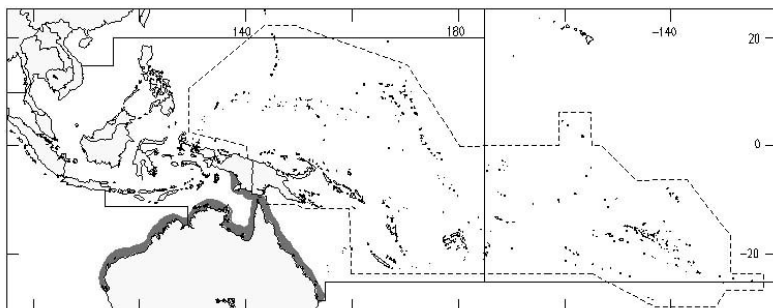


swimbladder

Size: Maximum standard length 45 cm; commonly to 35 cm.

Habitat, biology, and fisheries: Shallow mangrove creek shorelines, protected inlets and tidal areas. An important fishery has developed in northern Australia.

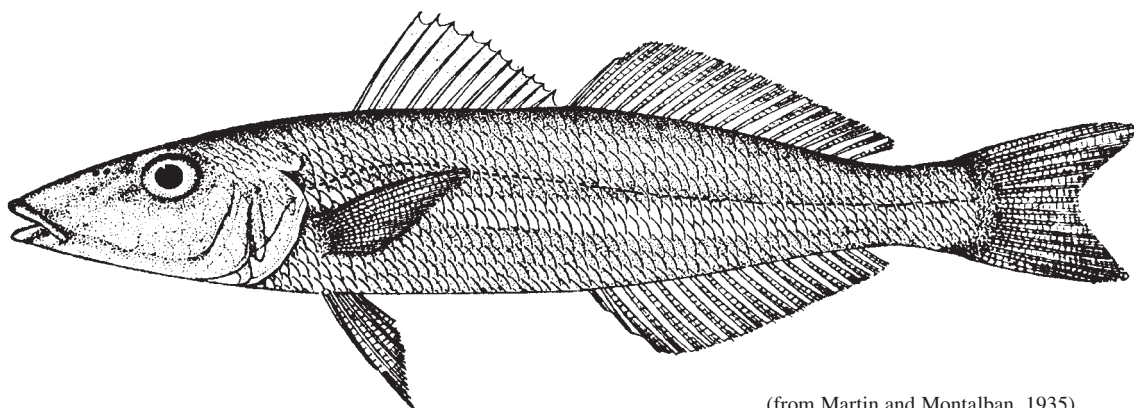
Distribution: Shark Bay, Western Australia, Northern Territory, Queensland south to Moreton Bay, and southern coast of New Guinea.



Sillago argentifasciata Martin and Montalban, 1935

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Silverbanded sillago; **Fr** - Pêche-madame ceinture d'or; **Sp** - Silago de bandas plateadas.



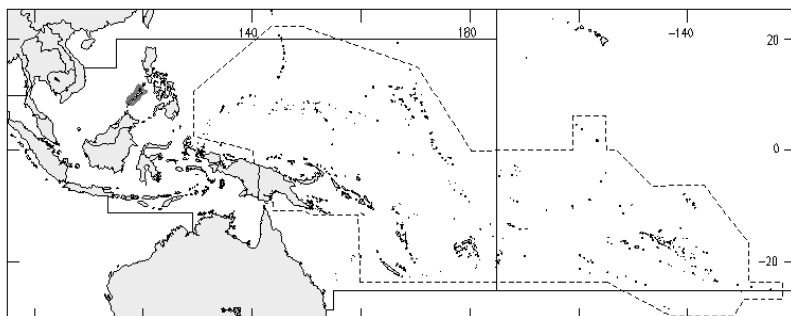
(from Martin and Montalban, 1935)

Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 17 or 18 soft rays; anal fin with II slender spines and 17 soft rays. Lateral line with 66 scales. Cheek with 3 rows of scales, **those on upper row cycloid, and on lower 2 rows ctenoid**. **Colour:** no irregular dark blotches on sides; **a wide, brilliant, silvery, longitudinal band on each side of body**.

Size: Not known.

Habitat, biology, and fisheries: Unknown.

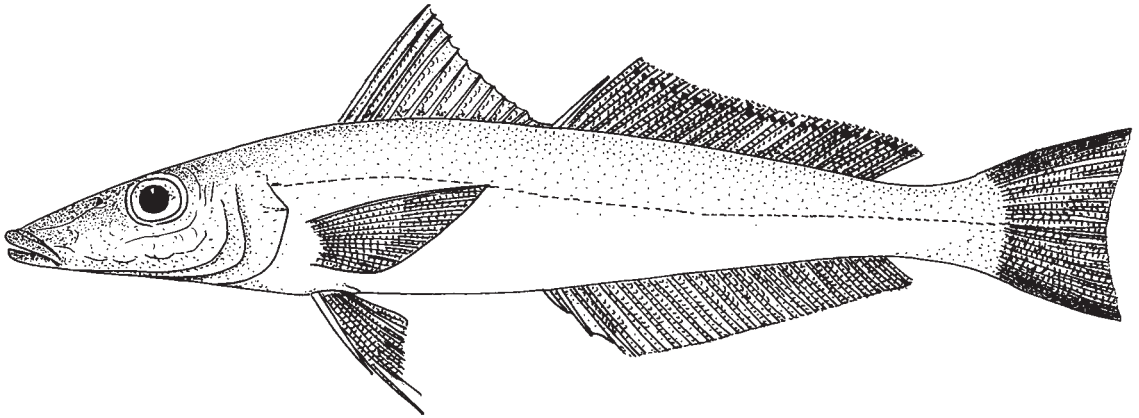
Distribution: Lumbucan Island, Philippines.



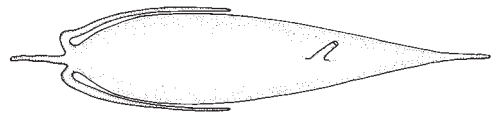
Sillago asiatica McKay, 1983

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Asian sillago; **Fr** - Pêche-madam asiatic; **Sp** - Silago asiatico.



Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 20 or 21 soft rays; anal fin with II slender spines and 21 to 23 soft rays. Lateral line with 67 to 70 scales. Vertebrae 13-14 + 6-7 + 13-16 (total 34). Swimbladder with 3 anterior extensions, **the middle one projecting forwards and the anterolateral ones recurved backwards up to 1/2 length of swimbladder; a single posterior extension.** **Colour:** head and body pale sandy brown to light fawn, an indistinct pale midlateral band is present on some specimens; belly paler, almost white; opercle and preopercle transparent with a crescentic patch of fine black-brown spots in a pigmented area, the shape of the gill arches on the inside of the gill cover showing through; fins hyaline, the margins of unpaired fins finely spotted with brown; upper and lower margins of caudal fin dark brown to almost black.

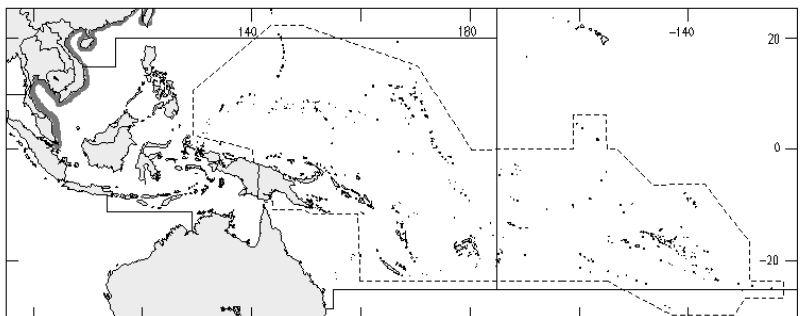


swimbladder

Size: Maximum standard length 15 cm.

Habitat, biology, and fisheries: Inshore waters. Biology unknown. Taken as an incidental catch with other sillago species.

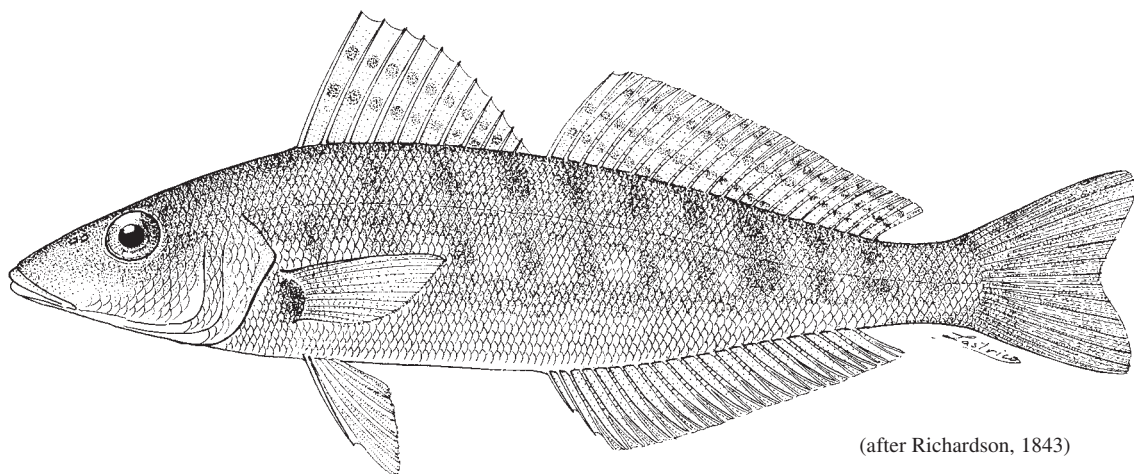
Distribution: Gulf of Thailand and Taiwan Province of China. This species is possibly widespread.



Sillago burrus Richardson, 1842

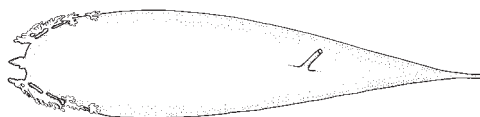
Frequent synonyms / misidentifications: *Sillago maculata burra* Richardson, 1842 / None.

FAO names: **En** - Western trumpeter sillago; **Fr** - Pêche-madam clairon; **Sp** - Silago tromperero occidental.



(after Richardson, 1843)

Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 19 to 21 soft rays; anal fin with II slender spines and 18 to 20 (**rarely 18**) soft rays. Lateral line with 69 to 76 scales. Vertebrae 13-14 + 20-22 (total **34 to 36, rarely 34**). **Swimbladder with 4 anterolateral extensions** that are more complex than *S. aeolus*, but much shorter than *Sillago maculata*. **Colour:** very similar in coloration to *S. aeolus* and *S. maculata* but in the latter species the upper and lower blotches are frequently joined, at least posteriorly; the upper blotches are generally larger; the black spot at the base of the pectoral fins is more distinct; the belly is not silver, and the operculum is dull or with the inner dark blotch showing through (inside of operculum of *S. burrus* is white). *S. aeolus* is best distinguished from *S. burrus* by means of vertebrae and anal-fin counts.

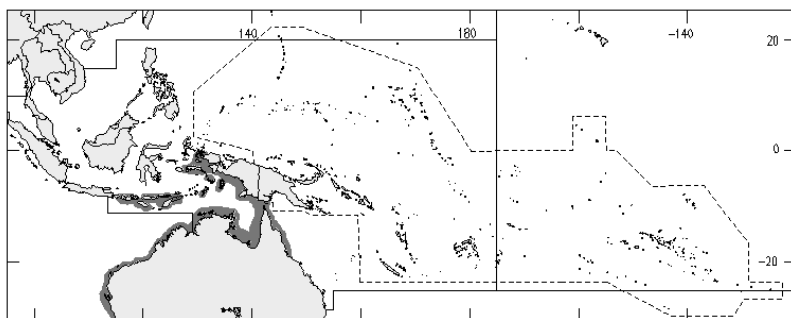


swimbladder

Size: Maximum standard length 36 cm.

Habitat, biology, and fisheries: *Sillago burrus* is most abundant on silty-sand or muddy substrates. Commonly taken by trawl net in shallow coastal waters to a depth of 32 m. Marketed fresh.

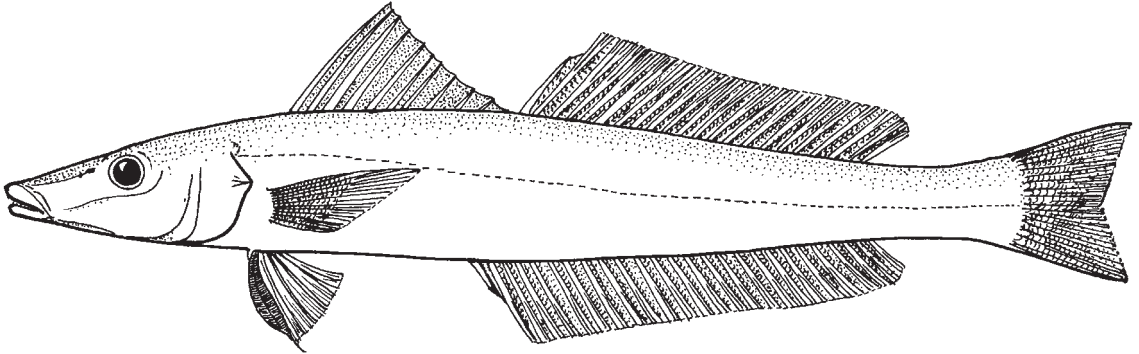
Distribution: Northern coast of Australia, southern New Guinea, and Indonesia.



Sillago chondropus Bleeker, 1849

Frequent synonyms / misidentifications: None / None.

FAO names: En - Clubfoot sillago; Fr - Pêche-madame diabolotin; Sp - Silago pateta.

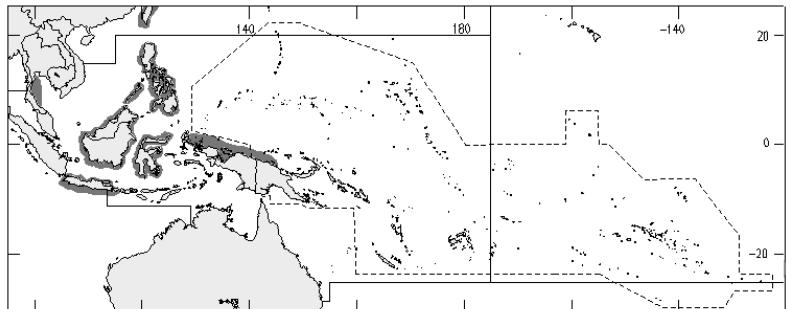
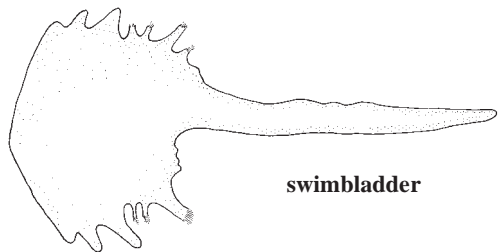


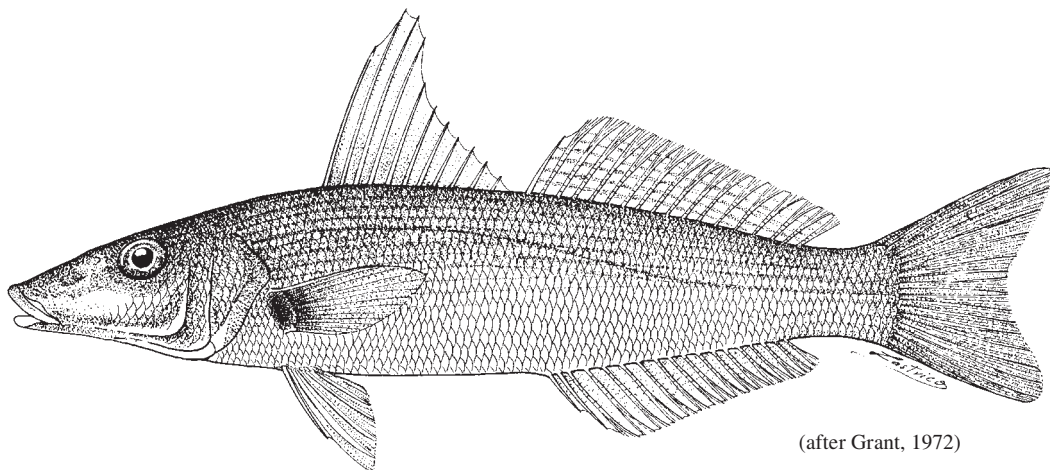
Diagnostic characters: First dorsal fin with XI or XII spines; second dorsal fin with I spine and 20 or 21 soft rays; anal fin with II slender spines and 22 or 23 soft rays; **first pelvic-fin ray modified into a laterally compressed thickened club-like structure.** Lateral line with 66 to 73 scales. Vertebrae 12-13 + 22-23 (total 35). Swimbladder reduced in size, no duct-like process from the ventral surface to the urogenital aperture.

Size: Maximum standard length 35 cm.

Habitat, biology, and fisheries: Shallow coastal waters. Captured by seine and marketed fresh.

Distribution: South Africa, Mozambique, West Pakistan, India, Myanmar, Indonesia, New Guinea, Thailand, Philippines, and Taiwan Province of China. Not recorded from southern New Guinea or Australia.



Sillago ciliata Cuvier, 1829**Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Sand sillago; Fr - Pêche-madame sable; Sp - Silago arena.

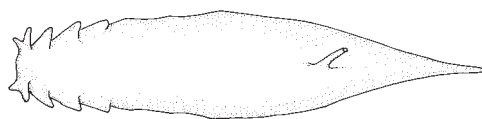
(after Grant, 1972)

Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 16 to 18 soft rays; anal fin with II slender spines and **15 to 17 soft rays**. Lateral line with 60 to 69 scales. Vertebrae 14-15 + 5-8 + 11-14 (total 32 to 34). Anterior part of swimbladder with rudimentary tubules projecting anteriorly and a series laterally that diminish in size and become sawtooth-like posteriorly; shape of swimbladder not distinguishable from *Sillago analis*. **Colour:** a dark spot at base of pectoral fins; coloration of adult specimens uniform without darker bars or blotches.

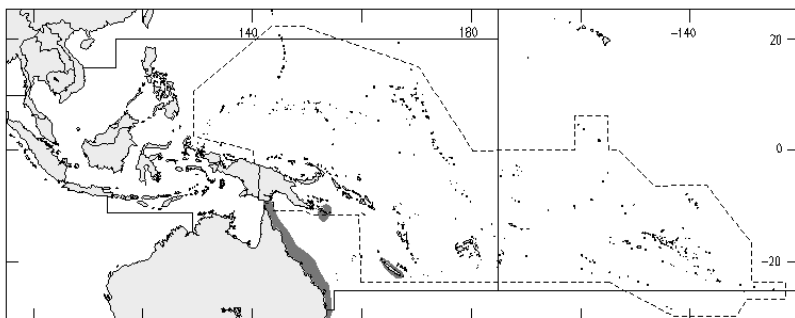
Size: Maximum total length 51 cm.

Habitat, biology, and fisheries: An onshore species occurring on coastal beaches, sandbars, and surf zones as well as open bays, estuaries, and coastal lakes. Feeds mostly on polychaetes and crustaceans. An important commercial species and an esteemed angling fish in eastern Australia. Taken by beach seine and tunnel-net. Marketed fresh.

Distribution: East coast of Australia from Cape York, Queensland (rare), southwards along the coast and the Great Barrier Reef to eastern Victoria, and the east coast of Tasmania; also known from Lord Howe Island, New Caledonia, and Woodlark Island (Papua).



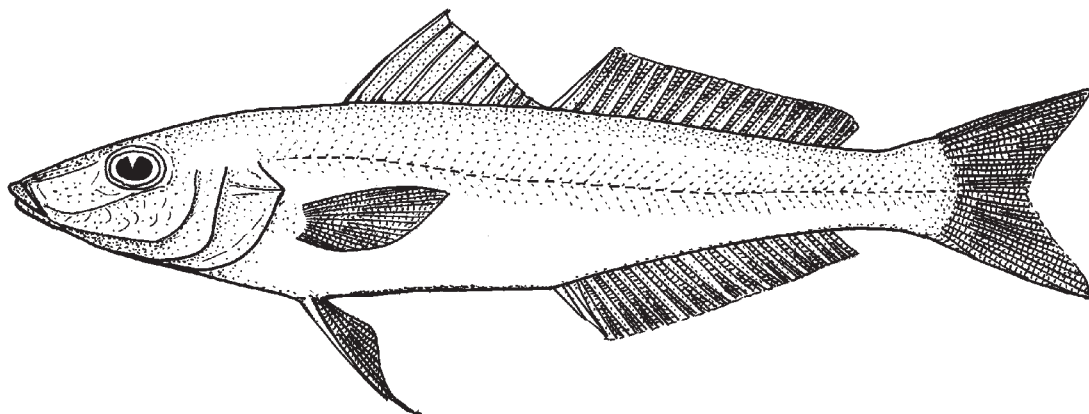
swimbladder



Sillago ingenuua McKay, 1985

Frequent synonyms / misidentifications: *Sillago argentifasciata* (non Martin and Montalban, 1935) / None.

FAO names: En - Bay sillago; Fr - Pêche-madame halanda; Sp - Silago de bahia.

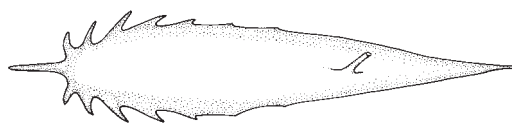


Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 17 soft rays; anal fin with II slender spines and 17 soft rays. **Cheek scales ctenoid.** Lateral line with 66 to 70 scales. Vertebrae 13 + 9-11 + 9-11 (total 33). Swimbladder with a short median anterior extension and about 5 small pointed anterolateral projections. **Colour:** no black spot on pectoral-fin base; **no wide distinct silvery lateral band; peritoneum black-brown.**

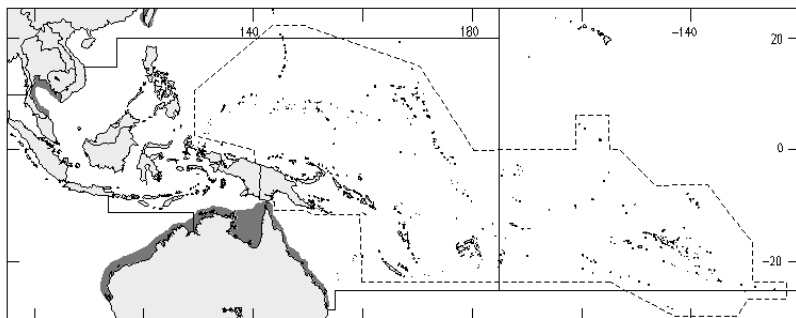
Size: Maximum standard length 20 cm.

Habitat, biology, and fisheries: Inshore coastal waters. Taken by prawn trawl. Marketed fresh.

Distribution: Known from India, Gulf of Thailand, Taiwan Province of China, and northern Australia from Shark Bay around the northern coast to Adolphus Passage in north-eastern Queensland.



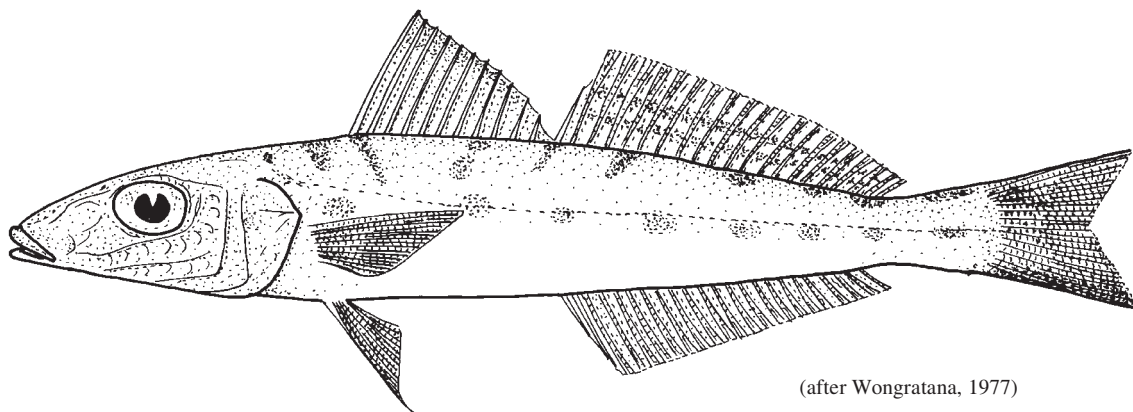
swimbladder



Sillago intermedius Wongratana, 1977

Frequent synonyms / misidentifications: None / *Sillago maculata maculata* Quoy and Gaimard, 1834.

FAO names: En - Intermediate sillago; Fr - Pêche-madame murda; Sp - Silago intermedio.



(after Wongratana, 1977)

Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 21 or 22 soft rays; anal fin with II slender spines and 21 or 22 soft rays. Lateral line with 67 to 70 scales. Vertebrae 14 + 5 + 15 (total 34). **Swimbladder with 2 posterior extensions;** anterior margin with 2 divergent blind tubes that extend to basioccipital above auditory capsule; an anterolateral extension on each side, each sending a blind tubule anteriorly and then curving posteriorly along abdominal wall as a simple tube to terminate just posterior to the duct-like process. **Colour:** sides of body just below lateral line with longitudinal row of dusky black spots, and a series of saddle-like dusky black blotches.

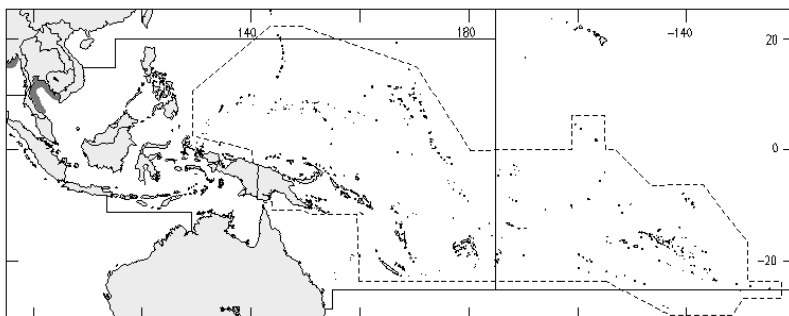


swimbladder

Size: Maximum standard length 20 cm; commonly to 20 cm.

Habitat, biology, and fisheries: An inshore species on open silty bottom. Taken locally and marketed fresh.

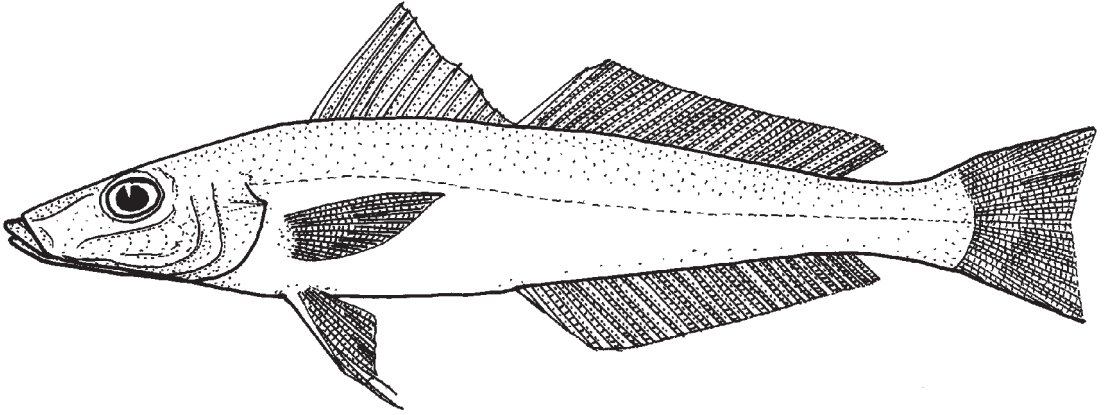
Distribution: Thailand and India.



Sillago lutea McKay, 1985

Frequent synonyms / misidentifications: None / *Sillago macrolepis* Bleeker, 1859.

FAO names: En - Mud sillago; Fr - Pêche-madame de vase; Sp - Silago de fango.

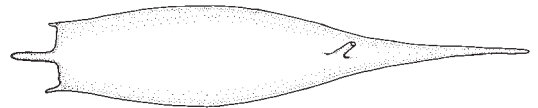


Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 20 to 22 soft rays; **anal fin with II slender spines and 21 to 24 soft rays. Lateral line with 67 to 72 scales.** Vertebrae 13-14 (normally 13) + 4-11 + 10-17 (total 33 to 35). Swimbladder with median anterior extension and with or without rudimentary anteriorly directed anterolateral projections; posterior extension single. **Color:** body light sandy brown above, pale brown to whitish below, with an indistinct silvery midlateral band; margins of scales may be slightly darker, giving a vague meshwork pattern to the body above lateral line; fins hyaline, first dorsal-fin membrane tipped with a fine dusting of black; no dark spot at pectoral-fin base.

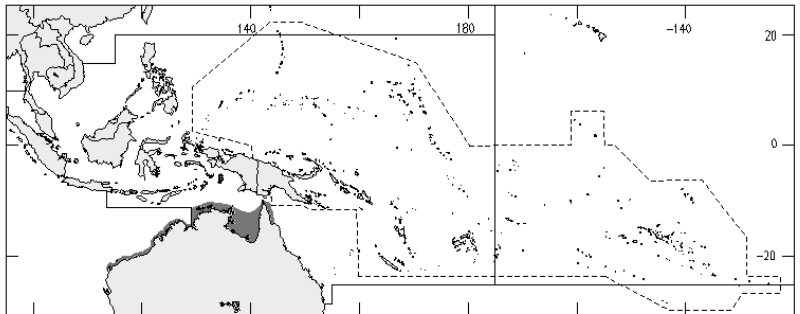
Size: Maximum standard length 16 cm; commonly to 15 cm.

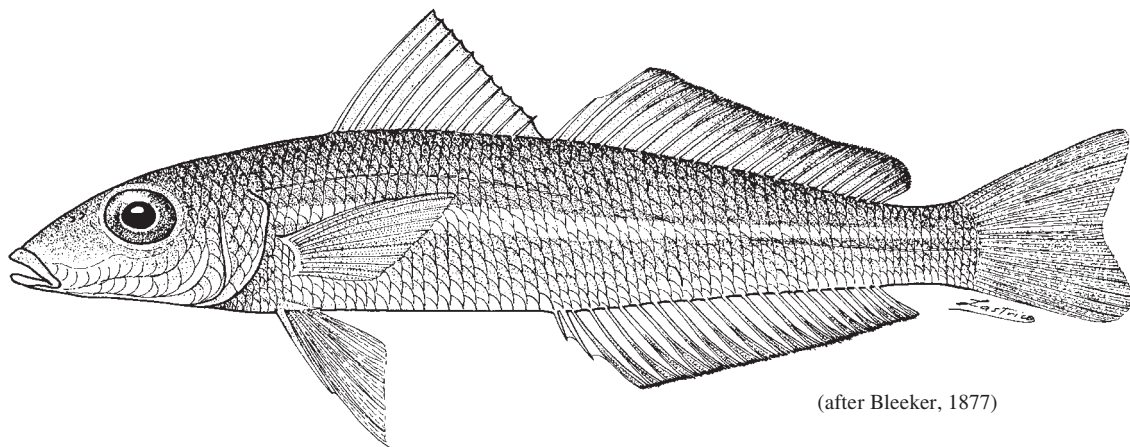
Habitat, biology, and fisheries: Inshore waters on muddy or very silty substrates. Large catches are taken by prawn trawlers but as the species attains sexual maturity at 10 cm standard length (ripe females 10.4 to 12 cm) and grows to only 16 cm; the catch is of no commercial importance at present.

Distribution: Exmouth Gulf, Western Australia, northwards and eastwards to Princess Charlotte Bay, Cape York; also known from India and Sri Lanka.



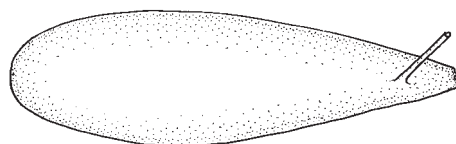
swimbladder



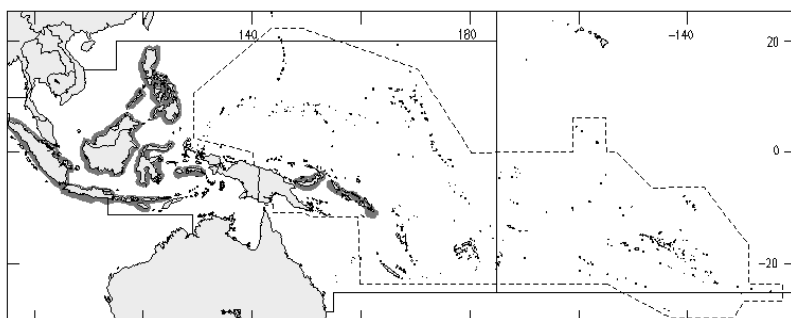
Sillago macrolepis* Bleeker, 1859*Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Largescale sillago; Fr - Pêche-madame grandes ecailles; Sp - Silago escamoso.

(after Bleeker, 1877)

Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 19 to 21 soft rays; anal fin with II slender spines and 19 to 21 soft rays. **Lateral line with 51 to 56 scales.** Vertebrae 14 + 20 (total 34); no haemal bridge overlying swimbladder. Swimbladder without extensions. **Colour:** yellowish, darker above, with diffuse silvery longitudinal midlateral band; dorsal fins dusky with narrow blackish margin; juveniles with a series of small brown spots, 1 on each side along back at base of dorsal fins; first dot at commencement of spinous dorsal fin, second about middle of spinous dorsal fin, third below fourth dorsal-fin ray, fourth below eleventh dorsal-fin ray, and last spot below end of soft-rayed dorsal fin.

Size: Maximum standard length 20 cm; commonly to 18 cm.**Habitat, biology, and fisheries:** Enters estuaries and may penetrate fresh waters. No fishery exists for this species.**Distribution:** Recorded from the Indonesian Archipelago, New Britain, Solomon Islands, and the Philippine Islands.

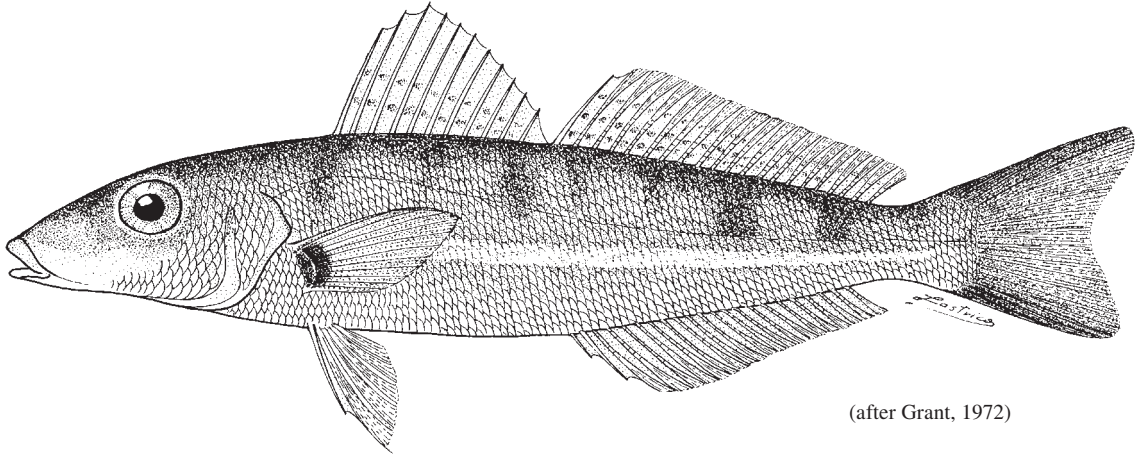
swimbladder



Sillago maculata Quoy and Gaimard, 1834

Frequent synonyms / misidentifications: None / None.

FAO names: En - Trumpeter sillago; Fr - Pêche-madame trompette; Fr - Silago trompetero.



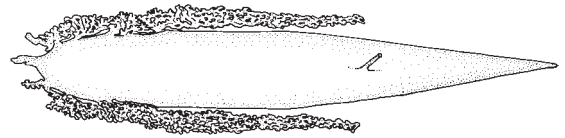
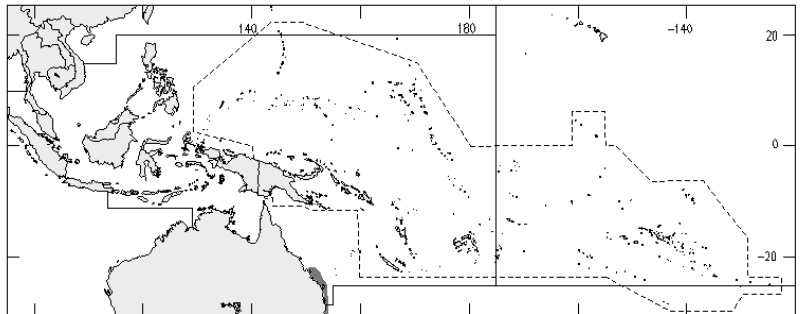
(after Grant, 1972)

Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 19 to 21 soft rays; anal fin with II slender spines and 19 or 20 soft rays. Lateral line with 71 to 75 scales. Vertebrae 13-15 + 8-11 + 10 to 14 (total 34 to 36). **Anterolateral extensions of swimbladder recurved posteriorly to reach level of anus.** **Colour:** a black spot at pectoral-fin base, dark blotches on back and side of body; the upper and lower blotches frequently joined, at least posteriorly, the upper blotches generally larger; operculum dull or with an inner dark blotch showing through.

Size: Maximum total length 30 cm; commonly to 25 cm.

Habitat, biology, and fisheries: Found on silty and muddy substrates in the deeper water of bays, but also frequenting the mouths of rivers, estuaries, and mangrove creeks. The juveniles are most abundant in estuaries and shallow water during the summer months, moving into deeper water as they mature. Taken by trawlers mainly as a bycatch of the prawn fishery. Marketed fresh.

Distribution: East Coast of Australia.

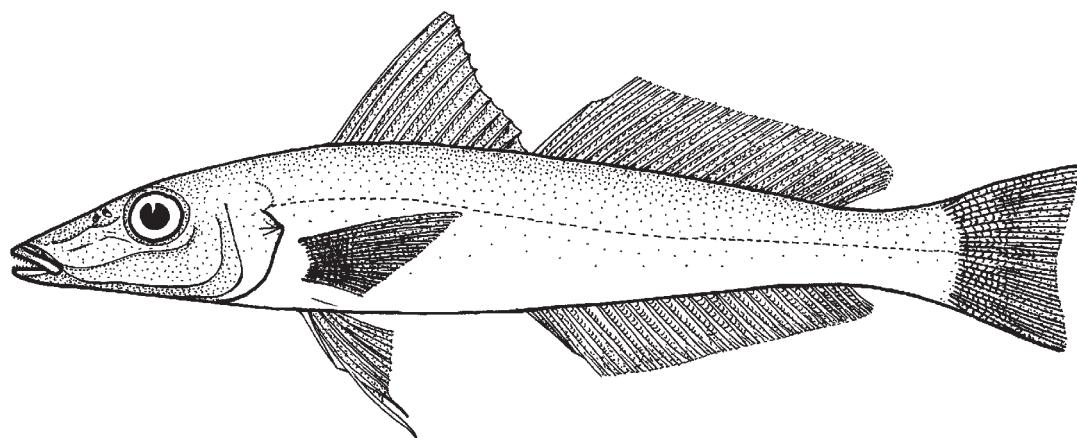


swimbladder

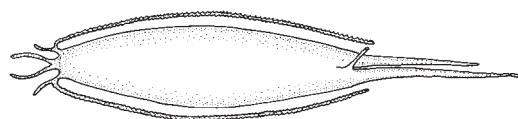
Sillago sihama (Forsskål, 1775)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Silver sillago; Fr - Pêche-madame argenté; Sp - Silago plateado.



Diagnostic characters: First dorsal fin with XI spines; second dorsal fin with I spine and 20 to 23 soft rays; anal fin with II slender spines and 21 to 23 soft rays. Lateral line with 66 to 72 scales. Vertebrae 14 + 2-8 + 12-18 (total 34). **Swimbladder with 2 anterior extensions extending forward and diverging to terminate on each side of the basioccipital above the auditory capsule; 2 lateral extensions commence anteriorly, each sending a blind tubule anterolaterally and then extending along the abdominal wall below the investing peritoneum to just posterior of the duct-like process; 2 posterior tapering extensions of the swimbladder project into caudal region, one usually longer than the other.** The lateral extensions are normally convoluted and have blind tubules arising along their length. **Colour:** body light tan, silvery yellow-brown, sandy-brown, or honey coloured; paler brown to silvery white below; a midlateral, silvery, longitudinal band normally present; dorsal fins dusky terminally with or without rows of dark brown spots on the second dorsal-fin membrane; caudal fin dusky terminally; **no dark blotch at base of pectoral fins**; other fins hyaline, the anal fin frequently with a whitish margin; after long preservation coloration may become a uniform light brown.

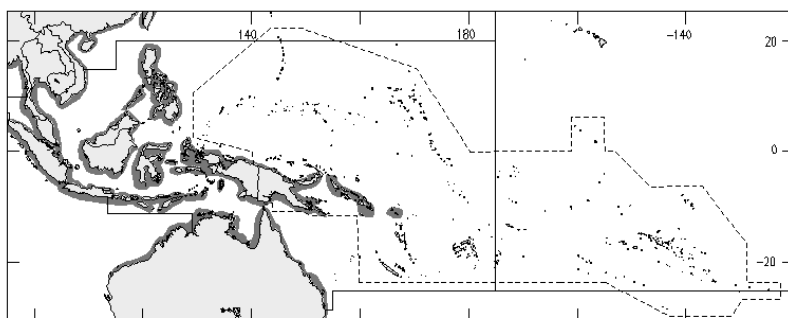


swimbladder

Size: Maximum standard length 30 cm; commonly to 20 cm.

Habitat, biology, and fisheries: A nearshore species inhabiting shallow water along beaches, sandbars, mangrove creeks, and estuaries; very rarely captured by prawn trawling vessels. Captured by line, seine net, cast-net, and traps operated from beaches. Marketed fresh and salted.

Distribution: A wide-ranging species throughout the Indo-West Pacific region from Knysna (South Africa) to Japan.



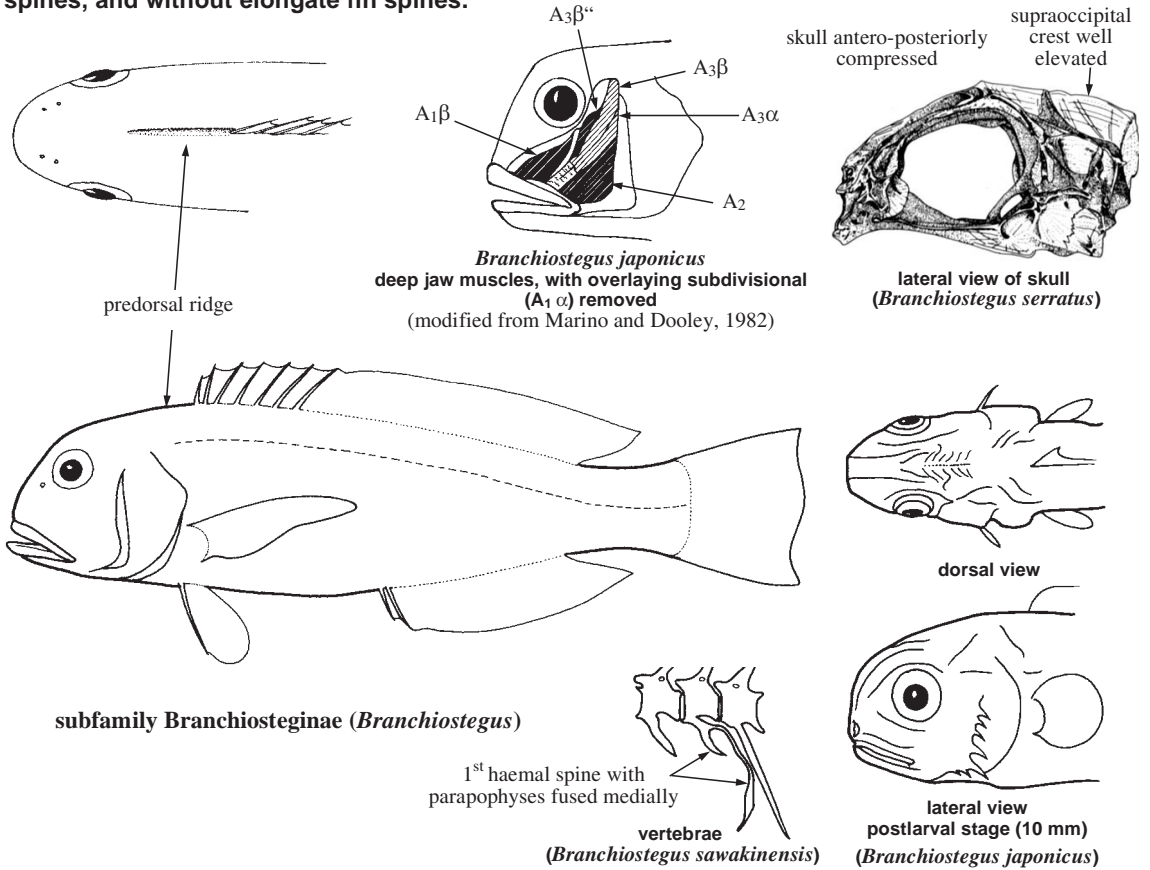
BRANCHIOSTEGIDAE

(= Malacanthidae)

Tilefishes (also, quakerfish, blanquillos, burrowfishes, amadais, horseheads, and sand tilefishes)

by J.K. Dooley

D diagnostic characters (subfamily Branchiosteginae, genus *Branchiostegus*): **Body quadriform and square-headed; body depth 22 to 30% (usually 27%) standard length. Predorsal ridge (a raised seam in front of dorsal fin) reduced, but always present. Predorsal length 27 to 37% (usually 32%) standard length; head length 24 to 33% (usually 28%) standard length; head depth 82 to 108% (usually 95%) head length; suborbital depth 14 to 35% (usually 19 to 25%) head length; orbit diameter 20 to 37% (usually 24 to 30%) head length. Preopercle finely serrated on upper limb to angle or just below, lower limb with few or no serrae; no enlarged spine at preopercular angle; preopercle angle 85° to 115°; opercle with a single soft, blunt spine. Jaws slightly oblique, extending posteriorly from in front of orbit under rear nostril to below rear rim of pupil; mouth terminal to slightly inferior, jaws each side with 4 or 5 mandibular pores (usually 5). Total gill rakers on first gill arch 18 to 24. Dorsal and anal fins long and continuous; length of dorsal-fin base plus anal-fin base 80 to 97% (usually less than 90%) standard length. Dorsal fin with VI to VIII (usually VII) spines and 14 to 16 (usually 15) soft rays. Anal fin with II spines and 11 to 13 (usually 12) soft rays. Caudal fin rounded, truncate, or double emarginate (never lunate or forked), with 17 principal rays, sometimes with elongate tips. Scales ctenoid (in pockets) over most of body, cycloid in head region. Pored lateral-line scales usually 47 to 51 (67 to 72 only in *B. serratus*); scales above lateral line 6 to 11, below lateral line 16 to 31. Vertebrae 10+14; supraoccipital skull crest well elevated and elongate; well-formed foramen in the ceratohyal; first haemal spine over second anal-fin ray with parapophyses fused medially forming an arch for rear of swimbladder; ratio of anal-fin supports to haemal spines 0.86:1; predorsal-fin supports always 0-0-2-; procurrent caudal-fin rays 10 or 11 (usually 10) in upper lobe, and 9 or 10 (usually 9) in lower lobe; 1 uroneural and parhypural, 3 epurals, and 2+3 autogenous hypurals. Highly complex adductor mandibulae (jaw) musculature, with 5 major subdivisions (see figure of jaw muscles below). Larvae pelagic, with numerous head spines and serrated ridges, no rostral head spines, and without elongate fin spines.**

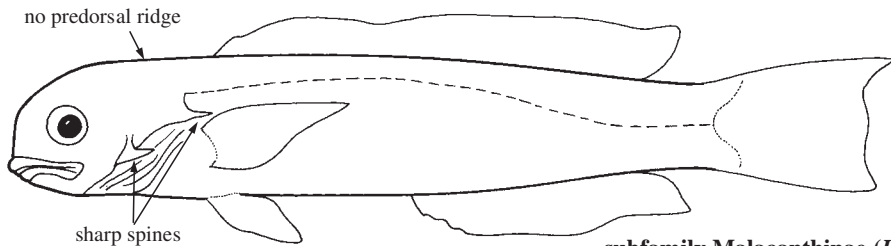
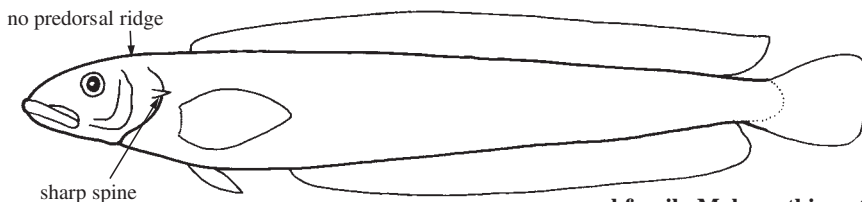
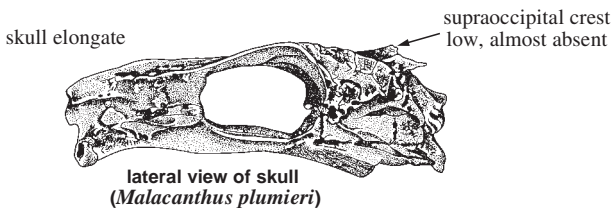
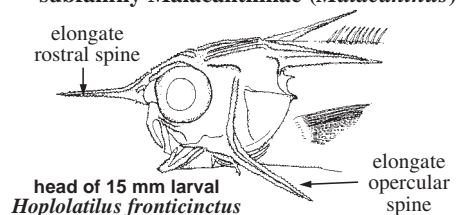


subfamily Branchiosteginae (*Branchiostegus*)

1st haemal spine with parapophyses fused medially
vertebrae
(*Branchiostegus sawakinensis*)

lateral view postlarval stage (10 mm)
(*Branchiostegus japonicus*)

Diagnostic characters (subfamily Malacanthinae, genera *Hoplostilatus*, *Malacanthus*): **Body elongate, fusiform or nearly cylindrical, with blunt or rounded snout; body depth 15 to 29% (usually 18 to 25%) standard length (*Hoplostilatus*), or 12 to 20% (usually 14 to 17%) standard length (*Malacanthus*). No predorsal ridge. Predorsal length 19 to 34% (usually 22 to 30%) standard length; head length 19 to 32% (usually 21 to 29%) standard length; head depth 57 to 86% head length (*Hoplostilatus*), or 49 to 64% head length (*Malacanthus*); suborbital depth 3 to 7% head length (*Hoplostilatus*), or 5 to 20% head length (*Malacanthus*); orbit diameter 22 to 31% head length (*Hoplostilatus*), or 13 to 29% head length (*Malacanthus*). Preopercle serrate (*Hoplostilatus*), or smooth (*Malacanthus*); an enlarged spine at angle of preopercle (*Hoplostilatus*), or spine absent (*Malacanthus*); opercle with single sharp pointed spine (not found in Branchiosteginae: only a single soft blunt spine). Mouth terminal to slightly inferior, jaws slightly oblique, extending posteriorly to eye or just under eye in *Malacanthus*, and to posterior rim of orbit and beyond in *Hoplostilatus*; jaws each side with 4 to 6 mandibular pores (4 in *Malacanthus*, usually 5 or 6 in *Hoplostilatus*). Total gill rakers on first gill arch 16 to 28 (usually 16 to 19, moderate to elongate) in *Hoplostilatus*, and 6 to 20 (usually 9 to 15, reduced and blunt) in *Malacanthus*. Dorsal and anal fins long and continuous; length of dorsal-fin base plus anal-fin base 80 to 135% (usually more than 90%) standard length. Dorsal-fin spines III to X in *Hoplostilatus*, and I to IV (usually II or IV) in *Malacanthus*; dorsal-fin rays 13 to 34 (*Hoplostilatus*), or 37 to 55 (*Malacanthus*). Anal-fin spines I or II (I in *Malacanthus*; usually II in *Hoplostilatus*, only *H. cuniculus* with I); anal-fin rays 12 to 20 in *Hoplostilatus*, and 37 to 55 (usually 39 to 51) in *Malacanthus*. Caudal fin falcate with rounded or pointed lobes, or truncate (may have elongate rays dorsally); caudal fin with 17 principal rays. Scales ctenoid in pockets over most of body, mostly cycloid in head region; pored lateral-line scales 89 to 141 in *Hoplostilatus*, 116 to 181 in *Malacanthus*; scales above lateral line 10 to 20 in *Hoplostilatus*, 7 to 17 in *Malacanthus*; scales below lateral line 34 to 49 in *Hoplostilatus*, 31 to 53 in *Malacanthus*. Vertebrae 10-11+14; supraoccipital skull crest much reduced to a small pointed process; first haemal spine over first or second anal-fin ray in *Hoplostilatus*, and over anal-fin rays 12 to 18 in *Malacanthus*; first haemal spine formed from parahypophyses fused only at their tips, forming a broad elliptical arch (unlike Branchiosteginae where they are fused medially forming a curved arch for rear of swimbladder); ratio of anal-fin supports to haemal spines 0.96 to 1.46 (*Hoplostilatus*) or 2.8 to 3.9 (*Malacanthus*); predorsal-fin supports 0-0-2- (*Hoplostilatus*) or 0-0-1-, 0-1-, or 2- (*Malacanthus*); procurent caudal-fin rays in upper fin lobe 10 to 12 (*Malacanthus*) or 11 to 13 (*Hoplostilatus*), and in lower lobe 9 to 13 (*Hoplostilatus*) or 10 to 12 (*Malacanthus*); a uroneural and parhypural, 3 epurals, and 2+3 autogenous hypurals. Highly complex adductor mandibulae (jaw) musculature but less complex than Branchiosteginae, with only 4 major subdivisions (lacking subdivision A₃B) (cf. figure of jaw muscles on previous page). Larvae pelagic, with numerous enlarged head spines and serrated ridges.**

subfamily Malacanthinae (*Hoplostilatus*)subfamily Malacanthinae (*Malacanthus*)lateral view of skull
(*Malacanthus plumieri*)head of 15 mm larval
Hoplostilatus fronticinctus

Habitat, biology, and fisheries: Tilefishes are a moderately deep, soft-bottom (mud or sand, or mixed sand, mud, and shell) dwelling group. They are usually caught at depths of 60 to 200 m in the area. Usually found living in burrows along the margins of continents or oceanic islands. The genus *Branchiostegus* is most abundant in the eastern Pacific and Indian oceans and Red Sea (15 nominal species). One species (*B. semifasciatus*) is also found in the eastern Atlantic off West Africa. The group all have pelagic larvae with elaborate patterns of head and scale spination until metamorphosis takes place when they become benthic juveniles (spination occurs only between 3 and 13 mm total length in *B. japonicus*). Tilefishes feed mainly on invertebrates (molluscs, polychaete worms, shrimps, squids, small crabs), although they may feed on small fish. They are very high quality food fishes and several species are commercially important. They are caught by hook-and-line or bottom longline and in trawls. For example, the fishery of *B. japonicus* is one of the more important fisheries of the East China Sea (Japanese landings have ranged from 6 000 to 12 000 t per year). The South China Sea is the location of another important tilefish fishery. Total annual tilefish landings for the Western Central Pacific probably exceed 25 000 t, but statistical data are not available for the area. Tilefishes are marketed fresh, dried, salted, or canned.

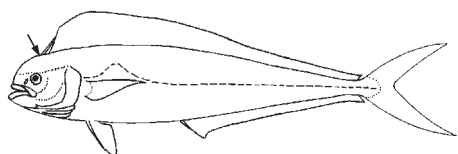
Remarks: The tilefishes are comprised of 2 morphologically different and evolutionarily distinct groups which are distinct enough to be considered as separate families (Branchiostegidae and Malacanthidae). However, for reasons of conformity in this field guide, these groups are tentatively treated herein as subfamilies following the classification in Nelson's (1994) "Fishes of the world", and Eschmeyer's (1998) "Catalog of fishes". However, the family name Malacanthidae used in these works must then be considered a junior synonym of Branchiostegidae. The subfamily Malacanthinae is also sometimes known as Latilinae.

Similar families occurring in the area

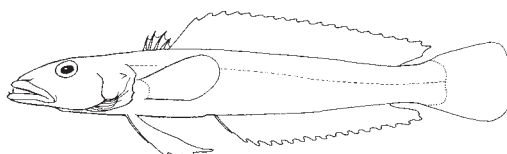
Representatives of several families look superficially similar to tilefishes, but can be separated from them as follows:

Coryphaenidae: dorsal fin extends forward to nape.

Pinguipedidae: always I anal-fin spine (versus I or II in Branchiostegidae).



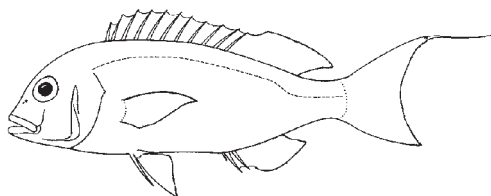
Coryphaenidae



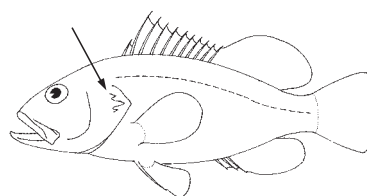
Pinguipedidae

Nemipteridae: caudal fin always forked (usually not forked in Branchiostegidae, except some *Hoplostetulus*); dorsal-fin spines X (versus VI to X); anal-fin spines III (versus I or II); anal-fin rays 7 or 8 (versus 11 to 55).

Serranidae: anal-fin spines III (versus I or II in Branchiostegidae); 1 to 3 opercular spines (versus a single sharp pointed spine or a single soft blunt spine).



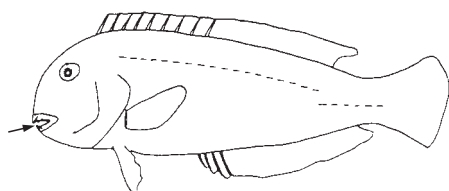
Nemipteridae



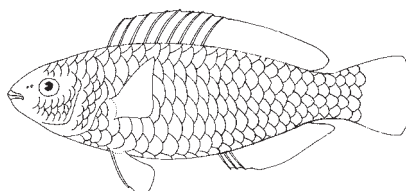
Serranidae

Labridae: with prominent nipping canines.

Scaridae: mouth smaller; scales larger; lateral line discontinuous.



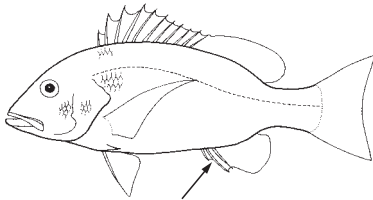
Labridae



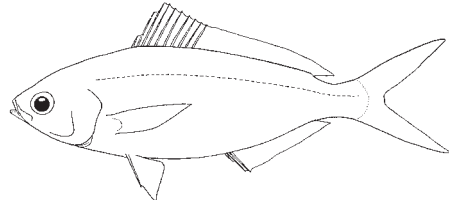
Scaridae

Lutjanidae: anal-fin spines III (versus I or II in Branchiostegidae); pointed head profile.

Caesionidae: caudal fin forked; mouth smaller; dorsal-fin spines X to XV (versus VI to X in Branchiostegidae); anal-fin spines III (versus I or II).



Lutjanidae



Caesionidae

Key to the subfamilies of Branchiostegidae occurring in the area

- 1a. Predorsal ridge present (may be as an enlarged flap); body depth 21 to 36% (usually 27%) standard length; dorsal-fin elements (i.e. spines plus soft rays) 22 to 36; anal-fin elements 14 to 28; length of dorsal-fin base plus anal-fin base 80 to 109% (usually about 90%) standard length; body shape robust or quadriform **Branchiosteginae**
(a single genus, *Branchiostegus*, occurring in the area)
- 1b. No predorsal ridge; body depth 12 to 26% (usually 27%) standard length; dorsal-fin elements 22 to 64; anal-fin elements 14 to 56; length of dorsal-fin base plus anal-fin base 80 to 135% (usually over 90%) standard length; body elongate or fusiform **Malacanthinae**

Key to the species of Branchiostegus occurring in the area (as modified from Dooley and Kailola, 1988)

Remarks on key characters: the 16 species of *Branchiostegus* presently known (14 in the area) are often difficult to distinguish by single external characters except their living colour pattern. As their coloration does not preserve well, identification becomes more difficult with the specimen's age or preservation. Nevertheless, meristic data such as pored lateral-line scales and morphological characters such as head, body, and fin proportions and internal characters are useful for species identification.

- 1a. Pored lateral-line scales 67 to 72 (modally 70); dorsal fin with VII (rarely VI) spines and 15 soft rays; body with 18 or 19 dark tapered vertical bars; operculum, predorsal ridge, and area above pectoral-fin axil without dark pigment (Fig. 1) **Branchiostegus serratus**
(eastern Australia)
- 1b. Pored lateral-line scales 47 to 51; dorsal fin with VI spines and 16 (rarely 15) soft rays, or with VII spines and 15 (rarely 14) soft rays; body with 16 to 20 dark tapered vertical bars, light vertical bars, or no bars; operculum, predorsal ridge, with or without dark pigment → 2
- 2a. Body with 6 or 7 rows of dark spots, 1 per scale, between lateral line and pectoral-fin base (spots may be faint); a dark spot on each dorsal-fin membrane along base of dorsal fin; caudal-fin margin double emarginate; lower half of caudal fin grey with yellow spots, and usually with 2 thin yellow stripes in central part of caudal fin; anal fin pale with clear areas between soft rays (Fig. 2) **Branchiostegus sawakinensis**
(Red Sea, South Africa, Philippines, northern and northwestern Australia)
- 2b. Body without rows of dark spots; no dark spots along base of dorsal fin between each ray → 3

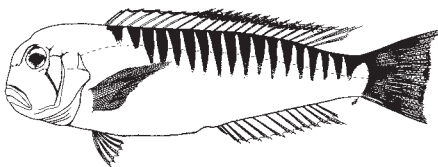


Fig. 1 *Branchiostegus serratus*

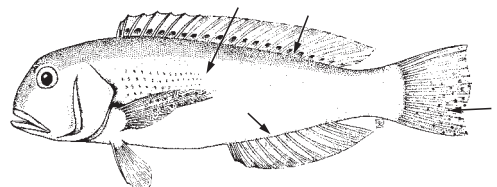


Fig. 2 *Branchiostegus sawakinensis*

- 3a. Jaws do not reach past a vertical line through anterior rim of orbit → 4
- 3b. Jaws reach beyond a vertical line through anterior rim of orbit → 6

4a. Preopercle indented above angle; predorsal ridge light coloured; caudal fin with numerous yellow spots, yellow rays, and light upper and lower margins; body whitish or silvery with some underlying pink; dorsal and anal fins clear with dark margin; broad white pelvic fins; no markings on cheek or snout (Fig. 3) ***Branchiostegus albus***
 (South Korea, Japan, East China Sea, Taiwan Province of China, South China Sea to Viet Nam)

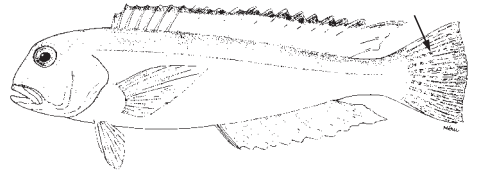


Fig. 3 *Branchiostegus albus*
(after Abe, 1965)

4b. Preopercle not indented above angle; predorsal ridge dark coloured; caudal fin with distinct yellow stripes and/or dark lower lobe and dark upper and lower margins; body light pink or silvery; dorsal fin clear (may have a yellow or black margin); anal fin clear; pelvic fins colourless and not broad; markings on cheek or snout may be present → 5

5a. Caudal-fin margin double emarginate, the fin with dark lower lobe and 2 central yellow stripes; 2 silvery or golden areas extending from suborbital rim to near upper jaw; snout top of head, and upper body red; sides and belly silvery white; a black upper margin along pectoral and soft dorsal fins; upper spinous dorsal-fin membrane with a thin yellow margin (Fig. 4) ***Branchiostegus australiensis***
 (known from 1 specimen collected in Shark Bay, Western Australia; not yet recorded from the area)

5b. Caudal-fin margin somewhat truncate, the fin with a dark lower lobe and a single central dark stripe, remainder of fin yellowish; suborbital and snout bright yellow, the snout with a triangular orange spot on lower medial portion; top of head and upper body dusky brown (in alcohol); sides and belly silvery; no black margin along upper pectoral or soft dorsal fins; spinous dorsal fin without yellow margin (Fig. 5) ***Branchiostegus ilocanus***
 [known only from Herre's (1928) description of a single specimen from the Philippines]

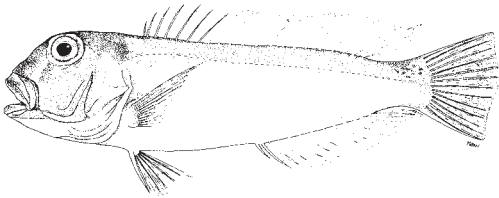


Fig. 4 *Branchiostegus australiensis*

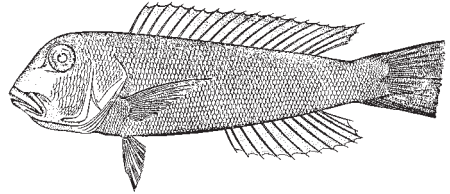


Fig. 5 *Branchiostegus ilocanus*
(from Herre, 1928)

6a. Distinct suborbital bars extending to near or over upper jaw → 7
 6b. No distinct suborbital markings extending to near or over upper jaw → 9

7a. A single narrow, pearly or silvery anterior suborbital bar extending to maxilla; head yellowish; dorsal fin may have small dark spot between first and second spines; upper dorsal-fin membrane yellow, narrowing posteriorly; base of dorsal-fin membrane also yellow; yellow dorsal-fin bands separated by narrow white streaks and central translucent areas; anal-fin membrane dusky with small white blotches along base between each ray; caudal fin double emarginate, its lower lobe dusky with several small yellow spots and 2 central yellow stripes; upper caudal-fin margin white near tip, with 3 or 4 radiating yellow stripes; upper margin of pectoral fins not dark; pelvic fins yellowish with white anterior margin; body reddish silver with no longitudinal stripes (Fig. 6) ***Branchiostegus auratus***

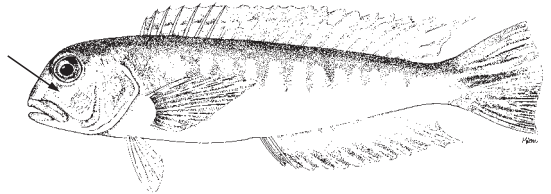


Fig. 6 *Branchiostegus auratus*
(after Abe, 1965)

(East China Sea, Japan, South Korea, Taiwan Province of China, South China Sea; not yet recorded from the area)

7b. Two or 3 silvery or white-coloured suborbital bars; remaining colour not as above → 8

8a. Three suborbital bars: a single pearl-coloured band extending from anterior suborbital to snout, a wider pearl-coloured bar extending from anterior suborbital to maxilla, a third silvery bar extending from posterior suborbital down scaled portion of cheek to branchiostegal membranes; snout bright pink; upper margin of spinous dorsal-fin membrane black; upper margin of soft dorsal-fin membrane yellow, the basal portion pearly; caudal fin subtruncate or somewhat double emarginate; 6 diagonal yellow stripes on upper two-thirds of caudal fin; body silvery pink with large dark spot above lateral line near upper opercular margin; predorsal ridge dark (Fig. 7) *Branchiostegus vittatus*

[known only from Herre's (1926) description of a single specimen from the Philippines]

8b. Two suborbital bars: parallel silvery bars extending from below the orbit and narrowing to over maxilla; head silvery; dorsal-fin membranes with a series of dark medial spots, becoming larger on soft-ray membranes, remaining membranes pink or clear; distal half of anal-fin membrane dusky, the proximal portion translucent (may have small elliptical white spots); caudal fin double emarginate, lower two-thirds dusky with 4 or 5 yellow longitudinal stripes; upper third of caudal fin pink with dark upper margin; upper margin of pectoral fins dark; pelvic fins translucent with white anterior margin; body pink with 2 dark stripes along entire length; predorsal ridge light coloured (Fig. 8) *Branchiostegus argentatus*
(East China Sea, Japan, South Korea, Taiwan Province of China, South China Sea, Nhatrang, Viet Nam)

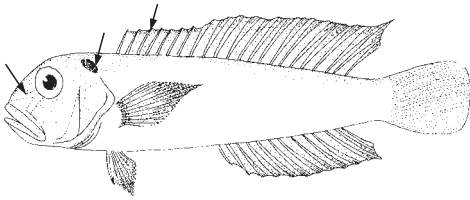


Fig. 7 *Branchiostegus vittatus*
(after Herre, 1926)

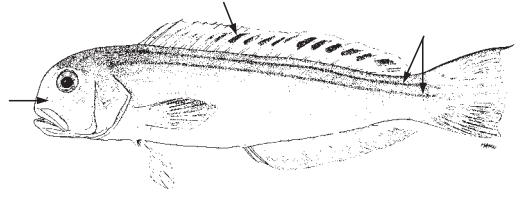


Fig. 8 *Branchiostegus argentatus*
(after Yoshino, 1984)

9a. Large triangular silvery marking from posterior orbital to midpreopercle; a silver triangular marking at upper opercular opening; upper body red with several irregular yellow markings near midbody; silvery iris usually with dark blotch along upper rim; caudal-fin membrane dusky, darker ventrally; 2 broad yellow parallel stripes in centre of caudal fin, with 5 or 6 yellow stripes on upper lobe; upper margin of caudal fin dark (reddish) (Fig. 9) *Branchiostegus japonicus*
(East China Sea, South Korea, Japan, South China Sea, Taiwan Province of China, South Viet Nam)

9b. No large silvery triangular marking on posterior orbital, nor at upper opercular opening; body without irregular yellow markings middorsally; no dark blotch along upper rim of iris; caudal-fin membrane light, dusky or dark ventrally; yellow stripes present or absent on caudal fin; upper margin of caudal fin light or dark → 10

10a. A dusky yellow area on dorsal-fin membrane between first and third spines; caudal fin yellow above, greenish grey below with 2 parallel yellow stripes in centre (Fig. 10) *Branchiostegus* sp. A
(Okinawa, Japan; not yet recorded from the area)

10b. No dusky yellow area on dorsal-fin membrane between first and third spines; caudal fin light above and light dusky or dark ventrally, yellow stripes present or absent → 11

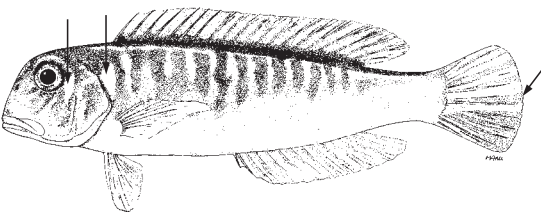


Fig. 9 *Branchiostegus japonicus*
(after Abe, 1965)

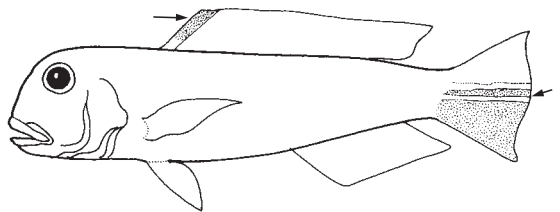


Fig. 10 *Branchiostegus* sp. A

- 11a. Predorsal ridge and surrounding area light (pale yellowish); dorsal and anal fins high (13% and 12% standard length, respectively); faint vertical body bars; caudal fin more truncate, the lower margin slightly emarginate, the fin without medial yellow stripes, but with single grey stripe (Fig. 11) ***Branchiostegus gloerfelti***
(eastern Indian Ocean: western central Sumatra; not yet recorded from the area)
- 11b. Predorsal ridge entirely dark or dark with a pale medial seam; dorsal-fin height 9 to 11% standard length; anal-fin height 7 to 9% standard length; may have faint reddish body markings corresponding to underlying myomeres; caudal-fin margin double emarginate, the fin with 2 or more medial yellow stripes → 12
- 12a. Caudal fin with black triangular patch on lower lobe, the lower margin light; upper caudal-fin lobe yellow with some grey, the upper margin dusky, central part of fin with 2 broad yellow stripes; body depth 23 to 26% (usually 25%) standard length; jaws extend to a vertical line drawn from posterior pupil rim; predorsal ridge dark (Fig. 12) ***Branchiostegus wardi***
(eastern Australia, Gulf of Papua to southern Queensland, Sydney, and New Caledonia)
- 12b. Caudal fin dusky, lacking black triangular patch on lower lobe, the lower margin dusky; upper caudal-fin lobe light with dusky upper margin; caudal fin with several light yellow radiating stripes corresponding to some of the rays; body depth 25 to 27% standard length; jaws extend to under anterior or middle of pupil; predorsal ridge pale with dark edges → 13

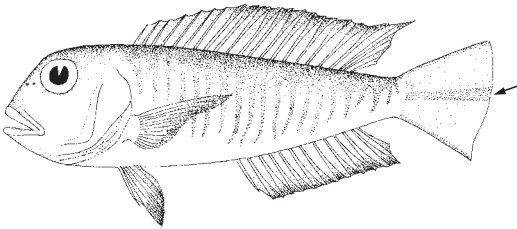


Fig. 11 *Branchiostegus gloerfelti*

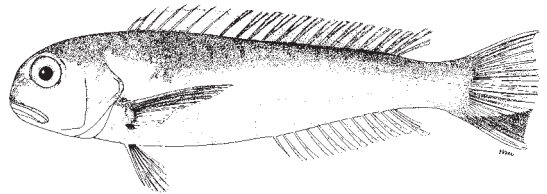


Fig. 12 *Branchiostegus wardi*

- 13a. Interorbital space 22 to 24% head length; jaws extending posteriorly to midorbit; suborbital depth 21% head length; predorsal ridge low, pale centrally with dark edges; preopercular angle about 90° (Fig. 13) ***Branchiostegus paxtoni***
(northwest of Port Hedland, Western Australia; not yet recorded from the area)
- 13b. Interorbital space 28 to 29% head length; jaws extending posteriorly to under anterior edge of pupil; suborbital depth 19 to 21% head length; predorsal ridge very prominent and dark; preopercular angle about 110° (Fig. 14) ***Branchiostegus hedlandensis***
(north of Port Hedland, Western Australia; not yet recorded from the area)

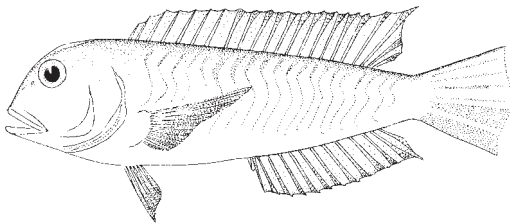


Fig. 13 *Branchiostegus paxtoni*

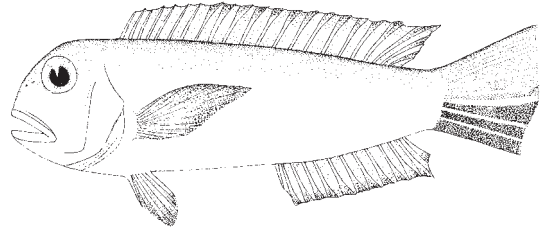


Fig. 14 *Branchiostegus hedlandensis*

Key to the genera of Malacanthinae occurring in the area

- 1a. Body depth 12 to 20% standard length (usually 14 to 17%); head depth 49 to 64% head length; suborbital depth 5 to 20% head length; preopercle smooth (no serrae), no spine at angle; opercle with a single sharp spine; no predorsal ridge; dorsal fin with I to IV spines and 43 to 60 soft rays; a single anal-fin spine; length of dorsal-fin base plus anal-fin base 112 to 135% (usually 125%) standard length; total gill rakers on first gill arch 6 to 20 (usually 9 to 15); pored lateral-line scales 116 to 181; predorsal-fin supports in the formulae 0-0-1-, 0-1-, or 2-; first haemal spine fused only at tip and positioned over anal-fin rays 12 to 18; vertebrae 10+14; all inhabit burrows ***Malacanthus***

1b. Body depth 15 to 29% standard length (usually 18 to 25%); head depth 57 to 86% head length; suborbital depth 3 to 7% head length; preopercle serrate, spine at angle (may be very reduced or prominent); opercle with sharp spine at angle; no predorsal ridge; dorsal fin with III to V (or VIII to X) spines and 13 to 34 soft rays; anal-fin spines I or II; length of dorsal-fin base and anal-fin base 80 to 100% (usually 90%) standard length; total gill rakers on first gill arch 16 to 28; pored lateral-line scales 89 to 140; predorsal-fin supports in the formula 0-0-2-; first haemal spine fused only at tip and positioned over second anal-fin ray; vertebrae 10 or 11+14; inhabit burrows except 2 known species (*H. fronticinctus* and *H. starcki* live in self-constructed mound of coral rubble) *Hoplolatilus*

Key to the species of *Hoplolatilus* occurring in the area

(modified from Randall and Dooley, 1974, Klausewitz, et al., 1978, and Randall, 1981)

- 1a.** Caudal fin emarginate or forked; vertebrae 10+14; total gill rakers on first gill arch 20 to 29; opercular spine smaller than pupil; width of maxilla less than diameter of pupil (**subgenus *Hoplolatilus***) → 2
- 1b.** Caudal fin truncate, not emarginate or forked, its upper lobe with elongate rays; vertebrae 11+14; total gill rakers on first gill arch 16 to 19; opercular spine larger than pupil; width of maxilla about equal to or greater than diameter of pupil (**subgenus *Asymmetrurus***) → 7
(a single representative of this subgenus, *H. fourmanoiri*, occurring in the area)
- 2a.** Dorsal fin with X spines and 13 soft rays; anal fin with II spines and 12 soft rays; lateral-line scales 89 to 97; an elongate projection of white skin along inner edge of clavicle under operculum near pectoral-fin base; posterior margin of preopercle with 18 or less serrae → 3
- 2b.** Dorsal fin with III to IX spines and 18 to 34 soft rays; anal fin with I or II spines and 12 to 20 soft rays; lateral-line scales 85 to 140; without an elongate projection of white skin along inner edge of clavicle under operculum near pectoral-fin base; posterior margin of preopercle with 35 or more serrae → 4
- 3a.** Lateral-line scales 85 to 92; 16 to 20 coarse preopercular serrae; a spine at preopercular angle, about 1/2 as large to nearly as large as opercular spine; total gill rakers on first gill arch 26 to 29; pectoral-fin rays 16 to 17; caudal fin deeply emarginate (forked); body olive-brown with blue (brown upon preservation) saddle-shaped spot on caudal peduncle; a broad blue area on side of cheek, chest, and abdomen; a narrow deep blue band across snout extending nearly to eyes; dorsal and anal fins yellowish with pink margins; spinous dorsal fin yellow; caudal fin mostly yellow, with faint thin medial white streak (Fig. 15) *Hoplolatilus fronticinctus*
(Mauritius; Madras, India; Luzon, Philippines; Palau Islands and Solomon Islands)
- 3b.** Lateral-line scales 90 to 97; 14 to 16 coarse preopercular serrae; no enlarged spine at preopercular angle; total gill rakers on first gill arch 20 or 21; pectoral-fin rays 16; caudal fin forked; body salmon dorsally, white or bluish white ventrally; a yellow longitudinal stripe may appear on back along dorsal-fin base, extending to caudal peduncle; snout and upper head olive (may have some yellow); a yellow-orange bar from eye to mouth; cheek with 2 irregular (wavy) longitudinal blue bands separated by light yellow bands; dorsal and anal fins light yellow; pectoral fins pale, pelvic fins pale or light yellow; upper and lower caudal-fin lobes various colours (yellow, green, blue), the central area transparent; can undergo a very rapid (24 colours in 15 seconds) colour change when frightened (Fig. 16) *Hoplolatilus chlupaty*
(Philippines: Batangas, Luzon)

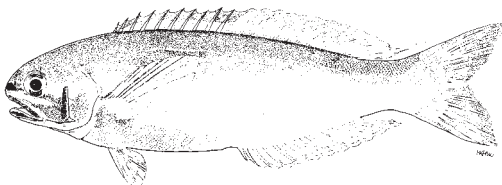


Fig. 15 *Hoplolatilus fronticinctus*

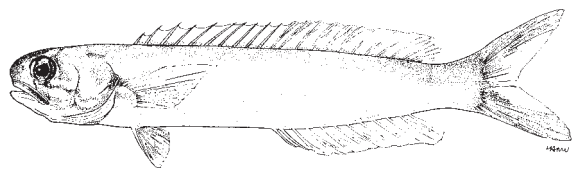


Fig. 16 *Hoplolatilus chlupaty*

4a. Dorsal fin with III to V spines and 29 to 34 soft rays; anal fin with I spine and 19 or 20 soft rays; lateral-line scales 116 to 140; body depth 5.2 to 6.3 times in standard length; caudal fin forked; colour: body light olive-brown on back, fading to light yellow ventrally; a blue area on dorsal and postorbital area of head (fades upon death); dorsal-fin base coloured like upper body, remainder of fin bluish; caudal peduncle and upper and lower caudal-fin lobes bright yellow (Fig. 17) *Hoplostilatus cuniculus*

(widespread Indo-Pacific: Tahiti, western Pacific to western Indian Ocean)

4b. Dorsal fin with VIII or IX spines and 18 to 23 soft rays; anal fin with I or II spines and 14 to 16 soft rays; lateral-line scales 95 to 121; body depth 3.8 to 5.5 times in standard length; caudal fin deeply emarginate to forked → 5

5a. Dorsal fin with IX spines and 18 or 19 soft rays; anal fin with I spine and 15 or 16 soft rays; total gill rakers on first gill arch 20 to 24; lateral-line scales 105 to 121; body depth 5.3 to 5.5 times in standard length; caudal fin deeply emarginate; colour: head and nape blue; body mostly magenta fading to white on belly; dorsal portion of body and base of dorsal fin brilliant blue; remainder of dorsal fin reddish orange; anal fin light orange with a pale blue margin; upper and lower lobes of caudal fin deep magenta, central area blue fading to magenta posteriorly (Fig. 18) *Hoplostilatus purpureus*

(Guadalcanal, Solomon Islands, Philippines, and Indonesia)

5b. Dorsal fin with VIII or IX spines and 16 to 23 soft rays; anal fin with I or II spines and 14 to 16 soft rays; total gill rakers on first gill arch 21 to 27; lateral-line scales 95 to 118; body depth 3.7 to 5.1 times in standard length; caudal fin emarginate to forked → 6



Fig. 17 *Hoplostilatus cuniculus*

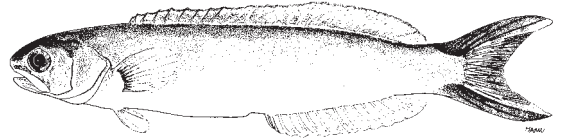


Fig. 18 *Hoplostilatus purpureus*

6a. Dorsal fin with IX spines and 16 soft rays; anal fin with I spine and 14 soft rays; total gill rakers on first gill arch 21 to 24; lateral-line scales 95 to 104; body depth 5 to 5.1 times in standard length; caudal fin emarginate; colour: an orange-red band from tip of snout to eye, arching dorsally to back then curving ventrally to middle of caudal peduncle, then broadening into a triangular area and becoming much darker (reddish black); head and body above band tan to red-brown, except on dorsal area of caudal peduncle where it is white; head and body below band white to pink-white; dorsal and anal fins white; dorsal with an red-orange margin, anal with a light blue margin; caudal fin white above and below with a dark triangle (Fig. 19) *Hoplostilatus marcosi*

(Luzon, Philippines, Guadalcanal and New Georgia, Solomon Islands)

6b. Dorsal fin with VIII spines and 21 to 24 soft rays; anal fin with II spines and 15 or 16 soft rays; total gill rakers on first gill arch 22 to 27; lateral-line scales 100 to 118; body depth 3.7 to 4.6 times in standard length; caudal fin deeply forked; colour: body tan with a large bright blue area over head area from below upper eye to thorax past base of pectoral fins; dorsal and anal fins light yellow, the dorsal fin with some blue; caudal fin bright yellow except upper and lower and central posterior margins which are whitish; young completely blue (Fig. 20) *Hoplostilatus starcki*

(Mariana Islands, Caroline Islands, Palau Islands, Marshall Islands, and Tuamotu Archipelago)

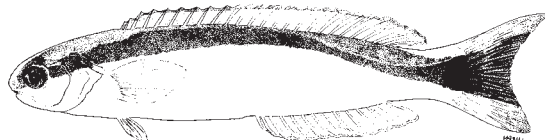


Fig. 19 *Hoplostilatus marcosi*



Fig. 20 *Hoplostilatus starcki*

7a. A prominent spine at preopercular angle, 1/2 or greater than length of opercular spine; dorsal fin with X spines and 21 to 23 soft rays; anal fin with II spines and 18 or 19 soft rays; total gill rakers on first gill arch 16 to 19; lateral-line scales 96 to 101; maxilla reaching a vertical at posterior rim of orbit; colour: body grey, darker dorsally; top of head violet-black; large irregular light (yellow) areas separated by dark areas; a large, nearly triangular black spot from caudal peduncle extending to near central caudal-fin margin (Fig. 21) *Hoplolatilus fourmanoiri*

(South Viet Nam, Guadalcanal, Solomon Islands, Philippines)

7b. A short broad-based spine at preopercular angle; dorsal fin with X spines and 22 soft rays; anal fin with II spines and 20 soft rays; total gill rakers on first gill arch 17; lateral-line scales 92; maxilla reaching beyond a vertical at posterior rim of orbit; an irregular dark stripe slightly above middle of side of body, ending at middle of caudal fin; an irregular row of dark spots on body above stripe (Fig. 22) *Hoplolatilus oreni*

(known only from the type specimen collected in the Red Sea; not yet recorded from the area)

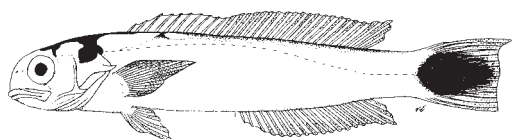


Fig. 21 *Hoplolatilus fourmanoiri*

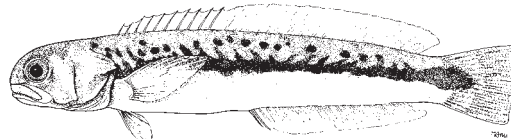


Fig. 22 *Hoplolatilus oreni*

Key to the species of *Malacanthus* occurring in the area

1a. Dorsal-fin elements (i.e. spines plus soft rays) 53 to 65; total gill rakers on first gill arch 9 to 20 (modally 15); broad midbody longitudinal band from operculum to tip of caudal fin, widening on tail to include most of middle and lower portion, lower portion with a small white rectangular area (Fig. 23) *Malacanthus brevirostris*

1b. Dorsal-fin elements 46 to 51 (modally 49); total gill rakers on first gill arch 6 to 14; caudal fin with characteristic 2 dark parallel bands (Fig. 24) *Malacanthus latovittatus*

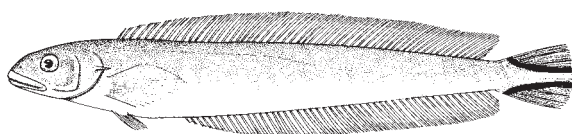



Fig. 23 *Malacanthus brevirostris*





Fig. 24 *Malacanthus latovittatus*

List of species occurring in the area

The symbol  is given when species accounts are included. A question mark indicates that presence in the area is uncertain.

Subfamily BRANCHIOSTEGIDAE

-  *Branchiostegus albus* Dooley, 1978
-  *Branchiostegus argentatus* (Cuvier, 1830)
- ? *Branchiostegus auratus* (Kishinouye, 1907) ^{1/}
- ? *Branchiostegus australiensis* Dooley and Kailola, 1988 ^{2/}
- ? *Branchiostegus gloerfelti* Dooley and Kailola, 1988 ^{3/}
- ? *Branchiostegus hedlandensis* Dooley and Kailola, 1988 ^{4/}

1/ Marginal to the area: known from southern Japan and south coast of Korea to the East China Sea to Taiwan Province of China and possibly northern portions of the South China Sea. Maximum standard length 29 cm. Found living along with *B. japonicus*, *B. argentatus*, and *B. albus* within part of their ranges (East China Sea), although depth preferences may differ somewhat (*B. auratus* usually caught at greater depths, 225 to 290 m, but at 30 to 290 m off Taiwan Province of China).

2/ Not yet recorded from the area. Known only from the holotype, 26.6 cm standard length, collected southeast of Shark Bay (26°21'S, 112°35'E), Western Australia at a depth of 164 to 170 m. Potentially commercial food fish.

3/ Not yet recorded from the area. Known only from the holotype, 23.5 cm standard length, trawled off central Sumatra (about 00°22'S, 98°44'E). Might be expected elsewhere in Indonesia. A potentially commercial species.

4/ Not yet recorded from the area. Known only from Port Hedland (18°32'S, 118°17'E), Western Australia. Size range 22.5 to 26 cm standard length. Collected by bottom trawls at a depth of 200 to 204 m. A potentially commercial species.

- Branchiostegus ilocanus* Herre, 1928 ^{5/}
 ➤ *Branchiostegus japonicus* (Houttuyn, 1782)
 ? *Branchiostegus paxtoni* Dooley and Kailola, 1988 ^{6/}
 ➤ *Branchiostegus sawakinensis* Amirthalingam, 1969
 ➤ *Branchiostegus serratus* Dooley and Paxton, 1975
Branchiostegus vittatus Herre, 1926 ^{7/}
 ➤ *Branchiostegus wardi* Whitley, 1932
 ? *Branchiostegus* sp. A from Okinawa, sensu Yoshino and Hayashi

Subfamily MALACANTHINAE

- Hoplolatilus (Hoplolatilus) chlupatyi* Klauswitz, McCosker, Randall, and Zetzsche, 1978
Hoplolatilus (Hoplolatilus) cuniculus Randall and Dooley, 1974
Hoplolatilus (Asymmetrurus) fourmanoiri Smith, 1963
Hoplolatilus (Hoplolatilus) fronticinctus Günther, 1887
Hoplolatilus (Hoplolatilus) luteus Allen and Kuitert, 1989
Hoplolatilus (Hoplolatilus) marcosi Burgess, 1978
 ? *Hoplolatilus (Asymmetrurus) oreni* (Clark and Ben Tuvia, 1973)
Hoplolatilus (Hoplolatilus) purpureus Burgess, 1978
Hoplolatilus (Hoplolatilus) starcki Randall and Dooley, 1974
 ➤ *Malacanthus brevirostris* Guichenot, 1848
 ➤ *Malacanthus latovittatus* (Lacepède, 1802)

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- Yoshino, T., W. Hiramatsuu, O. Tabata, and Y. Hayashi. 1984. First record of the tilefish *Branchiostegus argentatus* (Cuvier) from Japanese waters, with a discussion on the validity of *B. auratus* (Kishinouye). *Galaxea*, 3:145-151.

5/ This species has not been verified after the original description by Herre (1928), based on a 27 cm specimen (original specimen lost) purchased from a market at Narvacan, Ilocos Sur Province (Luzon, Philippines). A recent (1995) examination of fishes from numerous Philippine markets failed to reveal any specimens of *Branchiostegus*.

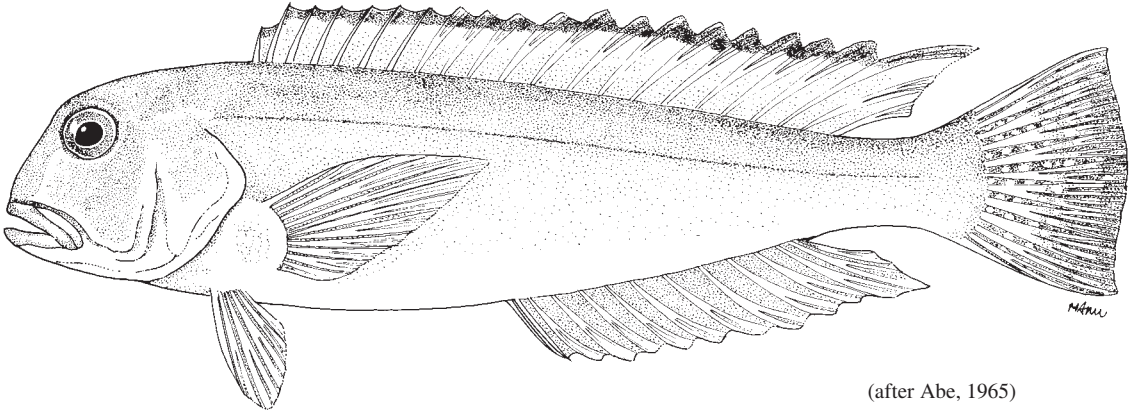
6/ Not yet recorded from the area. So far, known only from northwest of Port Hedland, Western Australia (19°01'S; 117°12'E). Size range 20.5 to 25.5 cm standard length. Caught in bottom trawls in depths of 200 to 202 m. Potential commercial food fish.

7/ This species has not been verified after the original description by Herre (1926), based on a single specimen, 24 cm standard length, collected from a Manila fish market (original specimen lost). A recent (1995) examination of fishes from numerous Philippine markets failed to reveal any specimens of *Branchiostegus*. Caudal-fin margin of this species may not be as rounded as drawn by Herre (see Fig. 7 in above key; figure redrawn from original).

Branchiostegus albus Dooley, 1978

Frequent synonyms / misidentifications: None / *Branchiostegus argentatus* (Cuvier, 1830); *B. japonicus* (Houttuyn, 1782).

FAO names: En - White tilefish; Sp - Blanquillo de blanco.



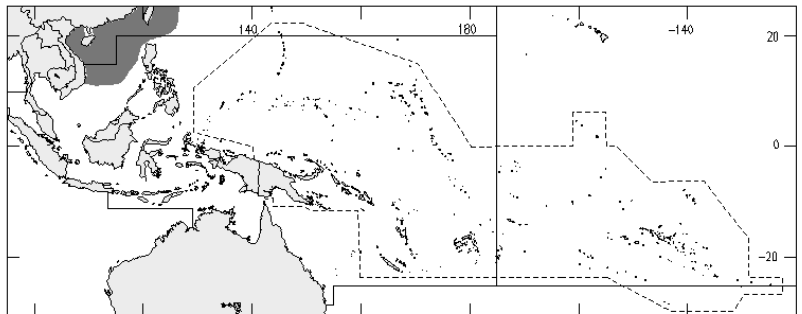
(after Abe, 1965)

Diagnostic characters: Preopercle finely serrated to its angle with a slight indentation above the angle is about 105°. Eye high on head and proportionately small, 20 to 24% head length. Posterior margin of jaw not quite or just reaching a vertical at anterior eye margin. Caudal fin double emarginate. Pelvic fins comparatively broad, with rounded posterior margin. First haemal spine characteristically very recurved. **Colour:** body without dark vertical bars; upper body silvery white with a pink hue (fresh specimens); belly white; snout yellow-pink, cheek with a broad silvery band from suborbit to upper jaw; dorsal-fin membrane translucent with some areas of white or pink; a dark band along margin of spinous dorsal fin; pectoral fins translucent; pelvic fins milky white with some overlying dusky tint; **predorsal ridge prominent and pale yellowish; caudal fin dusky, lower lobe not dark, the rays yellow at base, the membranes with small yellow spots, the dorsal and ventral edges mainly white.**

Size: Maximum standard length perhaps 60 cm; commonly between 20 and 40 cm standard length.

Habitat, biology, and fisheries: Found on muddy or sand bottom, usually associated with burrows; depths generally under 100 m. Caught by hook-and-line, bottom longlines, or trawls.

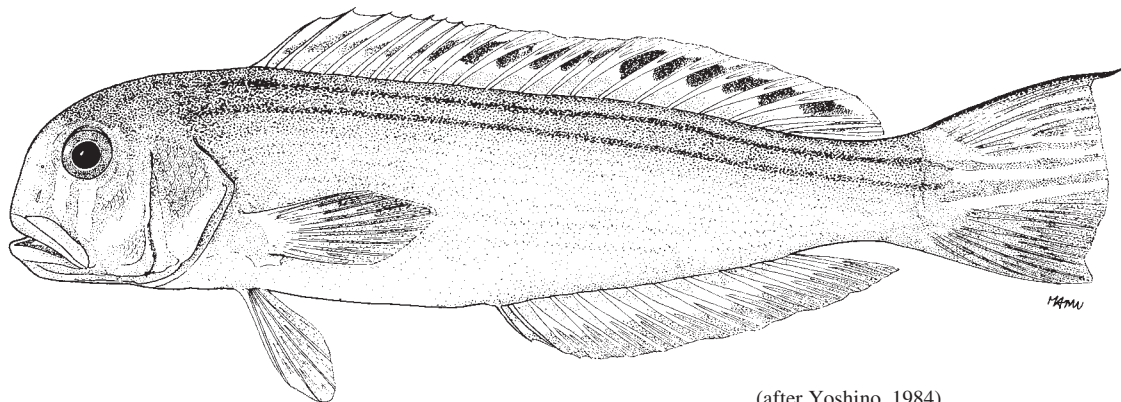
Distribution: From Japan (Honshu), North Korea (Pusan), East China Sea (including Shanghai and Taiwan Province of China), South China Sea (including Hong Kong and Macao) to Viet Nam.



Branchiostegus argentatus (Cuvier, 1830)

Frequent synonyms / misidentifications: None / *Branchiostegus japonicus* (Houttuyn, 1782); *B. albus* Dooley, 1978.

FAO names: En - Silver tilefish; Sp - Blanquillo de plata.



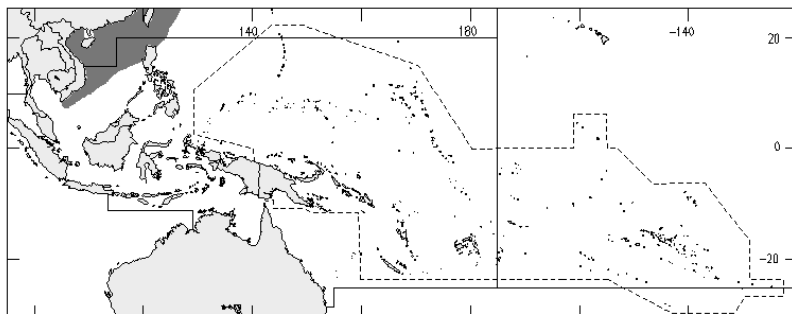
(after Yoshino, 1984)

Diagnostic characters: Body depth shallow, 22 to 25% (usually 24%) standard length; body width narrow, 10 to 12% standard length; predorsal length short, 28 to 31% (usually 30%) standard length. Preopercle finely serrate only to angle, no indentation at angle as in *Branchiostegus albus*, lower limb smooth; preopercular angle 85° to 95°. Suborbital shallow, 14 to 24% (usually 19%) head length (a character shared in the area only with *B. wardi*, suborbital 16 to 22% head length, usually 19%). Eye large, 25 to 36% (usually 30%) head length (proportionally largest among species of *Branchiostegus*). Jaws extend posteriorly to nearly under a vertical from posterior pupil. Dorsal fin comparatively low, 8% standard length. Caudal fin usually double emarginate. **Colour:** body dusky above lateral line, silvery below with a hint of yellow-orange stripes; belly white with a rose hue; numerous (2 or more prominent) longitudinal orange stripes on dorsal part of body, only faint ventrally; head with 2 prominent pearly silvery bands from suborbital to upper jaws; predorsal ridge dark; dorsal-fin membrane pink with a series of dark elliptical blotches dorsally (most prominent in rayed portion), disappearing before posterior edge; a series of faint yellow blotches basally along dorsal-fin membrane; anal fin whitish with a series of faint white spots basally, the distal half of fin dusky; caudal fin with dark leading upper edge, pink underneath, the lower portion dusky with 6 bright yellow stripes and several small spots below lowest stripe; upper edge of pectoral fins dark, and dusky below; pelvic fins white anteriorly, transparent posteriorly; much of the coloration lost upon preservation.

Size: Maximum standard length 25 cm.

Habitat, biology, and fisheries: Found benthically in relatively shallow depths (between 50 and 65 m). Caught by hook-and-line, bottom longlines, and trawls.

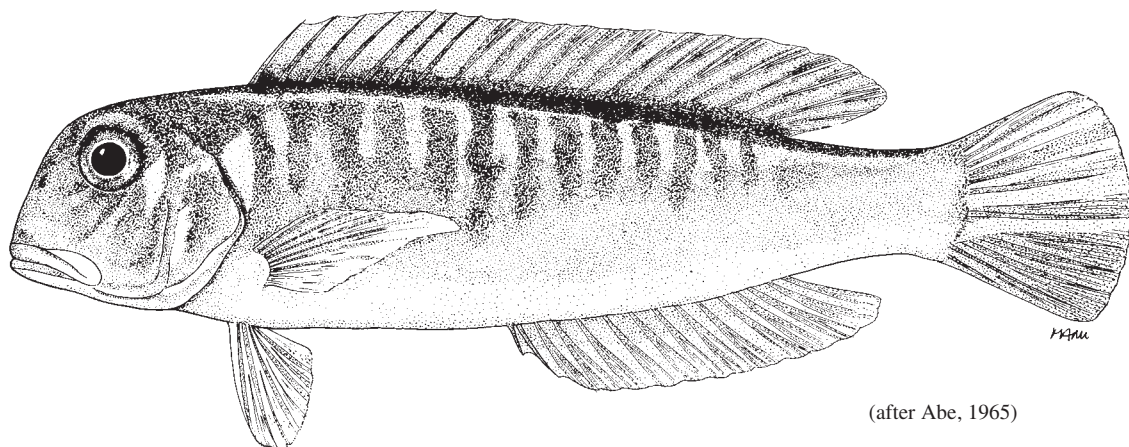
Distribution: Southern Japan to Viet Nam (Nhatrang), including Taiwan Province of China, East China Sea, coast of China, Hong Kong, and South China Sea.



Branchiostegus japonicus (Houttuyn, 1782)

Frequent synonyms / misidentifications: None / *Branchiostegus auratus* (Kishinouye, 1907); *B. argentatus* (Cuvier, 1830); *B. albus* Dooley, 1978.

FAO names: En - Red tilefish; Sp - Blanquillo de roja.



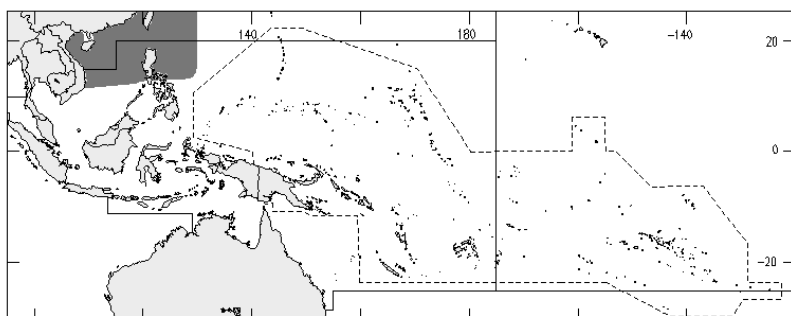
(after Abe, 1965)

Diagnostic characters: (Most meristic and morphometric data overlap other species of *Branchiostegus* in the area.) **Head large, 26 to 30% (usually 28%) standard length. Preopercle angle 90° to 95°, without notch above angle. Eye large, 28% head length.** Jaws slightly oblique, extending posteriorly to under anterior third of pupil. **Colour:** body pink-red with overlying golden tint and underlying faint yellowish blotches, several irregular light reddish blotches dorsally at midbody (appears as though mucus coating has been lost in that area revealing the underlying golden reddish coloration); predorsal ridge dark; head without suborbital silvery bars, but with characteristic large triangular postsuborbital silvery white area (may have another smaller triangular area at upper margin of operculum); caudal fin with 5 or 6 bright yellow stripes (2 prominent midcaudal stripes plus 3 or 4 smaller, fainter stripes dorsally on fin).

Size: Maximum recorded total length 37.8 cm; commonly between 20 and 33 cm standard length; maximum weight estimated to be 485 g (females) and 714 g (males), for an estimated age of 8 years.

Habitat, biology, and fisheries: Found associated with burrows on sandy-muddy, or shell-sand-mud bottoms in depths of 30 to 265 m; commonly caught at depths of 80 to 200 m in East China and Yellow seas. Bottom temperatures 8° to 18°C (winter) 14° to 22°C (autumn). Spawning peaks appear to be twice a year (July and October) in the East China Sea. Larvae appear in October off Sado Straits in Japan at depths of 0 to 50 m (19° to 21°C). Caught by bottom longlines and trawls. Catches have fluctuated from 500 t before 1956 to a peak of 12 460 t in 1970. Catches of the Red tilefish, although comprising 90% of all tilefish catches in the East China Sea, have declined since 1970, averaging about 6 000 t in recent years. The catch/effort in 1967 to 1980 declined from 9 to 4.4 fish per longline (1978 to 1980 catch per day averaged about 270 kg per 120 longlines, with 130 hooks/longline), indicating the need for fishery management at least for the male stock as males are generally larger, more voracious, and more easily caught. Marketed fresh, canned, and salted.

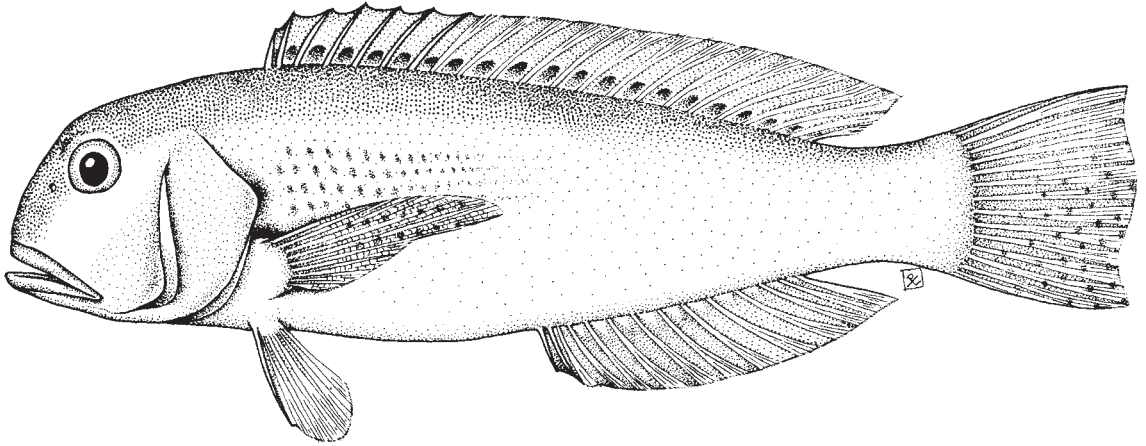
Distribution: Sea of Japan (central Honshu, Japan), portions of the East China Sea, South China Sea, and coast of China to South Viet Nam and waters around the Philippines. Previous records from South Africa are probably attributable to either *B. sawakinensis* or *B. doliatus*.



Branchiostegus sawakinensis Amirthalingam, 1969

Frequent synonyms / misidentifications: None / *Branchiostegus doliatus* (Cuvier, 1830); *B. japonicus* (Houttuyn, 1782).

FAO names: En - Freckled tilefish; Fr - Tile taches de son; Sp - Barko barko.

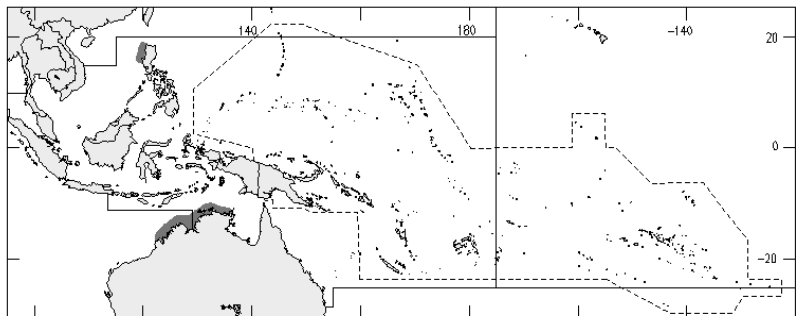


Diagnostic characters: Preopercle angle 95° to 100° . Jaws extending posteriorly to under middle of pupil. Dorsal-fin height low, about 7% standard length. Possesses (along with only *Branchiostegus wardi*) a unique arrangement of jaw muscles (adductor mandibulae complex) in having subdivisions of the $A_1\frac{2}{3}$ (cf. figure of jaw muscles on family sheet). **Colour:** body with varied reddish and yellow pastel shades and 5 to 7 rows of dark spots from below lateral line to beneath pectoral fins; rose-violet around eye and silvery yellow below; predorsal ridge darkly pigmented; a golden area above opercle; dorsal fin with a small dark rectangular markings along its base; anal-fin membrane with small, silver-white triangles along its base; upper portion of caudal fin light with yellow rays, lower portion dark grey with 10 to 15 small yellow spots (noted on Philippine specimens).

Size: Maximum standard length 39 cm, commonly to 25 cm standard length; preserved weight 1 kg.

Habitat, biology, and fisheries: Found over muddy bottoms at 80 m in the Red Sea (called locally "shawra" or "theena" and regarded to be occasionally poisonous there), 45 m over sandy bottom from South Africa, and captured by trawls at 120 to 180 m over sandy bottom off the Philippines. Not common in the markets of Cebu City (Philippines). Probably inhabits burrows. Captures by hook-and-line, and by trawls. Marketed fresh or salted.

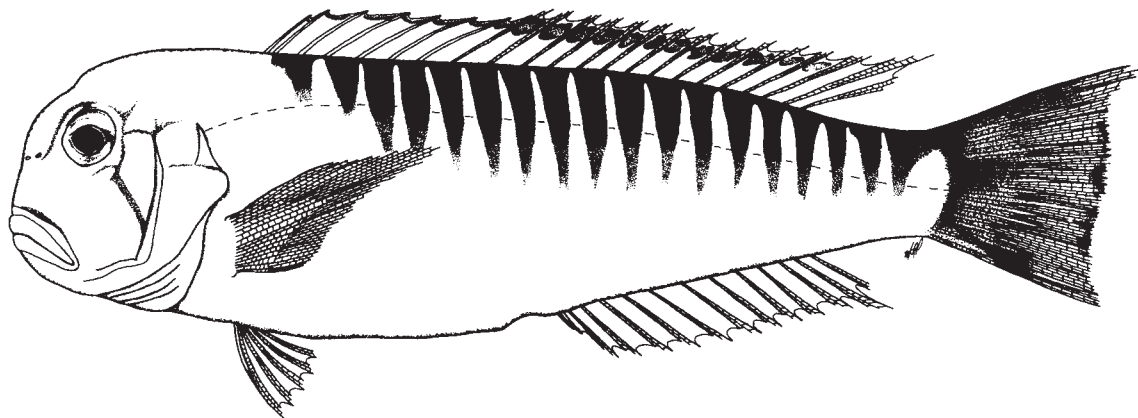
Distribution: Recent records from the Philippines and northwestern Australia. Also disjunctly known from the western Indian Ocean to South Africa, where it has been erroneously identified as *B. japonicus* or *B. doliatus*. May be widespread throughout the Indian Ocean and western Central Pacific.



Branchiostegus serratus Dooley and Paxton, 1975

Frequent synonyms / misidentifications: None / *Branchiostegus wardi* Whitley, 1932.

FAO names: En - Australian barred tilefish.

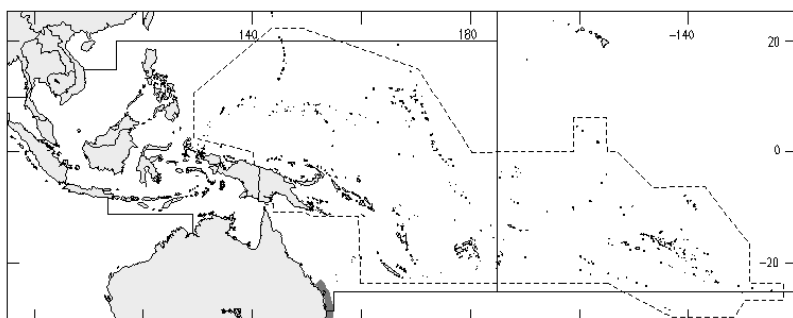


Diagnostic characters: Snout profile steep, nearly vertical. Jaws oblique reaching posteriorly to below centre of pupil. Total gill rakers on first gill arch 18 to 20. Caudal fin double emarginate. **Pored lateral-line scales 67 to 72 (highest among all species of *Branchiostegus*).** **Colour:** body silvery white with overlying yellow-orange and 18 or 19 dark violet tapering bars extending from back to below lateral line; no bars under orbit; predorsal ridge light yellow; snout yellow-orange; iris golden; cheeks silver-white with an oblique darker band on preopercle; spinous dorsal fin dusky with a narrow yellow upper margin; soft dorsal-fin membrane with a series of elliptical spots, fading posteriorly; anal-fin membrane translucent; pectoral fins opaque with an upper black edge (first 2 rays); pelvic fins translucent; caudal fin with wide central yellow area; dorsal, ventral, and posterior caudal-fin margins black.

Size: Maximum standard length 41 cm; commonly between 25 and 30 cm standard length.

Habitat, biology, and fisheries: Bottom-dwelling, well documented from depths of 110 to 150 m; maximum depth recorded 162 m. Shallower eastern Australian trawling surveys (60 to 110 m) conducted in the Australian area earlier, failed to catch any specimens of *B. serratus*. Often caught in the same trawl samples with *B. wardi* (another eastern Australian species not known until collected in 1928). Both species are now common in the Sydney fish markets. Stomach analysis revealed a wide variety of food items: fish remains, bivalves, gastropods, crabs, amphipods, stomatopods, and polychaete worms. Deviations of the expected 50/50 sex ratio suggest protogynous sex reversal (other explanations possible); specimens under 38 m standard length exhibit a 50/50 sex ratio, while larger specimens are generally males. Ovaries collected in June were filled with 0.2 to 0.9 mm ova. About 25 kg per day can be found in the Sydney market. Marketed fresh.

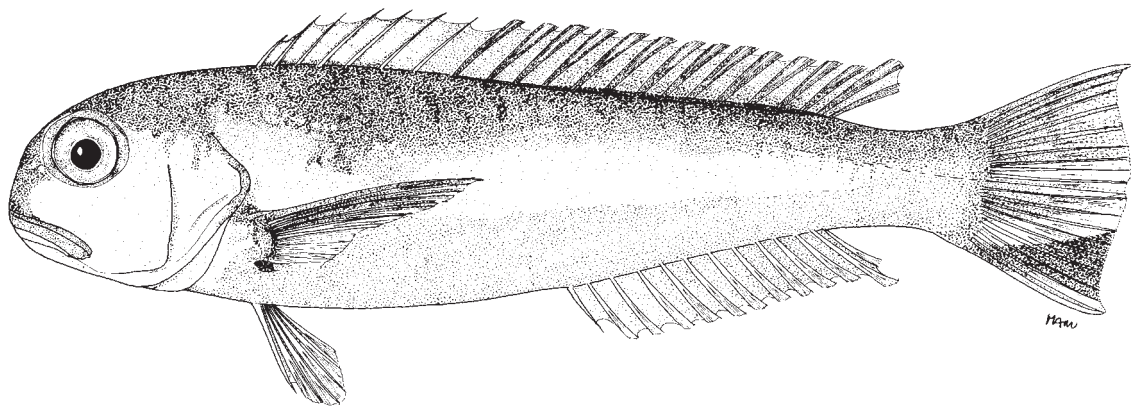
Distribution: Known from Cape Moreton (Queensland) and the coast of New South Wales (Australia) from Coff's Harbour 30°20'S, to Lake Illawarra 34°30'S.



***Branchiostegus wardi* Whitley, 1932**

Frequent synonyms / misidentifications: None / *Branchiostegus serratus* Dooley and Paxton, 1975.

FAO names: En - Ward's tilefish.

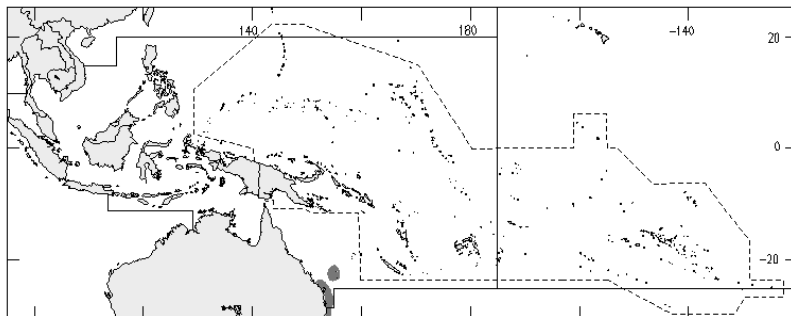


Diagnostic characters: Suborbital shallow, 16 to 22% (usually 19%) head length, a character in the area shared only with *Branchiostegus argentatus* (suborbital 14 to 24% head length, usually 19%). Snout blunt. Pored lateral-line scales 48 to 51 (unlike 67 to 72 in *B. serratus*); caudal fin double emarginate. **Colour:** body without vertical bars, dark brown dorsally, silver-white ventrally; snout purple; top of head dark; predorsal ridge dark; cheeks silver without suborbital bars; spinous membrane of dorsal fin light to dusky, with some yellow; soft dorsal-fin membrane dusky, without distinct markings; pectoral fins with dark dorsal margin, upper portion somewhat dusky, the lower clear; pelvic fins dusky; caudal fin with dark triangle on lower lobe, the dorsal and ventral edges yellow; 2 parallel medial yellow bands separated by medial dusky area, remainder of fin yellowish with some dusky areas.

Size: Maximum standard length 41 cm; commonly between 22 and 33 cm standard length.

Habitat, biology, and fisheries: Caught mainly by bottom trawls in depths of 90 to 110 m off southern Queensland and New South Wales; also caught at a depth of 250 m near the edge of a barrier reef off Nouméa, New Caledonia. Often caught in the same trawl with *B. serratus*. A benthic carnivore feeding on similar organisms as *B. serratus*. As with *B. serratus*, there is a disparity in the sex ratio in relation to size; specimens under 30 cm standard length were predominantly female, while those above 30 cm standard length were males. Either only males grow to larger sizes, or there may be protogynous sex reversal; no seasonal changes in ovaries were observed (perhaps indicating multiple spawning during the year). Marketed fresh in Sydney.

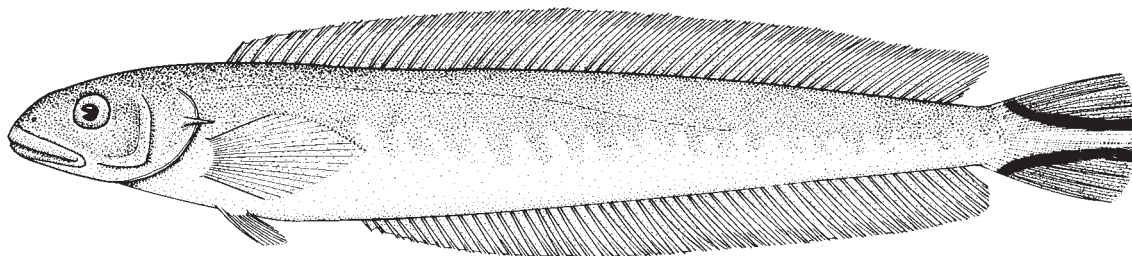
Distribution: Southern Queensland (26°25'S) to New South Wales (33°30'S); also known off New Caledonia.



Malacanthus brevirostris Guichenot, 1848

Frequent synonyms / misidentifications: *Malacanthus hoedtii* Bleeker, 1859; *M. parvipinnis* Vaillant and Sauvage, 1875; *Dikellorhynchus incredibilis*, Smith, 1956 (postlarvae) / *Malacanthus latovittatus* (Lacepède, 1802).

FAO names: En - Quakerfish; Sp - Blanquillo.

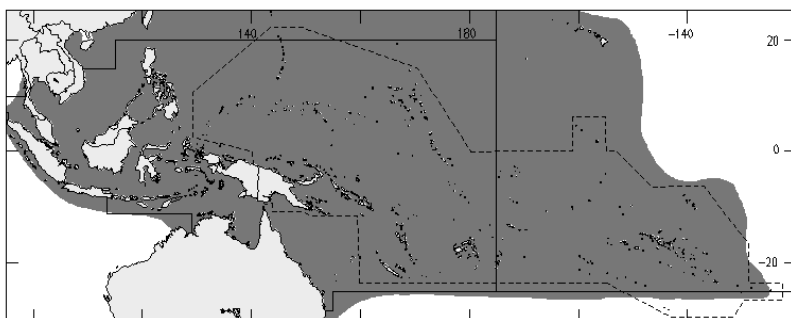


Diagnostic characters: Body elongate, its depth 12 to 16% (usually 14%) standard length. Preopercle edge smooth, angle 105°. **Opercle with a single sharp spine, size about equal to pupil diameter. Snout short, 29 to 37% (usually 32%) head length. Jaws extending posteriorly to anterior rim of orbit. Total gill rakers on first gill arch 9 to 20 (usually 15). Dorsal fin with I to V (usually II) spines and 52 to 60 (usually 57) soft rays. Anal fin with I spine and 46 to 55 (usually 51) soft rays. Caudal fin truncate to slightly rounded (upper lobe without elongate rays). Pored lateral-line scales 146 to 181. Colour: dorsal portions of body light olive green, belly silver-white; dorsal fin faint pink with a narrow yellow upper margin; upper and lower lobes of caudal fin yellow, separated by a central white band and with characteristic 2 dark parallel bands.**

Size: Maximum standard length 38.8 cm; commonly between 15 and 30 cm standard length.

Habitat, biology, and fisheries: Lives in self-constructed burrows in pairs at depths between 5 and 33 m. Commonly found in coral rubble or sandy bottom. When frightened, it dives into burrow head first. Caught mostly by spear, hook-and-line, and traps. Occasionally found in markets throughout the range. Marketed fresh or salted.

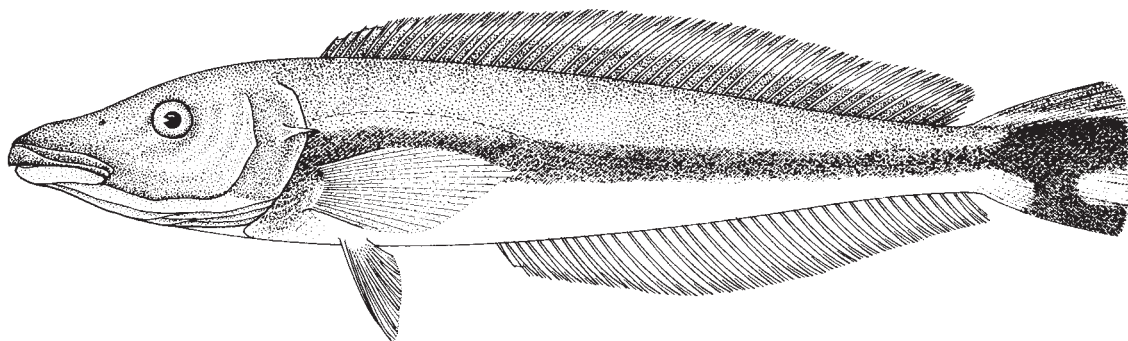
Distribution: Found throughout the Indo-Pacific, and westward to the eastern Pacific (Costa Rica, Panama, Columbia).



Malacanthus latovittatus (Lacepède, 1802)

Frequent synonyms / misidentifications: None / juveniles of *Labroides dimidiatus* Valenciennes, 1839 (family Labridae).

FAO names: En - Blue tilefish; Fr - Matajuel bleu; Sp - Matajuelo azul.

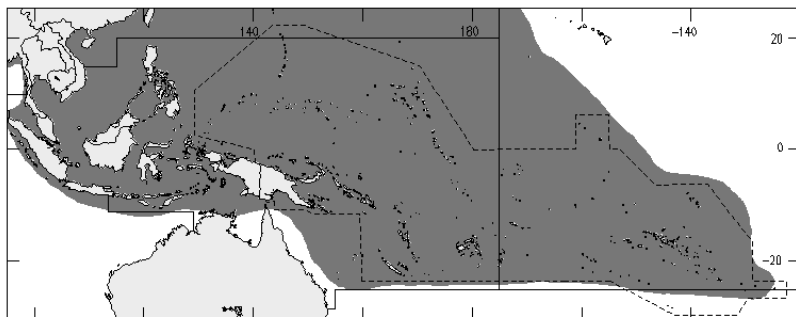


Diagnostic characters: Body elongate (somewhat deeper than in *Malacanthus brevisrostris*), its depth 15 to 20% (usually 17%) standard length. **Snout long**, its length 37 to 47% (usually 44%) head length. **Jaws extending posteriorly only to below anterior nostril, well in front of eye.** Preopercle edge smooth, the angle about 110° to 120°, opercle with a single sharp spine about equal in size to pupil diameter. Gill rakers on first gill arch reduced, their total number 6 to 14 (usually 9). **Dorsal fin with III or IV (usually IV) spines and 43 to 47 (usually 45) soft rays.** Anal fin with I spine and 37 to 40 (usually 39) soft rays; caudal fin truncate, with elongate elements in upper lobe. Pored lateral-line scales 116 to 132 (usually 124). **Colour:** head blue, iris yellow; body olive-grey to violet-blue above, bluish white on belly; **a broad midbody longitudinal band running from operculum to tip of caudal fin, widening on tail to include most of middle and lower portion; lower portion of fin with a small white rectangular area;** dorsal fin grey-brown with a pale band along upper margin; anal and pelvic fins white; pectoral fins bluish; juveniles with colour distinctly different from adult, closely resembling that of *Labroides dimidiatus*, a cleaner wrasse (family Labridae).

Size: Maximum standard length 38 cm; commonly to 35 cm standard length.

Habitat, biology, and fisheries: Lives in shallow waters (6 to 10 m), near edges of reefs. Inhabits self-constructed burrows of sand and rubble. Caught by hook-and-line, spears, and traps. Marketed fresh or salted.

Distribution: Throughout Indo-Pacific, but not known from Hawaii; extends as far north as Honshu (Japan), but not yet recorded from Australia in the south Pacific. Found in hyposaline waters of the Goldie River, New Guinea.

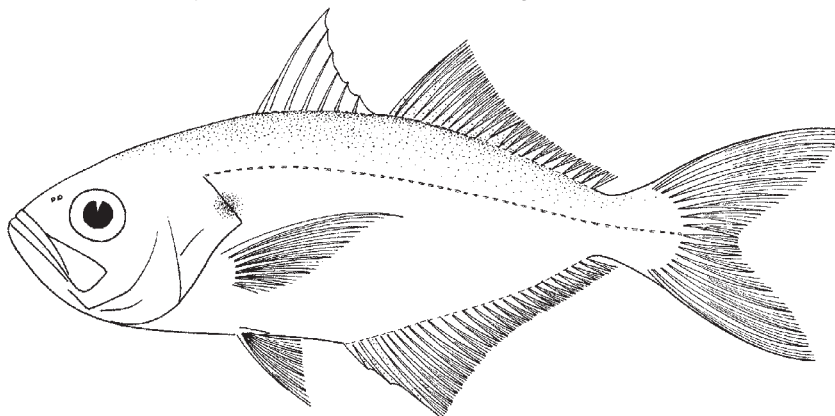


LACTARIIDAE**False trevally (milk trevally)**

by J.M. Leis

A single species in this family.*Lactarius lactarius* (Bloch and Schneider, 1801)

TRF

Frequent synonyms / misidentifications: *Lactarius delicatulus* Valenciennes, 1833 / None.**FAO names:** En - False trevally; Fr - Péliau chanos; Sp - Pagapa.

Diagnostic characters: Body of moderate depth, strongly compressed. Head large, contained 2.8 to 3.2 times in standard length. **Mouth large and oblique (maxilla reaching past middle of eye), with protruding lower jaw; a pair of small, sharp canine teeth at front of each jaw.** Total gill rakers on first gill arch 16 to 21. **Two dorsal fins of about equal height, the first with VII or VIII spines, the second with I spine and 19 to 23 soft rays. Anal fin with III spines and 25 to 28 soft rays (more soft rays than in dorsal fin); no detached spines in front of anal fin. Caudal fin forked.** Pectoral fins long and pointed. Pelvic fins immediately below base of pectoral fins, and less than 1/2 as long. **Caudal peduncle not exceptionally narrowed.** Cycloid scales moderate in size and easily shed; **no scutes along lateral line;** 74 to 80 lateral-line scales. **Colour:** silver with blue iridescence above; silver-white below; a dusky blotch on upper edge of gill cover; fins pale yellow to colourless; dorsal, anal, and caudal fins sometimes with dusky margin; blue and yellow fade quickly following death.

Similar families occurring in the area

Carangidae: first 1 or 2 anal-fin spines separate from remainder of fin; caudal peduncle exceptionally narrowed; most species have many spiny scutes (modified scales) along hind-part of lateral line; other scales small and adherent; anal fin does not have more soft rays than dorsal fin.

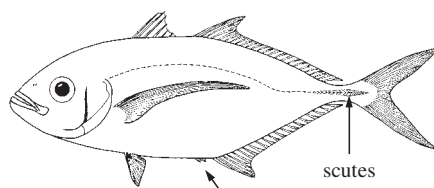
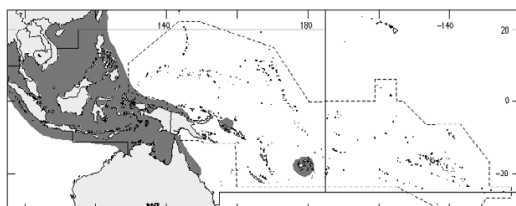
Size: Maximum standard length about 35 cm; commonly to 25 cm.

Habitat, biology, and fisheries: A coastal, schooling species over soft bottoms in depths of less than 100 m. Feeds on bottom-living invertebrates and fishes. Taken in seines, gill nets, trawls, and by hook-and-line. Moderately important in coastal fisheries; marketed mostly fresh, but also dried-salted. From 1990 to 1995, the FAO Yearbook of Fishery Statistics reports a range of yearly catch of around 6 420 to 9 140 t of *Lactarius lactarius* from the Western Central Pacific.

Distribution: Over continental shelves from the Persian Gulf to Taiwan Province of China, Philippines, Solomon Islands, Fiji, and Australia.

Reference

Leis, J.M. 1994. Larvae, adults and relationships of the monotypic perciform fish family Lactariidae. *Rec. Austr. Mus.*, 46(2):131-144.

**Carangidae**

POMATOMIDAE

Bluefishes

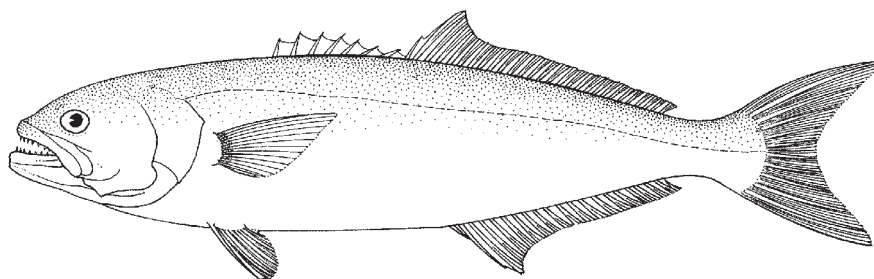
by B.B. Collette

A single species occurring in the area.

Pomatomus saltatrix (Linnaeus, 1766)

Frequent synonyms / misidentifications: *Pomatomus saltator* (Linnaeus, 1766); *Temnodon saltator* (Valenciennes, 1833) / None.

FAO names: En - Bluefish; Fr - Tassergal; Sp - Anchova de banco.



Diagnostic characters: A large species with a sturdy, compressed body and large head. Mouth large and terminal, lower jaw sometimes slightly projecting; **jaw teeth prominent, sharp, compressed, in a single series. Two dorsal fins, the first short and low, with VII or VIII feeble spines connected by a membrane, the second long with I spine and 23 to 28 soft rays; anal fin a little shorter than soft dorsal fin, with II or III spines and 23 to 27 soft rays; caudal fin forked, but not deeply so; pectoral fins short, not reaching to origin of soft dorsal fin. Scales small, covering head and body and bases of fins; lateral line complete, almost straight. Colour: back greenish blue, sides and belly silvery; dorsal and anal fins pale green tinged with yellow; pectoral fins bluish at base; caudal fin dull greenish tinged with yellow.**

Similar families occurring in the area

Carangidae: 2 detached spines in front of anal fin; also, scutes on caudal peduncle in many species, and detached finlets behind dorsal and anal fins in *Elagatis* and *Decapterus*.

Rachycentridae: spines of dorsal fin shorter, isolated, not connected by a membrane; body not elongate; 2 silvery stripes on sides; teeth smaller.

Epigonidae: anal fin with II spines and 9 soft rays; jaws lacking caniniform teeth.

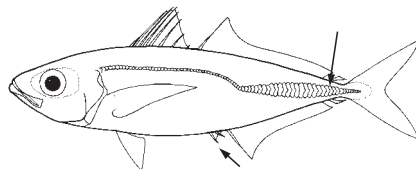
Size: Maximum total length 1.1 m; commonly to 60 cm.

Habitat, biology, and fisheries: A powerful, swift fish, the young hunting in schools, the adults in loose groups, often attacking shoals of mullet or other fishes and destroying numbers apparently far in excess of feeding requirements. Caught mainly with gill nets, lines, and purse seines; commonly taken on hook-and-line by sportsfishermen; marketed mostly fresh.

Distribution: Atlantic and Indo-West Pacific, but absent from the eastern Pacific and the northwest Pacific. Barely enters the area. Found along the southern coast of Australia from Onslow, Western Australia (21°38'S) to Maryborough, Queensland (25°32'S). Records from the Northern Territory and from Indonesia appear to be erroneous.

Reference

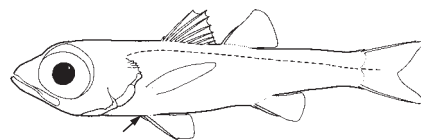
Goodbred, C.O. and J.E. Graves. 1996. Genetic relationships among geographically isolated populations of bluefish *Pomatomus saltatrix*. *Mar. Freshwater Res.*, 47:347-355.



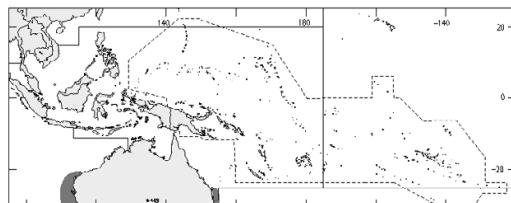
Carangidae



Rachycentridae



Epigonidae

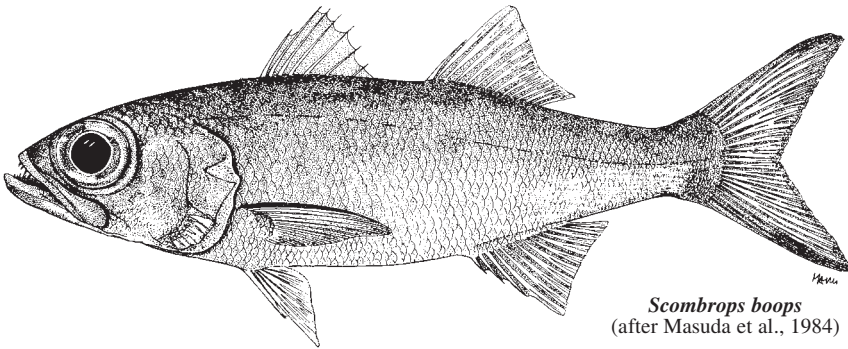


SCOMBROPIDAE

Gnomefishes

by P.C. Heemstra

Diagnostic characters (largely based on *Scombrops boops*): **Body elongate** (to 1.5 m total length), **slightly compressed, body length less than head length, contained 3.2 to 3.8 times in standard length.** Head (including maxilla) and body covered with cycloid scales. **Eyes large, their diameter more than snout length, 27 to 30% head length.** Preopercle finely serrate, with ventral lobe. No spines on opercle. Mouth large, maxilla (with large supramaxilla) reaching to below rear half of eye. Lower jaw with 2 or 3 canines at front, followed by a row of 8 or 9 large, knife-like spaced teeth; upper jaw with 12 or 13 large canines and 2 or 3 fang-like teeth just in front of vomer tooth patch; 1 or 2 rows of compressed canines on palatines and a patch of smaller teeth on vomer; 2 elongate patches of small slender teeth on tongue. Branchiostegal membranes separate, free of isthmus, with 7 rays. First gill arch with 2 or 3 gill rakers on upper limb and 12 to 15 on lower limb. **Two dorsal fins, the first with VIII or IX spines, the second with I spine and 13 or 14 soft rays. Anal fin with III spines (first minute) and 12 or 13 soft rays.** Caudal fin forked. Pectoral fins about 2/3 head length, with 15 rays, not reaching past vertical at origin of second dorsal fin. Origin of pelvic fins below base of pectoral fins; pelvic fins with I spine and 5 soft rays. Soft dorsal, anal, and caudal fins scaly. Lateral line complete, with 51 to 55 pored scales to base of caudal fin. Swimbladder present. Vertebrae 10+16. **Colour:** adults golden purplish brown; body of juveniles reddish brown or yellowish dorsally, paler ventrally.



Scombrops boops
(after Masuda et al., 1984)

Habitat, biology, and fisheries: Adults occur in rocky areas near the bottom at depths of 200 to 700 m; juveniles found in tidepools and shallow coastal water. Biology little known. Caught with hook-and-line and in trawls.

Remarks: This family contains a single genus with about 4 species. It has not yet been recorded from the Western Central Pacific; *Scombrops boops*, is known from Japan to the East China Sea and probably occurs in the area.

Similar families occurring in the area

Acropomatidae: anal fin with II or III spines and 6 to 9 soft rays; scales large, less than 50 in lateral line; pectoral fins about equal to head length; vertebrae 10+15.

Apogonidae: anal fin with II spines; second dorsal fin with 8 or 9 soft rays.

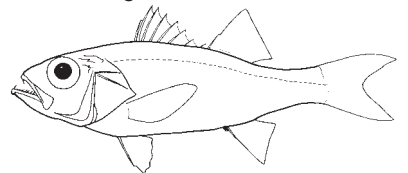
Sphyraenidae: snout much longer than eye diameter; dorsal fins widely separated; body more elongate, its depth 6 to 10 times in standard length.

List of species occurring in the area

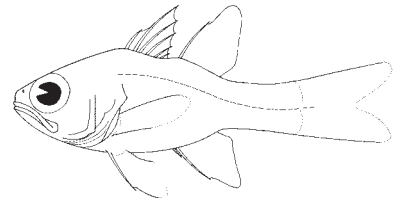
? *Scombrops boops* (Houttuyn, 1782)

Reference

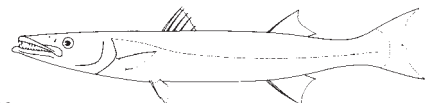
Mochizuki, K. 1988. Family Scombropidae. In *The fishes of the Japanese Archipelago*, edited by H. Masuda, K. Amaoka, C. Araga, T. Uyeno, and T. Yoshino. Tokyo, Tokai University Press, p. 152.



Acropomatidae



Apogonidae



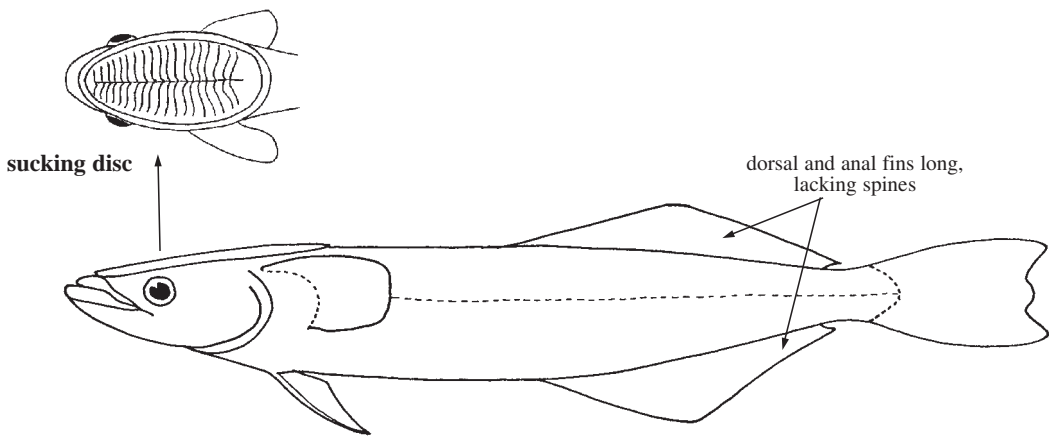
Sphyraenidae

ECHENEIDAE

Remoras (sharksuckers, discfishes)

by B.B. Collette

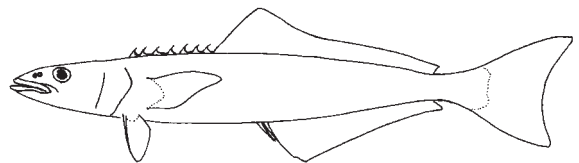
Diagnostic characters: Perciform fishes with fusiform, elongate body (size to about 90 cm), characterized by a **transversely laminated, oval-shaped cephalic disc**, this structure homologous with spinous dorsal fin; **skull wide, depressed to support disc**. Opercle without spines, premaxillae not protractile, gill membranes free from isthmus. Jaws broad, the lower projecting beyond the upper; villiform teeth present in jaws and vomer (i.e. centrally on roof of mouth), usually on tongue and in certain species on palatines (i.e. laterally on roof of mouth). **Dorsal and anal fins long, lacking spines**; dorsal-fin rays range from 18 to 45, anal-fin rays from 18 to 41; pectoral fins set high on body, pointed or rounded, with 18 to 32 rays; pelvic fins far forward, close together, narrowly or broadly attached to underside of body, with I spine and 5 soft rays; caudal fin slightly forked, emarginate, or slightly rounded (in large specimens of some species), juveniles of some species with an elongate median caudal-fin filament. Scales small, cycloid (smooth), usually embedded in the skin. No swimbladder. **Colour:** in life colours subdued, pale brown, greyish to black, sometimes light to whitish or with light and dark horizontal stripes on trunk.



Habitat, biology, and fisheries: Remoras attach themselves to many different marine vertebrates including sharks, rays, tarpons, barracudas, sailfishes, marlins, swordfishes, jacks, basses, groupers, ocean sunfish, sea turtles, whales, and dolphins; they may also attach to ships and various floating objects. Some remoras have a great preference or specificity toward certain hosts. *Remora australis*, the whalesucker, is only known from marine mammals. *R. osteochir*, the marlinsucker, is almost always found attached to spearfishes, particularly the sailfish and white marlin. The preferred host of *R. albescens*, the white sucker, is the manta ray. Species of the genus *Echeneis* are often free-swimming and occur in shallow, inshore waters. *Remora* and *Remorina* are almost always captured on their host where they may be found attached to the body, in the mouth, or in the gill cavity. Remoras feed on parasitic copepods attached to their host and food scraps dropped by the host. Although remoras are not considered to be of any commercial importance, at least *Echeneis naucrates* is taken in coastal fisheries along with other species and sold in local markets.

Similar families occurring in the area

No other family of fishes has a cephalic sucking disc. The cobia (*Rachycentron canadum*, family Rachycentridae) bears some resemblance to the remoras. It has been postulated that a cobia-like ancestor may have given rise to the echeneid fishes.



Rachycentridae

Key to the species of Echeneidae occurring in the area

Note: the Echeneidae is divisible into 2 subfamilies, 4 genera, and 8 species, 7 of which occur in the Western Central Pacific.

- 1a. Body very elongate, its depth contained 8 to 14 times in standard length; pectoral fins pointed; usually a dark longitudinal band on sides, bordered with white; anal-fin base long, anal-fin rays 29 to 41; caudal fin lanceolate in young, the middle rays filamentous, almost truncate in adults, the lobes pronounced (Fig. 1). (subfamily Echeneinae) → 2
- 1b. Body not elongate, its depth contained 5 to 8 times in standard length; pectoral fins rounded; colour nearly uniform, without bands; anal-fin base short, anal-fin rays 18 to 28; caudal fin forked in young, becoming emarginate or truncate in adults (Fig. 2). (subfamily Remorinae) → 3

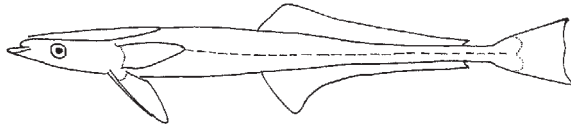


Fig. 1 *Echeneis*

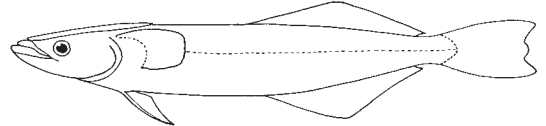


Fig. 2 *Remora*

- 2a. Sucking disc large, with 18 to 28 laminae; vertebrae 30 *Echeneis naucrates*
- 2b. Sucking disc small, with 9 to 11 laminae; vertebrae 39 to 41 *Phtheichthys lineatus*
- 3a. Pelvic fins broadly attached to abdomen; disc laminae 15 to 28; vertebrae 27; colour light to dark brown; hosts include sharks, billfishes, or cetaceans, depending on the species (*Remora*) → 4
- 3b. Pelvic fins narrowly attached to abdomen; disc laminae 13 or 14; vertebrae 26; colour whitish; usual host, manta rays *Remorina albescens*
- 4a. Disc laminae 25 to 28; total gill rakers on first gill arch 17 to 20 *Remora australis*
- 4b. Disc laminae 15 to 20; total gill rakers on first gill arch 11 to 17 → 5
- 5a. Posterior border of disc located far posterior to tips of adpressed pectoral fins . . . *Remora osteochir*
- 5b. Posterior border of disc located anterior to tips of adpressed pectoral fins → 6
- 6a. Disc laminae 15 to 18; dorsal-fin rays 27 to 34; total gill rakers on first gill arch less than 21 *Remora brachyptera*
- 6b. Disc laminae 16 to 20; dorsal-fin rays 21 to 27; total gill rakers on first gill arch 28 to 37 *Remora remora*

List of species occurring in the area

The symbol is given when species accounts are included.

- Echeneis naucrates* Linnaeus, 1758
- Phtheichthys lineatus* (Menzies, 1791)
- Remora australis* (Bennett, 1840)
- Remora brachyptera* (Lowe, 1839)
- Remora osteochir* (Cuvier, 1829)
- Remora remora* (Linnaeus, 1758)
- Remorina albescens* (Temminck and Schlegel, 1845)

References

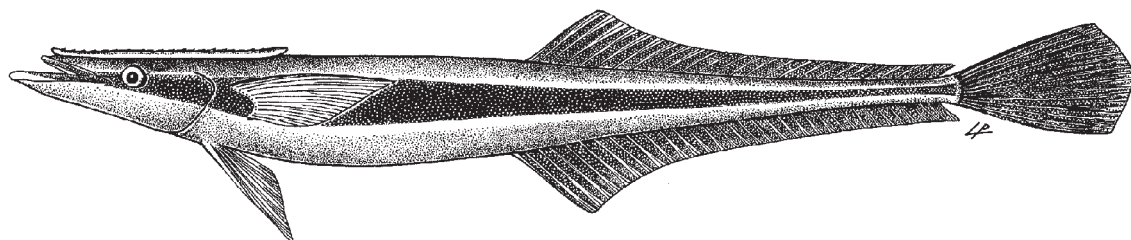
Cressey, R.F. and E.A. Lachner. 1970. The parasitic copepod diet and life history of diskfishes (Echeneidae). *Copeia*, 1970:310-318.

Lachner, E.A. 1986. Echeneididae. In *Fishes of the North-eastern Atlantic and the Mediterranean* 3, edited by P.J.P. Whitehead et al. UNESCO, pp.1329-1334.

Echeneis naucrates Linnaeus, 1758

Frequent synonyms / misidentifications: None / None.

FAO names: En - Sharksucker; Fr - Rémora commun; Sp - Pegatimón.

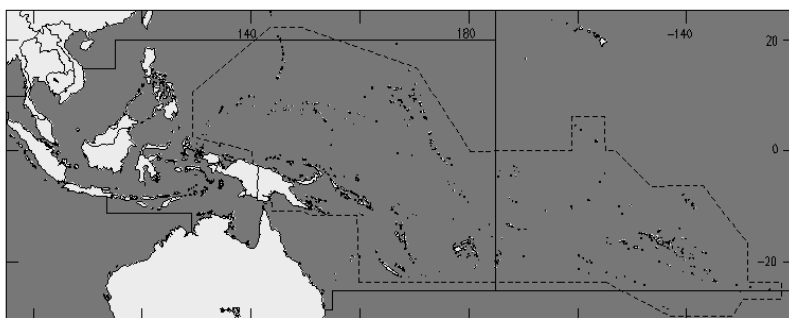


Diagnostic characters: An elongate fish, **depth of body contained 8 to 14 times in standard length**. Jaws broad, the lower projecting beyond the upper. First dorsal fin replaced by a transversal, laminated, oval cephalic disc with 21 to 28 laminae; second dorsal fin and anal fin long, lacking spines, **the anal fin with 31 to 41 soft rays**; pectoral fins short, high on body, pointed; caudal fin lanceolate in young, the middle rays elongate and filamentous; caudal fin almost truncate in adults, with the **upper and lower lobes longer than the middle rays**. **Colour:** dark longitudinal band on sides bordered with white; juveniles with upper and lower margins of fins white.

Size: Maximum standard length about 1 m.

Habitat, biology, and fisheries: Unlike most other remoras, *Echeneis naucrates* is often found free-swimming and occurs in shallow inshore waters. It will attach temporarily to a wide variety of hosts such as sharks and sea turtles and also to ships. Sometimes used by natives as an aid to fishing. A line is tied to the caudal peduncle of the remora and then it is released; upon attaching to another fish, the remora and its host are hauled in by the fishermen. Taken with drift nets and trawls. Occasionally marketed fresh.

Distribution: Worldwide in tropical and temperate seas, except for Pacific American coast.



RACHYCENTRIDAE

Cobia

by B.B. Collette

A single species in this family.

Rachycentron canadum (Linnaeus, 1766)

CBA

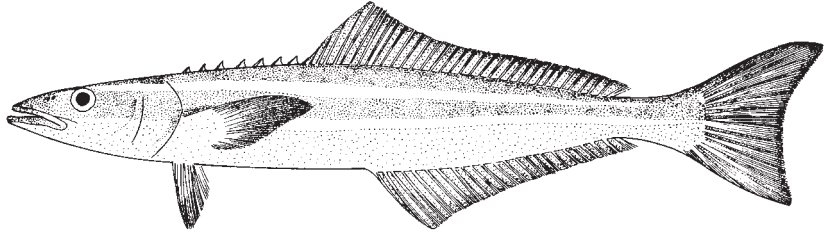
Frequent synonyms / misidentifications: None / None.

FAO names: En - Cobia; Fr - Mafou; Sp - Cobie.

Diagnostic characters:

Body elongate, subcylindrical; **head broad and depressed**. Mouth large, terminal, with projecting lower jaw; villiform teeth in jaws and on roof of mouth and tongue. **First dorsal fin consisting of VII to IX (usually VIII) short but strong isolated spines,**

not connected by a membrane; second dorsal fin long, with 26 to 33 soft rays, the anterior rays somewhat elevated in adults; anal fin similar to dorsal fin, but shorter, with II or III spines and 22 to 28 soft rays; **caudal fin lunate in adults, upper lobe longer than lower** (caudal fin rounded in young, the central rays much prolonged); pectoral fins pointed, becoming more falcate with age. Scales small, embedded in thick skin; lateral line slightly wavy anteriorly. **Colour:** back and sides dark brown, with 2 sharply defined narrow silvery bands; belly yellowish.



Similar families occurring in the area

Pomatomidae: spines of dorsal fin connected by a membrane; also, body and head deeper and no stripes on sides; teeth large and very sharp.

Carangidae (jacks): usually, II detached spines visible in front of anal fin; also, distinctly elongate carangid species have either scutes on lateral line (*Decapterus*, *Trachurus*) or detached finlets behind dorsal and anal fins (*Decapterus*, *Elagatis*).

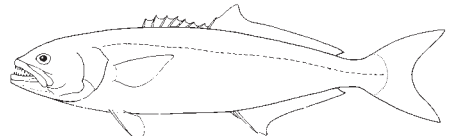
Size: Maximum total length 2 m, commonly to 1.1 m; maximum weight 50 kg.

Habitat, biology, and fisheries: Pelagic, but also found over shallow coral reefs and off rock shores, occasionally in estuaries. Feeds on crabs, squids, and fishes. Caught mainly with handlines, and by trolling pelagically offshore over the continental shelf. Excellent food and game fish but does not occur in large enough numbers to support a commercial fishery. Marketed mostly fresh. From 1990 to 1995, the FAO Yearbook of Fishery Statistics reports a range of yearly catch of around 1 290 to 1 750 t of *Rachycentron canadum* from the Western Central Pacific.

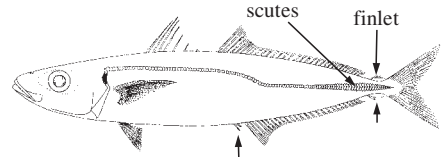
Distribution: Widespread in the Indo-West Pacific, but absent from the eastern Pacific and from the Pacific Plate, except marginally. Within the western Pacific, found around the northern coast of Australia, north to New Guinea, Indonesia, Borneo, the Philippines, and Japan.

Reference

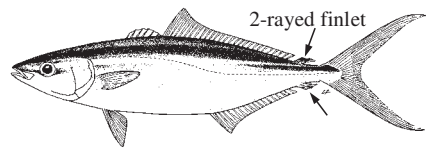
Smith, J.W. 1975. Life history of cobia, *Rachycentron canadum* (Osteichthyes: Rachycentridae), in North Carolina waters. *Brimleyana*, 23:1-23.



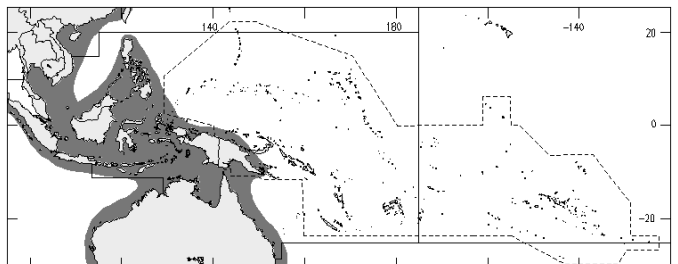
Pomatomus (Pomatomidae)



Decapterus (Carangidae)



Elagatis (Carangidae)

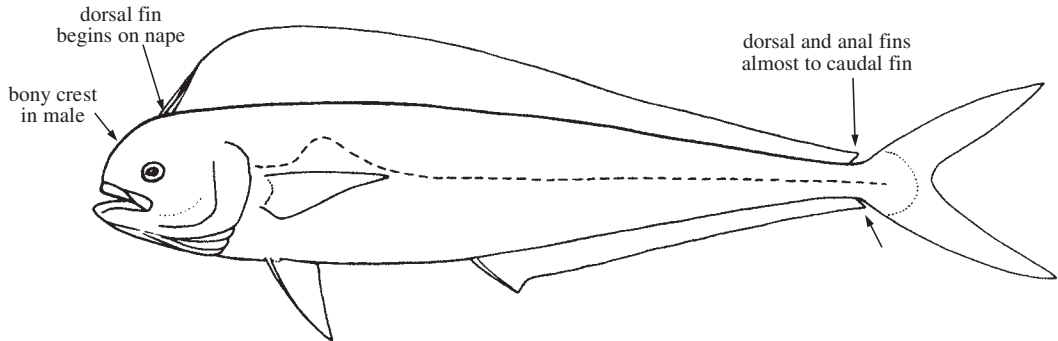


CORYPHAENIDAE

Dolphinfishes ("dolphins")

by B.B. Collette

Diagnostic characters: Elongate, compressed fishes (size to 2.1 m). Mouth large, with many fine teeth in bands; **adult males develop a bony crest on front of head**. Lateral line curved upward above pectoral fins. **Dorsal and anal fins very long, continuing almost to caudal fin, without sharp spines, or finlets; dorsal-fin origin on nape; anal-fin origin at or before midpoint of body; caudal fin deeply forked, without any keels on fin or caudal peduncle; pelvic fins fitting into a groove on body.** Scales small and cycloid. **Colour:** in life very variable, **sides with golden hues** and back brilliant metallic greens and blues; many small, black spots on head and body; specimens less than 15 cm have dark vertical bars.



Habitat, biology, and fisheries: Both species are open ocean pelagic species. They feed on flyingfishes and small fishes and crustaceans associated with floating *Sargassum* weed. Taken by both commercial and recreational fisheries wherever they occur. The flesh is highly esteemed.

Similar families occurring in the area

None. No other fishes have a combination of characters such as dorsal fin from nape almost to caudal fin; anal fin from about midpoint of body almost to caudal fin; no sharp spines in dorsal and anal fins; caudal fin deeply forked; and pelvic fins well developed.

Key to the species of Coryphaenidae

- 1a.** Greatest body depth in adults less than 25% of standard length; tooth patch on tongue small and oval (Fig. 1a); dorsal-fin rays 58 to 66; lateral-line scales 200 or more; vertebrae 31. *Coryphaena hippurus*
- 1b.** Greatest body depth in adults more than 25% of standard length; tooth patch on tongue broad and trapezoidal (Fig. 1b); dorsal-fin rays 52 to 59; lateral-line scales 200 or fewer; vertebrae 33 *Coryphaena equiselis*

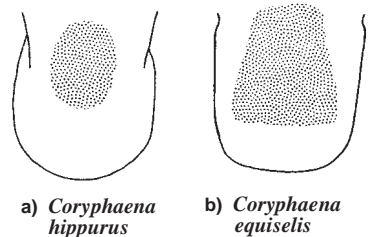


Fig. 1 tooth patch on tongue

List of species occurring in the area

The symbol is given when species accounts are included.

- Coryphaena equiselis* Linnaeus, 1758
- Coryphaena hippurus* Linnaeus, 1758

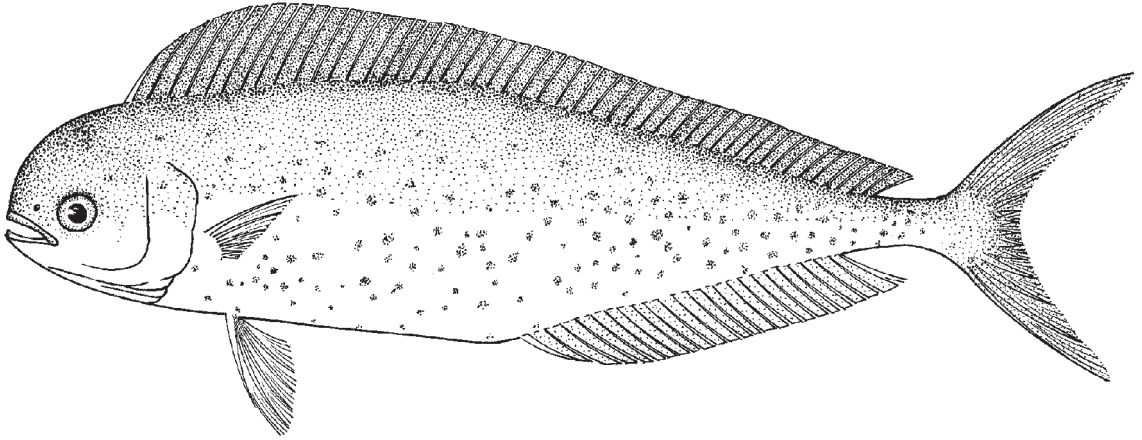
References

- Gibbs, R.H., Jr. and B.B. Collette. 1959. On the identification, distribution, and biology of the dolphins, *Coryphaena hippurus* and *C. equiselis*. *Bull. Mar. Sci. Gulf, Carib.*, 9(2):117-152.
- Palko, B.J., G.L. Beardsley, and W.J. Richards. 1982. Synopsis of the biological data on dolphin fishes, *Coryphaena hippurus* Linnaeus and *Coryphaena equiselis* Linnaeus. *NOAA Tech. Rep. NMFS Circ.*, (443):28 p.

Coryphaena equisetis Linnaeus, 1758

Frequent synonyms / misidentifications: *Coryphaena equisetis* Osbeck, 1765 / *Coryphaena hippurus* Linnaeus, 1758.

FAO names: En - Pompano dolphinfish; Fr - Coryphène dauphin; Sp - Dorado.

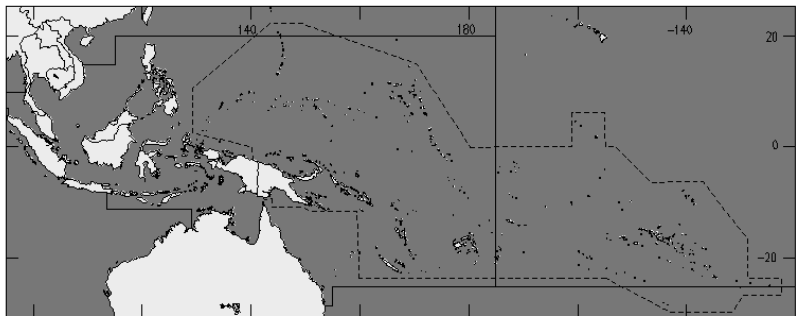


Diagnostic characters: Body elongate and compressed, **greatest body depth in adults more than 25% of standard length**; young fish (up to 30 cm) have head profile slightly convex. **Tooth patch on tongue broad and trapezoidal**; **bands of teeth on jaws and roof of mouth (vomer and palatines)**. **A single dorsal fin extending from just behind eyes almost to caudal fin, with 52 to 59 soft rays**; **a convex anal fin extending from anus almost to caudal fin**; **pectoral fins about 1/2 of head length**; caudal fin deeply forked. **Lateral-line scales 200 or fewer**. Vertebrae 33. **Colour:** back brilliant metallic blue-green in life; fading rapidly after death to green tinge; sides silvery with a golden sheen and numerous black spots; dorsal fin dark; in juveniles, entire margin of caudal fin white, pelvic fins not pigmented.

Size: Maximum total length 75 cm; commonly to 50 cm.

Habitat, biology, and fisheries: Pelagic, inhabiting open waters, but also approaching the coast. Probably resembles *Coryphaena hippurus* in following ships and concentrating below floating objects. Feeds on small fishes and squids. Caught mainly by trolling and with floating lines. Marketed fresh.

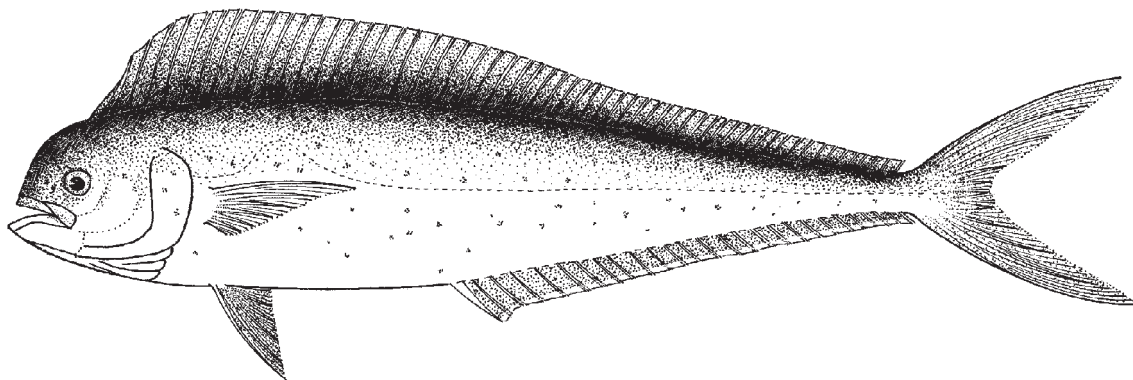
Distribution: Worldwide in most tropical and subtropical seas but frequently misidentified as juvenile or female *C. hippurus*.



Coryphaena hippurus Linnaeus, 1758

Frequent synonyms / misidentifications: None / None.

FAO names: En - Common dolphinfish; Fr - Coryphène commune; Sp - Dorado común.



Diagnostic characters: Body elongate and compressed, **greatest body depth in adults less than 25% of standard length**; young fish (up to 30 cm) have a slender, elongate body with head profile slightly convex; in larger males (30 to 200 cm) the head profile becomes vertical with development of a bony crest; **tooth patch on tongue small and oval**; bands of teeth on jaws and roof of mouth (vomer and palatines). **A single dorsal fin extending from above eyes almost to caudal fin, with 58 to 66 soft rays**; **a concave anal fin extending from anus almost to caudal fin**; **pectoral fins more than 1/2 of head length**; caudal fin deeply forked. **Lateral-line scales 200 or more.** Vertebrae 31. **Colour:** back brilliant metallic blue-green in life, after death fading to grey with a green tinge; sides silvery with a golden sheen, and 1 row of dark spots or golden blotches running below dorsal fin and 1, 2, or more rows on and below lateral line, some scattered irregularly; dorsal and anal fins black, the latter with a white edge; pectoral fins pale; caudal fin silvery with a golden sheen; in juveniles, only tips of caudal-fin lobes white, pelvic fins black.

Size: Maximum total length 2.1 m; commonly to 1 m.

Habitat, biology, and fisheries: Pelagic, inhabiting open waters, but also approaching the coast; follows ships and forms small concentrations below floating objects. Feeds mainly on fishes, but also on crustaceans and squids. Breeds in the open sea, probably approaching the coast as water temperatures rise. Caught by trolling and on tuna longlines; also occasionally with drift nets. Marketed fresh; a very highly appreciated food fish. For 1995, the FAO Yearbook of Fishery Statistics reports a total catch of 4 847 t of *Coryphaena hippurus* from the area.

Distribution: Worldwide in tropical and subtropical seas.

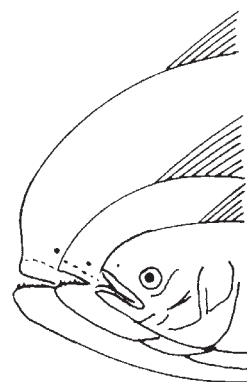
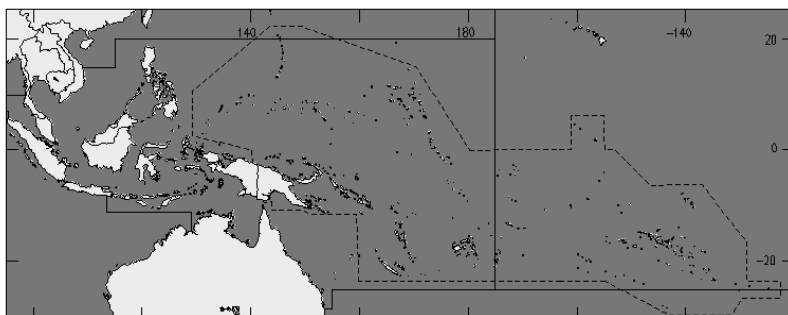


diagram showing development of bony crest in males

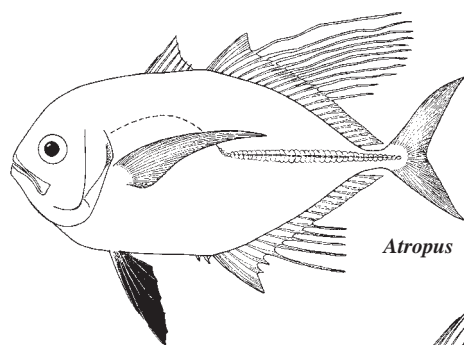


CARANGIDAE

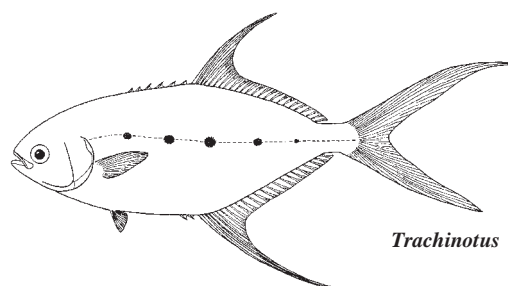
Jacks and scads (also trevallies, queenfishes, runners, amberjacks, pilotfishes, pampanos, etc.)

by W.F. Smith-Vaniz

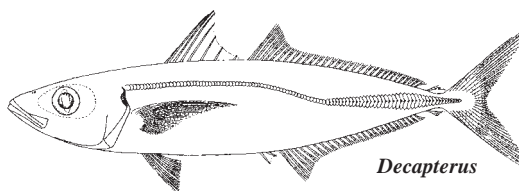
D **Diagnostic characters:** Body highly variable in shape, ranging from elongate and fusiform to deep and strongly compressed; caudal peduncle of medium width to notably slender, in some species with a moderate lateral keel, bilateral paired keels or dorsal and ventral grooves. Head varying from moderately long and rounded to short, deep and very compressed. Eye small to large, with adipose eyelid negligible to strongly developed. Snout pointed to blunt; lower jaw protruding to subtended (included). Teeth in jaws in rows or bands, either small to minute or an enlarged row of recurved canines present; teeth on roof of mouth (vomer, palatines) or tongue present or absent depending on species or developmental stage. Gill openings large, gill membranes not united, free from isthmus; branchiostegal rays 6 to 10 (usually 7); gill rakers moderate in length and number to long and numerous, their number decreasing with growth in some species; opercular bones smooth (but with spines in larvae and small juveniles). **Two dorsal fins** that are separate in small juveniles, **the first of moderate height or very low, with IV to VIII spines (spines obsolete or embedded in adults of some species), the second dorsal fin with I spine and 18 to 44 soft rays** and the anterior lobe scarcely produced to extremely long; **anal fin with II anterior spines (only I spine in *Elagatis* and *Seriolina*) that are separate from rest of fin by a gap (becoming embedded in adults of some species) followed by I spine and 15 to 39 soft rays**, with the anterior lobe low to elongate; pectoral fins with about 14 to 24 soft rays, either long and falcate or short and pointed or rounded; pelvic fins with I spine and 5 soft rays, moderately long in some species to becoming rudimentary in others (absent in *Parastromateus*); caudal fin forked, with the lobes equal in most species. **Scales small, sometimes difficult to see**, and cycloid (smooth to touch), but strongly lanceolate to needle-like in a few species, usually absent from some areas of head and covering body (but absent on certain body areas in some species) and sometimes extending onto fins. **Lateral line arched (curved) or elevated above pectoral fins and straight posteriorly, extending onto caudal fin; scutes (enlarged, thickened, and often pointed scales in lateral line) present and prominent, or reduced in some species and absent in some genera.** Vertebrae 10-11+14-16 (usually 10+14; total 24 to 26). **Colour:** darker above (green or blue to blackish) and paler below (silvery to white or yellow-golden), some species almost entirely silvery when alive, others with dark or coloured bars or stripes on head, body or fins, and some able to change patterns; the young of many species with bars or spots.



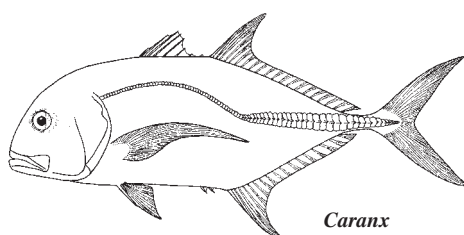
Atropus



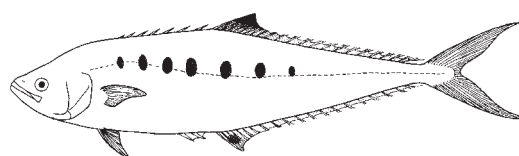
Trachinotus



Decapterus



Caranx



Scomberoides

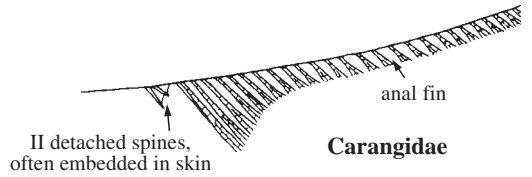
examples of body shapes

Habitat, biology, and fisheries: Mostly schooling species (but *Alectis* generally solitary); some species have largely continental distributions and occur primarily in brackish environments (especially young), others such as *Elagatis* and *Naucrates* are pelagic, usually found at or near the surface, mostly in oceanic waters, often far offshore. This is one of the most important families of commercial fishes, and all species are used for food. For 1995, FAO's Yearbook of Fishery Statistics reports a total catch of around 959 300 t of Carangidae from the Western Central Pacific. Caught commercially with trawls, also with purse seines, traps, and on line gear. The larger species of *Trachinotus*, *Seriola*, and *Caranx* are highly regarded as sportfish.

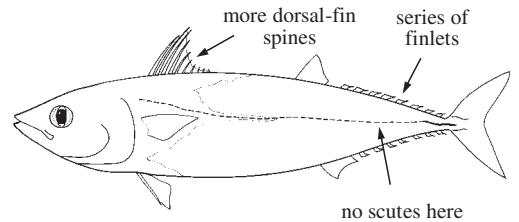
Similar families occurring in the area

The Carangidae is distinguished from all similar families in having the first 2 anal-fin spines detached from rest of fin (caution: these spines sometimes partially or completely embedded in large adults of several genera, especially *Seriola*, *Alectis*, and *Caranx*; however, they can be found, without much difficulty by dissection). The presence of enlarged, thickened scutes in the straight part of lateral line in some genera easily distinguishes them from other families. Additional distinguishing characters of similar families (especially to those carangid genera lacking scutes on the lateral line), are the following:

Scombridae: dorsal-fin spines IX to XXVII (IV to VIII in Carangidae); no scutes developed along posterior part of lateral line; series of finlets present behind dorsal and anal fins (*Scomberoides*, the only carangid that lacks scutes and at the same time has a series of finlets, is further distinguished by having II detached, depressible spines in front of anal fin).

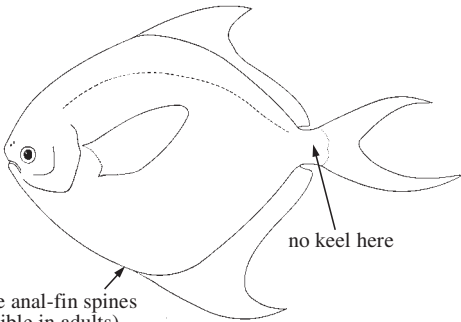


Carangidae

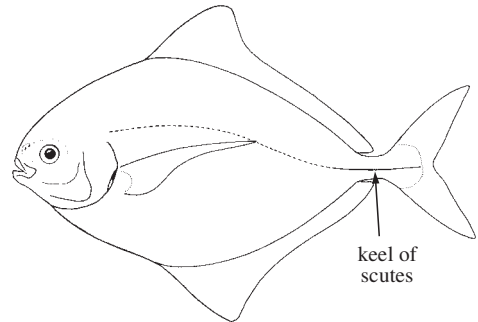


Scombridae

Stromateidae: *Pampus*, the only genus in the area, can be distinguished from carangids as follows: IV blade-like anal-fin spines, not detached from fin (barely visible in adults, may be embedded in skin); pelvic fins minute or absent in adults (readily apparent in carangids, except in adults of *Parastromateus*). *Pampus* is very similar in body shape to *Parastromateus*, but has the lateral line strongly arched anteriorly (weakly arched in *Parastromateus*) and the straight part does not form a slight keel on the caudal peduncle or has 8 to 19 weak scutes as in *Parastromateus*.

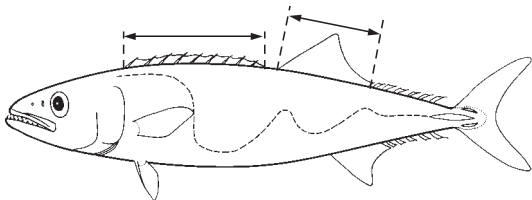


Pampus (Stromateidae)

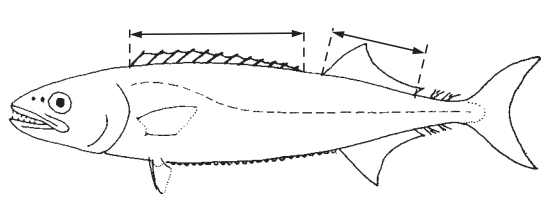


Parastromateus niger (Carangidae)

Gempylidae (especially *Lepidocybium* and *Ruvettus* species): base of first dorsal fin longer than that of second excluding finlets (equal or shorter than second in Carangidae); a series of dorsal and anal finlets present in *Lepidocybium* and *Ruvettus*.



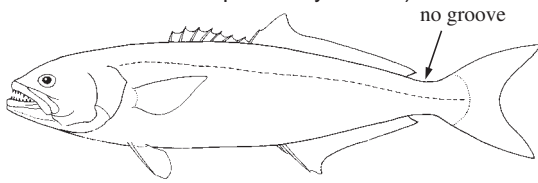
Lepidocybium



Ruvettus

Gempylidae

Pomatomidae: both jaws with a series of strong compressed teeth; no grooves on caudal peduncle (present in *Seriola* which is superficially similar).

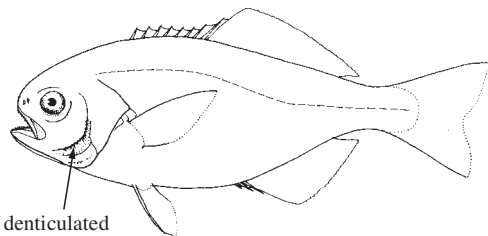


Pomatomidae

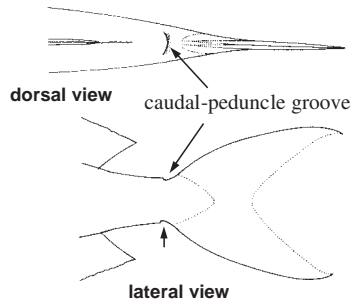
Rachycentridae: head broad and depressed, lower jaw projecting; body more slender; first dorsal fin with VIII or IX short, free spines, each depressible in a groove, II or III anal-fin spines, none detached from fin.

Centrolophidae, particularly the genus *Hyperoglyphe*: III anal-fin spines, none detached from fin; adults with margin of preopercle usually moderately denticulate (smooth in Carangidae); jaw teeth all conical; simple caudal fin, not deeply forked.

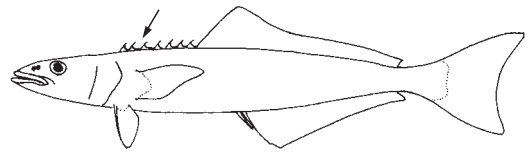
Lactariidae: III anal-fin spines, none detached from fin; anal fin has more soft rays than dorsal fin; caudal peduncle not exceptionally narrowed.



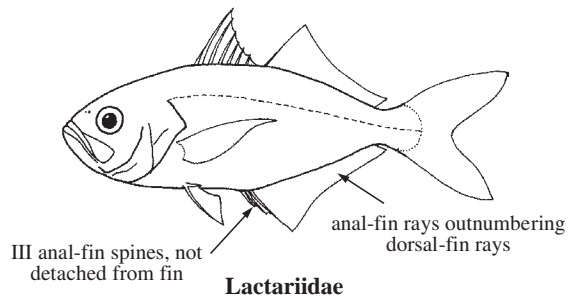
***Hyperoglyphe* (Centrolophidae)**



***Seriola* (Carangidae)**



Rachycentridae



Lactariidae

Identification note

Dentition: Dentition has traditionally been used by past workers to finely subdivide a number of presumably monophyletic species-groups centered around *Caranx* under different generic or subgeneric designations. One such group is the "catch-basket" category "*Carangoides*." The Indo-Pacific species of *Carangoides* (sensu lato) exhibit a wide range of dentition types, including some that appear to be morphologically intermediate. In other cases, genera long recognized as valid appear to be most closely related to a subgroup within *Carangoides*. It is tempting to recognize a more inclusive genus *Caranx*, with *Carangoides* recognized as one of several subgenera. However, *Caranx* would then probably become undefinable as a monophyletic group, thus the status quo is maintained for the present with some reluctance. Two nominal genera, *Pseudocaranx* and *Ulua*, are especially likely candidates for synonymization.

Fin spines: The 2 detached anterior anal-fin spines and some of the anterior spines of the first dorsal fin (especially the first spine) frequently become completely embedded in the skin in large individuals of many carangids (all spines of the first dorsal fin become embedded in *Alectis* and *Parastromateus* at a relatively small size). Even in those genera with a relatively high spinous dorsal fin, the first spine is usually small and closely appressed to the second spine and thus can easily be overlooked.

Breast squamation: Many species of *Carangoides*, *Caranx*, and *Uraspis* have the breast only partially scaly, and the pattern of breast squamation is an important character used to distinguish species. The pattern of breast squamation is sometimes difficult to observe in fresh specimens; observation is facilitated by gently scraping the breast with a knife to remove mucous and allowing the breast to partially dry, hastened by blowing air on the area.

Gill-raker counts: In species with relatively numerous gill rakers (e.g. *Decapterus* and *Trachurus*) great care must be taken not to overlook rakers at either end of the gill arch. It is suggested that a small knife be used to free the upper limb of the gill arch where it joins the skull. With a little practice this can be done

without leaving any stub with rakers attached. Once this has been accomplished, the gill rakers are much easier to see. In some genera (e.g. *Caranx* and *Seriola*) the number of developed rakers decreases with growth with a concomitant increase in the number of rudiments (tubercles or short rakers with the diameter of their bases greater than their height). When rudimentary rakers are included in the gill-raker counts, and large specimens are being examined, it is very important that all of the tubercles are counted. In all cases the raker in the angle of the gill arch is included in the count of lower-limb rakers.

Lateral-line scutes: In many carangids, size and configuration of the scales and scutes on the lateral line is variable and there may be a gradual transition from one type to another. Scutes are here defined as modified scales that either have their posterior margin with a small to moderate projecting spine or the scale has a raised horizontal ridge and ends in an apex not exceeding a 90° angle. All scutes should be counted, including those extending onto the caudal-fin base. In order to observe and accurately count the lateral-line scales and scutes, good lighting and some magnification is recommended. In some species it may also be necessary to remove small body scales that tend to overgrow or otherwise obscure the lateral line.

Measurements: The curved part of the lateral line is measured as a chord of the arch extending from the upper edge of the opercle to its junction with the straight part. The straight part of the lateral line is measured from its junction with the curved part to its termination on the caudal-fin base (end of the last scute). In cases where the junction of the curved and straight parts is very gradual, the curved part is considered to begin with the scale or scute that has 3/4 of its height above the central axis of the straight part.

Key to the genera and subgenera of Carangidae occurring in the area

- 1a. Posterior straight part of lateral line with hardened scutes; in adults, pectoral fins long and falcate, in most genera longer than head (Fig. 1) (about equal to head length in *Selar* and *Trachurus*, and shorter than head length in some *Decapterus* spp.) → 2
- 1b. No scutes in lateral line (only pored scales, not enlarged); pectoral fins relatively short, shorter than head (about 50 to 90% of head length) → 19

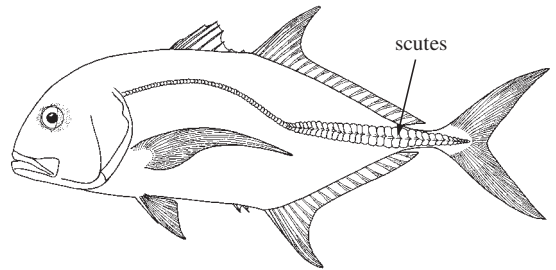


Fig. 1 *Caranx*

- 2a. Pored scales in curved lateral line scute-like, expanded dorsoventrally (Fig. 2) (caution: in large fish may be obscured by overgrowth of smaller scales); dorsal accessory lateral line normally extends posteriorly at least to below origin of second dorsal fin, usually farther posteriorly (Figs 2 and 3) *Trachurus*
- 2b. No enlarged scute-like scales in curved lateral line; dorsal accessory lateral line terminating before origin of spinous dorsal fin → 3

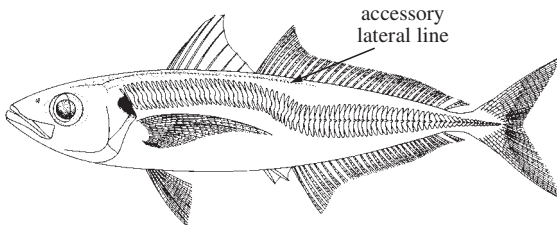


Fig. 2 *Trachurus*

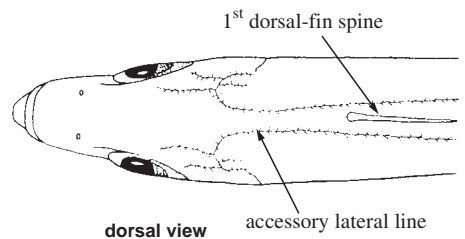


Fig. 3 *Trachurus*

- 3a. Pelvic fins, if present (absent in specimens larger than about 10 cm fork length), positioned distinctly anterior to a vertical line through pectoral-fin base; soft anal-fin rays 35 to 39 *Parastromateus*
- 3b. Pelvic fins (always present) not positioned distinctly anterior to a vertical through pectoral-fin base; soft anal-fin rays 15 to 31 → 4

- 4a. Scales on body minute, inconspicuous and embedded giving the impression of naked skin; in smaller fish, anterior soft rays of dorsal and anal fins filamentous (Fig. 4) *Alectis*
- 4b. Scales on body small but conspicuous, not embedded; in smaller fish, anterior soft rays of dorsal and anal fins not filamentous → 5
- 5a. Second dorsal and anal fins with 1 or more distinctly separate finlets → 6
- 5b. Second dorsal and anal fins without finlets → 7

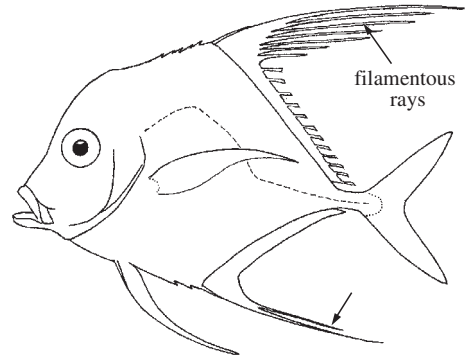


Fig. 4 *Alectis*

- 6a. Single detached terminal 2-rayed finlet in dorsal and anal fins (Fig. 5); shoulder girdle (cleithrum) margin with 2 papillae, the lower papilla larger (Fig. 6); maximum scute height smaller than eye diameter. . . *Decapterus*
- 6b. Posterior soft dorsal- and anal-fin rays consisting of 6 to 10 detached finlets; shoulder girdle margin smooth; maximum scute height larger than eye diameter (Fig. 7) . . . *Megalaspis*

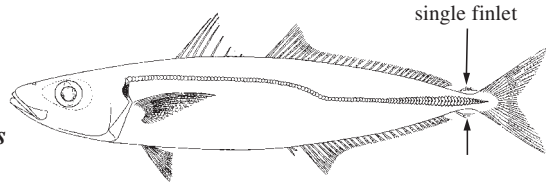
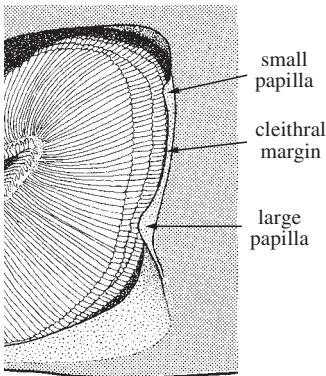


Fig. 5 *Decapterus*



gill chamber after lifting operculum

Fig. 6 *Decapterus*

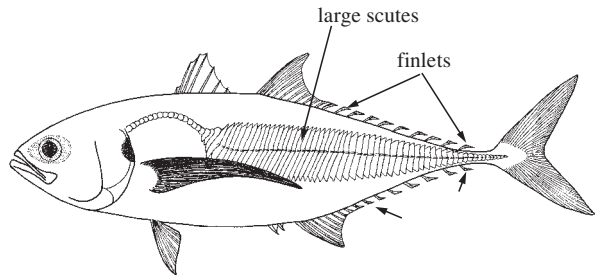
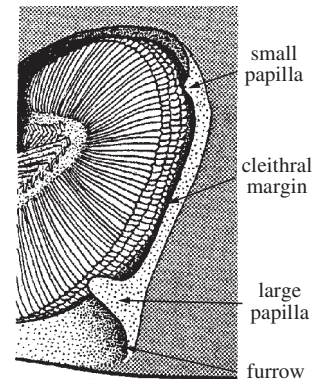


Fig. 7 *Megalaspis*

- 7a. Shoulder girdle (cleithrum) margin with a furrow ventrally, a large papilla immediately above it and a smaller papilla near upper edge (Fig. 8) *Selar*
- 7b. Shoulder girdle margin smooth → 8
- 8a. Upper jaw without teeth → 9
- 8b. Upper jaw with 1 or 2 rows or a band of minute teeth (caution: teeth difficult to detect in some *Carangoides*) → 10



gill chamber after lifting operculum

Fig. 8 *Selar*

- 9a. Lower jaw with a series of minute teeth; a prominent black opercular spot encroaching on shoulder; adipose eyelid well developed posteriorly *Selaroides*
- 9b. Lower jaw with a few feeble teeth in young (smaller than 10 cm fork length), absent in adults; no black opercular spot; adipose eyelid poorly developed *Gnathanodon*
- 10a. Tongue, roof and floor of mouth white, the rest dark (Fig. 9); anal-fin spines reabsorbed or reduced and immovable; no teeth on vomer or palatines *Uraspis*
- 10b. Lining of mouth not distinctly black and white; anal-fin spines normal and movable; teeth present on vomer and palatines → 11

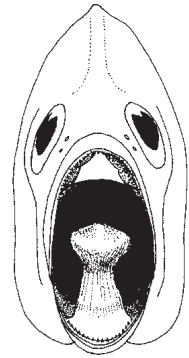


Fig. 9 *Uraspis*

- 11a. Fleshy adipose eyelid completely covering eye except for a vertical slit centred on pupil (Fig. 10a); terminal ray of dorsal and anal fins finlet-like, a little more separated from other rays but not detached, and about twice length of penultimate ray *Atule*
- 11b. Fleshy adipose eyelid, if present, not well developed anteriorly, most of anterior half of pupil exposed; terminal ray of dorsal and anal fins not finlet-like (except terminal ray length 1.5 times the length of penultimate ray in large *Alepes djedeba*) → 12

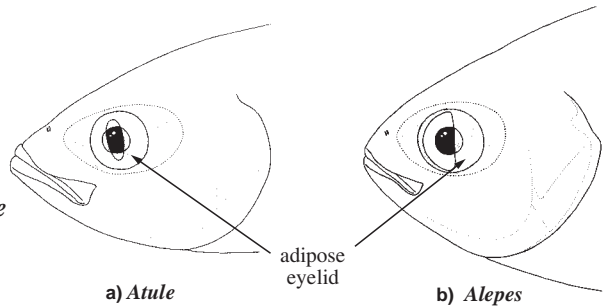


Fig. 10

- 12a. Both jaws with a single row of numerous, comb-like teeth; adipose eyelid well developed on posterior half of eye only (Fig. 10b) *Alepes*
- 12b. Dentition not as above; adipose eyelid, if present, variously developed → 13
- 13a. Upper jaw anteriorly with 2 irregular rows of short conical teeth, posteriorly inner surface of jaw paved with blunt teeth (Fig. 11a); snout shorter than eye diameter "*Alepes*"
- 13b. Dentition not as above; snout usually equal or larger than eye diameter → 14
- 14a. Upper jaw with an outer series of moderate to strong canines and an inner band of fine teeth (Fig. 11b); lower jaw with a single row of teeth → 15
- 14b. Dentition not as above → 16

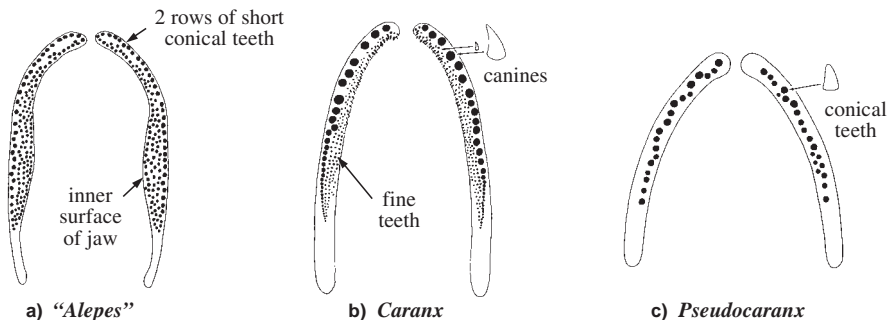


Fig. 11 ventral view of teeth in upper jaw (teeth on roof of mouth not shown)

- 15a. Body generally deep, with dorsal profile more convex than ventral; total gill rakers 20 to 31 on first gill arch; segmented dorsal- and anal-fin rays never produced as filaments; 2 to 4 canines anteriorly in each jaw *Caranx*
- 15b. Body shallow with dorsal and ventral profiles equally convex; total gill rakers 34 to 39 on first gill arch; segmented dorsal- and anal-fin rays produced as filaments in adult males; no canines anteriorly in either jaw *Pantolabus*
- 16a. Both jaws with single series of short, conical teeth (upper jaw sometimes with an inner row of conical teeth anteriorly) (Fig. 11c); breast completely scaly *Pseudocaranx*
- 16b. Both jaws with a band of teeth, at least anteriorly; breast naked ventrally (most species) to completely scaly → 17
- 17a. Belly with a deep median groove, accommodating pelvic fins, anus, and anal-fin spines (Fig. 12a); pelvic fins conspicuously long and black, tip of appressed fins extending almost to origin of anal fin; curved lateral line short, chord of curved part of lateral line contained 1.5 to 2 times in straight part (Fig. 12b) *Atropus*
- 17b. Belly without median groove; pelvic fins not conspicuously long and black; curved lateral line moderate in most species, with chord of curved part of lateral line contained less than 1.5 times in straight part → 18

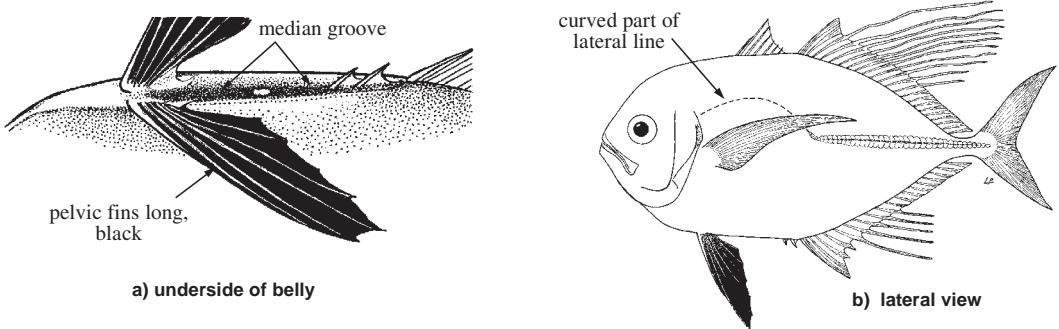


Fig. 12 *Atropus*

- 18a. Gill rakers long, feather-like, and project into mouth along side of tongue (Fig. 13); total gill rakers 54 to 86 on first gill arch; lower jaw becoming prominent in large adults, with the angle of "chin" projecting beyond upper jaw (Fig. 14) *Ulua*
- 18b. Gill rakers of normal length and shape; total gill rakers 21 to 37 on first gill arch; shape of lower jaw not as above *Carangoides*

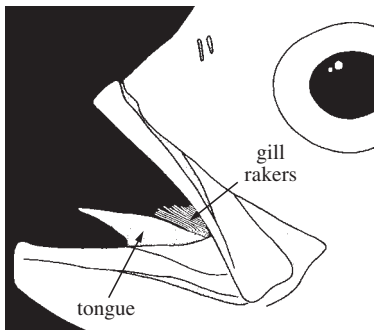


Fig. 13 *Ulua*

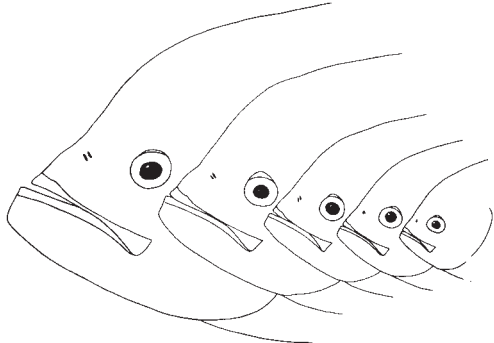


Fig. 14 *Ulua*

- 19a. Bases of soft dorsal and anal fins unequal in length, anal-fin base shorter and only about 45 to 70% of dorsal-fin base length (Fig. 15); caudal-peduncle grooves present, dorsally and ventrally (Fig. 16). → 20
- 19b. Base of soft anal fin as long as, or only slightly shorter than, base of dorsal fin; no caudal-peduncle grooves. → 23

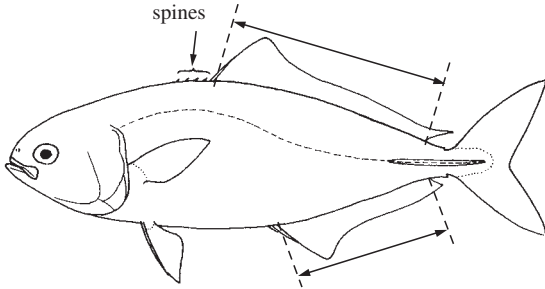


Fig. 15 *Naucrates*

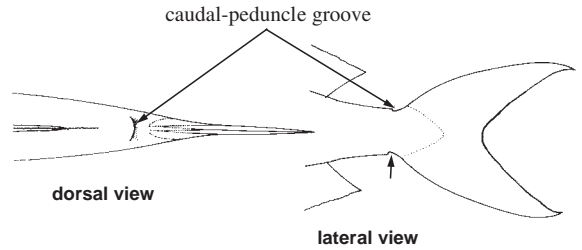


Fig. 16 *Naucrates*

- 20a. Terminal 2-rayed finlet present in dorsal and anal fins (Fig. 17); upper jaw ending distinctly before eye (to below anterior margin of eye in young) *Elagatis*
- 20b. No finlets in dorsal and anal fins; upper jaw ending below anterior margin of eye to posterior margin of eye → 21

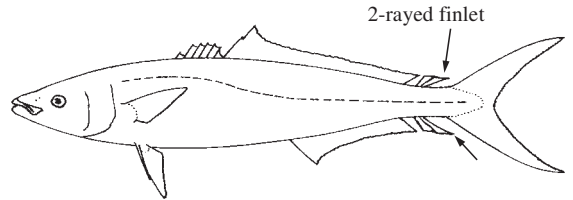
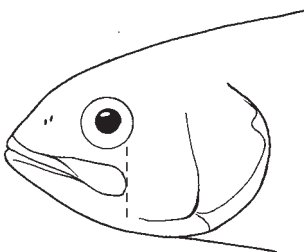
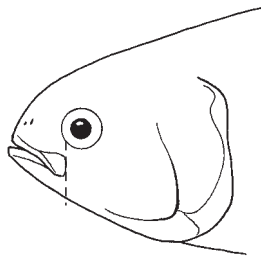


Fig. 17 *Elagatis*

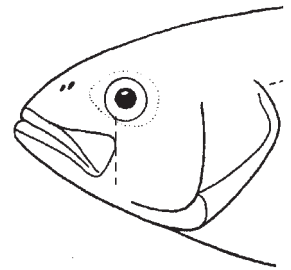
- 21a. Upper jaw broadly rounded posteriorly and usually terminating below posterior margin of eye (Fig. 18a); gill rakers on first gill arch mostly consisting of rudiments, 4 to 10 total elements *Seriolina*
- 21b. Upper jaw truncate or slightly rounded posteriorly and terminating below about anterior margin of eye to middle of eye (Fig. 18b, c); gill rakers on first gill arch mostly well developed, 11 to 29 total elements → 22



a) *Seriolina*



b) *Naucrates*



c) *Seriola*

Fig. 18

22a. First dorsal fin with IV or V spines; soft anal-fin rays 15 to 17; fleshy keel laterally on caudal peduncle well developed (Fig. 19) *Naucrates*

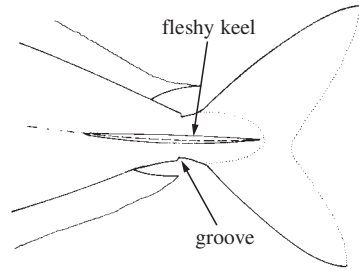


Fig. 19 *Naucrates*

22b. First dorsal fin with VII or VIII spines (caution: anterior spines may become completely embedded in large individuals); soft anal-fin rays 18 to 22 (except 15 to 17 in *S. hippos*); fleshy keel on caudal peduncle absent to moderately developed (*S. lalandi*) *Seriola*

23a. Posterior soft dorsal- and anal-fin rays consisting of semi-detached finlets (Fig. 20); distal quarter to half of rays not connected by interradial membrane (unattached portion of rays increasing with growth); lower jaw of adults with 2 rows of conical teeth separated by a shallow groove; upper lip joined to snout at midline by a bridge of skin (frenum), except crossed by a shallow groove in very young *Scomberoides*

23b. Posterior soft dorsal- and anal-fin rays not consisting of semi-detached finlets (Fig. 21); lower jaw without teeth or with band of small villiform teeth; upper lip separated from snout at midline by a continuous deep groove *Trachinotus*

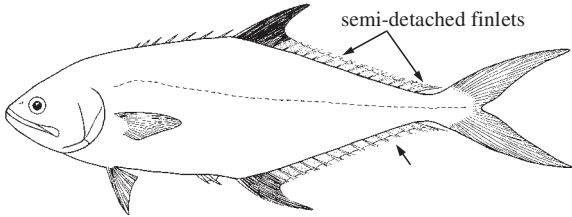


Fig. 20 *Scomberoides*

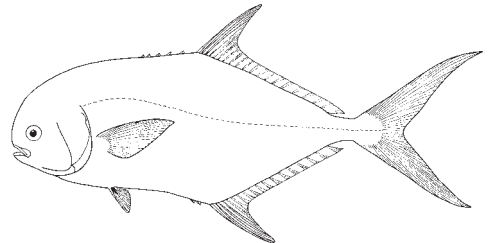


Fig. 21 *Trachinotus*

Key to the species of *Alectis* occurring in the area

1a. Profile of nape and head broadly rounded; suborbital depth relatively narrow, contained 1.7 to 3 times in upper jaw length (Fig. 22); gill rakers (excluding rudiments) on lower limb of first arch 12 to 17 *Alectis ciliaris*

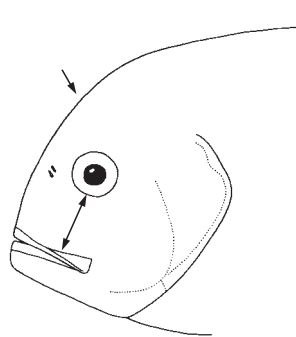


Fig. 22 *Alectis ciliaris*

1b. Profile of nape and head somewhat angular; suborbital depth relatively broad, contained 0.8 to 1 times in upper jaw length (Fig. 23); gill rakers (excluding rudiments) on lower limb of first arch 21 to 26 *Alectis indica*

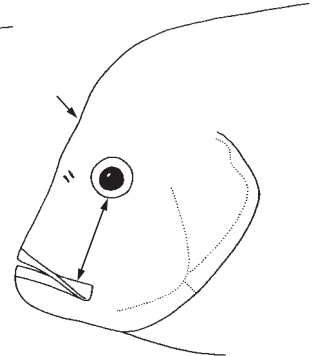


Fig. 23 *Alectis indica*

Key to the species of *Alepes* occurring in the area

- 1a. Interradial membranes of spinous dorsal fin black; total gill rakers 24 to 30 on first arch
 *Alepes melanoptera*
- 1b. Interradial membranes of spinous dorsal fin transparent to dusky; total gill rakers 32 to 47 on first arch (except 27 to 30 in *A. apercna*) → 2
- 2a. Total gill rakers 27 to 30 on first gill arch; upper jaw with supramaxilla relatively small and without an anterior spine-like projection (Fig. 24a) *Alepes apercna*
- 2b. Total gill rakers 32 to 47 on first gill arch; upper jaw with supramaxilla relatively large and with an anterior spine-like projection (Fig. 24b, c) → 3

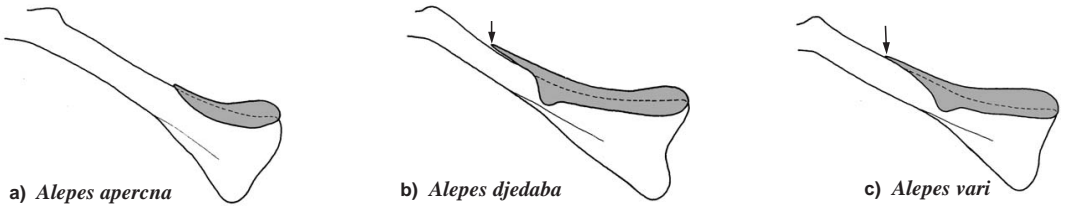


Fig. 24 upper jaw (supramaxilla shaded)

- 3a. Total gill rakers on first gill arch 38 to 47, of which 10 to 14 on upper limb, and 27 to 33 on lower limb; lateral line with 31 to 36 scales and 39 to 51 scutes (total 77 to 85); scutes larger (Fig. 25a); ultimate ray of dorsal and anal fins about 1.3 to 1.5 times the length of penultimate ray *Alepes djedaba*
- 3b. Total gill rakers on first gill arch 32 to 38, of which 9 to 12 on upper limb, and 23 to 26 on lower limb; lateral line with 42 to 50 scales, 48 to 69 scutes (total 86 to 119); scutes smaller (Fig. 25b); ultimate and penultimate rays of dorsal and anal fins of equal length . . . *Alepes vari*

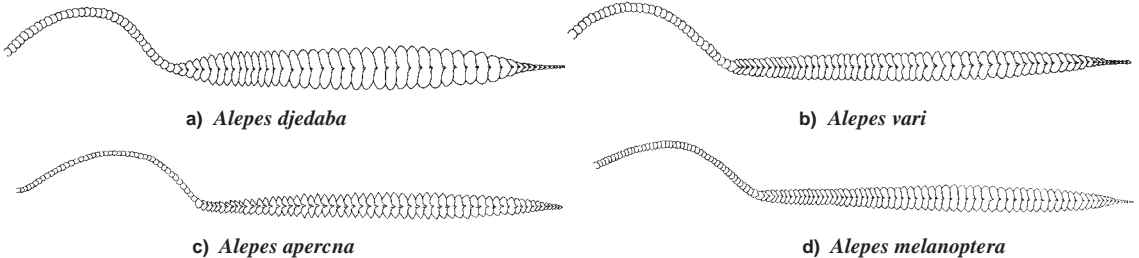
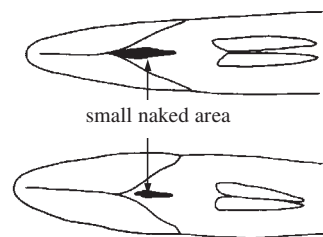
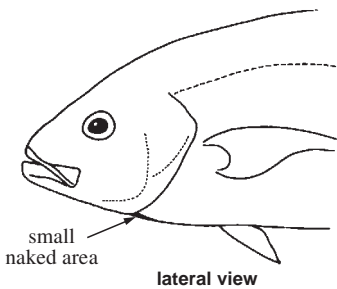


Fig. 25 lateral line

Key to the species of *Carangoides* occurring in the area

Note: species of *Carangoides* that have variable patterns of breast squamation may key out under both sections of couplets when this character is utilized.

- 1a. Breast completely scaly or with a small, median naked area ventrally, scarcely if at all visible in lateral view (Fig. 26) → 2
- 1b. Breast partially to completely naked → 5



ventral view (showing examples of variation)

Fig. 26

- 2a. Second dorsal fin with a conspicuous black blotch or submarginal band; vomerine tooth patch anchor-shaped, with a long posteromedian extension (Fig. 27a, b) → 3
- 2b. Second dorsal fin without a conspicuous black blotch or submarginal band; vomerine tooth patch without a distinct posteromedian extension (Fig. 27c) → 4

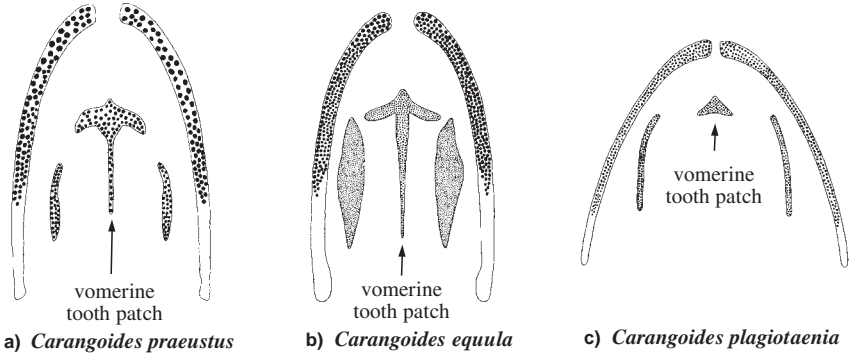


Fig. 27 tooth patches on roof of mouth and upper jaw

- 3a. Second dorsal fin with a conspicuous black blotch anteriorly (Fig. 28); soft anal-fin rays 18 to 20; total gill rakers on first gill arch 32 to 37 *Carangoides praeustus*
- 3b. Second dorsal fin with a submarginal black band (Fig. 29); soft anal-fin rays 21 to 24; total gill rakers on first gill arch 27 to 32 *Carangoides equula*

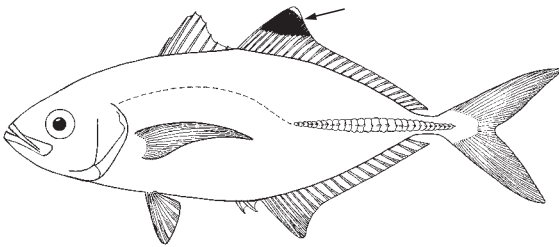


Fig. 28 *Carangoides praeustus*

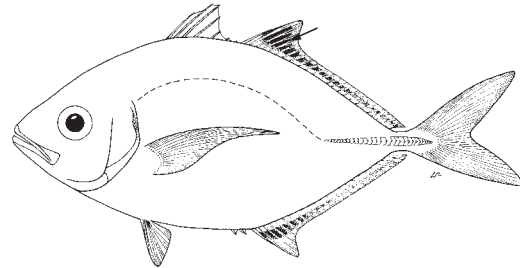


Fig. 29 *Carangoides equula*

- 4a. Soft anal-fin rays 18 to 20; posterior margin of preopercle outlined in black, at least in adults (Fig. 30); scutes 11 to 18 *Carangoides plagiotaenia*
- 4b. Soft anal-fin rays 21 to 24; posterior margin of preopercle not black; scutes 20 to 30 *Carangoides bajad*

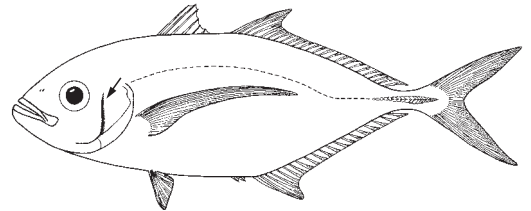


Fig. 30 *Carangoides plagiotaenia*

- 5a. Naked area of breast separated from naked base of pectoral fins by a broad band of scales (Fig. 31) → 6
- 5b. Naked area of breast uninterrupted to naked base of pectoral fins (Fig. 37) → 13
- 6a. Second dorsal fin with a conspicuous black blotch anteriorly (Fig. 28); vomerine tooth patch anchor-shaped, with a long posteromedian extension (Fig. 27a) *Carangoides praeustus*
- 6b. Second dorsal fin without a conspicuous black blotch; vomerine tooth patch without a distinct posterior extension → 7
- 7a. Soft dorsal-fin rays 25 to 34; soft anal-fin rays 21 to 26 → 8
- 7b. Soft dorsal-fin rays 17 to 23; soft anal-fin rays 15 to 19 → 10

- 8a. Naked area of breast extends posteroventrally well beyond origin of pelvic fins (Fig. 31a)
 *Carangoides fulvoguttatus*
- 8b. Naked area of breast does not extend posteroventrally beyond origin of pelvic fins
 (Fig. 31b). → 9

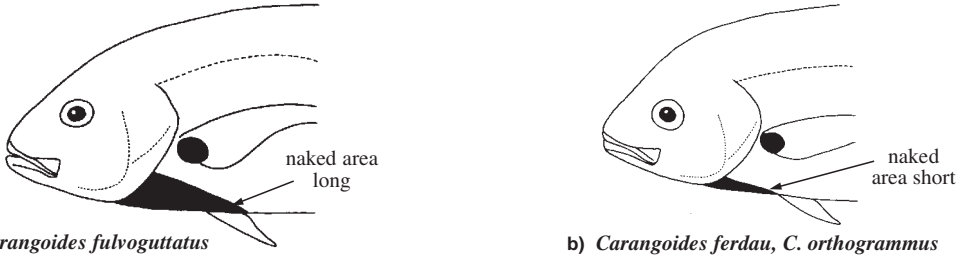


Fig. 31

- 9a. In life, typically 5 or 6 distinct dusky bands on sides of adults and yellow or orange spots on sides, if present, small, numerous and mostly above lateral line (Fig. 32); lips not papillose in adults *Carangoides ferdau*
- 9b. In life, dark bands usually absent on sides of adults and several relatively large, oblong yellow spots with dark centres present mostly below lateral line (Fig. 33); lips finely papillose in adults *Carangoides orthogrammus*

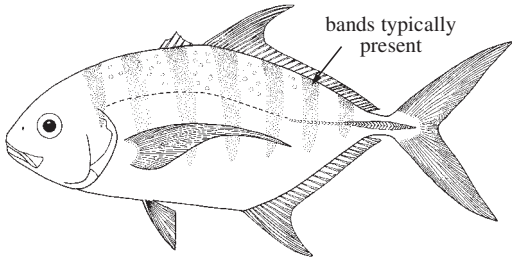


Fig. 32 *Carangoides ferdau*

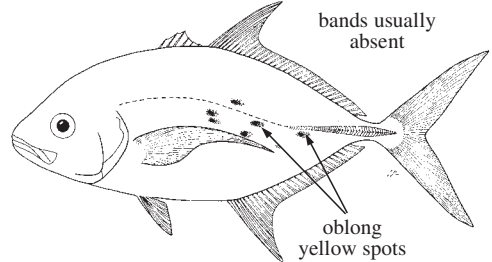


Fig. 33 *Carangoides orthogrammus*

- 10a. Straight part of lateral line slightly longer than curved part (Fig. 34); scutes 37 to 45
 *Carangoides oblongus*
- 10b. Straight part of lateral line slightly shorter than curved part (Fig. 35); scutes 16 to 38 → 11

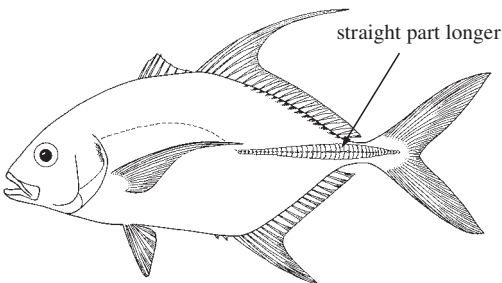


Fig. 34 *Carangoides oblongus*

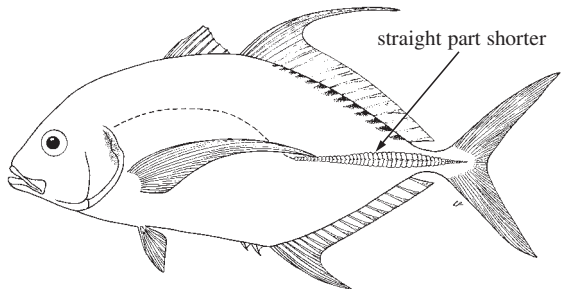


Fig. 35 *Carangoides dinema*

- 11a. No small dark blotches on dorsum between bases of dorsal-fin rays
 *Carangoides caeruleopinnatus*
- 11b. Small dark blotches (becoming larger posteriorly) on dorsum between bases of dorsal-fin rays → 12

- 12a. Soft dorsal-fin rays 20 to 22 (rarely 19); large black spot usually present on shoulder; naked area of breast extends posteroventrally well beyond origin of pelvic fins (Fig. 36a) *Carangoides humerosus*
- 12b. Soft dorsal-fin rays 17 to 19; no large black spot present on shoulder; naked area of breast typically does not extend posteroventrally beyond origin of pelvic fins (Fig. 36b) *Carangoides dinema*

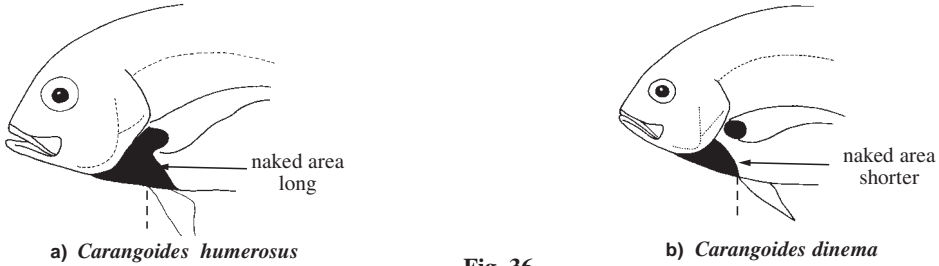


Fig. 36

- 13a. Soft dorsal-fin rays 25 to 32 (rarely 25) → 14
- 13b. Soft dorsal-fin rays 17 to 23 → 15
- 14a. Profile of snout angular and, in specimens larger than about 30 cm fork length, horizontal line from tip of snout distinctly below level of eye (Fig. 37a); soft anal-fin rays 21 to 26 (rarely 25 or 26); total gill rakers (including rudiments) on first gill arch 22 to 27, of which 6 to 8 on upper limb, and 17 to 21 on lower limb; vertebrae 10+14 *Carangoides fulvoguttatus*
- 14b. Profile of snout moderately rounded and, in specimens larger than about 30 cm fork length, horizontal line from tip of snout at or through level of eye (Fig. 37b), soft anal-fin rays 24 to 26 (usually 25); total gill rakers (including rudiments) on first gill arch 27 to 31, of which 7 to 9 on upper limb, and 19 to 22 on lower limb; vertebrae 10+15 *Carangoides gymnostethus*

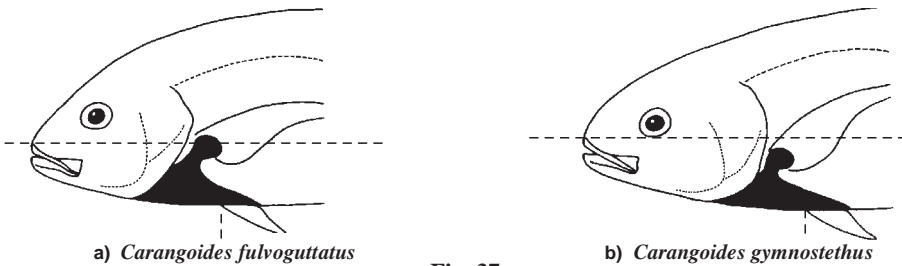


Fig. 37

- 15a. Small area naked of scales anteriorly just above pectoral-fin base (Fig. 38a) → 16
- 15b. Area anteriorly just above pectoral-fin base completely scaly (Fig. 38b) → 17

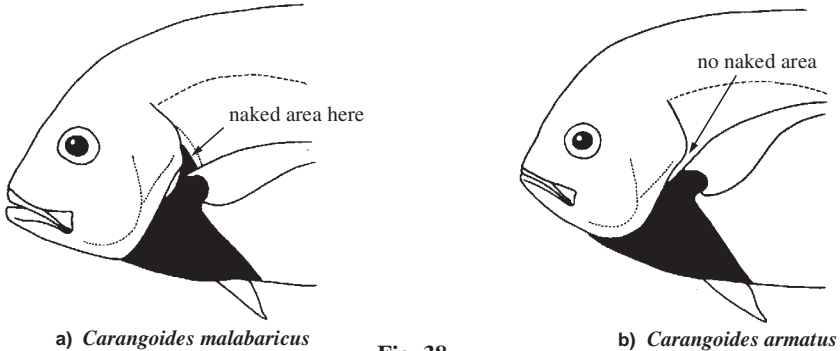


Fig. 38

- 16a. Total gill rakers (including rudiments) on first gill arch 32 to 38, of which 8 to 12 on upper limb, and 21 to 27 on lower limb; in life, tongue greyish brown to brown . . . *Carangoides malabaricus*
- 16b. Total gill rakers (including rudiments) on first gill arch 27 to 31, of which 6 to 9 on upper limb, and 19 to 22 on lower limb; in life, tongue white to pale grey *Carangoides talamparoides*

- 17a. Small dark blotches (becoming larger posteriorly) on back between bases of dorsal-fin rays; naked area of breast typically does not extend posteroventrally beyond origin of pelvic fins (Fig. 36b); soft dorsal-fin rays 17 to 19. *Carangoides dinema*
- 17b. Colour pattern not as above; naked area of breast extends posteroventrally well beyond origin of pelvic fins (Fig. 38b); soft dorsal-fin rays 18 to 23 → 18

- 18a. Total gill rakers (including rudiments) on first gill arch 31 to 37 *Carangoides armatus*
- 18b. Total gill rakers (including rudiments) on first gill arch 20 to 27 → 19

- 19a. Adults with a steep dorsal head profile, and with a distinct break (“bump”) in profile in the interorbital region (Fig. 39a); 3 to 8 (usually 5 to 7) of central soft rays of dorsal and anal fins elongated in mature males (about 17 cm fork length); eye diameter about equal to, or larger than snout length *Carangoides hedlandensis*
- 19b. Dorsal head profile not as steep in adults, and no distinct break (“bump”) in profile in the interorbital region (Fig. 39b, c); central soft rays of dorsal and anal fins not elongated in mature males; eye diameter slightly to much smaller than snout length → 20

- 20a. Dorsal profile of snout gently sloped, then abruptly vertical just above mouth cleft (Fig. 39b); soft dorsal-fin rays 18 to 20; soft anal-fin rays 15 to 17 *Carangoides chrysophrys*
- 20b. Dorsal profile of snout not as above (Fig. 39c), soft dorsal-fin rays 20 to 23 (usually 22 or 23); soft anal-fin rays 16 to 20 (usually 18 or 19) *Carangoides caeruleopinnatus*

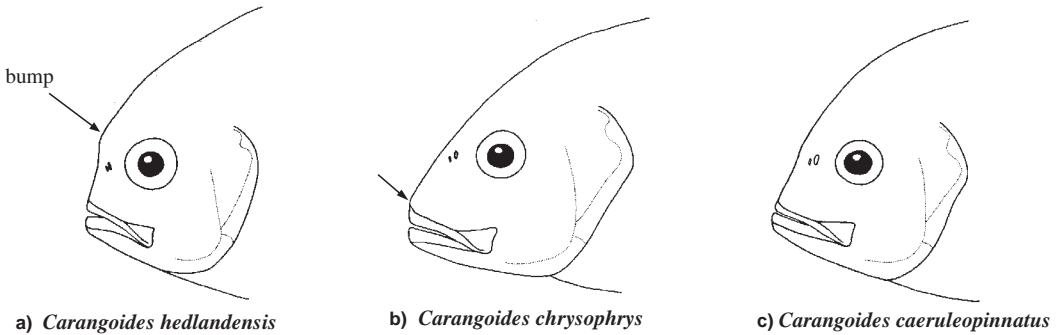


Fig. 39

Key to the species of *Caranx* occurring in the area

Note: species of *Caranx* that have variable patterns of breast squamation will key out under both sections of a couplet when this character is utilized.

- 1a. Breast completely scaly → 2
- 1b. Breast naked ventrally, frequently with small patch of prepelvic scales (Fig. 40) → 6

- 2a. In life, body coloration essentially uniform grey to brown; lobe of dorsal fin relatively long, contained 2.3 to 5.3 times in fork length; profile of head relatively steep and angular (Fig. 41) *Caranx lugubris*
- 2b. Body coloration not as above; lobe of dorsal fin contained 4.2 to 8.8 times in fork length; profile of head not noticeably steep and angular → 3

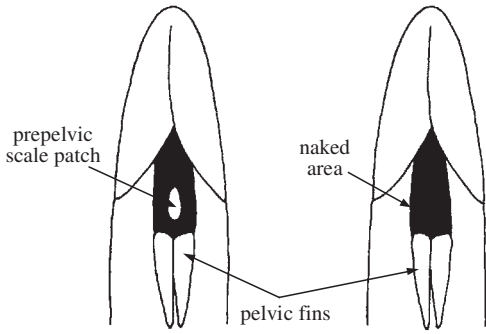


Fig. 40 ventral view

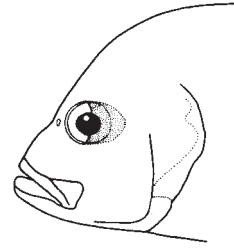


Fig. 41 *Caranx lugubris*

- 3a. Small black spots scattered on head and body (forming at about 16 to 22 cm fork length); snout length contained 9.2 to 12.7 times in fork length; total gill rakers (including rudiments) on first gill arch 25 to 29 (usually 26 or 27), and total soft dorsal- and anal-fin rays 39 to 44 *Caranx melampygus*
- 3b. No small black spots scattered on head and body; snout length contained 13.1 to 18.4 times in fork length; total gill rakers (including rudiments) on first gill arch 22 to 25, except 24 to 27 in *C. heberi* which has 34 to 38 total soft dorsal- and anal-fin rays → 4
- 4a. No small black spot present on upper margin of opercle; upper lobe of caudal fin frequently with distal half noticeably dark or black, especially in juveniles; in adults, adipose eyelid only slightly developed (Fig. 42a) *Caranx heberi*
- 4b. A small, black spot present on upper margin of opercle; upper lobe of caudal fin usually uniformly pigmented; in adults, adipose eyelid well developed, especially posteriorly (Fig. 42b, c) → 5
- 5a. In adults, dorsal-fin lobe without white tip; dorsal profile of head strongly convex and a black spot on upper margin of opercle, in adults, at least 1/2 the diameter of pupil (Fig. 42b); in specimens larger than 15 cm fork length, postorbital head length longer, contained 5.7 to 7.3 times in fork length, and dorsal-fin lobe shorter, contained 5.7 to 8.8 times in fork length; vertebrae 10+14 *Caranx tille*
- 5b. In adults, dorsal-fin lobe with white tip; dorsal profile of head moderately convex and black spot on upper margin of opercle, its size in adults no larger than twice the diameter of pupil (Fig. 42c); in specimens larger than 15 cm fork length, postorbital head length shorter, contained 6.4 to 8.2 times in fork length, and dorsal-fin lobe longer, contained 5 to 6.6 times in fork length; vertebrae 10+15 *Caranx sexfasciatus*

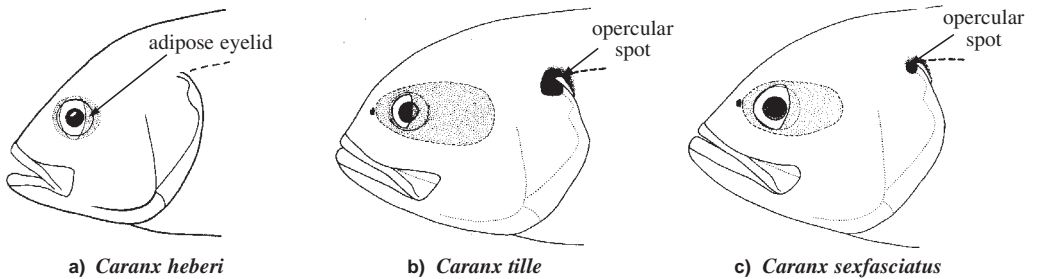


Fig. 42

- 6a. Naked area of breast uninterrupted to naked base of pectoral fins (Fig. 43); curved part of lateral line short, chord of curved part contained 2.5 to 3.3 times in straight part; scutes larger (Fig. 44a) *Caranx bucculentus*
- 6b. Naked area of breast separated from naked base of pectoral fins by a broad band of scales; curved part of lateral line moderate, with chord of curved part contained less than 1.5 times in straight part; scutes smaller (Fig. 44b) → 7

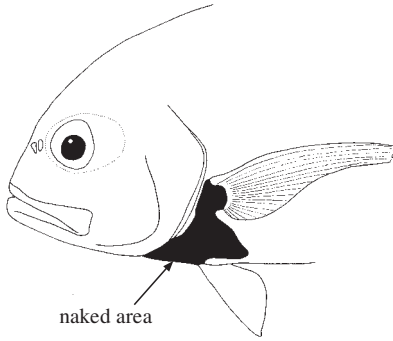


Fig. 43 *Caranx bucculentus*

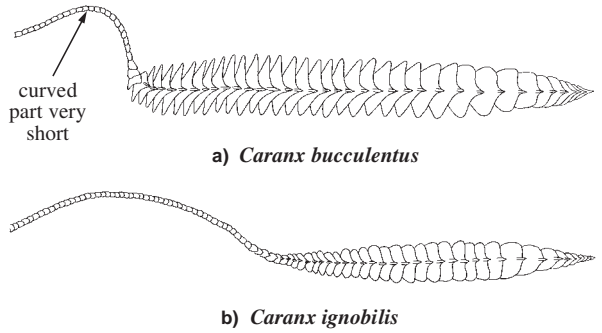


Fig. 44 lateral line

- 7a. Total gill rakers (including rudiments) 20 to 24 on first gill arch; general body colour silvery to black; in specimens larger than 15 cm fork length, body depth contained 2.5 to 3.2 times in fork length *Caranx ignobilis*
- 7b. Total gill rakers (including rudiments) 23 to 30 (rarely 23) on first gill arch; general body colour bronze to yellow-green; in specimens larger than 15 cm fork length, body depth contained 2.7 to 3.8 times in fork length → 8

- 8a. Total soft dorsal- and anal-fin rays 34 to 38 (rarely 38); upper lobe of caudal fin frequently with distal half noticeably dark or black (especially in juveniles), and posterior margin of lower lobe without a narrow white border; no pale spot on shoulder just behind posterodorsal margin of opercle; adults without small black spots *Caranx heberi*
- 8b. Total soft dorsal- and anal-fin rays 37 to 41 (rarely 37); upper lobe of caudal fin usually uniformly pigmented, and posterior margin of lower lobe with a narrow white border; in life a conspicuous pale spot, approximately the diameter of pupil, on shoulder just behind posterodorsal margin of opercle (Fig. 45); adults with small black spots on body above lateral line (forming at about 25 cm fork length) *Caranx papuensis*

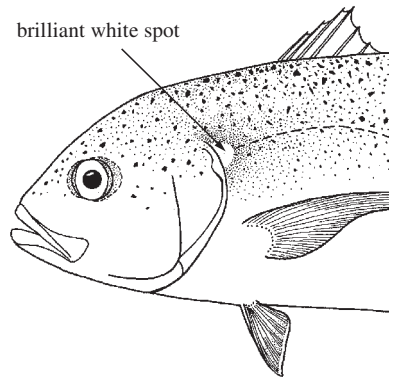


Fig. 45 *Caranx papuensis*

Key to the species of *Decapterus* occurring in the area

- 1a. Posterior end of upper jaw concave above, rounded and produced below (Fig. 46a); straight part of lateral line with 14 to 29 scales (Fig. 47a) *Decapterus macrosoma*
- 1b. Posterior end of upper jaw straight above, straight to slightly concave below (Fig. 46b-e); straight part of lateral line with 0 to 15 scales (except 18 to 39 scales in *D. macarellus*) → 2

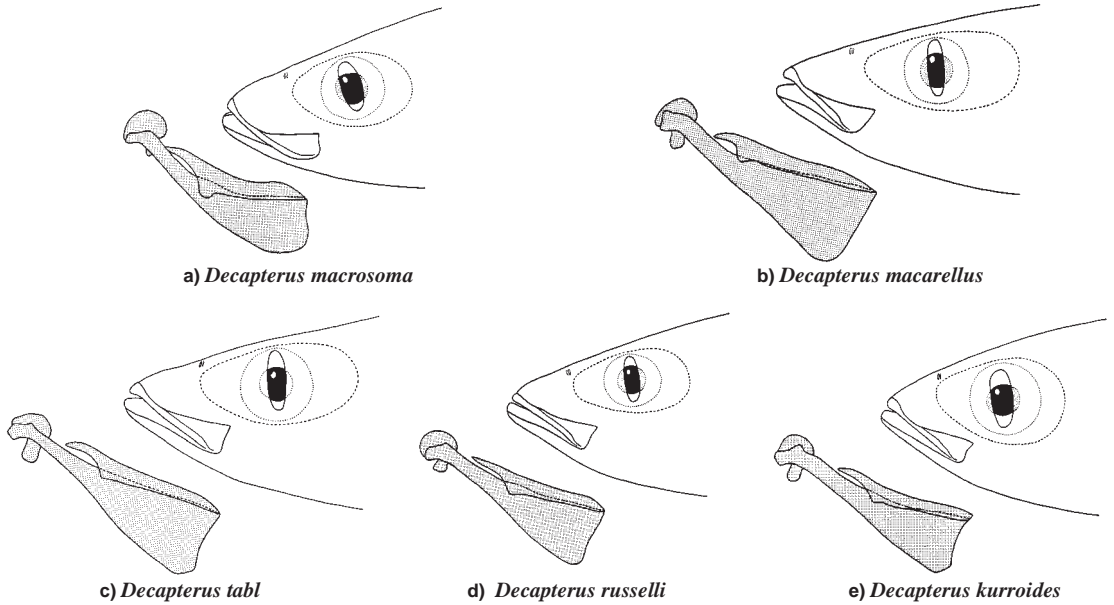


Fig. 46

- 2a. Posterior end of upper jaw noticeably slanted anteroventrally (Fig. 46b); straight part of lateral line with 18 to 39 scales and 24 to 40 scutes = 52 to 67 total (Fig. 47b); pectoral fins usually shorter in adults, 58 to 72% head length; oral valve (membrane) at symphysis of upper jaw conspicuously white (Fig. 48) *Decapterus macarellus*
- 2b. Posterior end of upper jaw not as noticeably slanted anteroventrally (Fig. 46c-e); straight part of lateral line with 0 to 10 scales and 30 to 40 scutes = 30 to 49 total (except 5 to 15 scales and 32 to 42 scutes = 41 to 50 total in *D. muroadsi*; Fig. 47c); pectoral fins usually longer in adults, 71 to 105% head length (except 62 to 83% in *D. tabl*); oral valve (membrane) at symphysis of upper jaw dusky or transparent (except white in *D. muroadsi*) → 3

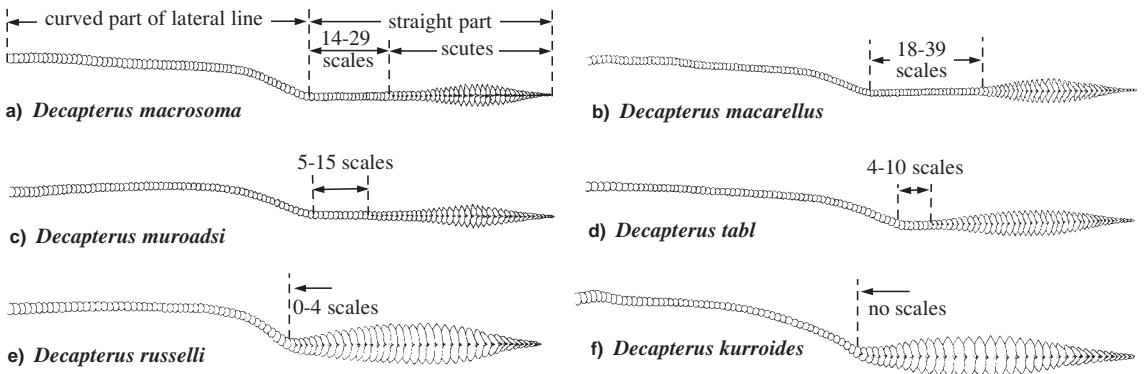


Fig. 47 lateral line

3a. In life, caudal fin with upper lobe greenish yellow and lower lobe grey; oral valve (membrane) at symphysis of upper jaw conspicuously white in adults (Fig. 48); gill rakers on lower limb of first gill arch 36 to 42 *Decapterus muroadsi*

3b. In life, caudal fin with upper and lower lobes both hyaline, brownish or red; oral valve (membrane) at symphysis of upper jaw transparent or dusky; gill rakers on lower limb of first gill arch 26 to 33 (except 30 to 39 in *D. russelli*) → 4

4a. Scutes relatively small (Fig. 47d); curved part of lateral line with 61 to 73 scales; straight part of lateral line with 4 to 12 anterior scales; total lateral-line scales and scutes (excluding scales on caudal fin) 103 to 118; in life, caudal fin red; posterodorsal margin of opercular membrane minutely serrated in large adults (Fig. 49) *Decapterus tabl*

4b. Scutes relatively large (Fig. 47e, f); curved part of lateral line with 42 to 62 scales; straight part of lateral line with 0 to 4 anterior scales; total lateral-line scales and scutes (excluding scales on caudal fin) 77 to 102; in life, caudal fin dusky or red; posterodorsal margin of opercular membrane smooth in adults → 5

5a. In life, caudal fin hyaline to dusky; gill rakers on lower limb of first gill arch usually 32 to 39; soft anal-fin rays (including finlet) 25 to 29 (rarely 25); eye usually smaller . . . *Decapterus russelli*

5b. In life, caudal fin red; gill rakers on lower limb of first gill arch usually 26 to 32; soft anal-fin rays (including finlet) 22 to 26 (rarely 26); eye usually larger *Decapterus kurroides*

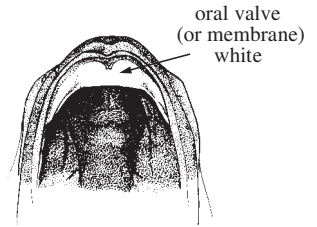


Fig. 48 ventral view of upper jaw and roof of mouth

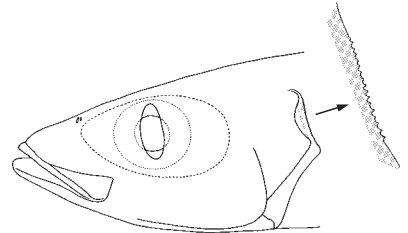
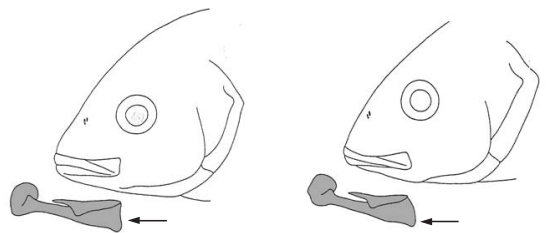


Fig. 49 *Decapterus tabl*

Key to the species of *Pseudocaranx* occurring in the area

1a. Scales in curved part of lateral line 57 to 78; no scales on preorbital bone below and in front of eye and on expanded part of maxilla; posterior end of upper jaw essentially vertical (Fig. 50a); total gill rakers (including rudiments) 29 to 35 on first gill arch *Pseudocaranx dentex*

1b. Scales in curved part of lateral line 37 to 48; scales present on preorbital bone below and in front of eye and on expanded part of maxilla; posterior end of upper jaw slanted posteroventrally (Fig. 50b); total gill rakers (including rudiments) 36 to 44 on first gill arch *Pseudocaranx wrighti*
(western and southern Australia; not yet recorded from the area, but easily confused with *P. dentex* and therefore included here)

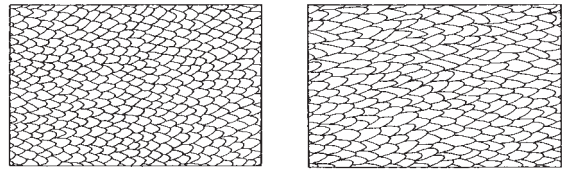


a) *Pseudocaranx dentex* b) *Pseudocaranx wrighti*

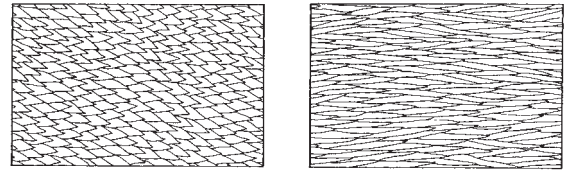
Fig. 50

Key to the species of *Scomberoides* occurring in the area

- 1a. Total gill rakers 8 to 15 on first gill arch; scales on midbody below lateral line broadly oblong or bluntly lanceolate (Fig. 51a, b); lobe of dorsal fin uniformly pigmented (Figs 52 and 53) → 2
- 1b. Total gill rakers 21 to 27 on first gill arch; scales on midbody below lateral line sharply lanceolate or needle-like (Fig. 51c, d); distal half of dorsal-fin lobe abruptly and heavily pigmented (Figs 55 and 56) → 3



a) *Scomberoides commersonnianus* b) *Scomberoides tala*



c) *Scomberoides lysan* d) *Scomberoides tol*

Fig. 51 scales on midbody below lateral line

2a. Upper jaw extends well beyond posterior margin of eye, especially in adults (Fig. 52); in adults, teeth of inner and outer rows in lower jaw subequal in size (Fig. 54a); in life, large oval blotches above or touching lateral line . . . *Scomberoides commersonnianus*

2b. Upper jaw extends slightly beyond posterior margin of eye (Fig. 53); in adults, inner row of teeth in lower jaw distinctly larger than those in outer row (Fig. 54b); in life, vertically elongate blotches intersecting lateral line *Scomberoides tala*

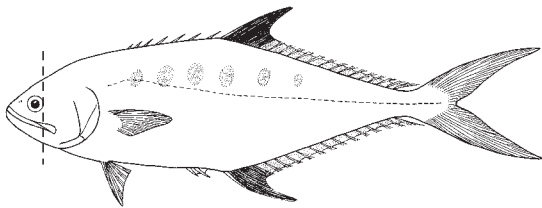


Fig. 52 *Scomberoides commersonnianus*

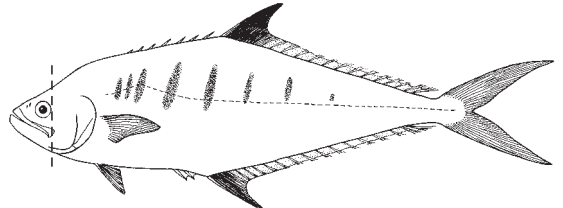


Fig. 53 *Scomberoides tala*



a) *Scomberoides commersonnianus*



b) *Scomberoides tala*

Fig. 54 teeth in lower jaw (teeth in inner row black)

3a. Scales on midbody below lateral line sharply lanceolate (Fig. 51c); in adults, upper jaw extends to or slightly beyond posterior margin of eye (Fig. 55); in life, a double series of 6 to 8 dusky, roundish blotches above and below lateral line, occasionally connected by narrow isthmus *Scomberoides lysan*

3b. Scales on midbody below lateral line slender, needle-like (Fig. 51d); in adults, upper jaw does not extend to posterior margin of eye (Fig. 56); in life, oval or vertically oblong dark blotches, the first 4 or 5 intersecting lateral line *Scomberoides tol*

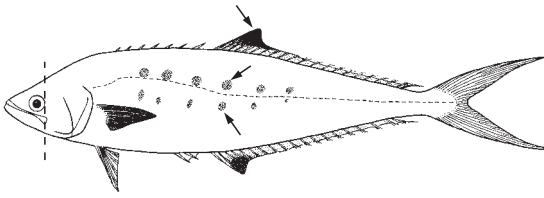


Fig. 55 *Scomberoides lysan*

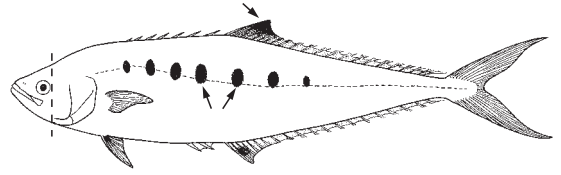


Fig. 56 *Scomberoides tol*

Key to the species of *Selar* occurring in the area

- 1a. Curved part of lateral line with 48 to 56 scales; curved part of lateral line moderate, with chord of curved part contained 0.7 to 1.2 times in straight part; scutes smaller (Fig. 57a) *Selar crumenophthalmus*
- 1b. Curved part of lateral line with 21 to 24 scales; curved part of lateral line short, chord of curved part contained 2.1 to 3 times in straight part; scutes larger (Fig. 57b) *Selar boops*

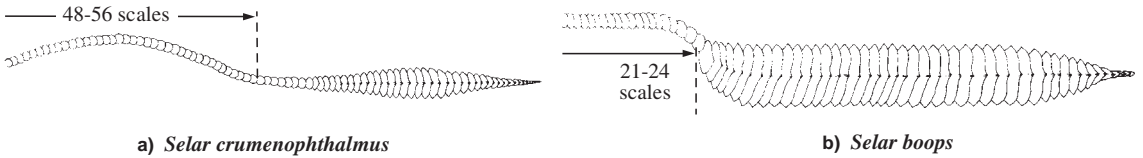


Fig. 57 lateral line

Key to the species of *Seriola* occurring in the area

- 1a. Soft dorsal- and anal-fin rays 22 to 25 and 15 to 17 (rarely 17), respectively; in specimens larger than about 20 cm fork length, total gill rakers (excluding rudiments) on first gill arch 10 to 12; in life, papillae surrounding broad band of teeth in both jaws engaged with blood giving teeth a red appearance *Seriola hippos*
- 1b. Soft dorsal- and anal-fin rays 27 to 35 and 18 to 22, respectively; in specimens larger than about 20 cm fork length, total gill rakers (excluding rudiments) on first gill arch 11 to 29; in life, papillae surrounding broad band of teeth in both jaws not engaged with blood, appearance of teeth white → 2
- 2a. Upper jaw moderately slender posteriorly, with slender supramaxilla (Fig. 58a); caudal fin yellowish; in adults, a moderate cutaneous keel laterally on caudal peduncle; vertebrae 11+14 *Seriola lalandi*
- 2b. Upper jaw relatively broad posteriorly, with broad supramaxilla (Fig. 58b-d); caudal fin dark to dusky sometimes with a lighter posterior margin; in adults, cutaneous keel on caudal peduncle absent to slightly developed; vertebrae 10+14 → 3

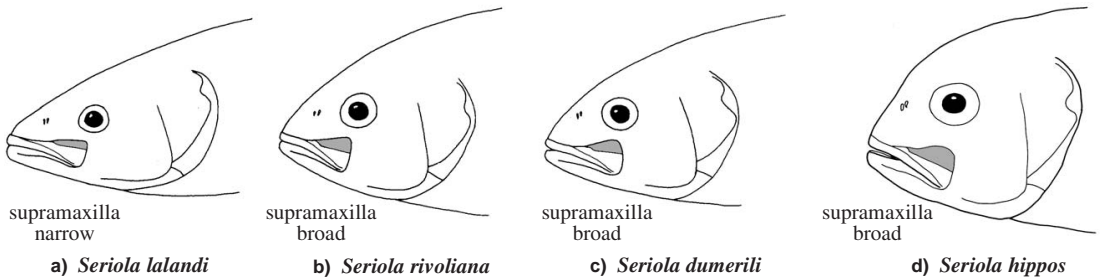


Fig. 58 lateral view of head (supramaxilla shaded)

- 3a.** In adults, length of dorsal-fin lobe about 1.3 to 1.6 times longer than pectoral fins (Fig. 59a) and 18 to 22% of fork length; in specimens larger than about 20 cm fork length, total gill rakers (excluding rudiments) 22 to 26 on first gill arch; first pterygiophore of anal fin straight in specimens larger than about 10 cm fork length (Fig. 60a) *Seriola rivoliana*
- 3b.** In adults, length of dorsal-fin lobe about equal to, or slightly longer than pectoral fins (Fig. 59b) and 13 to 18% of fork length; in specimens larger than about 20 cm fork length, total gill rakers (excluding rudiments) 11 to 19 on first gill arch; first pterygiophore of anal fin moderately curved (Fig. 60b) *Seriola dumerili*

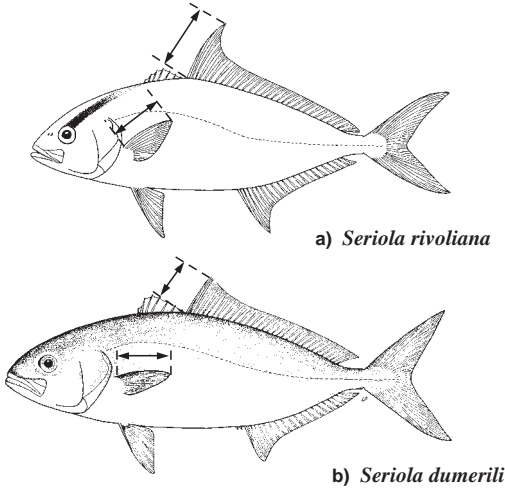


Fig. 59

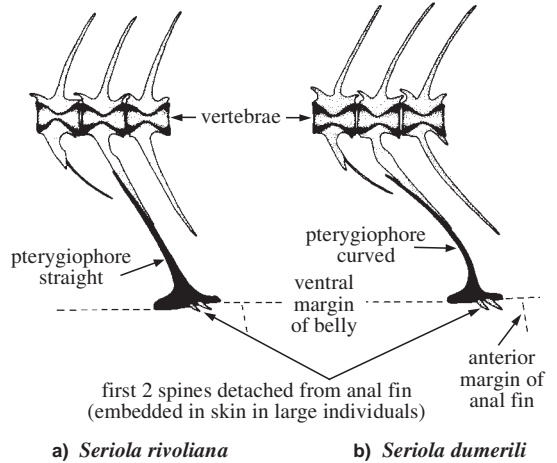


Fig. 60

Key to the species of *Trachinotus* occurring in the area

- 1a.** One to 7 spots in a longitudinal row on or near lateral line (spots absent on specimens smaller than about 10 to 13 cm fork length); soft dorsal-fin rays 21 to 25 → 2
- 1b.** No spots in a longitudinal row on or near lateral line; soft dorsal-fin rays 18 to 20 (except 21 to 23 in *T. africanus*) → 4
- 2a.** In adults, all spots equal to, or smaller than eye diameter, and with about half of spot below lateral line (Fig. 61); gill rakers (including rudiments) on lower limb of first gill arch 15 to 19; vomerine and palatine tooth patches typically type "A" (Fig. 62a) *Trachinotus baillonii*

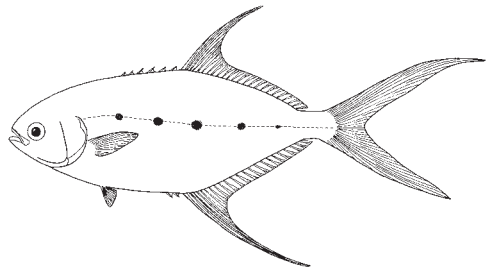


Fig. 61 *Trachinotus baillonii*

- 2b.** In adults, anterior 2 spots larger than eye diameter and at least two-thirds of spot above lateral line (Figs 63 and 64); gill rakers (including rudiments) on lower limb of first gill arch 11 to 15; vomerine and palatine tooth patches usually type "B" or "C" (Fig. 62b, c) → 3

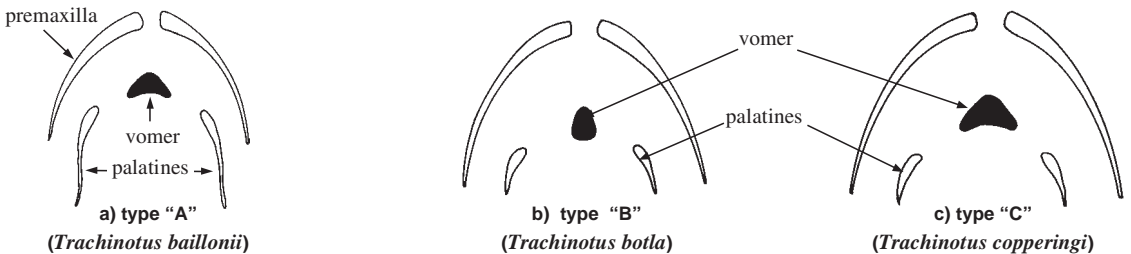


Fig. 62 tooth patches on roof of mouth and upper jaw

- 3a. Soft anal-fin rays 19 to 21; in adults only 1 dark spot above pectoral fins, and in large specimens spots oval-shaped (Fig. 63); dorsal-fin lobe usually longer than anal-fin lobe in specimens larger than about 25 cm fork length; pelvic fins long, their length contained 1.5 to 1.7 times in pectoral-fin length in specimens larger than about 25 cm fork length; vomerine tooth patch usually type "B" (Fig. 62b) *Trachinotus botla*
- 3b. Soft anal-fin rays 22 to 24; in adults 2 dark spots above pectoral fins, and in large specimens spots more vertically elongate (Fig. 64); dorsal-fin lobe consistently shorter than anal-fin lobe in specimens larger than about 25 cm fork length; pelvic fins relatively short, their length contained 1.7 to 2.2 times in pectoral-fin length in specimens larger than about 25 cm fork length; vomerine tooth patch usually type "C" (Fig. 62c)
 *Trachinotus copperingi*

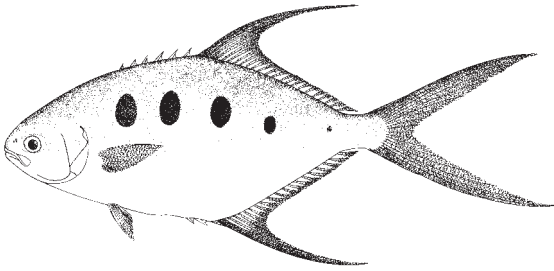


Fig. 63 *Trachinotus botla*

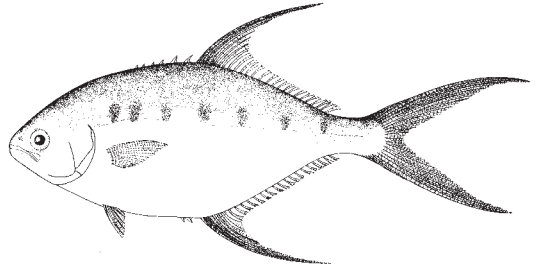


Fig. 64 *Trachinotus copperingi*

- 4a. Soft dorsal- and anal-fin rays 21 to 23 and 19 to 21, respectively; body often with a black oval-shaped blotch in axillary base under pectoral fins *Trachinotus africanus*
- 4b. Soft dorsal- and anal-fin rays 18 to 20 and 16 to 18, respectively; body uniformly pigmented in axillary base under pectoral fins. → 5
- 5a. First predorsal bone inverted teardrop- or oval-shaped (Fig. 65a, this character is easily observed by simple dissection along midline of nape); height of dorsal-fin lobe longer, 35 to 60% of fork length in specimens 10 to 40 cm fork length *Trachinotus blochii*
- 5b. First predorsal bone shaped like an inverted "L" with the arm projecting anteriorly (Fig. 65b, c); anal-fin lobe yellow without a brownish anterior margin; height of dorsal-fin lobe moderate, 24 to 37% of fork length in specimens 10 to 40 cm fork length → 6

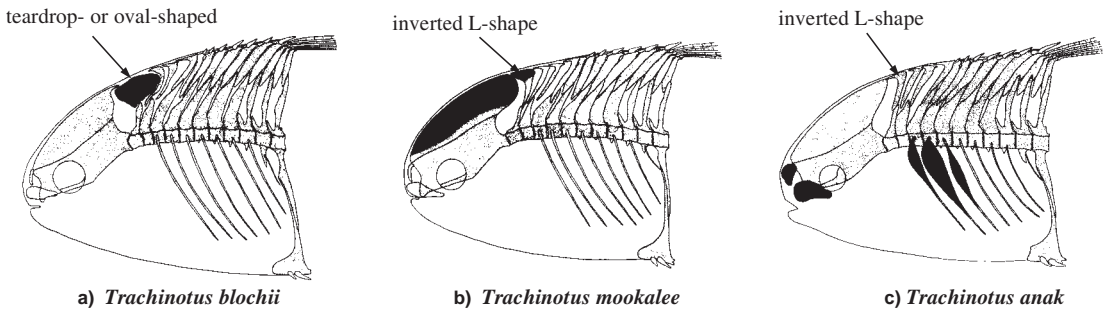


Fig. 65 anterior part of skeleton in lateral view (hyperossified bones shown in black)

6a. Teeth in a narrow band on tongue, persisting to about 50 cm fork length; supraoccipital bone of skull becoming broad and sausage-shaped (Fig. 66a) in specimens larger than about 30 cm fork length; profile of snout evenly rounded in specimens larger than about 20 cm fork length; preorbital and nasal bones never exhibiting hyperostosis *Trachinotus mookalee*

6b. No teeth on tongue; supraoccipital bone of skull thin and blade-like in adults (Fig. 66b); profile of snout essentially straight immediately above upper lip in specimens larger than about 20 cm fork length; preorbital and nasal bones hyperostified in specimens larger than about 30 cm fork length (Fig. 65c) *Trachinotus anak*

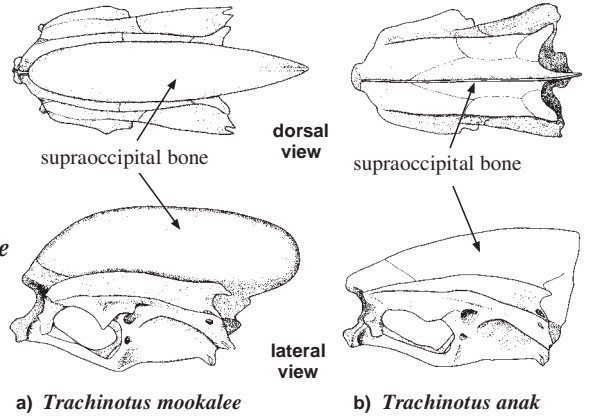


Fig. 66 skull

Note: the skull of *Trachinotus africanus* is used here for *T. anak*; the supraoccipital bone shape is nearly identical in both species

Key to the species of *Trachurus* occurring in the area

- 1a.** Dorsal accessory lateral line immediately below base of dorsal fin terminates below fifth to eleventh (usually seventh to ninth) soft dorsal-fin ray; total scales and scutes in lateral line 71 to 89 (usually more than 75); curved part of lateral line essentially parallel to axis of body for most of its length (Fig. 67) *Trachurus declivis*
- 1b.** Dorsal accessory lateral line immediately below base of dorsal fin terminates below first to fifth (usually first or second) soft dorsal-fin ray; total scales and scutes in lateral line 67 to 81 (rarely more than 76); curved part of lateral line slanted for most of its length (Fig. 68) *Trachurus novaezelandiae*

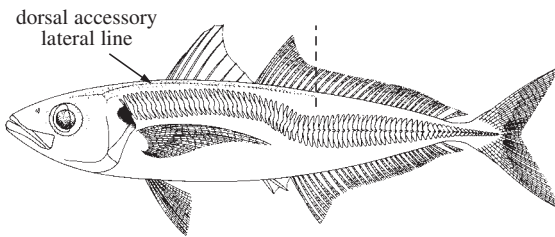


Fig. 67 *Trachurus declivis*

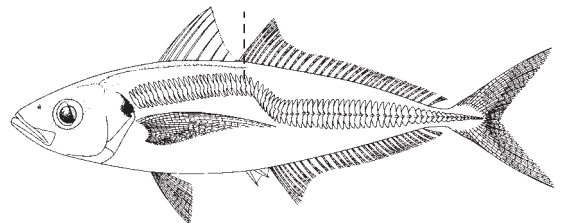


Fig. 68 *Trachurus novaezelandiae*

Key to the species of *Ulua* occurring in the area

- 1a.** Total gill rakers on first gill arch 54 to 61, of which 16 to 21 on upper limb, and 37 to 41 on lower limb; tongue with central band of villiform teeth; in specimens smaller than about 15 cm fork length, first anal-fin ray produced but not filamentous, not extending beyond caudal peduncle *Ulua aurochs*
- 1b.** Total gill rakers on first gill arch 74 to 86, of which 23 to 27 on upper limb, and 51 to 61 on lower limb; tongue without central band of villiform teeth; in specimens smaller than about 15 cm fork length, first anal-fin ray filamentous, extending beyond caudal peduncle *Ulua mentalis*

Key to the species of *Uraspis* occurring in the area

- 1a. Naked area of breast extends uninterrupted to naked base of pectoral fins (Fig. 69a); scales in curved part of lateral line 61 to 82 *Uraspis uraspis*
- 1b. Naked area of breast separated from naked base of pectoral fins by a broad band of scales (Fig. 69b); scales in curved part of lateral line 48 to 66 *Uraspis helvola* and *U. secunda*
(no verified records from the area; adults of these 2 species are virtually impossible to distinguish)

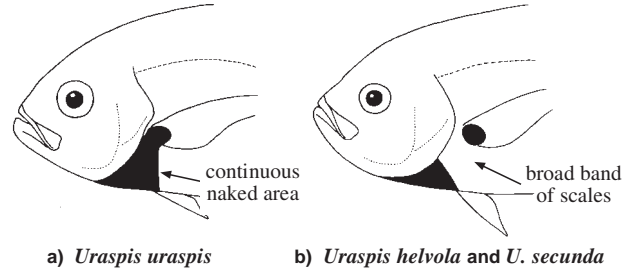





























Fig. 69

List of species occurring in the area

The generic limits and intrafamilial relationships of carangids are not well established; a few of the generic units recognized here are subject to change and are used for convenience. At least 5 additional species, "*Caranx*" *koheru* Hector, *Pseudocaranx wrighti* (Whitley), *Seriola quinqueradiata* Temminck and Schlegel, *Trachurus japonicus* (Temminck and Schlegel), and *T. murphyi* Nichols, occur in the western Pacific Ocean outside of the area of coverage.

The symbol  is given when species accounts are included. Species with a question mark have not yet been recorded from the area but should be watched for.

-  *Alectis ciliaris* (Bloch, 1788)
-  *Alectis indica* (Rüppell, 1830)
-  *Alepes apercna* Grant, 1987
-  *Alepes djedaba* (Forsskål, 1775)
-  "*Alepes*" *kleinii* (Bloch, 1793)^{1/}
-  *Alepes melanoptera* Swainson, 1839
-  *Alepes vari* (Cuvier, 1833)
-  *Atropus atropos* (Schneider, 1801)
-  *Atule mate* (Cuvier, 1833)
-  *Carangoides armatus* (Rüppell, 1830)
-  *Carangoides bajad* (Forsskål, 1775)
-  *Carangoides caeruleopinnatus* (Rüppell, 1830)
-  *Carangoides chrysophrys* (Cuvier, 1833)
-  *Carangoides dinema* Bleeker, 1851
-  *Carangoides equula* (Temminck and Schlegel, 1844)
-  *Carangoides ferdau* (Forsskål, 1775)
-  *Carangoides fulvoguttatus* (Forsskål, 1775)
-  *Carangoides gymnostethus* (Cuvier, 1833)
-  *Carangoides hedlandensis* (Whitley, 1933)
-  *Carangoides humerosus* (McCulloch, 1915)
-  *Carangoides malabaricus* (Bloch and Schneider, 1801)
-  *Carangoides oblongus* (Cuvier, 1833)
-  *Carangoides orthogrammus* (Jordan and Gilbert, 1882)
-  *Carangoides plagiotaenia* Bleeker, 1857
-  *Carangoides praeustus* (Bennett, 1830)
-  *Carangoides talamparoides* Bleeker, 1852
-  *Caranx bucculentus* Alleyne and Macleay, 1877
-  *Caranx ignobilis* (Forsskål, 1775)
-  *Caranx heberi* (Bennett, 1830)
-  *Caranx lugubris* Poey, 1860

^{1/} Generic allocation of this species uncertain; might eventually be assigned to a separate, monotypic genus.

- *Caranx melampygius* Cuvier, 1833
- *Caranx papuensis* Alleyne and Macleay, 1877
- *Caranx sexfasciatus* Quoy and Gaimard, 1825
- *Caranx tille* Cuvier, 1833
- *Decapterus kurroides* Bleeker, 1855
- *Decapterus macarellus* (Cuvier, 1833)
- *Decapterus macrosoma* Bleeker, 1851
- *Decapterus muroadsi* (Temminck and Schlegel, 1844)
- *Decapterus russelli* (Rüppell, 1830)
- *Decapterus tabl* Berry, 1967
- *Elagatis bipinnulata* (Quoy and Gaimard, 1825)
- *Gnathanodon speciosus* (Forsskål, 1775)
- *Megalaspis cordyla* (Linnaeus, 1758)
- *Naucrates ductor* (Linnaeus, 1758)
- *Pantolabus radiatus* (Macleay, 1881)
- *Parastromateus niger* (Bloch, 1795)^{2/}
- *Pseudocaranx dentex* (Bloch and Schneider, 1801)
- *Scomberoides commersonianus* Lacepède, 1801
- *Scomberoides lysan* (Forsskål, 1775)
- *Scomberoides tala* (Cuvier, 1832)
- *Scomberoides tol* (Cuvier, 1832)
- *Selar boops* (Cuvier, 1833)
- *Selar crumenophthalmus* (Bloch, 1793)
- *Selaroides leptolepis* (Cuvier, 1833)
- *Seriola dumerili* (Risso, 1810)
- *Seriola hippos* Günther, 1876
- *Seriola lalandi* Valenciennes, 1833
- *Seriola rivoliana* Valenciennes, 1833
- *Seriolina nigrofasciata* (Rüppell, 1829)
- *Trachinotus africanus* Smith, 1967
- *Trachinotus anak* Ogilby, 1909
- *Trachinotus baillonii* (Lacepède, 1801)
- *Trachinotus blochii* (Lacepède, 1801)
- *Trachinotus botla* (Shaw, 1803)
- *Trachinotus copperingi* (Günther, 1884)
- *Trachinotus mookalee* Cuvier, 1832
- *Trachurus declivis* (Jenyns, 1841)
- *Trachurus novaezelandiae* Richardson, 1843
- *Ulua aurochs* (Ogilby, 1915)
- *Ulua mentalis* (Cuvier, 1833)
- ? *Uraspis helvola* (Forster, 1801)
- ? *Uraspis secunda* (Poey, 1860)
- *Uraspis uraspis* (Günther, 1860)

References

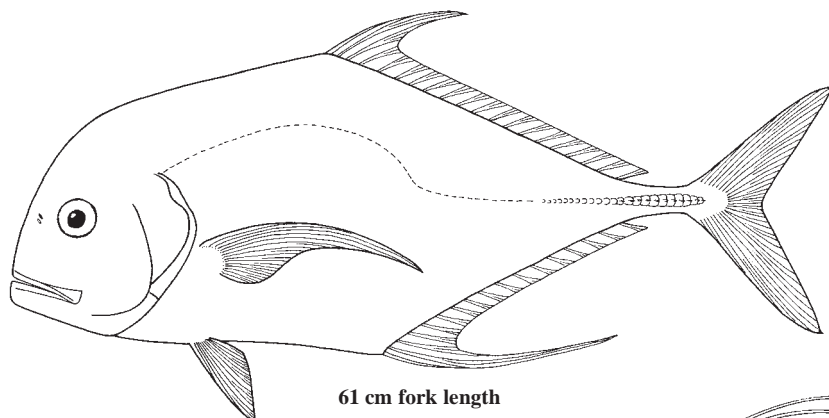
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- Gushiken, S. 1983. Revision of the carangid fishes of Japan. *Galaxea*, 2:135-264.
- Lin, P.-L. and K.-T. Shao. 1999. A review of the carangid fishes (family Carangidae) from Taiwan with descriptions of five new records. *Zool. Stud.*, 38(1):33-68.

^{2/} Many previous authors have assigned this species to a separate family, Apolectidae (or Formionidae)

Alectis ciliaris (Bloch, 1788)

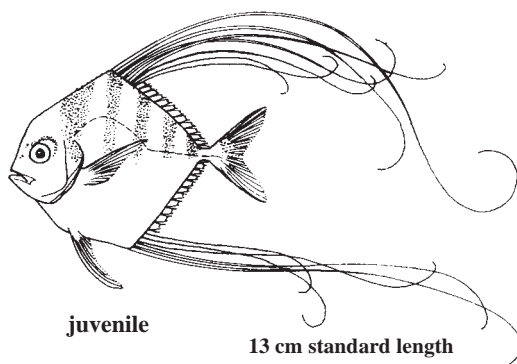
Frequent synonyms / misidentifications: Atlantic Ocean: *Alectis crinitus* (Mitchill, 1826); Hawaii: *Carangoides ajax* Snyder, 1904 / None.

FAO names: **En** - African pompano; **Fr** - Cordonnier fil; **Sp** - Pámpano de hebra.



61 cm fork length

Diagnostic characters: Body deep, becoming more elongate with growth, and very compressed. **Profile of nape and head broadly rounded**; suborbital depth relatively narrow, contained 1.7 to 3 times in upper jaw length; upper jaw extends to below middle to posterior third of eye. Both on jaws with bands of villiform teeth, becoming obsolete with age. **Gill rakers (excluding rudiments) 4 to 6 on upper limb and 12 to 17 on lower limb of first gill arch (total 18 to 22)**. Dorsal fin with VII short spines (embedded and not apparent at about 17 cm fork length) followed by I spine and 18 to 20 soft rays; anal fin with II spines (embedded and not apparent with growth) followed by I spine and 15 to 17 soft rays; anterior soft rays of dorsal and anal fins extremely long and filamentous in young; pectoral fins falcate, longer than head; pelvic fins elongate in young. Lateral line anteriorly with a strong and moderately long arch, its posterior (straight) part with 12 to 30 scutes; **body superficially naked, scales minute and embedded where present**. Vertebrae 10+14; **no hyperostosis**. **Colour:** mostly silvery with a light metallic bluish tinge on upper third of body and head; juveniles with 5 chevron-shaped dark bars on body, and a black blotch at base of third to sixth soft dorsal-fin rays, filaments black distally.



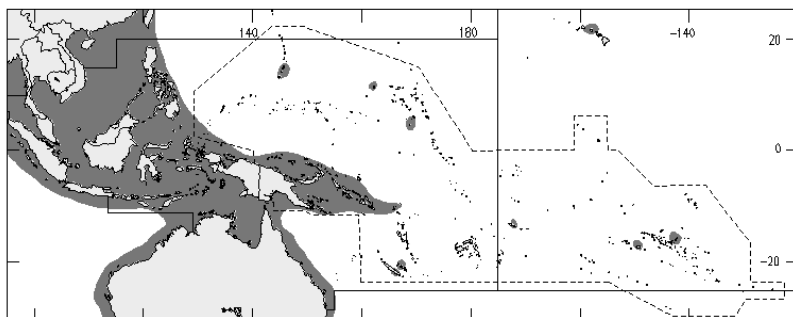
juvenile

13 cm standard length

Size: Maximum total length possibly 130 to 150 cm, but reliable data not available; commonly to 100 cm fork length, largest specimen examined 109 cm fork length and 16.5 kg. World angling record 18.8 kg.

Habitat, biology, and fisheries: Adults are usually solitary and frequent shallow coastal waters to a depth of about 100 m; young usually pelagic and drifting. Small pelagic juveniles with very filamentous dorsal and anal fins resemble medusae, and this "mimicry" may gain them some protection from predators. The diet consists of slow-swimming or sedentary crustaceans; small crabs and occasionally small fishes sometimes eaten. Adults are mainly taken on hook-and-line, especially on light tackle. Juveniles are often taken in beach seines.

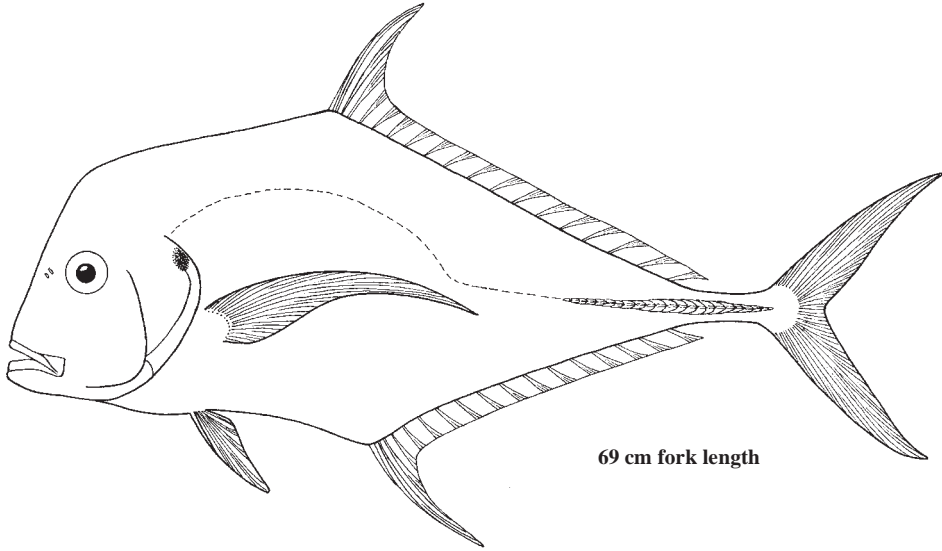
Distribution: Circumtropical in marine waters; widespread in the tropical Indo-West Pacific.



Alectis indica (Rüppell, 1830)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Indian threadfish; **Fr** - Cordonnier plume; **Sp** - Pámpano indico.

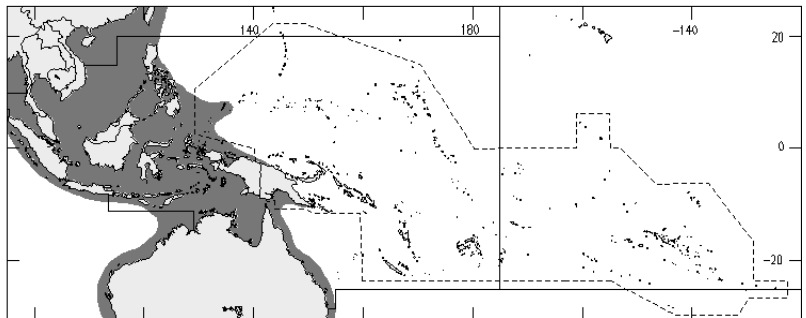


Diagnostic characters: Body deep, becoming more elongate with growth, and very compressed. **Profile of nape and head somewhat angular;** suborbital depth relatively broad, contained 0.8 to 1 times in upper jaw length; upper jaw extends to slightly before eye (to below anterior margin of eye in young). Both jaws with bands of villiform teeth, becoming obsolete with age. **Gill rakers (excluding rudiments) 8 to 11 on upper limb and 21 to 26 on lower limb of first gill arch (total 29 to 37).** Dorsal fin with VI short spines (embedded and not apparent at about 17 cm fork length) followed by I spine and 18 to 20 soft rays; anal fin with II spines (embedded and not apparent with growth) followed by I spine and 15 to 17 soft rays; anterior soft rays of dorsal and anal fins extremely long and filamentous in young; pectoral fins falcate, longer than head; pelvic fins elongate in young. Lateral line anteriorly with a strong and moderately long arch, its posterior (straight) part with 6 to 11 scutes; **body superficially naked, scales minute and embedded where present. Vertebrae 10+14; supraoccipital and distal ends of supraneural (predorsal) bones hyperossified and enlarged distally in specimens larger than 25 cm fork length. Colour:** mostly silvery with dusky green tinge dorsally; juveniles with dark bars on body; second dorsal fin pale with leading edges and tips of rays dusky; anal fin pale yellow and caudal fin dusky green.

Size: Maximum reported total length 150 cm; South African spear fishing record 21.4 kg.

Habitat, biology, and fisheries: Adults are reported to concentrate in large shoals and are wide ranging in tropical coastal waters including reef areas; juveniles are solitary and often enter estuaries. The diet consists of a wide range of fishes, small squids, and crustaceans. Adults are mainly taken on hook-and-line, especially on light tackle. Juveniles are often taken in beach seines.

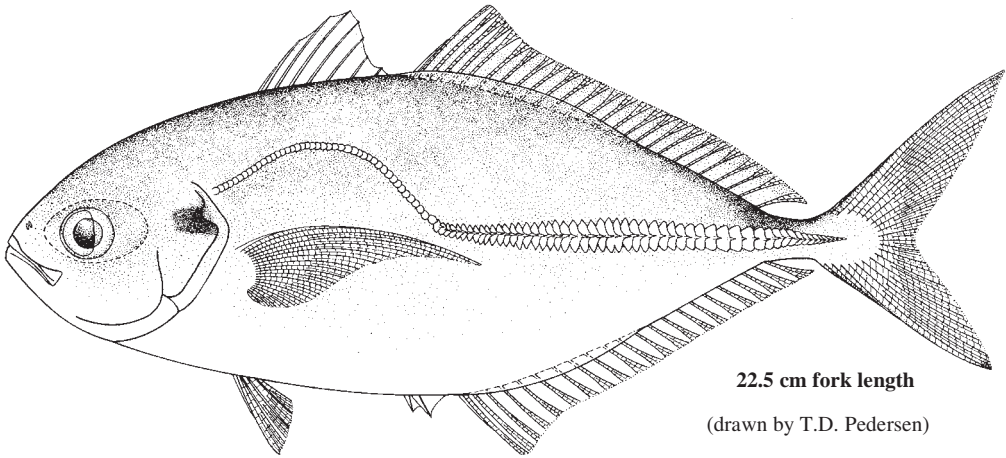
Distribution: Widespread in coastal waters of tropical Indo-West Pacific, from East Africa, including the Malagasy Republic, Red Sea, and Persian Gulf to Papua New Guinea; north to the Ryukyu Islands and south to Australia.



Alepes apercna Grant, 1987

Frequent synonyms / misidentifications: None / None.

FAO names: En - Smallmouth scad.



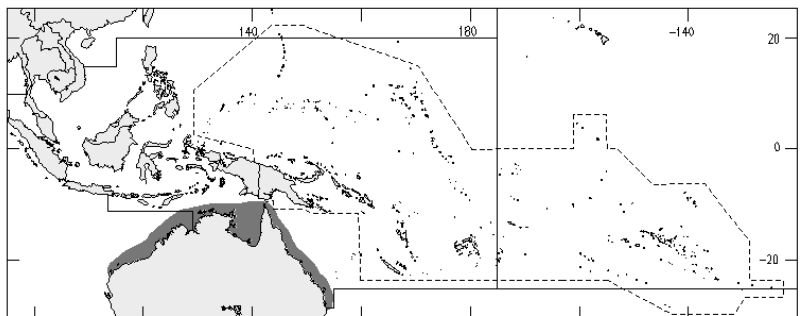
Diagnostic characters: Body oblong, compressed, with dorsal and ventral profiles almost evenly convex; snout bluntly rounded. Eye diameter about equal to snout length, with **adipose eyelid well developed on posterior half of eye only**. **Upper jaw narrowly rounded posteriorly, and supramaxilla relatively small without an anterior spine-like extension**; both jaws with a single row of numerous, comb-like teeth. **Gill rakers (including rudiments) 8 to 10 on upper limb and 18 to 21 on lower limb of first gill arch (total 27 to 30)**. Shoulder girdle (cleithrum) margin smooth, without papillae. Two separate dorsal fins, the first with VII spines, the second with I spine and 24 to 26 soft rays; anal fin with II detached spines followed by I spine and 20 to 22 soft rays; spinous dorsal fin moderately high, longest spine height about equal to length of soft dorsal-fin lobe; ultimate and penultimate rays of dorsal and anal fins of equal length. Lateral line strongly arched anteriorly, with junction of curved and straight parts below vertical from between second dorsal-fin origin and third soft ray; chord of curved part of lateral line contained 1.7 to 2.3 times in straight part (to caudal-fin base); scales in curved part of lateral line 35 to 48; 0 to 3 scutes in curved part; straight part with 0 to 2 scales and 50 to 64 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 90 to 113. Vertebrae 10+14. **Colour:** in life, green to bluish green above, silvery to white below; a diffuse dusky blotch on margin of opercle, not bordered above by a white spot; **interradial membranes of spinous dorsal fin hyaline to dusky**; spinous and second dorsal, anal, and caudal fins dusky yellow, with anterior rays of second dorsal and anal fins often with white tips; caudal-fin lobes often with dark tips; pelvic fins white and pectoral fins hyaline; juveniles with 7 dark bands on body.

Size: A small species, largest specimen examined 25 cm fork length and 29.5 cm total length.

Habitat, biology, and fisheries: An inshore species. Feeds primarily on small invertebrates, primarily microscopic crustaceans and molluscs. Caught mainly on hook-and-line.

Remarks: Grant (1987, Fishes of Australia) used the above scientific name (taken from manuscript paratypes deposited in the Queensland Museum) together with a very brief description and photograph, incorrectly crediting the species to Smith-Vaniz; according to the rules of the International Code of Zoological Nomenclature, this action qualifies as an original description and because the "description" was solely Grant's he becomes the author of the species.

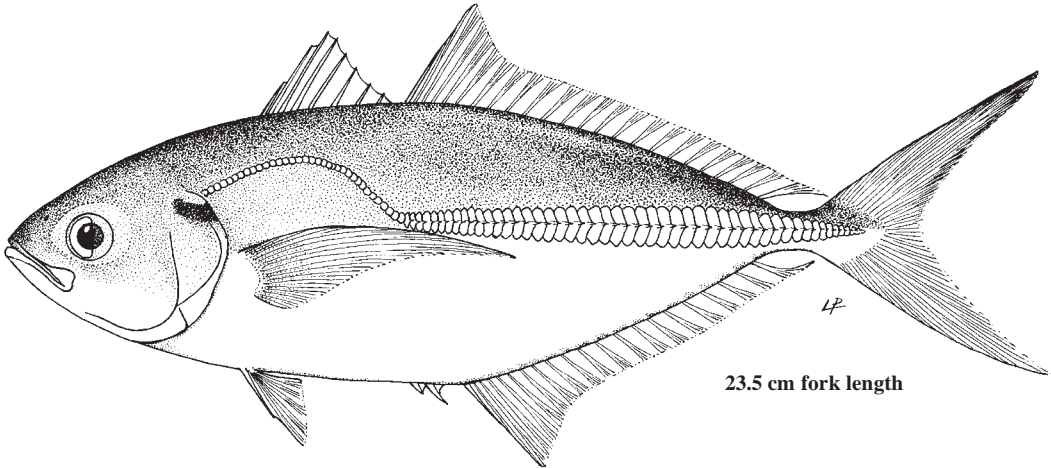
Distribution: Known only from Australia: Exmouth Gulf, western Australia (22°05'S) to Wide Bay, Queensland (25°52'S); may also occur in the Gulf of Papua from where not yet reported.



Alepes djedaba (Forsskål, 1775)

Frequent synonyms / misidentifications: *Atule djedaba* (Forsskål, 1775) [this name has frequently been misspelled "A. djeddaba"]; *Caranx djedaba* (Forsskål, 1775) / *Alepes vari* (Cuvier, 1833).

FAO names: En - Shrimp scad; Fr - Sélar subari; Sp - Jurel subari.



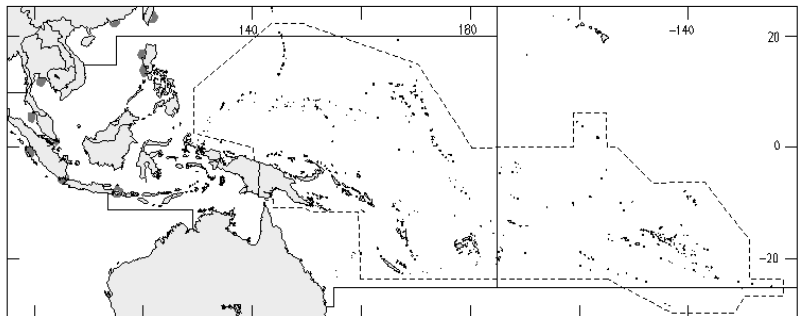
23.5 cm fork length

Diagnostic characters: Body oblong, compressed, with dorsal and ventral profiles almost evenly convex; snout pointed. Eye diameter about equal to snout length, with **adipose eyelid well developed on posterior half of eye only**. **Upper jaw slightly concave posteriorly, and supramaxilla relatively large with an anterior spine-like extension**; both jaws with a single row of numerous, comb-like teeth. **Gill rakers (including rudiments) 10 to 14 on upper limb and 27 to 33 on lower limb of first gill arch (total 38 to 47)**. Shoulder girdle (cleithrum) margin smooth, without papillae. Two separate dorsal fins, the first with VIII spines, the second with I spine and 23 to 25 soft rays; anal fin with II detached spines followed by I spine and 18 to 20 soft rays; spinous dorsal fin moderately high, longest spine height about equal to length of soft dorsal-fin lobe; ultimate ray of dorsal and anal fins about 1.3 to 1.5 times the length of penultimate ray. Lateral line strongly arched anteriorly, with junction of curved and straight parts below vertical from between origin of second dorsal fin and third soft ray; chord of curved part of lateral line contained 2 to 2.6 times in straight part (to caudal-fin base); **scales in curved part of lateral line 31 to 36**; 0 to 3 scutes in curved part; **straight part with 0 to 2 scales and 39 to 51 scutes**; **total scales and scutes in lateral line (excluding scales on caudal fin) 77 to 85**. Vertebrae 10+14. **Colour:** in life, greyish green above, silvery to white below; a distinct black blotch on margin of opercle, bordered above by a smaller white spot; **interradial membranes of spinous dorsal fin pale to dark dusky**; dorsal-fin lobe dusky, pale distally; caudal fin yellowish, except upper lobe often dusky to black distally; other fins pale.

Size: Largest specimen examined 29 cm fork length; seldom exceeds 25 cm fork length.

Habitat, biology, and fisheries: Rather common near inshore reefs, even in moderately turbid water, often forming large schools. Sexual maturity is attained by about 17 cm fork length. The diet consists primarily of invertebrates, shrimps, copepods, and larvae of decapod crustaceans; at larger sizes also feeds on small fishes. Caught mainly on hook-and-line.

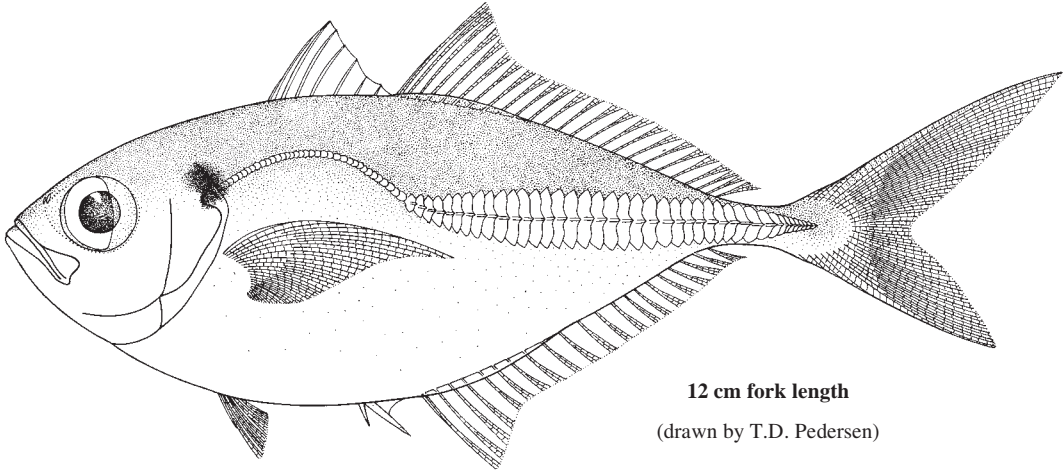
Distribution: Occurs throughout the western Indian Ocean, but appears to have a restricted distribution in the western Pacific Ocean where it is known only from Thailand, Taiwan Province of China, Sumatra, and the Philippines. Also occurs in the eastern part of the Mediterranean Sea (coasts of Israel, Lebanon, and Egypt); a recent immigrant from the Red Sea via the Suez Canal.



"*Alepes*" *kleinii* (Bloch, 1793)

Frequent synonyms / misidentifications: *Caranx para* Cuvier, 1833; *C. microchir* Cuvier, 1833; *C. miyakamii* Wakiya, 1924 / *Caranx kalla* Cuvier, 1833 (this name has generally been misapplied to "*Alepes*" *kleinii*); *Alepes kalla* (Cuvier, 1833).

FAO names: **En** - Banded scad; **Fr** - Comère rubari; **Sp** - Macarela bandoneada.

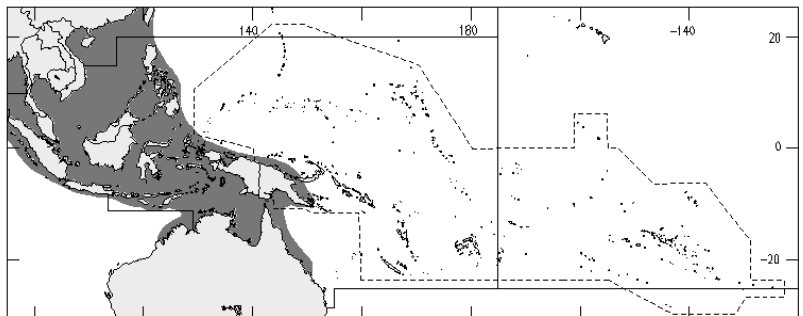


Diagnostic characters: Body oval, strongly compressed, with ventral profile distinctly more convex than dorsal profile; snout pointed. Eye diameter slightly larger than snout length, with **adipose eyelid well developed on posterior half of eye only**. Upper jaw broad and slightly concave posteriorly, extending to anterior margin of pupil; **upper jaw anteriorly with 2 irregular rows of short conical teeth, posteriorly inner surface of jaw paved with blunt teeth; lower jaw with a single row of short, conical teeth except 2 rows anteriorly**. Gill rakers (including rudiments) 10 to 12 on upper limb and 27 to 32 on lower limb of first gill arch (total 38 to 44). Shoulder girdle (cleithrum) margin smooth, without papillae. Two separate dorsal fins, the first with VIII spines, the second with I spine and 23 to 26 soft rays; anal fin with II detached spines followed by I spine and 19 to 22 soft rays; spinous dorsal fin moderately high, longest spine height about equal to length of soft dorsal-fin lobe; upper lobe of caudal fin longer than lower lobe in large adults. Lateral line strongly arched anteriorly, with junction of curved and straight parts below vertical from fourth to sixth soft ray of second dorsal fin; chord of curved part of lateral line contained 1.5 to 2.2 times in straight part (to caudal-fin base); **scales in curved part of lateral line 32 to 46**; 0 to 2 scutes in curved part; straight part with 0 to 2 scales and 35 to 45 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 72 to 86. Vertebrae 10+14. **Colour:** in life, bluish grey to green above, silvery below; **large black spot on upper margin of opercle and adjacent area of shoulder**; dark bands sometimes evident on sides above lateral line; caudal fin dusky to bright yellow, upper lobe with dark fringe; other fins mostly pale to hyaline.

Size: A relatively small species; largest specimen examined 16 cm fork length, commonly to about 14 cm fork length.

Habitat, biology, and fisheries: An inshore, coastal species. Feeds primarily on planktonic crustaceans and larval fishes. Caught on hook-and-line; also with gill nets and other artisanal gear.

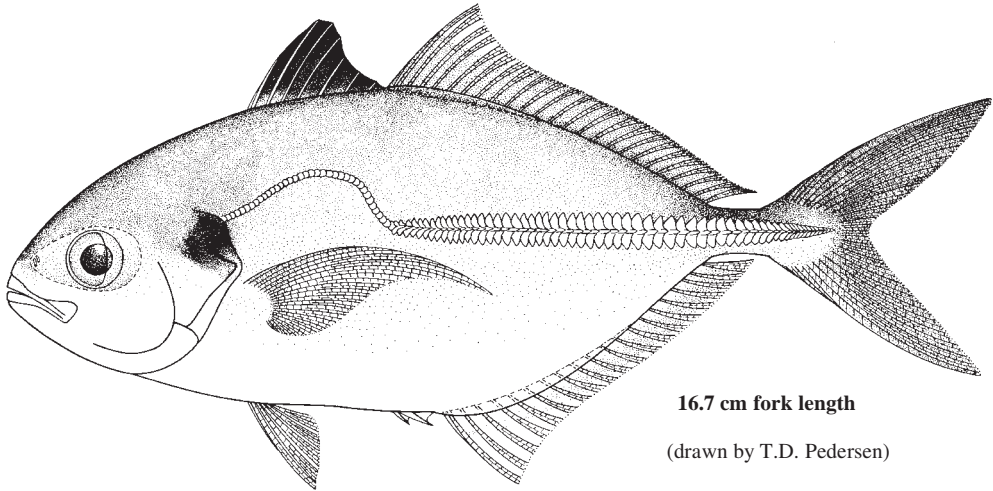
Distribution: In the western Indian Ocean, this locally abundant species is apparently restricted to coastal waters from Pakistan to Sri Lanka. Elsewhere in the Indo-West Pacific, known from the east coast of India, Taiwan Province of China, Okinawa, Japan, the Philippines, Papua New Guinea, and Australia.



Alepes melanoptera Swainson, 1839

Frequent synonyms / misidentifications: *Caranx malam* (Bleeker, 1851); *Alepes malam* (Bleeker, 1851); *Caranx nigripinnis* Day, 1876; *C. pectoralis* Chan, 1968 / None.

FAO names: En - Blackfin scad; Fr - Sélar aile noire; Sp - Jurel alinegro.



16.7 cm fork length

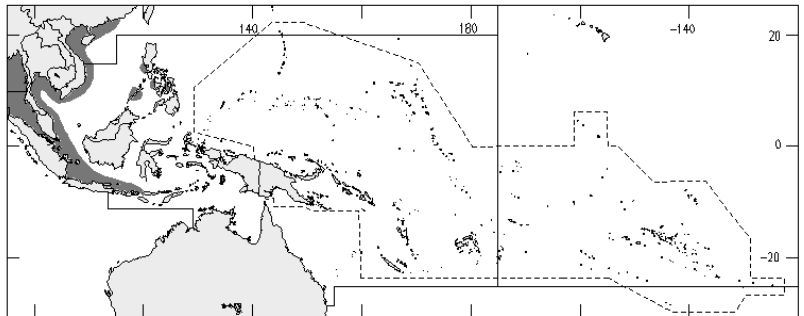
(drawn by T.D. Pedersen)

Diagnostic characters: Body oblong, compressed, with dorsal and ventral profiles almost evenly convex; snout bluntly rounded. Eye diameter about equal to snout length, with **adipose eyelid well developed on posterior half of eye only**. **Upper jaw narrowly rounded posteriorly, and supramaxilla relatively small without an anterior spine-like extension**; both jaws with a single row of numerous, comb-like teeth. **Gill rakers (including rudiments) 7 to 9 on upper limb and 17 to 24 on lower limb of first gill arch (total 24 to 30)**. Shoulder girdle (cleithrum) margin smooth, without papillae. Two separate dorsal fins, the first with VII spines, the second with I spine and 23 to 26 soft rays; anal fin with II detached spines followed by I spine and 18 to 21 soft rays; spinous dorsal fin moderately high, longest spine height about equal to length of soft dorsal-fin lobe; ultimate and penultimate rays of dorsal and anal fins of equal length. Lateral line strongly arched anteriorly, with junction of curved and straight parts below vertical from between second dorsal-fin origin and third soft ray; chord of curved part of lateral line contained 2.3 to 2.7 times in straight part (to caudal-fin base); scales in curved part of lateral line 31 to 50; 0 to 2 scutes in curved part; straight part with 0 to 4 scales and 49 to 69 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 95 to 114. Vertebrae 10+14. **Colour:** in life, grey-blue above, silvery to white below; a diffuse dusky blotch on margin of opercle, not bordered above by a white spot; **interradial membranes of spinous dorsal fin black**; second dorsal fin greyish, lobe pale distally; caudal fin dusky yellow, with darker trailing edges, other fins pale.

Size: A small species, largest specimen examined 21 cm fork length.

Habitat, biology, and fisheries: An inshore species. Feeds primarily on small invertebrates, shrimps, and copepods. Caught mainly on hook-and-line.

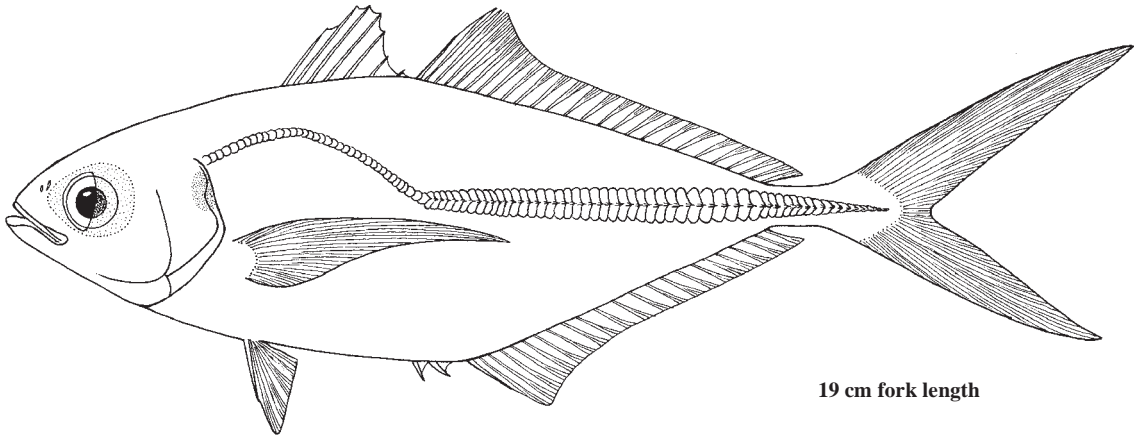
Distribution: In the western Indian Ocean, known only from the Persian Gulf eastward to Sri Lanka; elsewhere in the Indo-West Pacific known from the Gulf of Thailand southern China, Indonesia, and the Philippines.



Alepes vari (Cuvier, 1833)

Frequent synonyms / misidentifications: *Caranx macrurus* (Bleeker, 1852); *Alepes macrurus* (Bleeker, 1852); *A. glabra* (Fowler, 1904) / None.

FAO names: En - Herring scad; Fr - Sélar harengule; Sp - Jurel arenque.



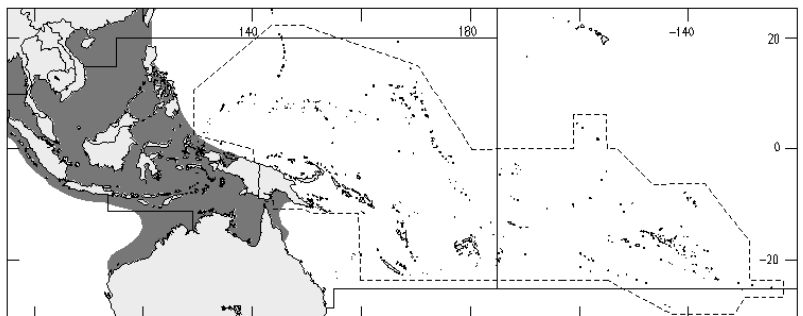
19 cm fork length

Diagnostic characters: Body oblong, compressed, with dorsal and ventral profiles almost evenly convex; snout pointed. Eye diameter about equal to snout length, with adipose eyelid well developed on posterior half of eye only. Upper jaw nearly straight posteriorly, and supramaxilla relatively large with an anterior spine-like extension; both jaws with a single row of numerous, comb-like teeth. Gill rakers (including rudiments) 9 to 12 on upper limb and 23 to 26 on lower limb of first gill arch (total 32 to 38). Shoulder girdle (cleithrum) margin smooth, without papillae. Two separate dorsal fins, the first with VIII spines, the second with I spine and 24 to 27 soft rays; anal fin with II detached spines followed by I spine and 20 to 23 soft rays; spinous dorsal fin moderately high, longest spine height about equal to length of soft dorsal-fin lobe; ultimate and penultimate rays of dorsal and anal fins of about equal length. Lateral line strongly arched anteriorly, with junction of curved and straight parts below vertical from between origin of second dorsal fin and third soft ray; chord of curved part of lateral line contained 1.9 to 2.5 times in straight part (to caudal-fin base); **scales in curved part of lateral line 42 to 50**; 0 to 2 scutes in curved part; **straight part with 0 to 7 scales and 48 to 69 scutes**; **total scales and scutes in lateral line (excluding scales on caudal fin) 86 to 119**. Vertebrae 10+14. **Colour:** in life, ash blue above, silvery to white below; a diffuse dusky blotch on margin of opercle, not bordered above by a white spot; **inter-radial membranes of spinous dorsal fin pale to dark dusky**; second dorsal fin, anal, and caudal fins dusky; mature males develop black pigmentation in spinous dorsal fin, lobes of soft dorsal and anal fins, and in pelvic fins that is lacking in females.

Size: A relatively large species, commonly attaining 30 cm fork length; largest specimen examined 46 cm fork length and 56 cm total length.

Habitat, biology, and fisheries: Common in shallow coastal waters where it often swims near the surface. Feeds primarily on shrimps, copepods, decapod crustaceans, and small fishes. Caught mainly on hook-and-line.

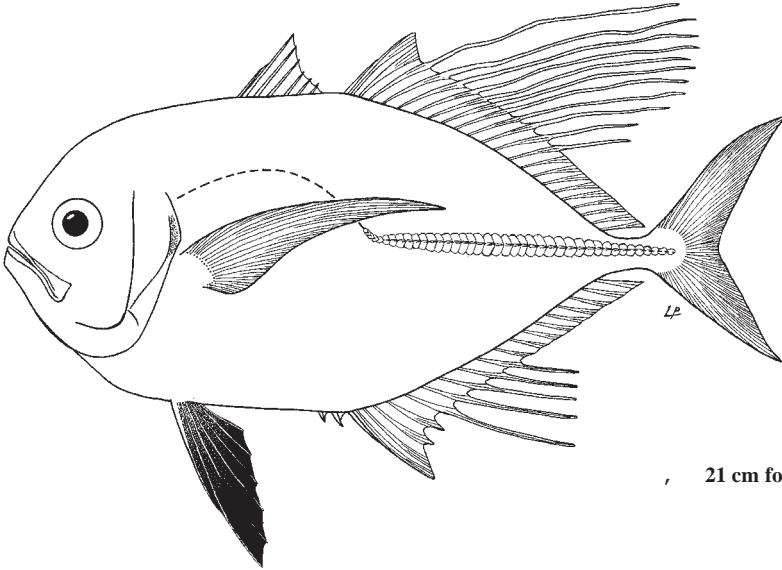
Distribution: In the western Indian Ocean apparently confined to coastal waters from the Red Sea to Sri Lanka; elsewhere in the Indo-West Pacific known from the east coast of India, Bay of Bengal, Gulf of Thailand, Taiwan Province of China, Okinawa, Indonesia, northern Australia, and New Guinea.



Atropus atropus (Schneider, 1801)

Frequent synonyms / misidentifications: *Atropus atropus* (misspelling) / *Carangoides armatus* (Rüppell, 1830); *C. hedlandensis* (Whitley, 1933).

FAO names: En - Clef belly trevally; Fr - Pompano à quille noire; Sp - Pámpano de quilla.



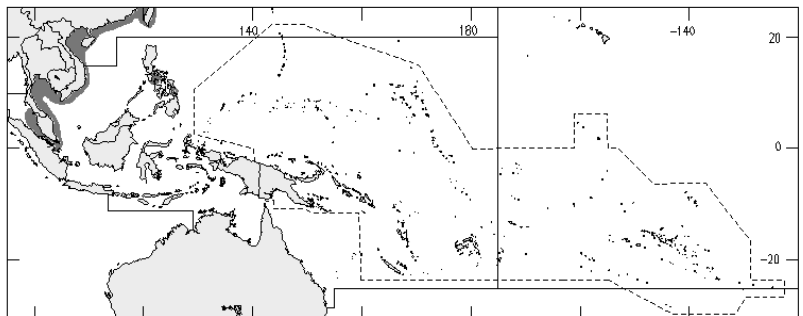
, 21 cm fork length

Diagnostic characters: Body strongly compressed, almost ovate; nape strongly convex; **belly with a deep median groove, accommodating pelvic fins, anus, and anal-fin spines.** Eye diameter slightly larger than snout length. Upper jaw with a narrow band of small teeth, the band widest anteriorly; lower jaw with a single series of small teeth, except 2 or 3 irregular rows anteriorly. Gill rakers (including rudiments) 8 to 11 on upper limb and 19 to 22 on lower limb of first gill arch (total 29 to 34). Two separate dorsal fins, the first with VIII spines, the second with I spine and 19 to 22 soft rays; anal fin with II detached spines followed by I spine and 17 or 18 soft rays; lobe of second dorsal fin shorter than head length; **dorsal fin sexually dimorphic, in mature males (only) 6 to 12 of the central rays produced into filaments of greatly varying lengths; pelvic fins conspicuously long, tip of appressed fin extending almost to anal-fin origin.** Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from sixth or seventh soft rays of second dorsal fin; chord of curved part of lateral line contained 1.5 to 2 times in straight part; straight part of lateral line with 31 to 37 scutes. Breast naked ventrally to behind pelvic fins; laterally, naked area of breast extends diagonally to naked base of pectoral fins. Vertebrae 10+14. **Colour:** in life, head and body bluish green above, silvery below; **membranes of pelvic fins black, with the rays white basally;** other fins pale; young with indistinct dark bands and opercular spot, the latter prominent in adults.

Size: Largest specimen examined 23 cm fork length and 26.5 cm total length; probably does not exceed 30 cm total length.

Habitat, biology, and fisheries: Common, in shallow coastal waters where it often swims near the surface. Feeds primarily on shrimps, copepods, decapod crustaceans, and small fishes. Caught mainly with bottom trawls, traps, and on hook-and-line.

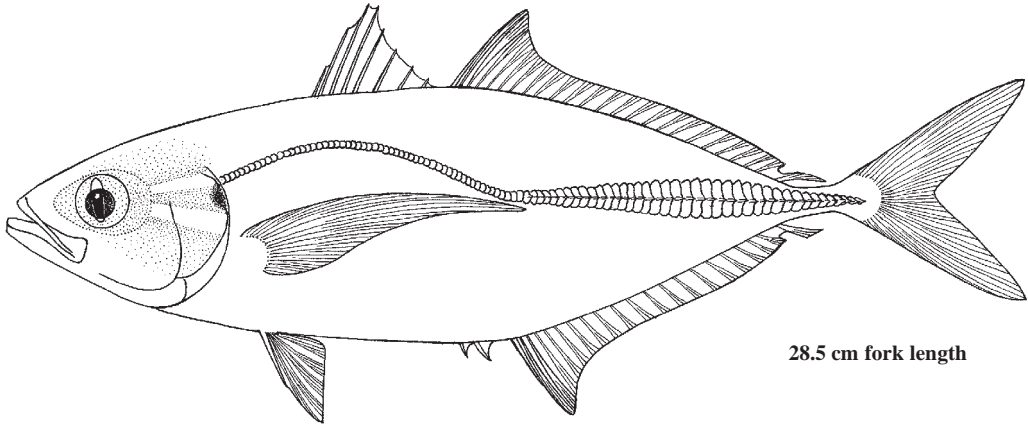
Distribution: Tropical Indo-West Pacific in coastal waters of the Arabian Gulf to Sri Lanka, east coast of India, Malaysia, Gulf of Thailand, Taiwan Province of China, Okinawa, and the Philippines.



Atule mate (Cuvier, 1833)

Frequent synonyms / misidentifications: *Caranx mate* Cuvier, 1833; *C. affinis* Rüppell, 1836; *Decapterus politus* (Jenkins, 1904); *D. lundini* Jordan and Seale, 1906; *D. normani* Bertin and Dollfus, 1948 / None.

FAO names: En - Yellowtail scad; Fr - S lar queue jaune; Sp - Jurel rabo amarillo.

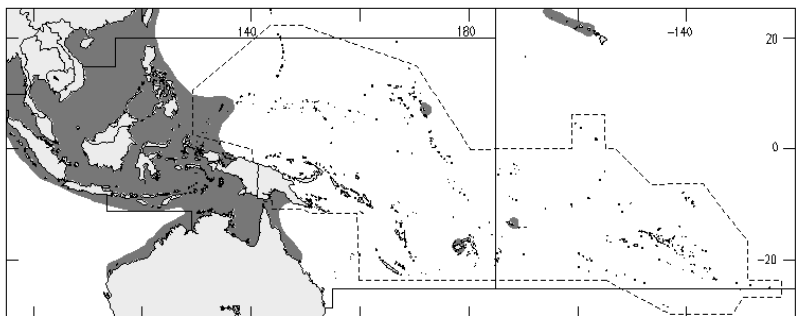


Diagnostic characters: Body elongate oval, moderately compressed, with dorsal and ventral profiles almost evenly convex; snout pointed. Eye moderate, diameter shorter than snout in adults, with **adipose eyelid well developed and completely covering eye except for a vertical slit centred on pupil**. Upper jaw extending to below anterior third of eye; both jaws with a single series of small conspicuous teeth, except in large specimens upper jaw with 2 or 3 rows of small canines anteriorly. Gill rakers (including rudiments) 10 to 13 on upper limb and 26 to 31 on lower limb of first gill arch (total 37 to 44). **Shoulder girdle (cleithrum) margin smooth, without papillae**. Two separate dorsal fins, the first with VIII spines, the second with I spine and 22 to 25 soft rays; anal fin with II detached spines followed by I spine and 18 to 21 soft rays; spinous dorsal fin moderately high, longest spine height about equal to length of soft dorsal-fin lobe; **terminal dorsal and anal rays finlet-like in adults, about twice length of adjacent rays and a little more separated but joined by interradiial membrane**; pectoral fins long and falcate, tip of appressed fin extending to junction of curved and straight parts of lateral line. **Lateral line gently arched anteriorly, with junction of curved and straight parts below vertical from sixth to eighth soft rays of second dorsal fin**; chord of curved part of lateral line contained 1 to 1.4 times in straight part (to caudal-fin base), **scales in curved part of lateral line 39 to 57; straight part with 0 to 10 scales and 36 to 49 scutes**; total scales and scutes in lateral line (excluding scales on caudal fin) 92 to 103. Vertebrae 10+14. **Colour:** in life, bright olive-green dorsally, yellowish green laterally and whitish ventrally; dorso-laterally 9 or 10 faint, grey bars, wider than pale interspaces; **a black spot, slightly smaller than eye, on upper margin of opercle and adjacent area of shoulder; dorsal and caudal fins dusky greenish yellow; anal fin pale yellow**; pectoral and pelvic fins hyaline to whitish.

Size: Largest specimen examined 20 cm fork length and 30 cm total length; commonly to about 26 cm fork length.

Habitat, biology, and fisheries: Occurs in schools at depths to about 50 m in inshore waters throughout its range; feeds primarily on crustaceans and planktonic invertebrates. Caught mainly on hook-and-line, and with various types of artisanal gear.

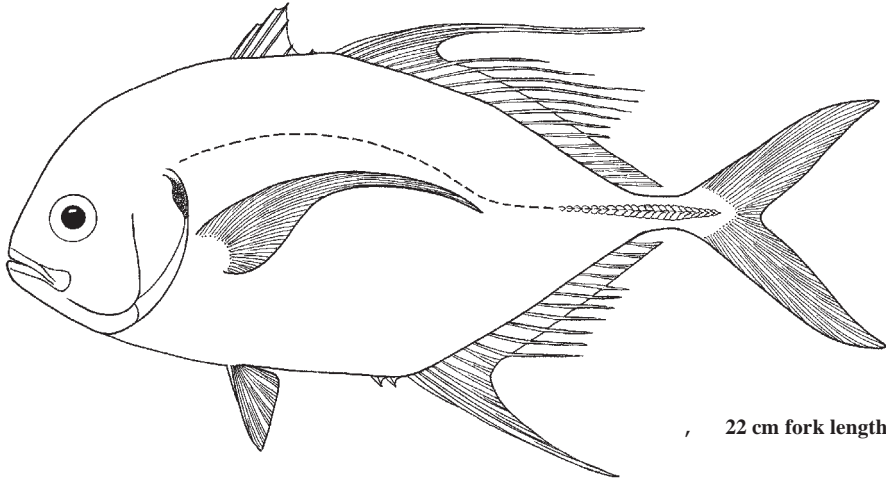
Distribution: Broadly distributed throughout the Indian Ocean; elsewhere in the Indo-West Pacific from southern Japan and Australia eastward to Hawaii.



***Carangoides armatus* (Rüppell, 1830)**

Frequent synonyms / misidentifications: *Caranx armatus* (Rüppell, 1830); *Carangoides ciliaris* of authors; *Caranx schlegeli* Wakiya, 1924 / *Carangoides hedlandensis* (Whitley, 1933).

FAO names: **En** - Longfin trevally; **Fr** - Carangue sap-sap; **Sp** - Jurel sap-sap.

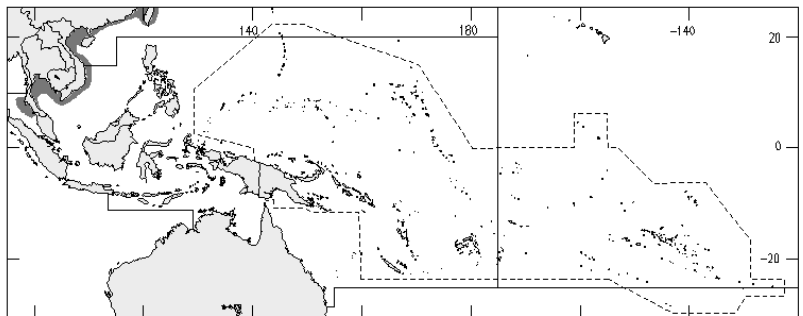


Diagnostic characters: Body strongly compressed and deep. **Head profile very steep in adults but relatively straight from snout to nape.** Eye diameter about equal to, or smaller than, snout length. Both jaws with bands of villiform teeth, the bands widest anteriorly; vomerine tooth patch wedge-shaped without a posteromedian, extension. **Gill rakers (including rudiments)** 10 to 15 on upper limb and 20 to 24 on lower limb of first gill arch (**total 31 to 37**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 19 to 22 soft rays; anal fin, with II detached spines followed by I spine and 16 to 18 soft rays; lobe of second dorsal fin elongate and filamentous, longer than head length; **dorsal fin sexually dimorphic, in mature males (only) larger than 21 cm fork length, 3 to 12 of the central rays produced into filaments of greatly varying lengths.** Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from tenth to twelfth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.7 to 0.9 times in straight part; straight part of lateral line with 11 to 24 weak scutes and 25 to 43 total elements (including anterior scales). **Breast naked ventrally to behind origin of pelvic fins; laterally, naked area of breast extends diagonally to naked base of pectoral fins.** Vertebrae 10+14. **Colour:** bluish grey above, silvery below; blackish blotch on upper margin of opercle; spinous dorsal fin blackish; second dorsal and anal fins pale to dusky, leading edge of lobes dusky to blackish; caudal fin grey with leading and trailing edges black; pelvic fins generally black in specimens smaller than 10 cm fork length, but becoming paler with increasing size until at 20 cm pale or only slightly dusky.

Size: Largest specimen examined 50 cm fork length.

Habitat, biology, and fisheries: Inhabits rocky and coral coastlines as well as shallow bays; small groups of adults often swim along the edges of reefs. Juveniles may occur in estuarine areas. Sexual maturity is attained at 21 or 22 cm fork length. Caught mainly on hook-and-line; also by spears.

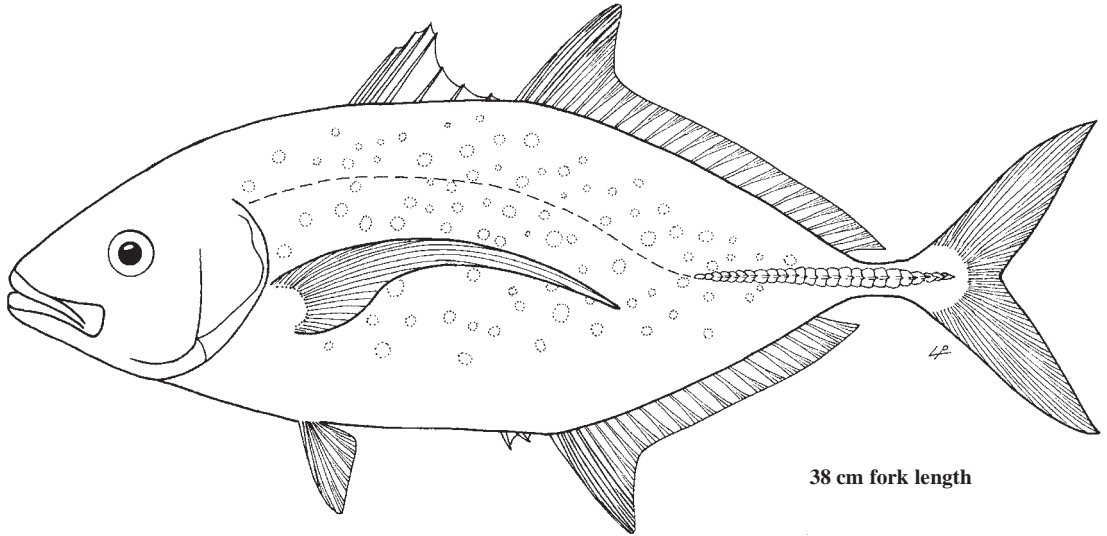
Distribution: Western Indian Ocean from South Africa northward to southern India and Sri Lanka, including the Red Sea, Gulf of Oman, and west coast of Malagasy Republic; in the western Pacific known from the Gulf of Thailand, Hong Kong, Thailand, Okinawa, and Japan.



Carangoides bajad (Forsskål, 1775)

Frequent synonyms / misidentifications: *Caranx auroguttatus* Cuvier, 1833; *Carangoides auroguttatus* (Cuvier, 1833) / *Carangoides gymnostethus* (Cuvier, 1833).

FAO names: **En** - Orangspotted trevally; **Fr** - Carangue lentigine; **Sp** - Jurel lentejuela.



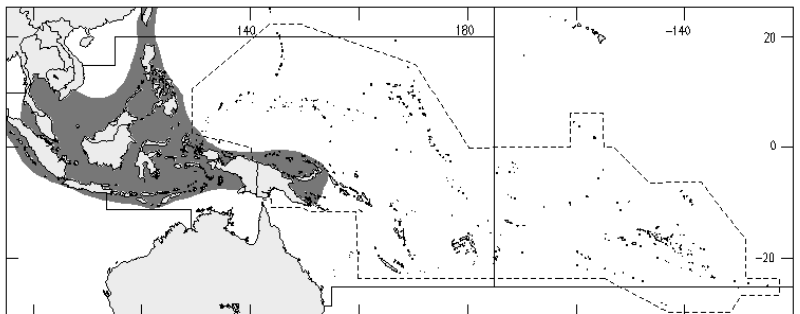
38 cm fork length

Diagnostic characters: Body oblong and compressed; dorsal profile more convex than ventral profile; dorsal profile of head slightly elevated to nape, almost straight. Eye diameter smaller than snout length. Both jaws with narrow bands of villiform teeth, the bands widest anteriorly; vomerine tooth patch triangular, without a posteromedian extension. Gill rakers (including rudiments) 7 to 9 on upper limb and 18 to 21 on lower limb of first gill arch (total 25 to 33). Two separate dorsal fins, the first with VIII spines, the second with I spine and 24 to 26 soft rays; **anal fin with II detached spines followed by I spine and 21 to 24 soft rays, lobe of second dorsal fin shorter than head length.** Lateral line anteriorly with a relatively low arch, with junction of curved and straight parts below vertical from eleventh to fifteenth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.7 to 0.9 times in straight part; straight part of lateral line with 14 to 26 scales followed by 20 to 30 scutes. **Breast completely scaly or with a narrow naked area anteroventrally, scarcely if at all visible in lateral view.** Vertebrae 10+14. **Colour:** brassy dorsally, shading to silvery white on sides, with **numerous conspicuous orange-yellow spots**; no dark opercular spot; capable of rapidly changing colour to almost entirely orange.

Size: Largest specimen examined 49 cm fork length and 55 cm total length.

Habitat, biology, and fisheries: Caught on hook-and-line, with gill nets, and other artisanal gear.

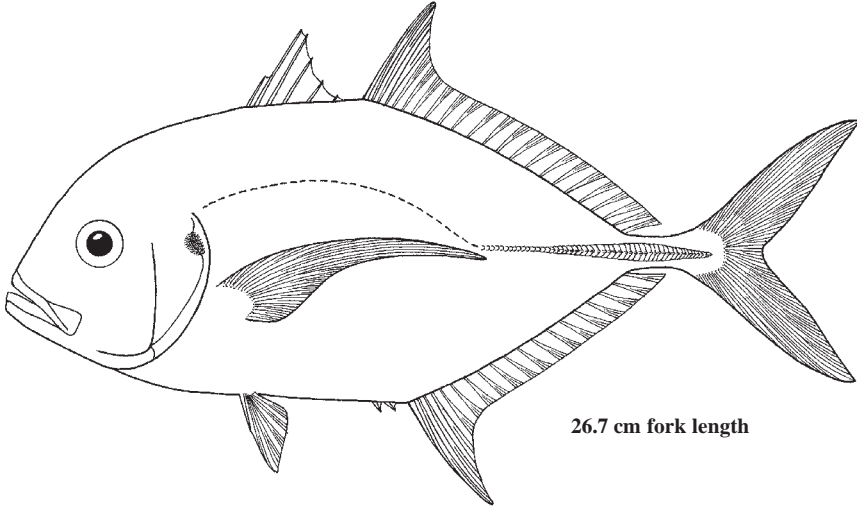
Distribution: In the Indian Ocean known from the Red Sea, Gulf of Aden, Persian Gulf, and the Gulf of Oman; elsewhere in the Indo-West Pacific known from the Gulf of Thailand, Okinawa, Indonesia, Philippines, and New Britain.



***Carangoides caeruleopinnatus* (Rüppell, 1830)**

Frequent synonyms / misidentifications: *Caranx caeruleopinnatus* Rüppell, 1830; *Carangoides altissimus* Jordan and Seale, 1907; *C. formosanus* Jordan and Snyder, 1910; *C. uii* Wakiya, 1924; *Citula diversa* Whitley, 1940 / None.

FAO names: **En** - Coastal trevally; **Fr** - Carangue c ti re; **Sp** - Jurel costero.



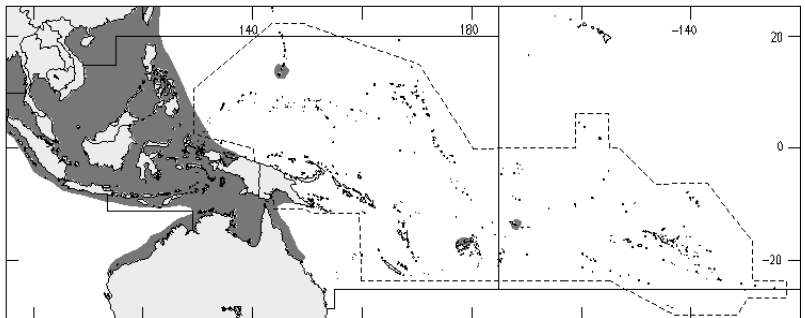
26.7 cm fork length

Diagnostic characters: Body strongly compressed, almost ovate; dorsal profile of body more strongly convex than ventral profile, nape moderately curved. Eye diameter slightly smaller than snout length. Both jaws with bands of villiform teeth, the bands widest anteriorly; vomerine tooth patch ovate, without a posteromedian extension. **Gill rakers (including rudiments)** 5 to 8 on upper limb and **15 to 19 on lower limb of first gill arch (total 21 to 27)**. **Two separate dorsal fins**, the first with VII spines, **the second with I spine and 20 to 23 (usually 22 or 23) soft rays**; anal fin with II detached spines followed by I spine and 16 to 20 soft rays; **lobe of second dorsal fin filamentous in young, becoming shorter with age, in mature adults distinctly shorter than head length** (in specimens larger than 25 cm fork length, height of second dorsal-fin lobe usually shorter than head length, and slightly to distinctly shorter than anal-fin lobe). Lateral line anteriorly with a moderately regular arch, with junction of curved and straight parts below vertical from between twelfth to fourteenth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.55 to 0.8 times in straight part; straight part of lateral line with 16 to 20 scutes, and 31 to 50 total elements (including anterior scales). **Breast naked ventrally to distinctly behind origin of pelvic fins; laterally, naked area of breast and pectoral-fin base interrupted laterally by a narrow band of scales**. **Colour:** in life, bluish green above, silvery grey below; sides with numerous, small yellow spots; small black blotch on upper margin of opercle; second dorsal, anal, and caudal fins dusky, the latter sometimes yellowish; pectoral fins pale yellow; pelvic fins hyaline to pale grey.

Size: Largest specimen examined 36 cm fork length; commonly to 25 cm fork length.

Habitat, biology, and fisheries: Adults are commonly found over deeper coastal reefs, but are rarely close to the shore. A rather sluggish fish, as compared to other *Carangoides* species. Taken incidental to artisanal fisheries throughout its range. Caught on hook-and-line, gill nets, and traps.

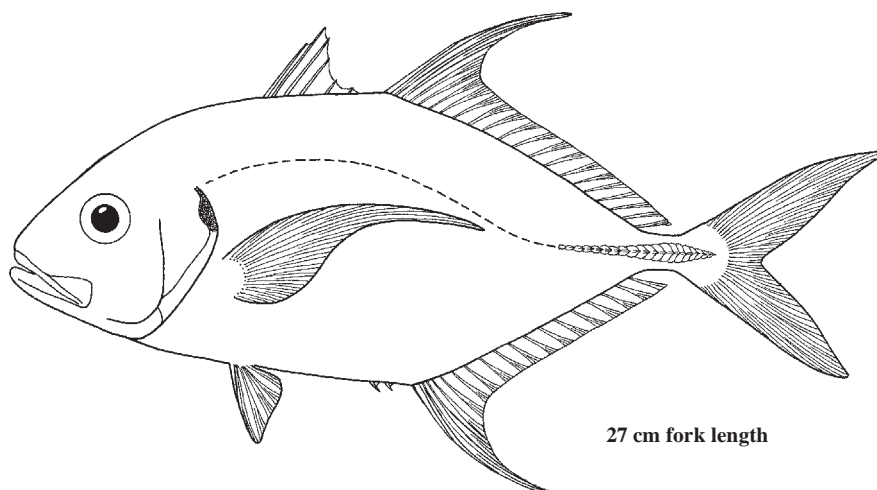
Distribution: Common in coastal waters throughout the western Indian Ocean; elsewhere in the Indo-West Pacific broadly distributed throughout the eastern Indian and western Pacific oceans from Japan to Australia.



***Carangoides chrysophrys* (Cuvier, 1833)**

Frequent synonyms / misidentifications: *Caranx chrysophrys* Cuvier, 1833; *Carangoides chrysophryoides* Bleeker, 1851; *Caranx typus* Gilchrist and Thompson, 1917 / None.

FAO names: En - Longnose trevally; Fr - Carangue tapir; Sp - Jurel tapir.

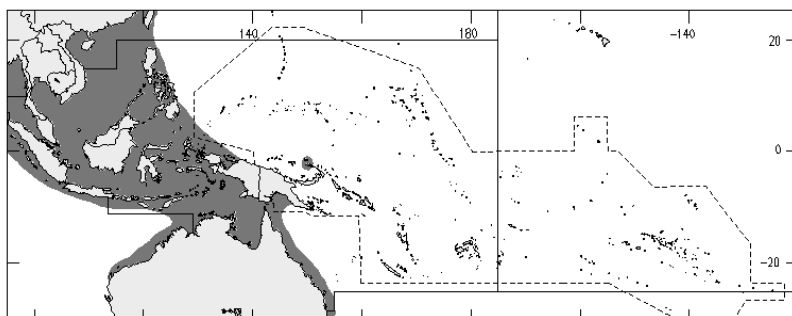


Diagnostic characters: Body subovate in juveniles, oblong in adults and compressed; nape only slightly elevated, **dorsal profile of snout gently sloped, then abruptly vertical just above mouth cleft.** Eye diameter smaller than snout length. Both jaws with bands of small villiform teeth, the bands widest anteriorly and in large specimens some outer teeth conical; vomerine tooth patch ovate, without a posteromedian extension. **Gill rakers (including rudiments)** 5 to 9 on upper limb and **15 to 18 on lower limb of first gill arch (total 21 to 26).** Two separate dorsal fins, the first with VIII spines, the second with I spine and 18 to 20 soft rays; anal fin with II detached spines followed by I spine and 15 to 17 soft rays; lobe of second dorsal fin falcate but usually shorter than head length, height of fin lobe becoming shorter with age. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between twelfth to fourteenth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.5 to 0.6 times in straight part; straight part of lateral line with 20 to 37 weak scutes and 32 to 42 total elements (including anterior scales). **Breast naked posteroventrally to distinctly behind pelvic fins; laterally, naked area of breast extends diagonally to naked base of pectoral fins.** Vertebrae 10+14. **Colour:** in life, generally silvery with head and body greenish above and silvery with yellow-green reflections below; opercle with a small black spot on upper margin; dorsal and anal fins ranging in colour from whitish to pale yellow to dusky; interradial membranes of soft anal-fin rays often with a white spot basally; caudal and pectoral fins pale to dusky yellow; large adults sometimes very dark, head and fins blackish; these fish perhaps exhibiting nuptial or spawning coloration.

Size: Largest specimen examined 38.5 cm fork length and 44 cm total length; reported to attain 60 cm total length.

Habitat, biology, and fisheries: Inhabits coastal waters in depths to 90 m, but most abundant at 30 to 60 m. Feeds on small demersal fishes and epibenthic crustaceans. Caught on hook-and-line, bottom trawls, gill nets, and traps.

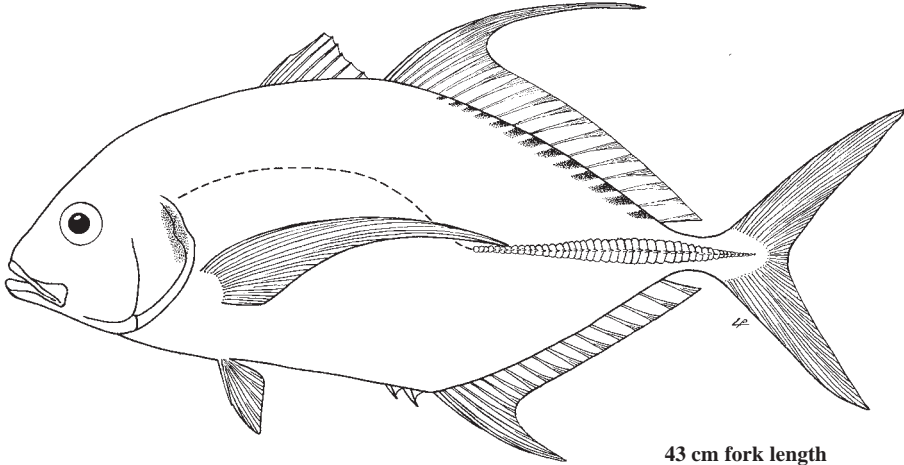
Distribution: Widespread in coastal waters of the Indian Ocean, including the Red Sea and Persian Gulf; elsewhere in the Indo-West Pacific from Okinawa to Australia and eastward to New Britain.



***Carangoides dinema* Bleeker, 1851**

Frequent synonyms / misidentifications: *Caranx dinema* (Bleeker, 1851); *Carangichthys dinema* (Bleeker, 1851); *Caranx deani* Jordan and Snyder, 1907 / None.

FAO names: En - Shadow trevally; Fr - Carangue crépuscule; Sp - Jurel crepúsculo.



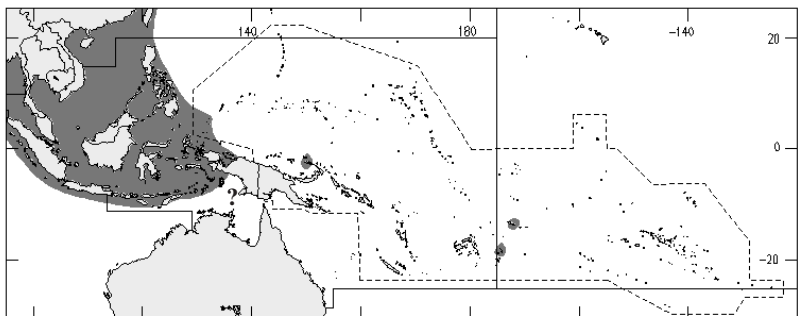
43 cm fork length

Diagnostic characters: Body strongly compressed, almost ovate; nape slightly elevated, almost straight in profile. Eye diameter slightly smaller than snout length. Both jaws with bands of small teeth, the bands widest anteriorly; upper jaw also with an irregular outer series of moderately large teeth (in large specimens outer row teeth may be enlarged in both jaws); vomerine tooth patch ovate, without a posteromedian extension. Gill rakers (including rudiments) 7 to 9 on upper limb and 16 to 19 on lower limb of first gill arch (total 24 to 28). **Two separate dorsal fins**, the first with VIII spines, **the second with I spine and 17 to 19 soft rays**; anal fin with II detached spines followed by I spine and 15 to 17 soft rays; lobe of second dorsal fin elongate, longer than head length, in adults about equal or exceeding the length of second dorsal-fin base. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between tenth or twelfth soft rays of second dorsal fin; **chord of curved part of lateral line slightly longer than straight part of lateral line, contained 0.7 to 0.95 times in straight part; straight part of lateral line with 0 to 6 scales followed by 23 to 30 scutes. Breast naked ventrally only to origin of pelvic fins; laterally, naked area of breast usually separated from naked base of pectoral fins by a moderate to narrow band of scales** (rarely, naked areas of breast and pectoral-fin base united laterally by a narrow naked strip). Vertebrae 10+14. **Colour:** in life, bluish green above, silvery white below; **small brown blotches (becoming larger posteriorly) on back between bases of second dorsal-fin rays**; opercular blotch brownish and diffuse; spinous dorsal fin pale to dusky; second dorsal-fin lobe dusky and ray tips yellowish; anal fin with distal margin whitish blue; caudal fin with upper lobe yellowish, and with trailing edges and tip of lower lobe pale; pectoral fins hyaline and pelvic fins whitish to dusky.

Size: Largest specimen examined 53 cm fork length, 58.5 cm total length, and 2.6 kg.

Habitat, biology, and fisheries: Inhabits coastal waters. Caught on hook-and-line, with bottom trawls and various kinds of artisanal gear.

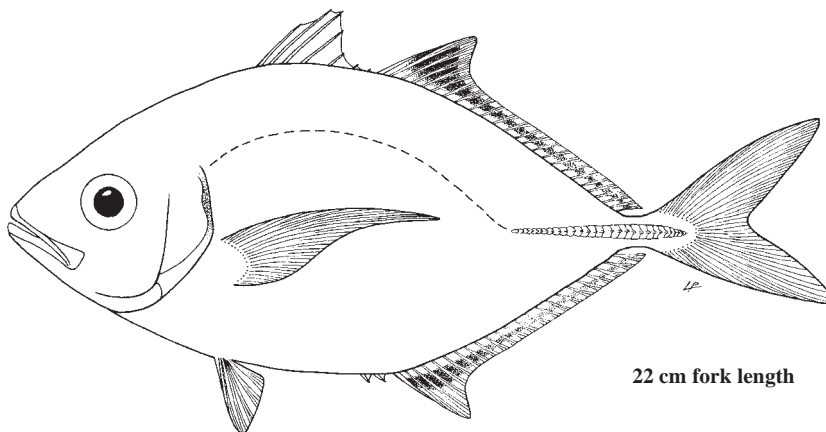
Distribution: In the Indian Ocean known only from South Africa to Tanzania; elsewhere in the Indo-West Pacific known from southern Japan, Okinawa, Indonesia, Philippines, Papua New Guinea, Tonga Islands, and Samoa.



Carangoides equula (Temminck and Schlegel, 1844)

Frequent synonyms / misidentifications: *Caranx equula* Temminck and Schlegel, 1844; *Kaiwarinus equula* (Temminck and Schlegel, 1844); *Carangoides acutus* Kotthaus, 1974; ? *Caranx dasson* Jordan and Snyder, 1907 (see **Remarks**) / None.

FAO names: **En** - Whitefin trevally; **Fr** - Carangue aile blanche; **Sp** - Jurel aliblanco.



Diagnostic characters: Body compressed, almost rhomboidal; dorsal and ventral profiles about equally convex, dorsal profile of snout and nape almost straight. Eye diameter slightly smaller than snout length. Both jaws with narrow bands of small teeth, the outer teeth slightly larger; **vomerine tooth patch anchor-shaped, with a distinct posteromedian extension. Gill rakers (including rudiments) 7 to 10 on upper limb and 18 to 23 on lower limb of first gill arch (total 27 to 32).** Two separate dorsal fins, the first with VII spines, the second with I spine and 23 to 25 soft rays; anal fin with II detached spines followed by I spine and 21 to 24 soft rays; **spinous dorsal fin moderately high, longest spine height about equal to length of soft dorsal-fin lobe.** Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between twelfth and fifteenth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.5 to 0.8 times in straight part; straight part of lateral line with 0 to 6 scales followed by 22 to 32 scutes. **Breast completely scaly or with a very small naked area anteroventrally.** Vertebrae 10+14. **Colour:** in life, head and body bluish grey to green dorsally, silvery white below; juveniles with 5 to 7 dark bands on sides; **second dorsal and anal fins with a submarginal brown to blackish band, white distally;** caudal fin dusky yellow; pectoral and pelvic fins pale yellowish to white.

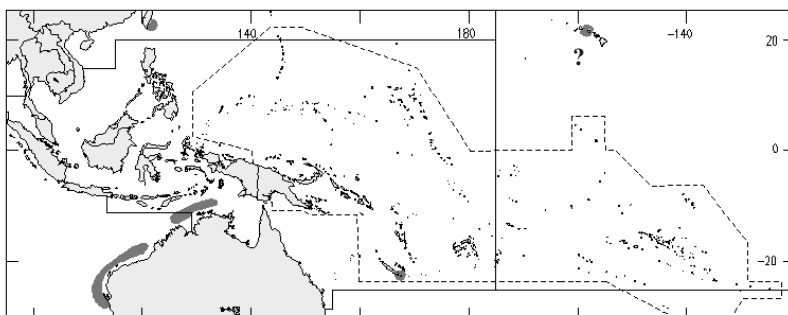
Size: Largest specimen examined 34.5 cm fork length, 37.5 cm total length.

Habitat, biology, and fisheries: In northern Australian waters largely restricted to shelf slope habitats in depths of 100 to 200 m. Feeds on a variety of fishes, crustaceans, and cephalopods. Taken primarily with bottom trawls.

Distribution: In the Indian Ocean known only from South Africa, off Somalia, and the Gulf of Oman; elsewhere in the Indo-West Pacific definitely known from Okinawa, southern Japan, and Australia. If *Carangoides dasson* is conspecific (see **Remarks**), the species also occurs at Hawaii and Easter Island.

Remarks: Specimens from Hawaii and Easter Island (for which the name *C. dasson* is available) have more slender bodies and larger eyes than do specimens from other localities but share all the diagnostic features of *C. equula*.

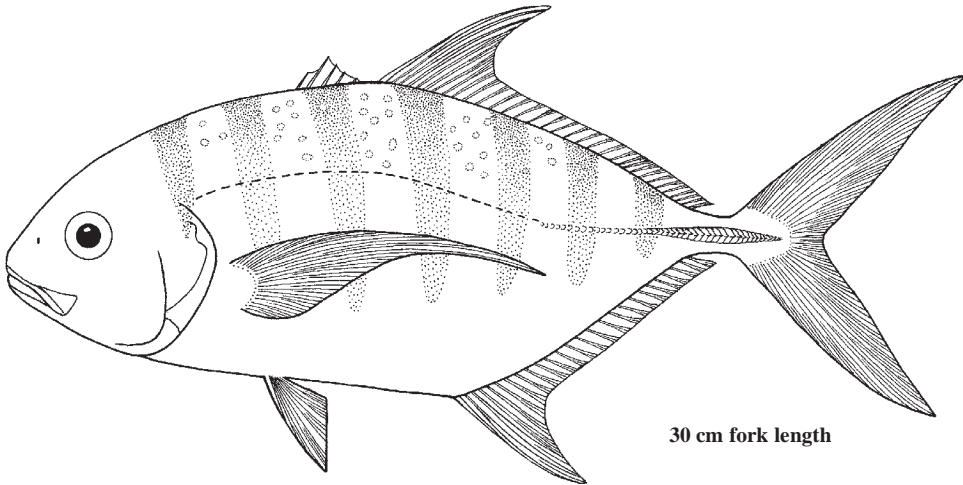
Additional study is required to determine if *C. equula* and *C. dasson* represent 2 closely related allopatric species.



Carangoides ferdau (Forsskål, 1775)

Frequent synonyms / misidentifications: *Caranx ferdau* (Forsskål, 1775); *Carangoides hemigymnostethus* Bleeker, 1851; *Caranx gilberti* Jordan and Seale, 1906 / None.

FAO names: En - Blue trevally; Fr - Carangue tachetée; Sp - Jurel manchado.

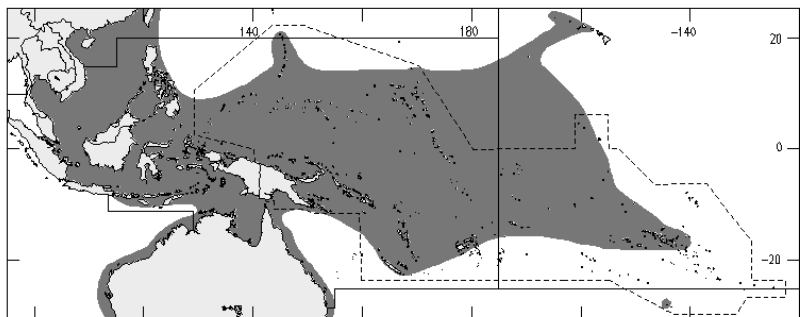


Diagnostic characters: Body oblong and compressed; dorsal profile more convex than ventral profile; **snout bluntly rounded**. Upper jaw highly protractile; **lips of large adults not noticeably fleshy**, both jaws with narrow bands of villiform teeth, becoming obsolescent with age; vomerine tooth patch ovate, without a posteromedian extension. Gill rakers (including rudiments) 7 to 10 on upper limb and 17 to 20 on lower limb of first gill arch (total 24 to 29). **Two separate dorsal fins**, the first with VIII spines, **the second with I spine and 26 to 34 soft rays**; anal fin with II detached spines followed by I spine and 21 to 26 soft rays; lobe of second dorsal fin falcate, especially in small adults, but usually shorter than head length. Lateral line anteriorly with a very slight arch, with junction of curved and straight parts below vertical from between fifteenth to twentieth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.6 to 0.85 times in straight part; straight part of lateral line with 10 to 30 scales followed by 21 to 37 small scutes. Breast naked ventrally to origin of pelvic fins; laterally, naked area of breast separated from naked base of pectoral fins by a moderate band of scales. Vertebrae 10+14. **Colour:** adults typically with 5 or 6 dusky bands on sides that usually persist in market specimens; in life, head and body generally silvery, blue-green above paler below; **numerous, inconspicuous golden spots often present on sides mainly above level of pectoral fins**; leading edge and tips of dorsal- and anal-fin lobes dark blue to dusky, rest of fin pale yellow-green except distal margin of anal fin whitish. Caudal fin yellow-green with trailing edge and lobe tips dark; pelvic fins hyaline to whitish; caudal fin yellow-green with trailing edge and lobe tips dark; pelvic fins hyaline to whitish.

Size: Largest specimen examined 47 cm fork length and 53 cm total length; reported to attain 70 cm total length. South African spearfishing record 8 kg.

Habitat, biology, and fisheries: Reported to prefer coastal waters adjacent to sandy beaches but also found to depths of 60 m, often near reefs. Feeds primarily on prawns, crabs, and small fishes. Caught mainly on hook-and-line; also with gill nets and traps.

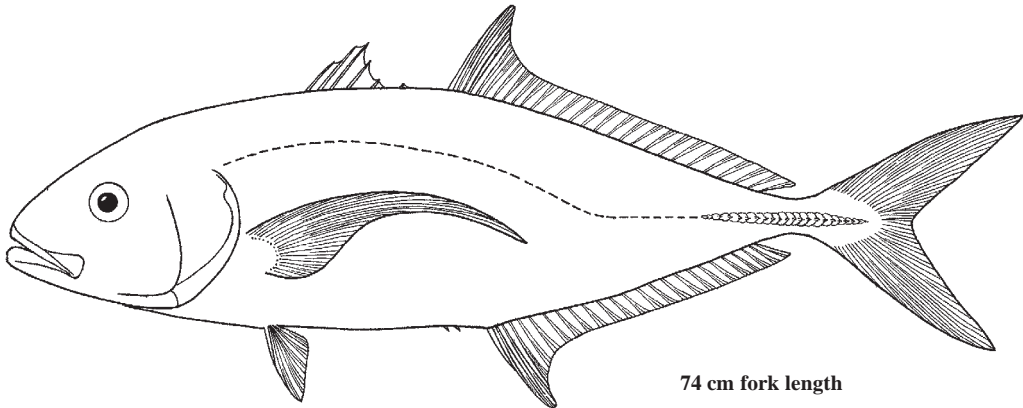
Distribution: Broadly distributed throughout the Indian Ocean, and western and Central Pacific ocean from southern Japan to Australia and eastward to Hawaii.



Carangoides fulvoguttatus (Forsskål, 1775)

Frequent synonyms / misidentifications: *Caranx fulvoguttatus* (Forsskål, 1775); *Turrum emburyi* Whitley, 1932 / *Carangoides gymnostethus* (Cuvier, 1833).

FAO names: **En** - Yellowspotted trevally; **Fr** - Carangue pailleeté; **Sp** - Jurel centellante.

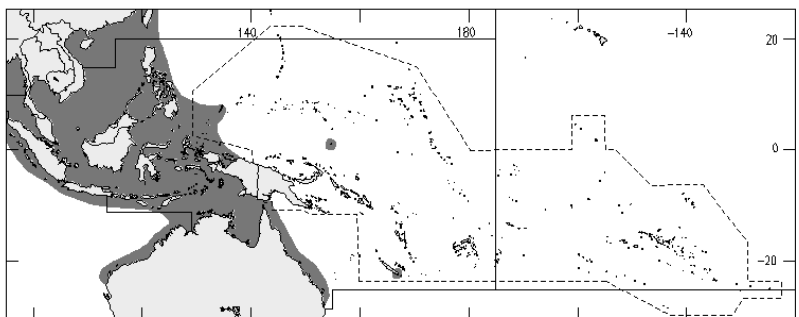


Diagnostic characters: Body subovate and compressed, becoming elongate-ovate and slightly subcylindrical with age; **profile of head and nape slightly angular becoming more steep with age. In adults mouth cleft distinctly below level of eye.** Eye diameter smaller than snout length. Both jaws with bands of villiform teeth, the bands widest anteriorly; vomerine tooth patch ovate, without a posteromedian extension. **Gill rakers (including rudiments)** 6 to 8 on upper limb and 17 to 21 on lower limb of first gill arch (**total 22 to 27**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 25 to 30 soft rays; **anal fin with II detached spines followed by I spine and 21 to 26 (rarely 25 or 26 soft rays);** lobe of second dorsal fin shorter than head length. Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below vertical from between thirteenth to sixteenth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.7 to 0.95 times in straight part; straight part of lateral line with 18 to 27 scales followed by 15 to 21 small scutes. **Breast naked ventrally to distinctly behind origin of pelvic fins; breast squamation variable laterally, either separated from naked base of pectoral fins by a moderate to very narrow band of scales or naked area of breast uninterrupted to naked base of pectoral fins** (only 23 of 47 specimens examined for this character had the uninterrupted pattern of breast squamation). **Vertebrae 10+14.** **Colour:** adults iridescent blue-green dorsally, shading to silvery on sides, with **many small golden or brassy spots mainly above midline; large individuals often with 3 irregular black blotches (sometimes very indistinct or absent) on flanks, the first below dorsal-fin lobe, the second at inflection point of lateral line, and the third slightly anterior to midpoint of straight part of lateral line;** opercular spot dusky and inconspicuous; dorsal and anal fins dusky yellow, the latter with leading edge and distal margin whitish blue; caudal fin olive-yellow with upper leading edge and trailing edges dusky; pelvic fins whitish blue.

Size: Largest specimen examined 80 cm fork length, 87.5 cm total length, and 6.4 kg. South African spearfishing record 10 kg. Reliably reported to attain 100 cm fork length.

Habitat, biology, and fisheries: Prefers rocky and coral reefs, but is occasionally found over offshore banks in depths to 100 m. Feeds mainly on small invertebrates and fishes. Caught mainly on hook-and-line and by spearing. Also with general types of artisanal gear, including gill nets and traps. A good sportsfish.

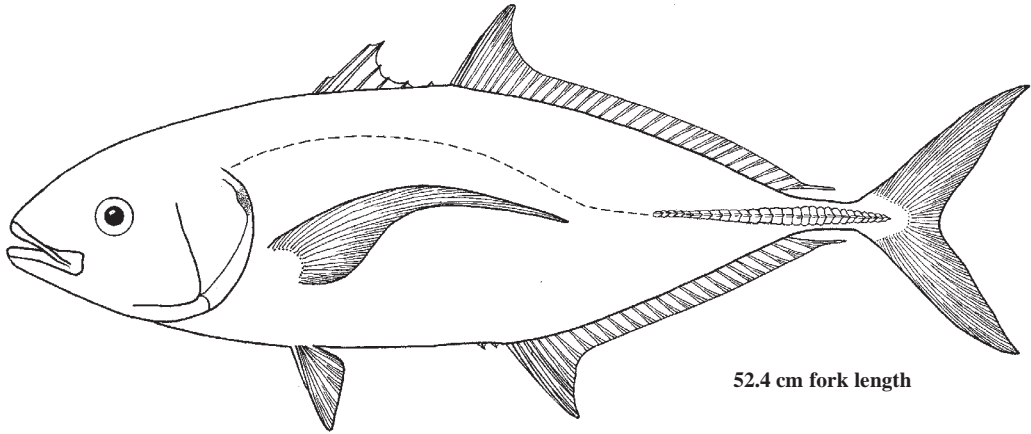
Distribution: Broadly distributed through the Indian and western Pacific oceans, including Okinawa, Palau, and Australia.



***Carangoides gymnostethus* (Cuvier, 1833)**

Frequent synonyms / misidentifications: *Caranx gymnostethus* (Cuvier, 1833); *Carangoides gymnostethoides* Bleeker, 1851 / *Carangoides fulvoguttatus* (Forsskål, 1775).

FAO names: En - Bludger; Fr - Carangue balo; Sp - Jurel balo.

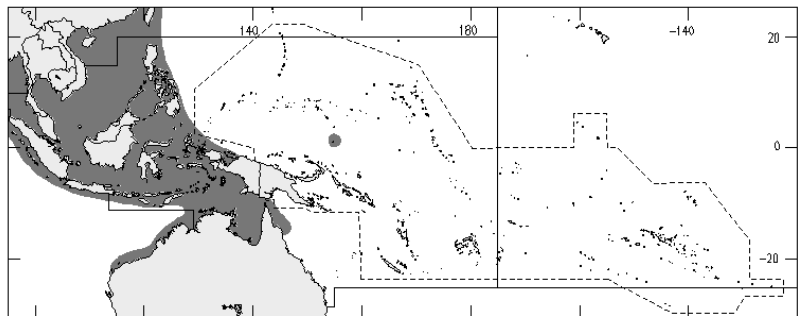


Diagnostic characters: Body ovate and compressed, becoming elongate-ovate and slightly subcylindrical with age; **profile of head and nape gently convex becoming less steep with age. In adults mouth cleft at level with lower margin of eye.** Diameter of eye smaller than snout length. Both jaws with bands of villiform teeth, the bands widest anteriorly; vomerine tooth patch ovate without a posteromedian extension. **Gill rakers (including rudiments) 7 to 9 on upper limb and 19 to 22 on lower limb of first gill arch (total 27 to 31).** Two separate dorsal fins, the first with VIII spines, the second with I spine and 28 to 32 soft rays; **anal fin with II detached spines followed by I spine and 24 to 26 (usually 25) soft rays;** lobe of second dorsal fin shorter than head length. Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below vertical from between sixteenth to twentieth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.65 to 0.9 times in straight part; straight part of lateral line with 14 to 25 scales followed by 20 to 31 small scutes. Breast naked ventrally to distinctly behind origin of pelvic fins; **laterally, naked area of breast extends diagonally to naked base of pectoral fins, the naked area somewhat constricted below pectoral-fin base. Vertebrae 10+15. Colour:** in life, adults olive-green above, silvery white below with a few brown or golden spots sometimes present midlaterally; opercular spot dusky and inconspicuous; dorsal, anal, and caudal fins pale olive-green to greenish grey, leading edge and distal margin of anal fin white; pelvic and pectoral fins pale green to hyaline.

Size: Largest specimen examined 76.5 cm fork length, 83 cm total length, and 7.2 kg. South African spearfishing record 14.5 kg. Reported to attain at least 90 cm total length.

Habitat, biology, and fisheries: Most common over slightly deeper offshore reefs. Larger individuals tend to be solitary, while juveniles form small schools. Feeds mainly on small prey, including shrimps. Caught mainly on hook-and-line and with several types of artisanal gear, including gill nets and traps. A good sportsfish.

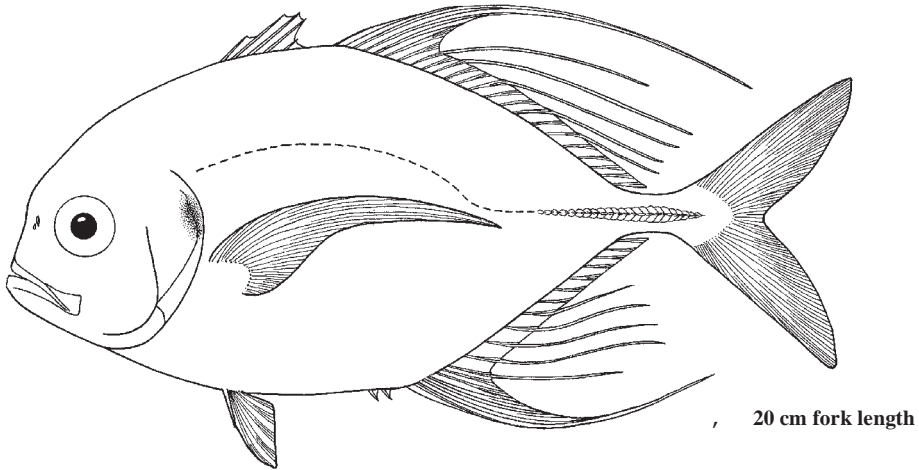
Distribution: Broadly distributed throughout the Indian and western Pacific oceans, including the Ryukyu Islands, Australia, and Kapingamangi Atoll.



Carangoides hedlandensis (Whitley, 1933)

Frequent synonyms / misidentifications: *Caranx hedlandensis* (Whitley, 1933); *C. plumbeus* of authors / *Carangoides armatus* (Rüppell, 1830).

FAO names: **En** - Bumpnose trevally; **Fr** - Carangue nez bossu; **Sp** - Jurel hocicón.



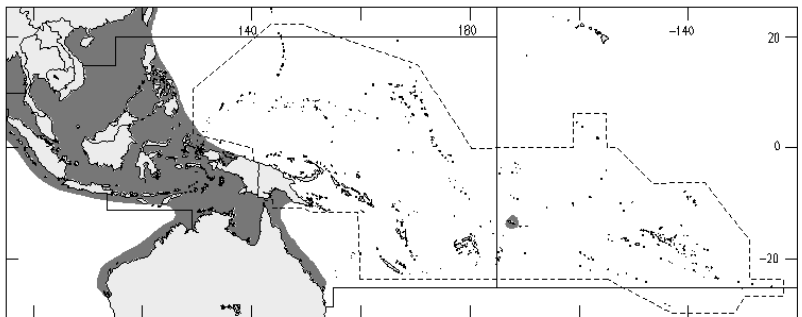
20 cm fork length

Diagnostic characters: Body strongly compressed and deep; **head profile extremely steep in adults, and with a distinct break in contour “bump” in the interorbital region which becomes more pronounced with increasing size.** Eye diameter about equal to or larger than snout length. Both jaws with bands of villiform teeth, the bands widest anteriorly; vomerine tooth patch wedge-shaped without a posteromedian extension. **Gill rakers (including rudiments)** 6 to 11 on upper limb, and 14 to 17 on lower limb of first gill arch (**total 20 to 27**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 20 to 22 soft rays; anal fin with II detached spines followed by I spine and 16 to 18 soft rays; **lobe of second dorsal fin elongate and filamentous, longer than head length; dorsal fin sexually dimorphic, in mature males (only) larger than 16.5 cm fork length, 3 to 8 of the central rays produced into filaments of greatly varying lengths.** Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between tenth and twelfth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.6 to 0.9 times in straight part; straight part of lateral line with 17 to 29 weak scutes and 29 to 41 total elements (including anterior scales). **Breast naked ventrally to behind origin of pelvic fins; laterally, naked area of breast extends diagonally to naked base of pectoral fins.** Vertebrae 10+14. **Colour:** greenish blue above with dusky tinge, shading to silvery grey below; blackish blotch on upper margin of opercle; spinous dorsal fin, elongated dorsal-fin rays and edges of caudal fin blackish; filamentous lobe of anal fin either blackish or pale brownish, elongated rays always pale brownish; pelvic fins generally black in specimens smaller than 10 cm fork length, at larger than 15 cm fork length pelvic fins variable in colour from pale to dusky blackish.

Size: Largest specimen examined 28 cm fork length.

Habitat, biology, and fisheries: A coastal demersal species. Caught on hook-and-line, with bottom trawls and several types of artisanal gear.

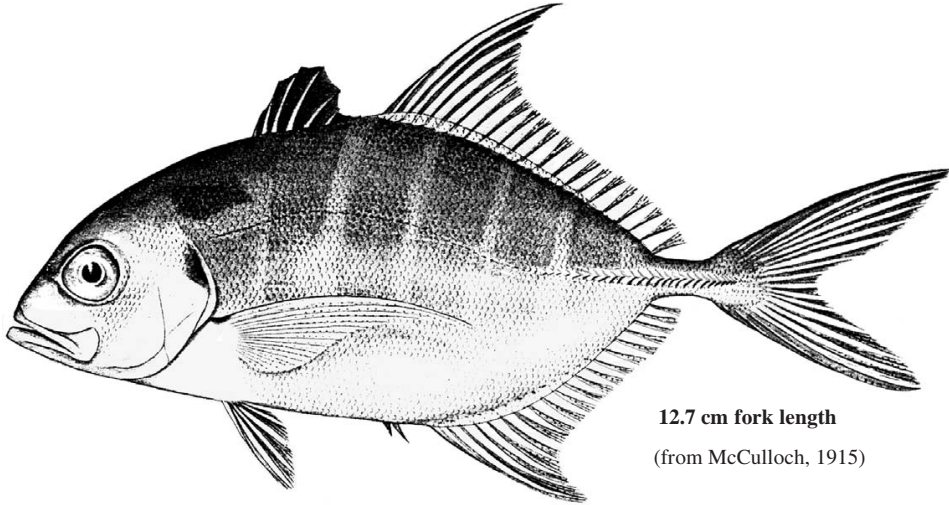
Distribution: In the western Indian Ocean, known from Durban (South Africa), the Seychelles, southern India and Sri Lanka; elsewhere reliably reported from the Bay of Bengal, Gulf of Thailand, Taiwan Province of China, Okinawa, Japan, the Philippines, Indonesia, Australia, New Guinea, and Samoa.



***Carangoides humerosus* (McCulloch, 1915)**

Frequent synonyms / misidentifications: *Caranx humerosus* McCulloch, 1915 / None.

FAO names: En - Epaulet trevally.

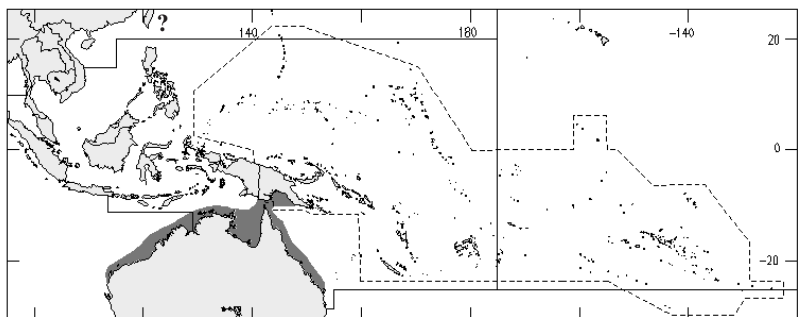


Diagnostic characters: Body oblong to elongate oval, compressed; dorsal profile more convex than ventral profile; head profile gently sloping to convex, in large males profile with a distinct bulge that is absent in females and juveniles of both sexes. Eye diameter larger than snout length. Both jaws with bands of small teeth, the bands widest anteriorly; upper jaw also with an irregular outer series of moderately large teeth (in large specimens outer row teeth may be enlarged in both jaws); vomerine tooth patch triangular, without a posteromedian extension. Gill rakers (including rudiments) 6 to 10 on upper limb and 16 to 20 on lower limb of first gill arch (total 23 to 30). **Two separate dorsal fins**, the first with VIII spines, **the second with I spine and 20 to 22 (rarely 19) soft rays**; anal fin with II detached spines followed by I spine and 17 to 19 soft rays; lobe of second dorsal fin falcate, slightly longer than to slightly shorter than head length, in adults shorter than the length of second dorsal-fin base. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between eleventh to thirteenth soft rays of second dorsal fin; chord of curved part of lateral line slightly longer than straight part of lateral line, contained 0.7 to 0.9 times in straight part; straight part of lateral line with 0 to 10 scales followed by 22 to 33 scutes. **Breast naked posteroventrally to well behind origin of pelvic fins; laterally, naked area of breast extends uninterrupted to naked base of pectoral fins.** Vertebrae 10+14. **Colour:** in life, head and body greenish above, silvery below, **small blue to black blotches on dorsum between bases of second dorsal-fin rays**; adults and juveniles often with 5 or 6 broad, dark bands separated by narrow interspaces, and a **large black spot on shoulder**; **axil of pectoral fins black**; opercular spot diffuse; distal parts of branchiostegal rays black in adult males, white in females and juveniles; **spinous dorsal fin black**, second dorsal fin, and caudal fins dusky; pectoral and pelvic fins white to hyaline.

Size: Relatively small species, largest specimen examined 25 cm fork length.

Habitat, biology, and fisheries: In Australia in depths shallower than 50 m. Feeds on a variety of demersal or bottom associated fishes, crustaceans, and cephalopods. Caught primarily with bottom trawls.

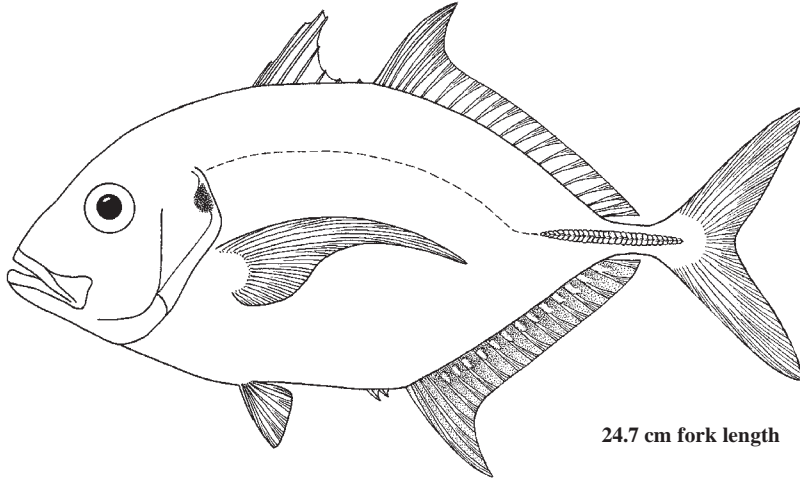
Distribution: Known from Australia, Exmouth Gulf (22°05'S) to Bustard Head, Queensland (24°08'S), southern Papua New Guinea, and reported (based on questionable collection records) from Taiwan Province of China.



Carangoides malabaricus (Bloch and Schneider, 1801)

Frequent synonyms / misidentifications: *Caranx malabaricus* (Bloch and Schneider, 1801); *Carangoides rectipinnis* Williams, 1958; *C. rhomboides* Kotthaus, 1974 / *Carangoides talamparoides* Bleeker, 1852.

FAO names: En - Malabar trevally; Fr - Carangue monique; Sp - Jurel malabárico.

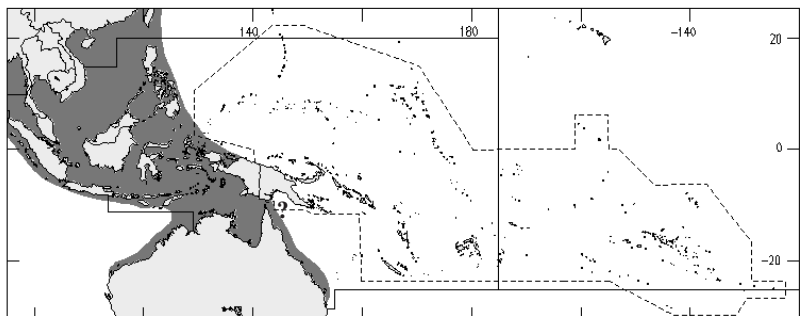


Diagnostic characters: Body strongly compressed, almost ovate; dorsal profile of head strongly elevated to nape, almost straight. Eye diameter distinctly smaller than snout length. Both jaws with bands of small villiform teeth, anteriorly some outer teeth conical; vomerine tooth patch roughly triangular, without a posteromedian extension. **Gill rakers (including rudiments)** 8 to 12 on upper limb and 21 to 27 on lower limb of first gill arch (**total 32 to 38**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 20 to 23 soft rays; anal fin with II detached spines followed by I spine and 17 to 19 soft rays; lobe of second dorsal fin shorter than head length. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between twelfth and fourteenth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.5 to 1 times in straight part; straight part of lateral line with 19 to 36 weak scutes and 31 to 55 total elements (including anterior scales). **Breast naked ventrally to distinctly behind pelvic fins often to origin of second anal fin; laterally, naked area of breast extends diagonally to naked base of pectoral fins, including small area anteriorly just above pectoral-fin base.** Vertebrae 10+14. **Colour:** in life, generally silvery with bluish grey above, silvery white below; opercle with a small black spot on upper margin; **tongue greyish brown to brown;** caudal fin, soft dorsal and anal fins pale greenish yellow to dusky; interradiar membranes of soft anal-fin rays often with a white spot basally.

Size: Largest specimen examined 24 cm fork length.

Habitat, biology, and fisheries: Frequents coral and rocky reefs but may also be found in shallow sandy bays (mainly the juveniles). Moderately tolerant of turbid waters. Feeds on crustaceans, small squids, and fishes. Caught on hook-and-line, bottom trawls, gill nets, and traps.

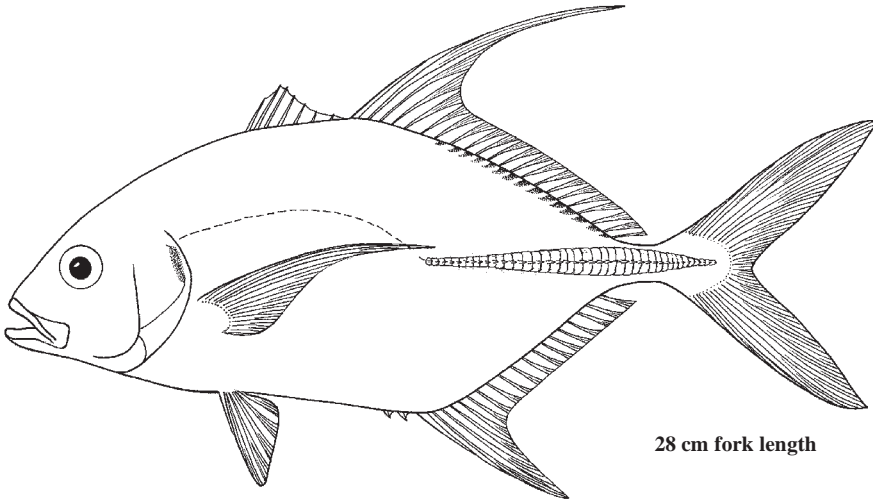
Distribution: In the western Indian ocean broadly distributed in coastal waters, from South Africa to Sri Lanka, including the west coast of the Malagasy Republic; elsewhere in the Indo-West Pacific known from Straits of Malacca, Gulf of Thailand, Okinawa, Japan (rare), Indonesia, and Australia.



Carangoides oblongus (Cuvier, 1833)

Frequent synonyms / misidentifications: *Caranx oblongus* Cuvier, 1833; *Carangichthys oblongus* (Cuvier, 1833); *Caranx gracilis* (Ogilby, 1915); *C. tanakai* Wakiya, 1924 / None.

FAO names: **En** - Coachwhip trevally; **Fr** - Carangue postillon; **Sp** - Jurel postillón.

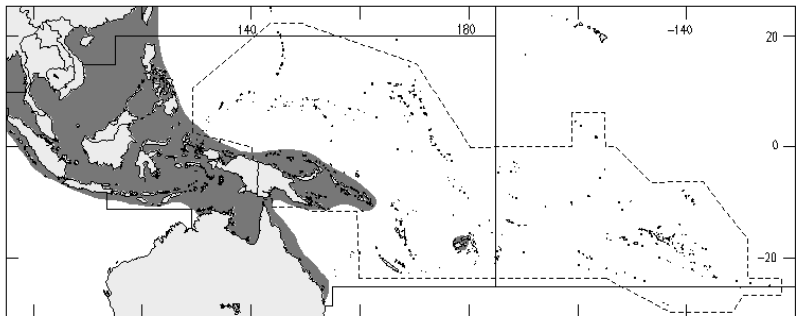


Diagnostic characters: Body oblong, compressed; dorsal profile more convex than ventral profile; head profile gently convex. Eye diameter smaller than snout length. Both jaws with bands of small teeth, the bands widest anteriorly; **upper jaw also with an irregular outer series of moderately large teeth (in large specimens outer row teeth may be enlarged in both jaws)**; vomerine tooth patch triangular, without a posteromedian extension. Gill rakers (including rudiments) 7 to 9 on upper limb and 17 to 21 on lower limb of first gill arch (total 26 to 30). **Two separate dorsal fins**, the first with VIII spines, **the second with I spine and 20 to 22 soft rays**; anal fin with II detached spines followed by I spine and 18 or 19 soft rays; lobe of second dorsal fin elongate, longer than head length, in adults about equal or exceeding the length of second dorsal-fin base. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between eighth or ninth soft rays of second dorsal fin; **chord of curved part of lateral line slightly shorter than straight part of lateral line**, contained 1 to 1.3 times in straight part; **straight part of lateral line with 0 to 2 scales followed by 37 to 45 scutes**. **Breast naked ventrally to origin of pelvic fins; laterally, naked area of breast separated from naked base of pectoral fins by a moderate to narrow band of scales**. Vertebrae 10+14. **Colour:** in life, head and body bluish green above, silvery below, **small blue to black blotches on dorsum between bases of second dorsal-fin rays**; opercular spot diffuse or absent; spinous dorsal fin pale to dusky; second dorsal-fin lobe and upper lobe of caudal fin dusky blue; anal fin and remainder of dorsal and caudal fins yellowish; pectoral and pelvic fins pale yellow.

Size: Largest specimen examined 41 cm fork length; 46 cm total length.

Habitat, biology, and fisheries: Caught on hook-and-line, with bottom trawls and various kinds of artisanal gear.

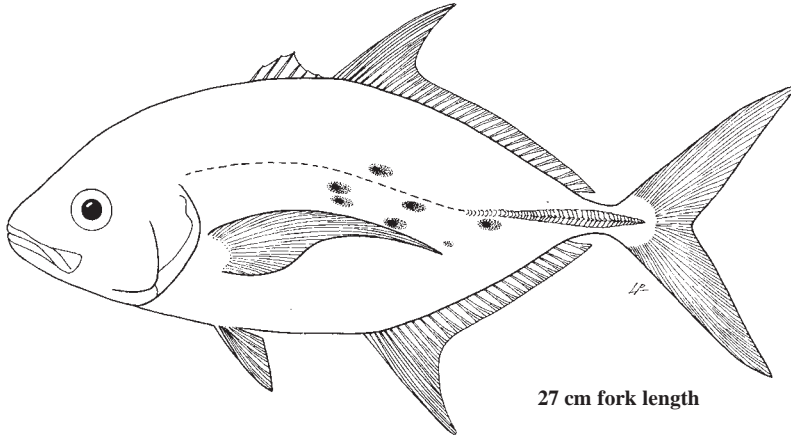
Distribution: Broadly distributed throughout the western Indian Ocean, but no records from the Persian Gulf to the west coast of India; elsewhere in the Indo-West Pacific known from Thailand, Japan, Indonesia, the Philippines, Australia, New Guinea, Solomon Islands, and Fiji.



***Carangoides orthogrammus* Jordan and Gilbert, 1881**

Frequent synonyms / misidentifications: *Carangoides gymnostethoides evermanni* Nichols, 1921; *C. jordani* Nichols, 1922; *C. nitidus* J.L.B. Smith, 1972; *Caranx ferdau jordani* of authors / *Carangoides ferdau* (Forsskål, 1775).

FAO names: En - Island trevally; Fr - Carangue des îles; Sp - Jurel isleño.

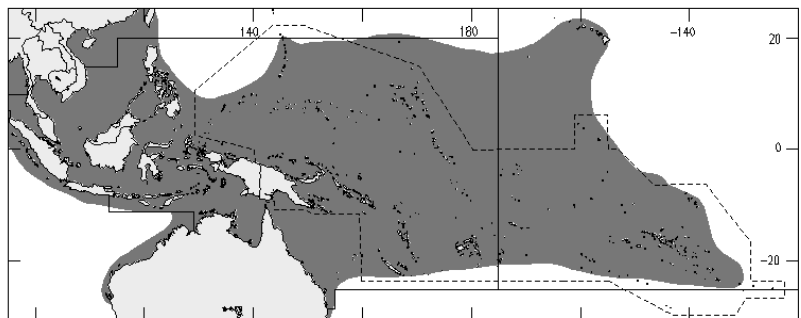


Diagnostic characters: Body oblong and compressed; dorsal profile more convex than ventral profile; snout usually slightly angular. Upper jaw highly protractile, lips noticeably fleshy in large adults. Both jaws with narrow bands of villiform teeth, becoming obsolescent with age; vomerine tooth patch ovate, without a posteromedian extension. Gill rakers (including rudiments) 8 to 10 on upper limb and 20 to 23 on lower limb of first gill arch (total 28 to 32). **Two separate dorsal fins**, the first with VIII spines, the second with I spine and 28 to 31 soft rays; anal fin with II detached spines followed by I spine and 24 to 26 soft rays; lobe of second dorsal fin falcate, especially in small adults, but usually shorter than head length. Lateral line anteriorly with a very slight arch with junction, of curved and straight parts below second dorsal fin between fifteenth to nineteenth soft rays; chord of curved part of lateral line slightly longer to about equal straight part of lateral line, contained 0.8 to 1 times in straight part; straight part of lateral line with 21 to 34 scales followed by 19 to 31 small scutes. **Breast naked ventrally to origin of pelvic fins, occasionally with a small patch of prepelvic scales; laterally, naked area of breast separated from naked base of pectoral fins by a moderate band of scales.** Vertebrae 10+14. **Colour:** in life, head and body generally silvery, brassy to greenish blue above, paler below; **adults with several relatively large, elliptical yellow spots, often with dusky centres, present on sides; dusky bands usually not present on sides, especially in postmortem specimens;** leading edge and tips of dorsal- and anal-fin lobes dark to dusky, rest of fin pale brownish except distal margin of anal fin whitish; caudal fin dusky brown with trailing edge and lobe tips darker; pelvic fins whitish.

Size: Largest specimen examined 63 cm fork length and 70 cm total length; commonly exceeds 40 cm fork length.

Habitat, biology, and fisheries: This species has a nearly ubiquitous occurrence at oceanic islands and is virtually absent from inshore, neritic areas. Inhabits lagoon and seaward reefs to depths exceeding 50 m. Occurs in pairs or in schools of up to a few dozen individuals and frequents sandy channels where it feeds on sand-dwelling crustaceans. Caught on hook-and-line, with trawls, and various kinds of artisanal gear.

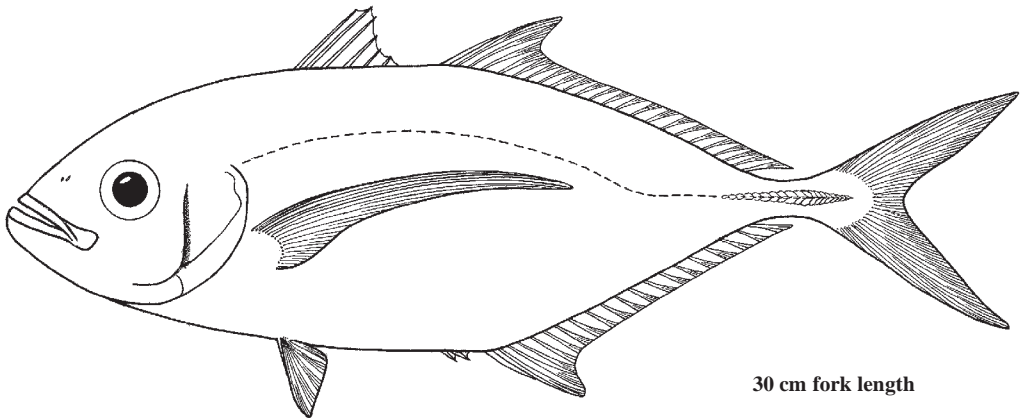
Distribution: In the Indian Ocean known from Kenya, Aldabra, Seychelles, Chagos Archipelago, and Cocos-Keeling Islands; elsewhere in the Indo-West Pacific known from Okinawa, Indonesia, Australia, and eastward to Hawaii and the Marquesas Islands, and the Revillagigedo Islands in the eastern Pacific Ocean.



***Carangoides plagiotaenia* Bleeker, 1857**

Frequent synonyms / misidentifications: *Caranx plagiotaenia* (Bleeker, 1857); *C. vomerinus* Playfair, 1867; *C. compressus* Day, 1870; *C. brevicarinatus* Klunzinger, 1871 / None.

FAO names: **En** - Barcheek trevally; **Fr** - Carangue grímée; **Sp** - Jurel maquillado.

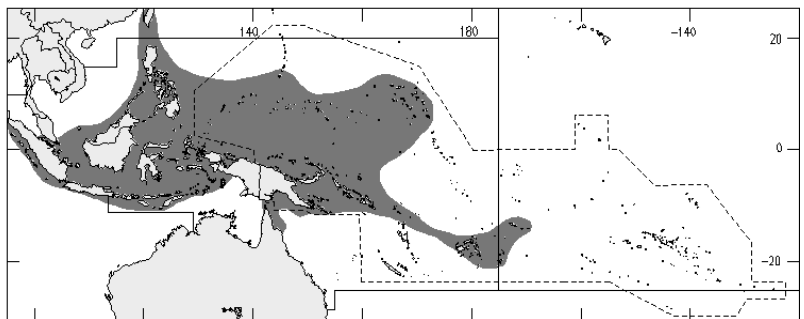


Diagnostic characters: Body oblong and compressed; dorsal and ventral profiles equally convex, but in large adults dorsal profile of head almost straight; **lower jaw somewhat enlarged and projecting beyond upper jaw**. Upper jaw with a narrow band of small teeth; lower jaw with an irregular row of small teeth, except a narrow band anteriorly; vomerine tooth patch triangular, without a posteromedian extension. Gill rakers (including rudiments) 8 to 14 on upper limb and 19 to 27 on lower limb of first gill arch (total 27 to 40). Two separate dorsal fins, the first with VIII spines, the second with I spine and 22 to 24 soft rays; anal fin with II detached spines followed by I spine and 18 to 20 soft rays; lobe of second dorsal fin shorter than head length. Lateral line anteriorly with a relatively low arch, with junction of curved and straight parts below vertical from between thirteenth and fifteenth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.5 to 0.6 times in straight part; straight part of lateral line with 20 to 26 scales followed by 11 to 18 relatively small scutes. **Breast completely scaly**. Vertebrae 10+14. **Colour:** in life, generally silvery, greyish above, paler below; **no opercular spot but adults with posterior margin of preopercle distinctly dark to black**; sides sometimes with 6 or 7 dusky oblique bands, mostly above midline; large adults occasionally with scattered dark blotches or a few small yellow spots on sides; caudal, second dorsal, and anal fins dusky to dark; leading edge of pelvic fins and distal margin of anal fin with a narrow white border; pectoral fins pale.

Size: Largest specimen examined 39 cm fork length and 41.5 cm total length.

Habitat, biology, and fisheries: Appears to be largely confined to outer reef areas and is often taken while bottom fishing. No information available on dietary preferences. Caught on hook-and-line, with trawls, and several types of artisanal gear.

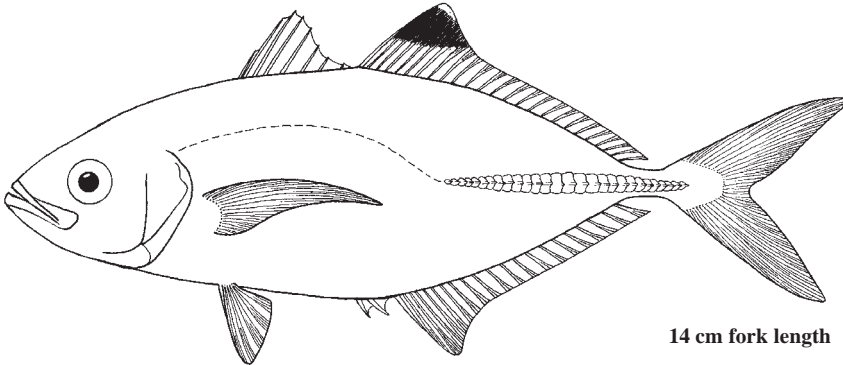
Distribution: Widespread in the Indian Ocean, except absent from Persian Gulf; elsewhere in Indo-West Pacific known from southern Japan to eastern Australia and eastward to the Marshall Islands, Fiji, and Samoa.



Carangoides praeustus (Bennett, 1830)

Frequent synonyms / misidentifications: *Caranx praeustus* Bennett, 1830; *C. ire* Cuvier, 1833; *C. melanostethos* Day, 1865 / None.

FAO names: **En** - Brownback trevally; **Fr** - Carangue à dos brun; **Sp** - Jurel pardo.



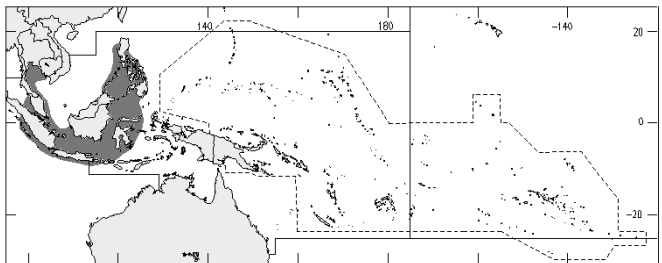
Diagnostic characters: Body elongate and compressed; dorsal and ventral profiles similar and gently convex, dorsal profile of head nearly straight. Eye diameter slightly smaller than snout length. Both jaws with an irregular row of small conical teeth; upper jaw with a narrow band of teeth anteriorly, the outer series slightly enlarged; **vomerine tooth patch anchor-shaped with a distinct posteromedian extension**. Gill rakers (including rudiments) 9 to 11 on upper limb and 22 to 26 on lower limb of first gill arch (total 32 to 37). Two separate dorsal fins, the first with VIII spines, the second with I spine and 21 to 24 soft rays; anal fin with II detached spines followed by I spine and 18 to 20 soft rays; **spinous dorsal fin moderately high, longest spine nearly equal height of soft dorsal-fin lobe**. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between seventh and eleventh soft rays of second dorsal fin; chord of curved part of lateral line slightly longer than, to slightly shorter than straight part of lateral line, contained 0.9 to 1.2 times in straight part; straight part of lateral line with 4 to 12 scales followed by 23 to 34 scutes. **Breast usually completely scaly or nearly so (see "Remarks")**; laterally, naked area of breast separated from naked base of pectoral fins by a broad band of scales (naked area of breast scarcely visible in lateral view). Vertebrae 10+14. **Colour:** in life, bluish grey above, silvery white below; no dark opercular spot; **distal half of second dorsal-fin lobe abruptly black, sometimes with a white margin, widest anteriorly**; remainder of fin pale dusky; caudal fin pale yellowish, other fins hyaline to whitish.

Size: A relatively small species, largest specimen examined 19.5 cm fork length and 22 cm total length; commonly to about 16 cm fork length.

Habitat, biology, and fisheries: Inhabits coastal waters throughout its range. Caught on hook-and-line, with bottom trawls, and several types of artisanal gear.

Distribution: In the Indian Ocean from the Persian Gulf to the Bay of Bengal; elsewhere in the Indo-West Pacific known from the Gulf of Thailand, Indonesia, Borneo, and the Philippines.

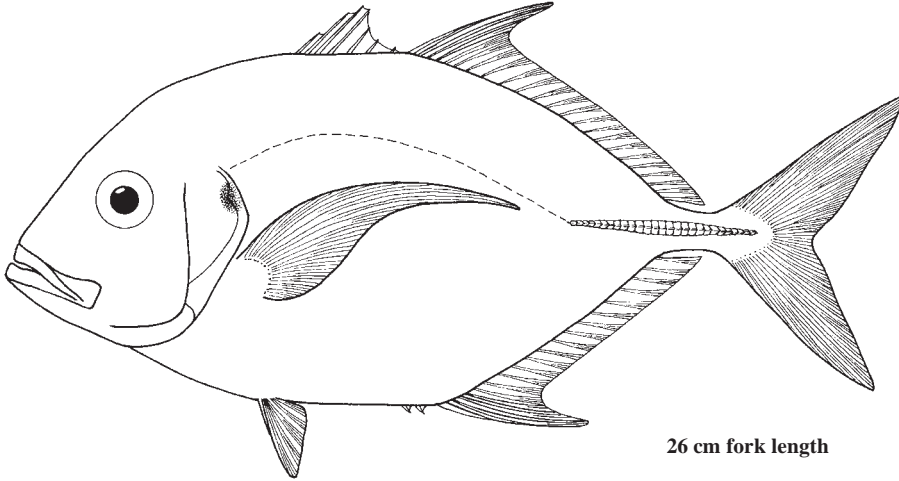
Remarks: This species, as currently recognized, consists of 2 populations that occur in different geographic regions (Persian Gulf to Bay of Bengal versus WCP area - see distribution map) that differ in gill-raker counts and also tend to have different patterns of breast squamation as follows (condition in non-WCP population in parentheses): total gill rakers on first gill arch 32 to 37 (40 to 47), of which 9 to 11 (11 to 15) on upper limb and 22 to 26 (28 to 32) on lower limb; squamation pattern: breast usually completely scaly or nearly so, if partially naked midventrally naked area rarely extending entire length of breast (breast typically with narrow naked midventral area extending entire length of breast). If future studies show that these 2 "geographic races" are actually represented by different sister species, the oldest available name for the Indian Ocean species is *Carangoides ire* (Cuvier).



***Carangoides talamparoides* Bleeker, 1852**

Frequent synonyms / misidentifications: None / *Carangoides malabaricus* (Bloch and Schneider, 1801).

FAO names: En - Imposter trevally; Fr - Carangue cavallys; Sp - Jurel impostor.

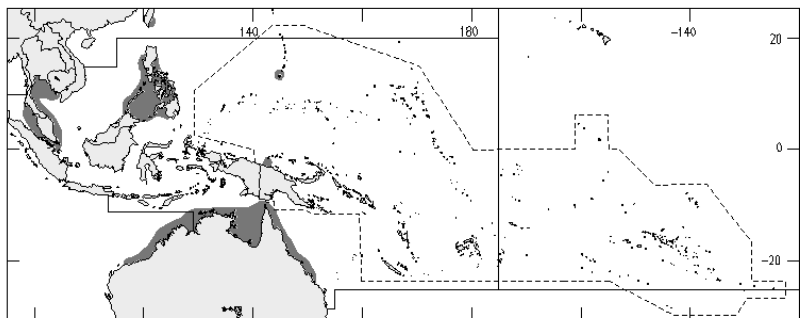


Diagnostic characters: Body strongly compressed, almost ovate; dorsal profile of head strongly elevated to nape, almost straight in profile. Eye diameter distinctly smaller than snout length. Both jaws with bands of small villiform teeth, anteriorly some outer teeth conical; vomerine tooth patch roughly triangular, without a posteromedian extension. **Gill rakers (including rudiments)** 6 to 9 on upper limb and 19 to 22 on lower limb of first gill arch (**total 27 to 31**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 20 to 23 soft rays; anal fin with II detached spines followed by I spine and 17 to 19 soft rays; lobe of second dorsal fin shorter than head length. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between twelfth and fourteenth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.5 to 0.8 times in straight part; straight part of lateral line with 20 to 32 weak scutes, and 32 to 52 total elements (including anterior scales). **Breast naked ventrally to distinctly behind pelvic fins, often to origin of second anal fin; laterally, naked area of breast extends diagonally to naked base of pectoral fins, including small area anteriorly just above pectoral-fin base.** Vertebrae 10+14. **Colour:** in life, generally silvery, bluish grey above, silvery white below; opercle with a small black spot on upper margin; **tongue white to pale grey**; soft dorsal and anal fins dusky; caudal fin with central rays dusky yellow with black distal margin.

Size: Largest specimen examined 28 cm fork length.

Habitat, biology, and fisheries: Inhabits coastal waters throughout its range. Caught on hook-and-line, with bottom trawls and several types of artisanal gear.

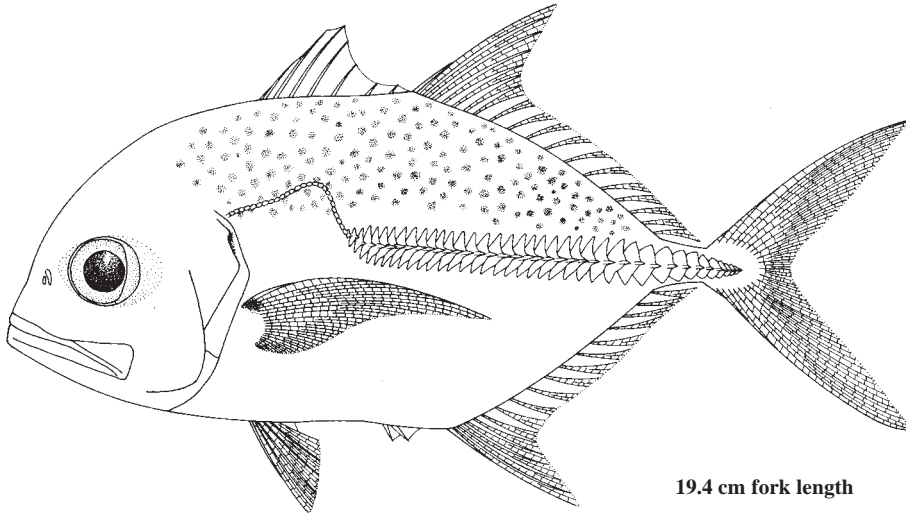
Distribution: In the western Indian Ocean known from the Gulf of Oman eastward to Sri Lanka; elsewhere in the Indo-West Pacific known from the Gulf of Thailand, Sumatra, Borneo, Philippines, Guam, and Australia.



***Caranx bucculentus* Alleyne and Macleay, 1877**

Frequent synonyms / misidentifications: None / None.

FAO names: En - Bluespotted trevally.

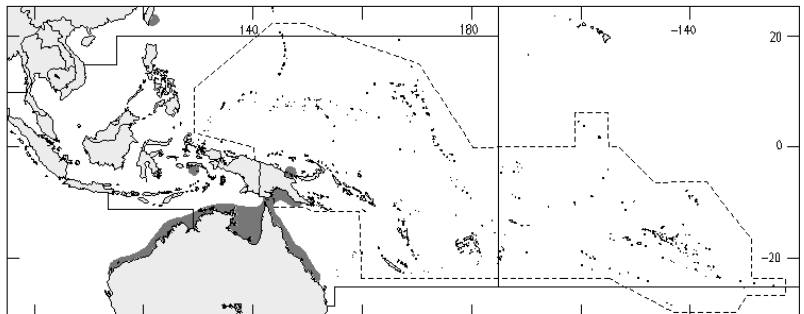


Diagnostic characters: Body oblong, compressed; dorsal profile strongly convex anteriorly, ventral profile only slightly convex. Adipose eyelid moderately developed, small anteriorly, posterior adipose eyelid extends onto eye to near rear border of pupil. End of upper jaw extends to posterior edge of pupil or a little beyond. Upper jaw with outer row of strong canines widely spaced in adults, and an inner band of small villiform teeth, widest at symphysis; lower jaw with a single row of strong conical teeth widely spaced in adults. Gill rakers (including rudiments) 7 to 10 on upper limb and 17 to 21 on lower limb of first gill arch (total 26 to 31). Two separate dorsal fins, the first with VIII spines, the second with I spine and 18 or 19 soft rays; anal fin with II detached spines followed by I spine and 15 to 17 soft rays; total soft dorsal- and anal-fin rays 34 to 36; dorsal-fin lobe contained 3.4 to 5.1 times in fork length in specimens larger than 15 cm fork length. **Curved part of lateral line short and strongly arched, chord of curved part contained 2.5 to 3.3 times in straight part** (to caudal-fin base); straight part of lateral line with no anterior scales and 33 to 39 strong scutes. **Breast naked posteroventrally to distinctly behind origin of pelvic fins and diagonally to naked base of pectoral fins.** Vertebrae 10+14. **Colour:** in life pale olive green above, silvery white below; **adults with small blue spots on upper half of body**; large dark spot at upper end of opercle and conspicuous black spot at upper base of pectoral fins; fins pale yellow-green.

Size: Largest specimen examined 56 cm fork length and 65 cm total length.

Habitat, biology, and fisheries: Feeds primarily on fishes. Caught on hook-and-line and commonly taken in trawls.

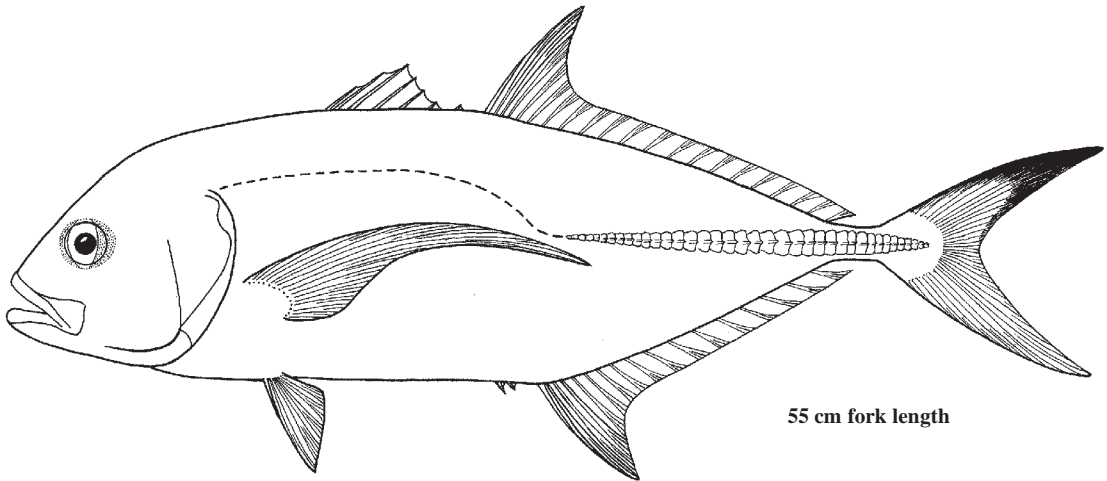
Distribution: Known from Taiwan Province of China, Indonesia (Ambon), Australia, and Papua New Guinea.



Caranx heberi (Bennett, 1830)

Frequent synonyms / misidentifications: *Caranx sem* Cuvier, 1833; *C. williamsi* J.L.B. Smith, 1968; *C. sansun* of authors / None.

FAO names: En - Blacktip trevally; Fr - Carangue cocole; Sp - Jurel cocolí.

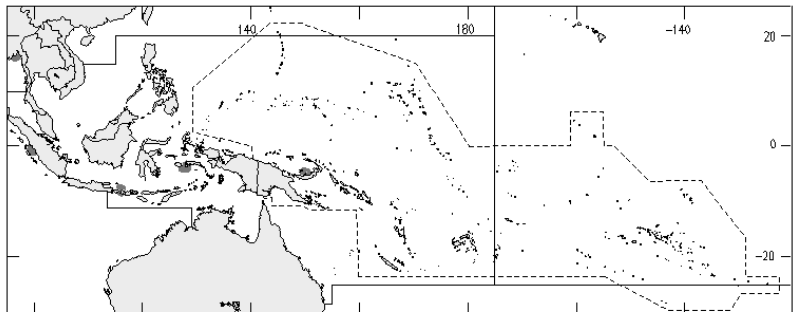


Diagnostic characters: Body oblong, compressed; dorsal profile strongly convex to second dorsal fin, ventral profile only slightly convex. Adipose eyelid moderately developed, small anteriorly, posterior adipose eyelid extends onto eye to rear border of pupil. End of upper jaw extends to posterior edge of pupil or a little beyond. Upper jaw with outer row of strong canines widely spaced in adults, and an inner band of small villiform teeth, widest at symphysis; lower jaw with a single row of strong conical teeth widely spaced in adults. **Gill rakers (including rudiments)** 6 to 8 on upper limb and 17 to 19 on lower limb of first gill arch (**total 24 to 27, but rarely 24**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 19 to 21 soft rays; anal fin with II detached spines followed by I spine and 15 to 17 soft rays; total soft dorsal- and anal-fin rays 34 to 38; dorsal-fin lobe contained 5.3 to 7.4 times in fork length in specimens larger than 15 cm fork length. Straight part of lateral line with 0 to 4 anterior scales followed by 30 to 40 strong scutes. **Breast squamation variable, completely scaly (uncommon) to naked ventrally and typically with a small to large patch of prepelvic scales.** Vertebrae 10+14. **Colour:** in life, adults with head and body dark bronze to yellow-green above, silvery bronze to yellow-green below; no dark spot on upper margin of opercle; caudal fin bright yellow or olive-yellow to dusky, typically with distal half of fin darker or black (especially in juveniles); other fins bright yellow to yellow-olive, sometimes dusky without any yellow hue; in juveniles and young adults black pigment in upper caudal-fin lobe typically present.

Size: Maximum verified size 78 cm fork length; weight to 7.7 kg.

Habitat, biology, and fisheries: Prefers clean, open coastal waters; adults are particularly common in small aggregations over rocky reefs and are seldom found in turbid or estuarine waters. Feeds primarily on fishes and crustaceans. Caught mainly on hook-and-line; also with gill nets and other artisanal gear.

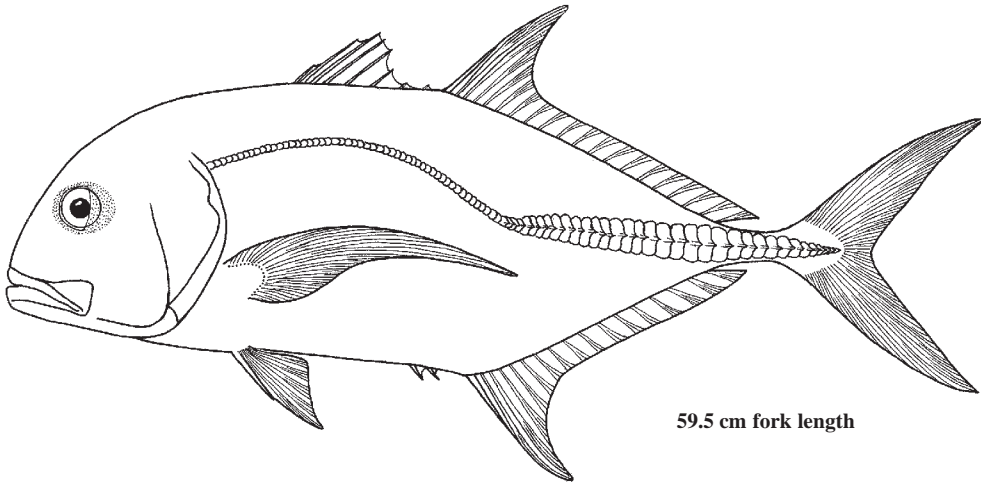
Distribution: Broadly distributed in coastal waters throughout most of the Indian Ocean, including the Persian Gulf, but no verified records from the Red Sea; elsewhere in the Indo-West Pacific known from Indonesia, the Arafura Sea, Ambon, New Guinea, and New Britain.



Caranx ignobilis (Forsskål, 1775)

Frequent synonyms / misidentifications: None / None.

FAO names: En - Giant trevally; Fr - Carangue tête; Sp - Jurel gigante.

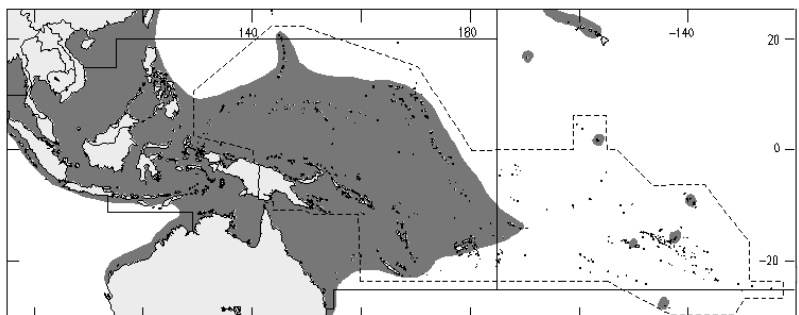


Diagnostic characters: Body oblong, compressed; dorsal profile strongly convex anteriorly, ventral profile only slightly convex. Adipose eyelid moderately developed, small anteriorly, posterior adipose eyelid extends onto eye to rear border of pupil. End of upper jaw extends to posterior edge of pupil or a little beyond. Upper jaw with outer row of strong canines widely spaced in adults, and an inner band of small villiform teeth, widest at symphysis; lower jaw with a single row of strong conical teeth widely spaced in adults. **Gill rakers (including rudiments)** 5 to 7 on upper limb and 15 to 17 on lower limb of first gill arch (**total 20 to 24**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 18 to 21 soft rays; anal fin with II detached spines followed by I spine and 15 to 17 soft rays; total soft dorsal- and anal-fin rays 34 to 38; dorsal-fin lobe contained 4.4 to 6.2 times in fork length in specimens larger than 15 cm fork length. Straight part of lateral line with 0 to 4 anterior scales followed by 26 to 38 strong scutes. **Breast naked ventrally, typically with a small to large patch of prepelvic scales.** Vertebrae 10+14. **Colour:** in life, adults with head and body silvery grey to black above, usually paler below; fins usually uniformly grey to black, except leading edge and tips of dorsal- and anal-fin lobes paler; no dark spot on upper margin of opercle; mature males usually darker than females, sometimes head and fins completely black; juveniles and young adults generally with more silvery bodies and paler fins, fish from turbid coastal waters often with yellow fins, the anal fin usually brightest.

Size: Maximum verified size 146 cm total length and 52.6 kg; commonly to about 80 cm fork length. World angling record (IGFA) 66 kg (145 lb 8 oz).

Habitat, biology, and fisheries: Abundant in all marine habitats; juveniles often encountered in estuaries. Feeds primarily on fishes. Caught mainly on hook-and-line and by spearing; also with gill nets and other artisanal gear. An excellent sports fish.

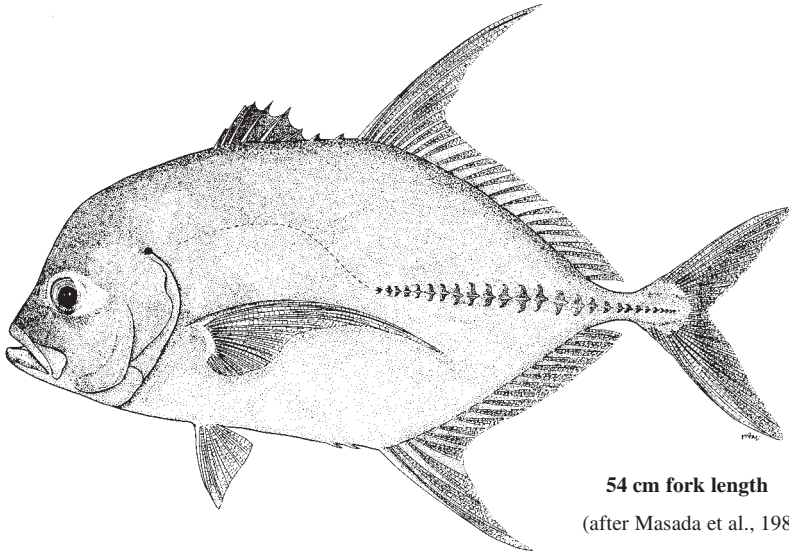
Distribution: Broadly distributed throughout the Indian Ocean; elsewhere in the Indo-West Pacific from southern Japan to Australia, and eastward to Hawaii and the Marquesas Islands.



***Caranx lugubris* Poey, 1860**

Frequent synonyms / misidentifications: *Caranx ascensionis* Cuvier, 1833 [Smith-Vaniz and Randall, 1994, *Bull. Zool. Nomen.*, 15 (4), have petitioned the International Commission of Zoological Nomenclature to conserve the name *C. lugubris*]; *C. ishikawai* Wakiya, 1924 / None.

FAO names: En - Black jack; Fr - Carangue noire; Sp - Jurel negro.



54 cm fork length

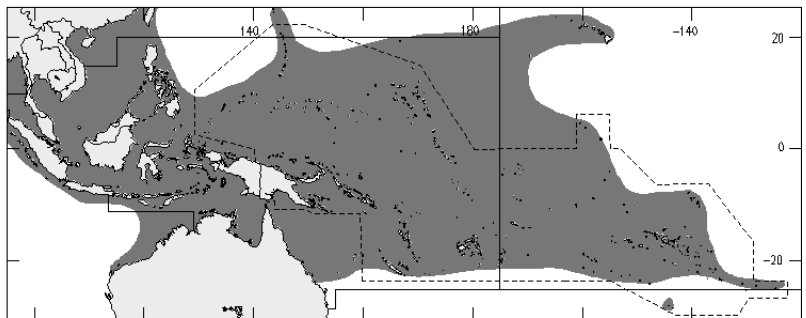
(after Masada et al., 1984)

Diagnostic characters: Body oblong, compressed; dorsal profile strongly convex anteriorly, ventral profile only slightly convex; **profile of head relatively steep and angular**. Adipose eyelid moderately developed, weak anteriorly, posterior eyelid extends onto eye to rear half of pupil. End of upper jaw extends to below middle of eye. Upper jaw with outer row of strong canines widely spaced in adults, and an inner band of small villiform teeth, widest at symphysis; on lower limb of first gill arch jaw with a single row of strong conical teeth widely spaced in adults. Gill rakers (including rudiments) 6 to 8 on upper limb and 17 to 22 on lower limb of first gill arch (total 23 to 30). Two separate dorsal fins, the first with VIII spines, the second with I spine and 20 to 22 soft rays; anal fin with II detached spines followed by I spine and 16 to 19 soft rays; total soft dorsal- and anal-fin rays 37 to 41; **dorsal-fin lobe contained 2.3 to 5.3 times in fork length in specimens larger than 15 cm fork length**. Straight part of lateral line with 26 to 32 strong scutes. **Breast completely scaly**. Vertebrae 10+14. **Colour: in life, head, body, and fins essentially uniform grey to brown, median fins and lateral-line scutes usually dark brown to black; upper end of opercle frequently with a dark spot, much smaller than pupil diameter.**

Size: Largest specimen examined 73.5 cm fork length (maximum weight not recorded).

Habitat, biology, and fisheries: Uncommon in shoal areas, confined to clear, offshore waters usually at depths of 25 to 65 m. Its early life history is unknown. Feeds primarily on fishes. Caught primarily on hook-and-line; also with traps and gill nets.

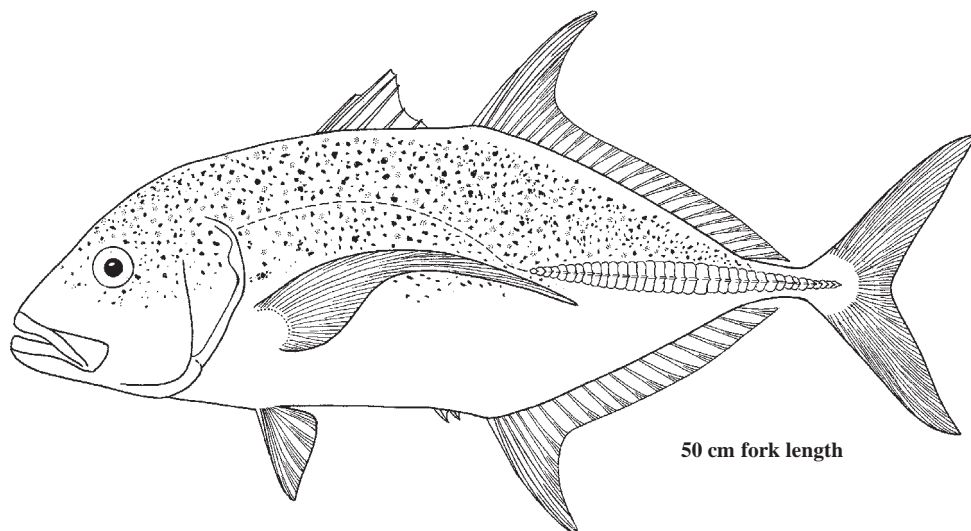
Distribution: A circumtropical species, very widespread but restricted to oceanic insular habitats.



Caranx melampygyus Cuvier, 1833

Frequent synonyms / misidentifications: *Caranx stellatus* Eydoux and Souleyet, 1841; *C. medusicola* Jordan and Starks, 1895 / None.

FAO names: **En** - Bluefin trevally; **Fr** - Carangue aile bleue; **Sp** - Jurel de aleta azul.

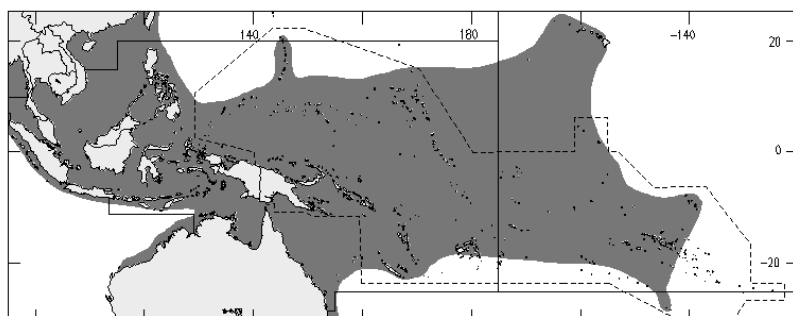


Diagnostic characters: Body oblong, compressed; dorsal profile moderately convex to second dorsal fin, ventral profile only slightly convex. Adipose eyelid weakly developed, small anteriorly, posterior adipose eyelid extends onto eye to rear border of pupil in large adults. End of upper jaw extends to below anterior margin of eye. Upper jaw with outer row of strong canines widely spaced in adults, and an inner band of small villiform teeth, widest at symphysis; on lower limb of first gill arch with a single row of strong conical teeth widely spaced in adults. **Gill rakers (including rudiments)** 5 to 9 on upper limb and 17 to 21 on lower limb of first gill arch (**total 25 to 29, usually 26 or 27**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 21 to 24 soft rays; anal fin with II detached spines followed by I spine and 17 to 20 soft rays, total soft dorsal- and anal-fin rays 39 to 44; dorsal-fin lobe contained 4.2 to 6.7 times in fork length in specimens larger than 15 cm fork length. Straight part of lateral line with 0 to 10 anterior scales followed by 27 to 42 strong scutes. **Breast completely scaly.** Vertebrae 10+14. **Colour:** adults with head and dorsal half of body brassy, suffused with blue, and covered with small blue black spots (forming at about 16 to 22 cm fork length and increasing in number with size); ventrally body generally silvery white; **second dorsal, anal, and caudal fins electric blue;** pelvic fins whitish and pectoral fins mostly pale yellow; **in juveniles and young adults, head and body silvery grey and fins pale to dark dusky, except pectoral fins yellow.**

Size: Maximum verified size 80 cm total length and 6.8 kg; reported to attain 100 cm total length.

Habitat, biology, and fisheries: Invariably associated with reef habitats throughout its broad range; most common in offshore areas. Feeds primarily on other fishes; reported to move up onto reef flats at night to feed. Caught primarily on hook-and-line and by spearing; also with traps and gill nets. An excellent sports fish.

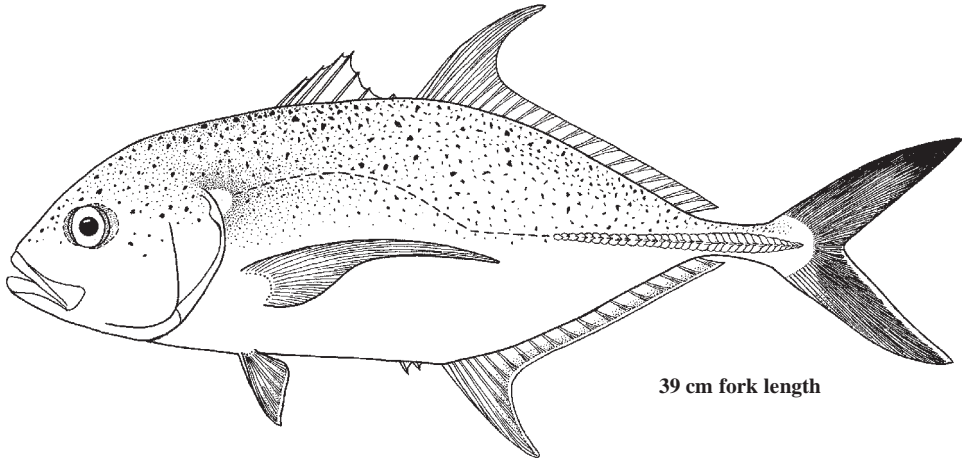
Distribution: Common throughout most of the western Indian Ocean, except apparently unrecorded from the Persian Gulf; elsewhere generally distributed throughout the Indo-West Pacific and tropical Eastern Pacific.



***Caranx papuensis* Alleyne and Macleay, 1877**

Frequent synonyms / misidentifications: *Caranx regularis* Garman, 1903; *C. celetus* Smith, 1968 / *C. melampyrgus* Cuvier, 1833 and "*C. sansun*."

FAO names: En - Brassy trevally; Fr - Carangue bronze; Sp - Jurel bronceado.



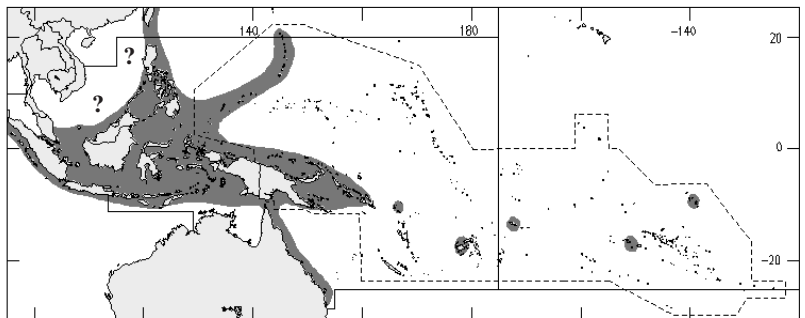
39 cm fork length

Diagnostic characters: Body oblong, compressed; dorsal profile moderately convex to second dorsal fin, ventral profile only slightly convex. Adipose eyelid weakly developed. End of upper jaw extends to below middle of eye. Upper jaw with outer row of strong canines widely spaced in adults, and an inner band of small villiform teeth, widest at symphysis; on lower limb of first gill arch jaw with a single row of strong conical teeth, widely spaced in adults. **Gill rakers (including rudiments)** 7 to 9 on upper limb and 18 to 21 on lower limb of first gill arch (**total 26 to 30**). Two separate dorsal fins, the first with VIII spines, the second with I spine and 21 to 23 soft rays; anal fin with II detached spines followed by I spine and 16 to 19 soft rays; total soft dorsal- and anal-fin rays 37 to 41; dorsal-fin lobe contained 4.1 to 5.6 times in fork length in specimens larger than 15 cm fork length. Straight part of lateral line with 0 to 3 anterior scales followed by 31 to 39 strong scutes. **Breast naked ventrally, usually with a small patch of prepelvic scales.** Vertebrae 10+14. **Colour:** in life, adults with head and body brassy to yellowish green above, silvery below; a conspicuous pale spot, approximately diameter of pupil, on shoulder just behind posterodorsal margin of opercle; small black spots (forming at about 25 cm fork length) scattered on body above lateral line, becoming more numerous with age; caudal fin with upper lobe uniformly dusky, on lower limb of first gill arch lobe dusky to bright yellow with a distinct, narrow white border; other fins pale to dusky yellow; anal and pelvic fins also with narrow white distal margins.

Size: Maximum verified size 68 cm fork length and 6.4 kg; commonly to at least 55 cm fork length.

Habitat, biology, and fisheries: Predominantly a seaward reef species although juveniles have been taken in estuaries; common on mainland reefs but rarely captured in offshore areas. Feeds primarily on other fishes. Caught primarily on hook-and-line and by spearing; also with gill nets and other artisanal gear.

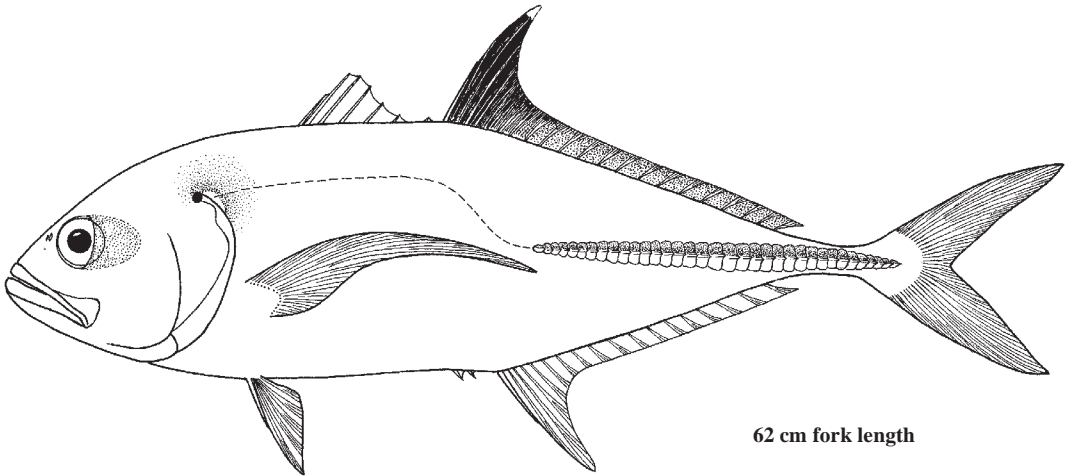
Distribution: In the Indian Ocean from South Africa to Zanzibar, the Malagasy Republic, Mauritius, Seychelles, and Sri Lanka; elsewhere in the Indo-West Pacific from Ryukyu Islands to Australia and eastward to the Mariana and Marquesas islands.



Caranx sexfasciatus Quoy and Gaimard, 1825

Frequent synonyms / misidentifications: *Caranx marginatus* Gill, 1863; *C. elacate* Jordan and Evermann, 1904 / None.

FAO names: En - Bigeye trevally; Fr - Carangue vorace; Sp - Jurel voraz.



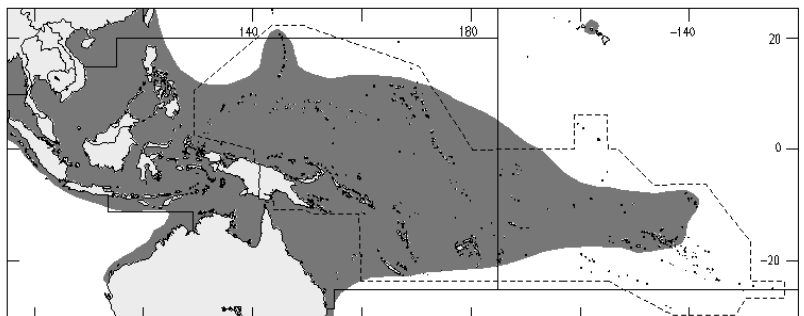
62 cm fork length

Diagnostic characters: Body oblong, compressed; **dorsal profile moderately convex anteriorly**, ventral profile only slightly convex; postorbital head length contained 6.4 to 8.2 times in fork length in specimens larger than 15 cm fork length. Adipose eyelid well developed, moderate anteriorly, posterior eyelid extends onto eye to rear border of pupil. End of upper jaw extends to beyond posterior margin of eye. Upper jaw with outer row of strong canines widely spaced in adults, and an inner band of small villiform teeth, widest at symphysis; on lower limb of first gill arch jaw with a single row of strong conical teeth widely spaced in adults. Gill rakers (including rudiments) 6 to 8 on upper limb and 15 to 19 on lower limb of first gill arch (total 21 to 25). Two separate dorsal fins, the first with VIII spines, the second with I spine and 19 to 22 soft rays; anal fin with II detached spines followed by I spine and 14 to 17 soft rays; total soft dorsal- and anal-fin rays 33 to 39; **dorsal-fin lobe contained 5 to 6.6 times in fork length in specimens larger than 15 cm fork length**. Straight part of lateral line with 0 to 3 anterior scales followed by 27 to 36 strong scutes. **Breast completely scaly. Vertebrae 10+15. Colour:** in life, adults with head and body silvery olive to iridescent blue-green above, silvery olive to whitish below; **small blackish spot, much smaller than pupil diameter, at upper angle of opercle (this spot evident on specimens of about 14 cm fork length); second dorsal fin olive to blackish, the lobe with a white tip (white tip becomes more obvious with increasing size);** anal and caudal fins yellowish to black; **lateral-line scutes dark to black.** In juveniles and young adults, head, body, and scutes more silvery and fins paler (grey to yellow) except upper half of dorsal-fin lobe and upper lobe of caudal fin usually dark.

Size: Maximum verified size 78 cm fork length and 7.7 kg; commonly to about 60 cm fork length.

Habitat, biology, and fisheries: A reef-associated species commonly caught in large numbers hand-lining around lights at night in waters inside the reef; juveniles may occur in estuaries. Feeds primarily on fishes and crustaceans. Caught mainly on hook-and-line; also with gill nets, purse seines, and other artisanal gear.

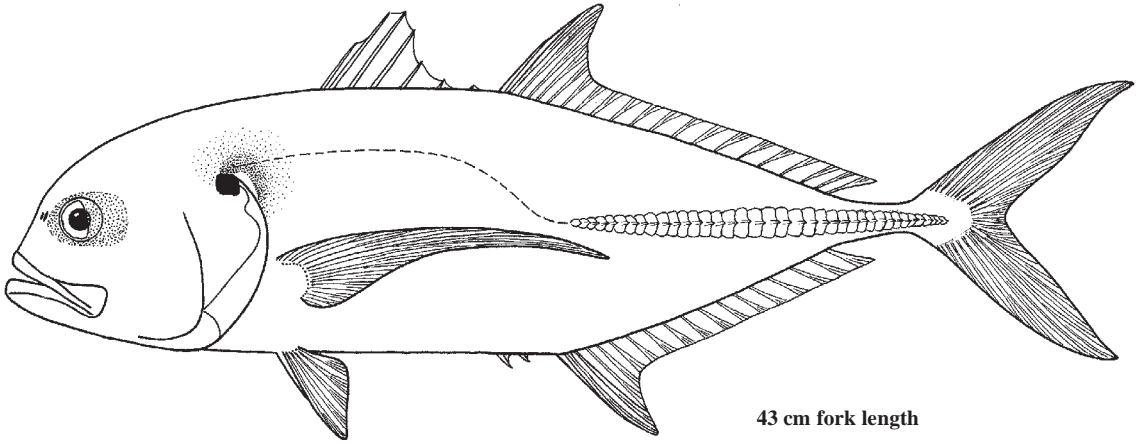
Distribution: Broadly distributed throughout the tropical Indo-West Pacific, including Hawaii; also occurs in the eastern Pacific Ocean and from Ecuador to Mexico, including the Galapagos Islands.



***Caranx tille* Cuvier, 1833**

Frequent synonyms / misidentifications: *Caranx cynodon* Bleeker, 1851 / *Caranx sexfasciatus* (Quoy and Gaimard, 1825).

FAO names: En - Tille trevally; Fr - Carangue tille; Sp - Jurel tille.



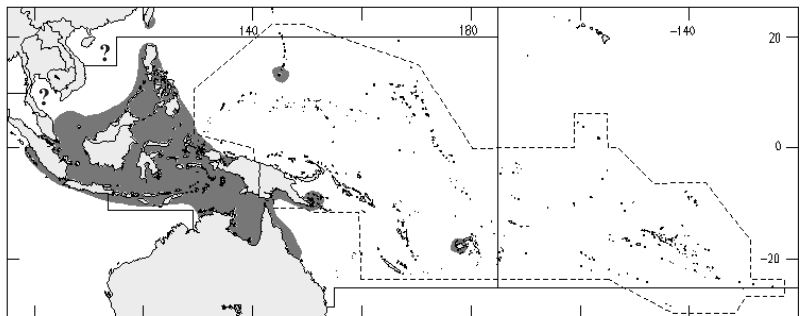
43 cm fork length

Diagnostic characters: Body oblong, compressed; **dorsal profile strongly convex anteriorly**, ventral profile only slightly convex; postorbital head length contained 5.7 to 7.3 times in fork length in specimens larger than 15 cm fork length. Adipose eyelid well developed, moderate anteriorly, posterior eyelid extends onto pupil. End of upper jaw extends beyond posterior margin of eye. Upper jaw with outer row of strong canines widely spaced in adults, and an inner band of small villiform teeth, widest at symphysis; on lower limb of first gill arch jaw with a single row of strong conical teeth widely spaced in adults. Gill rakers (including rudiments) 6 to 8 on upper limb and 15 to 17 on lower limb of first gill arch (total 22 to 25). Two separate dorsal fins, the first with VIII spines, the second with I spine and 20 to 22 soft rays; anal fin with II detached spines followed by I spine and 16 to 18 soft rays; total soft dorsal- and anal-fin rays 36 to 40; **dorsal-fin lobe contained 5.7 to 8.8 times in fork length in specimens larger than 15 cm fork length**. Straight part of lateral line with 0 to 2 anterior scales followed by 33 to 42 strong scutes. **Breast completely scaly. Vertebrae 10+14. Colour:** in life, adults with head and body dark olive-green to bluish grey above, shading to silvery white below; **blackish spot, at least 1/2 diameter of pupil, at upper margin of opercle (this spot evident on specimens of about 20 cm fork length); second dorsal fin olive-grey to blackish, the lobe without a white tip;** anal and caudal fins yellow-olive to blackish; **lateral-line scutes grey, except dark in caudal peduncle region;** in juveniles and young adults, head and body pale olive to silvery grey and fins uniformly pale to dusky.

Size: Maximum verified size 69 cm fork length and 4.3 kg.

Habitat, biology, and fisheries: A coastal species with a preference for inshore neritic waters, mainly around rocky and coral reefs. Feeds primarily on other fishes and crustaceans. Caught mainly on hook-and-line; also with gill nets, purse seines, and other artisanal gear.

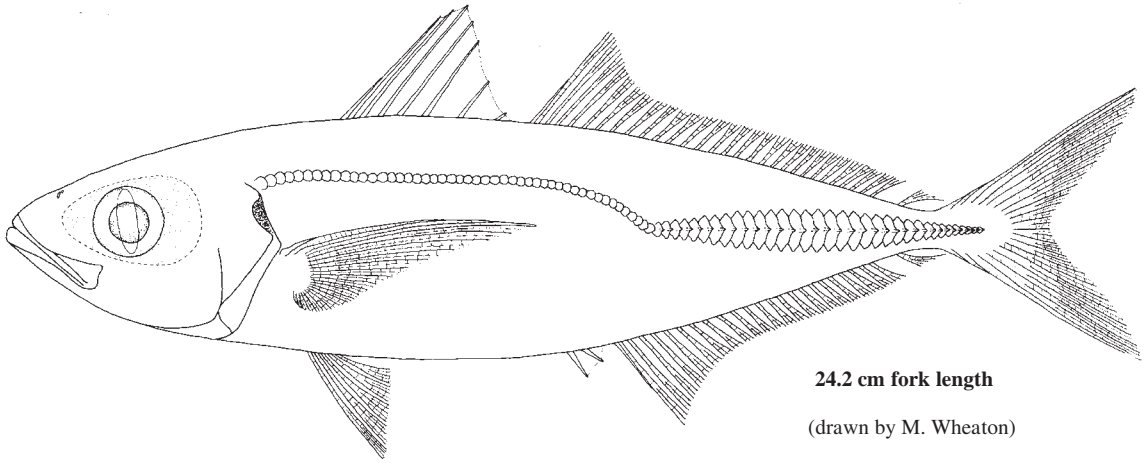
Distribution: South Africa northward at least to Zanzibar, northeast coast of Malagasy Republic, and Sri Lanka; elsewhere in the Indo-West Pacific known from Okinawa, Guam, the Philippines, Indonesia, northern Australia, New Guinea, and Fiji.



***Decapterus kurroides* Bleeker, 1855**

Frequent synonyms / misidentifications: *Decapterus kurroides akaadsi* Abe, 1958 / None.

FAO names: **En** - Redtail scad; **Fr** - Comète mauouane; **Sp** - Macarela mauuana.



24.2 cm fork length

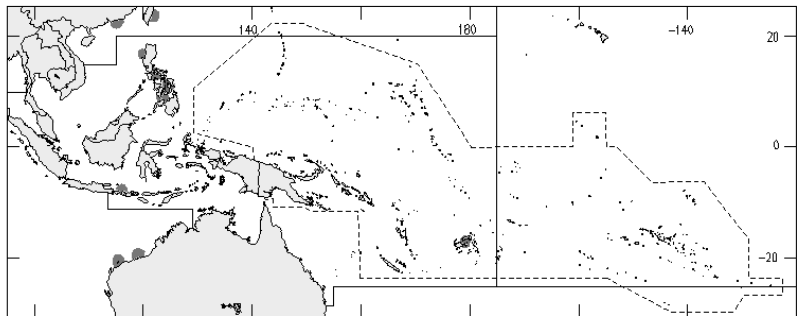
(drawn by M. Wheaton)

Diagnostic characters: Body elongate, moderately slender and slightly compressed. Adipose eyelid well developed, completely covering eye except for a vertical slit centred on pupil; Scales on top of head extend forward to anterior margin of pupil. Oral valve (membrane) at symphysis of upper jaw dusky or transparent. Posterior end of upper jaw straight above, slightly concave and not noticeably slanted anterovertally. Upper jaw with a narrow band of minute teeth, widest anteriorly; lower jaw with a single irregular series of minute teeth. Gill rakers (including rudiments) 9 to 12 on upper limb and 26 to 32 on lower limb of first gill arch (total 36 to 41). **Shoulder girdle (cleithrum) margin with 2 small papillae, the lower papilla larger.** Two widely separate dorsal fins, the first with VIII spines, the second with I spine and 28 to 30 soft rays (including finlet); anal fin with II detached spines followed by I spine and 22 to 26 soft rays (including finlet); **terminal dorsal- and anal-fin rays each consisting of a widely detached finlet;** pectoral fins moderately long (88 to 105% of head length), tip of appressed fins typically extending to or slightly beyond a vertical line from second dorsal-fin origin. Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below vertical from eleventh to thirteenth soft rays of second dorsal fin; **scales in curved part of lateral line 47 to 55; scutes in curved part 0 to 2; straight part without anterior scales, and with 31 to 36 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 80 to 86.** Vertebrae 10+14. **Colour:** in life, bluish green above, silvery white below; moderate black blotch on margin of opercle near upper edge; **caudal fin red;** spinous dorsal and second dorsal-fin lobe sometimes dark, anal and pelvic fins pale dusky to white.

Size: Largest specimen examined 41 cm fork length and 44 cm total length; commonly to about 30 cm fork length.

Habitat, biology, and fisheries: A deep-water, schooling species taken in depths of 100 to 300 m, but usually below 150 m. Feeds primarily on smaller planktonic invertebrates. Caught with midwater trawls.

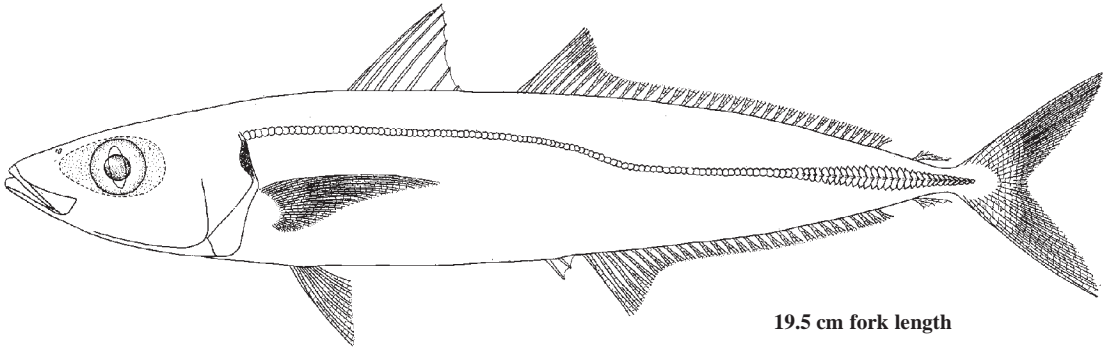
Distribution: Distribution poorly known, due to the deep-water habitat preference of this species. In the Indian Ocean known from off Kenya, Tanzania, and Reunion Island; elsewhere in the Indo-West Pacific known from Japan, Taiwan Province of China, Indonesia, the Philippines, and Australia.



***Decapterus macarellus* Cuvier, 1833**

Frequent synonymys / misidentifications: *Decapterus jacobus* (Cuvier, 1833); *D. pinnulatus* (Eydox and Souleyet, 1841); *D. canonoides* Jenkins, 1903 / *Decapterus macrosoma* Bleeker, 1851 (a valid species, but this name has often been misapplied to *D. macarellus*).

FAO names: En - Mackerel scad; Fr - Comète maquereau; Sp - Macarela caballa.



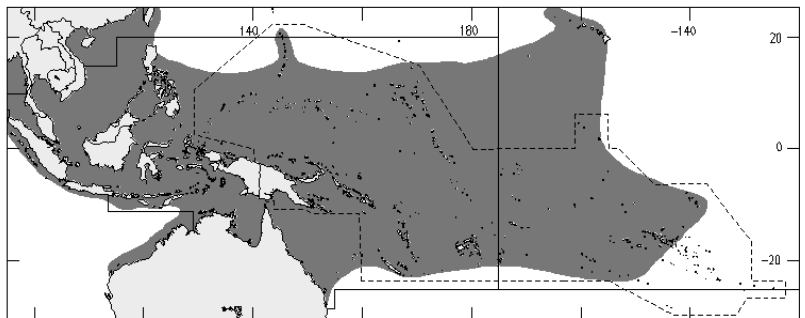
(drawn by M. Wheaton)

Diagnostic characters: Body very elongate, slender and nearly round in cross-section. Adipose eyelid well developed, completely covering eye except for a vertical slit centred on pupil. Scales on top of head extend forward to anterior margin of pupil. **Oral valve (membrane) at symphysis of upper jaw conspicuously white in adults. Posterior end of upper jaw straight above, moderately rounded and noticeably slanted anteroventrally.** Both jaws without teeth. Gill rakers (including rudiments) 10 to 13 on upper limb and 34 to 41 on lower limb of first gill arch (total 45 to 54). **Shoulder girdle (cleithrum) margin with 2 small papillae, the lower papilla larger.** Two widely separate dorsal fins, the first with VIII spines, the second with I spine and 31 to 37 soft rays (including finlet); anal fin with II detached spines followed by I spine and 27 to 31 soft rays (including finlet); **terminal dorsal- and anal-fin rays each consisting of a widely detached finlet;** pectoral fins short (58 to 72% of head length), **tip of appressed fins falling considerably short of a vertical line from second dorsal-fin origin.** Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below vertical from eleventh to thirteenth soft rays of second dorsal fin; **scales in curved part of lateral line 58 to 75, no scutes in curved part; straight part with 18 to 39 scales,** followed by 24 to 40 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 110 to 138. Vertebrae 10+14. **Colour:** in life, bluish green above, silvery below; small black blotch on margin of opercle near upper edge; caudal fin yellow-green; dorsal-fin lobe sometimes dark distally, anal and pelvic fins pale to whitish.

Size: Largest specimen examined 30 cm fork length and 32 cm total length; commonly to about 26 cm fork length.

Habitat, biology, and fisheries: A schooling species, occurring mostly in open water and common in insular habitats. Sometimes near the surface but usually taken in depths between 40 and 200 m. Feeds primarily on smaller planktonic invertebrates. Caught with purse seines and trawls.

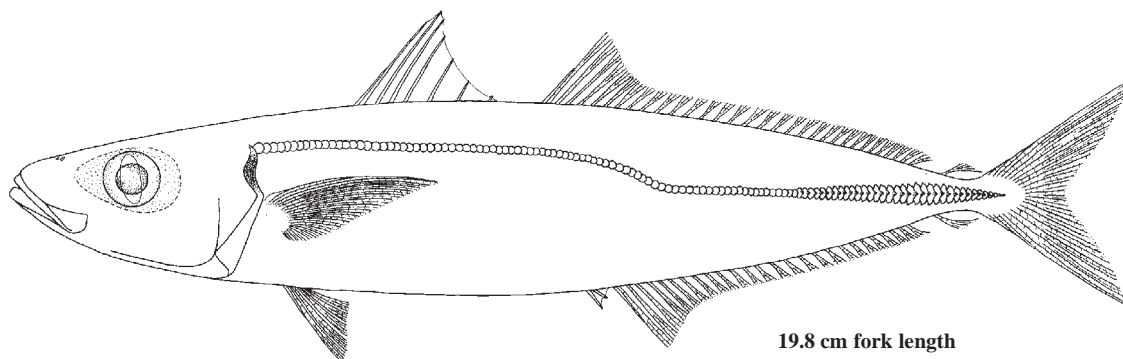
Distribution: A circumtropical species. Widespread throughout the tropical Indian Ocean, including the Red Sea but not the Persian Gulf; in the Indo-West Pacific to the Marquesas Islands, north to southern Japan and south to Australia.



***Decapterus macrosoma* Bleeker, 1851**

Frequent synonyms / misidentifications: *Decapterus afuerae* Hildebrand, 1946; *D. lajang* (a synonym of *D. russelli*, but this name has often been misapplied to *D. macrosoma*) / *Decapterus macarellus* (Cuvier, 1833).

FAO names: En - Shortfin scad; Fr - Comère fine; Sp - Macarela alicorta.



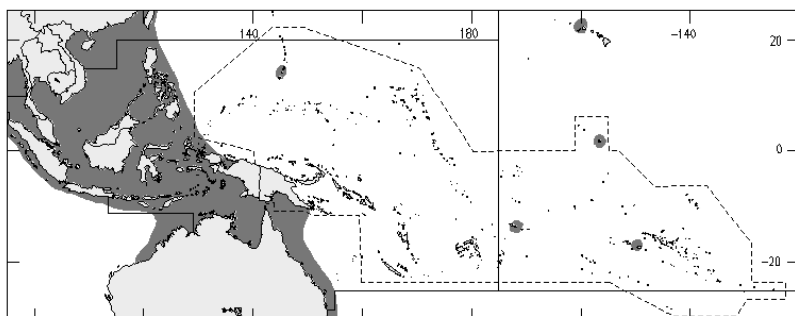
(drawn by M. Wheaton)

Diagnostic characters: Body very elongate, slender and nearly rounded. Eye moderate, with adipose eyelid well developed, completely covering eye except for a vertical slit centred on pupil. Scales on top of head do not extend forward to beyond posterior margin of pupil. Oral valve (membrane) at symphysis of upper jaw dusky or transparent. **Posterior end of upper jaw concave above, rounded and produced below.** Upper jaw without teeth and lower jaw with a single series of minute teeth. Gill rakers (including rudiments) 10 to 12 on upper limb and 34 to 38 on lower limb of first gill arch (total 43 to 50). **Shoulder girdle (cleithrum) margin with 2 small papillae, the lower papillae larger.** Two widely separate dorsal fins, the first with VIII spines, the second with I spine and 33 to 39 soft rays (including finlet); anal fin with II detached spines followed by I spine and 27 to 31 soft rays (including finlet); **terminal dorsal- and anal-fin rays each consisting of a widely detached finlet;** pectoral fins short (61 to 75% of head length), **tip of appressed fins falling considerably short of a vertical line from second dorsal-fin origin.** Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below vertical from eleventh to thirteenth soft rays of second dorsal fin; **scales in curved part of lateral line 58 to 72; no scutes in curved part; straight part with 14 to 29 scales** followed by 24 to 40 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 110 to 126. Vertebrae 10+14. **Colour:** in life, metallic blue above, silvery below; small black blotch on margin of opercle near upper edge; caudal fin hyaline to dusky and dorsal-fin lobe sometimes dark distally; other fins mostly pale.

Size: The smallest Indo-West Pacific species of *Decapterus*. Maximum fork length about 30 cm, but rarely exceeding 25 cm fork length.

Habitat, biology, and fisheries: A schooling species, in depths between 30 and at least 170 m, reported to occur much deeper. Feeds primarily on smaller planktonic invertebrates. Caught with purse seines and trawls.

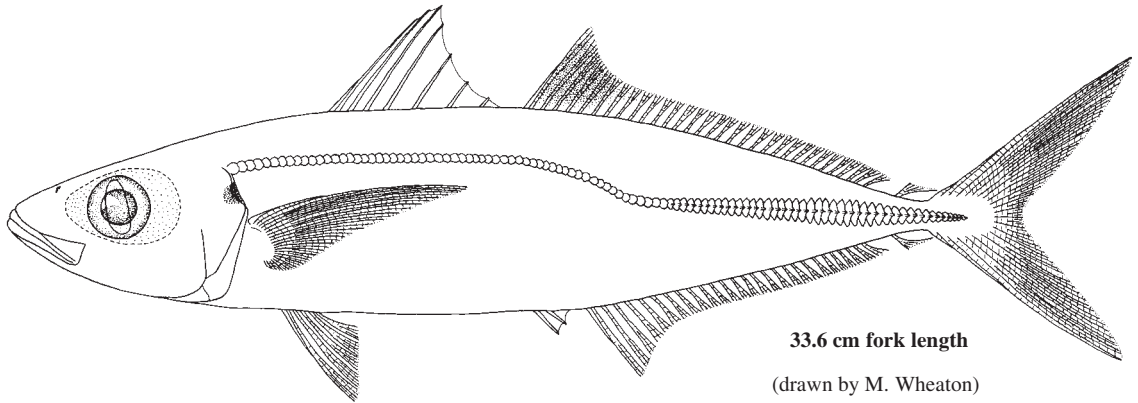
Distribution: Widespread in the tropical Indo-West Pacific, from East Africa, including the Red Sea but not the Persian Gulf, north to southern Japan and south to Australia and eastward to Hawaii; also present in the eastern Pacific Ocean, from the Gulf of California and Peru.



Decapterus muroadsi (Temminck and Schlegel, 1844)

Frequent synonyms / misidentifications: *Caranx scombrinus* Valenciennes, 1844; *Decapterus hypodus* Gill, 1862 / *Decapterus macarellus* (Cuvier, 1833).

FAO names: En - Amberstripe scad.

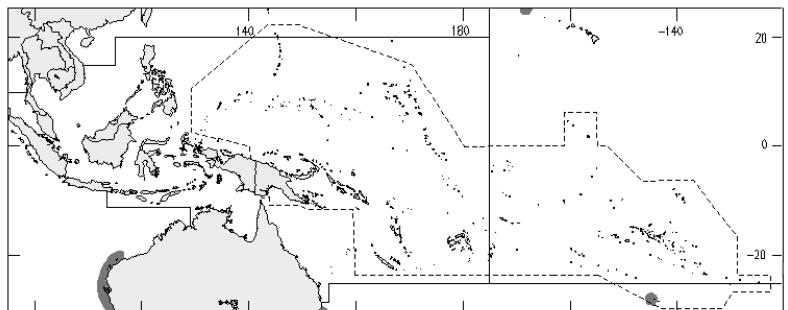


Diagnostic characters: Body very elongate, slender and nearly rounded. Eye moderate, with adipose eyelid well developed, completely covering eye except for a vertical slit centred on pupil. Scales on top of head do not extend forward to anterior margin of pupil. **Oral valve (membrane) at symphysis of upper jaw white. Posterior end of upper jaw straight above, not noticeably slanted anteroventrally.** Upper jaw with irregular series of minute teeth anteriorly, becoming obsolete with age; lower jaw with a single series of minute teeth. Gill rakers (including rudiments) 13 to 15 on upper limb and 36 to 42 on lower limb of first gill arch (total 47 to 56). **Shoulder girdle (cleithrum) margin with 2 small papillae, the lower papillae larger.** Two widely separate dorsal fins, the first with VIII spines, the second with I spine and 29 to 33 soft rays (including finlet); anal fin with II detached spines followed by I spine and 25 to 28 soft rays (including finlet); **terminal dorsal- and anal-fin rays each consisting of a widely detached finlet;** pectoral fins short (71 to 93% of head length), tip of appressed fins falling usually short of a vertical line from second dorsal-fin origin. Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below vertical from eleventh to thirteenth soft rays of second dorsal fin; **scales in curved part of lateral line 54 to 76; no scutes in curved part; straight part with 5 to 15 scales** followed by 32 to 42 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 102 to 121. Vertebrae 10+14. **Colour:** in life, bluish green above, silvery below; small black blotch on margin of opercle near upper edge; amber stripe often present on sides; **caudal fin with lower lobe dusky and upper lobe greenish yellow;** dorsal-fin lobe usually dark distally; other fins mostly pale.

Size: Maximum fork length at least 45 cm; commonly to about 30 cm fork length.

Habitat, biology, and fisheries: A pelagic schooling species. Feeds primarily on smaller planktonic invertebrates. Caught with purse seines and trawls.

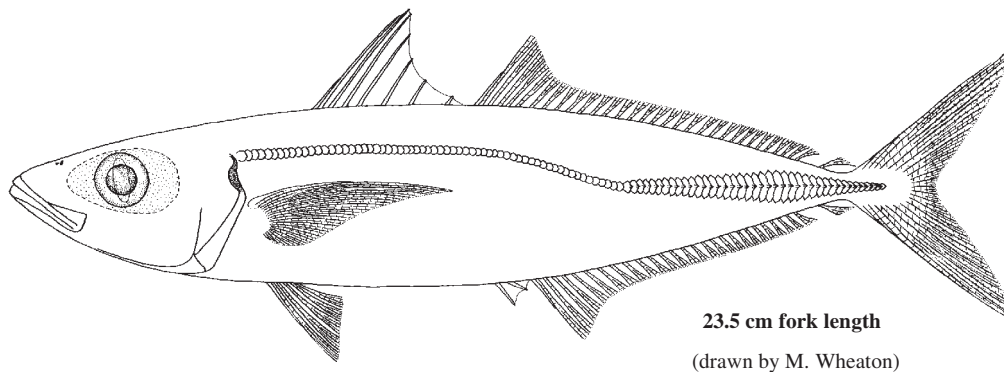
Distribution: Broadly distributed, warm-temperate Indo-West Pacific species known from Australia, southern Japan, northern Hawaiian Islands, Rapa, Easter Island, Nazca Ridge, the eastern Pacific Ocean (Gulf of California to Peru), and an apparently relict population at St. Helena Is. in the mid-South Atlantic Ocean.



Decapterus russelli (Rüppell, 1830)

Frequent synonyms / misidentifications: *Decapterus kiliche* (Cuvier, 1833); *D. dayi* Wakiya, 1928; *D. lajang* Bleeker, 1885 (this name has often been misapplied to *D. macrosoma*) / *Decapterus maruadsi* (Temminck and Schlegel, 1844) (a questionably valid species, apparently restricted to Japan and the South China Sea, but this name has often been misapplied to *D. russelli*); *D. tabl* Berry, 1968.

FAO names: **En** - Indian scad; **Fr** - Comère indienne; **Sp** - Macarela indica.



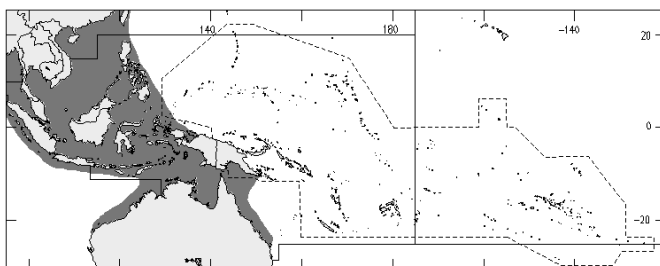
Diagnostic characters: Body elongate, moderately slender and slightly compressed. Eye moderate, with adipose eyelid well developed, completely covering eye except for a vertical slit centred on pupil. Scales on top of head do not extend forward to beyond centre of pupil. Oral valve (membrane) at symphysis of upper jaw dusky or transparent. Posterior end of upper jaw straight above, slightly concave and not noticeably slanted anteroventrally. Both jaws with an irregular row of minute teeth anteriorly and a single series posteriorly. Gill rakers (including rudiments) 10 to 14 on upper limb and 30 to 39 on lower limb of first gill arch (total 41 to 53). **Shoulder girdle (cleithrum) margin with 2 small papillae, the lower papilla larger.** Two widely separate dorsal fins, the first with VIII spines the second with I spine and 28 to 33 soft rays (including finlet); anal fin with II detached spines followed by I spine and 25 to 29 soft rays (including finlet); **terminal dorsal- and anal-fin rays each consisting of a widely detached finlet;** pectoral fins 76.5 to 97% of head length, tip of appressed fins falling short of to slightly beyond a vertical line from second dorsal-fin origin. Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below vertical from eleventh to thirteenth soft rays of second dorsal fin; **scales in curved part of lateral line 42 to 62, scutes in curved part 0 to 4, straight part with 0 to 4 scales, followed by 30 to 40 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 77 to 102.** **Vertebrae 10+14.** **Colour:** in life, bluish green above, silvery below; small black blotch on margin of opercle near upper edge; **caudal fin hyaline to dusky brown**, second dorsal fin hyaline basally, light dusky distally; other fins mostly hyaline, except pelvic fins of adult males slightly dark.

Size: Largest specimen examined 35 cm fork length; commonly to about 20 cm fork length.

Habitat, biology, and fisheries: The most common species of *Decapterus* in inshore waters in depths not exceeding 100 m. Reaches sexual maturity during the first year of life at about 12 cm total length. Fish of 15 cm total length (average weight 50 g) and 2 to 3 years of age are the most frequent in catches. Feeds primarily on smaller planktonic invertebrates. Caught with purse seines and trawls.

Distribution: Broadly distributed throughout the Indian Ocean and from Japan to Australia in the western Pacific Ocean.

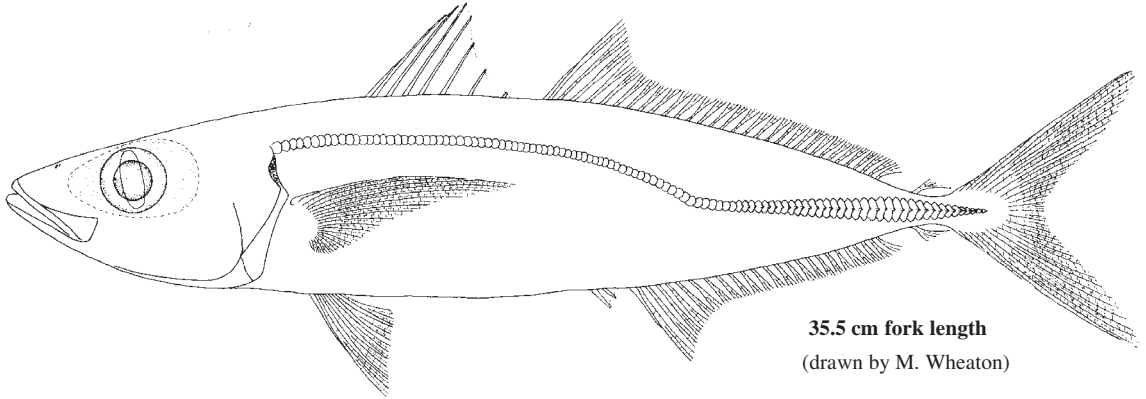
Remarks: Two somewhat different morphological "forms" of *Decapterus* are here recognized as *D. russelli*. The more abundant form is characterized by a more robust body, larger scales, fewer scales in the curved part of the lateral line and tends to have more gill rakers. The more elongate "lajang" form attains a larger size and usually has shorter pectoral fins. Some morphologically intermediate specimens exist and because the "lajang" form tends to be more typical of fish from insular habitats, the observed differences are believed to be environmentally determined.



***Decapterus tabl* Berry, 1968**

Frequent synonyms / misidentifications: None / In Japan, the name *Decapterus russelli* has often been misapplied to this relatively common species. The misapplication of the name originates with Bertin and Dollfus (1948, *Mem.Mus.natn.Hist.Nat.*) who made an invalid neotype selection for *D. russelli* (Rüppell).

FAO names: En - Roughear scad; Fr - Comère queue rouge; Sp - Macarela rabo colorado.



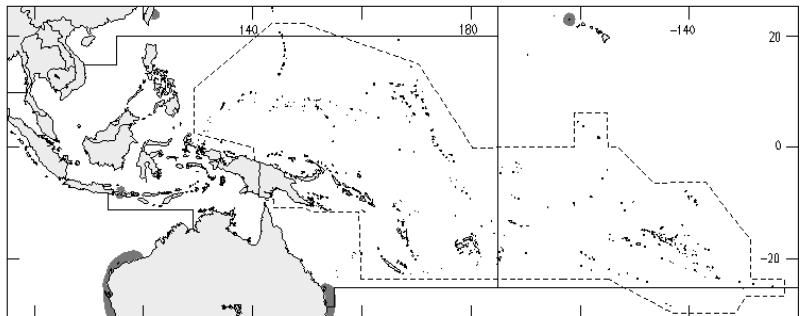
Diagnostic characters: Body very elongate, slender and nearly rounded. Eye moderate, with adipose eyelid well developed, completely covering eye except for a vertical slit centred on pupil. Scales on top of head extend forward to anterior margin of pupil. **Posterodorsal margin of opercular membrane minutely serrated in adults. Oral valve (membrane) at symphysis of upper jaw dusky or transparent. Posterior end of upper jaw straight above, slightly concave and not strongly slanted anteroventrally.** Upper jaw with an irregular series of minute teeth anteriorly that become obsolete with age. Lower jaw with a single series of minute teeth. Gill rakers (including rudiments) 10 to 12 on upper limb and 30 to 33 on lower limb of first gill arch (total 41 to 45). **Shoulder girdle (cleithrum) margin with 2 small papillae, the lower papilla larger.** Two widely separate dorsal fins, the first with VIII spines, the second with I spine and 30 to 34 soft rays (including finlet); anal fin with II detached spines followed by I spine and 24 to 26 soft rays (including finlet); **terminal dorsal- and anal-fin rays each consisting of a widely detached finlet;** pectoral fins 62 to 83% of head length, tip of appressed fins falling slightly to distinctly short of a vertical line from second dorsal-fin origin. Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below vertical from eleventh to fourteenth soft rays of second dorsal fin; **scales in curved part of lateral line 61 to 73; no scutes in curved and straight part with 4 to 12 scales, followed by 30 to 40 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 103 to 118.** Vertebrae 10+14. **Colour:** in life, metallic blue to greenish above, silvery below; small black blotch on margin of opercle near upper edge; **caudal fin bright red and tips of soft dorsal-fin rays tinged with red.**

Size: The largest Indo-West Pacific species of *Decapterus*. Maximum fork length about 48 cm, commonly to 35 cm fork length.

Habitat, biology, and fisheries: Most captures of this deep-water, schooling species are from depths of 200 to 360 m. Feeds primarily on smaller planktonic invertebrates. Caught with purse seines and trawls.

Distribution: Distribution poorly known, due to the deep-water habitat preference of this species. In the

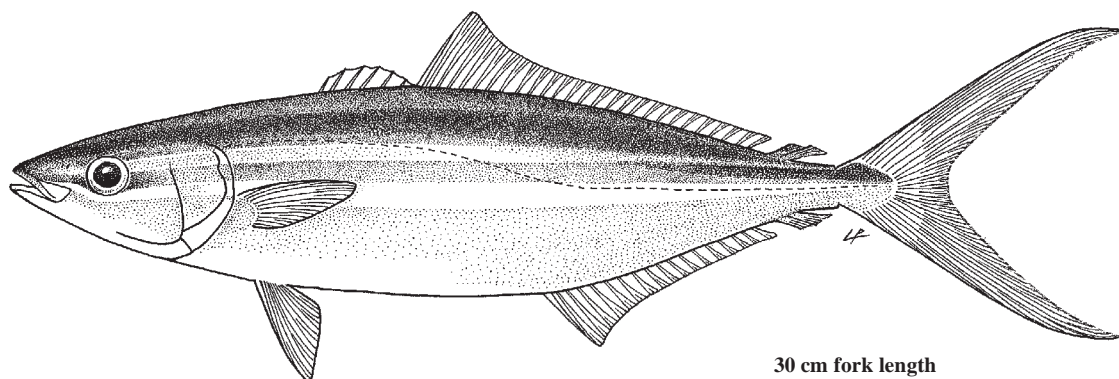
Indian Ocean known from a single collection off Kenya. Elsewhere in the Indo-West Pacific known from Japan and Okinawa, Indonesia, Australia, and the Hawaiian Archipelago (Necker Island). Also occurs in the western Atlantic Ocean: Bermuda, South America off Colombia and Verlezuela, and at St. Helena in the mid-South Atlantic.



Elagatis bipinnulata (Quoy and Gaimard, 1825)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Rainbow runner; **Fr** - Comère saumon; **Sp** - Macarela salmón.

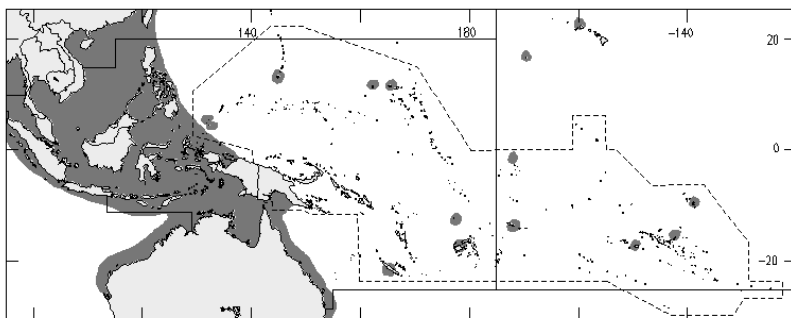


Diagnostic characters: Body greatly elongate, almost fusiform. Head and snout pointed; mouth small, **upper jaw ending distinctly before eye (to below anterior margin of eye in young)**. Teeth in jaws in villiform bands, minute teeth also on roof of mouth and on tongue. **Dorsal fin with VI spines, followed by I spine and 25 to 30 soft rays including a detached terminal 2-rayed finlet; anal fin with only I spine, slightly detached from rest of fin and covered by skin in fish of larger sizes, followed by a second spine continuous with the following 18 to 22 soft rays, including a detached 2-rayed finlet;** anal-fin base relatively short, contained about 1.5 times in second dorsal-fin base; pectoral fins short, about 2 times in head length and about as long as pelvic fins; caudal fin deeply forked. Lateral line with a slight anterior arch. No scutes; caudal peduncle grooves present. Vertebrae 10+14. **Colour: dark olive-blue or green dorsally and white ventrally; 2 narrow light blue or bluish white stripes along sides, with a broader olive or yellowish stripe between them; fins dark with an olive or yellow tint.**

Size: Maximum fork length 107 cm (possibly to 120 cm); commonly to 80 cm fork length. Maximum weight 10.5 kg.

Habitat, biology, and fisheries: A pelagic species, usually found at or near the surface, over reefs or sometimes far offshore; may form sizeable schools. Feeds on invertebrates and small fishes. Caught mainly on hook-and-line; also with gill nets. An excellent sports fish.

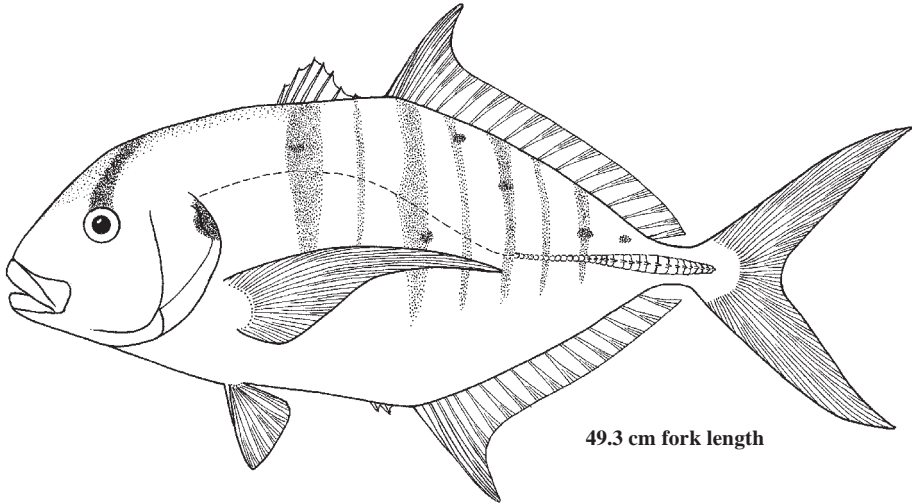
Distribution: Widespread circumtropical species.



***Gnathanodon speciosus* (Forsskål, 1775)**

Frequent synonyms / misidentifications: *Caranx speciosus* (Forsskål, 1775) / None.

FAO names: **En** - Golden trevally; **Fr** - Carangue royale jaune; **Sp** - Jurel dorado.

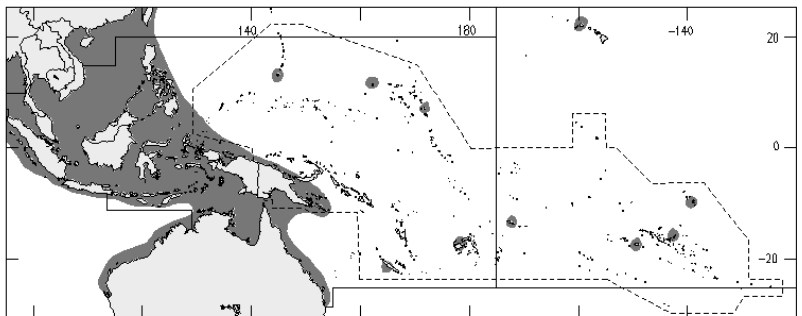


Diagnostic characters: Body compressed, oblong, **lips noticeably papillose and upper jaw strongly protactile**. Eye diameter smaller than snout length. **Upper jaw without teeth; lower jaw with a few feeble teeth in young (smaller than 10 cm fork length) absent in adults**. Gill rakers (including rudiments) 7 to 9 on upper limb and 19 to 22 on lower limb of first gill arch (total 27 to 30). Two separate dorsal fins, the first with VII spines, the second with I spine and 18 to 20 soft rays; anal fin with II detached spines followed by I spine and 15 to 17 soft rays; lobe of second dorsal fin shorter than head length. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from between ninth and fourteenth soft rays of second dorsal fin; chord of curved part of lateral line longer to slightly shorter than straight part of lateral line, contained 0.75 to 1.3 times in straight part; straight part of lateral line with 17 to 24 scales followed by 17 to 26 scutes. **Breast completely scaly**. Vertebrae 10+14. **Colour:** **juveniles and young adults silvery to yellow with 7 to 11 black bands, usually alternating broad and narrow**; the first band oblique through eye, the second crossing back and opercle; upper margin of opercle black; **all fins yellow, tips of caudal-fin lobes black; dark opercular spot also fades with age and body becomes yellow-green dorsally, pale yellow below**.

Size: Maximum size not known but reported to attain 110 cm fork length. South African spearfishing record 14.5 kg.

Habitat, biology, and fisheries: Found inshore, including rocky reefs, deep lagoons, and seaward reefs. A bottom feeder that uses its highly protractile mouth to root the sand and small crevices for crustaceans, molluscs, and small fishes. Young display "piloting" habits with sharks and other large fish such as groupers; their maneuverability protects them from their host, and the association probably affords them some protection from other predators. Caught mainly with gill nets and by spearing.

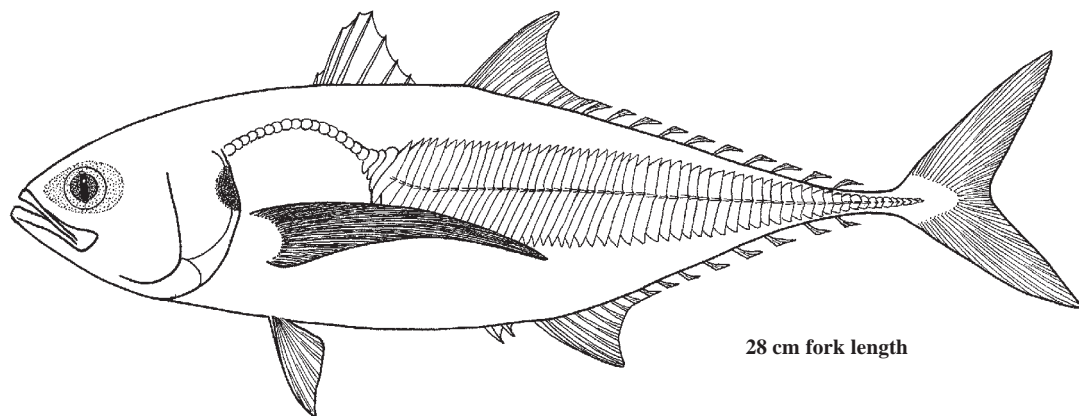
Distribution: Broadly distributed throughout the Indo-West Pacific, including Hawaii; also occurs in the eastern Pacific Ocean, from Peru to Baja California.



***Megalaspis cordyla* (Linnaeus, 1758)**

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Torpedo scad; **Fr** - Comère torpille; **Sp** - Macarela torpedo.

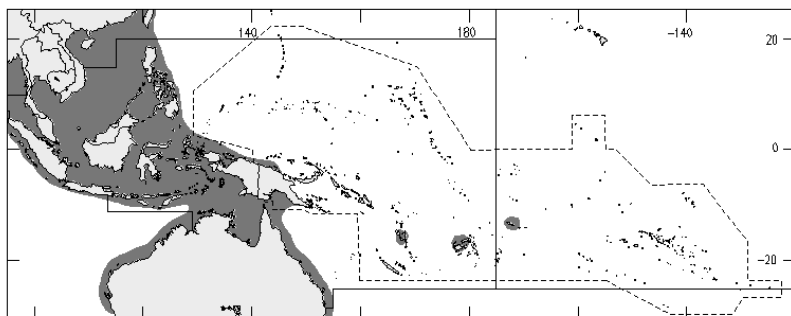


Diagnostic characters: Body elongate, subcylindrical, a little compressed posteriorly, and **caudal peduncle strongly compressed with a marked medial keel**; snout and lower jaw pointed. Eye moderate, with well developed adipose eyelid completely covering eye except for a vertical slit centred on pupil. Upper jaw extending posteriorly to centre of eye. Upper jaw with small villiform teeth, outer teeth moderately enlarged; lower jaw with a single row of small teeth, except a narrow band anteriorly. Gill rakers (including rudiments) 8 to 11 on upper limb and 18 to 22 on lower limb of first gill arch (total 26 to 32). Shoulder girdle (cleithrum) margin smooth, without papillae. Two separate dorsal fins, the first with VIII spines, **the second with I spine and 18 to 20 soft rays, posterior 7 to 9 rays consisting of detached finlets**; anal fin with II detached spines followed by I spine and 16 or 17 soft rays, **posterior 8 to 10 rays consisting of detached finlets**; spinous dorsal fin moderately high, longest spine height about equal to length of soft dorsal-fin lobe. **Lateral line strongly arched anteriorly, with junction of curved and straight parts below vertical from fourth or fifth spine of dorsal fin**; chord of curved part of lateral line contained 3.6 to 4.7 times in straight part (to caudal-fin base); scales in curved part of lateral line 21 to 28; straight part with **51 to 59 very large scutes**. Breast naked ventrally and laterally in a triangular area for about one third distance to pectoral-fin base. Vertebrae 10+14. **Colour:** head and body bluish grey to green dorsally, sides and belly silvery; large black opercular spot; dorsal and anal fins pale to yellow, distally dusky; pectoral and pelvic fins pale, with upper half dusky; caudal fin dark, especially leading and trailing edges of fin.

Size: Maximum reported total length 80 cm; commonly attains 30 to 40 cm total length and 3 to 4 kg.

Habitat, biology, and fisheries: A pelagic, schooling species. Feeds primarily on other fishes. Caught on hook-and-line, with beach seines, trawls, purse seines, and traps.

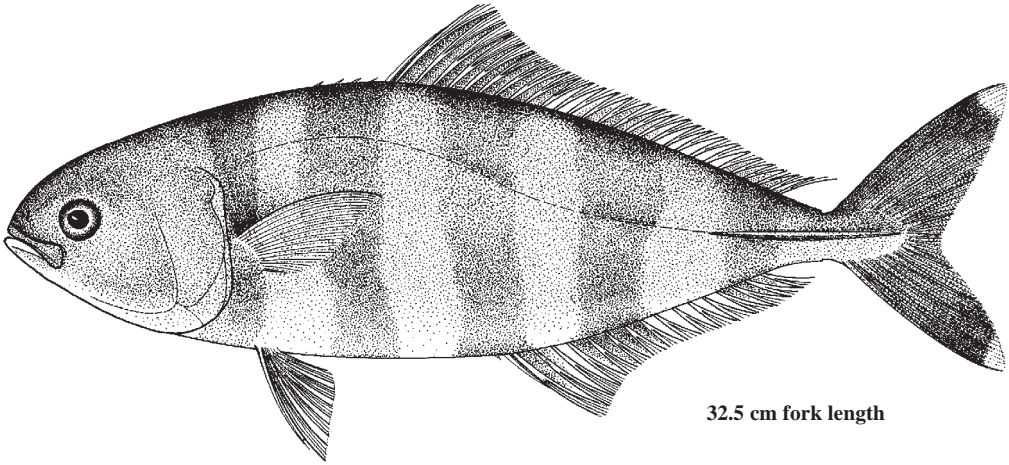
Distribution: Broadly distributed throughout the Indian Ocean; elsewhere in the Indo-West Pacific from Japan to Australia and eastward to Fiji. Records of the species from Hawaii are erroneous.



Naukrates ductor (Linnaeus, 1758)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Pilotfish; **Fr** - Poisson pilote; **Sp** - Pez piloto.



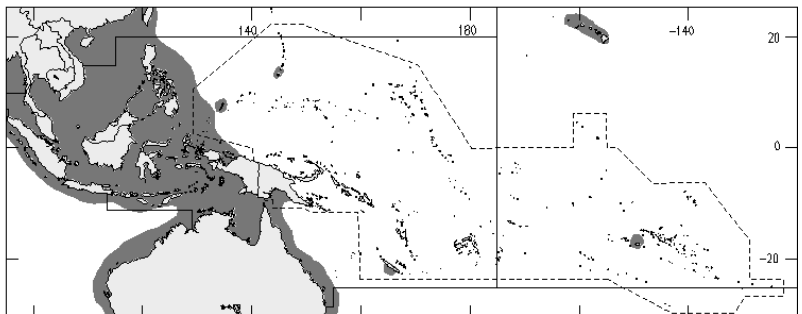
32.5 cm fork length

Diagnostic characters: Body elongate, shallow and barely compressed, with nearly equal upper and lower profiles, but head profile tapering sharply above anterior half of upper jaw to produce a nearly blunt snout. **Upper jaw very narrow, posteriorly and extending to about below anterior margin of eye.** Teeth minute, in a band in upper and lower jaws. Gill rakers (including rudiments) 6 or 7 on upper limb and 15 to 20 on lower limb of first gill arch (total 21 to 27). **Dorsal fin with IV or V spines** (first spine minute and/or last spine may be reduced and embedded in fish larger than 20 cm fork length), followed by I spine and 25 to 29 soft rays; **anal fin with II spines slightly separated from rest of fin** (first spine may be reduced and embedded) followed by I spine and 15 to 17 soft rays; second dorsal-fin lobe short, contained 7.1 to 8.2 times in in fork length; anal-fin base short, contained 1.6 to 1.9 times in second dorsal-fin base. No scutes; **caudal peduncle with a well-developed lateral, fleshy keel on each side and dorsal and ventral peduncle grooves.** Vertebrae 10+15. **Colour:** in live fish, 6 or 7 black bands against a light silvery background, but there also is a transient coloration (possibly aggressive display) with bands disappearing and most of fish silvery white with 3 broad blue patches in tandem across back; in fresh or preserved specimens, head dark, 5 or 6 dark, broad body bands and a similar band at end of caudal peduncle, bands 3 to 6 extending through soft dorsal- and anal-fin membranes, and the bands persistent at all sizes; rest of body bluish (fresh) or light to dusky; **white tips prominent on upper and lower lobes of caudal fin, and smaller white tips on anterior lobes of second dorsal and anal fins;** fins otherwise dusky to dark.

Size: Maximum size 63 cm fork length and 70 cm total length; commonly to 35 cm fork length; weight 0.5 kg at 33 cm fork length.

Habitat, biology, and fisheries: Primarily pelagic in oceanic waters. This species has a semi-obligate relationship with large sharks, rays and other fishes, turtles, and flotsam. Juveniles are frequently found in association with jellyfish; the larvae are widespread in epipelagic oceanic waters. Maturity is reached by at least 23 cm fork length. Caught with pelagic trawls.

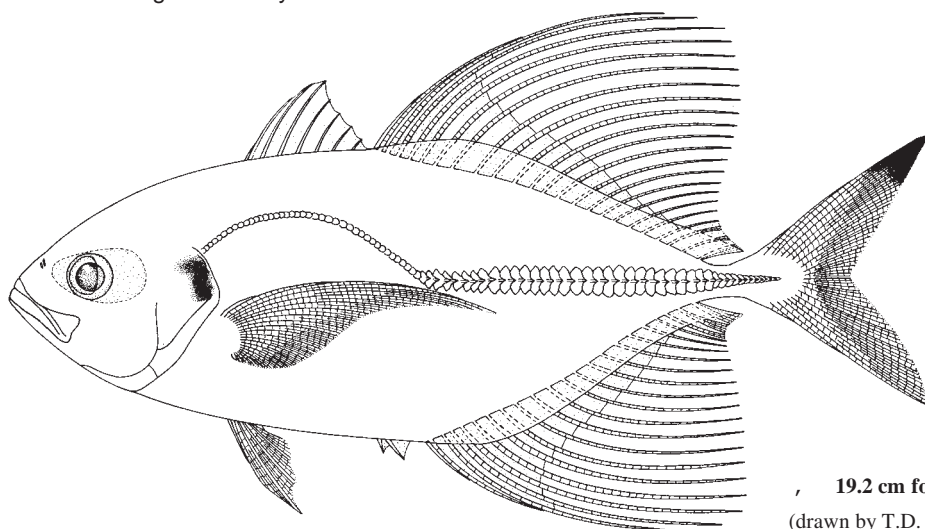
Distribution: Widespread circumtropical species.



***Pantolabus radiatus* (Macleay, 1881)**

Frequent synonyms / misidentifications: *Caranx radiatus* Macleay, 1881; *Absalom radiatus* (Macleay, 1881) / None.

FAO names: En - Fringefin trevally.



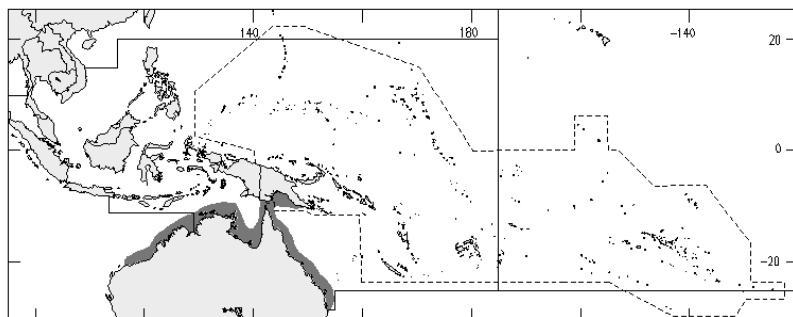
19.2 cm fork length
(drawn by T.D. Pedersen)

Diagnostic characters: Body elongate oval, compressed; dorsal and ventral profiles equally convex; snout pointed. Eye diameter about equal or larger than snout length, with **adipose eyelid well developed on posterior half of eye only**. Upper jaw extending to below middle of centre of pupil, and with posterior margin distinctly concave. **Upper jaw with an outer row of moderately enlarged conical teeth bordered by an inner band of small, sharply pointed teeth; lower jaw with a single row of moderately enlarged conical teeth, sometimes with a few inner teeth anteriorly**. Gill rakers (including rudiments) 11 to 13 on upper limb and 25 to 28 on lower limb of first gill arch (**total 36 to 41**). Two separate dorsal fins, the first with VIII spines, followed by I spine and 23 to 26 soft rays; anal fin with II detached spines followed by I spine and 18 to 20 soft rays; spinous dorsal fin relatively high, equal or subequal lobe of second dorsal fin in females; **second dorsal fin and anal fin with well-developed scaly basal sheaths; adult males with all soft dorsal- and anal-fin rays produced as filaments (females without filaments)**. Lateral line moderately arched anteriorly, with junction of curved and straight parts below a vertical from between fourth and sixth soft rays of second dorsal fin; chord of curved part of lateral line contained 1.6 to 2.2 times in straight part (to caudal-fin base); scales in curved part 33 to 41; straight part with 0 to 9 scales and 38 to 49 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 77 to 85. Breast completely scaly, except sometimes a small naked patch on ventral midline anteriorly. Vertebrae 10+14. **Colour:** olive-green to bluish green above, silvery to white below; black spot on operculum; spinous and soft dorsal fins, and anal fin orange-yellow; caudal fin pale to bright yellow with tip of upper lobe black; pelvic fins white and pectoral fins pale orange to hyaline.

Size: Largest specimen examined 21.5 cm fork length, 24.5 cm total length.

Habitat, biology, and fisheries: In northern Australia in coastal waters, sometimes entering river mouths, rarely found in depths exceeding 30 m. Diet consists primarily of epibenthic crustaceans. Caught mainly with bottom trawls.

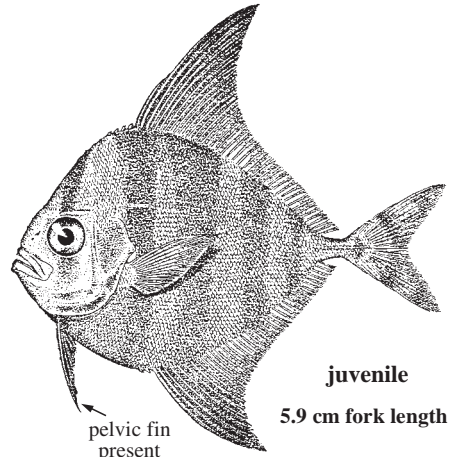
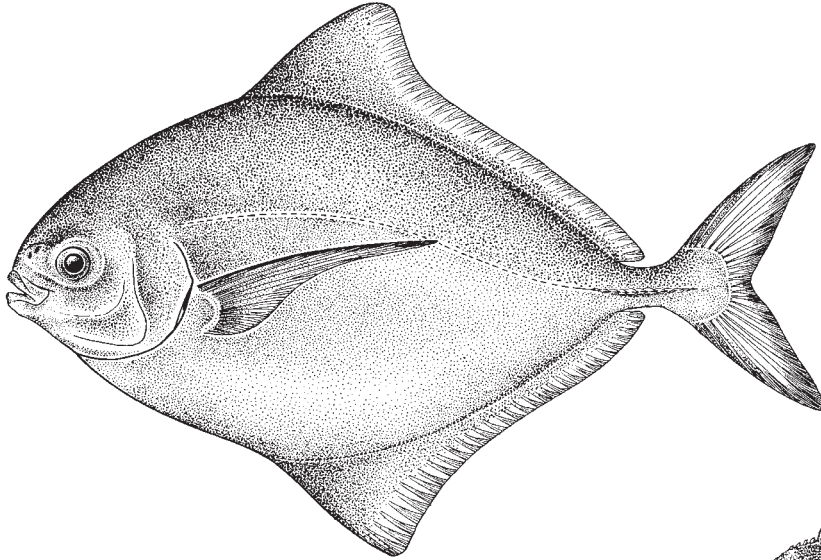
Distribution: Known only from Papua New Guinea and Australia: Port Headland, Western Australia (20°18'S) to Port Curtis, Queensland (23°55'S).



Parastromateus niger (Bloch, 1795)

Frequent synonyms / misidentifications: *Apolectus niger* (Bloch, 1795); *Formio niger* (Bloch, 1795); *Citula halli* Evermann and Seale, 1907/ None.

FAO names: En - Black pomfret; Fr - Castagnoline noire; Sp - Palometa negra.

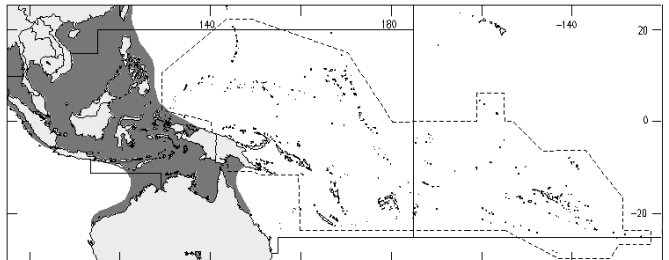


Diagnostic characters: Body deep and compressed; dorsal and ventral profiles of body strongly and equally convex. Mouth terminal with upper jaw unrestricted dorsally and ending below and slightly before anterior margin of eye. Both jaws with a single row of small conical teeth. Gill openings unrestricted laterally and ventrally. **Dorsal fin with VI or V short spines (embedded and not apparent in adults) followed by I spine and 41 and 44 soft rays;** anal fin with II spines (embedded and not apparent in adults) followed by I spine and 35 to 39 soft rays; **profile of second dorsal and anal fins nearly identical, with elevated, broadly rounded anterior lobes;** **pelvic fins absent in specimens larger than about 10 cm fork length, and in juveniles positioned distinctly anterior to a vertical line through pectoral-fin base;** pectoral fins long and falcate. Lateral line very weakly arched anteriorly, with junction of straight and curved parts below posterior third of dorsal fin; straight part of lateral line with 8 to 19 weak scutes, forming a slight keel on caudal peduncle; **scales small and deciduous, and almost completely covering dorsal and anal fins;** breast completely scaly. Vertebrae 10+14. **Colour:** in life, adults uniformly silvery grey to bluish brown (yellowish brown when deciduous scales missing); fins with dark edges; young with dark vertical bars and long black jugular pelvic fins.

Size: Maximum total length about 55 cm; commonly to 30 cm total length.

Habitat, biology, and fisheries: Generally near the bottom during the day, rising to near the surface at night. Often occurs in large schools, and not uncommonly observed swimming on their sides. Usually found in depths of 15 to 40 m, generally over muddy bottoms. Feeds on zooplankton. The principal gear used is gill nets, but boat seines and trawls also take black pomfrets.

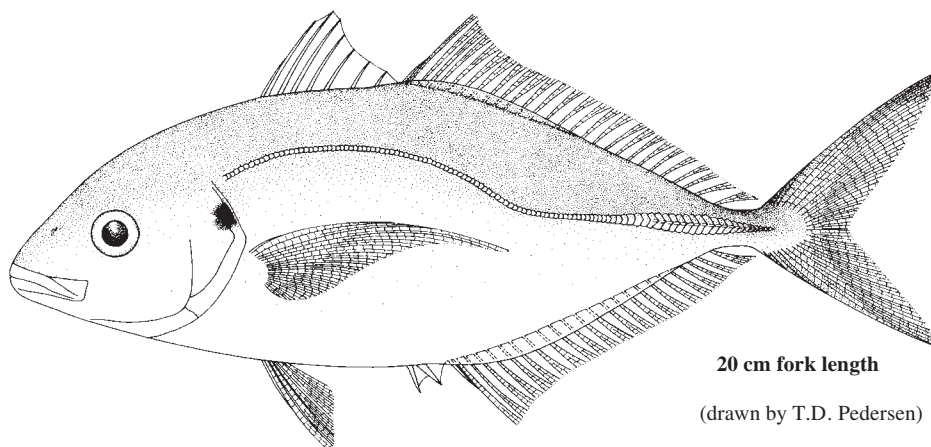
Distribution: Pelagic on the continental shelf from South Africa, Mozambique, Kenya, the Arabian Sea, Bay of Bengal, Indonesia, the Philippines, China, southern Japan, and Australia. Most abundant on the west coast of India and in Indonesia.



Pseudocaranx dentex (Bloch and Schneider, 1801)

Frequent synonyms / misidentifications: *Caranx dentex* (Bloch and Schneider, 1801); *C. georgianus* Cuvier, 1833; *Usacaranx georgianus* (Cuvier, 1833); *Caranx nobilis* Macleay, 1881; *C. cheilio* Snyder, 1904; *C. natalensis* Gilchrist and Thompson, 1911 / None.

FAO names: **En** - White trevally; **Fr** - Carangue dentue; **Sp** - Jurel dentón.



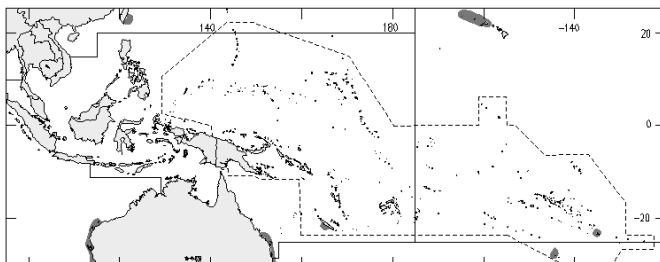
Diagnostic characters: Body elongate, moderately deep and compressed, with dorsal and ventral profiles similar. Eye relatively small with adipose eyelid poorly developed. Lips noticeably papillose and upper jaw projecting beyond lower in large adults; **end of upper jaw essentially vertical. Both jaws with a single row of blunt conical teeth, upper jaw sometimes with an inner series of conical teeth anteriorly. Gill rakers (including rudiments) 9 to 11 on upper limb and 20 to 24 on lower limb of first gill arch (total 29 to 35).** Two separate dorsal fins, the first with VIII spines, the second with I spine and 24 to 28 soft rays; anal fin with II detached spines followed by I spine and 20 to 24 soft rays; terminal dorsal and anal-fin rays enlarged and a little separated from adjacent rays but not detached; spinous dorsal fin high, longest spine height slightly longer than length of soft dorsal-fin lobe. Lateral line with a weak and extended anterior arch, with junction of curved and straight parts of lateral line below vertical from twelfth to fourteenth soft rays of second dorsal fin; chord of curved part of lateral line contained 0.6 to 0.85 times in straight part (to caudal-fin base); **curved part of lateral line with 57 to 78 scales;** straight part of lateral line with 2 to 27 anterior scales and 16 to 30 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 91 to 115; **no scales on preorbital bone below and in front of eye and on expanded part of maxilla; breast completely scaly.** Vertebrae 10+14-15. **Colour:** pale greenish to steely blue above, silvery below; a yellow stripe usually present along sides (wider posteriorly) and at bases of soft dorsal and anal fins; caudal fin and soft dorsal fins dusky yellow; **a diffuse black spot on upper margin of opercle.**

Size: Maximum fork length about 82 cm; commonly to 40 cm fork length; weight to 10.7 kg.

Habitat, biology, and fisheries: Found mainly on banks and shelf slope habitats at depths of 80 to 200 m throughout much of its range, but at some localities juveniles and occasionally adults may also frequent the shoreline. Fishes, molluscs, and crustaceans constitute the bulk of the diet of this opportunist bottom feeder. Caught mainly with bottom trawls.

Distribution: A broadly distributed, anti-tropical species. In the Indo-Pacific known from off South Africa, Japan, Australia, New Zealand, Rapa, Pitcairn, Hawaiian Archipelago, and Easter Island. Also occurs on both sides of the Atlantic Ocean (Bermuda, off North Carolina, southern Brazil, Azores, Madeira, Canary, Cape Verde, Ascension, and St. Helena islands) and in the Mediterranean Sea.

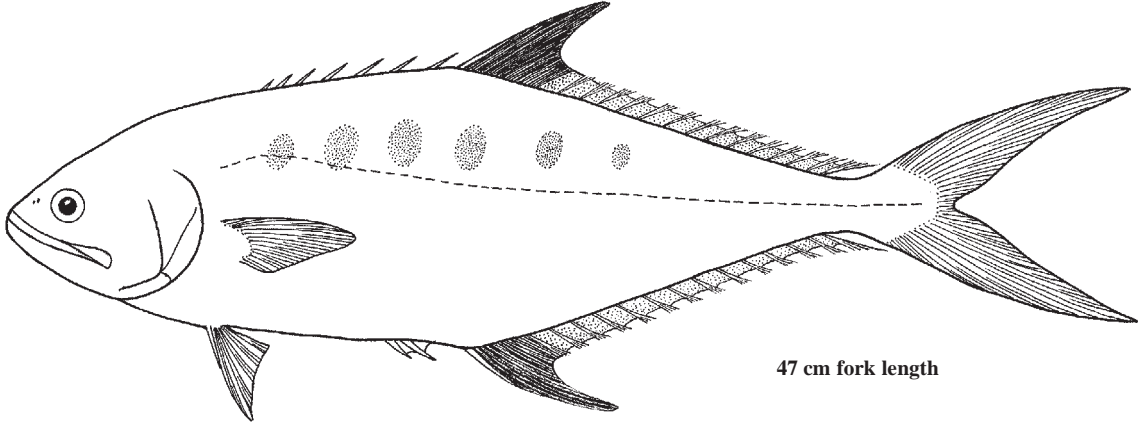
Remarks: *Pseudocaranx wrighti*, which is known only from western and southern Australia and thus outside the WCP area, is included in the key to species of *Pseudocaranx*. Australian fishery biologists need to be able to distinguish both of these species, which in the past have often been confused.



Scomberoides commersonnianus Lacepède, 1802

Frequent synonyms / misidentifications: *Chorinemus commersonnianus* (Lacepède, 1802) / The name *Scomberoides lysan* (Cuvier) had been generally misapplied to this species prior to Smith-Vaniz and Staiger's (1973, *Proc. Cal. Acad. Sci.*) revision of *Scomberoides*.

FAO names: **En** - Talang queenfish; **Fr** - Sauteur talang; **Sp** - Jurel saltador.



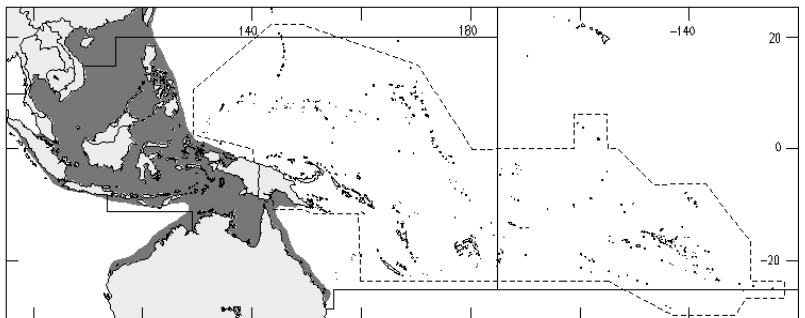
47 cm fork length

Diagnostic characters: Body oblong to elliptical, strongly compressed; ventral profiles similar, snout blunt with dorsal profile of head and scales on midbody nape slightly convex. Upper lip joined to snout at midline by a bridge of skin (frenum), except crossed by a shallow groove in very young. **Upper jaw extends well beyond posterior margin of eye in adults. Lower jaw with 2 rows of teeth separated by a shallow groove, adults with teeth in inner row about equal in size to those in outer row. Gill rakers (excluding rudiments) 0 to 3 on upper limb and 7 to 12 on lower limb of first gill arch (total 8 to 15).** Two separate dorsal fins, the first with VI or VII short spines, depressible into a shallow groove on dorsal midline, followed by I spine and 19 to 21 soft rays; anal fin with II detached spines followed by 16 to 19 soft rays; **posterior soft dorsal-and anal-fin rays consisting of semidetached finlets**, bases of anal and second dorsal fins about equal in length; height of second dorsal-fin lobe 14.4 to 19.8% of fork length in specimens larger than 15 cm fork length; pelvic fins about equal in length or shorter than pectoral fins. Lateral line only slightly irregular, weakly to moderately convex above pectoral fins, becoming straight posteriorly. No scutes; **scales on midbody below lateral line, partially embedded and broadly oblong. No caudal peduncle grooves. Vertebrae 10+16. Colour:** in life, head and body dusky green to bluish dorsally, grey to silvery below, large individuals often golden, especially ventrally; **sides of adults with 5 to 8 large, plumbeous blotches above or touching lateral line, first 2 may intersect lateral line;** dorsal and anal fins dusky to dark, uniformly pigmented; pectoral fins of adults frequently with a dusky blotch ventrally.

Size: Largest specimen examined 94 cm fork length; reported to attain 120 cm total length. African spearfishing record 14.4 kg.

Habitat, biology, and fisheries: Although periodically entering estuaries, generally intolerant of low salinities, and turbid water; swims in small groups and usually frequents reefs and offshore islands. As is true of all members of the genus, the spines of the first dorsal and anal fins are venomous (especially the latter) and capable of inflicting painful stings. Primarily a daytime feeder on fishes, cephalopods, and other pelagic prey; young use specialized juvenile dentition to aggressively remove scales and epidermal tissue from other fishes. Caught with drift set nets, gill nets, seines, and on hook-and-line.

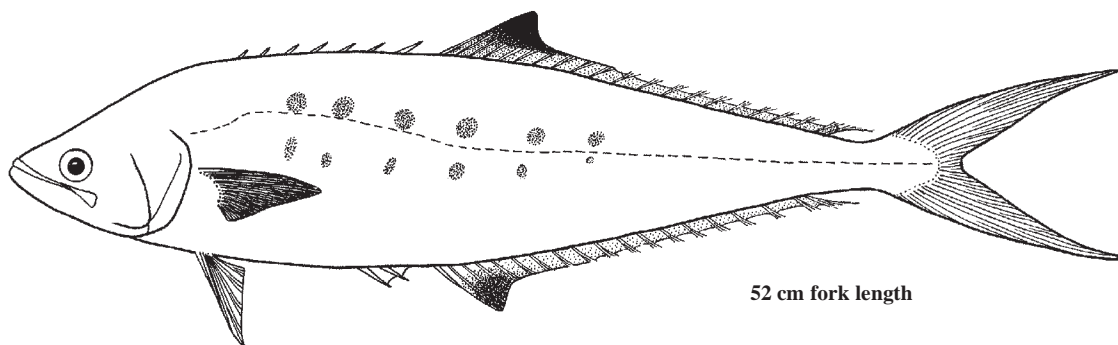
Distribution: Broadly distributed throughout the Indian Ocean; elsewhere in the Indo-West Pacific known from the Gulf of Thailand, Okinawa, Indonesia, the Philippines, Australia, and Papua New Guinea.



Scomberoides lysan (Forsskål, 1775)

Frequent synonyms / misidentifications: *Chorinemus sanctipetri* Cuvier, 1832; *C. orientalis* Temminck and Schlegel, 1844 / The name *Scomberoides lysan* (Cuvier) had been generally misapplied to *S. commersonianus* prior to Smith-Vaniz and Staiger's (1973, *Proc. Cal. Acad. Sci.*) revision of *Scomberoides*.

FAO names: En - Doublespotted queenfish; Fr - Sauteur sabre; Sp - Jurel sable.

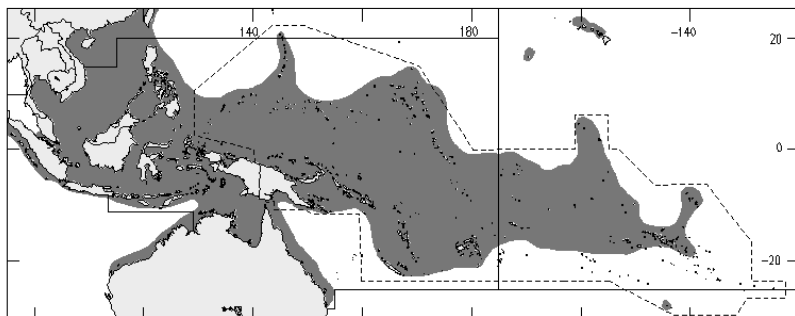


Diagnostic characters: Body oblong to elliptical, strongly compressed; dorsal and ventral profiles nearly equal, snout pointed with dorsal profile of head and nape slightly concave. Upper lip joined to snout at midline by a bridge of skin (frenum), except crossed by a shallow groove in very young. **Upper jaw extends to or slightly beyond posterior margin of eye in adults.** Lower jaw with 2 rows of teeth separated by a shallow groove, adults with teeth in inner row equal in size to those in outer row. **Gill rakers (excluding rudiments)** 3 to 8 on upper limb and 15 to 20 on lower limb of first gill arch (**total 21 to 27**). Two separate dorsal fins, the first with VI or VII short spines, depressible into a shallow groove on dorsal midline, followed by I spine and 19 to 21 soft rays; anal fin with II detached spines followed by 17 to 19 soft rays; **posterior soft dorsal- and anal-fin rays consisting of semidetached finets**, bases of anal and second dorsal fins about equal in length; height of second dorsal-fin lobe 9.1 to 14.2% of fork length in specimens larger than 15 cm fork length; pelvic fins about equal in length or shorter than pectoral fins. Lateral line only slightly irregular, weakly to moderately convex above pectoral fins becoming straight posteriorly. No scutes; **scales on midbody below lateral line partially embedded and sharply lanceolate.** No caudal peduncle grooves. Vertebrae 10+6. **Colour:** in life, body grey-green dorsally, silvery grey to midline and silvery white ventrally; **adults with a series of 6 to 8 dusky roundish blotches above and below lateral line, occasionally connected by narrow isthmus (blotches faint or absent in young); distal half of dorsal-fin lobe abruptly and heavily pigmented;** anal-fin lobe white or pale yellow, often interradiol membranes of several anterior rays black, especially in large individuals.

Size: Largest specimen examined 58.5 cm fork length.

Habitat, biology, and fisheries: Often travels in small schools and inhabits inshore waters from shallow lagoons to offshore areas from the surface to depths of 100 m. Reported to be attracted by hitting the surface of the water repeatedly in rapid succession. As a true of all members of the genus, the spines of the first dorsal and anal fins are venomous (especially the latter) and capable of inflicting painful stings. Feeds primarily on fishes and small crustaceans; young use specialized juvenenl dentition to aggressively remove scales and epidermal tissue from other fishes. Caught with drift set nets, gill nets, seines, and on hook-and-line.

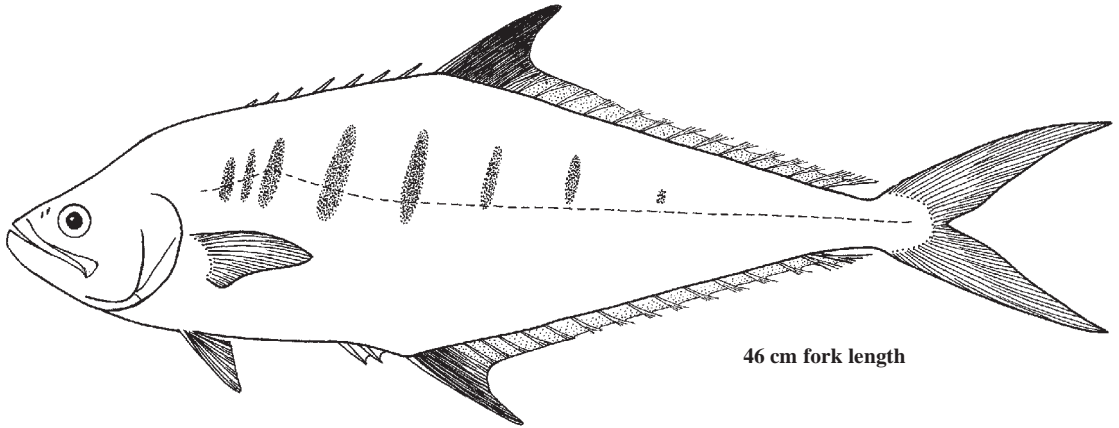
Distribution: Broadly distributed throughout the Indian ocean, except no confirmed records from the Persian Gulf; widespread elsewhere in the Indo-West Pacific, from Okinawa to Australia and eastward to Hawaii.



Scomberoides tala (Cuvier, 1832)

Frequent synonyms / misidentifications: *Chorinemus tala* Cuvier, 1832; *C. hainanensis* Chu and Cheng, 1958 / None.

FAO names: En - Barred queenfish; Fr - Sauteur carsia; Sp - Jurel carsia.



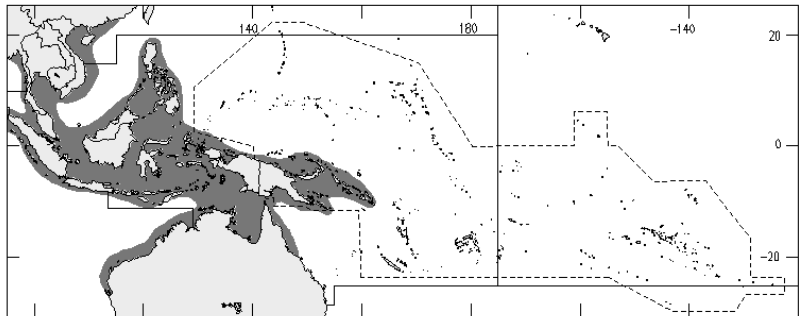
46 cm fork length

Diagnostic characters: Body oblong to elliptical, strongly compressed; snout and nuchal profile nearly straight. Upper lip joined to snout at midline by a bridge of skin (frenum), except crossed by a shallow groove in very young. **Upper jaw extends slightly beyond margin of eye in adults. Lower jaw with 2 rows of teeth separated by a shallow groove, adults with teeth in inner row distinctly larger than those in outer row. Gill rakers (excluding rudiments) 1 to 3 on upper limb and 7 to 11 on lower limb of first gill arch (total 11 to 15).** Two separate dorsal fins, the first with VI or VII short spines, depressible into a shallow groove on dorsal midline, followed by I spine and 19 to 21 soft rays; anal fin with II detached spines followed by 16 to 19 soft rays; **posterior soft dorsal-and anal-fin rays consisting of semidetached finlets;** bases of anal and second dorsal fins about equal in length; height of second dorsal-fin lobe 14.6 to 18% of fork length in specimens larger than 15 cm fork length; pelvic fins about equal in length or shorter than pectoral fins. Lateral line only slightly irregular, weakly to moderately convex above pectoral fins becoming straight posteriorly. No scutes; **scales on midbody below lateral line partially embedded and bluntly lanceolate.** No caudal peduncle grooves. Vertebrae 10+16. **Colour:** in life, head and body greenish grey dorsally, grey to silvery below; **sides of adults with 4 to 8 vertically elongate plumbeous blotches, most of which intersect lateral line;** dorsal and anal fins dusky to dark and uniformly pigmented; pectoral fins yellow and pelvic fins white in adults.

Size: Largest specimen examined 62 cm fork length.

Habitat, biology, and fisheries: An inshore species whose biology is poorly known. As is true of all members of the genus, the spines of the first dorsal and anal fins are venomous (especially the latter) and capable of inflicting painful stings. Adults feed primarily on other fishes. Caught with drift set nets, gill nets, seines, and on hook-and-line.

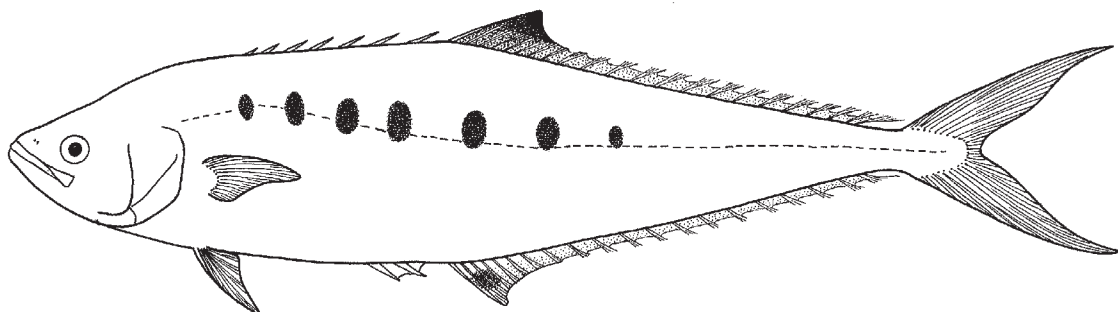
Distribution: In the Indian Ocean known only from Sri Lanka, but probably also occurs on the west coast of India. Elsewhere known from the east coast of India, Andaman Islands, Gulf of Thailand, Malaysia, Indonesia, the Philippines, Australia, and the Solomon Islands.



Scomberoides tol (Cuvier, 1832)

Frequent synonyms / misidentifications: *Chorinemus tol* Cuvier, 1832 / None.

FAO names: En - Needlescaled queenfish; Fr - Sauteur leurre; Sp - Jurel saltarín.



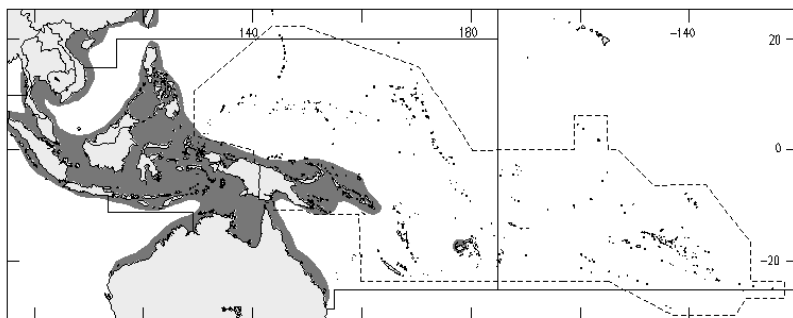
45 cm fork length

Diagnostic characters: Body oblong to elliptical, strongly compressed; dorsal and ventral profiles nearly equal, snout pointed with dorsal profile of head and nape slightly concave. Upper lip joined to snout at midline by a bridge of skin (frenum), except crossed by a shallow groove in very young. **Upper jaw extends to posterior margin of pupil in adults.** Lower jaw with 2 rows of teeth separated by a shallow groove, adults with teeth in inner row equal in size to those in outer row. **Gill rakers (excluding rudiments)** 4 to 7 on upper limb and 17 to 20 on lower limb of first gill arch (**total 21 to 26**). Two separate dorsal fins, the first with VI or VII short spines, depressible into a shallow groove on dorsal midline, followed by I spine and 19 to 21 soft rays; anal fin with II detached spines followed by 18 to 20 soft rays; **posterior soft dorsal-and anal-fin rays consisting of semidetached finlets**, bases of anal and second dorsal fins about equal in length; height of second dorsal-fin lobe 7.7 to 11.2% of fork length in specimens larger than 15 cm fork length; pelvic fins about equal in length or shorter than pectoral fins. Lateral line only slightly irregular, weakly to moderately convex above pectoral fins becoming straight posteriorly. No scutes; **scales on midbody below lateral line partially embedded, slender and needle-like.** No caudal peduncle grooves. Vertebrae 10+6. **Colour:** in life, body bluish dorsally, white ventrally; **adults with 5 to 8 oval or vertically oblong black blotches, the first 4 or 5 of which intersect lateral line (blotches faint or absent in young); distal half of dorsal-fin lobe abruptly and heavily pigmented; anal-fin lobe usually immaculate, white in life.**

Size: Largest specimen examined 47 cm fork length.

Habitat, biology, and fisheries: Usually found in small schools near the surface in coastal waters. As is true of all members of the genus, the spines of the first dorsal and anal fins are venomous (especially the latter) and capable of inflicting painful stings. Feeds primarily on fishes; young use specialized juvenile dentition to aggressively remove scales and epidermal tissue from other fishes. Caught with drift set nets, gill nets, and seines.

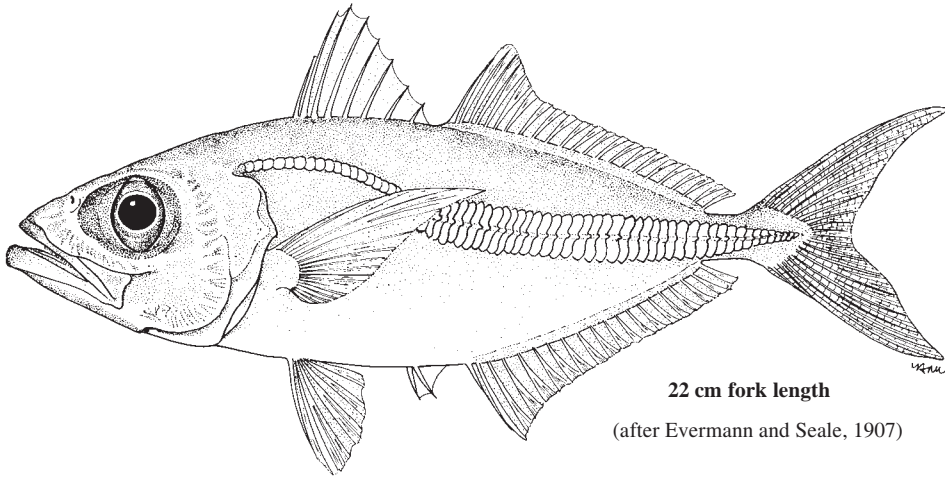
Distribution: Broadly distributed throughout most of the Indian and western Pacific oceans, from Japan to Australia, and eastward to Fiji.



***Selar boops* (Cuvier, 1833)**

Frequent synonyms / misidentifications: None / None.

FAO names: En - Oxeye scad; Fr - S elar oeil de boeuf; Sp - Chicharro ojo buey.



22 cm fork length

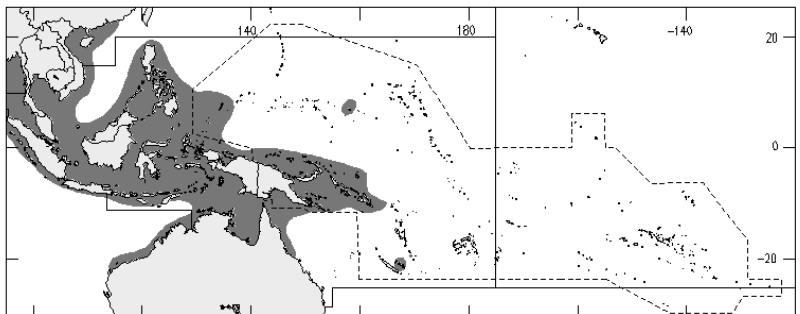
(after Evermann and Seale, 1907)

Diagnostic characters: Body elongate and moderately compressed, with lower profile slightly more convex than upper. **Eye very large, shorter than snout length and with a well developed adipose eyelid completely covering eye except for a vertical slit centred on pupil.** Upper jaw moderately broad posteriorly and extending to below anterior margin of pupil. Teeth small and recurved, upper jaw with a narrow band, tapering posteriorly; lower jaw with an irregular single row. Gill rakers (including rudiments) 8 to 12 on upper limb and 25 to 29 on lower limb of first gill arch. **Shoulder girdle (cleithrum) margin with a deep furrow, a large papilla immediately above it and a smaller papilla near upper edge.** Dorsal fin with VIII spines, followed by I spine and 23 to 25 soft rays; anal fin with II spines separated from rest of fin, followed by I spine and 19 to 21 soft rays; **dorsal and anal fins without a detached terminal finlet;** pectoral fins shorter than head. Scales moderately small and cycloid (smooth to touch), covering body except for a small area behind pectoral fins, **scutes relatively large,** maximum height contained 1.3 to 1.6 times in eye diameter; **chord of the curved part of lateral line contained 2.1 to 3 times in straight part** (to caudal-fin base); **scales in curved part of lateral line 21 to 24;** 0 to 4 scutes in curved part; straight part with no anterior scales and 37 to 46 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 62 to 69. Vertebrae 10+14. **Colour:** in fresh fish, upper third of body and top of head bluish green to green; lower two-thirds of body and head silvery or whitish; **a narrow, yellowish stripe may be present from edge of opercle to upper part of caudal peduncle;** blackish areas above and below pupil with a reddish area sometimes present; a small elongated, blackish opercular spot on edge near upper margin; first dorsal fin dusky on margins with rest of fin clear; second dorsal, anal, and caudal fins pale green with dusky margins; pectoral fins pale green to hyaline; pelvic fins white.

Size: Maximum length reported 26 cm total length; attains at least 24 cm fork length.

Habitat, biology, and fisheries: Co-occurs with *Selar crumenophthalmus* on continental shelf waters of northern Australia where common between 20 and 100 m; also one confirmed record from off Portugal where trawled in 366 to 439 m. Feeds primarily on planktonic or benthic invertebrates, including shrimps, crabs, and foraminifers; also on fishes. Caught on hook-and-line, with beach seines, trawls, purse seines, and traps.

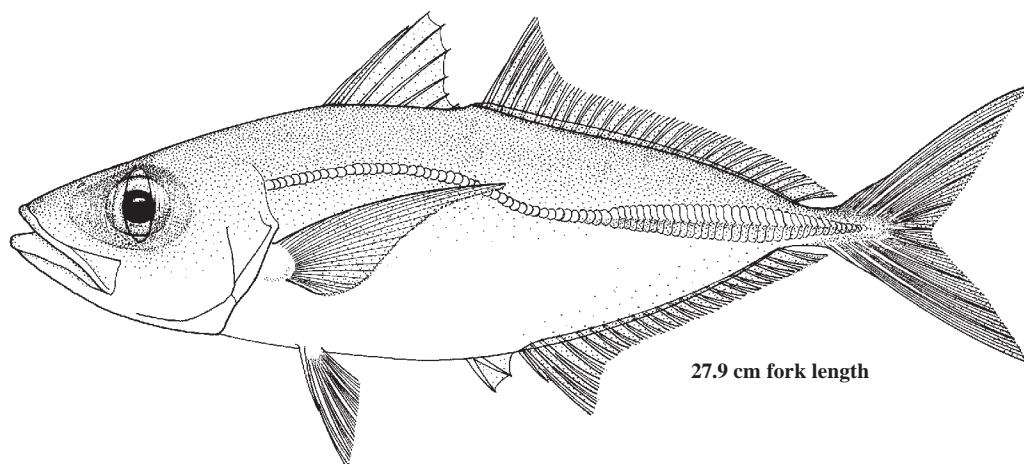
Distribution: Restricted to the Indo-West Pacific except for one confirmed record from Sezimbra Bay, Portugal; elsewhere recorded from the Philippines, Palau, Indonesia, and northern Australia.



Selar crumenophthalmus (Bloch, 1793)

Frequent synonyms / misidentifications: *Trachurops crumenophthalmus* (Bloch, 1793) / None.

FAO names: En - Bigeye scad; Fr - S lar coulissou; Sp - Chicharro oj n.

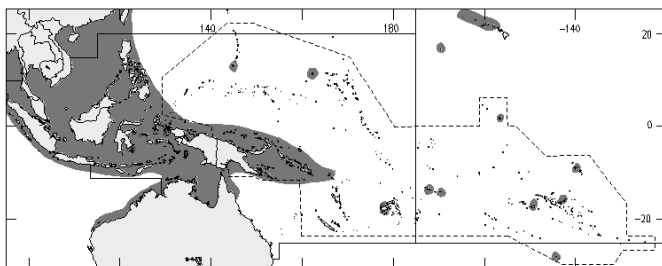


Diagnostic characters: Body elongate and moderately compressed, with lower profile slightly more convex than upper. **Eye very large, shorter than snout length and with a well-developed adipose eyelid completely covering eye except for a vertical slit centred on pupil.** Upper jaw moderately broad posteriorly and extending to below anterior margin of pupil. Teeth small and recurved, upper jaw with a narrow band, tapering posteriorly; lower jaw with an irregular single row. Gill rakers (including rudiments) 9 to 12 on upper limb and 27 to 31 on lower limb of first gill arch. **Shoulder girdle (cleithrum) margin with a deep furrow, a large papilla immediately above it and a smaller papilla near upper edge.** Dorsal fin with VIII spines, followed by I spine and 24 to 27 soft rays; anal fin with II spines separated from rest of fin, followed by I spine and 21 to 23 soft rays; **dorsal and anal fins without a detached terminal finlet;** pectoral fins shorter than head. Scales moderately small and cycloid (smooth to touch), covering body except for a small area behind pectoral fins, **scutes relatively small,** maximum height contained 2.1 to 2.9 times in eye diameter; **chord of the curved part of lateral line contained 0.7 to 1.2 times in straight part** (to caudal-fin base); **scales in curved part of lateral line 48 to 56;** 0 to 4 scutes in curved part; straight part with 0 to 11 anterior scales and 29 to 42 scutes; total scales and scutes in lateral line (excluding scales on caudal fin) 84 to 94. Vertebrae 10+14. **Colour:** in fresh fish, upper third of body and top of head metallic blue or bluish green; tip of snout dusky or blackish; lower two-thirds of body and head silvery or whitish; **a narrow, yellowish stripe may be present from edge of opercle to upper part of caudal peduncle;** blackish areas above and below pupil with a reddish area sometimes present; a small elongated, blackish opercular spot on edge near upper margin; first dorsal fin dusky on margins with rest of fin clear; second dorsal fin dusky over most of fin with dorsal lobe blackish; anal fin clear or slightly dusky along base; caudal fin dusky with tip of upper lobe dark; pectoral fins clear or slightly dusky near base and with a yellowish tint sometimes present; pelvic fins clear.

Size: Maximum length not well established, but unverified report of 60 cm standard length; documented record of 27 cm standard length; commonly to about 24 cm fork length and 0.23 kg.

Habitat, biology, and fisheries: Found in small to large schools, mainly inshore or in shallow water; at times over shallow reefs and in turbid water, but ranging in depth to about 170 m. Feeds primarily on planktonic or benthic invertebrates, including shrimps, crabs, and foraminifers; also on fishes. Caught on hook-and-line, with beach seines, trawls, purse seines, and traps.

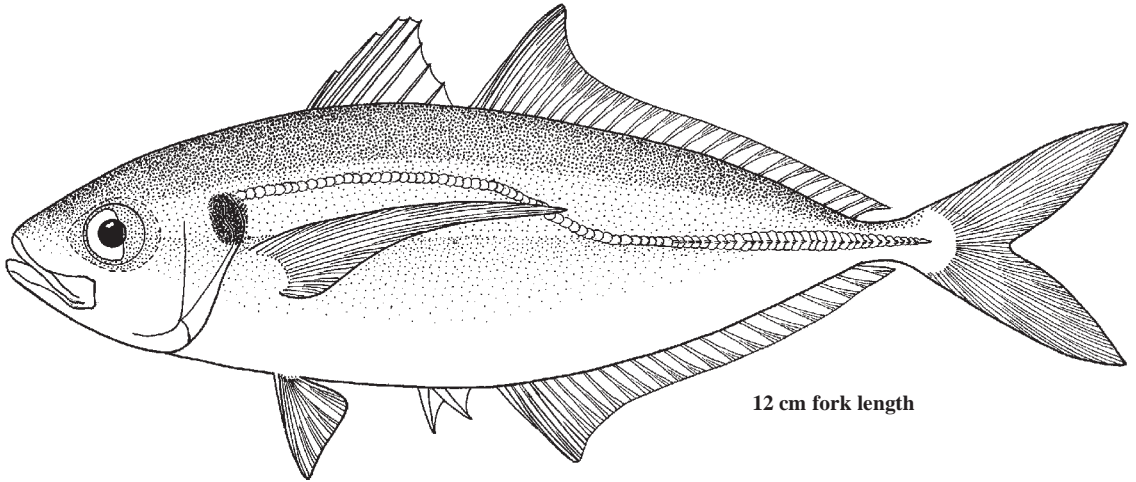
Distribution: Worldwide in tropical and subtropical marine waters; broadly distributed throughout the Indo-West Pacific from Japan to Australia and eastward to Hawaii where an important commercial species.



Selaroides leptolepis (Cuvier, 1833)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Yellowstripe scad; **Fr** - Sélar à bande dorée; **Sp** - Chicharro banda dorada.

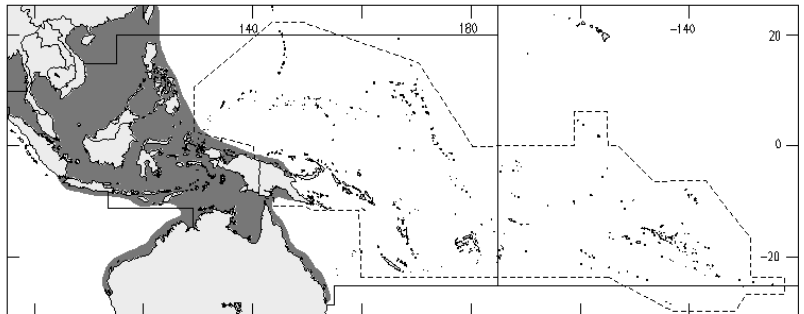


Diagnostic characters: Body elongate, oblong and compressed; dorsal and ventral profiles equally convex. Eye diameter about equal to slightly smaller than snout length, with **adipose eyelid moderately developed on posterior half of eye**. **Upper jaw strongly protractile with posterior end of jaw concave above, concave and produced below**. Upper jaw without teeth; lower jaw with a series of minute teeth. Gill rakers (including rudiments) 10 to 14 on upper limb and 27 to 32 on lower limb of first gill arch (total 40 to 46). **Shoulder girdle (cleithrum) margin smooth, without papillae**. Two separate dorsal fins, the first with VIII spines, the second with I spine and 24 to 26 soft rays; anal fin with II detached spines followed by I spine and 21 to 23 soft rays; spinous dorsal fin moderately high, longest spine height about equal length of soft dorsal-fin lobe. Lateral line anteriorly with a moderate regular arch, with junction of curved and straight parts below vertical from tenth to twelfth soft rays of second dorsal fin; chord of curved part of lateral line longer than straight part of lateral line, contained 0.6 to 0.8 times in straight part; straight part of lateral line with 13 to 25 scales followed by 24 to 29 relatively small scutes. Breast completely scaly. Vertebrae 10+14. **Colour:** in life, **metallic blue above, silvery white below, with a broad yellow stripe from upper margin of eye to caudal peduncle; prominent black opercular spot encroaching onto shoulder**; dorsal, anal, and caudal fins pale to dusky yellow; pelvic fins white.

Size: A small species, largest specimens examined 18.5 cm fork length.

Habitat, biology, and fisheries: Occurs in large demersal schools over soft bottom habitats at depths shallower than 50 m. Females attain sexual maturity by about 11 cm fork length. Ostracods, gastropods, and euphausiids are common prey but it also feeds on small fishes. Reported to feed at night. Caught with seines and bottom trawls; also with traps and gill nets.

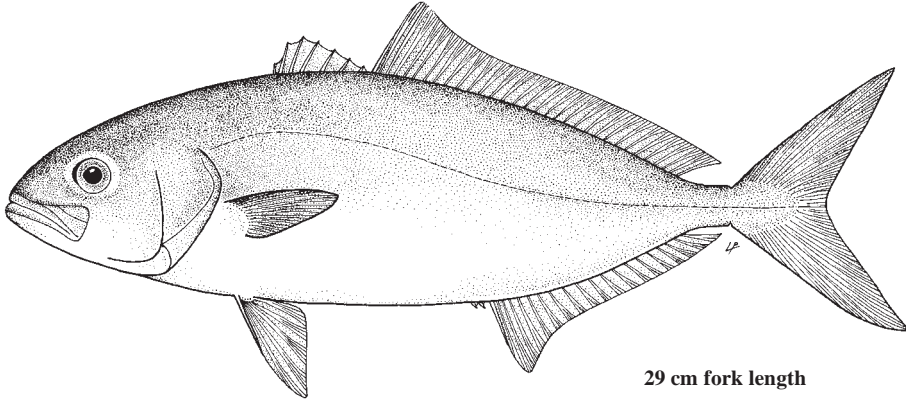
Distribution: In the Indian Ocean confined to coastal waters from the Persian Gulf to the Bay of Bengal; elsewhere in the Indo-West Pacific known from the Gulf of Thailand, Okinawa, Japan, the Philippines, Indonesia, and Australia.



Seriola dumerili (Risso, 1810)

Frequent synonyms / misidentifications: Australia: *Seriola simplex* Ramsey and Ogilby, 1886; Japan: *S. purpurescens* Temminck and Schlegel, 1844; Indonesia: *S. tapeinometapon* Bleeker, 1853 / None.

FAO names: En - Greater amberjack; Fr - Sériele couronnée; Sp - Medregal coronado.

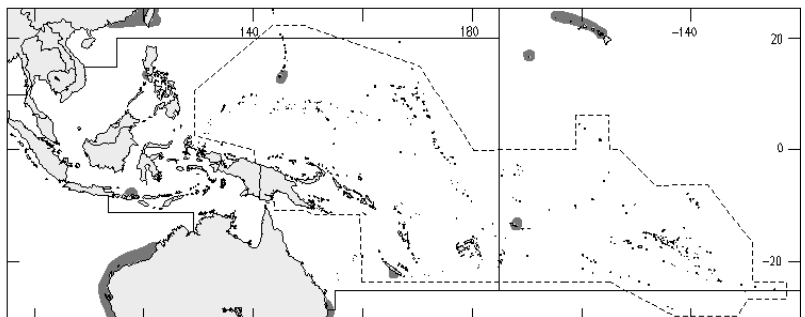


Diagnostic characters: Body elongate, moderately shallow and slightly compressed, with upper profile slightly more convex than lower. **Upper jaw very broad posteriorly (with very broad supramaxilla), and extending to below posterior margin of pupil.** Teeth minute, in a broad band in both jaws. **Gill rakers (excluding rudiments) decreasing in number with growth, 5 or 6 on upper limb, 15 or 16 on lower limb, and 20 to 24 total on first gill arch at sizes 2 to 7 cm fork length; in specimens larger than about 20 cm fork length, total gill rakers 11 to 19.** **Dorsal fin with VII spines (first spine minute or missing in large fish), followed by I spine and 29 to 35 soft rays; anal fin with II detached spines (these spines reduced or completely embedded in large fish), followed by I spine and 18 to 22 soft rays;** in adults, length of dorsal-fin lobe about equal to, or slightly longer than, pectoral fins and 13 to 18% of fork length; anal-fin base contained 1.4 to 1.7 times in second dorsal-fin base; pelvic fins longer than pectoral fins. No scutes; **caudal peduncle with dorsal and ventral grooves present.** First pterygiophore of anal fin moderately curved in specimens larger than about 10 cm fork length. Vertebrae 10+14. **Colour:** bluish grey or olivaceous above, sides and belly silvery white, sometimes brownish or with a pinkish tinge; usually a darker nuchal bar through eye to dorsal-fin origin; often an amber stripe from eye along middle of body; caudal fin dark or dusky with a lighter narrow posterior margin, extreme tip of lower caudal-fin lobe sometimes light or white; small juveniles (2 to 17 cm fork length) with a prominent dark nuchal bar extending from eye to dorsal-fin origin; 5 dark body bars, becoming irregularly split vertically, that do not extend into the membranes of the second dorsal and anal fins, and a sixth bar at end of caudal peduncle; **papillae surrounding broad bands of teeth in both jaws not engorged with blood, appearance of teeth white.**

Size: Maximum total length 188 cm; weight to 80.6 kg. Verified angling record of 150 cm fork length and 67.6 kg; commonly to 100 cm fork length and 15 kg.

Habitat, biology, and fisheries: Occurs both epibenthically and pelagically. Smaller fish (less than 3 kg) may be taken in shallow water (less than 10 m). Larger fish usually occur in 18 to 72 m and have been taken as deep as 360 m; they are often found on reefs or at deep offshore holes or drop-offs, usually in small or moderate-sized schools, but may be solitary. In some areas large individuals have reported to cause cases of ciguatera when eaten. Small juveniles associate with floating plants or debris in oceanic and offshore neritic waters. Known to feed primarily on fishes and also invertebrates, and to take live, dead, and artificial bait. Caught with pelagic and bottom trawls, as well as on hook-and-line.

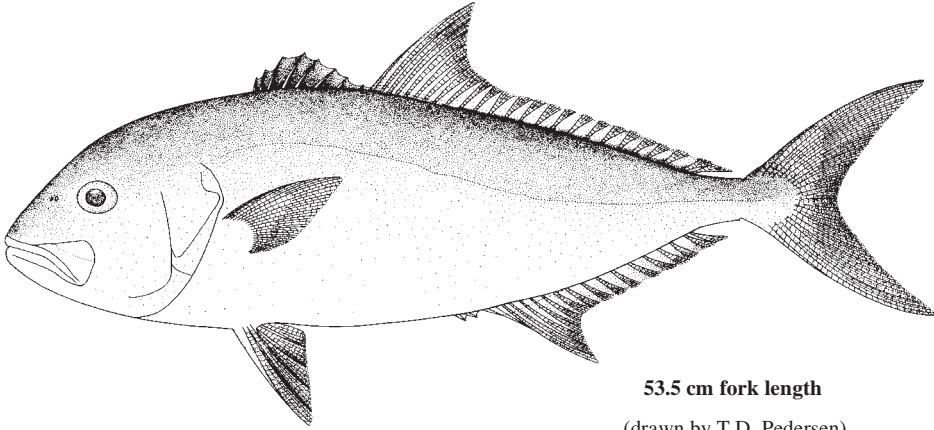
Distribution: In the Indo-West Pacific known from Japan, Australia, Johnston Island, and Hawaii. Also known from the Indian Ocean, both sides of the Atlantic Ocean, and the Mediterranean Sea; absent from the eastern Pacific Ocean.



***Seriola hippos* Günther, 1876**

Frequent synonyms / misidentifications: None / None.

FAO names: En - Samson fish.



53.5 cm fork length

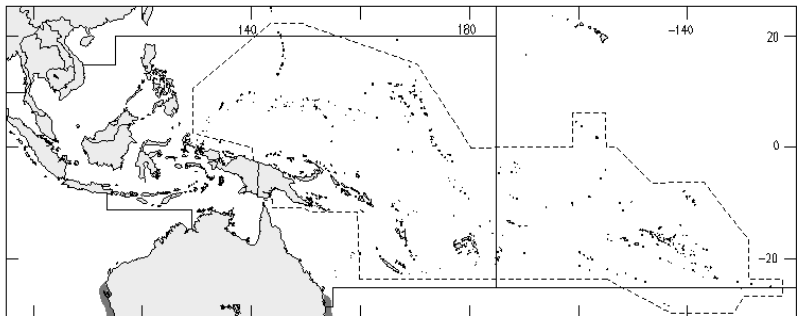
(drawn by T.D. Pedersen)

Diagnostic characters: Body elongate, moderately shallow and slightly compressed, with upper profile slightly more convex than lower; juveniles with very blunt head, becoming less pronounced with age. **Upper jaw very broad posteriorly (with very broad supramaxilla), extending to below posterior margin of pupil.** Teeth minute, in a broad band in both jaws. **Gill rakers (excluding rudiments) decreasing in number with growth,** 2 to 5 on upper limb, 9 to 12 on lower limb, and 11 to 17 total on first gill arch at sizes 2 to 7 cm fork length; **in specimens larger than about 20 cm fork length, total gill rakers (excluding rudiments) 10 to 12.** **Dorsal fin with VIII spines** (first spine minute or missing in large fish), followed by I spine and **22 to 25 soft rays**; **anal fin with II detached spines** (these spines reduced or completely embedded in large fish), followed by I spine and **15 to 17 soft rays**; in adults, length of dorsal-fin lobe about equal to, or slightly longer than, pectoral fins and 14 to 18% of fork length; anal-fin base contained 1.6 to 1.7 times in second dorsal-fin base; pelvic fins longer than pectoral fins. No scutes; **caudal peduncle with dorsal and ventral grooves present.** First pterygiophore of anal fin moderately curved in specimens larger than about 10 cm fork length. Vertebrae 10+14. **Colour:** in fresh adults, generally silvery to bluish green above, sides and belly silvery white, on death changing to brownish, paler below; an amber stripe from eye along middle of body may be present or absent; spinous and second dorsal fins dusky to dark, and anal and caudal fins generally dark; juveniles with 5 broad, dark bands on body and a dark blotch on head above and behind eye; **papillae surrounding broad bands of teeth in both jaws often engorged with blood giving teeth a red appearance.**

Size: Maximum total length 173 cm; weight to 53 kg.

Habitat, biology, and fisheries: Occurs in small schools or pairs around rocky reefs or wrecks in depths to 70 m. Feeds primarily on other fishes. It is an especially inquisitive fish and will frequently follow another hooked fish to the side of the boat. An excellent sport fish mainly caught by anglers using handlines or strong rods.

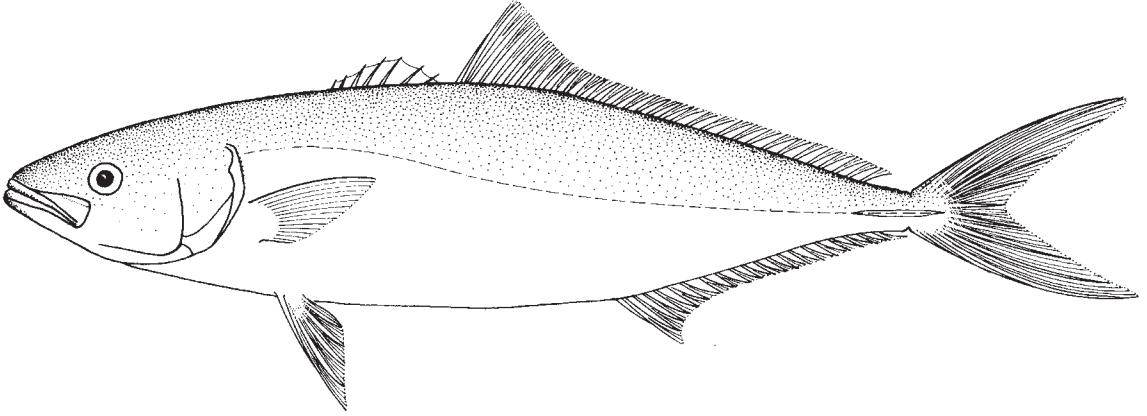
Distribution: A temperate species known from the southern half of Australia, Shark Bay, Western Australia (25°21'S) to Moreton Bay, Queensland (27°39'S), Norfolk Island, and northern New Zealand.



Seriola lalandi Valenciennes, 1833

Frequent synonyms / misidentifications: South Africa: *Seriola pappei* (Castelnau, 1861) and *S. banisteri* Smith, 1959; Japan: *S. auerovittata* Temminck and Schlegel, 1844; Australia: *S. grandis* Castelnau, 1872; eastern Pacific: *S. dorsalis* (Gill, 1864) / None.

FAO names: **En** - Yellowtail amberjack; **Fr** - Sériele chicard; **Sp** - Medregal rabo amarillo.

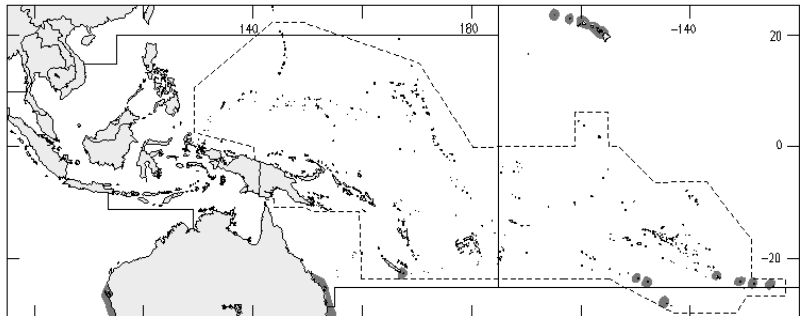


Diagnostic characters: Body elongate, moderately slender and slightly compressed, with upper and lower profiles similar. **Upper jaw moderately slender posteriorly (with moderately slender supramaxilla), extending to below about anterior margin of pupil.** Teeth minute, in a broad band in both jaws. Gill rakers (excluding rudiments) 7 to 10 on upper limb and 15 to 20 on lower limb of first gill arch (total 22 to 29). Dorsal fin with VII spines (first spine minute or missing in large fish), followed by I spine and 30 to 35 soft rays; anal fin with II detached spines (these spines reduced or completely embedded in large fish), followed by I spine and 19 to 22 soft rays; **in adults, length of dorsal-fin lobe subequal or slightly shorter than pectoral fins** and 11 to 13.4% of fork length, anal-fin base contained 1.6 to 1.8 times in second dorsal-fin base; pelvic fins longer than pectoral fins. No scutes; **caudal peduncle with a slight lateral fleshy keel on each side**, and dorsal and ventral grooves present. First pterygiophore of anal fin moderately curved in specimens larger than about 10 cm fork length. **Vertebrae 11+14.** **Colour:** usually blue to olivaceous above, sides and belly silver to white, sometimes with a rosy tinge; a narrow bronze stripe from snout extending through eye and along midside of body, darker on head, becoming yellow posteriorly; spinous dorsal fin dusky; second dorsal fin and anal fin dusky olive basally, yellow distally; **caudal fin olivaceous yellow, pectoral and pelvic fins yellowish;** juveniles (to about 20 cm fork length) with many irregular dusky body bars, slightly wider than paler interspaces that do not extend into the membranes of the second dorsal and anal fins.

Size: Maximum size not well established but known to attain at least 150 cm fork length and 50 kg. If *Seriola banisteri* is conspecific, as believed, then the maximum verified size is 193 cm total length and 58.4 kg.

Habitat, biology, and fisheries: Congregates in large offshore shoals in depths of 50 m, but occasional fish will venture into surf zones in pursuit of prey. Feeds primarily on small fishes and squids. An excellent sport fish. Caught with seines, bottom trawls, and on hook-and-line.

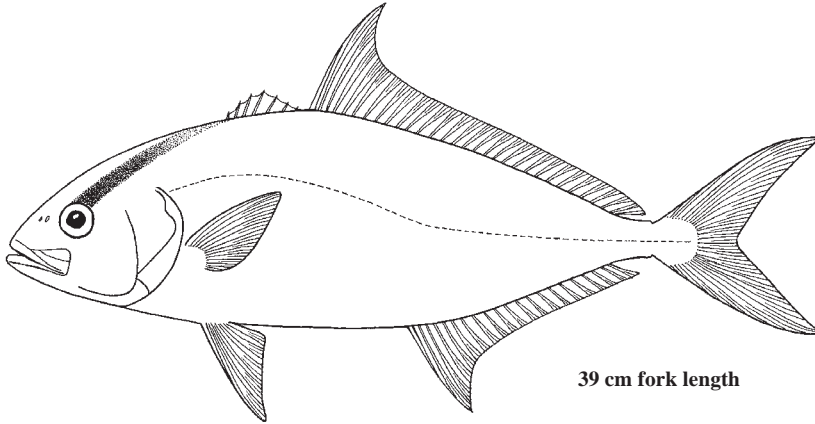
Distribution: A circumglobal species restricted to subtropical waters, and consisting of a series of apparently disjunct populations, many of which until recently were considered to represent distinct species. In the Indo-Pacific known from South Africa, Walters Shoals, Amsterdam Island, Japan, Australia, New Zealand, New Caledonia, Rapa, Pitcairn Island, Easter Island, and Hawaii.



Seriola rivoliana Valenciennes, 1833

Frequent synonyms / misidentifications: South Africa: *Seriola songoro* Smith, 1959; Mozambique: *S. bovinoculata* Smith, 1959; eastern Pacific: *S. colburni* Evermann and Clark, 1928; western Atlantic: *S. falcata* Cuvier, 1833 / None.

FAO names: En - Almaco jack; Fr - Sériole limon; Sp - Medregal limón.



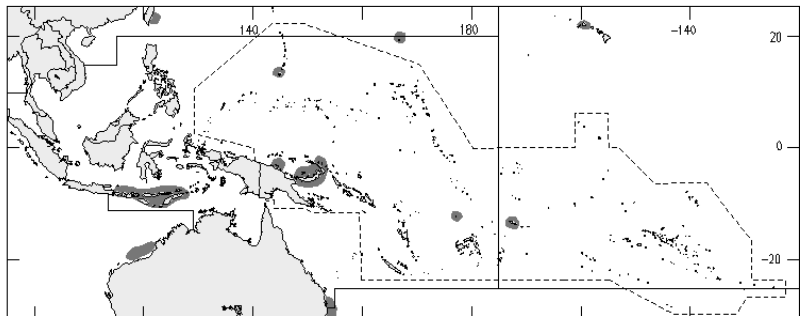
39 cm fork length

Diagnostic characters: Body elongate, moderately deep and slightly compressed, with upper profile more convex than lower. **Upper jaw very broad posteriorly (with very broad supramaxilla), extending to below posterior midpoint of pupil.** Teeth minute in a broad band in both jaws. **Gill rakers (excluding rudiments) decreasing slightly in number with growth, 6 to 9 on upper limb, 18 to 20 on lower limb, and 24 to 29 total on first gill arch at sizes of 2 to 7 cm fork length; in specimens larger than about 20 cm fork length, total gill rakers 22 to 26.** Dorsal fin with VII spines (first spine minute or missing in large fish), followed by I spine and 27 to 33 soft rays; anal fin with II detached spines (these spines reduced or completely embedded in large fish), followed by I spine and 18 to 22 soft rays; in adults, **length of dorsal-fin lobe about 1.3 to 1.6 times longer than pectoral fins and 18 to 22% of fork length;** anal-fin base contained 1.5 to 1.6 times in second dorsal-fin base; pelvic fins longer than pectoral fins. No scutes; **caudal peduncle with dorsal and ventral grooves present. First pterygiophore of anal fin straight in specimens larger than about 10 cm fork length.** Vertebrae 10+14. **Colour:** brown or olivaceous to bluish green above, sides and belly lighter, sometimes with brassy or lavender reflections; the nuchal bar often persistent in adults, and a faint amber lateral stripe extending backward from eye frequently present; caudal fin dark with a lighter narrow posterior margin; juveniles (from 2 to 18 cm fork length) with a dark nuchal bar extending from the eye to the dorsal-fin origin; 6 dark body bars, each with a light narrow irregular area through their centre vertically, that do not extend into the membranes of the second dorsal and anal fins, and a seventh bar at the end of caudal peduncle; tip of anal fin white; pectoral, pelvic, and caudal fins dusky.

Size: Maximum weight 24 kg, data on maximum length not available. Verified angling record of 103 cm total length and 15.7 kg; commonly to 65 cm fork length and 4.6 kg.

Habitat, biology, and fisheries: Adults are pelagic and epibenthic, possibly more oceanic than other *Seriola* species, and rarely caught in inshore waters. Juveniles are pelagic and occur offshore, under floating plants and debris when small. Known to feed on fishes, to strike trolled artificial bait and bottom-fished dead bait. Caught mainly with seines, bottom trawls, and on hook-and-line.

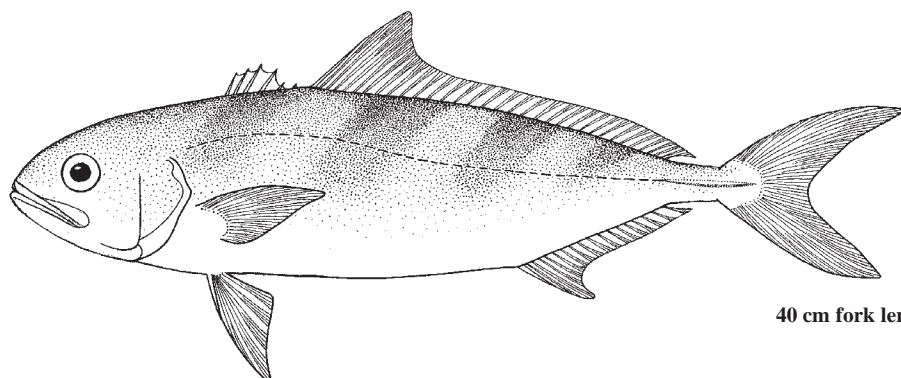
Distribution: Circumtropical in marine waters, entering temperate waters in some areas. Broadly distributed in the Indian Ocean, except unrecorded from the Persian Gulf; elsewhere in the Indo-West Pacific from southern Japan, Australia, and eastward to Hawaii.



Seriolina nigrofasciata (Rüppell, 1829)

Frequent synonyms / misidentifications: *Zonichthys nigrofasciata* (Rüppell, 1829) / None.

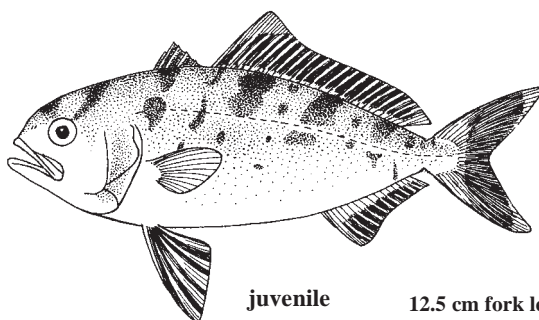
FAO names: En - Blackbanded trevally; Fr - Sériole amourez; Sp - Medregal listado.



40 cm fork length

Diagnostic characters: Body elongate, moderately shallow and slightly compressed, with head profile rising steeply to interorbital, then becoming smoothly convex to origin of spinous dorsal fin.

Upper jaw broadly rounded posteriorly (with moderately slender supramaxilla), usually extending to below posterior margin of eye. Teeth minute, in a broad band in both jaws. **Gill rakers on first gill arch mostly consisting of rudiments, 4 to 10 total elements.** Dorsal fin with VII or VIII short spines (spines weak, especially several posterior ones which may be embedded), followed by I spine and 30 or 37 soft rays; anal fin with I detached spine (usually embedded), followed by I spine and 15 to 18 soft rays; length of dorsal-fin lobe slightly longer than pectoral fins and 15 to 20% of fork length; anal-fin base contained 2.1 to 2.3 times in second dorsal-fin base; pelvic fins longer than pectoral fins. No scutes; **caudal peduncle with a slight lateral fleshy keel on each side, and dorsal and ventral grooves present.** First pterygiophore of anal fin moderately curved in specimens larger than about 10 cm fork length; vertebrae 11+13. **Colour:** in life, head and body bluish grey to black dorsally, white to dusky below; young with 5 to 7 dark oblique bands and blotches on upper body that fade with age; spinous dorsal fin black; second dorsal and anal fins dusky brown, tips of anterior lobes white, except in large adults; caudal and pelvic fins yellowish brown to black.



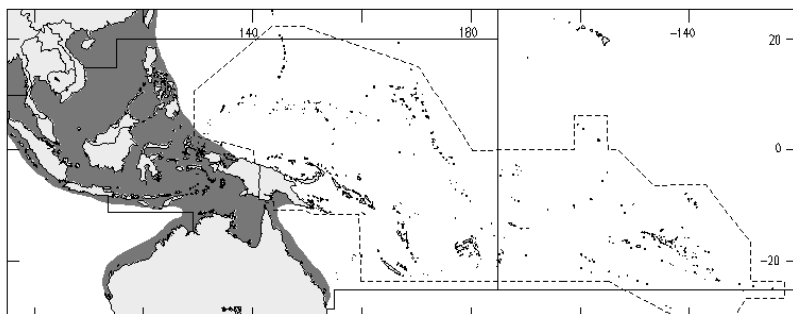
juvenile

12.5 cm fork length

Size: Maximum size not well established, reported to attain 70 cm total length. South African angling record 5.2 kg.

Habitat, biology, and fisheries: A non-schooling, generally solitary species seldom seen close to shore. Favoured habitat appears to be offshore reefs near continental shelves at depths of 20 to 150 m. Feeds on demersal fishes, cephalopods, and prawns. Caught with seines, traps, gill nets, and on hook-and-line; also by spearing.

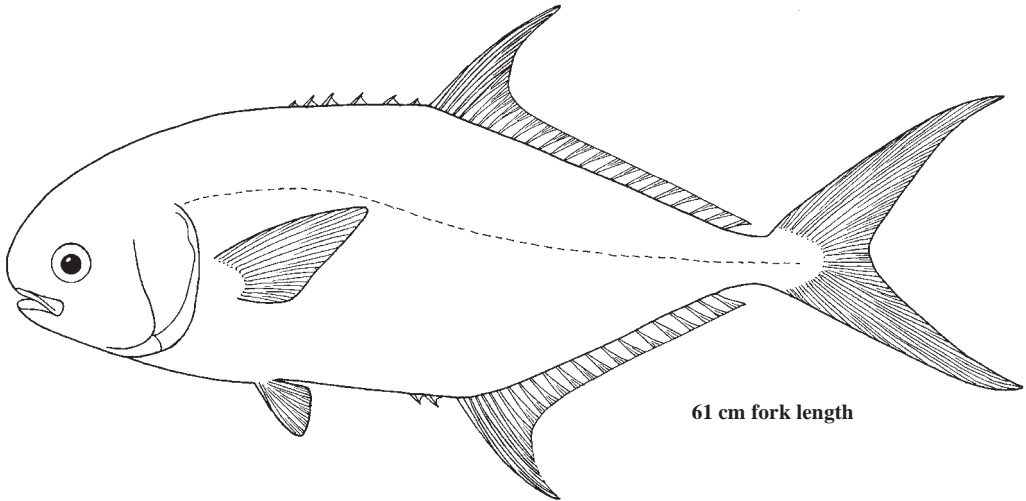
Distribution: Broadly distributed throughout the Indian Ocean; elsewhere in the Indo-West Pacific known from southern Japan, Indonesia, Philippines, and Australia.



***Trachinotus africanus* Smith, 1967**

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - African pompano; **Fr** - Pompaneau africain; **Sp** - Pámpano africano.

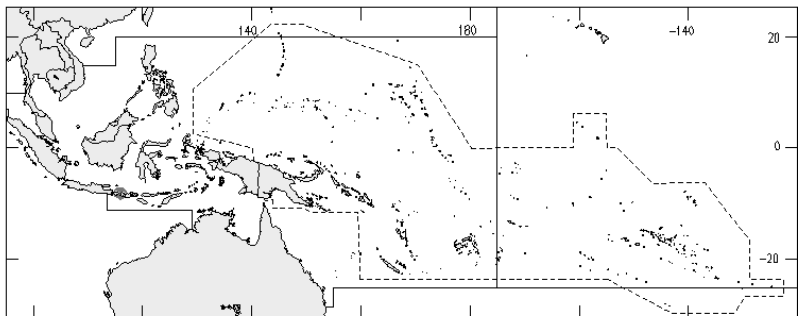


Diagnostic characters: Body ovate in young to subovate in large adults and compressed; profile of snout broadly rounded. Both jaws with small villiform bands of teeth (absent in adults); tongue with a narrow patch of teeth, persisting to about 50 cm fork length. Gill rakers (including rudiments) 7 to 10 on upper limb and 11 to 14 on lower limb of first gill arch. **Two separate dorsal fins, the first with VI short spines** (the anterior spines often becoming completely embedded in large adults) followed by I spine and **21 to 23 soft rays**; anal fin with II detached spines (becoming embedded in large adults) followed by I spine and 19 to 21 soft rays; height of second dorsal-fin lobe 19 to 25% of fork length in specimens of 10 to 40 cm fork length; pelvic fins shorter than pectoral fins. Lateral line only slightly irregular, weakly convex above pectoral fins, becoming straight posteriorly. No scutes or caudal-peduncle grooves. **First predorsal (supraneural) bone shaped like an inverted "L" with the arm projecting anteriorly**, this character is easily observed by simple dissection along midline of nape; **supraoccipital bone of skull thin and blade-like in adults**. Vertebrae 10+14. **Colour:** in life, adults bluish dorsally, ventral half of body silvery, the 2 areas separated by an indistinct orange-pink stripe; second dorsal-fin base and fin lobe dusky, distal half of fin yellow; **anal fin bright yellow with fin lobe orange**; caudal fin, pectoral, and pelvic fins yellowish; juveniles silvery with yellow hues, dorsal- and anal-fin lobes dusky.

Size: Maximum verified size 83 cm fork length, 92 cm total length and about 9.2 kg; Durban Aquarium fish reported to have exceeded 25 kg. South African spearfishing record 14.1 kg.

Habitat, biology, and fisheries: Prefers shallow coastal areas marked with reefs or rocky outcrops, but is tolerant of low salinities. Adults usually encountered singly or in pairs, although shoals of up to 100 individuals may congregate during the spring breeding season (South Africa). Young make extensive use of sheltered bays as nursery areas. Molluscs (rock mussels) are a preferred food source, but crabs are also taken. Caught with traps, gill nets, and handlines; also by spearing.

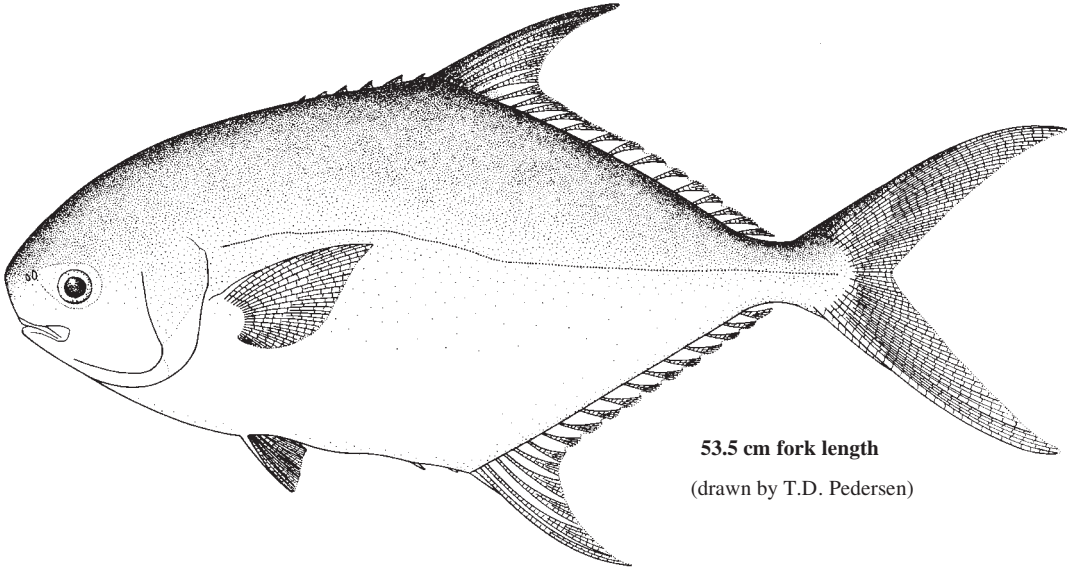
Distribution: In the western Indian Ocean known from South Africa northward to Durban, Gulf of Aden, Oman, and eastward to Karachi, Pakistan. Elsewhere in the Indo-West Pacific known from a single confirmed record from Bali, Indonesia.



Trachinotus anak Ogilby, 1909

Frequent synonyms / misidentifications: None / None.

FAO names: En - Oyster pompano.

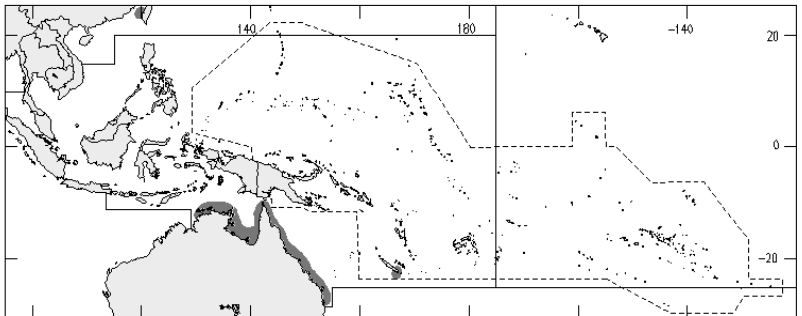


Diagnostic characters: Body ovate in young to subovate in large adults and compressed; in profile of snout broadly rounded, in adults becoming nearly straight to interorbital region. Both jaws with bands of small villiform teeth; **tongue toothless (except 2 or 3 slender teeth rarely on small specimens)**. Gill rakers (including rudiments) 3 to 6 on upper limb and 8 to 10 on lower limb of first gill arch. Two separate dorsal fins, the first with VI short spines (the anterior spines often becoming completely embedded in large adults), followed by I spine and 18 to 20 soft rays; anal fin with II detached spines (becoming embedded in large adults), followed by I spine and 16 to 18 soft rays; height of second dorsal-fin lobe 30 to 37% of fork length in specimens 10 to 40 cm fork length; pelvic fins shorter than pectoral fins. Lateral line only slightly irregular, weakly convex above pectoral fins, becoming straight posteriorly. No scutes or caudal-peduncle grooves. **First predorsal bone (supraneural) shaped like an inverted "L" with the arm projecting anteriorly**, this character is easily observed by a simple dissection along midline of nape; **supraoccipital bone of skull thin and blade-like in adults; preorbital and nasal bones hyperossified in specimens larger than about 30 cm fork length**. Vertebrae 10+14. **Colour:** in life, head and body generally silvery, greenish to bluish grey dorsally, paler below, large adults sometimes with body mostly bronze or greenish golden; second dorsal and caudal fins dusky orange to nearly black, leading edges and fin tips darkest; **anal fin bright to dirty yellow, lobe without a brownish anterior margin**; pelvic fins pale to bright yellow; pectoral fins dark.

Size: Largest specimen examined 88 cm fork length and about 100 cm total length.

Habitat, biology, and fisheries: Inhabits shallow coastal waters. Diet consists primarily of benthic molluscs. Caught primarily with gill nets and by hook-and-line.

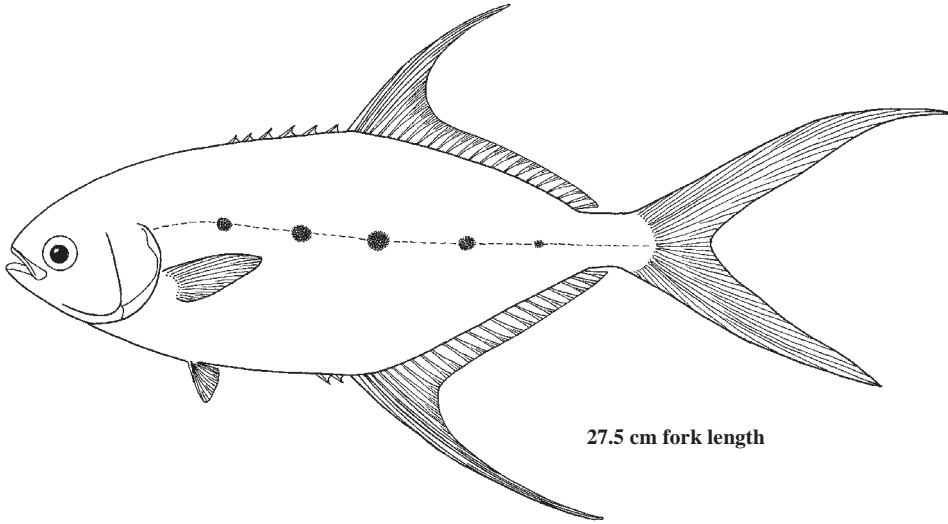
Distribution: Known only from Australia (Darwin to Moreton Bay, Queensland), New Caledonia, and Taiwan Province of China (Takao).



Trachinotus bailloni (Lacepède, 1801)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Smallspotted dart; **Fr** - Pompaneau muscadin; **Sp** - Pámpano abotonado.

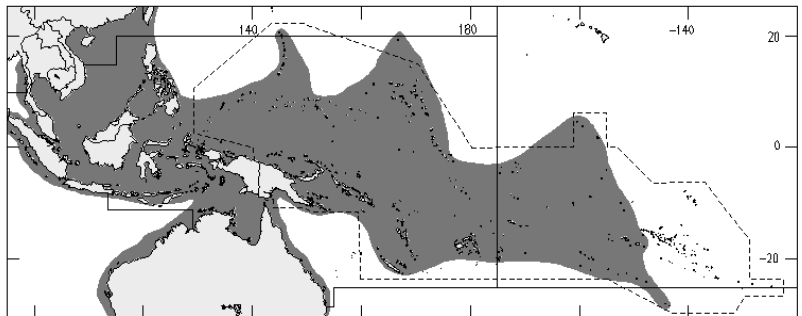


Diagnostic characters: Body elongate to ovate and strongly compressed; dorsal and ventral profiles almost equally convex, snout blunt. Both jaws with bands of small villiform teeth; vomerine tooth patch usually chevron-shaped and palatine tooth patch elongate; tongue without teeth. Gill rakers (including rudiments) 7 to 13 on upper limb and 15 to 19 on lower limb of first gill arch. Two separate dorsal fins, the first with VI short spines, followed by I spine and 21 to 25 soft rays; anal fin with II detached spines, followed by I spine and 20 to 24 soft rays; **dorsal-fin lobe consistently shorter than anal-fin lobe in specimens larger than about 25 cm fork length; pelvic fins relatively short, their length contained 1.9 to 2.3 times in pectoral-fin length in specimens larger than about 25 cm fork length.** Lateral line only slightly irregular, weakly convex above pectoral fins, becoming straight posteriorly. No scutes or caudal-peduncle grooves. Vertebrae 10+14. **Colour:** in life, adults silvery blue to grey above, silvery white below, **sides with 1 to 6 relatively small black spots (spots absent on fish smaller than about 10 to 13 cm fork length), the number of spots generally increasing with age (spots individually and bilaterally variable in number, location and intensity) in a longitudinal row on or near lateral line; in adults, all spots typically equal to or smaller than eye diameter, and with about half of spot below lateral line;** caudal, second dorsal, and anal fins grey to black, the lobes usually darkest; pectoral fins pale to dusky yellow; pelvic fins pale yellow to orange-yellow.

Size: Largest specimen examined 41 cm fork length, 53.5 cm total length, and about 0.9 kg.

Habitat, biology, and fisheries: Usually found in surge zone along sandy beaches. Feeds primarily on crustaceans and worms. Caught with traps, gill nets, and handlines.

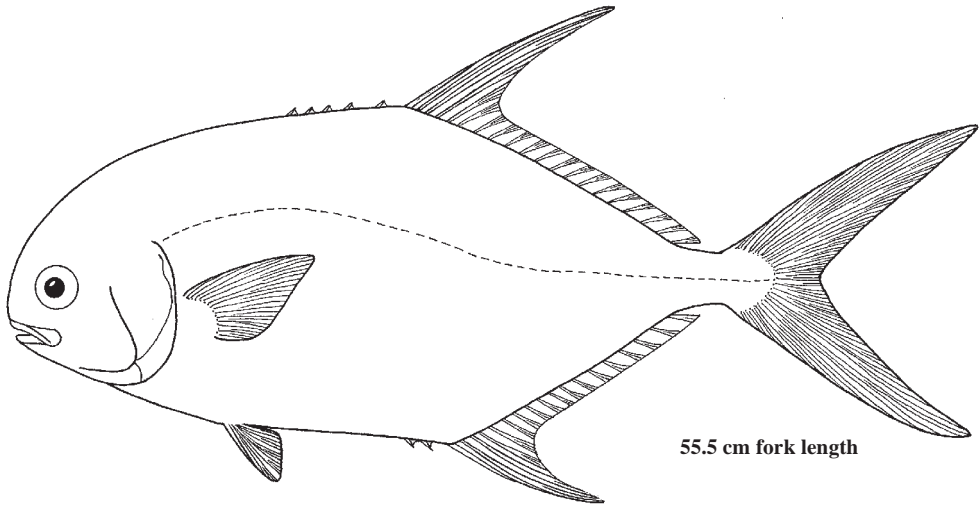
Distribution: Broadly distributed throughout the Indian Ocean, except unrecorded from the Persian Gulf; elsewhere in the Indo-West Pacific known from southern Japan southward to northern and eastern Australia, and eastward to the Marshall, Line, and Society islands.



Trachinotus blochii (Lacepède, 1801)

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Snubnose pompano; **Fr** - Pompaneau lune; **Sp** - Pámpano lunero.

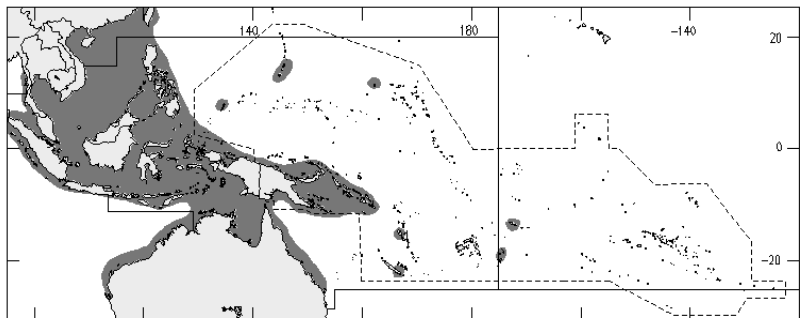


Diagnostic characters: Body ovate in young to subovate in large adults and compressed; profile of snout broadly rounded, in adults becoming nearly straight in interorbital region. Both jaws with bands of small villiform teeth; **tongue toothless (except 2 or 3 slender teeth rarely on small specimens)**. Gill rakers (including rudiments) 5 to 8 on upper limb and 8 to 10 on lower limb of first gill arch. Two separate dorsal fins, the first with VI short spines (the anterior spines often becoming completely embedded in large adults), followed by I spine and 18 to 20 soft rays; anal fin with II detached spines (becoming embedded in large adults), followed by I spine and 16 to 18 soft rays; height of second dorsal-fin lobe 35 to 60% of fork length in specimens of 10 to 40 cm fork length; pelvic fins shorter than pectoral fins. Lateral line only slightly irregular, weakly convex above pectoral fins, becoming straight posteriorly. No scutes or caudal-peduncle grooves. **First predorsal (supraneural) bone shaped like an inverted teardrop- or oval-shaped**, this character is easily observed by simple dissection along midline of nape; **supraoccipital bone of skull thin and blade-like in adults**. Vertebrae 10+14. **Colour:** in life, head and body generally silvery, blue-grey above, paler below; large adults sometimes with most of body golden orange, especially snout and lower half of body; **second dorsal fin dark, lobe of fin dusky orange; anal fin dusky to dirty orange, lobe with a brownish anterior margin; caudal fin dark to dirty orange**, leading edges of fin darkest; pelvic fins white to dirty orange; pectoral fins dark; juveniles silvery with pale fins, except lobes of median fins and anterior half of pelvic fins brownish to dirty orange.

Size: Largest specimen examined 55.5 cm fork length, 65 cm total length, and about 5 kg.

Habitat, biology, and fisheries: Inhabits coral and rocky reef areas in shallow coastal waters. Feeds on benthic molluscs. Caught mainly with traps, gill nets, and handlines.

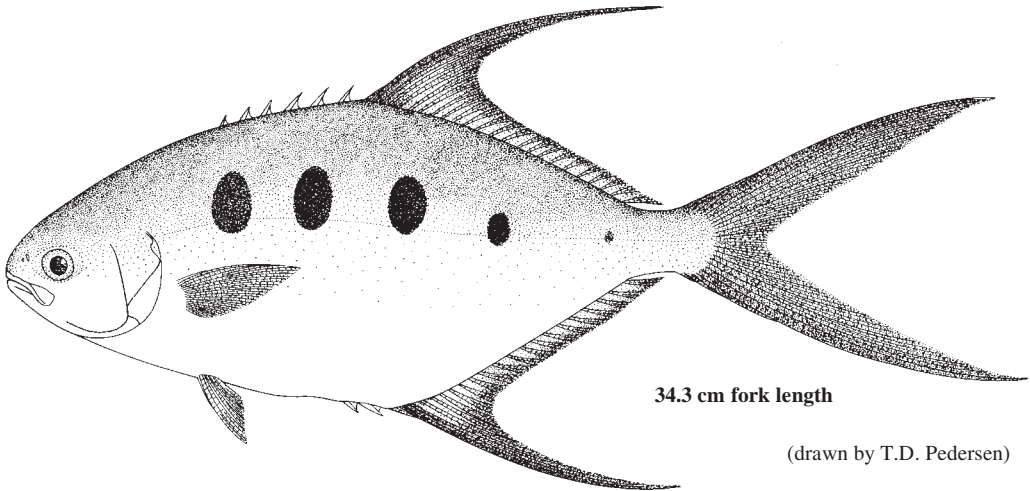
Distribution: Broadly distributed throughout the Indian Ocean; elsewhere in the Indo-West-Pacific from southern Japan to northern Australia, and eastward to Samoa, Tonga, Marina, and Marshall islands.



Trachinotus botla (Shaw, 1803)

Frequent synonyms / misidentifications: *Trachinotus russelli* (Cuvier, 1832) (see **Remarks**) / None.

FAO names: En - Largespotted dart; Fr - Pompaneau pierrot; Sp - Pámpano pastilla.



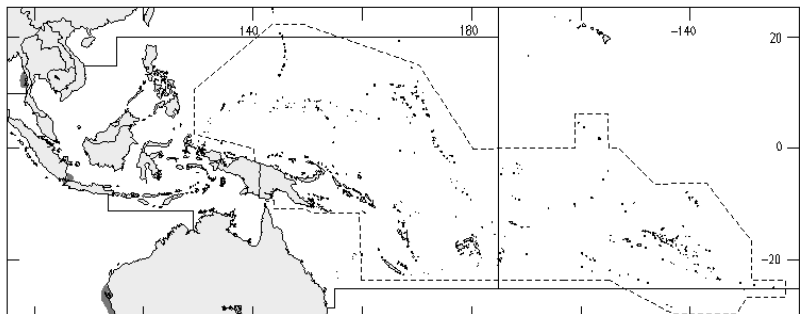
Diagnostic characters: Body elongate to ovate and strongly compressed; dorsal and ventral profiles almost equally convex, snout blunt. Both jaws with bands of small villiform teeth; vomerine tooth patch usually a small oval or a narrow triangle and palatine tooth patch short; tongue without teeth. **Gill rakers (including rudiments)** 6 to 9 on upper limb and **11 to 15 on lower limb of first gill arch**. Two separate dorsal fins, the first with VI short spines, followed by I spine and 22 to 24 soft rays; **anal fin with II detached spines, followed by I spine and 19 to 21 soft rays; dorsal-fin lobe usually longer than anal-fin lobe in specimens larger than about 25 cm fork length; pelvic fins relatively long, their length contained 1.5 to 1.7 times in pectoral-fin length in specimens larger than about 25 cm fork length**. Lateral line only slightly irregular, weakly convex above pectoral fins, becoming straight posteriorly. No scutes or caudal-peduncle grooves. Vertebrae 10+14. **Colour:** in life, adults bluish black above, silvery below, **sides usually with 5 or 6 relatively large plumbeous spots (spots absent on fish smaller than about 10 to 13 cm fork length)**, the number of spots generally increasing with age (spots individually and bilaterally variable in number, location, and intensity), in a longitudinal row on or near lateral line; **in adults, only 1 of anterior 2 spots is above the pectoral fins and both are typically larger than eye diameter, all spots broadly oval-shaped, and with at least two-thirds of spot above lateral line**; second dorsal and anal fins dusky to bluish black, the lobes usually darkest; caudal fin dusky with leading edges and most of lobes blue-black; pectoral fins pale, upper two-thirds sometimes dark; pelvic fins white.

Size: Largest specimen examined 48 cm fork length, 61 cm total length, and 0.7 kg. South African angling record 2.3 kg.

Habitat, biology, and fisheries: Inhabits shallow coastal waters, often in rough surf zone along sandy beaches. Feeds mainly on crabs, mussels, and worms. Caught with seines, gill nets, on hook-and-line, and by spearing.

Distribution: Apparently restricted to the Indian Ocean where found along the African coast from South Africa to Kenya, Malagasy Republic (west coast), India, Sri Lanka, Myanmar, Java, and Western Australia.

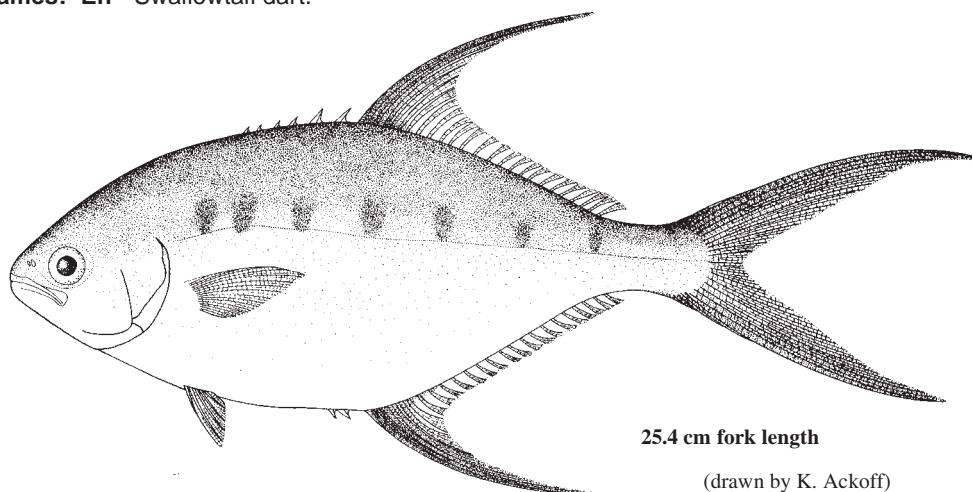
Remarks: *Scomber botla* Shaw, as originally proposed, was a composite species; validation and priority of name is based on the action of Day (1876:233, *The fishes of India*, Pt. 2) who as "first reviser" listed it as a synonym of *Trachinotus russelli*.



Trachinotus copperingi Günther, 1884

Frequent synonyms / misidentifications: *Trachinotus velox* Ogilby, 1908 / *Trachinotus botla* (Shaw, 1803) or *T. russelli* (Cuvier, 1832).

FAO names: En - Swallowtail dart.

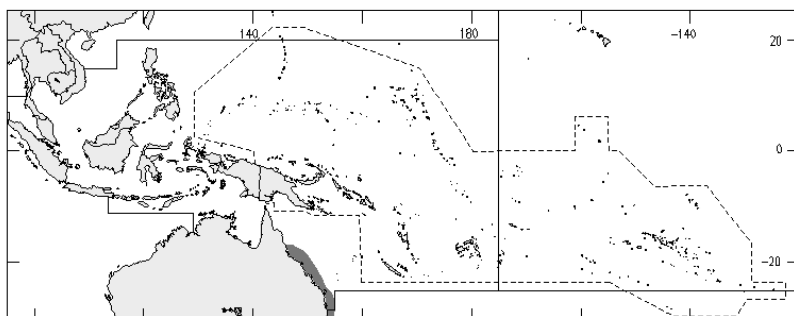


Diagnostic characters: Body elongate to ovate and strongly compressed; dorsal and ventral profiles almost equally convex, snout blunt. Both jaws with bands of small villiform teeth; vomerine tooth patch varying from chevron-shaped to a large triangle and palatine tooth patch usually short; tongue without teeth. **Gill rakers (including rudiments)** 5 to 9 on upper limb and **12 to 15 on lower limb of first gill arch**. Two separate dorsal fins, the first with VI short spines, followed by I spine and 23 to 25 soft rays; **anal fin with II detached spines, followed by I spine and 22 to 24 soft rays; dorsal-fin lobe consistently shorter than anal-fin lobe in specimens larger than about 25 cm fork length; pelvic fins relatively short, their length contained 1.7 to 2.2 times in pectoral-fin length in specimens larger than about 25 cm fork length**. Lateral line only slightly irregular, weakly convex above pectoral fins, becoming straight posteriorly. No scutes or caudal-peduncle grooves. Vertebrae 10+14. **Colour:** in life, adults bluish black above, silvery below, **sides usually with 6 or 7 relatively elongate plumbeous spots (spots absent on fish smaller than about 10 to 13 cm fork length)**, the number of spots generally increasing with age (spots individually and bilaterally variable in number, location, and intensity), in a longitudinal row on or near lateral line; **in adults, anterior 2 spots are above the pectoral fins and at least some spots larger than eye diameter, all spots vertically elongate ovals, and with at least two-thirds of spot above lateral line**; second dorsal and anal fins dusky to bluish black, the lobes usually darkest; caudal fin dusky with leading edges and most of lobes blue-black; pectoral fins pale, upper two-thirds sometimes dark; pelvic fins white.

Size: Largest specimen examined 34.5 cm fork length.

Habitat, biology, and fisheries: Inhabits shallow coastal waters, often in rough surf zone along sandy beaches. Feeds mainly on crabs, mussels, and worms. Caught with seines, gill nets, on hook-and-line, and by spearing.

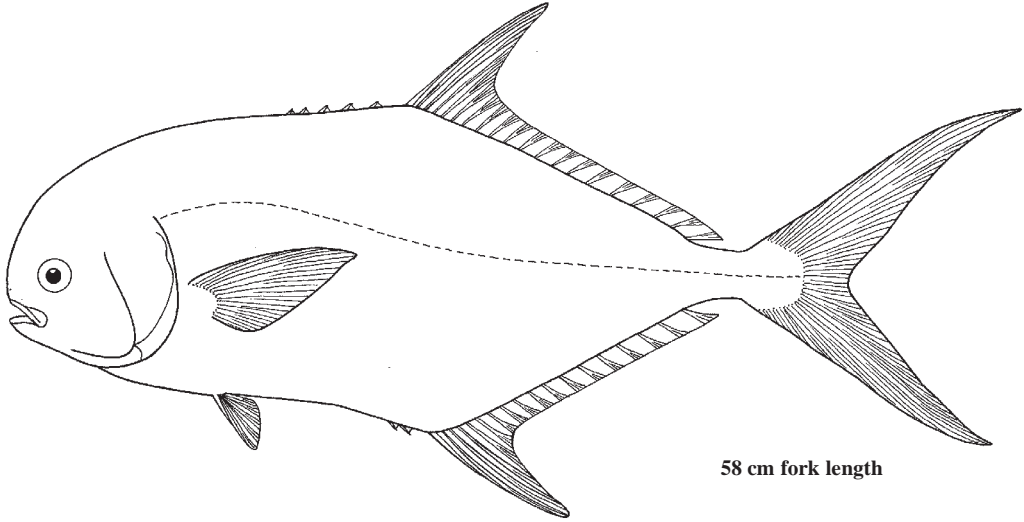
Distribution: Essentially an Australian endemic species, known only from the north-east coast (19°S) to New South Wales (34°S), and Lord Howe Island.



***Trachinotus mookalee* Cuvier, 1832**

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Indian pompano; **Fr** - Pompaneau indien; **Sp** - Pámpano indico.



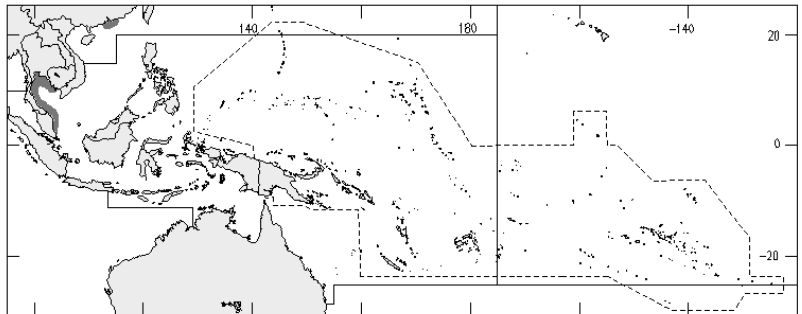
58 cm fork length

Diagnostic characters: Body ovate in young to subovate in large adults and compressed; profile of snout broadly rounded, in adults becoming nearly straight to interorbital region. Both jaws with bands of small villiform teeth, **tongue with a narrow band of teeth, persisting to about 50 cm fork length.** Gill rakers (including rudiments) 5 to 8 on upper limb and 8 to 10 on lower limb of first gill arch. Two separate dorsal fins, the first with VI short spines (the anterior spines often becoming completely embedded in large adults), followed by I spine and 18 to 20 soft rays; anal fin with II detached spines (becoming embedded in large adults), followed by I spine and 16 to 18 soft rays; height of second dorsal-fin lobe 24 to 34% of fork length in specimens 10 to 40 cm fork length; pelvic fins shorter than pectoral fins. Lateral line only slightly irregular, weakly convex above pectoral fin, becoming straight posteriorly. No scutes or caudal-peduncle grooves. **First predorsal bone (supraneural) shaped like an inverted "L" with the arm projecting anteriorly,** this character is easily observed by a simple dissection along midline of nape; **supraoccipital bone becoming broad and sausage-shaped in specimens larger than about 30 cm fork length.** Vertebrae 10+14. **Colour:** in life, head and body generally silvery, greenish to bluish grey dorsally, paler below, large adults sometimes with body mostly bronze or greenish golden; second dorsal and caudal fins dusky yellow, leading edges and fin tips darkest; **anal fin bright to dirty yellow, lobe without a brownish anterior margin;** pelvic fins pale yellow to white; pectoral fins dark; juveniles silvery with pale yellow fins, except distal half of dorsal-fin lobe black.

Size: Largest specimen examined 77 cm fork length, 90 cm total length, and about 8.1 kg.

Habitat, biology, and fisheries: Inhabits shallow coastal waters. Caught with traps, gill nets, handlines, and other artisanal gear.

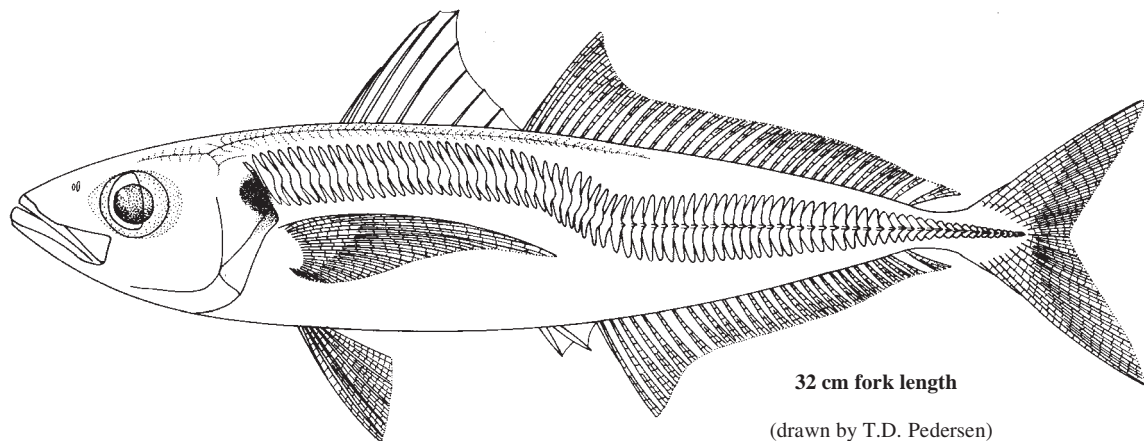
Distribution: In the western Indian Ocean known from the Gulf of Oman and the Persian Gulf eastward to Sri Lanka; elsewhere in the Indo-West Pacific known from Singapore, Gulf of Thailand, and Hong Kong.



Trachurus declivis (Jenyns, 1842)

Frequent synonyms / misidentifications: None / *Trachurus novaezelandiae* Richardson, 1848.

FAO names: En - Greenback scad.

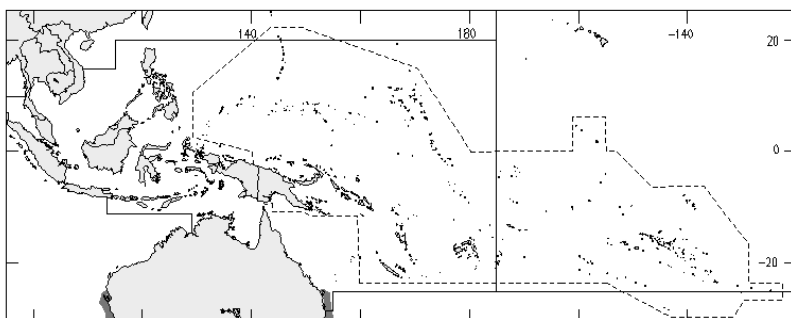


Diagnostic characters: Body elongate and nearly cylindrical, with upper and lower profiles about equal. Eye moderate, with adipose eyelid well developed, usually covering most of eye except for a vertical oval centred on pupil. Upper jaw moderately broad and extending to below anterior margin of eye. Teeth small, in a single row in both jaws. Gill rakers (including rudiments) 11 to 16 on upper limb and 32 to 42 on lower limb of first gill arch (total 53 to 55). **Shoulder girdle (cleithrum) margin with a small furrow at upper end, but no papillae present.** Two separate dorsal fins, the first with VIII spines, followed by I spine and 29 to 35 soft rays; anal fin with II detached spines followed by I spine and 24 to 29 soft rays; pectoral fins about equal to or slightly longer than head length. **Scales in curved as well as straight part of lateral line enlarged and scute-like (caution: in large *Trachurus* these scales may be obscured by an overgrowth of smaller scales);** total scales and scutes in lateral line 71 to 89, usually more than 75; **curved part of lateral line essentially parallel to axis of body for most of its length. Dorsal accessory lateral line immediately below base of dorsal fin terminates below fifth to eleventh (usually seventh to ninth) soft dorsal-fin ray.** Vertebrae 10+14. **Colour:** greenish above, silvery below; caudal fin greyish; a prominent black spot on upper margin of opercle.

Size: Attains 19 to 23 cm fork length by age of 2 years and reaches maturity by 3 or 4 years and about 27 cm fork length and 250 g; maximum recorded size 47 cm fork length at an age of 16 years.

Habitat, biology, and fisheries: Occurs in large schools and generally not present where surface water temperature exceeds 17°C. Feeds mostly during the day on krill and other planktonic crustaceans or lantern fishes (Myctophidae) at edge of continental shelf from surface to 500 m. Caught with demersal trawls and purse seines.

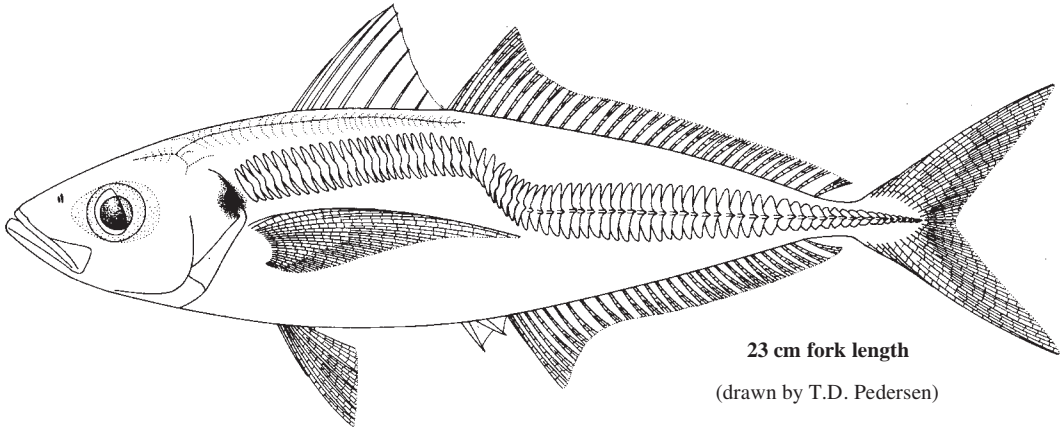
Distribution: Temperate species known from southern half of Australia, Shark Bay, Western Australia (25°52'S) to Wide Bay, Queensland (25°52'S), and from New Zealand.



***Trachurus novaezelandiae* Richardson, 1848**

Frequent synonyms / misidentifications: *Trachurus mccullochi* Nichols, 1920 / *Trachurus declivis* (Jenyns, 1842).

FAO names: En - Yellowtail horse mackerel.

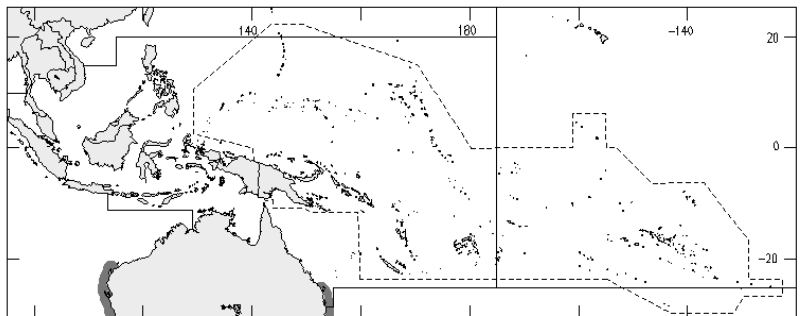


Diagnostic characters: Body elongate and slightly compressed, with upper and lower profiles about equal. Eye moderate, with adipose eyelid well developed, usually covering most of eye except for a vertical oval centred on pupil. Upper jaw moderately broad and extending to below anterior margin of eye. Teeth small, in a single row in both jaws. Gill rakers (including rudiments) 11 to 17 on upper limb and 35 to 45 on lower limb of first gill arch (total 53 to 61). **Shoulder girdle (cleithrum) margin with a small furrow at upper end, but no papillae present.** Two separate dorsal fins, the first with VIII spines, followed by I spine and 27 to 33 soft rays; anal fin with II detached spines followed by I spine and 22 to 29 soft rays; pectoral fins about equal to or slightly longer than head length. **Scales in curved as well as straight part of lateral line enlarged and scute-like (caution: in large *Trachurus* these scales may be obscured by an overgrowth of smaller scales);** total scales and scutes in lateral line 67 to 81, rarely more than 76; **curved part of lateral line slanted for most of its length. Dorsal accessory lateral line immediately below base of dorsal fin terminates below first to fifth (usually first or second) soft dorsal-fin ray.** Vertebrae 10+14. **Colour:** brassy green above, silvery below (sometimes with iridescent brown vertical bands in fresh specimens), with yellow tinges on scutes in straight lateral line; caudal and second dorsal fins yellowish; a prominent black spot on upper margin of opercle.

Size: Maximum total length at least 50 cm.

Habitat, biology, and fisheries: Occurs in large schools on coastal reefs. Feeds mainly on planktonic crustaceans. Caught with demersal trawls and purse seines.

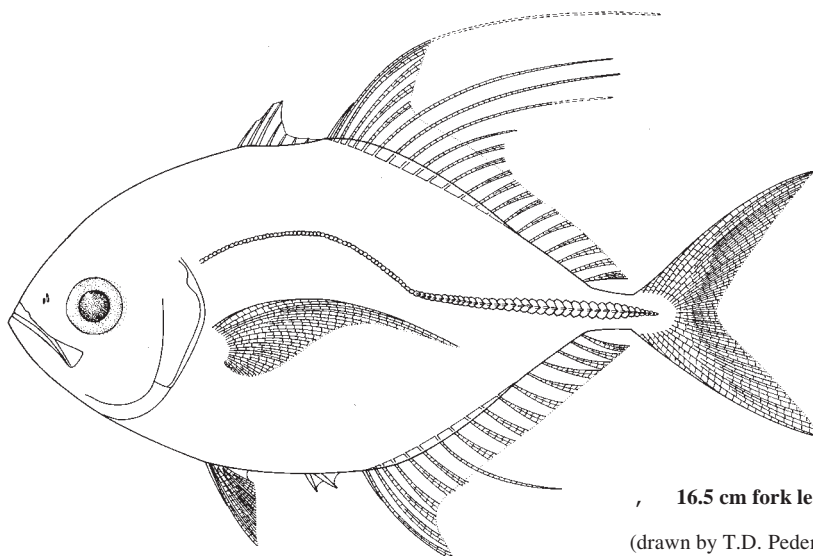
Distribution: Temperate species known from southern half of Australia, Exmouth Gulf, Western Australia (22°05'S) to Wide Bay, Queensland (25°52'S), and from New Zealand.



Ulva aurochs (Ogilby, 1915)

Frequent synonyms / misidentifications: *Citula aurochs* Ogilby, 1915; *Carangoides aurochs* (Ogilby, 1915) / None.

FAO names: En - Silvermouth trevally.

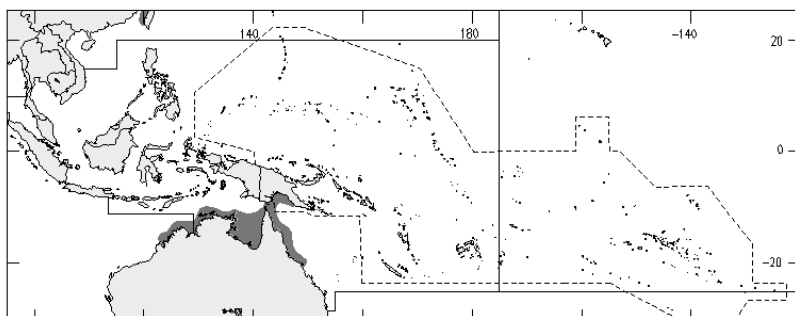


Diagnostic characters: Body oval, strongly compressed; lower jaw protudes slightly beyond upper jaw. Eye diameter larger than snout length. Both jaws with a very narrow band of small villiform teeth; **tongue with central band of villiform teeth. Gill rakers (including rudiments) 16 to 21 on upper limb and 37 to 41 on lower limb of first gill arch (total 54 to 61); gill rakers long, feather-like, and project into mouth along side of tongue.** Two separate dorsal fins, the first with VIII spines, the second with I spine and 20 to 22 soft rays; anal fin with II detached spines followed by I spine and 17 or 18 soft rays; lobe of second dorsal fin in young elongate, longer than head length; **in large males (only), first 5 to 8 soft dorsal-fin rays produced as filaments;** anterior rays of anal fin slightly produced in both sexes but not as filaments. Lateral line anteriorly with a moderate arch, with junction of curved and straight parts below vertical between tenth and twelfth soft rays of second dorsal fin; chord of curved part of lateral line slightly longer to slightly shorter than straight part of lateral line, contained 0.8 to 1.2 times in straight part; straight part of lateral line with 0 to 5 scales followed by 26 to 38 scutes. Breast naked ventrally to behind pelvic fins; laterally, naked area of breast extends diagonally to naked base of pectoral fins. Vertebrae 10+14. **Colour:** in life, body blue to silvery blue dorsally, silvery below; dorsal surface of head dark blue to black; diffuse dark blotch on upper margin of opercle; dorsal-fin filaments and inner rays of anal fin black; other fins dusky to hyaline; cheeks, lower jaw, inside of mouth and tongue bright silver; juveniles with 5 or 6 dark bands on body.

Size: Maximum reported fork length 26 cm.

Habitat, biology, and fisheries: Inhabits shallow coastal waters; in northern Australian waters largely restricted to depths shallower than 70 m. Feeds on small crustaceans and cephalopods. Caught primarily with trawls.

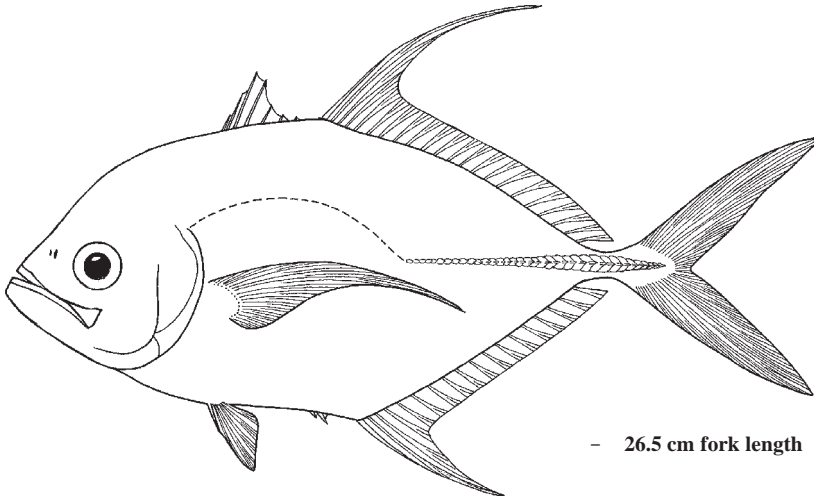
Distribution: Known from Australia, off Cape Leveque, Western Australia (16°10'S) to Townsville, Queensland (19°40'S), Papua New Guinea, and Taiwan Province of China.



Ulua mentalis (Cuvier, 1833)

Frequent synonyms / misidentifications: *Caranx mentalis* Cuvier, 1833; *C. mandibularis* Macleay, 1833; *Ulua mandibularis* (Macleay, 1833) / None.

FAO names: **En** - Longrakered trevally; **Fr** - Carangue démêloir; **Sp** - Jurel peinero.

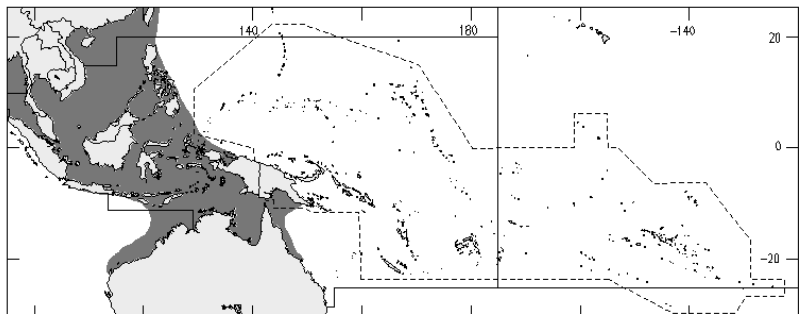


Diagnostic characters: Body strongly compressed; dorsal profile more strongly convex than ventral profile, **lower jaw becoming prominent in large adults, with the angle of “chin” projecting beyond upper jaw**. Both jaws with a very narrow band of small villiform teeth; **tongue without central band of villiform teeth**. **Gill rakers (including rudiments) 23 to 27 on upper limb and 51 to 61 on lower limb of first gill arch (total 74 to 86); gill rakers extremely long, feather-like, and project into mouth along side of tongue**. Two separate dorsal fins, the first with VIII spines, the second with I spine and 21 or 22 soft rays; anal fin with II detached spines followed by I spine and 17 or 18 soft rays; lobe of second dorsal fin elongate in young, longer than head length becoming shorter than head in large adults. Lateral line anteriorly with a moderate arch, with junction of curved and straight parts below vertical between tenth and twelfth soft rays of second dorsal fin; chord of curved part of lateral line slightly longer to slightly shorter than straight part of lateral line, contained 0.8 to 1.2 times in straight part; straight part of lateral line with 0 to 5 scales followed by 26 to 38 scutes. Breast naked ventrally to behind pelvic fins; laterally, naked area of breast extends diagonally to naked base of pectoral fins. Vertebrae 10+14. **Colour:** in life, head and body blue-green dorsally, silvery below; diffuse dark blotch on upper margin of opercle in large specimens, faint or absent in young; adults with a dusky mark on cheek at angle of jaws; spinous dorsal and caudal fins dusky to black; second dorsal and anal fins pale green except leading edges and distal margins of fins dusky; cheeks, lower jaw, inside of mouth and tongue silver in small specimens; juveniles with 7 or 8 dark bands on body.

Size: Largest specimen examined 75.5 cm fork length, 85 cm total length, and 6.4 kg; commonly to about 60 cm total length, reported to attain 100 cm total length.

Habitat, biology, and fisheries: Inhabits shallow coastal waters. Feeds on crustaceans and fishes. Caught with gill nets, traps, handlines, and other types of artisanal gear.

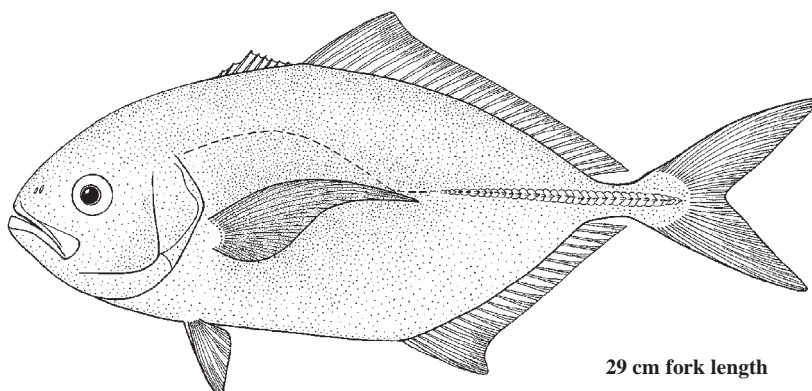
Distribution: African coast southward to Tanzania, north-west coast of Malagasy Republic, Red Sea, Gulf of Aden, Oman, Persian Gulf and Sri Lanka; elsewhere in the Indo-West Pacific known from the Gulf of Thailand, Taiwan Province of China, Indonesia, the Philippines, Australia, and Papua New Guinea.



Uraspis helvola (Forster, 1801)

Frequent synonyms / misidentifications: *Caranx helvolus* (Forster, 1801); *C. micropterus* Rüppell, 1836; *Leucoglossa candens* Jordan, Evermann, and Wakiya, 1927 / See **Remarks**.

FAO names: **En** - Whitetongue jack; **Fr** - Carangue langue blanche; **Sp** - Jurel lengua blanca.



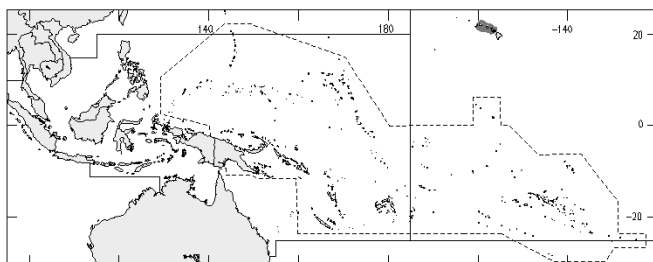
Diagnostic characters: Body oblong and compressed; dorsal profile strongly convex, ventral profile slightly convex to isthmus, then nearly straight to origin of second dorsal fin; snout broadly rounded. Upper jaw extending posteriorly to below anterior margin of eye to middle of eye. Teeth in both jaws small, pointed and usually recurved, in a narrow band, an irregular row or a single row, becoming uniserial with increasing age. Gill rakers (including rudiments) 5 to 8 on upper limb and 13 to 17 on lower limb of first gill arch (total 19 to 24). Two dorsal fins, the first with VIII short, slender spines (the posterior 2 or 3 embedded and not apparent with growth) followed by I spine and 25 to 30 soft rays; anal fin with II detached spines (embedded and not apparent in all but very young) followed by I spine and 19 to 22 soft rays; lobe of second dorsal fin shorter than head length; pelvic fins very long in young but becoming relatively shorter with age; chord of curved part of lateral line contained 0.8 to 1.3 times in straight part of lateral line (ratio generally increasing with increasing size of fish); curved part of lateral line with 48 to 66 scales and straight part of lateral line with 23 to 40 scutes; in fish smaller than about 20 cm fork length some of the scutes with spines directed anteriorly (antrorse), the number of antrorse spines decreasing with growth. **Breast naked ventrally to origin of pelvic fins; laterally naked area of breast separated from naked base of pectoral fins by a broad band of scales.** Vertebrae 10+14. **Colour:** tongue, roof and floor of mouth white or cream-coloured, the rest blue-black; head dusky to black, with a large, diffuse black opercular blotch; body dusky to black dorsally, lighter below and with 6 or 7 wide, dark bands and narrow pale interspaces (faint bands evident in specimens as large as 25 cm; in specimens smaller than 10 cm bands may extend onto second dorsal and anal fins); second dorsal and anal fins hyaline to black; the anal fin commonly, and the second dorsal fin occasionally with tips of the falcate lobe and fin margin pale; pelvic fins generally black in specimens smaller than 10 cm fork length, rapidly becoming pale whitish at larger sizes; caudal fin pale yellowish dusky with trailing edges and tips of lobes blackish.

Size: Maximum fork length 46 cm.

Habitat, biology, and fisheries: A benthic-pelagic species inhabiting shelf waters along continental coasts and around islands. Typically occurs in small demersal schools. Caught mainly with bottom trawls, seines, traps, and on hook-and-line.

Distribution: Widely distributed in the Indo-West Pacific but rarely collected; verified records from the WCP area are pending. Confirmed records are from the Red Sea, Arabian Sea, off Oman and Sri Lanka, and Hawaii; also known from Ascension and St. Helena in the South Atlantic and from offshore islands in the northeastern tropical Pacific Ocean.

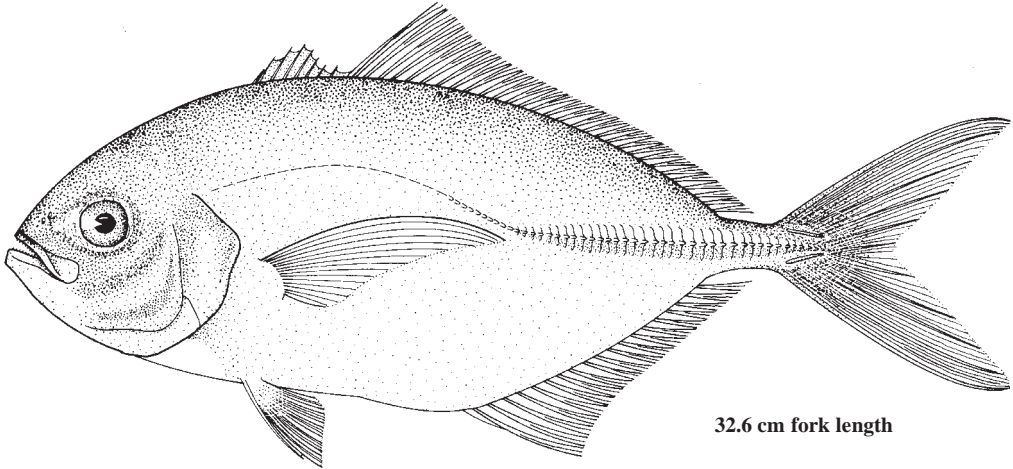
Remarks: Adults of *Uraspis helvola* and *U. secunda* are virtually impossible to distinguish although juvenile characters involving allometric growth patterns suggest that they are distinct species. If subsequent studies indicated that these 2 nominal species are conspecific, the oldest available name is *Uraspis helvola*.



Uraspis secunda (Poey, 1860)

Frequent synonyms / misidentifications: *Caranx hullianus* McCulloch, 1909; *Uraspis reversa* Jordan, Evermann, and Wakiya, 1927; *U. wakiyai* Williams, 1961; *U. cadenati* Blache and Rossignol, 1962 / See **Remarks**.

FAO names: **En** - Cottonmouth jack; **Fr** - Carangue cotor; **Sp** - Jurel volantin.



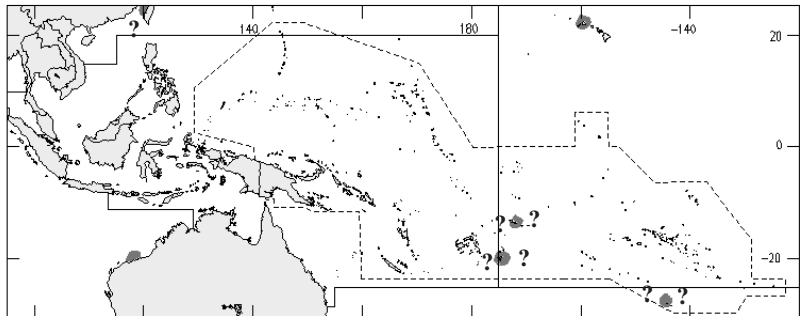
32.6 cm fork length

Diagnostic characters: Meristic and colour pattern characters are identical and broadly overlap those of *Uraspis helvola* (see **Remarks**), and only the following major diagnostic characters (which apply to both species) are repeated here. **In fish smaller than about 20 cm fork length some of the scutes with spines directed anteriorly (antrorse), the number of antrorse spines decreasing with growth. Breast naked ventrally to origin of pelvic fins; laterally naked area of breast separated from naked base of pectoral fins by a broad band of scales. Colour:** tongue, roof and floor of mouth white or cream-coloured, the rest blue-black.

Size: Maximum fork length 43.5 cm.

Habitat, biology, and fisheries: Apparently an oceanic species; at surface, pelagic, and benthic; solitary and in small schools. Can produce a grunting sound when caught. Caught with trawls, purse seines, longlines, and on hook-and-line.

Distribution: In the Indo-West Pacific known from South Africa and Tanzania, Japan to Taiwan Province of China, Northwest shelf and Tasman Sea off Australia, and Hawaii; also known from both sides of the Atlantic Ocean and from offshore islands in the northeastern tropical Pacific Ocean. Records of *Uraspis* not identified to species from Samoa, the Tonga Islands, and Rapa may apply to this species.

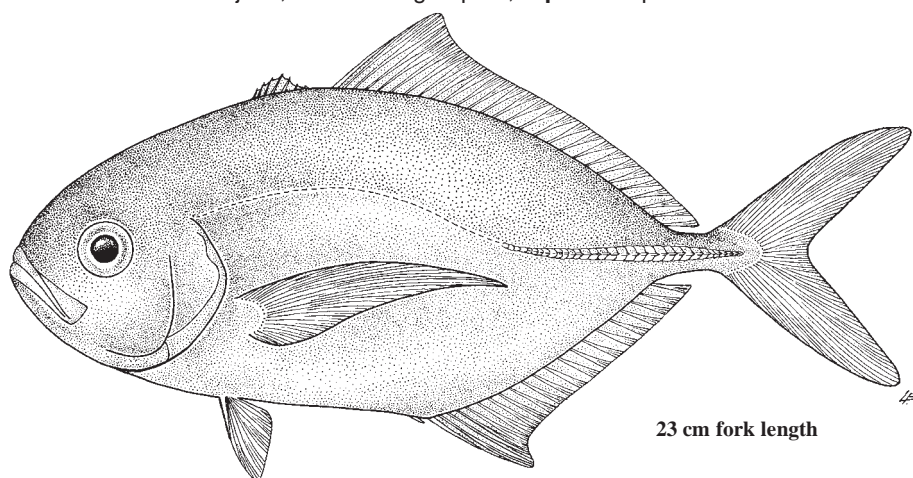


Remarks: Adults of *U. secunda* and *U. helvola* are virtually impossible to distinguish although juvenile characters involving allometric growth patterns suggest that they are different species. If subsequent studies indicated that these 2 nominal species are conspecific, the oldest available name is *Uraspis helvola*.

***Uraspis uraspis* (Günther, 1860)**

Frequent synonyms / misidentifications: *Caranx uraspis* (Günther, 1860); *C. quptae* Chaudhuri, 1909; *Leucoglossa herklotsi* Herre, 1932; *Uraspis pectoralis* Fowler, 1938 / See **Remarks**.

FAO names: **En** - Whitemouth jack; **Fr** - Carangue paia; **Sp** - Jurel paia.

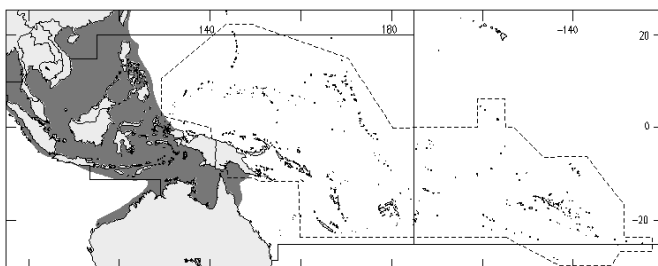


Diagnostic characters: Body oblong and compressed; dorsal profile strongly convex, ventral profile slightly convex to isthmus, then nearly straight to origin of second dorsal fin; snout broadly rounded. Upper jaw extending posteriorly to below anterior margin of eye to middle of eye. Teeth in both jaws small, pointed and usually recurved, in a narrow band, an irregular row, or a single row, becoming uniserial with increasing age. Gill rakers (including rudiments) 5 to 7 on upper limb and 13 to 16 on lower limb of first gill arch (total 18 to 22). Two dorsal fins, the first with VIII short slender spines (the posterior 2 or 3 embedded and not apparent with growth) followed by I spine and 25 to 30 soft rays; anal fin with II detached spines (embedded and not apparent in all but very young) followed by I spine and 17 to 22 soft rays; lobe of second dorsal fin shorter than head length; pelvic fins very long in young but becoming shorter with age; chord of curved part of lateral line contained 0.7 to 0.98 times in straight part of lateral line (ratio generally increasing with increasing size of fish but always less than 1); curved part of lateral line with 61 to 82 scales and straight part of lateral line with 24 to 39 scutes; in fish smaller than about 20 cm fork length some of the scutes with spines directed anteriorly (antrorse), the number of antrorse spines decreasing with growth. **Breast naked ventrally to origin of pelvic fins; laterally naked area of breast extends diagonally to naked base of pectoral fins.** Vertebrae 10+14. **Colour:** tongue, roof and floor of mouth white or cream-coloured, the rest blue-black; body and head dusky to black dorsally, shading to dusky or pale grey ventrally; juveniles and occasionally adults with 6 dusky or blue-black bars, which are about twice the width of pale interspaces and much more distinct on ventral half of body below the level of lateral line (bars evident on specimens as large as 22.5 cm fork length and absent on specimens as small as 12 cm); second dorsal fin pale hyaline proximally with distal areas dusky posteriorly; anal fin yellow-white hyaline with distal areas dusky, especially posteriorly; in small specimens of 8 to 13 cm fork length, pelvic fins whitish with distal half of one third black, at sizes larger than 13 cm entire fin becoming pale white; caudal fin pale to dusky with trailing edges dusky.

Size: Apparently a small species; maximum recorded size 28 cm fork length.

Habitat, biology, and fisheries: Forms small demersal schools in depths from 50 to at least 130 m. Caught with bottom trawls, longlines, and traps.

Distribution: In the western Indian Ocean known from the Red Sea, Persian Gulf, and in coastal waters eastward to Sri Lanka; elsewhere in the Indo-West Pacific known from the east coast of India, Straits of Malacca, Gulf of Thailand, Hong Kong, the Philippines, Indonesia, Australia, Papua New Guinea, and Hawaii (Oahu).



INDEX OF SCIENTIFIC AND VERNACULAR NAMES

Explanation of the System

Italics : Valid scientific names (genera and species).

Italics : Synonyms (genera and species), misidentifications.

ROMAN : Family names.

ROMAN : Names of divisions, classes, subclasses, orders, suborders, and subfamilies.

Roman : FAO and local names.

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COLOUR PLATES

Family Serranidae (pages 2442 to 2548)

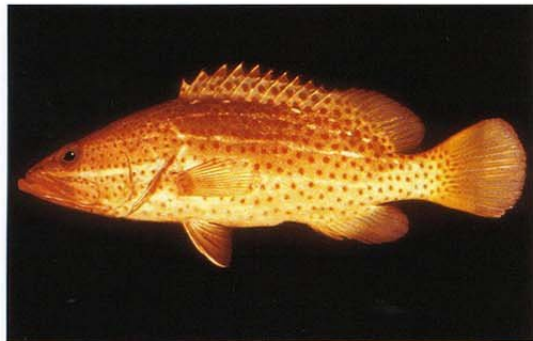
Photographs by J.E. Randall

Abbreviation used: SL = standard length

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1. *Aethaloperca rogae* 29.5 cm SL, Bahrain



2. *Anyperodon leucogrammicus* 24.2 cm SL, Palau



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5. *Cephalopholis igarashiensis* 14.9 cm SL, Naha, Okinawa, Ryukyu Islands



6. *Cephalopholis miniata* 25.4 cm SL, Ishigaki, Ryukyu Islands

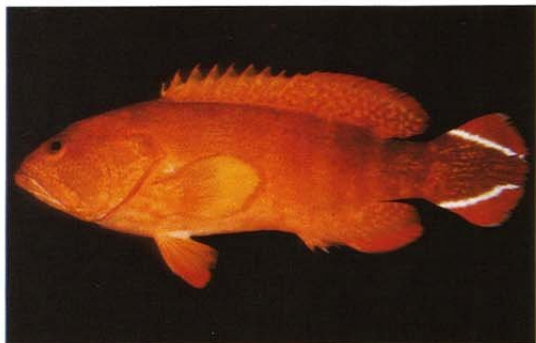


7. *Cephalopholis sexmaculata* 25.6 cm SL, Hiva Oa, Marquesas Islands



8. *Cephalopholis sonnerati* 16.2 cm SL, Tutuila, American Samoa

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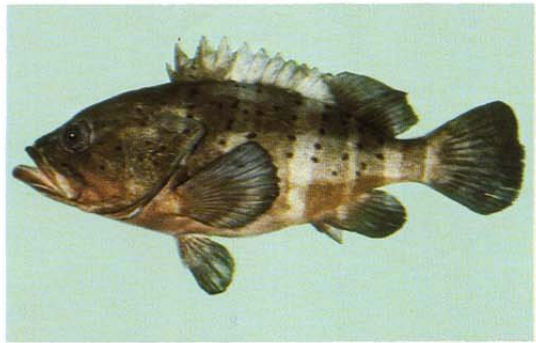
9. *Cephalopholis urodeta* 15.3 cm SL, Tetiaroa Atoll, Society Islands



10. *Cromileptes altivelis* 9.3 cm SL, One Tree Island, Great Barrier Reef, Australia



11. *Epinephelus akaara* 29.8 cm SL, Hong Kong



12. *Epinephelus amblycephalus* 32.2 cm SL, Dumaguete, Negros, Philippines



13. *Epinephelus areolatus* 26.2 cm SL, Nuweiba, Sinai, Egypt



14. *Epinephelus awoara* 20.8 cm SL, Keelung, Taiwan Province of China

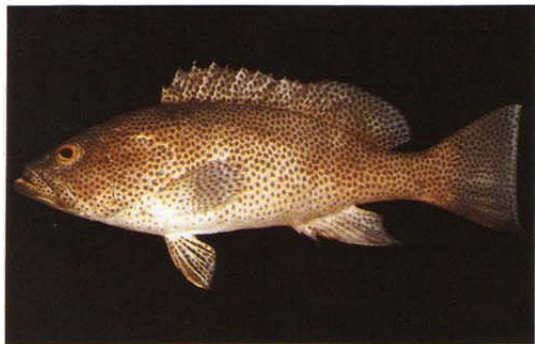


15. *Epinephelus bleekeri* 14.8 cm SL, Batu Nampar, Lombok, Indonesia

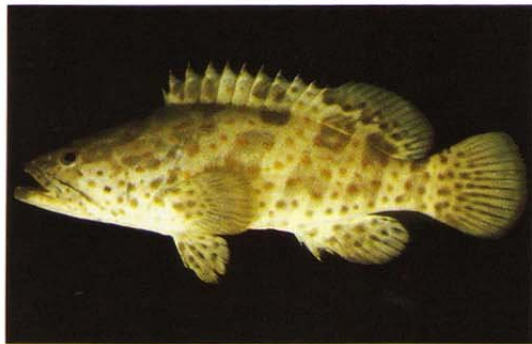


16. *Epinephelus caeruleopunctatus* 23.7 cm SL, Alite Reef, Solomon Islands

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17. *Epinephelus chlorostigma* 32.7 cm SL, Port Sudan, Sudan



18. *Epinephelus coioides* 17.5 cm SL, Jakarta, Indonesia



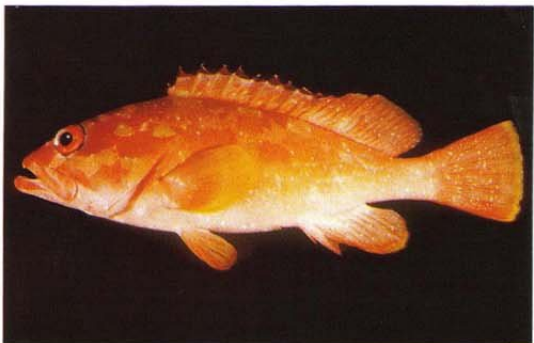
19. *Epinephelus cyanopodus* 14.5 cm SL, Manila, Philippines



20. *Epinephelus epistictus* 44 cm SL, Ambon, Indonesia



21. *Epinephelus fasciatomaculosus* 8.5 cm SL, Yeh-Liu, Taiwan Province of China



22. *Epinephelus fasciatus* 21.3 cm SL, Teavaraa Pass, Tahiti

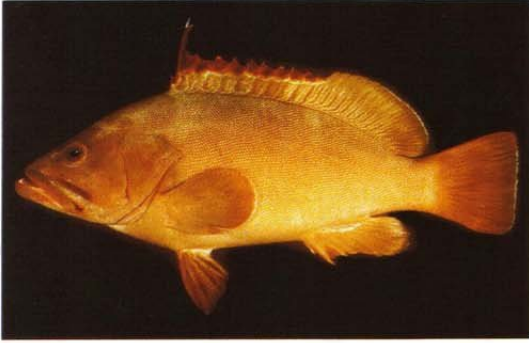


23. *Epinephelus faveatus* 22.5 cm SL, Batu Nampar, Lombok, Indonesia

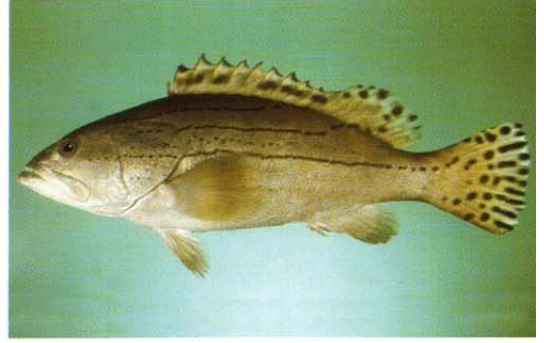


24. *Epinephelus hexagonatus* 16 cm SL, Enewetak, Marshall Islands

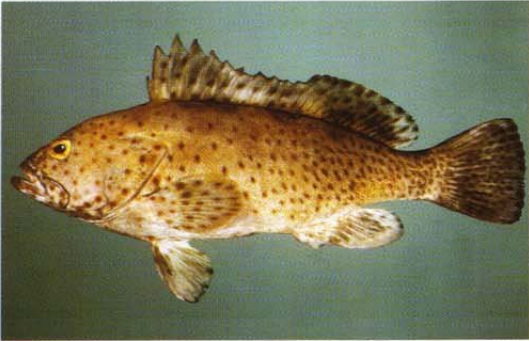
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25. *Epinephelus irroratus* 27.9 cm SL, Ua Huka, Marquesas Islands



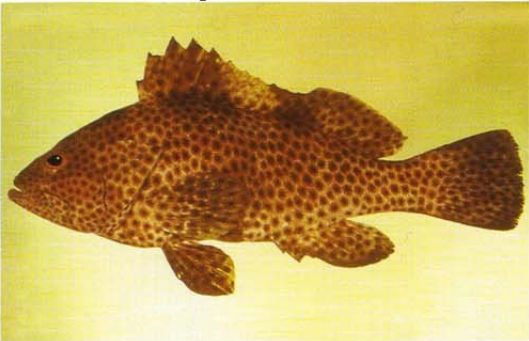
26. *Epinephelus latifasciatus* 27.4 cm SL, Cochin, India



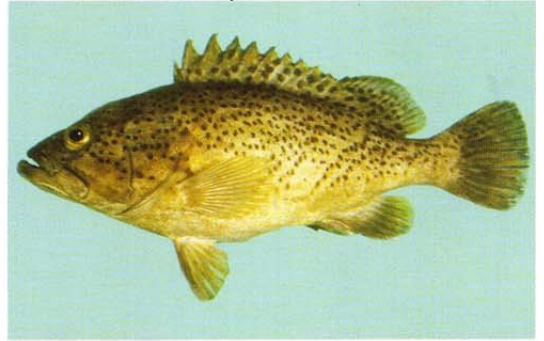
27. *Epinephelus longispinis* 30.2 cm SL, Batu Nampar, Lombok, Indonesia



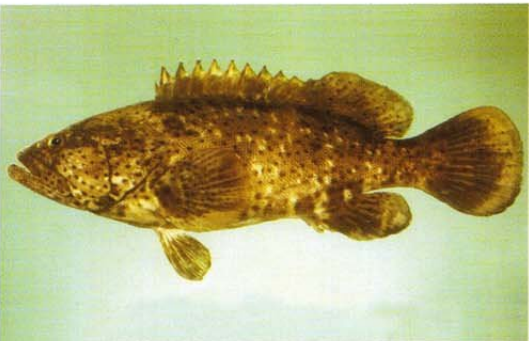
28. *Epinephelus macrospilos* 18.6 cm SL, Sodwana Bay, Natal, South Africa



29. *Epinephelus maculatus* 26.3 cm SL, Enewetak, Marshall Islands



30. *Epinephelus magniscuttis* 33.5 cm SL, Sodwana Bay, Natal, South Africa



31. *Epinephelus malabaricus* 31.7 cm SL, Cochin, India

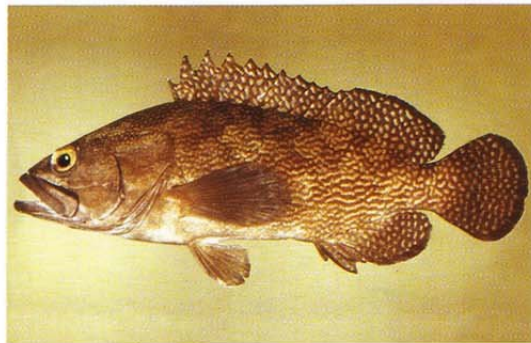


32. *Epinephelus merra* 9.3 cm SL, Lord Howe Island, Australia

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34. *Epinephelus ongus* 22.2 cm SL, Pohnpei, Caroline Islands



35. *Epinephelus polystigma* 8.8 cm SL, Ambon Bay, Indonesia



36. *Epinephelus quoyanus* 10 cm SL, Poka, Ambon, Indonesia



37. *Epinephelus radiatus* 29.5 cm SL, Naha, Okinawa, Ryukyu Islands



38. *Epinephelus retouti* 30.4 cm SL, Papeete, Tahiti



39. *Epinephelus rivulatus* 20.6 cm SL, Naha, Okinawa, Ryukyu Islands

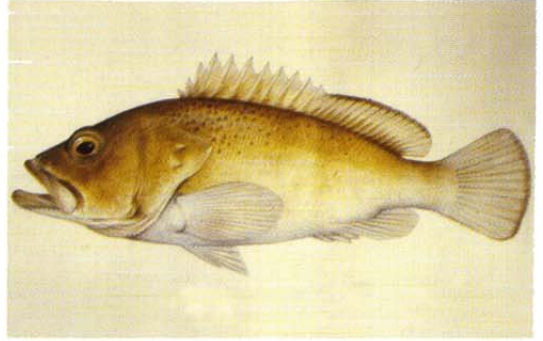


40. *Epinephelus sexfasciatus* 20.8 cm SL, Cebu, Philippines

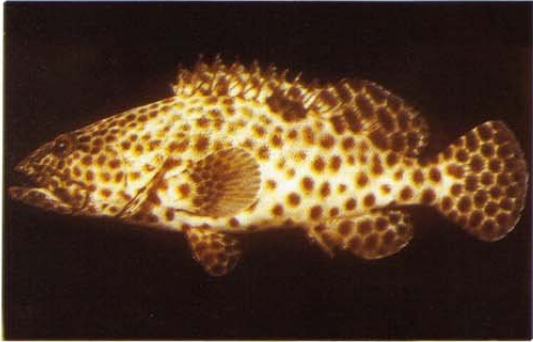
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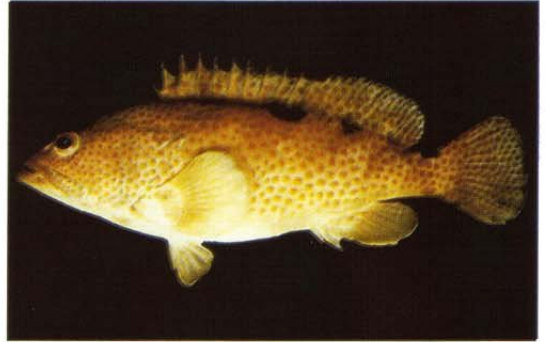
41. *Epinephelus spilotoceps* 18.8 cm SL, Kwajalein, Marshall Islands



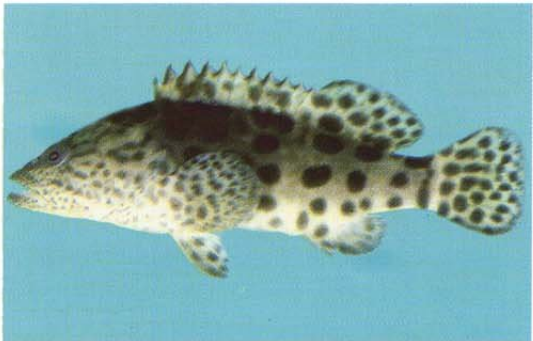
42. *Epinephelus stictus* Western Australia (painting by R. Swainston)



43. *Epinephelus tauvina* 19.2 cm SL, Enewetak, Marshall Islands



44. *Epinephelus trimaculatus* 27 cm SL, Keelung, Taiwan Province of China



45. *Epinephelus tukula* 8.8 cm SL, Kovalam, India



46. *Epinephelus undulatostratus* 26.4 cm SL, One Tree Island, Great Barrier Reef, Australia

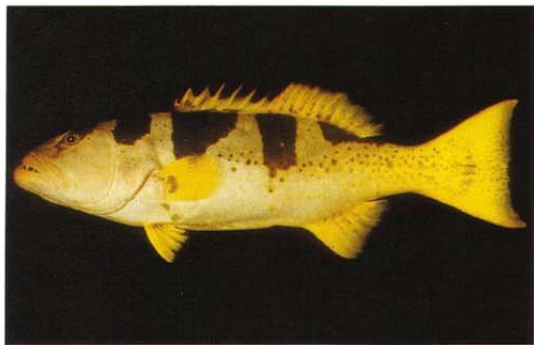


47. *Gracila albomarginata* 23 cm SL, Majuro, Marshall Islands

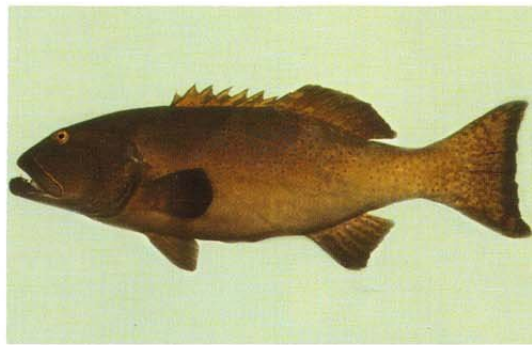


48. *Plectropomus areolatus* 35 cm SL, Enewetak, Marshall Islands

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49. *Plectropomus laevis* 59.7 cm SL, Enewetak, Marshall Islands



50. *Plectropomus laevis* 47.5 cm SL, Enewetak, Marshall Islands



51. *Plectropomus leopardus* 20.8 cm SL, Gill Ayer, Lombok, Indonesia



52. *Plectropomus maculatus* 40.2 cm SL



53. *Plectropomus oligacanthus* 24A cm SL, Alite Reef, Solomon Islands



54. *Saloptiapowellii* 38.8 cm SL, Guam



55. *Variola albimarginata* 22 cm SL, Mauritius



56. *Variola louti* 27.3 cm SL, Enewetak, Marshall Islands