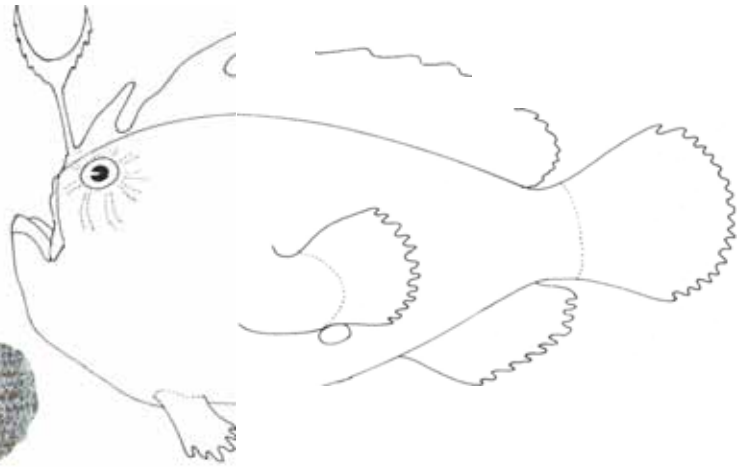


ANTENNARIIDAE



Antennarius commerson



Antennarius hispidus



Antennarius pictus



Antennarius striatus

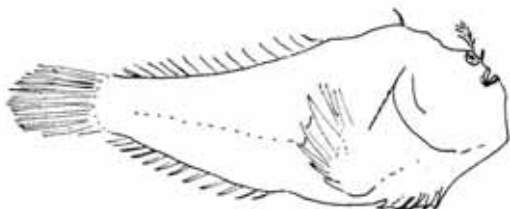


Lophiocharon trisignatus



Tathicarpus butleri

TETRABRACHIIDAE



Tetrabrachium ocellatum

ANTENNARIIDAE

Fishing frogfishes -

Specialised bottom-dwelling small to medium-sized fishes. Body short, bulky and slightly compressed. Head large; mouth large, oblique or vertical; eyes lateral, teeth slender; gill opening pore-like, situated below and behind pectoral fin base. Scales absent, skin loose and flabby, either smooth or with spinules or fleshy filaments. Illicium (modified first dorsal fin spine) long, its tip usually thickened or branched, not depressible; second and third dorsal fin spines well developed and covered by skin; ventral fin with 5 rays; pectoral fin modified and single, with distinct "elbow".

Total genera in the family 15, of which members of three were obtained on the Survey.

REFERENCES: Pietsch, 1999, Pietsch & Arnold, 2020.

Antennarius commerson

Narrow filaments at tip of moderately-long illicium. Dorsal fin rays all branched; all pectoral fin and anal fin rays unbranched; all caudal fin rays branched. Body marbled and speckled with dark marks and with scattered pale red and yellow patches.

D₂ 13 (rarely 11 or 12). A 8. P 11 (rarely 10)
(voucher: 190 mm SL)

Antennarius pictus

Illicium nearly twice length of tapered 2nd dorsal spine, posterior membrane which reaches base of 3rd spine, usually covered with spinules; caudal peduncle present. Up to 5 last dorsal rays branched; caudal rays branched, all pectoral rays simple. Three circular dark spots on caudal fin; row of dark spots along soft dorsal fin.

D₂ 11-13. A 6-8. P 9-11.

Lophiocharon trisignatus

No caudal peduncle. Illicium slender, its tip simple and much-branched. All soft dorsal and caudal fin rays branched, pectoral fin rays simple. Tan, orange or greenish; caudal fin always with 2 or 3 rows of white ocelli across its middle.

D₂ 13. A 7. P 9.
(voucher: 75 mm SL)

Antennarius hispidus

Tip of illicium large, of a clump of filaments. Second dorsal fin spine sub-equal to illicium in length; soft dorsal fin rays simple, last 2 or 3 branched. Anal and caudal fin rays branched; pectoral fin rays simple. Brown streaks radiate over head from eye and spread obliquely across body; fins spotted dark brown.

D₂ 12-13. A 7. P 10.
(voucher: 45 mm SL)

Antennarius striatus

Tip of illicium with 2 or 3 simple filaments; second dorsal fin spine noticeably shorter than illicium; soft dorsal fin rays simple, last 2 or 3 branched. Anal and caudal fin rays branched; pectoral fin rays simple. Dark brown streaks spread across head and obliquely over body; fins spotted or striped dark brown.

D₂ 12-13. A 6-7. P 10.
(voucher: 80 mm SL)

Tathicarpus butleri

Elongate tubercles and filaments on body, illicium very long, with simple filaments at tip. Soft dorsal, anal and caudal fins high; pectoral fin free of body for most of its length. All fin rays simple except for branched anal fin rays. Dark grey or mauve; distinct olive or black oval patch on side near pectoral fin; anal fin black.

D₂ 11. A 7. P 6-8.
(voucher: 55 mm SL)

TETRABRACHIIDAE

Smooth angler fishes -

Head "globular" or rounded in cross-section, prominent hump on nape; body compressed posteriorly. Mouth small, opening dorsally; teeth slender; small eyes dorsally, gill opening pore-like, situated below and behind pectoral fin base. Scales absent, body smooth and firm. Illicium (modified first dorsal fin spine) small, with no cavity to contain it; all dorsal fin spines exposed; ventral fin with 1 spine and 5 rays.

Two genera and two species in the family, of which one was caught in the Survey.

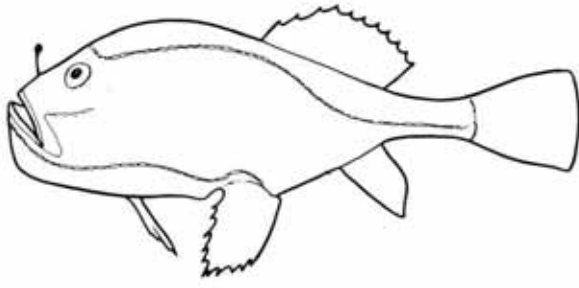
REFERENCES: Pietsch, Johnson & Arnold, 2009; <https://www.fishbase.se/summary/Dibrachichthys-melanurus.html>

Tetrabrachium ocellatum

Second dorsal fin spine fringed and large, 3rd very small and on hump of neck. Violet-brown above with many oval white spots extending over soft dorsal fin; body white below.

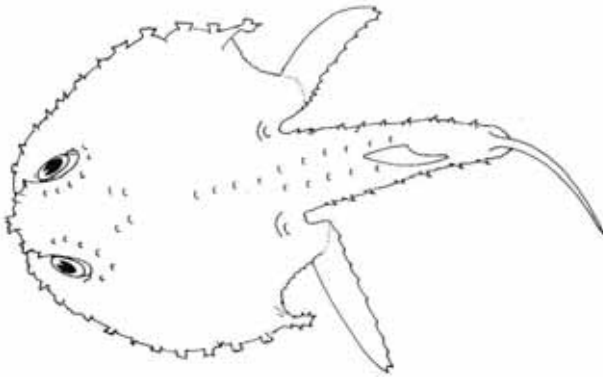
D I: 1; 1; 16-17. A 11-12. P 4+5 (in 2 parts)

CHAUNACIDAE

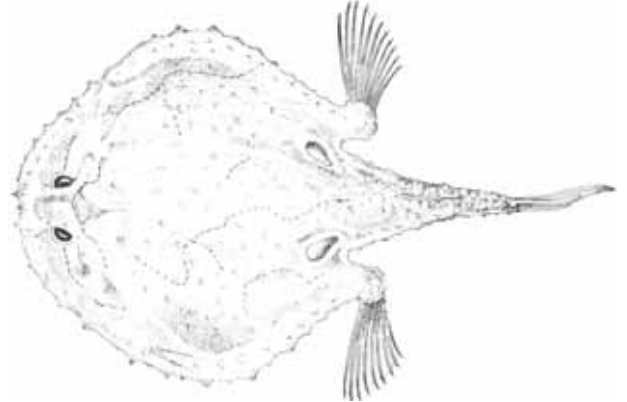


Chaunax gonomi

OGCOCEPHALIDAE



Haliutaea sp 1



Haliutaea coccinea drawing of preserved specimen



Haliutaea fumosa



Haliutaea indica

CHAUNACIDAE

Sea toads -

Body ovate and compressed posteriorly. Head square in cross-section; mouth large, almost vertical; teeth slender. Small pore-like gill opening behind pectoral fin base. Skin soft and flabby, densely covered with fine prickles and scattered with soft flaps of skin. First dorsal spine modified as a short, thick, "fishing rod with a lure" (illicium) depressible into a circular hollow before eyes; second and third dorsal fin spines embedded beneath skin; ventral fin with 1 spine and 4 rays; well-developed pectoral fin with a distinct "elbow".

Two genera with 27 species in the family. One species obtained on the Survey.

REFERENCES: Caruso, 1999b; Ho, Kawai & Satria, 2015.

Chaunax gomoni

Tip of illicium black, illicium fits into a circular groove or hollow before eyes. Belly often inflated. Body deepest in mid-length. HL 2.5 in SL. Body pink, sometimes dusky; usually with large yellow, green and olive spots on dorsal surface. Peritoneum white.

(D 1; (1; 1;) 11-13. A 5-7. P 12-13.
(voucher: 53 mm SL)

OGCOCEPHALIDAE

Batfishes -

Head extremely depressed and large, rounded or triangular; body short, slender and slightly compressed. Mouth wide, and horizontal; fine teeth in jaws. Skin naked, but well-developed hard plates and spines on upper surface and tail. Gill opening small, above pectoral fin base. Pectoral fin well-developed. Illicium (first dorsal fin) short, thickened and bulbous at its end, depressible into a pit or groove on snout. Second dorsal fin spine embedded beneath skin; 3rd dorsal spine absent. Ventral fin with one spine and 5 rays. Soft dorsal and anal fins small. Colouration and the extent of spination appear to be variable.

10 genera known, of which two were obtained on the Survey:

Malthopsis: esca ovate; disc triangular.

Halieutaea: esca in three lobes; disc rounded; gills three.

REFERENCES: Prokofiev, 2020a; Ho & Shao, 2008; Bradbury, 1999.

Halieutaea sp 1

Sharp spines over dorsal surface, ventral surface covered with fine spinules; disc ovate, distinctly longer than wide, humped behind eyes; eye 1.7 in interorbital, 11.5 in disc length; roof of rostral cavity does not reach disc edge.

Dorsal surface rosy with violet patches, ventral surface bright pink, lateral lobes of esca bright crimson; fins plain grey or rosy.

D 5. A 4.

(voucher: 65 mm SL)

Halieutaea fumosa

Strong spines and skin filaments scattered on dorsal surface, ventral surface completely smooth; disc slightly wider than long, slightly flattened behind eyes; eye equal to interorbital, 6.5-7 in disc length; roof of rostral cavity does not reach disc edge. Dorsal surface pinkish-fawn, with few thin lines of black spots, disc edge pink, filaments black, ventral surface pale crimson or grey, esca stippled green over dark pink; lining of gill cavity fawn, peritoneum black; fins pink crossed by broad black bands.

D 4-5. A 5. P 12-13.

(voucher: 64.5 mm SL)

Halieutaea coccinea

Well-developed spines over all of dorsal and ventral surfaces; disc slightly wider than long, humped behind eyes; eye 1.6-2 in interorbital, 9 in disc length; roof of rostral cavity does not reach disc edge; lateral lobes of esca prominent. Dorsal surface bright pink, sometimes with pattern of fine black lines; ventral surface dark crimson; lining of gill cavity and peritoneum black; lateral lobes of esca dark pink; fin edges dusky.

D 5. A 4. P 14-15.

(voucher: 135.5 mm SL)

Halieutaea indica

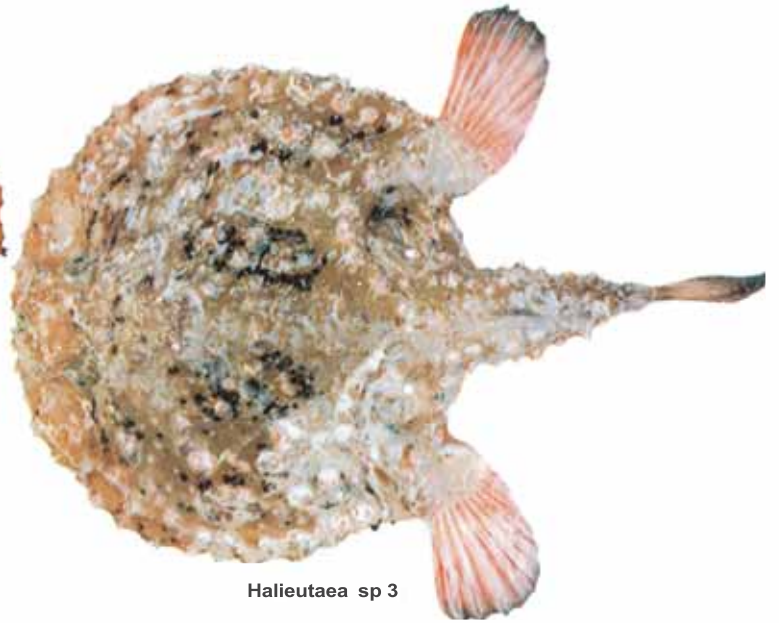
Many strong sharp spines over dorsal surface, ventral surface mostly smooth except for fine spines around ventral fin bases; disc wider than long, slightly flattened behind eyes; eye 1.2 in interorbital, 7.5 in disc length; roof of rostral cavity reaches disc edge. Dorsal surface fawn or dusky pink with wide brown lines encircling gill openings and forming a "U"-shaped marking medially; ventral surface pink, stippled fawn; lining of gill cavity and peritoneum pale; dorsal fin brown, others orange-yellow, barred white.

D 4. A (damaged in voucher). P 12-13.

(voucher: 56 mm SL)



Halieutaea sp 2

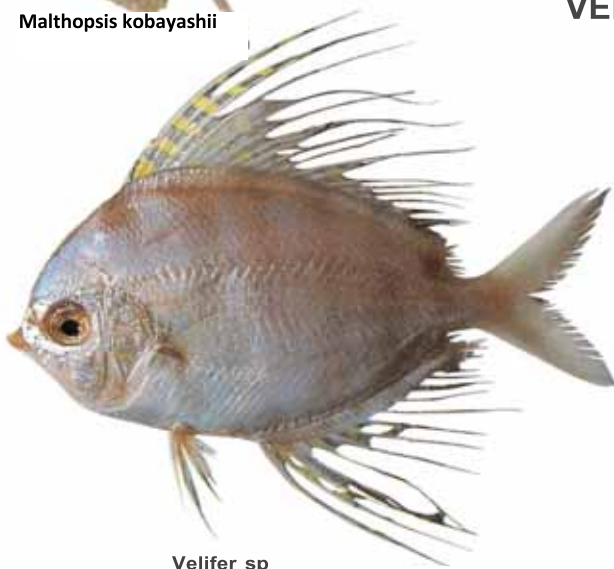


Halieutaea sp 3

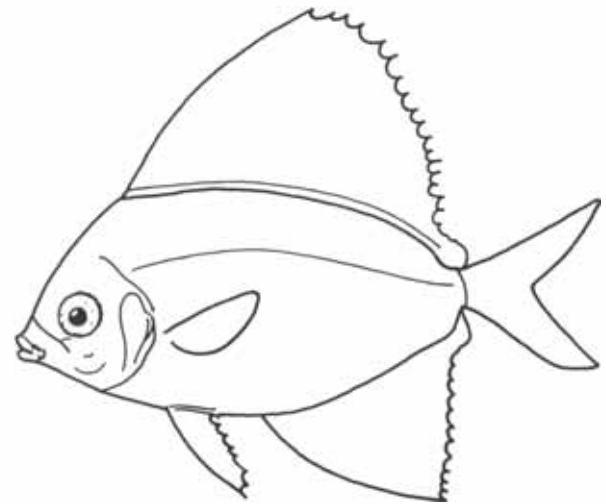


Malthopsis kobayashii

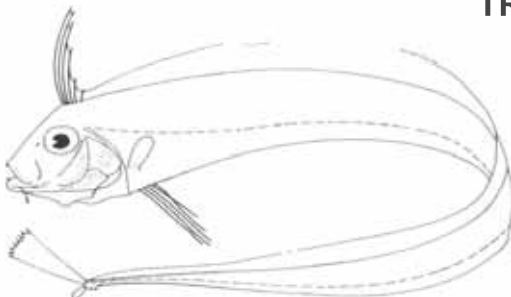
VELIFERIDAE



Velifer sp



TRACHIPTERIDAE



Desmodema polystictum

ATELEOPODIDAE



Ateleopus javanicus

Halieutaea sp 2

Strong spines cover dorsal surface, ventral surface covered with fine spinules or simple spines; disc much wider than long, flattened behind eyes; eye 1.5-1.7 in interorbital, 8-9 in disc length; roof of rostral cavity ends well behind disc edge. Dorsal and ventral surfaces orange-red, black spots forming pattern of clusters and crescentic lines on dorsal surface; fins orange-red, margins scarlet.

D 4-5. A 4. P 13-14.

(voucher: 161 mm SL)

Malthopsis kobayashii

Disc triangular, snout produced to form a sharp projecting spine; many body plates over dorsal surface, tail, fewer on ventral surface. Esca a single ovate bulb; eye 4-5 in disc length; subopercular spine triangular and with spinules (none antrorse). Dorsal surface violet, fawn or dusky, sometimes with scattered black rings; fins plain. D 5. A 4. P 11-12.

(voucher: 44 mm SL)

Halieutaea sp 3

Many strong sharp spines over dorsal surface, ventral surface smooth except for scattered fine spines around ventral fin bases; disc slightly wider than long, slightly flattened behind eyes; eye 1-2 in interorbital, 8-9 in disc length; roof of rostral cavity does not reach disc edge.

Dorsal surface rosy or dusky pink, usually patterned with black spots forming crescentic lines or clusters near disc midline; ventral surface dark crimson; esca dusky; fins pink or red with black margins. Lining of gill cavity pale fawn, peritoneum brown, stippled dark.

D 4-5. A 4. P 13-15.

(voucher: 190 mm SL)

VELIFERIDAE

Veil fins -

Body deep, ovate and compressed. Mouth small and with no teeth. Body scales cycloid and easily lost. Dorsal and anal fins single, long and elevated, of few to many feeble spines and many rays; scaly sheath at their bases. Ventral fin has 8-9 rays, and a scaly axillary process. Caudal fin deeply forked.

Two genera and two known species of which one was caught on the Survey.

REFERENCE: Olney, 1999.

Velifer sp

Maxilla reaches front of eye; scaly sheath along entire dorsal fin base. Iridescent blue-green; back crossed by 6 or 7 dusky bars. Alternating blue and yellow bands along dorsal and anal fins; a large white-ringed black spot posteriorly on dorsal fin. Caudal fin plain.

D 32-36 (total). A 23-27. L. lat. 59-63.

(voucher: 119 mm SL)

TRACHIPTERIDAE

Ribbonfishes -

Very compressed and elongate fishes, tapering posteriorly. Head short and high, profile steep; mouth oblique, protractile; some teeth weak, others fang-like; eye large; head bones strong. Body naked or with easily lost scales; lateral line with tubular and spine-bearing plates. Long dorsal fin begins above or behind eye, a spine at base of each ray; anal fin absent; only upper lobe of caudal fin well-developed and situated at right angles to or on same axis as caudal peduncle; ventral fin of 1-10 rays; pectoral fin short, almost vertical.

Three genera, 10 species in the family.

REFERENCE: Olney, 1999.

Desmodema polystictum

Caudal fin on same axis as caudal peduncle, no lower caudal lobe; tail extremely long; ventral body profile not scalloped; each lateral line scale with pair of spines, rest of body naked (all sizes). Snout length less than eye. Body silvery, reddish above, dusky spots on upper half of body in smaller fish.

Caudal 7-10.

(voucher: 495 mm SL)

(Note: photo of preserved voucher)

ATELEOPODIDAE

Jellynose fishes -

Head large; trunk short; tail long, compressed and tapered. Eye small, mouth inferior, opercular bones hidden by skin; teeth very small or absent. Skin soft, jelly-like, slimy, usually without scales. Fins without spines; dorsal fin single and short, above pectoral fin. Anal fin long and joined to caudal fin. Pectoral fin well-developed; ventral fin with two rays. Gill openings wide.

Four genera with 13 species of which one was collected on the Survey.

REFERENCES: Moore, 1999; Kaga, van Oijen, Kubo & Kitagawa, 2015.

Ateleopus japonicus

Head large; snout projecting and obtuse and bulbous; fine teeth anteriorly in upper jaw, none in lower. HL slightly longer than trunk length, but shorter than single-rayed ventral fin. Tail long and tapered. Eye 12 in HL; dorsal fin height 1.6 in HL; pectoral fin 1.4 in HL. Body depth 11.6 in SL; HL 5.5 in SL. Tan, darker ventrally and fins dark; head orange-brown.

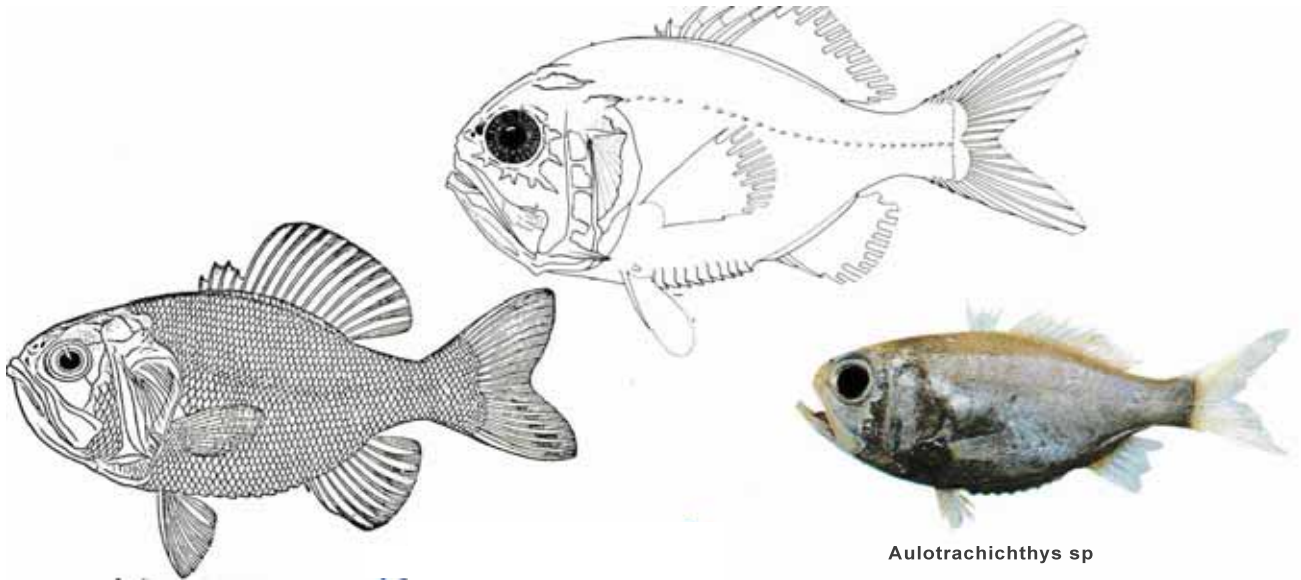
D 8-9. A 115. P 12. C 5. GR 0 + 8 or 9.

(voucher: 444 mm SL)

*** MELAMPHAIDAE**

(See Species List)

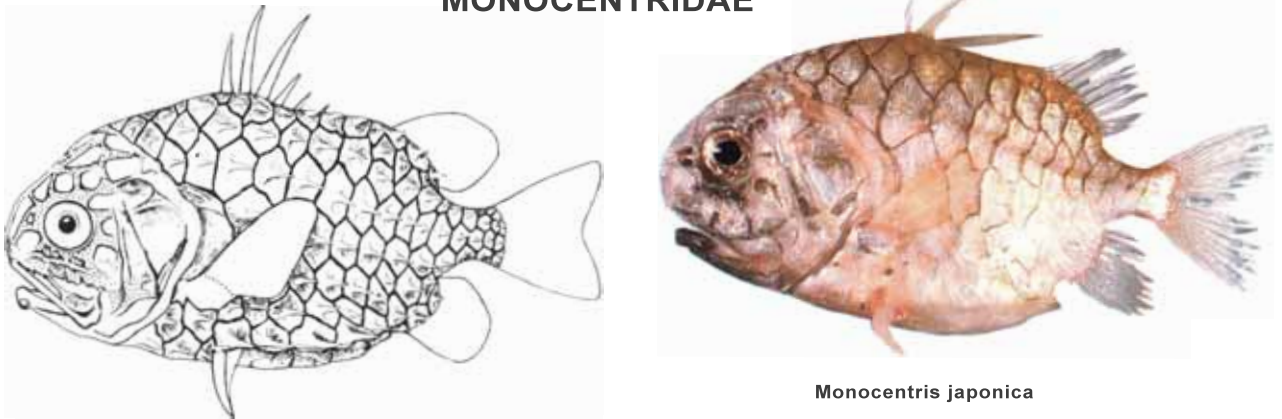
TRACHICHTHYIDAE



Aulotrachichthys latus after Fowler, 1938

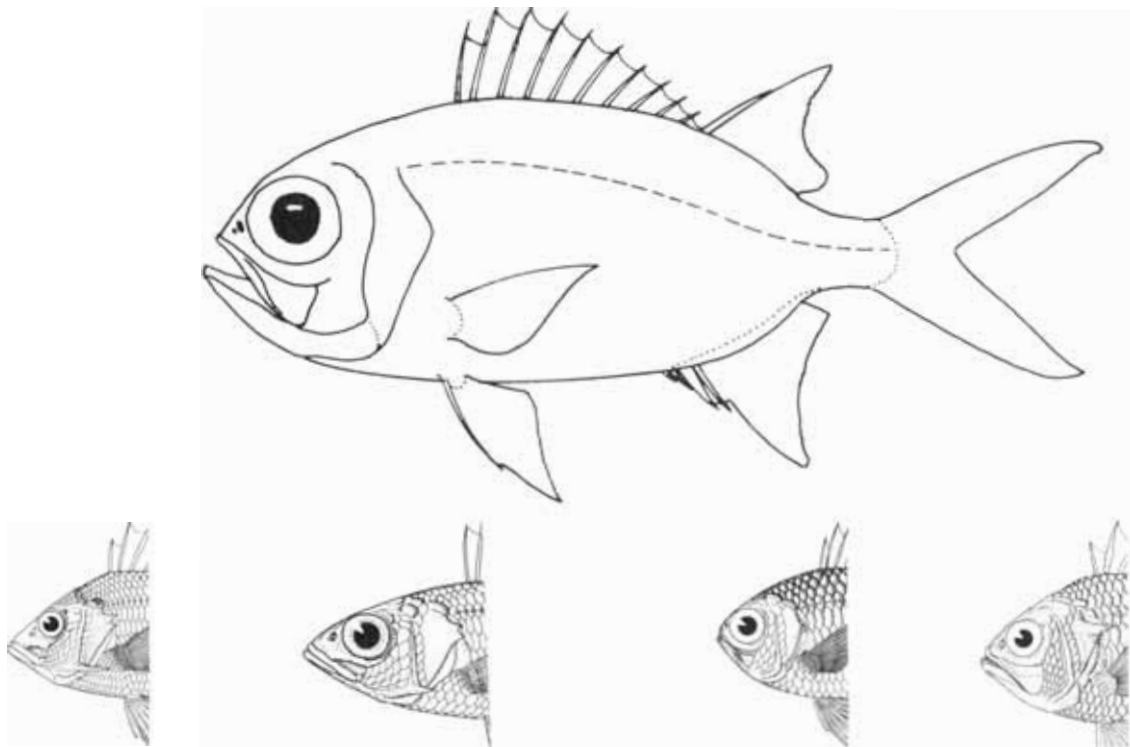
Aulotrachichthys sp

MONOCENTRIDAE



Monocentris japonica

HOLOCENTRIDAE



Sargocentron

Neoniphon

Myripristis

Ostichthys

TRACHICHTHYIDAE

Slimeheads; Roughies -

Small to medium-sized fishes of deeper water. Body ovate and compressed. Head large with mucous cavities covered by skin; strong spines on preoperculum and operculum. Mouth large and oblique, teeth small. Scales ctenoid (rough) and usually a keel of strong scutes along belly. Dorsal fin single, with a few strong spines; anal fin short-based. Caudal fin forked; ventral fin with 1 spine, 6-7 rays.

Family comprises eight genera and 48 known species. Representatives of one genus caught on the Survey.

REFERENCES: Moore & Paxton, 1999. Gomon, 2006.

Aulotrachichthys latus

Scales moderately ctenoid; striated light organ along ventral profile from breast to caudal peduncle. Anus anterior, between ventral fin bases. Seven to 9 scutes present between ventral fin and anal fin origin. Body depth 2.4-2.6 in SL. Body brown, iridescent silvery-grey below. D III-IV, 15. A II, 9 57-58 scale rows along body. Lower GR 10.

(voucher: ? mm SL)

Aulotrachichthys sp.

Scales moderately ctenoid; striated light organ along ventral profile from breast to caudal peduncle. Anus anterior, between ventral fin bases. Seven to 9 scutes present between ventral fin and anal fin origin. Body depth 2.5-2.7 in SL. Dark grey or tan; fins pale pink.

D IV-V, 13-14. A II-III, 8-9. 59-66 scale rows along body. Lower GR 10-12.

(voucher: 74 mm SL)

MONOCENTRIDAE

Pinecone fishes -

Body deep, compressed. Head large with mucous cavities covered by skin. Mouth large, inferior, teeth fine. Light (phosphorescent) organs under lower jaw. Scales large, heavy and bony, united to form a rigid covering for body. Dorsal fin notched, with 5 or 6 strong spines. One or two spines in anal fin. Ventral fin with one long, strong spine and 3 rays. Caudal fin moderately forked.

Family comprises two genera and four species, one collected in the Survey.

REFERENCE: Paxton, 1999b.

Monocentris japonica

Snout profile rounded; a pair of light organs each side of chin. Suborbital deep, almost equal to eye diameter. Body yellow, scales outlined in black; lower jaw black.

D V-VI, 11-12. A II, 8.

(voucher: 120 mm SL)

HOLOCENTRIDAE

Squirrelfishes, Soldierfishes - Suangi;

Moderately deep-bodied, compressed fishes, mostly associated with shallow coral reefs, but some in deeper waters. Bones of head with highly serrated margins and often long and strong spines. Eye large. Spinous part of dorsal fin (10-13 spines) separated from shorter but higher soft part by a deep notch; anal fin with 4 strong spines (third usually the longest). Scales with rough hind margins. Body and fins often red or red and silver; distinctive marks may include black at hind border of gill opening.

Family comprises eight genera and about 90 species.

REFERENCES: Randall & Greenfield, 1996; Randall & Greenfield, 1999; Greenfield, Randall & Psomadakis, 2017; Randall, 1998.

SYNOPSIS OF GENERA

Subfamily Holocentrinae: long, sharp spine at lower angle of preoperculum; anal fin with 7-10 branched fin rays.

Sargocentron: last dorsal fin spine the shortest, not joined to soft part of fin.

Neoniphon (Flammeo of authors): last dorsal fin spine longer than the other one before it, joined to soft part of fin.

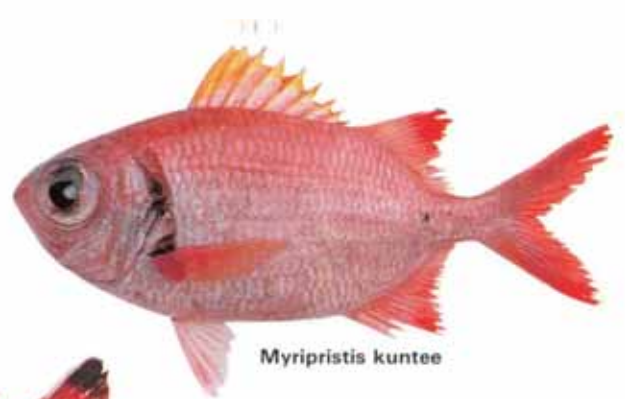
Subfamily Myripristinae: lower angle of preoperculum rounded or with very short, broad spine; anal fin with more than 10 branched fin rays.

Myripristis: 11 dorsal fin spines.

Ostichthys: 12-13 dorsal fin spines.



Myripristis berndti



Myripristis kuntee



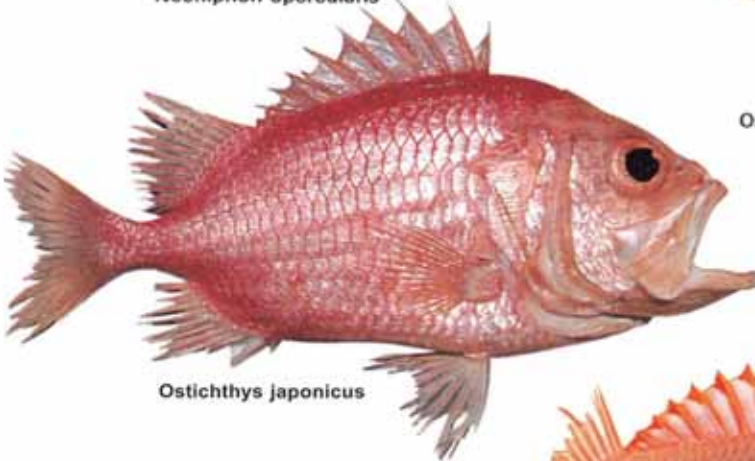
Myripristis botche



Neoniphon opercularis



Ostichthys acanthorhinus



Ostichthys japonicus



Ostichthys kaianus



Sargocentron caudimaculatum



Sargocentron diadema



Sargocentron punctatissimum

Myripristis berndti

Scales present in pectoral fin axil; vomerine tooth patch triangular with rounded edges; interorbital 4.3-5.2 in HL. Broad orange-yellow band on margin of spinous dorsal fin; soft dorsal and anal fins tipped white; black margin on operculum interrupted.

D₁ XI

(voucher: 150 mm SL)

Myripristis botche

No scales in pectoral fin axil. Margin of spinous dorsal fin red; leading edges of dorsal, anal and caudal fins white, sub-marginally black; black margin on operculum continuous.

D₁ XI.

(voucher A: 230 mm SL) (voucher B: 145 mm SL)

Neoniphon opercularis

Last dorsal spine longer than the second last one. Spinous dorsal fin black with "zig-zag" white band basally; operculum and shoulder region deep red. Body bluish red with scale being black on posterior part; white on belly. Soft dorsal and anal fins with first rays red, last rays yellow. Caudal fin with yellow middle rays, upper and lower margins red.

A₂ 9.

(voucher: 205 mm SL)

Ostichthys japonicus

All scales clearly striate. Body and fins plain silvery-red with no distinct markings.

D₁ XIII. Pectoral fin 17 (average). Lower GR 11-14. Tr above 3½.

(voucher: 340 mm SL)

Sargocentron caudimaculatum

Nasal fossa with one or more spines. Silver spots on upper caudal peduncle just behind dorsally-white fin; margin of spinous dorsal fin red. No black markings on fins.

D₁ XI, 14. P 13-14. A. IV, 9.

Tr above 2½. L. lat. 40-43.

(voucher: 160 mm SL)

Sargocentron punctatissimum

Nasal fossa without spines. Outer margin of spinous dorsal fin crimson; snout profile steep, convex before eye; body with scattered dark spots; diffuse red band from nape to inner pectoral fin axil.

Tr above 2½. L. lat. 42-45.

D₁ XI, 12-14. P 15. A. IV, 9.

(voucher: 105 mm SL)

Myripristis kuntee

Broad rectangular dark brown or black bar from upper edge of gill opening into pectoral fin axil. Spinous dorsal fin yellow; tips of red soft dorsal, anal and caudal fin lobes white.

D₁ XI, 15-17. Tr above 2½. L. lat. 37-44.

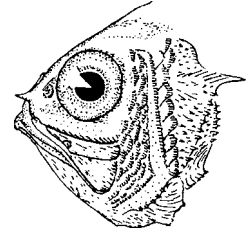
(voucher: ? mm SL)

Ostichthys acanthorhinus

Sharp, forward-directed spine from nasal bone (see fig). Body rosy violet, silvery below; scale centres white, forming faint longitudinal stripes. All fins clear.

D₁ XII. Lower GR 16-18. Tr above 3½.

(voucher: 112 mm SL)

**Ostichthys kaianus**

Body bright red, scale centres white, forming longitudinal white stripes along body. Fins red without distinctive markings.

D₁ XIII. Pectoral fin 16 (average). L. lat. usually 28. Tr above 2½.

(voucher: 140 mm SL)

Sargocentron diadema

Thin white lines along body over scale row junctions. Oblique white stripe below eye. Leading edges of soft dorsal and anal fins and margins of white caudal fin crimson. First basally, outer ¼ plain brownish red. No spines on nasal fossa.

Tr above 2½.

(voucher: 110 mm SL)



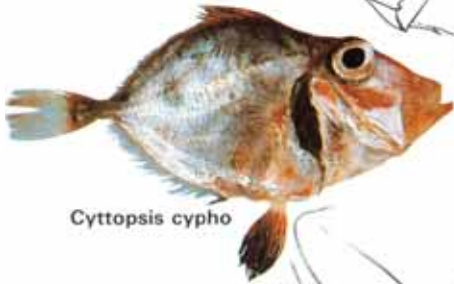
Sargocentron rubrum



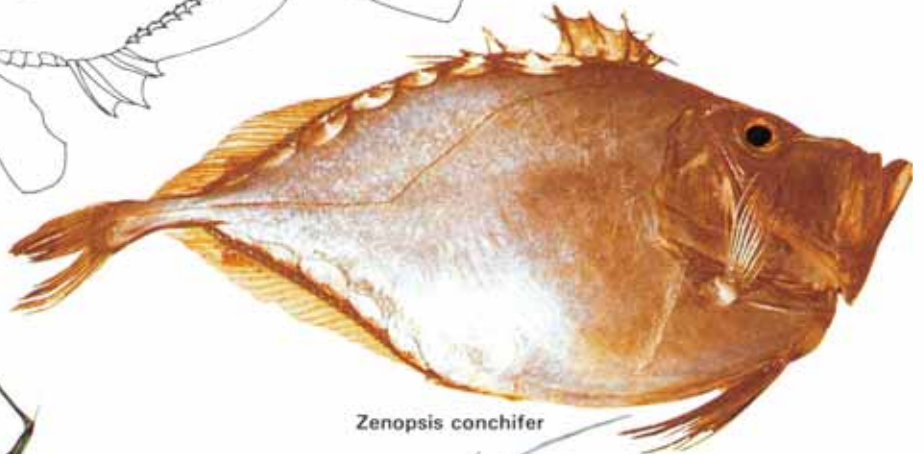
Sargocentron spiniferum

ZEIDAE

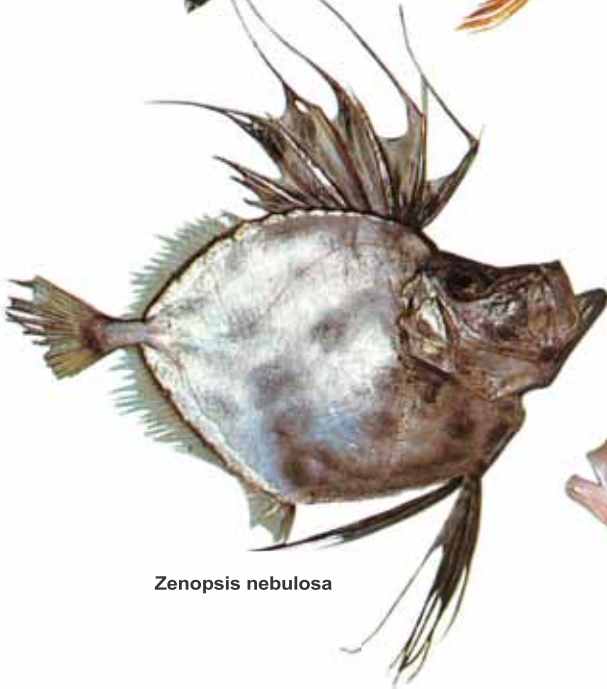
See opposite page for explanation on correct classification of *Cyttopsis cypho*



Cyttopsis cypho



Zenopsis conchifer

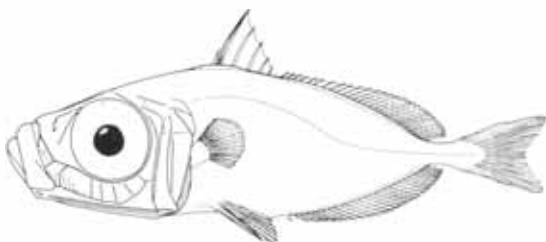


Zenopsis nebulosa



Zeus faber

ZENIONTIDAE



Zenion sp.

Sargocentron rubrum

No spines on nasal fossa. White stripe along each body scale row. Dorsal spines red, membrane orange or cream; soft dorsal, anal fins and caudal fins yellow, leading edges and margins crimson. Tips of ventral blackish. Tr above 2½. L. lat. 34-37. Total GR 14-19. Diagonal rows of scales on cheek 5. (voucher: 220 mm SL)

Sargocentron spiniferum

Nostril without spines. Spinous dorsal fin uniform deep scarlet, all other fins yellow-orange. Large vertically elongate crimson spot on head behind eye. Inner pectoral fin axil crimson. Tr above 3½. L. lat. 41-47. D₂ 15. A IV, (usually) 10. P 15. (voucher: 355 mm SL)

ZEIDAE

Dories

Body ovate, very compressed, body depth more than head length. Mouth very large and oblique, upper jaw extendable. Eye moderate; head large, its profile steep. Scales very small or absent. Spines or bucklers often present along dorsal and anal fin bases; row of bony plates always present on belly. Dorsal fin single, deeply notched between spined and rayed portions, 6-10 spines in first part. Anal fin with 1-4 spines; ventral fin with one spine and 6-8 rays. Caudal fin rounded or truncate.

Two genera and six species in the family; three species obtained on the Survey.

REFERENCES: Heemstra, 1980; Heemstra, 1999a; O'Toole & Winterbottom, 2003.

Zenopsis nebulosa

Membrane of spinous dorsal fin produced into short filaments. Twelve to 14 large bucklers along base of spinous and soft dorsal fins, 8-9 along base of anal fin. Two to 3 single and 2-4 paired bucklers along ventral profile before ventral fin and 1 unpaired plus 6-8 paired bucklers behind ventral fin. Body silvery blue or greyish; dark grey or brown blotches scattered over body and fins. D VIII-X, 27-29. A III, 23-24. V 6-7. (voucher: 168 mm SL)

Zenopsis conchifer

Spinous dorsal fin membrane produced into short filaments; 1-3 + 4-5 large bucklers along base of spinous and soft dorsal fins, 5-7 along anal fin base; 2-3 bucklers along ventral profile before ventral fin and pairs of bucklers behind. Body silvery-grey, faint blotch above pectoral fin. Spinous dorsal and ventral fins dark brown. D IX-X, 24-27; A III, 24-26. V 6-7. (voucher: 485 mm SL)

Zeus faber

Membrane of spinous dorsal fin produced into long filaments behind each spine. Five to 7 bucklers along bases of soft dorsal and anal fins. Head brown or bronze to violet-brown on caudal peduncle. Brown horizontal stripes on body and large black spot on mid-sides. D X, 23-24. A IV, 21-22. Lower GR 7-10. VI, 6-7.

PARAZENIDAE

Parazen -

Premaxillaries highly protrusible. Lateral lines 2; fused behind soft dorsal fin. Spinous dorsal fin with 8 rays. Second dorsal fin with 26-30 soft rays. A single spine in anal fin; soft rays 31. Pectoral fin rays 15 or 16. Pelvic fin insertion thoracic. A single unbranched pelvic fin ray 1; 6 branched and one unbranched rays in ventral fin. Caudal fin with 11 principal rays. Slightly ctenoid scales. Three genera and four species in the family; one obtained on the Survey.

REFERENCE: Tyler, O'Toole & Winterbottom, 2003, Heemstra, 1999.

Cyttopsis cypho

Head dusky orange, body grey, iridescent; round indistinct spot may be present on lateral line below soft dorsal fin. Ventral fin with orange rays, membrane black. No spine in ventral fin. Scales thin, easily lost; low bucklers along base of soft dorsal and anal fins, row of 4 bucklers along belly. D VII, 29. A I, 30. L. lat. 55-59. V 9-10. (voucher: 78 mm SL)

ZENIONTIDAE

Bighead dories -

Body ovate, very compressed, its depth subequal to head length. Mouth moderate or large, almost vertical and protractile (extendable); eye large; head with mucous cavities, most head bones finely serrated. Scales small and ctenoid, none on head; single lateral line. Single dorsal fin with spinous part of 6-7 spines notched from rayed part; anal fin with 0-2 spines; ventral fin with 1 spine and 6 rays; caudal fin truncate or rounded.

REFERENCES: Heemstra, 1980; Heemstra, 1986; Tyler, O'Toole & Winterbottom, 2003.

Zenion sp.

Body profiles evenly convex; HL and body depth 2.2-2.5 in SL; eye 1.7-1.9 in HL. Second spine of dorsal and 1st ventral spine strong and serrated; anal spine short; ventral rays shorter than long fin spine; caudal emarginate. Dark reddish blue body, silvery over head; outer half of white spinous dorsal and ventral fins black; black margin on caudal fin. D VI-VII, 26-27. A I, 22-23. L. lat. 58-60. Lower GR 12. (voucher: 41 mm SL)

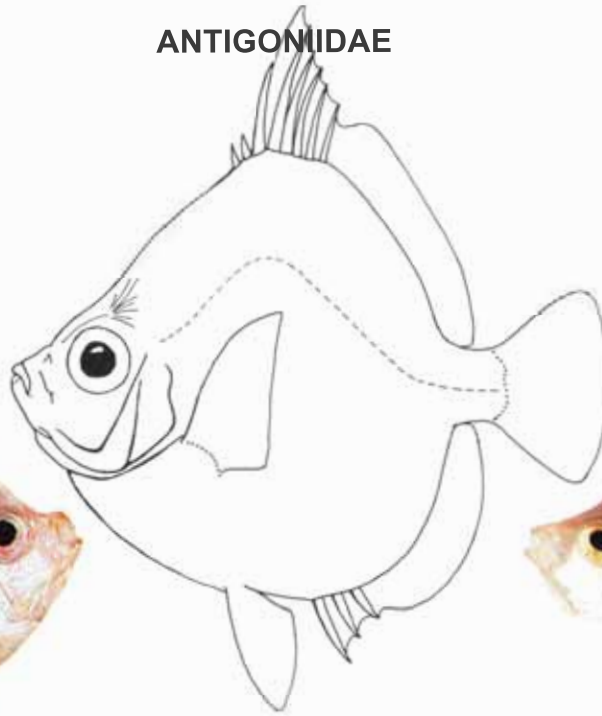
*** GRAMMICOLEPIDIDAE**

(See Species List)

ANTIGONIIDAE



Antigonia capros



Antigonia rubescens

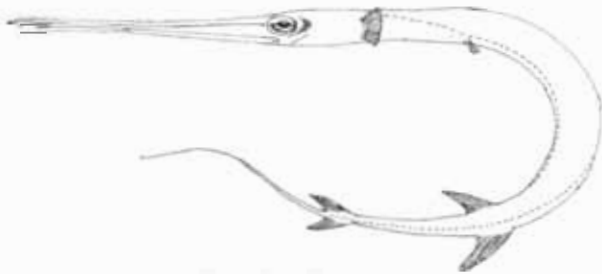


Antigonia rubicunda



Antigonia malayana

FISTULARIIDAE



Fistularia commersonii redrawing of figure on Fritzsche & Thiesfeld, 1999a



Fistularia petimba

CENTRISCIDAE



Centriscus scutatus

ANTIGONIIDAE

Boarfishes -

Very deep and compressed, rhomboid or oval in shape; head profile very steep, concave above eye, ventral profile convex. Mouth protractile, jaw teeth small, none on palate; upper head surface bony and striated; preoperculum and suborbital finely serrated. Small body scales rough and ctenoid, side of head scaly. Dorsal fin single, with 7-9 strong stout spines scarcely notched from soft fin with 26-38 rays; anal fin with 3 spines and 25-35 rays; pectoral pointed; ventral fin with one spine and 5 rays, placed behind pectoral base; caudal fin slight rounded.

Family comprises a single genus and 18 species; four obtained on the Survey.

REFERENCES: Heemstra, 1999b; Parin & Borodulina, 1986; Zehren, 1987; Prokofiev, Psomadakis & Gon, 2020.

Antigonia capros

Predorsal profile steep, mouth oblique, upper jaw length 9.8-13.7 in SL. Body depth 0.7-1.1 in SL. Ventral fin origin in level with line drawn from anal origin, ventral spine 2.7-5 in SL. Silvery red body and fins.
D VII-IX, 31-37. A III, 29-34. Pi, 12-14. 46-58 scale rows between head and tail base.
(voucher: 108 mm SL)

Antigonia rubicunda

Predorsal profile moderately steep; mouth nearly vertical, upper jaw length 10.5-12.5 in SL. Body depth 0.9-1.2 in SL. Ventral fin origin above or in level with a horizontal line drawn from anal fin origin, ventral spine 3.3-4.5 in SL. Body and fins red.
D IX, 26-28. A III, 24-26. Pi, 12. 38-47 scale rows between head and tail base.
(voucher: 73 mm)

Antigonia rubescens

Predorsal profile moderately steep, mouth nearly vertical, upper jaw length 7.2-10 in SL. Body depth 1-1.3 in SL. Ventral fin origin in level with or slightly below horizontal line drawn from anal origin; ventral spine 4-5 in SL. Silvery rosy body and fins.
D VIII-IX, 26-29. A III, 24-27. Pi, 12. 48-53 scale rows between head and tail base.
(voucher: 56 mm SL)

Antigonia malayana

Predorsal profile low and angular, ventral profile rounded. Mouth vertical, upper jaw length 7-8.3 in SL. Body depth 1.2-1.5 in SL. Ventral fin origin below or in level with a horizontal line drawn from anal fin origin, ventral spine 5.7-7 in SL. Body orange red, silvery below.
D VIII-XI, 27-29. A III, 26-28. P i, 12-14. 50-60 scale rows between head and tail base.
(voucher: 57 mm SL)

FISTULARIIDAE

Cornetfishes; Flutemouths - Ikan terompet

Small to large fishes, body elongate and depressed, sometimes with a row of elongate bony plates along dorsal and ventral midlines before dorsal and anal fins. Snout long and tubular; teeth small. Body naked, or covered with rows of small spinules; lateral line ossified, sometimes spiny and continued onto caudal fin. Spineless dorsal and anal fins set well back on body, short-based and opposite each other, with 14-17 rays; ventral fin small with 6 rays; caudal fin forked with an elongate filament produced by the middle two fin rays.

There are four species in this monotypic family, of which two were collected on the Survey.

REFERENCE: Fritzsche & Thiesfeld, 1999a.

Fistularia commersonii

No embedded bony plates along midline of back. Upper ridges on snout diverging at about ½ their length from eye. Interorbital space flat. Skin granular in juveniles, adults smooth; no spines on lateral line posteriorly. Body brown-olive above, silvery below; two thin blue stripes or row of blue spots along back.
D 13-15. A 13-15. P 15-17.
(voucher: ? mm SL)

Fistularia petimba

Slender bony plates embedded in skin along midline of back before dorsal fin. Upper ridges on snout parallel, those above and behind eye strongly serrated. Interorbital space concave. Skin granular at all sizes; small sharp spines along posterior part of lateral line. Body pink or red above, silvery below.
D 14-16. A 14-15. P 15-17
(voucher: 411 mm SL)

CENTRISCIDAE

Shrimpfishes -Turik

Body extremely compressed and blade-like, ventral edge sharp. Stiff thin bony plates, fused together, encase body. Snout long and tubular, mouth terminal and toothless, slightly upturned. No lateral line. First dorsal fin spine long, stiff and sharp, placed at the very end of the body, second and third fin spines below it. Rayed dorsal and caudal fins displaced ventrally. Pectoral and ventral fins well-developed.

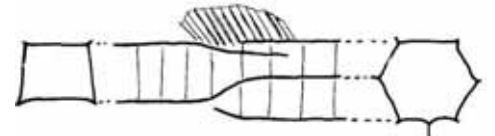
Family with five genera and 12 species; only one obtained on the Survey.

REFERENCE: Fritzsche & Thiesfeld, 1999b.

Centriscus scutatus

Body appears transparent and silvery-yellow with a dark longitudinal stripe and 8-10 vertical bars on lower sides. First dorsal fin spine tip not jointed - fused with body armour. Top of head with longitudinal striations and a groove along interorbital space. Body depth 6.4-6.7 in SL.
D III, 11-12. P 10. A 11-12.
(voucher: 146 mm SL)

SYNGNATHIDAE



Trunk

Cross section



Hippocampus angustus

Hippocampus spinosissimus



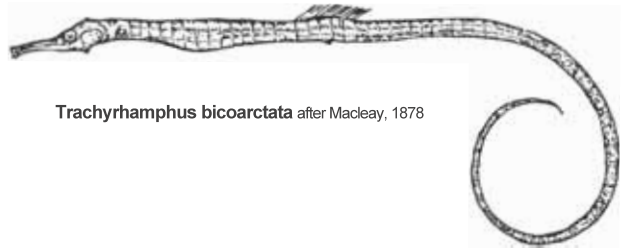
Halicampus macrorhynchus after Smith, 1963



HaHaliichthys taeniophora after Weber & deBeaufort, 1922

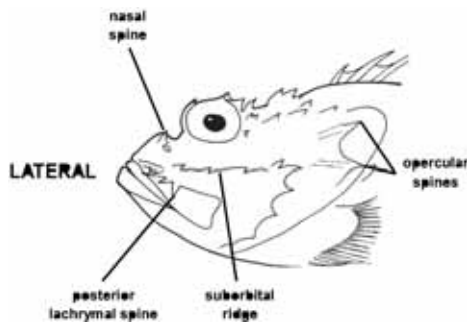


Solegnathus lettiensis after Weber & de Beaufort, 1922

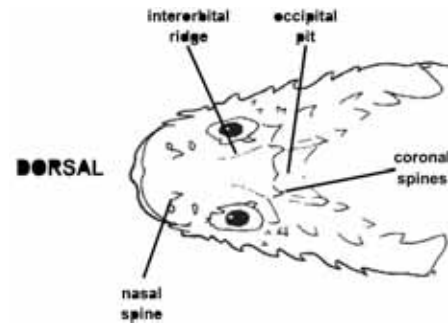


Trachyrhamphus bicoarctata after Macleay, 1878

SCORPAENIFORMES



LATERAL



DORSAL

APISTIDAE



Apistops caloundra



Apistus carinatus

SYNGNATHIDAE

Pipefishes; Seahorses - Tangkur Kuda

Body elongate, slender and encased in a series of connected bony rings. On trunk and tail the rings bear ridges interconnected in several ways. No lateral line. Snout tube-like with small terminal, toothless mouth. Gill opening very small. Fins without spines. Dorsal fin with 15-60 rays; anal fin very small, with 2-6 rays. Pectoral fins well developed; no ventral fins; caudal fin sometimes absent. Tail may be prehensile and used for holding onto objects.

There are 57 genera and 307 known species in this family; we collected six species in five genera.

REFERENCES: Paulus, 1999; Dawson, 1982; Dawson, 1984; Dawson, 1985; Kuitert, 2009; Lourie, Pollom & Foster, 2016; Kuitert, 2001; Lourie, Vincent & Hall, 1999.

Halicampus macrorhynchus

Slender pipefish. All body ridges distinct, margins granular, notched or indented between rings. Snout and head spinose on dorsal profile; often branched cirri on snout, head and dorsally on trunk and tail rings. Superior and inferior ridges of trunk and tail discontinuous. Eye prominent; opercular keel curved upward. Caudal fin present. Body tan, mottled dusky above; about 10 darker bands across trunk and tail.

D 18. A 4. P 19-18. Rings 14 (trunk) + 25-27 (tail).

Hippocampus angustus

A large and slender seahorse. Coronet high and spikey. Colouration variable: whitish, yellow, orange or brownish to greyish. Body patterned with of fine white, yellow, orange or brown scribbly or net-like markings and 5-6 distinctive dark irregular stripes across the snout. Dorsal fin has a narrow dusky submarginal margin band.

D 17-19 (usually 18); P 15-19 (usually 16-17); Rings 11; (trunk) + 32-35 (usually 33-34 (tail)).
(voucher: ? mm trunk length)

Solegnathus lettiensis

A large pipefish. Body compressed; body surface roughened or tuberculate, superior trunk and tail ridges discontinuous near end of dorsal fin base. No caudal fin; tail tip prehensile, dorsal fin base not elevated, fin placed well back on tail only. Body dusky pink above, yellowish green below; 4-8 dark brown blotches or bars on sides of trunk and tail; sometimes dark line along snout or along back.

D 37-49. A 4. P 22-24. Rings 21-24 (trunk) + 51-56 (tail).

Haliichthys taeniophorus

Slender pipefish. All body ridges with enlarged spines. Snout long; often branched cirri on snout, head and dorsally on trunk and tail rings. Superior and inferior ridges of trunk and tail discontinuous. Eye prominent; opercular keel curved upward. Tail tip prehensile. Caudal fin present. Body tan, mottled dusky above; about 10 darker bands across trunk and tail.

D 18. A 4. P 19-18. Rings 14 (trunk) + 25-27 (tail).
(voucher: ? mm trunk length)

Hippocampus spinosissimus

Seahorses with a cluster of 5 spines ('coronet') on top of head, the ridge behind it roughed or spined. Body spines well-developed, longest on 1st to 11th trunk rings, and long spines distally on tail. Dorsal fin base elevated. Body reddish-brown, black, or banded.

D 16-20. A 4. P 16-19. Rings 11 (trunk) + 33-37 (tail).
(voucher: 37.5 mm trunk length)

Trachyrhampus biocoarctata

Slender pipefish, mid-length of trunk slightly swollen. Rings vertically striate, edges smooth. Superior and inferior ridges of trunk and tail discontinuous. Eyes not prominent. Short keel on operculum curved upward, with radial lines. Snout short. Caudal fin present and base of dorsal fin slightly elevated. Body mottled pink and brown. Large black spots on snout and underside of head; white spots on trunk, white bars on tail.

D 26-29. A 4. P 16-17. Rings 20-24 (trunk) + 59-63 (tail).
(voucher: ? mm trunk length)

SCORPAENIFORMES

Stonefishes; Scorpionfishes; Firefishes; Waspfishes - Lepu-penganten; Lain; Lepu tembaga

Small to moderate-sized fishes, body robust or compressed. Head large, with spines variously arranged on upper parts and a ridge of bone (suborbital ridge) extending from below eye to preoperculum, usually cirri or fleshy flaps of skin on head and sometimes body. The suborbital ridge is unique to the SCORPAENIFORMES. Scales usually present, rough or smooth, sometimes hidden in skin. A single notched dorsal fin, with 10-17 spines; anal fin with 1-3 spines. Pectoral fin usually large, fan-like; ventral fin with one spine and 1-5 rays; caudal fin rounded or truncate, never forked.

APISTIDAE

Wasp scorpionfishes -

The Apistidae are relatively small fishes reaching to between 15-20 cm TL. One or three free lower pectoral rays and a bilobed swim bladder.

Some authors have placed the waspfishes into an expanded stonefish clade (Synanceiidae) because all of these fish have a lachrymal saber that can project a switch-blade-like mechanism out from underneath their eye.

Three genera with three species of which two were collected on the Survey.

REFERENCE: Poss, 1999a, Smith, Smith & Richardson, 2018.

Apistopus caloundra

Five chin barbels; body scales cycloid. Pectoral fin very long, lowermost ray free and rod-like, fin reaching as far as anal fin. 1st infraorbital bone moveable. Head and body pale brown, 2 brown streaks along upper sides. Large black white-ringed ocellus over posterior dorsal spines; 3 dark red bands across caudal fin. Inner pectoral fin speckled black above, lower rays bright yellow.

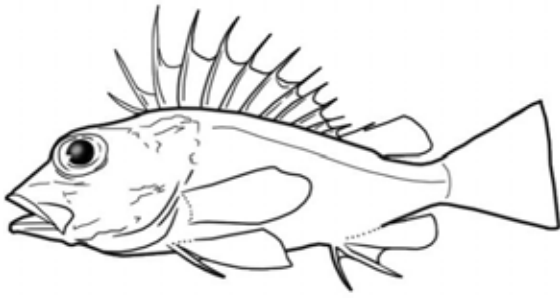
D XIV, 9.
(voucher: 190 mm SL)

Apistus carinatus

Three chin barbels; body scales with rough edges. Pectoral fin very long, lowermost rays free and rod-like, fin reaching as far as second half of anal fin. 1st infraorbital bone moveable. Head and body fawn, white below. Large black white-ringed ocellus over posterior dorsal fin spines. Inner pectoral fin charcoal, lower rays and near axil orange.

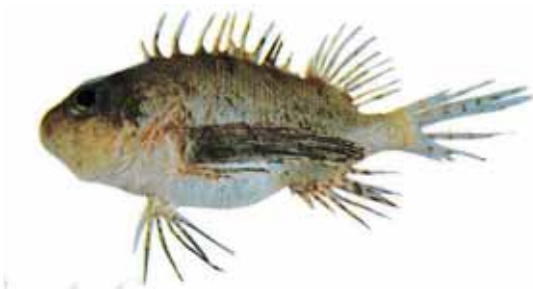
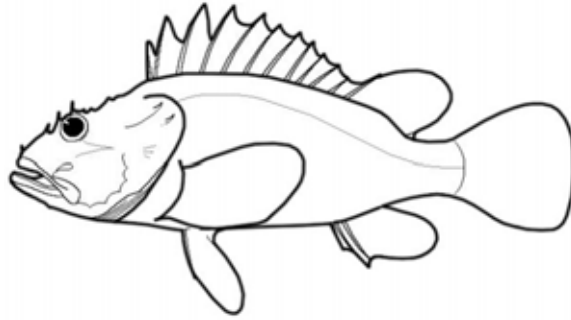
D XV-XVI, 8-10.
(voucher: 115 mm SL)

NEOSEBASTIDAE



Neosebastes occidentalis

SCORPAENIDAE



Brachyterois serrulifer



Dendrochirus brachypterus



Dendrochirus zebra



Ebosia bleekeri



Neomerinthe amplisquamiceps



Neomerinthe megalepis

NEOSEBASTIDAE

Gurnard scorpionfishes

Large eyes. Head fully covered by rough ctenoid scales; strong spines and ridges on head. Thirteen long dorsal fin spines; 6-8 dorsal fin soft rays. Benthic fishes, occurring from shallow depths down to over 500 m on both reef and soft substrata. Their food comprises small fishes and crustaceans.

There are two genera and 18 species in the family; only one was obtained in the Survey.

REFERENCES: Poss, 1999a; Motomura, 2004.

Neosebastes occidentalis

Row of strong, curved spines along suborbital ridge; preopercular and opercular spines strong. Palatine teeth present. Dorsal spines long and strong, longest spine about equal to body depth, interspinous membranes deeply emarginated; deep notch between spinous and soft dorsal fins. Pectoral fin reaching to below last dorsal spine. Body orange, scarlet or dark yellow; soft dorsal and anal fins, caudal fin and upper pectoral fin barred with dark orange or black.

D XIII, 8-9. A III, 5. P. 18-21. L. lat. 32-36.
(voucher: 150 mm SL)

SCORPAENIDAE

Scorpionfishes -

Dorsal fin spines 12-13. Anal fin spines 2-3, lateral line of tubed scales. Typical overlapping scales on body, or scales as small spiny papillae. Skin at gill openings connected to each other or connected to isthmus only narrowly. Bones of cranium strongly or moderately ossified.

25 genera and 230 species in this family; representatives of 12 genera were obtained on the Survey.

REFERENCES: Eschmeyer, 1986; Poss, 1999a; Matsunuma & Motomura, 2014; Motomura, Sakurai, Senou & Ho, 2009; Matsunuma, Motomura & Bogorodsky, 2017; Motomura, Arbsuwan & Musikasinthorn, 2010; Motomura, Causse, Béarez & Mishra, 2015; Motomura & Peristiwady, 2010; Morishita, Kawai & Motomura, 2018; Randall & Eschmeyer, 2001; Wibowo & Motomura, 2019.

Brachyterois serrulifer

Mouth oblique; all head ridges finely serrated including lower jaw. Scales extend over head and chin. Dorsal fin spines very long, longest dorsal - fin soft ray length 20.5–26.2 (av. 23.4)% SL; pectoral fin long, reaching to above anal fin. Body and head dusky red; fins reddish brown with some dark markings, few large dark spots on caudal fin.

D XIII, 10-11. A III, 5-6. P 15-17 (av. 16).
(voucher: 73 mm SL)

Dendrochirus zebra

Dorsal fin spines long, deeper than body depth. Most of pectoral fin rays branched (except for upper 1 to 3), membrane almost to fin edge. Cirrus above eye long. Body scarlet or crimson with vertical bands over head and body, dark patch on operculum. Soft dorsal anal and caudal fins with rows of dark spots; black edge on pectoral fin, large black and white spot on base of inner pectoral fin.

D XIII, 10-11. A III, 6-7. 48-55 scale rows along body.
(voucher: 160 mm SL)

Neomerinthe amplisquamiceps

Snout blunt and head profile rounded; jaws about equal; longitudinal ridge on side of maxilla; palatine teeth present; posterior lachrymal spine strong, directed posteroventrally; 4 spines on suborbital ridge and 4 preopercular spines; simple tentacle above eye. Scales ctenoid, present on nape and opercles. Some pectoral rays branched; 3rd dorsal spine longest. Head and body orange-red, dusky on back. Dark patch over 7th and 10th dorsal spines; caudal fin edged dark, caudal peduncle crossed by a pale, oblique band.

D XII, 9-11. P 19-21.
(voucher: 77 mm SL)

Dendrochirus brachyterus

Dorsal fin spines long, equal to or longer than body depth and much longer than dorsal rays. All except upper 1-3 pectoral fin rays branched, fin membrane almost to fin edge. Three spines on preopercle. Body scarlet or crimson with vertical bands over head and body, 4-7 rows of dark spots over unpaired fins, and rows of distinct dark spots across pectoral fin.

DXII-XIII, 9-10. A III, 5. P 17-18. 40-45 scale rows along body.
(voucher: 110 mm SL)

Ebosia bleekeri

Suborbital finely serrated, a weak ridge along opercle ending in a short spine; 4 spines on preopercle; a crest present behind eye (more obvious in males). Dorsal fin spines very long, soft dorsal and anal fins angular. Body dusky orange; back crossed by 6-7 brown bands; 3-5 rows of large black checks across pectoral fin, and narrow dusky border to head crest.

D XIII, 9. A III, 7. P 15-16.
(voucher: 80 mm SL)

Neomerinthe megalepis

Snout blunt and head profile rounded; lower jaw protruding slightly beyond upper jaw; longitudinal ridge on side of maxilla; palatine teeth present; posterior lachrymal spine strong, directed posteroventrally; 4 spines on suborbital ridge and 4 preopercular spines. Scales ctenoid, present on nape and opercles. Some pectoral rays branched; 4th dorsal spine longest. Simple tentacle above eye. Head and body rosy to fawn, darker on head and back, dark patch over posterior dorsal fin spines; lower pectoral fin red, red checks on upper fin, anal and caudal fin.

D XII, 9-10. P 18-20. L. lat. 22-25
(voucher: 94 mm SL)



Neomerinthe procurva



Neomerinthe erostris



Parascorpaena aurita



Pontinus macrocephalus



Pterois antennata



Pterois paucispinula



Pterois radiata



Pterois russelii

Neomerinthe procurva

Snout blunt and head profile rounded; jaws about equal; longitudinal ridge on side of maxilla; palatine teeth present; posterior lachrymal spine strong, directed posteroventrally; 4 spines on suborbital ridge and 4 preopercular spines. Scales ctenoid, present on nape and opercles. Some pectoral rays branched; 3rd dorsal spine longest. Branched tentacle above eye. Head and body red, darker or dusky above, dark red patch over posterior dorsal fin spines.

D XII, 9-10. P 18-20. L. lat. 23-24

(voucher: 71 mm SL)

Parascorpaena aurita

Teeth on palatines; posterior lachrymal spine directed down and forward; occipital pit present on upper part of head behind eyes. Body scales cycloid, some on opercular region of head. Upper pectoral fin rays branched. Body dark brown or red-brown; soft dorsal, anal, caudal and pectoral fins densely barred.

D XII, 9-10. A III, 5. P 14-17. 38-45 scale rows between head and tail base.

(voucher: 121 mm SL)

Pterois antennata

Dorsal fin spines long, membrane only at bases. Pectoral fin long, reaching to caudal fin, all of its rays unbranched and mostly free from membrane. Scales on back ctenoid. Head and body scarlet to crimson, crossed by many thin and thick dark bands. A dark bar from eye to preopercular angle; long supraorbital tentacle ringed black; unpaired fins with many series of dark spots; upper and lower axil of pectoral fin with conspicuous white spots.

D XII, 10-12. A III, 5-6. P 16-18. 50-54 scale rows along body.

(voucher: 140 mm SL)

Pterois radiata

Dorsal fin spines long, membrane only at base. Pectoral fin long, its rays simple and filamentous, mostly free from membrane. Scales on back ctenoid. Body reddish or dark brown, crossed by 7-8 white lines, usually forked on back and on lower sides. Oblique dark band through eye to operculum; supraorbital tentacle plain red. White spot in upper and lower pectoral fin axils. No spots on soft dorsal anal and caudal fins.

D XII, 10-11. P 16. 50-55 scale rows between head and tail.

(voucher: 105 mm SL)

Neomerinthe erostris

Snout blunt and head profile rounded; longitudinal ridge on side of maxilla; palatine teeth present; posterior lachrymal spine directed posteroventrally; 3 spines on suborbital ridge and 5 preopercular spines. Large, much branched tentacle above eye; no occipital pit. Scales ctenoid, present at nape and opercles. Third dorsal spine longest; some pectoral rays branched. Head and body yellowish red, back dark red, 2 pale patches on body near base of last dorsal spine and last ray. Fins mottled red, brown and olive.

D XII, 9-11. P 18. Total GR 17-19. L. lat. 23-25

(voucher: ? mm SL)

Pontinus macrocephalus

Palatine teeth present; both lachrymal spines directed backwards; 3 or 4 spines on suborbital ridge; second preopercular spine very small or absent. Tentacle over eye sometimes absent but when present, 2-3 times eye diameter. Pectoral fin rays all unbranched (in adults). Body plain red; a dark spot on dorsal fin in juveniles.

D XI+I, 9-10. A III, 5. P 16-17. 45-50 rows of ctenoid

scales on body.

(voucher: 180 mm SL)

Pterois paucispinula

Dorsal fin spines long, membrane only at base. Pectoral fin reaches caudal peduncle, membrane extending over half the fin, rays simple. Scales ctenoid on upper sides. Scarlet or reddish brown, rosy below with vertical body bands which may fork on back. Dark crimson band through eye to beyond preopercular angle; pectoral fin with elongate red or charcoal spots.

D XIII, 10. P 18-19. 46-57 scale rows along body.

(voucher: 93 mm SL)

Pterois russelii

Dorsal fin spines long, membrane only at bases. Pectoral fin long, reaching to above anal fin, all of its rays unbranched. Scales cycloid. Crimson or brownish bands over head and body. Soft dorsal, anal, caudal and pectoral fins plain yellow or red with no trace of spots; alternating rows of black and white spots and checks over ventral fin.

D XIII, 10-11. A III, 6-7. P 13. 65-80 scale rows between head and tail base.

(voucher: 105 mm SL)



Pterois volitans



Rhinopias frondosa



Scorpaena neglecta



Scorpaena onaria



Scorpaenodes evides



Scorpaenodes smithi



Scorpaenopsis neglecta



Scorpaenopsis oxycephalus



Scorpaenopsis venosa

Pterois volitans

Dorsal fin spines long, membrane only at bases. Pectoral fin long, may reach as far as caudal fin, all its rays simple. Scales cycloid. Scarlet, crimson or brownish red bands over head and body. Soft dorsal, anal and caudal fins always with some dark spots at least; other fins crossed by dark bands, white spots often present on inner base of ventral fin.

D XIII, 10-11. P 14. 85-106 scale rows between head and tail base.

(voucher: 300 mm SL)

Scorpaena neglecta

Palatine teeth present; occipital pit present; posterior lachrymal spine directed straight downwards; interorbital space broad and flat. Scales ctenoid; upper pectoral fin rays branched; skin flap present in upper pectoral fin axil. Body rosy or red; pectoral fin densely checked red.

D XII, 9. P 19.

(voucher: 220 mm SL)

Scorpaenodes evides

No palatine teeth; spines present on interorbital and on coronal ridge; head and body scales ctenoid. Body overall mottled rose, pale brown patches on head and upper sides with 3-5 irregular broad bars. Second anal fin spine equal to or more than half HL. Soft dorsal, anal, caudal and pectoral fins finely mottled brown; four dark bars radiate from eye. D XIII, 9. P 16-19. 42-49 vertical scales rows above lateral line.

(voucher: ? mm SL)

Scorpaenopsis neglecta

Nape humped before dorsal fin; occipital pit present, another pit below eye; interorbital broad, 4-5 in HL; no palatine teeth. Upper opercular spine with 2 points; supraorbital ridge serrated; eye diameter 1.7-2 in snout length. Body dark brown to brownish purple, a white bar sometimes present below dorsal fin, rose on breast and beneath pectoral fin. Fins either completely dark brown, or fin margins banded yellow, pink or orange. Axil of pectoral fin with small black spots, inner fin yellow or orange and along its margin, outer aspect of fin with broad black band along hind margin of outer fin aspect, lower rays crimson. D XII, 9-10. P 16-18. Tr above 6. Scale series along body 40-47.

(voucher: 85 mm SL)

Scorpaenopsis venosa

Upper opercular spine single, no ridges on suborbital spines. No palatine teeth, nape humped before dorsal fin. Occipital pit deep. Body reddish brown, fins marbled or barred red and brown; ventral and pectoral fins darker, margined yellow or orange. Inner aspect of pectoral fin orange or yellow, axil bluish, a black patch followed by a broad black band along upper hind margin.

D XII, 9. P 15-18. Scale series along body 47-52.

(voucher: 132 mm SL)

Rhinopias frondosa

Body and head strongly compressed. Snout concave, orbits high on head; nasal spines absent. No palatine teeth; head spines reduced. Scales small, cycloid, none on head. Skin flaps over body, fins and lower jaw. Some pectoral fin rays branched. Body, head and fins with dark-edged oblong or round pale spots and blotches; general colouration varying from mostly yellow to red or crimson. Oblong black spot on soft dorsal fin posteriorly.

D XII, 9. P 16. 70-75 scale rows along body.

(voucher: 130 mm SL)

Scorpaena onaria

Palatine teeth present; occipital pit present; posterior lachrymal spine directed obliquely backwards; interorbital space concave; larger specimens possess a knob on front of lower jaw. Scales ctenoid; upper pectoral rays branched. Males display a large black patch over posterior dorsal spines; colour apparently variable with depth of capture, but usually red.

D XII, 9. P 16-17.

(voucher: 145 mm SL)

Scorpaenodes smithi

No palatine teeth, coronal ridge and interorbital spines usually absent; usually 3 spines on suborbital ridge; few or no cirri on head and body; scales ctenoid. Second anal spine about equal to $\frac{1}{3}$ HL. Body red; 3 darker bars radiate from eye; well-developed darker bars on back; fins with series of red checks.

D XIII, 8-10. P 17-18. Vertical scale rows above L. lat. 38-50.

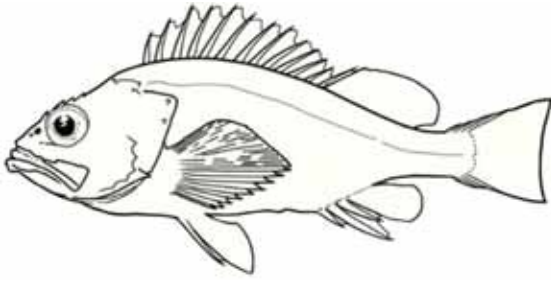
Scorpaenopsis oxycephala

Upper opercular spine single, no palatine teeth; nape not humped before dorsal fin; occipital pit absent or shallow and another pit below eye; snout very long, 2.7-3 in HL. Dark brown or reddish brown. Lower ventral and pectoral fins blotched rosy; black spot often present between 7th and 9th dorsal spines.

D XII, 9. P 18-20. 59-68 scale rows along body.

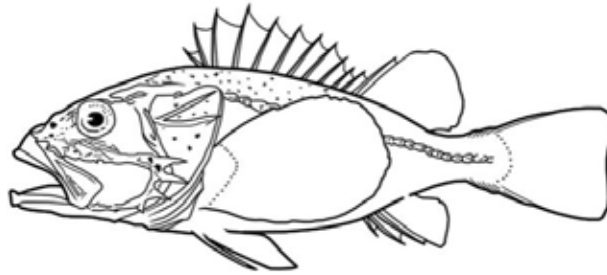
(voucher: 192 mm SL)

SEBASTIDAE



Sebastiscus vibrantus

SETARCHIDAE



Ectreposebastes imus



Lythrichthys cypho



Lythrichthys dentatus



Setarches guentheri

SYNANCEIIDAE



Erosa erosa



Inimicus cuvieri

SEBASTIDAE

Sea perches -

Dorsal fin spines 12-13; dorsal fin rays 8-9 or 11-13. Body compressed; head usually with ridges and spines; gill membranes free from isthmus. Venom gland in spines of dorsal, anal, and ventral fins.

Seven genera and many species in the family; one collected on the Survey.

REFERENCE: Morishita, Kawai & Motomura, 2018; Poss, 1999a.

Sebastiscus vibrantus

Head profile moderately steep, head bones strong, operculum with 2 distinct ridges, suborbital ridge and lachrymal scarcely spined, spines on nape weakly-developed. Body scales ctenoid, extending onto posterior half of head almost as far as anterior eye margin. Unbranched pectoral rays thick, fin base broad. Body scales ctenoid. Body dusky red or pink, green spots on head; 3 to 5 white patches on back below posterior half of dorsal fin; pectoral fin orange, other fins greenish yellow. D XII, 11-12. P (usually) 19. GR 23-27. (voucher: ? mm SL)

SETARCHIDAE

Deep-sea bristly scorpionfishes -

Typical overlapping scales on body, or scales as small spiny papillae; dorsal spines 12-14; lateral line a continuous trough, roofed by thin scale. Skin at gill openings connected to each other or connected to isthmus only narrowly. Bones of cranium fairly weakly ossified.

There are four genera and seven species in this family; three genera were collected during the Survey.

REFERENCES: Poss, 1999a; Wada, Kai & Motomura, 2021.

Ectreposebastes imus

Head large, bones weak. Body deep 2-2.7 in SL; body profile convex. Anterior lachrymal spine shorter than posterior two; all spines on preopercular margin long and strong (see fig). Small scales extend onto top of head; interorbital space two times eye diameter. Body black, charcoal or dusky red; mouth cavity black with orange or red patches; intestine pale. (Note. We obtained both colour forms during Survey but could not relate them to different depth).

D XII, 9-10. A III, 5-7. P 18-20
(voucher: 175 mm SL)

Lythrichthys dentatus

Head large, bones thin; first lachrymal spine reaching upper lip. Teeth in upper jaw widely-spaced, in 1 or 2 rows. Operculum with two distinct ridges, bearing spines; 2nd preopercular spine short or rudimentary. Lateral line a continuous trough roofed by thin scales; belly and breast scales embedded. Six or 7 scale rows between last dorsal fin spine and lateral line. Body depth 29-34% SL, caudal peduncle depth 7.2-9% of SL. Head and body uniform dusky red, finely stippled black. Dorsal fin margin black; mouth and body cavities black.

D XII, 10. A III, 4-5. P 21-24.
(voucher: 76 mm SL)

Lythrichthys cypho

Head large, bones thin; first lacrymal spine reaching upper lip. Teeth in upper jaw densely packed, in 3-6 short rows. Operculum with two distinct ridges, bearing spines; 2nd preopercular spine short or rudimentary. Lateral line a continuous trough roofed by thin scales; belly and breast scales embedded. Eight to 11 scale rows between last dorsal fin spine and lateral line. Body depth 29-44% SL, caudal peduncle depth 7.4-9.4% of SL. Head and body uniform dusky red, finely stippled black. Dorsal fin margin black; mouth and body cavities black.

D XI-XII, 9-11. A III, 5. P 21-24.
(voucher: 53 mm SL)

Setarches guentheri

Head large, bones thin; operculum with two distinct ridges, bearing spines; 2nd preopercular spine well-developed, about equal to or longer than spines above and below it; 1st lachrymal spine not reaching upper lip. Lateral line a continuous trough roofed by thin scales; belly and breast scales not embedded. Eye large, equal to width of interorbital space. Body rosy above; scattered green and charcoal spots over head and back; intestine pale.

D XI-XII, 9-11. A III, 5-6. P 20-24.
(voucher: 93 mm SL)

SYNANCEIIDAE

Stonefishes -

No free pectoral rays; skin glands present, appearing as 'warts' in most species; dorsal fin with 11-17 spines and 4-14 soft rays; anal fin with 2-4 spines and 4-14 soft rays; pelvic fin with one spine and 3-5 soft rays; pectoral fin rays 11-10; vertebrae 23-30. Venom glands present near base of hypodermic-like dorsal fin spines. The neurotoxin of these fishes is the most deadly of fish venoms and can be fatal to humans.

There are nine genera and 37 species in this family; representative of four genera were obtained on the Survey.

REFERENCES: Poss, 1999a; Matsunuma & Motomura, 2018; Inaba & Motomura, 2018.

Erosa erosa

Body profile humped at nape before dorsal fin; deep occipital pit. Mouth slightly oblique; eyes on side. Head and body scaleless, but covered with knobs, warts or short papillae. Body dusky orange; 3 or 4 red bands.

D XIV, 5-7. A III, 4-6. P 14-16.
(voucher: 72 mm SL)

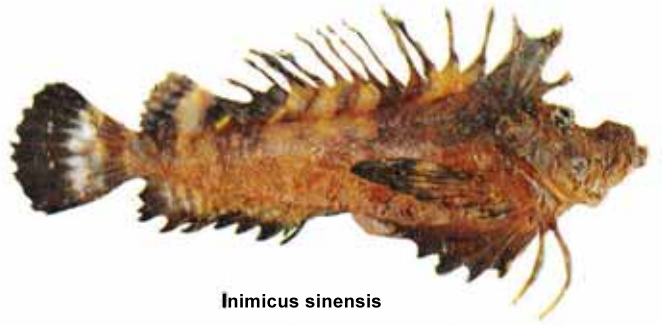
Inimicus cuvieri

Elongate, naked body; snout equal to or longer than postorbital distance. Dorsal fin spines almost free from membrane, except for first three; lowermost two pectoral fin rays rod-like and free from rest of fin. Inner pectoral fin colour plain grey or dark brown.

D XV-XVIII, 5-9. A II-III, 10-13.
(voucher: 175 mm SL)



Inimicus didactylus



Inimicus sinensis



Minous groeneveldi



Minous pictus



Minous roseus



Minous versicolor



Synanceia verrucosa

Inimicus didactylus

Elongate, naked body; snout longer than or equal to postorbital distance; interorbital space much wider than eye diameter, eye on top of head. Dorsal fin spines almost free from membrane except for first 3. Lowermost 2 pectoral fin rays rod-like and free from rest of fin. Inner pectoral fin colour charcoal or black scattered with cream spots or large patches, always with a broad cream band across fin.

D XV-XVII, 6-9. A II, 9-11.

(voucher: 135 mm SL)

Minous groeneveldi

Body naked. Second lachrymal spine much longer than first. First dorsal spine much shorter than second spine; lowermost pectoral fin ray rod-like and free from rest of fin, moveable. Anterior and posterior lacrimal spines blunt. Large eye moderately low-set on head; head depth about 13.7% SL. Body yellow or fawn, streaked above with broad dark brown blotches extending onto dorsal fin. Caudal fin plain; inner pectoral fin pink or yellow, grey or brown stripes and spots spreading along fin rays to margin.

D XI, 11. A II, 9.

(voucher: 80 mm SL)

Minous roseus

Body naked. Lachrymal spines about equal in length. First dorsal spine much shorter than second spine; lowermost pectoral fin ray rod-like and free from rest of fin, moveable. Anterior and posterior lachrymal spines sharp. Large eye set high on head; head depth about 19-22% SL. Body pink to yellow, brown mottling on back tending to form longitudinal bands. Caudal fin finely barred or pale. Inner pectoral fin bright yellow, axil and rays red of pink, large white spots in axil, the white spots spreading onto breast.

D X-XI, 8-10. A II, 7-9.

(voucher: 77 mm SL)

Inimicus sinensis

Elongate, naked body; snout equal to or longer than postorbital distance. Dorsal fin spines almost free from membrane except for first 3; lowermost two pectoral fin rays rod-like and free from rest of fin. Inner pectoral fin colour dark brown or black with large orange or cream spots, base of rays bright yellow, spotted brown.

D XVI-XVIII, 6-9. A I-II, 10-13.

(voucher: 139 mm SL)

Minous pictus

Body naked. Second lachrymal spine much longer than first. First dorsal spine much shorter than second spine; lowermost pectoral fin ray rod-like and free from rest of fin, moveable. Body dark pink; dorsal fin crossed by diagonal brown bands; caudal fin dark pink. Inner pectoral fin yellow or pink with series of oval tan or brown spots along rays.

D X-XI, 12-13. A II, 10-11. L. lat tubes 17-21.

(voucher: 100 mm SL)

Minous versicolor

Body naked. Second lachrymal spine much longer than first. First dorsal spine equal to or longer than second spine; lowermost pectoral fin ray rod-like and free from rest of fin. Body pink, darker above, dark brown patches over back and dorsal fin. Caudal fin with 3 or 4 brown wavy cross-bands. Inner pectoral fin fawn to charcoal with a few large pink patches.

D XIII-IX, 11-13. A II, 8-10 (spines weak)

(voucher: 100 mm SL)

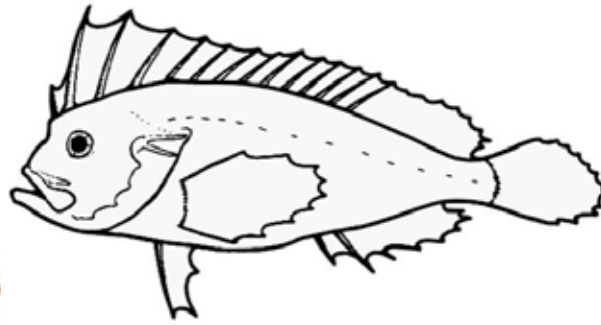
Synanceia verrucosa

Body variegated and mottled with brown, red, green and yellow. Pectoral, ventral and caudal fins tipped yellow or cream. Body naked, skin thick and warty. Mouth vertical; eyes on top of head, pit between them, occipital pit behind eye, another before eye.

D XII-XIV, 5-7. A III, 4-7. P 17-19.

(voucher: 115 mm SL)

TETRAROGIDAE

*Cottapistus cottoides**Neocentropogon aeglefinus**Liocranium pleurostigma**Paracentropogon longispinis**Neocentropogon trimaculatus**Richardsonichthys leucogaster**Snyderina yamanokami*

TETRAROGIDAE

Wasp fishes -

Body compressed; head usually with ridges and spines; usually two divergent opercular spines; gill membrane free from isthmus. These fishes are extremely venomous.

There are 17 genera and 43 species in this family, of which representatives of six genera were collected on the Survey.

REFERENCES: Poss, 1999a; Chungthanawong & Motomura, 2021; Motomura, Last & Johnson, 2008; Inaba & Motomura, 2018.

Cottapistus cottoides

Head profile convex, a "hump" on snout. No palatine teeth. Gill rakers elongate; interorbital space two times eye diameter. No scales on head and anterior 1/3 of body; scale series 64-68. Dorsal fin begins above eye, spines of equal length. Dusky pink or orange, scattered spots and 8-9 vague brown bars across back; dorsal fin spines tipped orange.

D XIV-XV, 6. V I, 5. Total GR 18-21.
(voucher: ? mm SL)

Neocentropogon aeglefinus

Head profile oblique; body slender and appears naked, but tiny scales present, embedded in skin. Dorsal fin begins just above hind eye margin, spinous fin membrane deeply emarginate, last dorsal ray connected to top of caudal peduncle. Teeth present on palatines; small "knob" at symphysis of lower jaw. Body charcoal with violet shades. Large dark patch over lateral line origin.

D XIII-XV, 6-8. A III, 5-6. V I, 5. L. lat. 94-137
(voucher: 95 mm SL)

Paracentropogon longispinis

Head profile steep; dorsal fin begins above eye, spinous fin membrane deeply emarginate. Small scales absent from head and anterior one third of body. Body depth 31-38% SL. Palatine teeth present. Body brown, fawn or mottled. Dark patch may be present on dorsal fin, but nearly always a white spot present above lateral line below middle of spinous dorsal fin.

D XIV-XV, 6-8. A III, 5. P 10-11. V I, 4. L. lat. 19-24
(voucher: ? mm SL)

Richardsonichthys leucogaster

Head profile rounded; head and body naked except for scaled lateral line; deep groove on nape at each side of dorsal fin origin. Short cirrus on eye. Palatine teeth present. Dorsal fin begins above eye, membrane of spinous portion deeply emarginated. Body and fins scarlet or orange, nape often pale, green and charcoal patches and checks on back and fins.

D XII-XIV, 5-9. P 13-16. V I, 5.
(voucher: 60 mm SL)

Liocranium pleurostigma

Head profile steep, slightly concave in front of eye. No palatine teeth. Small scales absent from head and anterior half of body. Dorsal fin origin above eye. Body depth 39-46% SL. Body marbled orange and brown; fins checked brown, orange on pectoral fin. A large indistinct brown blotch behind gill opening, mostly above lateral line.

D XIII-XIV, 8-9. A III, 6. P 13-15. V I 4. L. lat. 40-46
(voucher: 60 mm SL)

Neocentropogon trimaculatus

Head profile oblique, body slender and appears naked, but tiny scales present, embedded in skin. Dorsal fin begins just above hind eye margin, spinous fin membrane deeply emarginate. Teeth present on palatines. Tan, orange or yellow, marbled and spotted brown. Dark brown patch over lateral line origin, 3-4 dark bars across back extending onto dorsal fin, dark bars and series of dark checks on caudal fin base. and dark bar on caudal fin base.

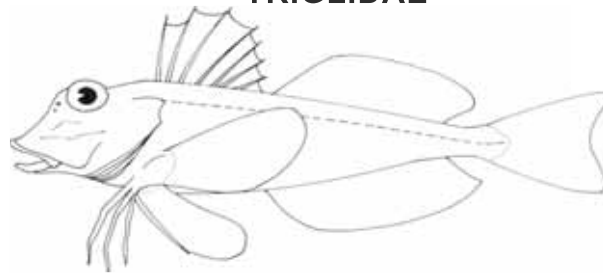
D XIII-XV, 6-8. A III, 6-8. V. I, 5.
(voucher: ? mm SL)

Snyderina yamanokami

Head profile steep and straight; mouth large, lacking palatine teeth. Head and anterior portion of body without scales, scales on remainder of body cycloid and embedded. Body depth 34-42% SL. Dorsal fin begins above anterior half of eye; last dorsal and anal rays attached to caudal peduncle. Body dusky red, spotted and marbled dark brown; fins marbled and checked dark brown or black.

D XIV-XVI, 10-11. A III, 5-6. V I, 5. Scales in longitudinal series 74-95.
(voucher: ? mm SL)

TRIGLIDAE



KEY TO GENERA FOUND ON SURVEY

- 1a. Scales on body (may be very small): 2
- 2a. Large spiny scales along base of spinous and soft dorsal fin **Lepidotrigla**
- 2b. Larger, thicker scales along base of spinous dorsal only 3
- 3a. Rostral spines on snout longer than eye diameter; distinct nasal spine present... **Parapterygotrigla**
- 3b. Rostral spine shorter than eye diameter; no nasal spine **Pterygotrigla**



Lepidotrigla sp 1



Lepidotrigla sp cf japonica



Lepidotrigla spiloptera



Lepidotrigla maculapinna



Lepidotrigla macracaina



Lepidotrigla russelli



Lepidotrigla tanydactyla



Lepidotrigla sp cf venusta



Pterygotrigla (Parapterygotrigla) multiocellata.



Pterygotrigla (Parapterygotrigla) macrorhynchus

TRIGLIDAE

Searobins; Gurnards; Armoured Sea Robins -

Moderate-sized bottom dwelling fishes. Body tapering to slender caudal peduncle. depressed or moderately compressed. Head large and bony. with many ridges and low spines; snout projecting beyond mouth, either as a short groups of spines or as a pair of flat or pointed plates (rostral processes); teeth small or absent; barbels may be present on lower jaw. Body either scaled or encased in bony plates or scutes. Dorsal fin deeply notched or as separate spinous and rayed fins; anal fin opposite soft dorsal and equal to it; pectoral fin large, wing-like, lower 2 or 3 fin rays free and rod-like; caudal fin truncate, emarginate or slightly forked. Predominant colour red; pectoral fins often with distinctive markings.

Nine genera in the family, of which representatives of three were obtained on Survey.

REFERENCES: Gomon, 1987; del Cerro & Lloris, 1997; Richards, 1999; Richards, Yato & Last, 2003; Richards & Yato, 2012 ; Richards & Yato, 2014; Gomon & Kawai, 2018; Gomon & Psomadakis, 2018.

Lepidotrigla sp 1

Pectoral fin reaches to below 3rd-4th dorsal ray, 3.3-4 in SL. Breast naked; a well-developed serrated ridge on preoperculum ending in a low spine. Inner pectoral fin plain charcoal, washed grey-green, sometimes with a pale blue-ringed black patch near base of middle rays; base and lower rays cream-yellow, upper fin rays crimson. D₂ 16. A 16. Tr below 25-27. L. lat. 60-64. (voucher: 140 mm SL)

Lepidotrigla spiloptera

Pectoral fin moderately long, to below 5th dorsal ray, 3.2-3.4 in SL. Breast naked; well-developed ridge on preoperculum; body scales easily lost. Inner pectoral fin black, entirely covered by scattered moderately-large white spots; base and entire edge orange or crimson. D₂ 15-16. A 15-16. Tr below 20-23. L. lat. 61-62. (voucher: 97 mm SL)

Lepidotrigla macracaina

Pectoral fin moderately long, to below 4th-6th dorsal ray, 3.2-3.6 in SL. Breast naked; second dorsal spine long, equal to or longer than body depth, its front edge serrated. Inner pectoral fin charcoal or dark green with blue or black spots scattered or in 4-6 rows across fin; fin base and lower rays orange. D₂ 17. A 16-17. Tr below 19-20. L. lat. 64-67. (voucher: 120 mm SL)

Lepidotrigla tanydactyla

Pectoral fin moderately long, to below 4th-5th dorsal ray, 3.1-3.3 in SL. Breast naked; well-developed ridge on preoperculum. Inner pectoral fin plain black; base and edges dark pink. D₂ 15-16. A 15-16. Tr below 16-17. L. lat. 61-62. (voucher: 124 mm SL)

Lepidotrigla sp cf venusta

Pectoral fin moderate, to below 6th-7th dorsal ray, 2.4-2.6 in SL. Breast and belly fully scaled. Pectoral fin slender, 5th and 6th rays elongate. Pectoral fin upper portion and hind border dark pink, base and lower rays cream or creamy pink; mid and lower part of fin lime-green with charcoal stippling or small spots within. D₂ 15-16. A 15-16. Tr below 23. L. lat. 59-63. (voucher: 94 mm SL)

Pterygotrigla (Parapterygotrigla) macrorhynchus

Snout long, 17-22% SL, rostral spine very long and slender, $\frac{2}{3}$ HL; about 10 bucklers below first few dorsal spines. Rich brown-red border to second dorsal fin and as a band along mid height of fin. Brown-red streaks on snout, lips, behind eye and on upper margin of caudal fin; first dorsal fin tipped with brown-red. D₂ 13. A 12. P 12+3. (voucher: 85 mm SL)

Lepidotrigla sp cf japonica

Pectoral fin long, to below 8th-13th dorsal ray, 1.6-2.3 in SL. Breast naked; body scales easily lost. Inner pectoral fin lime-green crossed by 3 or 4 oblique wavy blue lines; oblong black patch over lower rays sometimes with white spots within; base and fin edge pink. D₂ 14-15. A 14-15. Tr below 15-17. L. lat. 54-59. (voucher: 93 mm SL)

Lepidotrigla maculapinna

Pectoral fin moderate, to below 5th-7th dorsal ray, 2.6-3.3 in SL. Breast naked, body scales firmly attached. Inner pectoral fin membrane plain black sometimes with scattered milky-blue spots, or the rays marked cream; base and lower rays yellow, upper fin edge pink. D₂ 14-15. A 14-15. Tr below 22-26. L. lat. 56-60. (voucher: 103 mm SL)

Lepidotrigla russelli

Pectoral fin moderately long, to below 3rd-5th dorsal ray, 2.6-2.9 in SL. Breast and belly fully scaled; body scales easily lost. Inner pectoral fin smoky dark green with few diffuse pale blue patches over membrane between upper 2 rays and on lower part of fin; base and lower rays cream; upper edge pink; hind edge slate blue. D₂ 15. A 14. Tr below 17-22. L. lat. 60-64. (voucher: 115 mm SL)

Pterygotrigla (Parapterygotrigla) multiocellata

Rostral process broad and long, $\frac{1}{2}$ to $\frac{3}{4}$ HL. Head and upper sides brownish orange with scattered pale spots anteriorly; orange patch on pectoral fin base, grey or orange streak along lower sides; dorsal and caudal fin margins dark brown. D₂ 11. A 11. P 11 + 3. (voucher: 204 mm SL)



Pterygotrigla (Otohime) draiggoch

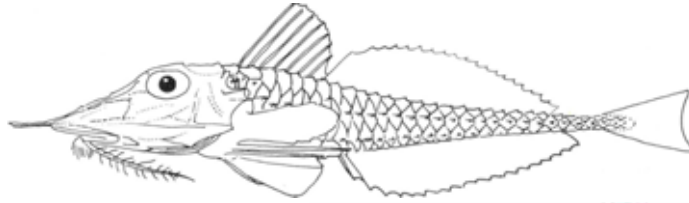


Pterygotrigla (Bovitrigla?) leptacanthus



Pterygotrigla (Pterygotrigla) ryukyuensis

PERISTEDIIDAE



Gargariscus prionocephalus



Peristedion lorhynchus



Satyrichthys laticeps



Satyrichthys moluccense

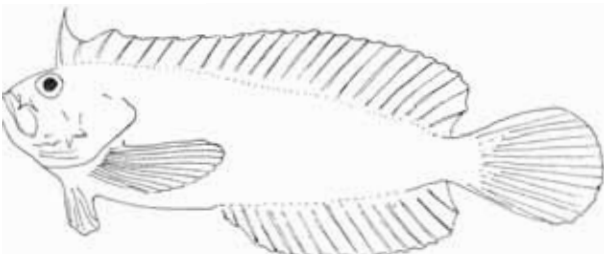


Satyrichthys rieffeli



Satyrichthys welchi

APLOACTINIDAE



Erisphex aniarus

Pterygotrigla (Otohime) draiggoch

Rostral spines, nuchal and humeral spines short, less than eye diameter; opercular spine very long, much longer than eye diameter; bucklers below all of spinous dorsal fin. Inner pectoral fin with large black patch over middle of fin containing smaller white spots. Brown spots over back and soft dorsal fin in juveniles.

P 11-12+3.

(voucher: 92 mm SL)

Pterygotrigla (Pterygotrigla) ryukyuensis

Rostral process triangular, subequal to eye diameter; opercular spine short; nuchal and humeral spines very long, 1-1.5 times eye diameter; bucklers below all of spinous dorsal fin. Inner pectoral fin uniformly tan, base and upper and lower edges pale (preserved colour).

P 11-12 + 3.

(voucher: 120 mm SL)

Pterygotrigla (Bovitrigla?) leptacanthus

Rostral spine subequal to eye diameter; nuchal spine very long, usually longer than eye diameter; humeral and opercular spines short; bucklers only below first few dorsal spines. Inner pectoral fin with large plain black patch near its base; green spots over back and in a row on lower part of soft dorsal fin.

P 16+3, fin 38-41% SL. L. lat more than 70 rows.

(voucher: 107 mm SL)

PERISTEDIIDAE

Armoured gurnards -

Body entirely encased in heavy spine-bearing plates; preorbitals each with a forward projection; pectoral fin with lower two rays free and enlarged; barbels on lower jaw.

There are six genera and 45 species in this family, of which three genera were collected on the Survey.

REFERENCES: Richards, 1999; Kawai, 2013; Ono & Kawai, 2014; Kawai, 2016; Kawai, 2019.

Gargariscus prionocephalus

Suborbital ridge very broad and deeply scalloped, head evenly rounded when viewed from above. Orange-pink markings over head edges; inner pectoral fin pinkish yellow crossed by 3 irregular rows of black checks; anal fin dark with yellowish band along it.

D VI-VII, 15. A 13-14.

(voucher: ? mm SL)

Satyrichthys laticeps

Rostral processes slightly triangular, parallel. Pectoral fin dark brown, upper edge pale. Dark green(?) streaks on head. Three simple lip barbels and 2 or 3 simple chin barbels on each side of lower jaw (from symphysis).

D₂ 15-16. A 15-16. Lower GR 15-17. Second row of body scutes 30.

(voucher: 91 mm SL)

Satyrichthys rieffeli

Rostral processes slender, with serrated edges, parallel or converging anteriorly. Many rows of black spots over head back and upper sides along scute edges and in 4-7 row over dorsal fins. One simple lip barbel and 1 or 2 simple chin barbels on each side of lower jaw.

D₂ 17. A 16-17. Lower GR 17-19. Second row of body scutes 31-33;

(voucher: 189 mm SL)

Peristedion liorhynchus

Rostral processes short and parallel. Seven to 9 clumps of tentacles along lower jaw between the 2 outer and longer fleshy tentacles. Dark green or brown-green lines mark body along snout, across head and around scutes of back. Ventral fin bright pink; pectoral fin axil dark brown; 2 dark bands across pectoral fin.

D₂ 20-22. A 20-22. Dorsal series of scutes 31-33.

(voucher: 184 mm SL)

Satyrichthys moluccense

Rostral processes rectangular, nearly parallel. Plain scarlet or orange above, cream below; dorsal and anal fins with black edges. Two or 3 simple lip barbels and 0-2 simple chin barbels on each side of lower jaw.

D₂ 17-18. A 17-18. Lower GR 16. Second row of body scutes 30-32.

(voucher: 145 mm SL)

Satyrichthys welchi

Rostral processes rectangular, serrated and converging anteriorly. Thin black lines over head and around scute edges; black spots on dorsal fin; dorsal and anal fins black edged. Two simple lip barbels and 3-5 small chin barbels on each side of lower jaw.

D₂ 17-18. A 17-18. Lower GR 16. Second row of body scutes 32;

(voucher: 310 mm SL)

APLOACTINIDAE

Velvetfishes;

Small to moderate-sized fishes; head large, with ridges, knob-like spines and pits variously. Mouth terminal or lower jaw slightly projecting; teeth small; usually cirri and fleshy papillae on head, sometimes also on body. Scales absent, body covered with small velvet-like villi. Dorsal fin begins above or before eye in most genera, anterior 3-5 spines divergent but connected to remainder of fin in most species. All fin rays unbranched: anal fin spines weak or absent; well-developed pectoral fin; ventral fin with less than 4 fin rays; caudal fin rounded or truncate.

Seventeen genera in the family; representatives of one obtained on the Survey.

REFERENCES: Poss & Eschmeyer, 1978; Poss, 1999b.

Erispex aniarus

Head and body naked, thin skin rough and warty. Head profile abrupt; both lacrimal spines sharp, posterior one directed downwards; 4 spines on preopercular margin.

Dorsal fin begins above eye, first spine longest; ventral fin begins before pectoral fin base. Body mottled grey-brown.

D X-XII, 12-14. A I, 11-12. VI, 2. L. lat. tubules 13-15.

(voucher: ? mm SL)

PLATYCEPHALIDAE

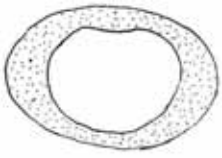


Fig 2



Fig. 3.



Fig 4



Fig 6



Fig 8



Fig. 5

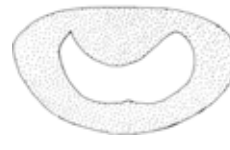
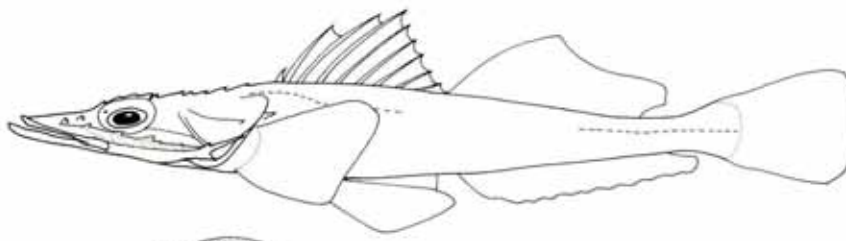


Fig. 7



Fig. 9



Iris lappet types



Cociella punctata (A)



Cociella punctata (B)



Cymbacephalus nematophthalmus



Elates ransonnettii



Grammoplites scaber



Cymbacephalus bosschei



Inegocia harrisii



Inegocia japonica



Onigocia macrocephala



Onigocia sp

PLATYCEPHALIDAE

Flatheads - Anjing

Body elongate; depressed anteriorly, sub-cylindrical and tapered posteriorly. Head with spiny ridges and serrations; mouth large, lower jaw protrudes beyond upper jaw; small isolated spine before first dorsal fin; eye with a lappet on iris; gill openings wide. Usually ctenoid scales on body. Two slightly separated dorsal fins, first with 6-11 spines, second with 11-14 rays; anal fin without spines; ventral fins set well apart. Form of the iris lappet is often distinctive (examples are Figs 1-9). Vomerine teeth usually in two parallel longitudinal bands (Fig 10) but in *Platycephalus*, they fare in a single transverse crescentic band (Fig 11).

Eighteen genera, with 81 species; members of 13 genera were obtained on Survey.

REFERENCES: Knapp, 1987; Knapp, 1996; Imamura, Ida & Moyer, 1995; Imamura, 2003; Imamura, 2008; Gomon & Imamura, 2010; Imamura, 2012; Imamura, 2015; Imamura, 2016; Imamura, 2018; Imamura, 2020; Imamura & Aungtonya, 2020; Imamura & Hoese, 2020; Knapp, 1999.

Cociella punctata (A + B)

Teeth fine; rounded or thin interopercular flap; upper preopercular spine much longer than second; eye 4.2-6 in HL. Iris lappet variable (Figs 5 and 7). Fine black spots over head and back; body either fawn above and cream below or dark and faintly banded above, lower head and body reddish brown. Outer third of spinous dorsal fin dusky to charcoal; caudal fin either faintly barred brown or heavily spotted black.

D₂ 11. A 11. P 19-22.

(voucher (A): 193 mm SL)

(voucher (B): 270 mm SL)

Elates ransonnettii

One very long preopercular spine reaching past edge of operculum. Caudal fin emarginate, upper lobe usually with filament. Head and body almost translucent cream, row of mauve blotches along mid-sides.

D VI; 13-14. A 12-14.

(voucher: 150 mm SL)

Inegocia harrisii

Suborbital ridge with 2 spines below eye, sides of head beneath eye bicarinate; iris lappet a half-circle with long, branched cirri (Fig 8); 2 preopercular spines, about equally long; interopercular flap absent or scarcely developed; anterior 10-12 lateral line scales with low spines. Body fawn; caudal fin brown with few dark elongate marks.

D IX; 11. A 11. P 22-25.

(voucher: 150 mm SL)

Onigocia macrocephala

Scales large. Head spiny and "heart"-shaped; one preopercular spine present; 15-17 short spines or serrae on suborbital ridge which is deeply indented or with gap below eye; short, branched cirrus on upper eye surface; iris lappet finely branched (Fig 9); no interopercular flap. Body brown, fins tan and barred brown; outer third of spinous dorsal fin charcoal; ventral fin margin white.

D VIII-IX; 11-12. A 12. 35-42 scale rows from head to tail base.

(voucher: 82 mm SL)

Onigocia sp

Scales large. Head spiny and "heart" -shaped; 4 or 5 preopercular spines; 19-23 evenly-spaced spines or serrae on suborbital ridge; no cirrus on eye; iris lappet scalloped (Fig 6). Body brown with distinct white band across nape and 2 darker brown bands on caudal peduncle; ventral and pectoral fins edged white.

D VII-IX; 11. A 11. 29-34 scale rows between head and tail base.

(voucher: 80 mm SL)



Fig. 10

Fig. 11
arrangements of vomerine teeth

Cymbacephalus nematophthalmus

Deep pit behind eye; 6-9 skin flaps on upper surface of eye, 2nd very long with many flaps. Iris lappet a half-circle with long branches (Fig 8), maxilla reaches past front edge of eye; one spine on suborbital ridge; interopercular flap present. Body dark grey-green crossed by 7 or 8 dark bands. Fins marbled green, yellow and brown; second dorsal and caudal fins crossed by short brown vertical stripes.

D VIII-IX; 11-12. A 11-12.

(voucher: 250 mm SL)

Grammoplites scaber

All lateral line scales with strong spine. Head and body tan, blotched or banded over back and along mid-sides. Outer half of dorsal and ventral fins dark brown; all fins, especially upper caudal fin and lower pectoral fin, closely spotted brown.

D IX; 12. A 12.

(voucher: 178.5 mm SL)

Cymbacephalus bosschei

Eye small, 6-7.2 in HL; iris lappet a very cirrhone half-circle (similar Fig 8). Head ridges almost smooth; single spine present on suborbital ridge; broad, scalloped interopercular flap present. Preopercular spines small and blunt; no lateral line scales with spines. Body pale brown; upper and lower edges of fawn caudal fin dark brown or black.

D IX; 11-12. A 12-13.

(voucher: 250 mm SL)

Inegocia japonica

Two low spines below eye on suborbital ridge; sides of head beneath eye bicarinate; iris lappet a half-circle with long, branched cirri (Fig 8); 2 preopercular spines, subequal; interopercular flap well-developed and acute; anterior 6-8 lateral line scales with low spines. Body fawn; pectoral and dorsal fins crossed by series of brown spots; caudal fin orange, crossed by 4-6 series of distinct black spots.

D IX; 12. A 12. P 19-21.

(voucher: 160 mm SL)



Onigocia spinosa



Platycephalus endrachtensis



Platycephalus westraliae

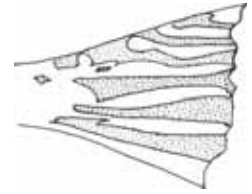


Fig. 14 from A.D. Lewis

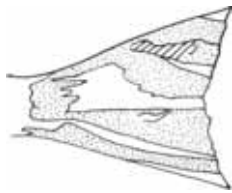


Fig. 12 from Lewis



Fig. 13 from Lewis



Ratabulus fulviguttatus



Rogadius pristiger



Sorsogona tuberculata



Rogadius welanderi



Insidiator macracanthus



Kumococius rodericensis



Cociella hutchinsi



Rogadius patriciae



Sunagocia otaitensis

BEMBRIDAE



Bembras megacephala

Onigocia spinosa

Scales large. Head spiny and "heart"-shaped; 2-6 preopercular spines; suborbital ridge notched below eye; short branched ocular flap on upper eye; iris lappet finely branched (Fig 6). HL 31-42.5% SL; no interopercular flap. Body brown, nape often cream; lower pectoral and ventral fins dark brown or black with white margins.

D VIII-IX; 11-12. A 11-12. 34-42 scale rows from head to tail base.

(voucher: 76 mm SL)

Platycephalus westraliae

Vomerine teeth fine, in one transverse patch. Head almost smooth; lower preopercular spine longer than upper spine; finger-like interopercular flap; interorbital 0.8-1.3 in eye diameter; iris lappet broad and slightly bilobed (Fig 2); snout length 25.9-27.7% HL. First and last dorsal spines small and separated from others. Distinctive tail markings of 4 black wedge-shaped bands over cream background with bright yellow patch on upper lobe (Fig. 12); lower opercular flap spotted brown.

D I+VIII, I, 13. A 13. Lower GR 7-9.

(voucher: 340 mm SL)

Rogadius pristiger

Forward-directed spine on ventral edge of preoperculum; head ridges finely serrated, upper preopercular spine large; one preocular spine. Teeth sharp; iris lappet bilobed (Fig 4). Body brown, nape pale; black bars across pectoral and ventral fins; broad olive band across middle to outer half of caudal fin, preceded proximally by a pale band.

D IX; 10-11. A 11-12. 51-62 scale-rows above lateral line, from head to tail base. Tr above 5-7.

(voucher: 99 mm SL)

Rogadius welanderi

Forward-directed spine on ventral edge of preoperculum slender, only its top visible; head ridges very finely serrated, suborbital ridge not over-hanging cheek; 5 or 6 small preocular spines present; 3 preopercular spines, upper strong, equal to $\frac{1}{3}$ eye diameter; no interopercular flap; iris lappet bilobed (Fig 4). Body pale brown, nape cream; fins barred; 6 or 7 charcoal bands across caudal fin.

D IX; 11. A 11. Tr 6-7 + 14-15.

(voucher: 107 mm SL)

Kumococius rodericensis

Upper preopercular spine long and strong, subequal to eye diameter; interopercular flap well-developed; one preocular spine; 5 or 6 spines on suborbital ridge; iris lappet bilobed or scalloped (Fig 3). Pectoral fin hind edge distinctly concave. Body brown; pectoral fin plain brown with blonde (cream) patch in its centre, broad dark margin to caudal fin.

D VIII-IX; 11. A 12.

(voucher: 159 mm SL)

Rogadius patriciae

No forward-directed spine on preoperculum. Suborbital ridge finely serrated, head moderately smooth; 2 or 3 preocular spines; iris lappet bilobed (Fig 3). First of 3 preopercular spines longest, $\frac{2}{3}$ eye diameter; interopercular flap scarcely developed. Pectoral fin slightly concave. Body fawn; outer half of spinous dorsal fin black, other fins dotted black; black longitudinal bands and 1 or 2 oblique black blotches on caudal fin.

D IX; 12. A 11. P 21-22. Tr above 6-11.

(voucher: 191 mm SL)

Body elongated and cylindrical; head moderately to strongly depressed; jaws approximately equal in length; no isolated spine before first dorsal fin; ventral fin begins below or before pectoral fin base; large mouth with fine teeth on jaws, vomer and palatines. Family has five genera and 15 species; one obtained on the Survey.

REFERENCES: Poss, 1999c; Imamura & Knapp, 1998.

Platycephalus endrachtensis

Vomerine teeth fine, in one transverse patch. Head almost smooth; lower preopercular spine equal to or longer than upper spine; finger-like interopercular flap; interorbital 1.4-2 in eye diameter; iris lappet slightly triangular; snout length 28.5-31.0% HL. Distinctive tail markings of 4 or more black longitudinal bands over white background (Fig 14); interopercular flap plain white.

D I+VII-VIII, I, 13. A 13. Lower GR 8-12.

(voucher: 205 mm SL)

Ratabulus fulviguttatus

Teeth on jaws and vomer canine-like and depressible. Snout 30-35% HL; suborbital ridge with many spines; upper preoperculum; spine clearly longer than second; iris lappet simple (Fig 2). Small, free spine between spinous and rayed dorsal fins; caudal fin truncate. Head spotted orange and brown; back spotted orange and green. Outer spinous dorsal fin charcoal; base and outer third of caudal fin black.

D IX, I; 11. A 11-12.

(voucher: 189 mm SL)

Sorsogona tuberculata

Head ridges very finely serrated, suborbital ridge expanded and overhanging cheek; bicarinate; 3-5 preocular spines present; 5 or 6 preopercular spines; upper one strong, equal to half eye diameter; no interopercular flap; iris lappet bilobed, slightly crenulate (Fig 3). Body pale brown, nape pale; lower pectoral fin and outer ventral fin with patches of black, their margins white. D VIII-IX; 11-12. A 11. Tr 5 + 11-12.

(voucher: 81 mm SL)

Insidiator macracanthus

Upper preopercular spine long and strong, equal to eye diameter; lower opercular flap moderately-developed; one preocular spine; about 10 spines on suborbital ridge; iris lappet crenulate or scalloped (similar Fig 3). Hind edge of pectoral fin evenly convex. Body fawn; distinct dark spots on spinous dorsal fin; pectoral fin finely barred brown.

D IX; 12. A 12.

(voucher: 80 mm SL)

Cociella hutchinsi

Suborbital ridge with 2 spines below eye; well-developed striae on temporal region of head; iris lappet a smooth half-circle (Fig 7); two strong preopercular spines, upper one $\frac{3}{4}$ eye diameter; no ocular flap. HL 36-38% SL; interorbital 4-6.5% HL. Body fawn; spinous dorsal fin with broad dark brown band along its outer third; caudal fin olive with submarginal crescent of distinct charcoal blotches.

D IX; 11-12. A 11. P 21-22. Tr 11-15 + 24-29.

(voucher: 210 mm SL)

Sunagocia otaitensis

Short, fine papillae along edge of both lips; maxilla reaching past front eye margin. Two short preopercular spines present, upper the longer; well developed; rounded interopercular flap; 1 preocular spine. Iris lappet crenulate (Fig 6, 8). Body mottled reddish brown; lips, cheeks and opercles with reddish-brown bars; all fins crossed by series of orange, dull red or black checks, especially distinct on pectoral and ventral fins.

D IX-X; 11-12. A 12. Tr above 4-6. L. lat .57-63.

(voucher: 129 mm SL)

BEMBRIDAE**Bembras megacephala**

Head convex over eyes and nape; lower jaw not projecting beyond upper jaw. Head and body fawn, pale orange or bright yellow, paler below and scattered with lime-green and charcoal spots. Dorsal fin orangey with charcoal and green spots; pectoral and caudal fins checked dark green; dark grey or brown crescentic band along hind margin of caudal fin.

D IX-XI; 11-12. A 14-15. P 19-20. L. lat. 59-60.

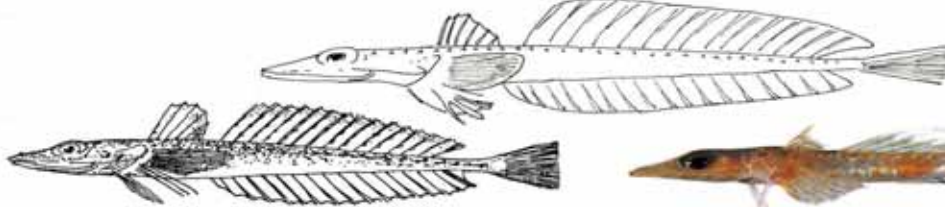
(voucher: 180 mm SL)

PLECTROGENIIDAE



Bembradium sp

HOPLICHTHYIDAE



Hoplichthys gilberti after Jordan & Richardson, 1908



Hoplichthys imamurai

DACTYLOPTERIDAE

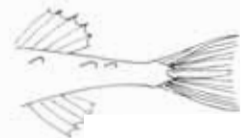
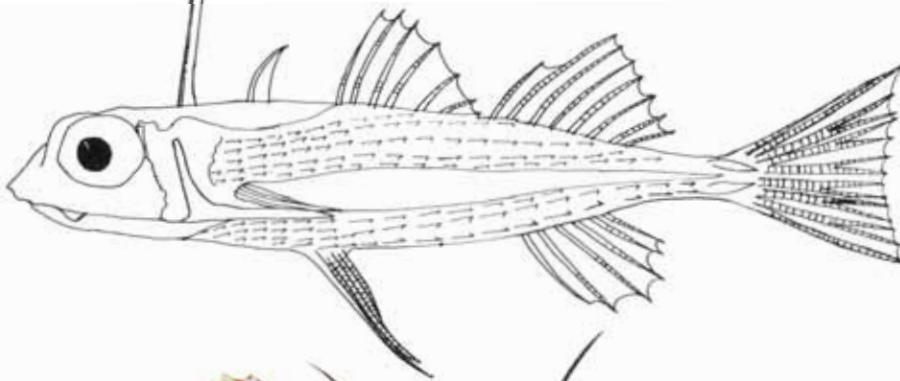


Fig 1



Dactyloptena macracantha



Dactyloptena orientalis



Dactyloptena papilio



Dactyloptena peterseni after Jordan & Richardson., 1980

PLECTROGENIIDAE

Stinger Flatheads -

Body compressed; head usually with spines and ridges; gill membranes free from isthmus; venom gland in dorsal, anal, and pelvic spines.

This family comprises one genus and two (or three?) species.

REFERENCES: Kumar et. al, 2019; Kishimoto, Kawai, Tashiro & Augtonya, 2019.

Bembradium sp

Head convex over eyes and nape; lower jaw not projecting beyond upper jaw; suborbital and supraorbital ridges densely spined, 11-12 short spines on suborbital ridge. Scales large. Lower 10 rays in pectoral fin slightly thickened. Body and fins red or orange-red, pink spots and red margins sometimes visible on fins.

D VIII-IX; 12. A 10-11. P 24-27. L. lat. 27-30.

(voucher: 89 mm SL)

HOPLICHTHYIDAE

Ghost flatheads -

Body elongate, subcylindrical; back and upper sides with bony plates and spiny scutes. Head depressed and broad, with strong spines and ridges. No scales on body. Two dorsal fins: first spinous and short, second rayed; anal fin without spines, about as long as second dorsal fin; lower 3 or 4 pectoral fin rays detached or free from rest of fin; caudal fin rounded or lanceolate.

The family comprises a single genus containing 14 species, two of which were collected on the Survey.

REFERENCES: McGrouther, 1999; Nagano, McGrouther & Yabe, 2013; Nagano, Endo & Yabe, 2013; Nagano, Imamura & Yabe, 2012.

Hoplichthys gilberti

Lateral line spines in one row. No cluster of spines on underside of head behind maxilla. Upper jaw length 3-3.2 in HL; snout approximately equal to eye diameter; interorbital $\frac{1}{3}$ of eye diameter. Longest free pectoral ray shorter than longest branched pectoral ray. Body tan with 4 dark cross-bands; first dorsal and pectoral fins dark brown.

D VI, 15. A 16-18.

(voucher: 160 mm SL)

Hoplichthys imamurai

Lateral line scales in one row. A cluster of spines on underside of head behind maxilla; head ridges strongly spined; snout $\frac{1}{3}$ of HL; large eye, $\frac{1}{4}$ of HL; gill rakers long and thin. In males, rays of second dorsal fin produced and filamentous (first, middle and last rays noticeably longer); caudal fin emarginate, upper lobe filamentous. Three broad orange blotches across body and lower caudal fin lobe orange; sometimes black edge to anal fin.

D VI, 15. A 16-17.

(voucher: 141 mm SL)

DACTYLOPTERIDAE

Flying Gurnards -

Body moderately elongate. Head large and blunt, bones on top of head united to form a shield which is produced backward from top of head into a long post-temporal spine and a long spine from preopercular angle. Interorbital broad. Body scales sharply-keeled and scute-like. Two dorsal fins, spinous fin preceded by one or two single free spines; no spines in short anal fin. Pectoral fin enormous and wing-like. Caudal fin lunate or emarginate.

The family comprises two genera and seven species; four were obtained on the Survey.

REFERENCES: Eschmeyer, 1997; Poss & Eschmeyer, 1999; Sato, Endo, Nakabo & Machida, 2003.

Dactyloptena macracantha

Post-temporal spine lies flat against body. Eye 1.2-1.5 in interorbital; t2-4 enlarged scales on lower side of caudal peduncle (Fig 1). Lateral line present, reaching caudal fin. Two single free spines before first dorsal fin, first one much longer than second. Inner pectoral fin usually with one large black blotch midway along fin, sometimes containing cream or yellow spots.

D I, I, V+I, 8-9, P 31-35.

(voucher: 192 mm SL)

Dactyloptena orientalis

Post-temporal spine lies flat against body. Snout blunt; eye 1.4-1.6 in interorbital; 2-4 enlarged scales on lower side of caudal peduncle (Fig 1). Two single free spines before first dorsal fin, second one much shorter. Lateral line absent or obscured. Inner pectoral fin with many olive and charcoal blotches over all of fin, golden bands across caudal fin.

D I, I, V+I, 8. P 32-35.

(voucher: 370 mm SL)

Dactyloptena papilio

Post-temporal spine elevated above body profile. Snout narrow; eye 2-2.3 in wide interorbital; 5-7 enlarged scales on lower sides of caudal peduncle. Two single free spines before first dorsal fin, second one much shorter than first. Lateral line present, reaching caudal fin. Large black patch containing blue spots near base of inner pectoral fin, rest of fin with dark blotches.

D I, I, V+I, 8. P 28-32.

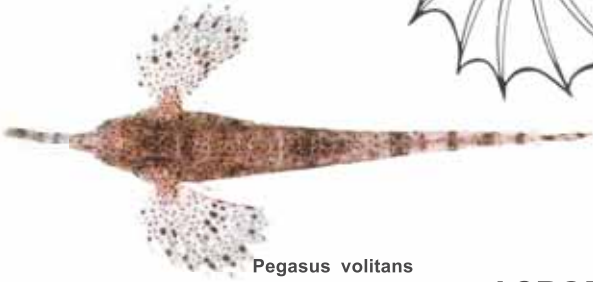
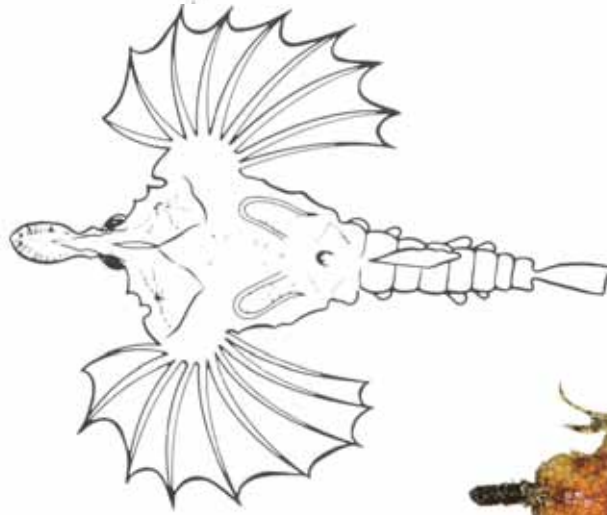
Dactyloptena peterseni

A single free spine before first dorsal fin. Snout blunt; interorbital moderately wide. Lateral line absent or obscured; 3 enlarged scales on lower sides of caudal peduncle. Body orange-red above with scattered green or brown spots; a large dark green or brown blotch over centre of inner pectoral fin crossed by many pale yellow lines and spots.

D I, VII, 8. P 31-34.

(voucher: ? mm SL)

PEGASIDAE

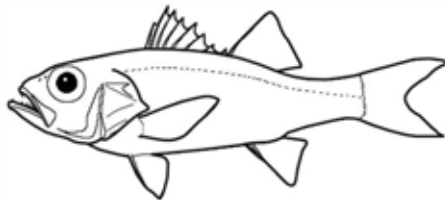


Pegasus volitans



Eurypegasus draconis

ACROPOMATIDAE

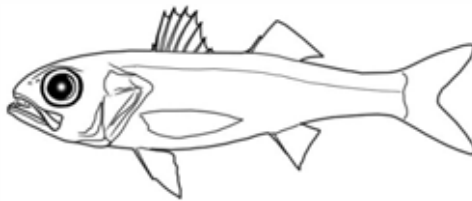


Acropoma leobergi



Doederleinia berycoides

SYNAGROPIDAE



Parascombrops philippinensis



Synagrops japonicus

MALAKICHTHYIDAE



Malakichthys griseus



Malakichthys elegans

PEGASIDAE

Sea moths -

Body very broad and very depressed, encased in bony rings. Snout (rostrum) long and flattened; small mouth underneath snout; no teeth. Gill cover a single bony plate. Bony body rings fused together anteriorly, tail section quadrangular. Dorsal and anal fins short-based without spines; ventral fin with one spine and 1-3 rays; pectoral fin large, horizontal, with 8-10 unbranched rays.

The family consist of two genera and six species, of which two genera were collected on the Survey.

REFERENCES: Palsson & Pietsch, 1989; Osterhage, Pogonoski, Appleyard & White, 2016.

Pegasus volitans

Tail portion (without caudal fin) as long as or longer than rest of body and with 12 bony rings. Rostrum slender. Body barred dark brown; fins barred and spotted black and violet.
D 5. A 5. P 11.

Eurypegasmus draconis

Tail portion (without caudal fin) shorter than rest of body (without snout) and with 8 bony rings. Rostrum short, sides convex. Orange-brown, mottled green. Fins and snout spotted brown and charcoal; snout and tail tips black.
D 5. A 5. P 9-11.
(voucher: ? mm SL)

ACROPOMATIDAE

Lanternbellies -

Body oblong, moderately compressed. Two dorsal fins, first with 7-10 spines; the second with or without a spine and with 8-10 soft rays; anal fin with 2-3 spines and 7-9 soft rays. Seven branchiostegal rays. Opercle with two rounded spines. Lateral line complete. Pelvic fin with one spine and 5 soft rays. Two flat opercular spines; large eye; canine teeth often present. Dorsal fin either deeply notched near end of spinous part or completely separated into spinous and rayed fins. Scales large and easily lost.

These fish are often confused for members of the families APOGONIDAE and SERRANIDAE.

Two genera and seven species in the family; both genera represented in the Survey material. This family was (1984) included with SYNAGROPIDAE and MALAKICHTHYIDAE (q.v.) as family PERCICHTHYIDAE.

REFERENCES: Okamoto & Golani 2017; Okamoto, Williams, Carpenter, Santos & Kimura 2019; Okamoto, Randall & Motomura 2021; Yamanoue & Matsuura, 2007; Ghedotti, Gruber, Barton, Davis & Smith, 2018.

Note: See additional comments in the Species List.

Acropoma leobergi

Dorsal fin divided into two separate fins. Body pink, lower sides silver with scattered dark dots; anus pale.
D VIII; I, 10. A III, 7. GR 5-8 + 15-18. L. lat. 43-45.
(voucher: 89 mm SL)

Doederleinia berycoides

Eye large, 2.7-3.2 in HL; lower preopercular margin strongly serrated; dorsal fin deeply notched. Head and body red, yellow shades on head, deep red over fin edges.
D IX, 10. A III, 6-8. GR 6-9+15-18. L. lat. 41-46.

SYNAGROPIDAE

Splitfin ocean-basses -

Four genera and 17 species in the family; two obtained on the Survey.

REFERENCES: Schwartzhans & Prokofiev, 2017.

Synagrops japonicus

Skin on head "knobby"; preopercular angle and ventral fin spine smooth. Body black or dark brown.
D IX; I, 9. A II, 7. GR (total) 19-23. L. lat. 28-30.
(voucher: ? mm SL)

Parascombrops philippinensis

Front edge of ventral fin spine strongly serrated; strong serrae at preopercular angle. Body dusky mauve above, silvery below; dorsal fin margin black.
D IX, 1, 9. A II, 7. GR (total) 18-20. L. lat. 24.
(voucher: 79 mm SL)

MALAKICHTHYIDAE

Temperate ocean-basses -

Two genera and 15 species in the family; three species collected on the Survey.

REFERENCES: Yamanoue & Matsuura, 2002; Yamanoue & Matsuura, 2004; Yamanoue & Matsuura, 2014.

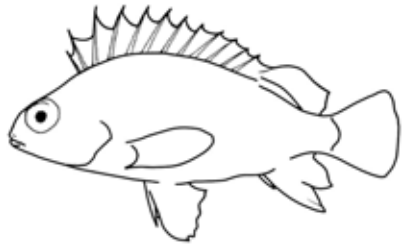
Malakichthys griseus

Chin sharp but no tooth-like spines near symphysis; body depth 3.6-3.7 in SL. Body pinkish fawn, silvery on lower sides; operculum, snout and maxilla metallic silver; edge of spinous dorsal black.
D IX-X, 9-10. A III, 8. GR (total) 30. L. lat. 48-50.
(voucher: 105 mm SL)

Malakichthys elegans

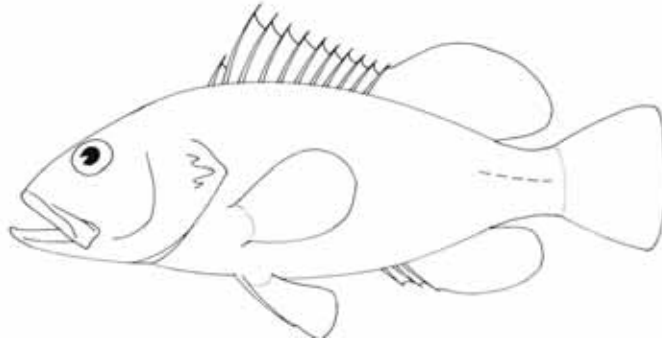
One pair of tooth-like spines on chin near symphysis; body depth 2.9-3.2 in SL. Body pink or fawn, edge of spinous dorsal black.
D IX-X, 10. A III, 7. GR (total) 30-33. L. lat. 50-54.
(voucher: 125 mm SL)

CENTROGENYIDAE



Centrogenys vaigiensis

SERRANIDAE



Subfamily Serraninae



Chelidoperca flavolineata



Chelidoperca stella

Subfamily Ephinephelinae



Aethaloperca rogaa



Anyperodon leucogrammicus



Cephalopholis boenak



Cephalopholis argus

CENTROGENYIDAE

False Scorpionfishes, Prettyfins -

Body short and deep, head large with 2 spines on operculum and 3 or 4 antrorse spines on lower edge of preopercle; no suborbital ridge. All teeth villiform and non-depressible. Dorsal fin begins above mid head length, with XIII-XIV spines; second anal fin spine strong and very long; upper rays of pectoral fin not branched.

This is a monotypic family.

REFERENCE: Gill, 1999a.

Centrogenys vaigensis

Small fish; fringed tentacle on front nostril; scales large and ctenoid; spinous dorsal fin base much longer than soft fin base. Body and fins mottled and blotched dark brown; some alternating white and brown bars on most fins.

D XIII-XIV, 9-11. A III, 5.

(voucher: 60 mm SL)

SERRANIDAE

Groupers; Sea-basses; Rock-cods - Kerapu;

Small to very large fishes, body oblong, moderately compressed and robust. Mouth large, maxilla usually exposed posteriorly and usually with a supramaxilla; jaw teeth villiform or conical, inner teeth often depressible or hinged and usually canine teeth present; preopercular margin serrated; 2 or 3 spines on operculum. Scales usually small, lateral line complete. Single dorsal fin with 14 spines, slightly notched from posterior part of 9-21 rays; anal fin with 3 spines, 5-10 rays; pectoral fin broadly rounded; caudal fin slightly rounded, truncate or lunate, but never forked.

SERRANIDAE comprises three subfamilies and comprises altogether 72 genera and 579 species.

Subfamily Anthiadae comprises 29 genera and 231 species; individuals belonging to five genera and nine species were collected on the Survey.

Subfamily Epinephelinae comprises 31 genera and 327 species, split among five Tribes. Eight genera and 40 species were collected on the Survey.

Subfamily Serraninae comprises 12 genera and 101 species; we collected two species in one genus, *Chelidoperca*.

Subfamily Serraninae

Perchlets -

These small, perch-like fishes generally have ten spines in their dorsal fins and seven soft rays in their anal fins; all fin spines are smooth, without serrae. They are generally solitary and inhabit depths from shallow waters down to 500 m over sandy rocky areas or sea-grass beds. Carnivorous, bottom-dwelling fishes. Members of the Serraninae exhibit a diverse expression of sexual patterns.

REFERENCES: Matsunuma & Motomura, 2016; Parenti & Randall, 2020; Matsunuma, Tan & Peristiwady, 2016; Lee, Lee, Matsunuma & Chen, 2019.

Chelidoperca flavolineata

Body rosy, blotched below. Eye surrounded by bright yellow; faint broad yellow band along body to tail base. Two to 3 rows of dark olive checks along dorsal fin, bright yellow bands across caudal fin.

GR (total) 17-19. L. lat. 46-47.

(voucher: 78 mm SL)

Chelidoperca stella

Yellow or pale pink body with iridescent blue spots on lower sides. Maxilla and suborbital bright yellow. Fins violet, marked with yellow, paired fins white with yellow spots.

Total GR. 15-16. L. lat. 35-36.

(voucher: 78 mm SL)

Subfamily Epinephelinae

Groupers, Sea bass -

Dorsal fin with seven to twelve spines, anal fin with three spines. The caudal fin is mostly rounded or truncate, sometimes lunate; seven branchiostegal rays. There are three spines on the operculum, and the tip of the maxilla is exposed. These are demersal fishes inhabiting coral reefs, rocky, muddy or sandy bottoms, and over seagrass beds. They are hermaphrodites and top food-chain predators, feeding mainly on fishes or large crustaceans and cephalopods, and reaching 300 cm in length and 400 kg in weight. Epinephelines are excellent food fishes and commercially important.

REFERENCE: Nelson, J.S. 1994.

Aethaloperca rogae

Red-brown body and fins, scarlet around lips and inside mouth, prominent bluish white bar often present behind pectoral fin, narrow white edge on caudal fin. Body compressed and deep, depth 2.1-2.5 in SL; ventral fin long, caudal fin truncate; middle dorsal and anal fin rays extended.

D IX, 17-18. A III, 9.

Cephalopholis boenak

Dark brown or dark tan, sometimes with 8 faint darker cross bands, black spot usually on upper opercular flap; spinous dorsal margin black, white edge to soft dorsal, anal and caudal fins, pectoral fin black.

D IX, 15-17. A III, 8. P 16-17. GR 7 + 14-16. Tr above 10-12.

(voucher 97 mm SL)

Anyperodon leucogrammicus

Body and head greenish-grey; four white streaks from head along body; orange or red spots over head, body and dorsal fin. Juveniles with broad black midlateral band. Slender fish; no palatine teeth; no large serrae on preoperculum; head fully scaled, pointed.

D XI, 14-15.

(voucher: 175 mm SL)

Cephalopholis argus

Dark brown becoming brownish orange posteriorly, breast pale, sometimes 5 or 6 dark bars present on posterior half of body; head, body and fins covered with many pale blue, brown-edged spots; edge of unpaired fins white, tips of dorsal spine membranes and outer 1/3 of pectoral fin plain orange. Gill rakers short; axillary scales present on body.

D IX, 16-17. P 16-17. GR 9-11 + 16-19.

(voucher: 260 mm SL)



Cephalopholis miniata



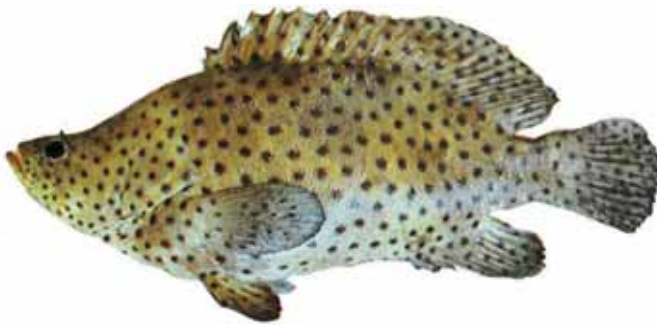
Cephalopholis sexmaculata



Cephalopholis sonnerati



Cephalopholis urodelus



Chromileptes altivelis



Epinephelus amblycephalus



Epinephelus areolatus



Epinephelus bleekeri



Epinephelus cyanopodus



Epinephelus coeruleopunctatus

Cephalopholis miniata

Head, body and fins orange or red, covered with many dark-edged blue spots, spots more dense posteriorly; soft dorsal, anal and caudal fins with blue margin and dark submarginal band; outer half of pectoral fin bright yellow. Longest dorsal spine 3.3-3.5 in HL; 2nd and 3rd anal spines about equal in length; gill rakers long. D IX, 15. P 17-18. GR 9-11 + 14-17. Tr above 8-10. (voucher: 225 mm SL)

Cephalopholis sonnerati

Head, body and fins bright red or reddish brown; meshwork of blue line and/or dark red spots over head and front of back; black margin on all except pectoral fins. Ventral fin long, equal to postorbital head length. D IX, 14-15. P 19. GR 9-10 + 13-14. Tr above 13-15; 100-120 scale rows between head and tail base. (voucher: 225 mm SL)

Chromileptes altivelis

Dark brown or black moderate-sized spots over pale yellow or green head, body and fins. Body very compressed; head profile deeply concave above eye, convex ("humped") before dorsal fin; no canine teeth. D X, 17-19. (voucher: ? mm SL)

Epinephelus areolatus

Body olive or pale brown, head, body and fins covered with round large yellow-green or orange-brown spots or blotches; distinct white hind margin on caudal fin. Membranes of spinous dorsal fin incised; caudal fin emarginate. Caudal peduncle depth 2.9-3.1 in HL. D XI, 15-17. P 17-18. GR 8-9 + 14-16. L lat. 49-53. (voucher: 195 mm SL)

Epinephelus cyanopodus

Body, head and fins blue or violet, becoming brownish purple above and covered with large- and smaller scattered irregularly-shaped dark spots. Margin of pectoral fin orange. Body deep, 2.5-2.7 in SL. Caudal fin truncate. D XI, 16-17. P 17-19. Lower GR 15. L. lat. 65-70.

Cephalopholis sexmaculata

Scarlet or orange-red, many blue spots over head, body and unpaired fins; five or six dark brown squarish blotches along back, first 4 extending onto dorsal fin; blue lines around eye; pectoral and ventral fins bright orange. Longest dorsal spine 2.9-3.2 in HL; gill rakers long. D IX, 14-15. P 16-18. GR 7-8 + 14-16. Tr above 10. (voucher: 215 mm SL)

Cephalopholis urodeta

Body and fins red, becoming reddish brown posteriorly; two oblique white bands on caudal fin converge near centre of fin's hind margin, lobes of caudal fin red. Pectoral fin long, equal to head without snout. D IX, 14-16. P 18. GR 7-10 + 14-15. Tr above 9-10. (voucher: 150 mm SL)

Epinephelus amblycephalus

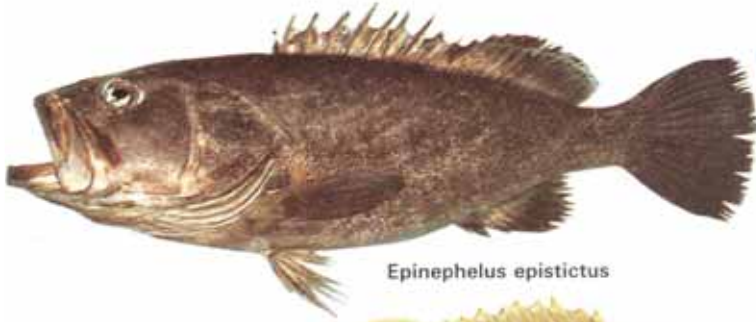
Seven broad brown or dark olive bands across pale body, each edged by series of small black spots: first band from interorbital obliquely through eye, second band as a saddle across nape; maxillary groove bright yellow; fins plain, unpaired fins spotted in young. Pectoral fin much shorter than postorbital head length; caudal fin rounded. D XI, 15-17. P 19. GR 8 + 14-16. Tr above 14-16. (voucher: 365 mm SL)

Epinephelus bleekeri

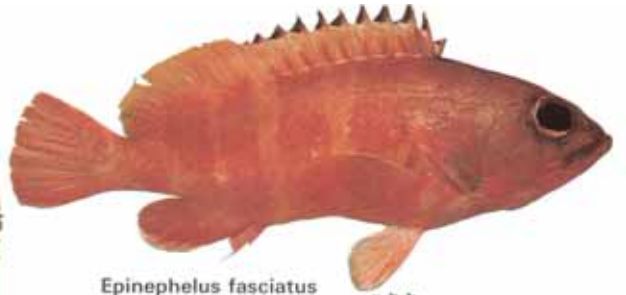
Body and fins brown or dark brown; moderate-sized dark-ringed orange or yellow spots scattered over head, back and sides, dorsal and upper $\frac{2}{3}$ of caudal fins. Paired fins plain dark brown; lower $\frac{2}{3}$ of caudal fin plain dark brown. Membranes of spinous dorsal fin incised; caudal fin truncate. D XI, 17-18. P 17. GR 4-6 + 16. (voucher: 530 mm SL)

Epinephelus coeruleopunctatus

Variegated dark brown or bluish, sometimes broad brown blotches below dorsal fin base; white or pale blue round spots or blotches on back and sides; maxillary groove black. Fins bluish brown. Membranes of spinous dorsal fin incised. Gill rakers very short, subequal to gill filaments; upper opercular border slightly curved. Caudal peduncle short, its length 2.9-3.1 in HL; pectoral fin large and fleshy. D XI, 15-16. P 18. Lower GR 14-18. (voucher: 280 mm SL)



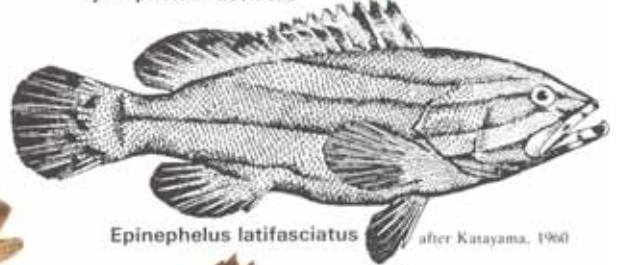
Epinephelus epistictus



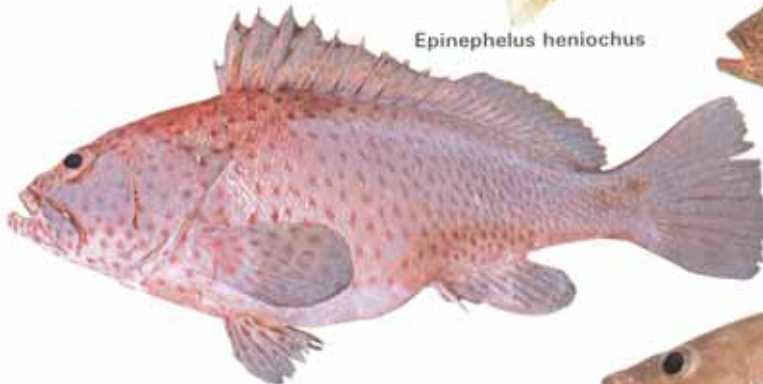
Epinephelus fasciatus



Epinephelus heniochus



Epinephelus latifasciatus after Katayama, 1960



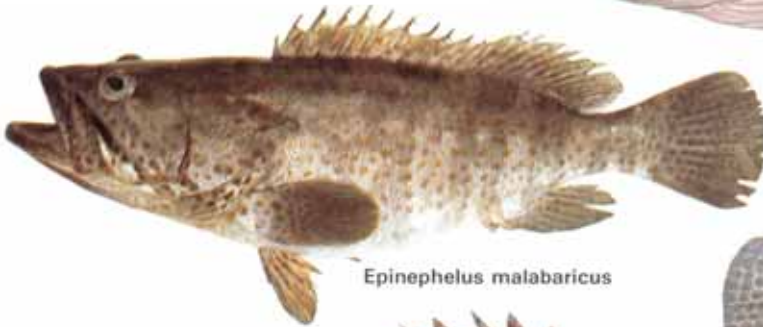
Epinephelus longispinis



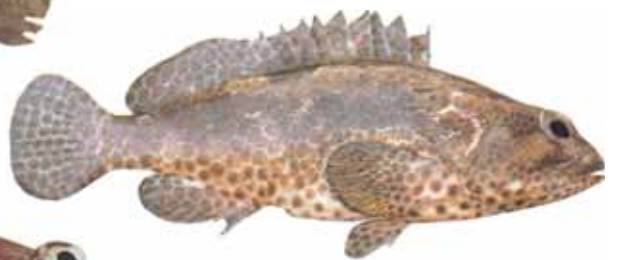
Epinephelus maculatus



Epinephelus magniscuttis



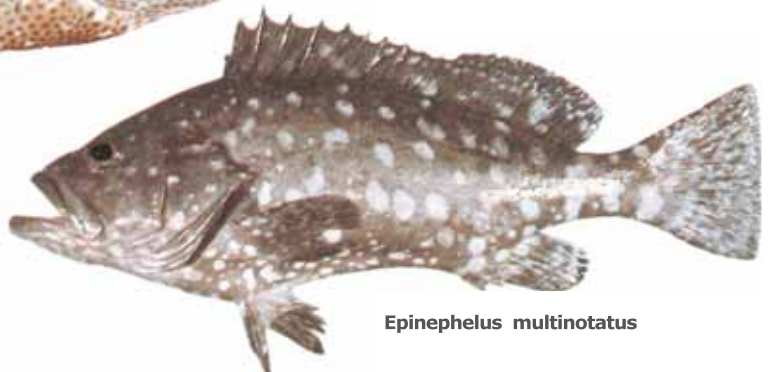
Epinephelus malabaricus



Epinephelus melanostigma



Epinephelus polyphkadion



Epinephelus multinotatus

Epinephelus epistictus

Brown, pale brown or violet below; irregular rows of dark brown spots on body; in rows in juveniles, becoming smaller, more numerous in adults, absent in large fish; 3 dark bands on head, uppermost from eye to opercular flap, lowermost in maxillary groove. Margins of brown soft dorsal, anal and caudal fins white. Preopercular angle serrated; maxilla doesn't extend much past eye; opercular spines equally spaced.

D XI, 14-15. P usually 17-18. L. lat. 57-69. Lower GR 13-17.

(voucher: 500 mm SL)

Epinephelus heniochus

Body olive-fawn or brown, 3 oblique dark brown lines over head usually apparent; dusky yellow patch around eye and mouth; dorsal fin spines tipped orange or bright yellow; dark brown margin to caudal fin. Preopercular angle prominent; caudal fin truncate or slightly rounded.

D XI, 15. P 17. GR 5-7 + 9-12. Tr above 10-11.

(voucher: 210 mm SL)

Epinephelus longispinis

Body fawn or pale reddish brown, fins dark brown; head, body and fins covered with dark spots which are rounded anteriorly, becoming elongate, vertically slanted and densely crowded posteriorly; crimson spots on lower head and breast. Second and 3rd dorsal fin spines noticeably longer than remainder; caudal fin almost truncate.

D XI, 16-17. P 18.

Epinephelus magniscuttis

Body grey, pale brown on upper head and back; well-spaced brown spots scattered along middle of sides, number increasing in larger fish but spots never extending over front half of head. Unpaired fins greyish green with scattered spots; pectoral fin brown or yellow. Preoperculum strongly angular with large serrae. Caudal fin rounded. Pectoral fin 1.9 in HL.

D XI, 14-15. About 75 scale rows between head and tail base.

(voucher: 360 mm SL)

Epinephelus melanostigma

Body, head and fins covered with brown spots. On upper half of body and head, spots mostly hexagonal and separated by narrow pale lines; on belly, lower sides and head spots rounded and well-separated; large dark brown blotch on back below 7-10th dorsal fin spines, extending onto fin. White edge to soft dorsal, anal and caudal fins. Pectoral fin 1.7-1.8 in HL.

D XI, 15. P 19. Lower GR 17-18. Scale rows from head to tail base 90-95.

(voucher: 210 mm SL)

Epinephelus multinotatus

Rich brown to bluish grey; head, body and fins covered with large and small cream or grey spots and blotches; black ring around eye; narrow white hind margin on caudal fin. Gill rakers long; caudal fin truncate. Body depth 2.6-2.9 in SL.

D XI, 15-17. P 18. GR 8 + 15-16. Tr above 20-23.

(voucher: 270 mm SL)

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Epinephelus fasciatus

Scarlet or brownish red with 5-6 faint broad darker bars across body; 3 diagonal red bars across chest; eye ringed black; triangular black area on membrane behind tip of each dorsal fin spine. Soft dorsal, ventral and outer half of anal fin yellow. Tip of opercular flap much closer to lateral line than to top of pectoral fin base; opercular spines equally spaced from each other, caudal fin rounded.

D XI, 15-17. P 18-20. Lower GR 14-17. L. lat. 52-57.

(voucher: 250 mm SL)

Epinephelus latifasciatus

Pale brown or mauve-grey, with 4 longitudinal, slightly upwardly-curved dark brown lines on head and body, broken into spots in larger fish. Fins yellowish or bluish grey, dorsal, caudal and anal fins with large black spots on their outer halves; dorsal spines tipped black, membranes incised.

Maxilla extends well past eye; preopercular angle strong; middle opercular spine nearer to lower than to upper spine.

D XI, 12-14. P 18-19. Lower GR 13-17. L. lat. 58-66.

(voucher: ? mm SL)

Epinephelus maculatus

Dark brown spots over tan head, body and all fins, one or 2 large black patches on back below first dorsal base, all fins dark. Gill rakers long; caudal fin slightly rounded.

D XI, 15-16. P 17-18. Tr above 13. GR 8 -10 + 15-17.

(voucher: 350 mm SL)

Epinephelus malabaricus

Yellow to brown; 5-6 oblique double bands across body; orange or brown spots scattered over head, body and fins; maxillary groove dark brown; 3 dark spots on lower operculum; fins brownish yellow, spotted over lower half. Two rows of teeth on side of lower jaw; HL 2.3-2.6 in SL; maxilla ending past hind eye border; anterior L. lat. scales with branched tubules.

D XI, 14-16. P 19-20. Lower GR 15-18. L. lat. 58-64.

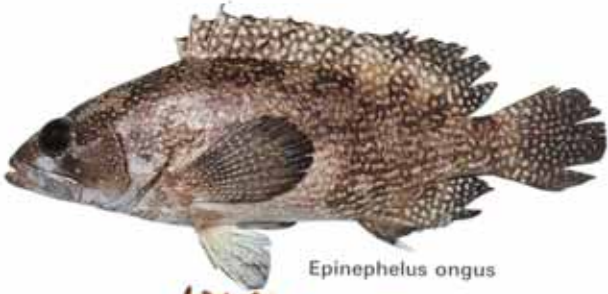
(voucher: 430 mm SL)

Epinephelus polyphekadion

Numerous brown spots over body and fins, 5 or 6 dark brown oblique irregular bars over back, first forward from nape, last as distinct saddle over caudal peduncle; dark mark in maxillary groove. Dorsal head profile smoothly curved; maxilla ends approximately below hind eye border, upper edge of operculum convex.

D XI, 14-15. P 16-17. GR 10 + 15-16.

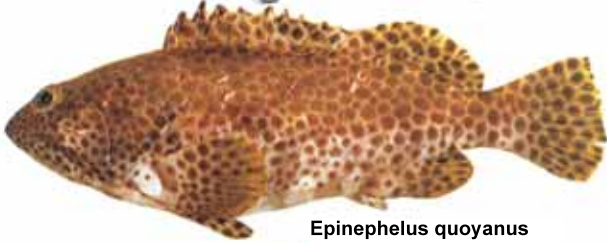
(voucher: 380 mm SL)



Epinephelus ongus



Epinephelus poecilonotus



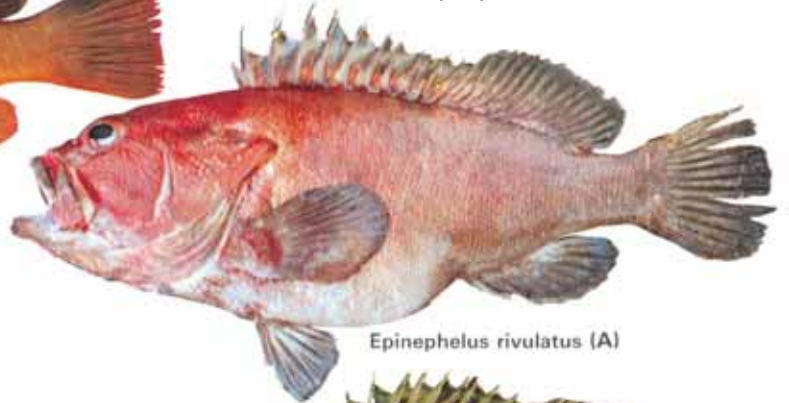
Epinephelus quoyanus



Epinephelus radiatus



Epinephelus retouti



Epinephelus rivulatus (A)



Epinephelus sexfasciatus



Epinephelus rivulatus (B)



Epinephelus tauvina



Epinephelus undulosus



Epinephelus stictus.

Epinephelus ongus

Body yellowish brown, darker on head; 5 dark brown bands obliquely across body; small white spots cover head and form into numerous wavy lines of spots along body. Fins dark brown, covered with larger or smaller white spots; edges of unpaired fins white. Gill rakers shorter than gill filaments; 3-4 rows of teeth on side of lower jaw; posterior nostril small and rounded. Pectoral fin 1.5-1.7 in HL; ventral fin 2-2.4 in HL.

D XI, 14-16. A III, 8-9. P 16-18. Lower GR 16-17. L. lat. 49-54.

(voucher: 165 mm SL)

Epinephelus quoyanus

Many moderate to large dark spots or hexagons on body extending over head, body and fins, largely absent from breast and belly; lower sides of body plain; two dark brown bands across breast before pectoral fin, another on its base; margins of pectoral, soft dorsal and caudal fins yellow. Pectoral fin long, 1.2-1.5 in HL.

D XI, 16-18. P 17-18. GR 7-8 + 14-16.

(voucher: 251 mm SL)

Epinephelus retouti

Orangey brown; top of head, back, dorsal and caudal fins greenish; five faint, broad bars across body; triangular bright orange area on membrane behind tip of each dorsal fin spine; soft dorsal and upper caudal fin dark greenish brown. Tip of opercular flap midway between lateral line and top of pectoral fin base; middle opercular spine slightly nearer to lower than to upper spine; caudal fin truncate.

D XI, 16-17. P 19. Lower GR 15. L. lat. 64-71.

(voucher: 310 mm SL)

Epinephelus sexfasciatus

Six broad, slightly oblique dark bands across body, bands as wide as interspaces and sometimes double; scattered pale spots over head and body; 4 to 7 rows of dark spots on soft dorsal, anal and caudal fins; pectoral fin plain fawn or orange. Caudal fin rounded.

D XI, 14-15. P 16. GR 7 + 13-14. Tr above 8-12.

(voucher: 170 mm SL)

Epinephelus undulosus

Body olive to purplish grey with 12-16 thin wavy dark brown lines slanting over head and upper half of body to tail base; yellowish dots on head; narrow black margin on dorsal fin; pectoral fin pale yellow; cream band on anal fin base. Caudal fin truncate; gill rakers elongate.

D XI, 18-19. A III, 8-9. P 18. GR 14 + 20-23. Tr above 20-21.

(voucher: 350 mm SL)

Epinephelus poecilnotus

Body and head pale reddish-brown with pattern of parallel alternating brown lines and rows of spots: those on upper half of body obliquely ascending, those on lower half horizontal. Fins mostly plain, dorsal fin spines tipped black. Preoperculum strongly angular with large serrae; caudal peduncle length 2.3-2.8 in HL. Interspinous membrane of dorsal fin incised, soft dorsal fin outline convex and higher than posterior dorsal spines.

D XI, 14-15. P 17-18. Lower GR 13-14. L. lat. 60-65.

Epinephelus radiatus

Head and body fawn or pale olive. Dark brown lines from eye passing obliquely over head thence upward to back and across caudal peduncle; dark lines enclose white patches and scattered dark brown spots. Unpaired fins fawn; dorsal fin with median band of brown spots; pectoral fin orange. Preoperculum strongly angular, with large serrae; caudal peduncle length 2.5-3.1 in HL.

D XI, 14-15. P 17. Lower Gr 14-17. L. lat. 61-67.

(voucher: 177 mm SL)

Epinephelus rivulatus

Body reddish brown or greenish, more red on head, each scale with small bluish spot, extending over head and fins, sometimes forming close wavy lines; 5-6 dark cross bands, faded in large individuals, first on nape. Blackish brown margin to spinous dorsal fin, other fins unmarked; red or orange bar on pectoral fin base. Two rows of teeth on each side of lower jaw; opercular spines equally spaced from each other; caudal fin rounded, interspinous membrane of dorsal fin incised.

D XI, 17. P 17-18. Lower GR 14. L. lat. 49-53.

(voucher: (A) specimen lost)

(voucher: (B) 150 mm SL)

Epinephelus tauvina

Body greenish grey to brown, paler below; 5-6 faint oblique double bands across body; reddish or brown spots scattered over head, body and fins almost to their margins. Large brown blotch at rear base of spinous dorsal fin. 3-4 rows of teeth on side of lower jaw; HL 2.1-2.4 in SL; maxilla extending well past eye.

D XI, 14-16. P 18-19. Lower GR 18-20. L. lat. 67-74.

(voucher: 440 mm SL)

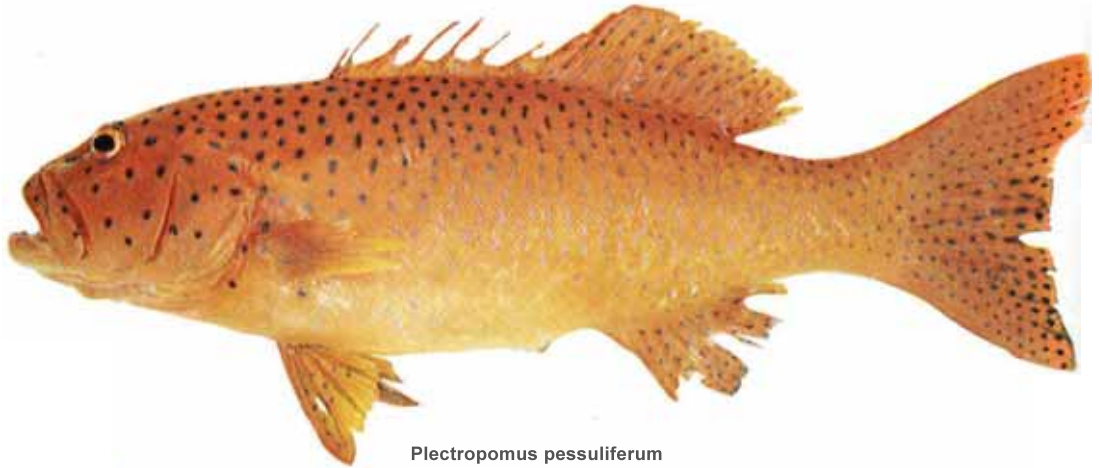
Epinephelus stictus

Olive-yellow, white below; top of head and back with many orange-brown spots, more numerous in larger fish; 5-6 faint broad darker bands across body; maxillary groove brown; a thin dark line along base of dorsal fin. Soft dorsal and caudal fin margins dark brown. Caudal fin rounded.

D XI, 16. P 18. Lower GR 15. Scale rows between head and tail base 98-103.



Plectropomus maculatus



Plectropomus pessuliferum



Variola albimarginata



Variola louti



Grammistes sexlineatus



Diploprion bifasciatus

Plectropomus maculatus

Nostrils rounded and of equal size; gill rakers long; hind anal fin margin straight or concave. Caudal fin truncate or with undulate hind margin. Body orange-red; 5-7 elongate blue spots on head becoming smaller and rounded on body posteriorly; no spots on lower sides; one spot on inner pectoral fin base; few spots on dorsal, anal and caudal fins, none on ventral fins.

P 16.

(voucher: 465 mm SL)

Variola albimarginata

Caudal fin deeply lunate; 1-3 large canines at midside of lower jaw. Body and fins crimson with violet wash, covered with small violet and yellow spots. Outer half of pectoral fin yellow; dorsal and anal fin margins brown; narrow white posterior margin and submarginal dark line to caudal fin.

D XI, 13-14. A III, 8. 90-95 scale rows between head and tail base.

(voucher: 265 mm SL)

Diploprion bifasciatus

Preopercular margin strongly serrate; scales ctenoid; body depth 2-2.4 in SL. Dorsal fin deeply notched. Ventral fin long, reaching beyond anus. Two broad black vertical bands across body: first through eye; second over spinous dorsal fin, mid-side of body, ventral fin and anterior half of anal fin. Remainder of body orange-yellow or pale yellow.

D VIII, 13-16. A II, 12-13.

Plectropomus pessuliferus

Nostrils rounded, anterior nostril noticeably smaller than posterior one; gill rakers long. Body orange-red; few blue spots on head, rounded; spots vertically elongate over middle of body remainder rounded, extending densely over dorsal, anal and caudal fins, fewer on ventral fin.

P 16.

(voucher: 380 mm SL)

Variola louti

Caudal fin deeply lunate; 1-3 large canines at midside of lower jaw. Body yellow to orange-red with small yellow spots arranged in irregular rows; fins yellow with many red spots and margins yellow. Posterior margin of caudal fin broadly yellow.

D XI, 13-14. A III, 8. About 110 scale rows between head and tail base.

(voucher: 220 mm SL)

Grammistes sexlineatus

Small fleshy flap on chin. Deep notch between spinous dorsal and dorsal rays. Scales cycloid; preopercular margin smooth. Dark brown or black with 3-8 bright yellow, cream or white stripes along body. Outer part of spinous dorsal fin bright red.

D VII, 13-14. A II, 9.

(voucher: 99 mm SL)

Subfamily Anthiadae



Pseudanthias gibbosus



Pseudanthias rubrizonatus (male)



Pseudanthias squamipinnis



Pseudanthias rubrizonatus (female)



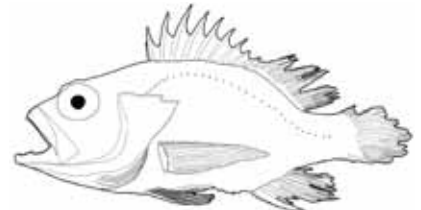
Odontanthias rhodopeplus



Plectranthias japonicus



Selenanthias analis



Plectranthias ferrugineus drawing of preserved specimen by Moras 2022

CALLANTHIDAE



Callanthias sp cf australis



Callanthias sp cf japonicus

PSEUDOCROMIDAE



Pseudochromis steenei



Congrogadus spinifer



Congrogadus subducens

Subfamily Anthiadiinae

Butterfly perches -

Compressed, small colourful fishes. Maxilla exposed posteriorly, usually scaled and usually without a supplemental bone; two nostrils close together. Canine and villiform teeth; preopercular margin serrated and operculum with three spines. Lateral line complete, high on sides. Single dorsal fin with 10 spines, 11-21 rays; anal with 3 spines and 6-8 rays.

REFERENCES: Randall, 1996b; Randall & Heemstra, 1999; Parenti & Randall, 2020.

Pseudanthias gibbosus

Third dorsal spine longest; pectoral fin rays branched. Caudal fin crescentric, lobes sometimes produced. Upper head and body orangey-red, lower head and body white, body with longitudinal yellow lines. Females with curved crimson, band from head edge to tail base, purple line from mouth to pectoral fin base, bright yellow white-edge caudal fin. Males with yellow purple-edge band from mouth to pectoral base, caudal fin margined in purple.
D X, 16-17. A III, 7. P 17-18. Lower GR 24-28. L lat. 39-43
(voucher: 105 mm SL)

Pseudanthias squamipinnis

Third dorsal spine produced and flexible; pectoral fin rays branched; vertical fins almost covered with small scales. Caudal fin lunate, lobes sometimes produced. Yellow red-edged band from eye to lower pectoral fin base; blue posterior margin to caudal fin. Males with large ovate red or purple blotch on leading edge of pectoral fin.
D X, 16-17. A III, 6-8. P 15-19. Lower GR 23-28. L. lat. 38-44.
(voucher: 54 mm SL)

Plectranthias japonicus

Predorsal scales reaching forward to nostrils; preoperculum serrated. Pectoral fin rays branched; caudal fin truncate to rounded. Body mostly pink, lower half of head yellow, fins yellow marked with pink. Six or 7 dark orange blotches along back and some on upper sides.
D X, 14-16. A III, 7. P 15-17. Lower GR 10-13. L. lat. 30-35.
(voucher: 79 mm SL)

Selenanthias analis

Scales on maxilla and on throat; gill rakers long, close together. Caudal fin only slightly emarginate. Two orange-yellow oblique bands across head; red patch basally at end of spinous dorsal fin; conspicuous large black patch over posterior anal fin; white filament to upper caudal fin lobe.
D X, 15-17. A 28-33. Lower GR 19-21. L. lat. 36-38.
(voucher: 94 mm SL)

CALLANTHIIDAE

Splendid perches -

Lateral line runs close to dorsal fin base; incomplete, ending on upper side of caudal peduncle. Two opercular spines; preopercular margin smooth or only slightly irregular. Posterior end of maxilla exposed; caniniform teeth in both jaws anteriorly. Single dorsal fin with 11 spines and 9-11 soft rays; 3 spines in anal fin and 9-11 soft rays. No supplemental bone on maxilla; two widely-separated nostrils. Caudal fin usually emarginate. Scale moderate to large.

Two genera and about 18 species in the family, one or two species obtained on the Survey.

REFERENCE: Anderson, Johnson & Baldwin, 2015.

PSEUDOCROMIDAE

Dotty backs -

Small, oblong fishes with small mouth and conical teeth in jaws. Preopercular margin entire. Body scales ctenoid, cycloid on head. Lateral line either in 2 parts or in one short part on upper body. One continuous dorsal fin, with 1-3 spines, 21-37 branched or unbranched rays. Anal fin with 1-3 spines. Ventral fin beginning before or below pectoral fin base. Caudal fin rounded.

24 genera and 154 species; two genera caught on the Survey.

REFERENCES: Gill & Randall, 1992; Gill, 1999b; Winterbottom, 1995.

Congrogadus spinifer

Gill membranes fused to isthmus; usually 7 pores (rarely 6) in line along preoperculum edge. Dark brown or tan with 3 irregular longitudinal rows of pale yellow spots on body and unpaired fin bases: spots large, equal to or more than eye diameter; yellow-ringed black ocellus on operculum.

D I, 62-64. A 52-54.

(voucher: ? mm SL)

Pseudanthias rubrizonatus

Posterior dorsal and anal rays produced. Caudal fin lunate, lobes produced. Broad red bar across sides below spinous dorsal fin and pearly-pink line from snout to lower pectoral fin base. Red streak across anal fin, dorsal fin deep blue; red streak along anal spines. Caudal fin in female emarginate, lobes tipped red, Dorsal and anal fins red.

D X, 16. A. III, 7. P 18-20. Lower GR 25-28. L lat. 42-47.
(voucher: (A) male, 74 mm SL; (B) female, 54 mm SL)

Odontanthias rhodopeplus

Large and deep-bodied; head fully scaled. Third dorsal spine long and with short filament; anterior dorsal rays long, some with filaments; caudal fin crescentic. Broad oblique yellow band from snout to below pectoral fin base; rows of dark brown checks across dorsal fin rays; base of caudal fin dark brown or black.

D X, 12-13. P 17-18. L. lat. 30-33. Lower GR 27-30.

Plectranthias ferrugineus

Many serrae on upper preopercular margin and 2 antrorse spines on lower margin; 14-16 scales around caudal peduncle. Pectoral fin rays simple; caudal fin emarginate, upper lobe produced. Body densely mottled red and yellow; large red and yellow blotches along back. Fins mainly yellow with some red basally.

D X, 14-16. A III, 7. P 12-15. L. lat. 27-29. Lower GR 16-20.
(voucher: 61 mm SL)

Callanthias* sp cf *australis

Females and juveniles are uniformly pinkish-red with a red pectoral fin base. Males are deep purple on the head and anterior body, with a reddish rear, a yellow caudal fin with purple lobes, and yellow to brownish dorsal and anal fins with blue margins.

Callanthias* sp cf *japonicus

Violet wash over top of head and in stripe above pectoral fin; body orange-rosy. Caudal fin violet, central area yellow-orange. Dorsal and anal fins elevated; caudal fin emarginate.

Pseudochromis steenei

Upper edge of operculum with 3-5 short spines. Caudal fin may have filamentous rays. Depth 3.7-4.8 in SL. Predorsal scales 15-22. Front half of back yellow or pale green, dark centres on scales, grey line around eye; posterior half of body dusky pink or violet.

D III, 24-27. A III, 13-14. L. lat 36-37 + 7-11 (in 2 parts).

(voucher: 76 mm SL)

Congrogadus subducens

Gill membranes free from isthmus; usually 6 pores (rarely 7) in line along preoperculum edge. No ventral fins; caudal fin confluent with dorsal and anal fins. Dark brown with 3 to 5 irregular longitudinal rows of cream spots along body and scattered over belly: spots about half eye diameter in size; yellow-ringed black ocellus on operculum.

D 68-76. A 57-66.

GLAUCOSOMATIDAE

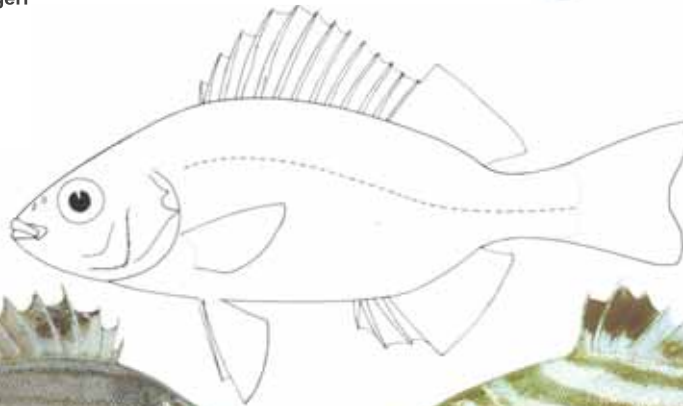


Glaucosoma buergeri



Glaucosoma magnificum

TERAPONTIDAE



Pelates quadrilineatus



Terapon jarbua

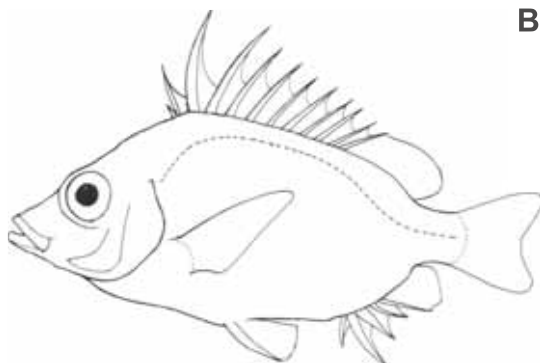


Terapon puta



Terapon theraps

BANJOSIDAE



Banjos banjos brevispinis

GLAUCOSOMATIDAE

Western Australian Jewfish

Body fairly deep, robust and compressed. Head large and scaled, maxilla scaled; mouth large and oblique. Single dorsal fin with 8-12 spines increasing in height posteriorly; soft part of fin higher, with 12-14 rays; anal fin with 3 spines, third spine longest; caudal fin truncate, emarginate or lunate.

A single genus with three species; two obtained on the Survey.

REFERENCE: McKay, 2001b.

Glaucosoma buergeri

Silvery-grey or bronze body; dark bar from above eye to breast, fading with age; about 10 thin dark bands along body, also fading with age. Inside mouth and peritoneum black.

D VIII, 11-12. A III, 9. Lower GR 13-15. L. lat. 49-51. Tr above 12.

(voucher: 250 mm SL)

Glaucosoma magnificum

Some dorsal and anal fin rays, and caudal fin lobes produced into filaments. Silvery body; 3 vertical brown bands on head, fading with age: 1st through black-ringed eye, 2nd along edge of preopercle, 3rd to pectoral fin base. Inside mouth black, peritoneum brown.

D VIII, 14. A III, 12. Lower GR 18. L. lat. 46-48. Tr above 14-16.

TERAPONTIDAE

Terapon perches; Grunters - Kerong-kerong

Small to moderate perch-like fishes with oblong, compressed bodies. Upper jaw reaching beyond middle of eye; preopercular margin sharply serrated; 1 or 2 strong spines on operculum, the lower spine longest. Scales strongly ctenoid. Single dorsal fin with 11-14 strong spines, slightly notched from soft part of fin; anal fin with 3 spines. Caudal fin rounded, truncate or emarginate. Many species often have distinctive dark bands present on body and fins. These fishes often grunt when caught.

Worldwide about 15 genera, of which two were obtained on the Survey.

REFERENCE: Vari, 2001.

Pelates quadrilineatus

Large black blotch behind upper edge of gill opening; 6-8 straight brown stripes along body; black blotch in middle of spinous dorsal fin; caudal fin plain olive, not barred. Lower GR 20-27. L. lat. 66-75. Tr. above 9-12.

(voucher: 87 mm SL)

Terapon puta

Serrations on angle of preoperculum very large; scales small. Three or 4 thin straight brown stripes along body; large black blotch on spinous dorsal fin; caudal fin barred, 2 black bars on soft dorsal fin.

Lower GR 18-24. L. lat. 70-85. Tr. above 10-13.

(voucher: 100 mm SL)

Terapon jarbua

Three or 4 curved dark brown bands along body; large black blotch on spinous dorsal fin; 2 black bars on soft dorsal fin; caudal fin barred, each lobe black tipped.

Lower GR 12-15. L. lat. 70-85. Tr. above 14-16.

(voucher: 145 mm SL)

Terapon theraps

Scales moderate in size. Four straight brown bands along body; large black blotch on spinous dorsal fin and caudal fin with 5 bars.

Lower GR 14-17. Tr. above 6-8. L. lat. 46-56.

(voucher: 125 mm SL)

BANJOSIDAE

Banjosids;

Body fairly deep, compressed. Head profile steep; upper jaw nearly hidden by suborbital bone; no palatine teeth; no spine on hind margin of operculum. Scales present on cheek, but not on upper and front parts of head. Dorsal fin with 10 high, flattened spines, separated from soft part of fin by a deep notch, membrane between spines deeply emarginate; anal fin with 3 spines, the 2nd spine strongest and longest, ventral fin large, its base behind pectoral fin base; caudal fin slightly emarginate.

A single genus with three species and two subspecies.

REFERENCE: Matsunuma & Motomura, 2017

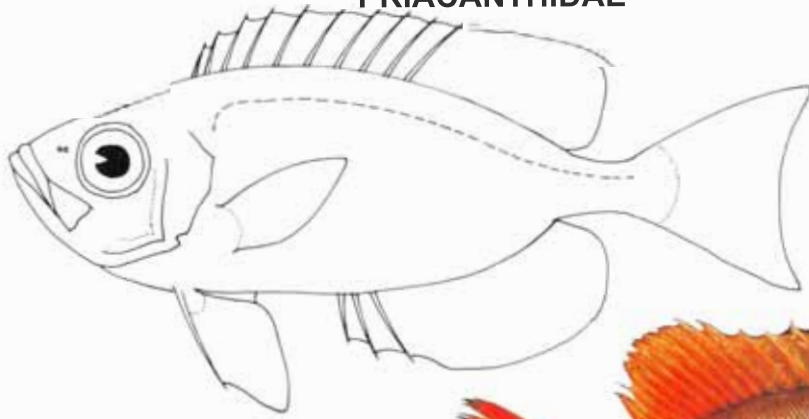
Banjos banjos brevispinis

Head 33-39.6% SL; a short, weakly serrated spine at the preopercle angle; least interorbital width 5.8-8.1 (mean 6.8)% of SL; first dorsal-fin spine length 4.5-8.0 (6.1% of SL). Body brownish-green, several darker brown stripes along body, fading with age. Spinous dorsal membrane black or brown, fin tips white; ventral fins black; hind margin of caudal fin with 2 irregular bands of black and white.

D X, 12. A III, 7. L. lat. 48-51. Lower GR 14-16.

(voucher: 71 mm SL)

PRIACANTHIDAE



Cookeolus japonicus



Priacanthus blochii



Heteropriacanthus carolinus



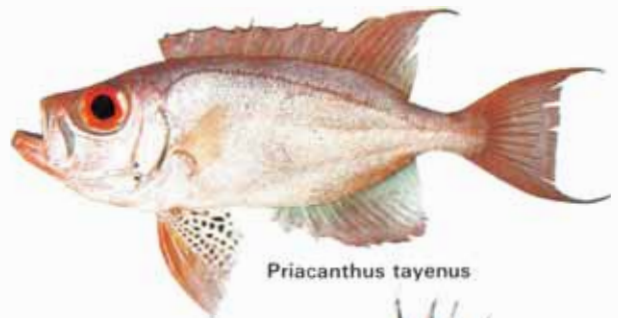
Priacanthus hamrur



Priacanthus fitchi



Priacanthus macracanthus



Priacanthus tayenus



Priacanthus saggitarius



Pristigenys nipponia

PRIACANTHIDAE

Bulls Eyes - Gora suangi; Serinding tembakau

Medium-sized fishes with oval to elongate body. A continuous dorsal fin; eyes very large; mouth large and oblique; preoperculum with a more or less developed spine. Dorsal fin with 10 spines and 11-14 rays; anal fin with 3 spines and 12-15 rays; pectoral fin with 16-18 rays. Innermost pectoral fin ray is joined to body by membrane.

Four genera in the family and members of all obtained on the Survey; they can be distinguished as follows:

- | | | |
|-----|---|-------------------|
| 1. | Body profile very deep and broadly ovate, 1.7-1.9 in SL; A III, 10-11 | Pristigenys |
| 1a. | Body profile less deep, 2-3.1 in SL; A III, 13-16 | 2 |
| 2. | Ventral fin very long, reaching at least onto anal fin | Cookeolus |
| 2a. | Ventral fin shorter, at most equal to HL | 3 |
| 3. | Posterior portion of preoperculum scaleless; small dark specks on membranes of unpaired fins | Heteropriacanthus |
| 3a. | Posterior portion of preoperculum with scales; membranes of unpaired fins plain or with large spots | Priacanthus |

REFERENCES: Starnes, 1988; Starnes, 1999; Fernandez-Silva & Ho, 2017; Iwatsuki, Matsuda, Starnes, Nakabo & Yoshino, 2012.

Cookeolus japonicus

Body deep, 2-3.1 in SL. Preopercular spine well developed, short and broad in adults, long and slender in juveniles. Membranes between spinous dorsal and anal fins deeply incised. Ventral fin conspicuously enlarged, much longer than head. Ventral, spinous dorsal and edge of caudal fin blackish, other fins red.

(voucher: 152 mm SL)

Heteropriacanthus carolinus

Preopercular spine strong, flat and without scales. First dorsal spine with spinules anteriorly. Dorsal fin low; soft dorsal and anal fins rounded, caudal fin truncate or convex. Body dark red with irregular lighter blotches variably situated on body. Dark spots on soft dorsal, anal fins, and caudal fin. Ventral fin sometimes pale, unpaired fins dark.

Lateral scale rows 81-96

(voucher: 190 mm SL)

Priacanthus macracanthus

Preopercular spine long and narrow. Caudal fin truncate. Body silvery-red to red, fins pinkish to red; dorsal, anal and ventral fins with horizontal rows of dusky yellow-green spots, no black blotch at base of ventral fin, red caudal fin with black margin.

(voucher: 200 mm SL)

Priacanthus sagittarius

Preopercular spine short and broad; caudal fin emarginate or truncate; soft dorsal and anal fins elevated, rounded. Tenth dorsal spine about twice length of 2nd dorsal spine. Body and all fins red except for black membrane between the first and second dorsal fin spines; a distinct dark spot at base of ventral fin.

Lateral scale rows 67-74.

(voucher: 200 mm SL)

Pristigenys nipponia

Body deep, 1.5-2 in SL; spinous dorsal prominent with 4th and 5th spines longest; caudal fin truncate to double-emarginate (adults). Skin very rough to touch. Body pinkish-red; 5 white vertical bands on sides of body in young, fading with age, bands about half width of pupil. Dark membrane to spinous dorsal fin.

Total GR on first arch 27-30.

(voucher: 60 mm SL)

Priacanthus blochii

Preopercular spine very short and broad in adults. Soft dorsal and anal fins rounded, caudal fin convex. Tenth dorsal fin spine 1.5-1.7 longer than 2nd dorsal spine. Body and all fins uniformly red; a distinct black spot at base of ventral fin.

(voucher: 200 mm SL)

Priacanthus hamrur

Preopercular spine short and broad. Caudal fin concave to lunate. Ventral fin red with a dark spot at base. Body and fins mostly uniformly red. Soft dorsal and anal fins with dark or black margins and faint rows of red-orange spots. Caudal fin red with a black edge.

A III, 15-16. Total GR on first arch 24-26.

(voucher: 190 mm SL)

Priacanthus tayenus

Preopercular spine long and slender. Fourth and 5th dorsal rays produced in young specimen as short filaments; soft dorsal and anal fins with pointed lobes; caudal fin lunate. Body silvery red. Inner ventral fin with numerous purplish-brown large and smaller blotches. D X, 11-13.

(voucher: 185 mm SL)

Priacanthus fitchi

Preopercular spine long and narrow; caudal fin truncate; body somewhat tapering towards caudal fin. Body silvery orange-red, fins orange; the last 4-5 rays in soft dorsal and anal fins clearly white; no black blotch at base of ventral fin.

(voucher: 145 mm SL)

APOGONIDAE



Fig 1.

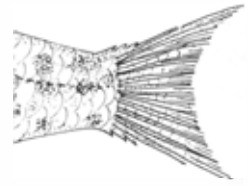
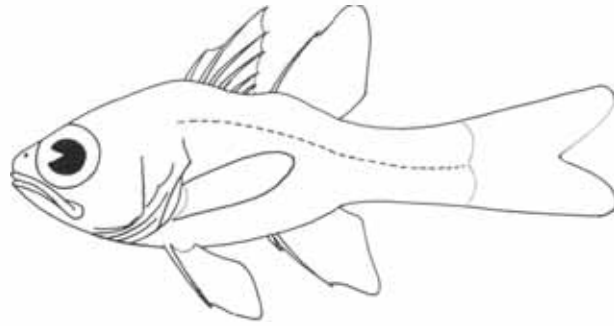


Fig 2.



Ozichthys albimaculosus



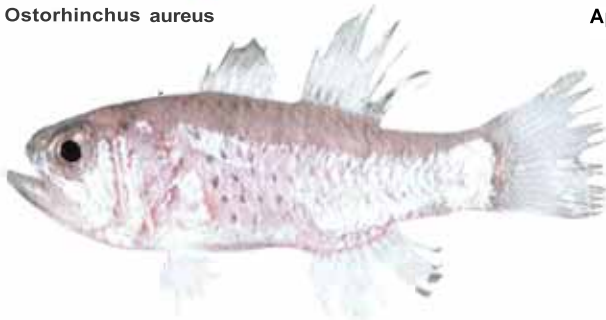
Ostorhinchus apogonoides



Ostorhinchus aureus



Apogonichthyoides brevicaudatus



Jaydia carinata



Fibramia lateralis



Apogonichthyoides timorensis



Jaydia smithi



Ostorhinchus hartzfeldii



Ostorhinchus hoevenii

APOGONIDAE

Cardinalfishes - Serinding; Sankarang

Small compressed fishes with a large mouth and head. Teeth usually small and fine, sometimes enlarged as canines; preoperculum double edged; operculum with a pointed flap. Scales usually ctenoid. Two separate dorsal fins, first with 6 -9 strong spines, second with 1 spine and 8-11 rays; anal fin with 2 spines and 8-17 rays. Many species incubate their eggs in their mouth.

There are 40 genera and 357 species in this diverse family; members of 12 genera were obtained on the Survey.

REFERENCES: Baldwin & Johnson, 1999; Fraser, 2006; Fraser & Allen, 2011; Fraser & Randall, 2011; Gon, 1993; Gon & Allen, 2012; Gon, 1997; Mabuchi, Fraser, Song, Azuma & Nishida, 2014; Randall, Lachner & Fraser, 1985; Yoshida, Kawai & Motomura, 2019; Yoshida & Motomura, 2018.

Ozichthys albimaculosus

Preopercular ridge smooth; caudal fin rounded. Head mottled and checked with brown, rows of large distinct yellow or cream spots along body. Brown and yellow checks or yellow spots cover fins; large black yellow-rimmed ocellus on soft dorsal and anal fins near bases. Seven dorsal fin spines. P 17-19.
(voucher: 67 mm SL)

Ostorhinchus aureus

Preopercular ridge smooth. Head dark brownish-red with thin blue lines from snout to operculum; broad black band around caudal peduncle. Red tips on soft dorsal, anal and caudal fin lobes.
Seven dorsal fin spines. P 13-14.
(voucher: 86 mm SL)

Jaydia carinata

Preopercular margin and ridge entire or crenulate. Caudal fin truncate or rounded. Vertical rows of dark brown checks on side near pectoral fin base, sometimes also along lateral line; large black ocellus at base of last dorsal fin rays (may be rimmed yellow) and black edge to anal fin. Dark brown over outer part of first dorsal fin.
Seven dorsal fin spines. P 15-17. Total formed GR 10-11.
(voucher: 70 mm SL)

Apogonichthyoides timorensis

Eye large, 2.8 in HL. Caudal fin truncate; preopercular ridge smooth, edge truncate. Black band from eye to preopercular angle. Two dark bands across body from base of 1st dorsal and soft dorsal fins, 3rd dark band across caudal peduncle near tail base. Outer part of 1st dorsal fin dark brown; ventral fin pale.
Seven dorsal fin spines. Total formed GR 8-9.
(voucher: 37 mm SL)

Ostorhinchus hartzfeldii

Preoperculum serrated. Broad brown or orange-gold bands along body; pearly blue stripe from head along dorsal profile to tail base, shorter pearly stripes from head ending on mid-body. Distinct black spot at caudal fin base, at least equal to pupil size.
Seven dorsal fin spines. Total formed GR 15-17.

Ostorhinchus apogonoides

Strong curved teeth on sides of both jaws. Caudal fin emarginate, lobes pointed. Snout black or brown; two blue lines from snout through eye to opercular edge. Each gill raker with dusky stripe. Front edge or outer part of first dorsal fin black and narrow black edge to posterior fin margin.
Seven dorsal fin spines. P 14.
(voucher: 80 mm SL)

Apogonoichthyoides brevicaudatus

Preopercular ridge, margin and suborbital edge all serrated. Caudal fin truncate. Seven to 8 dark brown undulating bands from head to tail base; large black, white-washed ocellus sometimes may be present near base of soft dorsal fin and also anal fin, ventral fin dark brown; mouth cavity and gill rakers pale.
Seven dorsal fin spines. P 15-16.
(voucher: 85 mm SL)

Fibramia lateralis

Preopercular ridge smooth, margin serrated. Six dorsal spines. Head and body orange-violet, iridescent over head; diffuse brown bar behind operculum. This black stripe from operculum to tail base ending near a small distinct black spot on caudal peduncle. Front edge of first dorsal fin dark brown; narrow dark band along lower half of soft dorsal and anal fins.
Six dorsal spines.
(voucher: 64 mm SL)

Jaydia smithi

Caudal fin rounded. First dorsal black over outer half; black margin on soft dorsal, anal and caudal fins; black line along mid-height of soft dorsal and anal fins. Black line from eye to preoperculum angle; underside of head and body silvery, densely stippled black; mouth cavity and gill rakers pale.
Seven dorsal spines. Total formed GR 13-17.
(voucher: 80 mm SL)

Ostorhinchus hoevenii

Preopercular ridge smooth; caudal fin slightly emarginate. Body dusky green above, iridescent below. Large black patch on membrane near tips of 3rd and 4th dorsal fin spines and brown spots on fin membrane posteriorly.
Seven dorsal fin spines. P. 12.
(voucher: 51 mm SL)



Ostorhinchus sp 1.



Ostorhinchus moluccensis



Apogonichthyoides atripes



Ostorhinchus nigrocincta



Ostorhinchus novemfasciatus



Jaydia poeciloptera



Ostorhinchus fasciatus



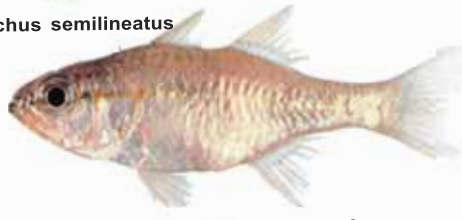
Ostorhinchus taeniophorus



Ostorhinchus semilineatus



Ostorhinchus septemstriatus



Ostorhinchus sp. 2



Ostorhinchus chrysopomus



Taeniamia fucata



Cheilodipterus isostigma



Cheilodipterus macrodon



Gymnapogon sagittarius

Ostorhinchus sp 1

Rays of soft dorsal and anal fins long; caudal fin emarginate. Head and body violet with gold and silver sheen, a broad diffuse brown band crossing body from first dorsal base to ventral fin; ventral fin black. Black spot behind bases of soft dorsal and anal fins. Gill rakers and mouth cavity charcoal.

Seven dorsal fin spines. P 15. Total formed GR 17-18. (voucher: 80 mm SL)

Apogonichthyoides atripes

Preopercular ridge smooth; caudal fin truncate. Large black spot ringed by yellow on side above pectoral fin base; caudal fin pale yellow.

Seven dorsal fin spines. Total formed GR 10-12. (voucher: 50 mm SL)

Ostorhinchus novemfasciatus

Body width 6.1-6.8 in SL. Five dark brown bands along body from head: first and 5th along body profiles; 2nd from above eye to tail, 3rd through eye to tail, 4th through pectoral fin base to tail. Second, 3rd and 4th bands continue onto caudal fin, 2nd and 4th converging toward 3rd band well beyond caudal fin base. Caudal spot never present. First dorsal and ventral fins transparent.

Seven dorsal fin spines. Total formed GR 19-22. (voucher: 54 mm SL)

Ostorhinchus fasciatus

Two dark bands along body from head: first from snout above eye to upper caudal peduncle; 2nd through eye to tail and continuing across caudal fin to its margin; 2nd band often over-shaded deep orange or gold.

Seven dorsal fin spines. Total formed GR 14-16. (voucher: 54 mm SL)

Ostorhinchus semilineatus

Preopercular margin serrated, ridge smooth. Dark brown horizontal stripe from snout to below soft dorsal fin (may be faded posteriorly) and a thinner shorter stripe from above eye. Large black spot at caudal fin base; tip of first dorsal fin black.

Seven dorsal fin spines. Total formed GR 18-19. (voucher: 70 mm SL)

Ostorhinchus sp 2

Preopercular ridge and margin serrated. Brownish orange band from snout through eye fading posteriorly; second stripe from above eye to below soft dorsal fin. Small conspicuous black spot at base of caudal fin.

Seven dorsal fin spines. Total formed GR 19-21.,

Taeniamia fucata

Yellow band through eye; many vertical narrow orange lines across body. Large diffuse black spot at base of caudal fin.

A II, 15-18. (voucher: ? mm SL)

Cheilodipterus macrodon

About 8 brown horizontal stripes from head to tail; dark brown band from pectoral fin to base to ventral fin base; broad indistinct black band around caudal peduncle at caudal fin base, upper and lower margins of caudal fin black. Soft dorsal, anal and caudal fins red, outer part of first dorsal black.

(voucher: 120 mm SL)

Ostorhinchus moluccensis

Caudal fin emarginate, lobes rounded; preopercular margin finely serrated. Snout dark brown; two broad blue bands from snout through eye to edge of operculum, becoming pale yellow as continue along body. White spot on body posterior to base of soft dorsal fin. Dorsal and caudal fins yellow and iridescent blue; outer part of first dorsal fin black. Gill rakers pale.

Seven dorsal fin spines. P 14. (voucher: 57 mm SL)

Ostorhinchus nigrocincta

Preopercular ridge and margin finely serrated. Dark brown band from snout through eye to edge of operculum; narrow black band around caudal peduncle at tail base; front margin of first dorsal dark brown; distinct black band near bases of soft dorsal and anal fins; mouth cavity dusky.

Seven dorsal fin spines. (voucher: 61 mm SL)

Jaydia poeciloptera

Preopercular ridge and margin entire; caudal fin truncate. Outer part of first dorsal fin black; 2-3 irregular brown bands along soft dorsal fin; caudal fin dark. Dark line from eye to preopercular angle; mouth cavity and gill rakers charcoal; 9-10 brown vertical bands on body.

Seven dorsal fin spines. Total formed GR 11-12.

Ostorhinchus taeniophorus

Body width 4.9-6.8 in SL. Five dark brown bands along body from head: first and 5th along body profiles, 2nd from snout above eye to tail, 3rd through eye to caudal fin base where it may form a diffuse oblong spot, 4th through pectoral fin base to tail; middle 3 bands extend onto caudal fin. Operculum black-edged near pectoral fin. First dorsal fin dusky, tipped black; ventral fin margin black.

Seven dorsal fin spines. Total formed GR 12-13. (voucher: 46 mm SL)

Ostorhinchus septemstriatus

Caudal fin truncate or slightly emarginate. Black line from snout along head midline to first dorsal fin origin; 2nd black line from nape to below first dorsal fin bases; 3rd black line from snout along back to upper caudal fin base; 4th and most prominent band horizontal: from snout to mid-caudal fin base and across fin to margin.

Seven dorsal fin spines. P 15-16. (voucher: 53 mm SL)

Ostorhinchus chrysopomus

Eye 3.4 in HL; 3rd dorsal spine strong. Preopercular margin serrated, ridge smooth or roughened. Broad dusky orange band along head. Large black spot on caudal peduncle mostly above lateral line, centre of caudal fin checked black. Brown line basally on soft dorsal and anal fins. Dark streak along each gill raker.

Seven dorsal fin spines. Total formed GR 14. (voucher: 70 mm SL)

Cheilodipterus isostigma

Body slender. Five thin black stripes along body from head to caudal peduncle. Conspicuous black spot at caudal fin base surrounded by yellow.

(voucher: 71 mm SL)

Gymnapogon sagittarius

Caudal fin transparent and moderately forked; head smooth.

D VI; I, 9. A II, 8. 16 pectoral fin rays. (voucher: 49 mm SL)



Pseudamia gelatinosa



Rhabdamia gracilis



Siphamia fuscolineata



Siphamia roseigaster

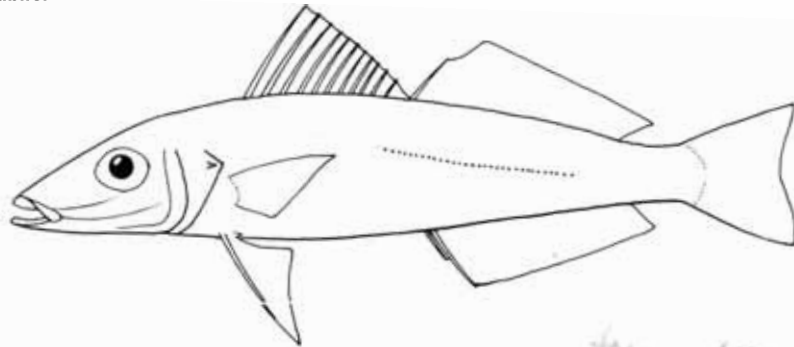


Siphamia tubifer



Sphaeramia orbicularis

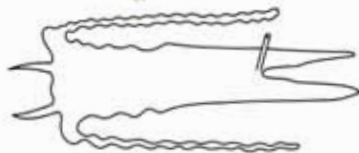
SILLAGINIDAE



Sillago burrus



Sillago robusta



Sillago sihama



Sillago vittata



Sillago ingenua

Pseudamia gelatinosa

Caudal fin rounded. Head and body densely spotted dark brown or black, spots arranged into indistinct stripes along body. Caudal peduncle at caudal fin base black, black extending onto fin.

Six dorsal fin spines. L. lat. about 36.
(voucher: 79 mm SL)

Siphamia fuscolineata

Three broad dark brown bands along body, median one most prominent; body along base of both dorsal fins black. All fins white and translucent.

D VII; I, 9. A II, 8. P 13-15.
(voucher: 40 mm SL)

Siphamia tubifer

Body silvery brown; snout and body with dark brown spots; median body band tan; fins dusky.

D VII; I, 9. A II, 8. P 15-16.
(voucher: 56 mm SL)

Rhabdamia gracilis

Body translucent pink or yellow, sometimes with fine black stripe from operculum to tip of pectoral fin.

A II, 12-13. Lower GR 21.
(voucher: 50 mm SL)

Siphamia roseigaster

Head and body pale yellow or pink without bands or spotting. Fins rosy, dorsal fin margins dusky.

D VI; I, 10; A II, 9-10

Sphaeramia orbicularis

Body depth more than half body length. Dark band across mid-length of body from first dorsal fin base to belly and large dark spots posterior to it.

A II, 9.
(voucher: 49 mm SL)

SILLAGINIDAE

Whiting - Besot; Rejung

Body moderately elongate and tapered posteriorly. Head conical, mouth small; a single small opercular spine. Cycloid scales on head, body scales small and ctenoid. Dorsal fin divided by deep notch separating a spinous part of 9-12 slender spines from second longer part of one spine and 16 -26 rays; two weak spines at beginning of long-based anal fin; ventral fin base about opposite pectoral fin base; caudal fin truncate or slightly emarginate.

Swim bladder drawings and diagnoses partly prepared by R.J. McKay.

Three genera in the family: one genus and seven species obtained on the Survey.

REFERENCE: McKay, 1985; McKay, 1999.

Sillago burrus

Swim bladder as in drawing. Conspicuous dark blotch on pectoral fin base; 7-9 oblique irregular dark blotches along upper sides.

D₂ 18-21. A₂ 19-20. L. lat. 69-76.
(voucher: 205 mm SL)

Sillago sihama

Swim bladder as in drawing. Body plain silvery yellow or fawn; dorsal and caudal fins may have dark markings.

D₂ 20-23. A₂ 21-23. L. lat. 66-72.
(voucher: 162 mm SL)

Sillago vittata

Swim bladder as in drawing. Conspicuous dark blotch on pectoral fin base: 9-11 narrow oblique brown streaks on upper sides. Black patches on outer spinous dorsal fin and both caudal fin lobes.

D₂ 17-19. A₂ 16-18. L. lat. 65-70.
(voucher: 80 mm SL)

Sillago robusta

Swim bladder as in drawing. Lower caudal fin black. Sharp edge to front base of first dorsal fin spine topped by dark brown spot.

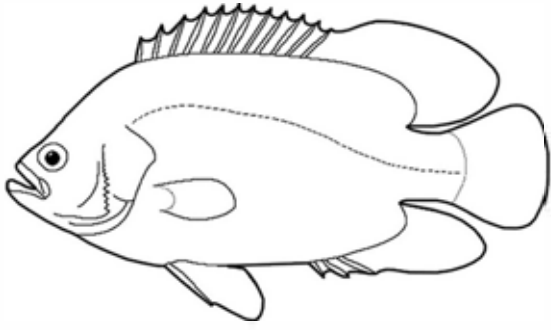
D₂ 16-18. A₂ 16-19. L. lat. 64-70.
(voucher: 100 mm SL)

Sillago ingenuua

Cheek scales ctenoid; eye 4-5 in HL. Swim bladder as in drawing. Silvery-yellow, fine dark lines on scale edges of back; no markings on body and fins. Snout dusky.

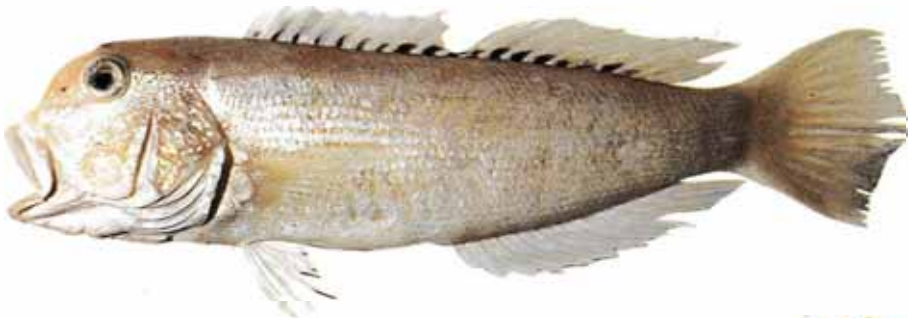
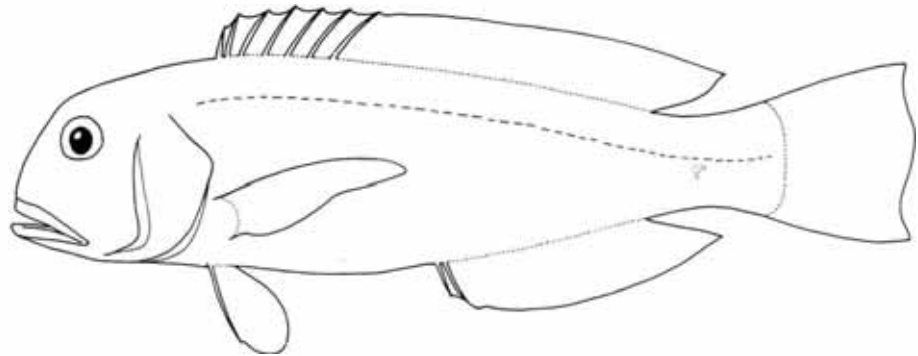
D₂ 17. A₂ 17+18. L. lat. more than 65.
(voucher: 135 mm SL)

LOBOTIDAE

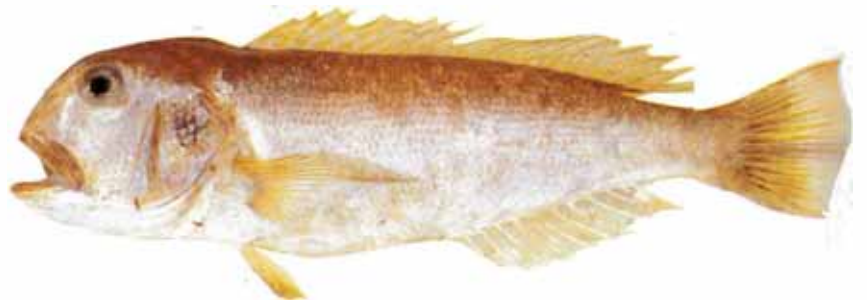


Hapalogenys dampieriensis

LATILIDAE



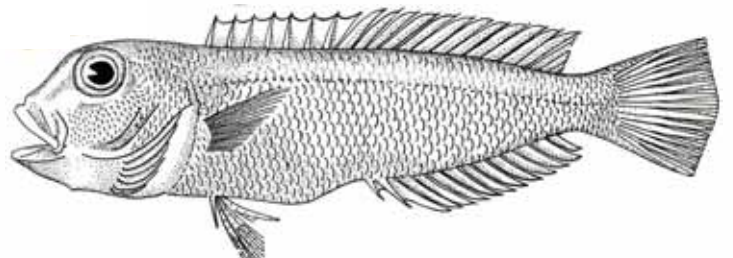
Branchiostegus sawakinensis



Branchiostegus australiensis



Branchiostegus gloerfelti



Branchiostegus australiensis drawing of Holotype

LOBOTIDAE

Tripletails; velvetchins

Body compressed, elevated, nape humped. Head short, preoperculum strongly serrate; 1-2 flat spines on upper operculum. Jaw teeth small and conical, no teeth on palate; chin with 6-10 pores and in some species, low and soft papillae or villi. Eleven to 13 spines in dorsal fin, 13-16 soft rays; anal with 3 spines and 8-11 soft rays; antrorse spine hidden by skin precedes the spinous dorsal fin. Caudal fin rounded or almost truncate. Scales ctenoid, rough to touch; 40-70 scales in the lateral line.

Three genera (*Datnioides* Bleeker, *Lobotes* Cuvier, *Hapalogenys* Richardson). One species in the survey area.

REFERENCES: Gill & Leis, 2019; Iwatsuki & Russell, 2006.

Hapalogenys dampieriensis

No scales on maxilla; cluster of very short papillae under symphysis of lower lip; 2nd anal spine very long, about half of HL; ventral fin tip extending just past anus but not reaching to base of 1st anal fin spine. Body rosy brown above, silvery white below; 4-5 well-spaced brown horizontal bands along body originating on nape and head, 3rd to 5th bands often faded, generally narrower than pupil diameter. Fins plain cream or dusky, soft dorsal and anal truncate.

D XI, 13-14. L. lat. 41-45
(voucher: 270 mm SL)

LATILIDAE (= Branchiostegidae)

Deepwater tilefishes -

Body elongate-oval and robust. Head deep and blunt, a predorsal ridge always present, sometimes simply as a raised flap of thick tissue. Jaws slightly oblique, with canine teeth and patches of villiform teeth anteriorly. Preoperculum serrated or smooth on upper limb; opercular spine soft and blunt. Scales on head nearly all cycloid; ctenoid on body. Dorsal and anal fins long-based and continuous; dorsal fin with 6-8 spines, 14-16 rays; anal fin with 2 spines, 11-13 rays. Ventral fin base behind or below pectoral fin base; caudal fin double emarginate, truncate or rounded.

Tilefish generally are found in deep waters, 90 to 500 m depth. They inhabit self-constructed burrows in muddy ground, at around 200 m depths.

Three genera in the family, representatives of one were obtained on Survey.

REFERENCES: Dooley, 1999; Dooley & Kailola, 1988; Dooley & Iwatsuki, 2012.

Branchiostegus sawakinensis

Caudal fin 'double emarginate'. Usually dark brown or black central spots on scales in 6 or 7 rows between lateral line and pectoral fin base; median predorsal ridge dark brown; a black spot basally on membrane between each dorsal fin element; 2 yellow lines along median caudal fin rays, lower caudal lobe grey with yellow spots.

D VI-VII, 15-16. A II, 12. Total GR 17-21; Tr below 17-20. L. lat. 67-72.

(voucher: 386 mm SL)

Branchiostegus gloerfelti

Caudal fin truncate overall. Jaws reach past a vertical line through front of eye; vertical fins high, 12-13% SL. Median predorsal ridge pale yellow. Body white or yellowish, orange on top of head and upper body; body crossed by about 20 faint violet-brown bars. Operculum dark violet. Vertical fins pale yellow, pectoral and ventral fins orange, caudal fin membrane pale yellow, upper and lower margins dark, grey stripe along middle rays.

D VII, 14-15. A II, 12. Tr below 17. L. lat. 48.

Branchiostegus australiensis

Caudal fin margin 'double-emarginate', Jaws reach to below front of eye; preoperculum not indented above angle; Median predorsal ridge dark brown; head dusky orange with snout, top of head and upper body either red or violet, sides and belly silvery white; sometimes up to 20 violet, curved bands across back. Dark blotch on operculum, 2 silver lines from eye across suborbital to upper jaw; unpaired fins clear except dorsal fin with orange blotches basally and thin yellow margin; black upper margin on pectoral and ventral fins. Caudal fin yellow with 2 violet-grey bands along median rays.

D VII, 15. A II, 12. Total GR 22. Tr below 23. L. lat. 48.

MALACANTHIDAE

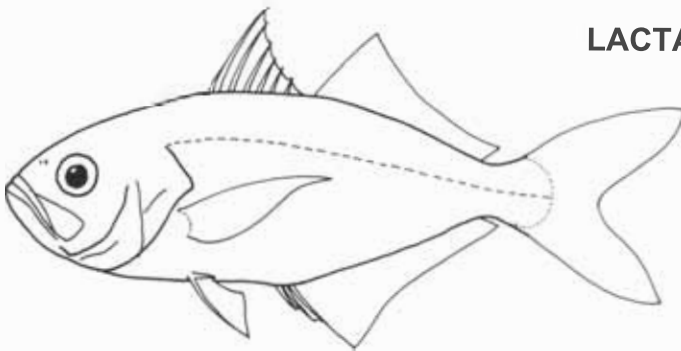


Malacanthus brevirostris



Malacanthus latovittatus

LACTARIIDAE



Lactarius lactarius

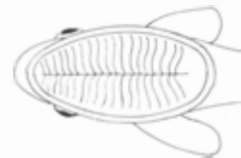
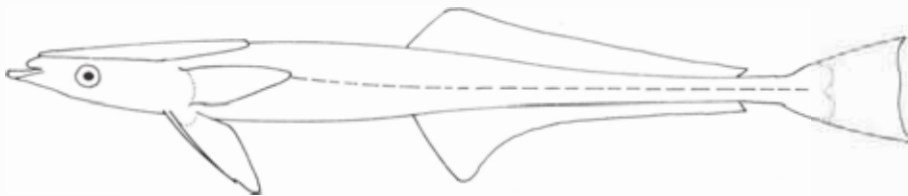
RACHYCENTRIDAE



Rachycentron canadum



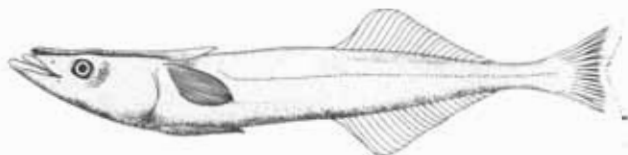
ECHENEIDIDAE



Sucker disc



Echeneis naucrates



Remora remora drawing of preserved specimen

MALACANTHIDAE

Sand tilefishes, blanquillos -

Body elongate and fusiform; snout blunt or rounded. Jaws equal, slightly oblique. Preoperculum serrated or smooth, sometimes with a large spine at angle; operculum with a single, sharp spine. Jaws equal, slightly oblique. Scales on head mostly cycloid, body scales ctenoid. Dorsal and anal fins long and continuous: dorsal with 3-10, and 13-55 rays; anal fin with one or 2 spines, 12-55 rays (more numerous fin elements in *Malacanthus* spp). Caudal fin falcate with rounded, pointed or elongate (upper) lobes, or truncate.

The shallow water sand tilefishes inhabit 5-100 m depths. They live in self-constructed burrows in sand or rubble bottom.

The family comprises two genera and about 16 nominal species; two species of one genus were collected on the Survey.

REFERENCES: Dooley, 1999; Dooley & Iwatsuki, 2012

Malacanthus brevirostris

Snout short, 2.7-3.4 in HL. Upper head and body pale olive-green; two broad black curved stripes along caudal fin. D I-IV, 52-60 (usually II, 57). A I, 46-55 (usually I, 51). Total GR, first arch 9-20 (usually 15) (voucher: ? mm SL)

Malacanthus latovittatus

Snout long, 2.1-2.7 in HL. Head bluish, body olive to violet-blue above; broad black or blue-black band from head to hind caudal fin margin; small white patch on hind lower caudal fin. D III-IV, 43-47. A I, 37-40. Total GR, first arch 6-14 (usually 9). (voucher: 225 mm SL)

LACTARIIDAE

False trevallies - Ikan susu

Body moderately deep, compressed. Mouth large, oblique, with canine-like teeth at front of both jaws. Scales on body large, cycloid, easily lost; small scales on soft dorsal and anal fins. Two dorsal fins, the first with 7 or 8 spines, separated from the second fin; anal fin as long as second dorsal fin; caudal fin deeply forked. A single genus with one species.

REFERENCE: Leis, 1999.

Lactarius lactarius

Chin prominent; hind border of operculum pointed. No scutes at end of lateral line; caudal fin forked. Body silvery blue-grey; black blotch on upper operculum. D VII-VIII; I, 20-22. A III, 25-28. (voucher: 154 mm SL)

RACHYCENTRIDAE

Cobias - Gabus laut

Body elongate, slender; head broad, depressed, mouth wide. Scales small, embedded in thick skin; no keel or scutes at base of tail. Dorsal fin long, preceded by 6-9 short and broad spines, separate from each other and depressible; anal fin moderately long; caudal fin emarginate.

A single genus and species known.

REFERENCE: Collette, 1999.

Rachycentron canadum

Body above dark brown, pale yellow on lower sides. Two narrow silvery or pale bands along body, fading with age; tips of soft dorsal and anal fins and caudal fin lobes usually white. D VI-IX, 26-33. A II-III, 23-25. (voucher: ? mm SL)

ECHENEIDAE

Remoras - Ikan gemi

Body usually elongate, slender (rather stout in some); head depressed. Lower jaw projecting well beyond upper jaw; no opercular spines. Small scales on body. Large oval-shaped sucking disc on top of head, with paired transverse ridges (this is the modified first dorsal fin), second dorsal fin long-based, without spines, beginning well behind midpoint of body; anal fin opposite and similar. The sucker is used to attach to larger fishes, turtles and sea mammals.

Total genera three, of which two were obtained on the Survey area (two species).

REFERENCE: Collette, 1999.

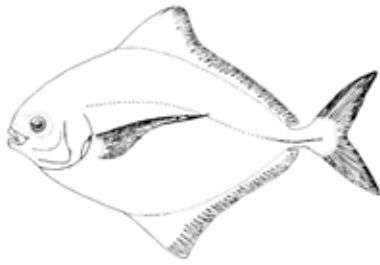
Echeneis naucrates

Body elongate, depth 9-14 times in SL. Sucker disc with 21-28 transverse ridges. Pectoral fin pointed; caudal fin rounded. Broad black band from snout to tail; caudal, dorsal and anal fin tips white in young. (voucher: 359 mm SL)

Remora remora

Body stout, depth 5-8 times in SL. Sucker disc with 15-20 transverse ridges, disc not extending beyond tip of pectoral fin; pectoral fin rounded. Body plain brown or grey. D 21-27. Total GR 28-37. (voucher: 95 mm SL)

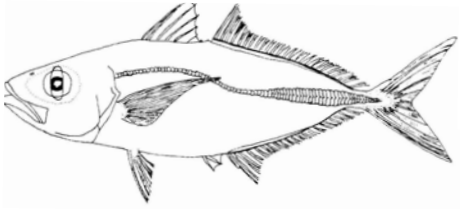
CARANGIDAE



PARASTROMATEUS



MEGALASPIS



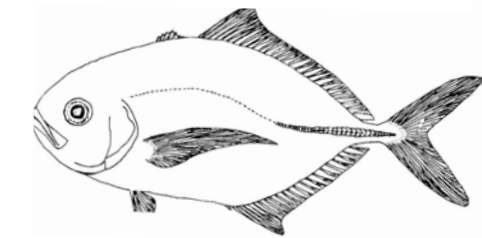
SELAR



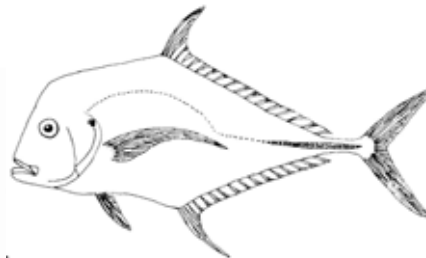
DECAPTERUS



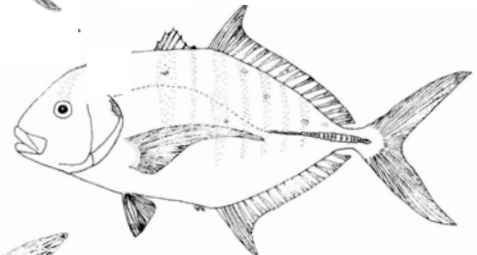
AROPUS



URASPIS



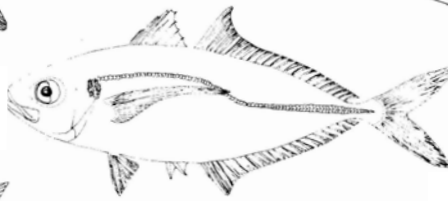
ALECTIS / SCYRIS



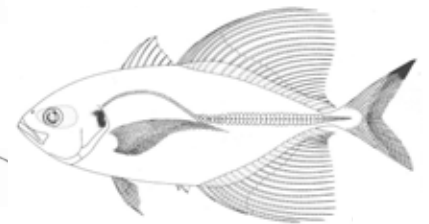
GNATHANODON



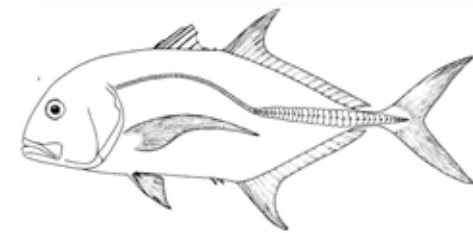
ATULE



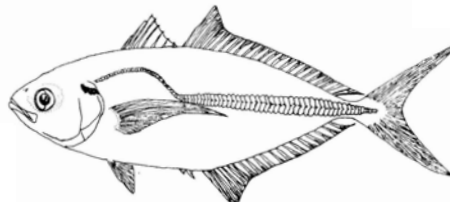
SELAROIDES



PANTOLABUS



CARANX



ALEPES



ELAGATIS



SERIOLINA

ATROPUS / CARANGICHTHYS / CARANGOIDES
 CRATEROGNATHUS / FERDAUIA / FLAVICARANX /
 KAIWARINUS / PLATYCARANX / TURRUM



SERIOLA



SCOMBEROIDES

CARANGIDAE

Trevallies, Jacks, Scads, Runners, Pilot Fishes - Kuweh, Angara, Selar

A family with extremely variable characters, but all sharing a dorsal fin separated into two parts, first with 7-8 spines (spines may be reduced or completely embedded in the skin), second with 1 spine and 18-43 soft rays. Anal fin with anterior first 1 (*Elagatis* and *Seriolina*) or 2 spines separated from rest of fin by a gap and may become embedded in adults, followed by 1 spine and 15-36 soft rays. Caudal fin always forked. Gill opening large, gill membranes not united. Scales small and cycloid but strongly lanceolate to needle-like in some species. Lateral line arched or elevated anteriorly, straight posteriorly.

Body form ranges from elongate and rounded to deep and strongly compressed; caudal peduncle sometimes with 1 or 2 keels, or dorsal and ventral grooves; snout pointed to blunt; eye small to large; adipose eyelid absent or strongly developed; teeth in rows or bands, either absent or small to minute or enlarged and caniniform; scutes often present on posterior part of lateral line. Colour in general bluish-green on back, silvery below (some species almost completely silvery); bars and spots present in many species.

Representatives of 25 genera were caught during the Survey.

Note. The genus *Carangoides* Bleeker and its related genera (*Alectis* Rafinesque, *Atropus* Oken, *Parastromateus* Bleeker, *Selene* Lacepède, *Ulua* Jordan & Snyder, and *Uraspis* Bleeker) have recently been revised by Kimura et al, 2022. Based on both molecular-phylogenetic results and morphological analyses these 7 genera have been split into 16 genera, of which 10 are new and/or resurrected. As we have not been able to rearrange this family to reflect the changes, we have opted to use the new names first and the 'original' name second in parenthesis.

REFERENCE: Smith-Vaniz, 1999; Kimura, S., S. Takeuchi and T. Yadome 2022.

Synopsis of Genera obtained during the Survey

Ventral fin (absent in adults) distinctly before pectoral fin base	Parastromateus
A single one-rayed detached finlet behind soft dorsal and anal fins	Decapterus
Several detached finlets behind soft dorsal and anal fins.	Megalaspis
Shoulder girdle margin with a furrow ventrally and a large papilla immediately above	Selar
Body appears to be completely naked, scales (when present) embedded in skin	Alectis & Scyrus
Tongue, roof and floor of mouth brilliant white, rest of mouth dark.	Uraspis
No teeth in upper jaw, black opercular spot. Posterior adipose eyelid well-developed	Selaroides
No teeth in upper jaw, no opercular spot. Lips "fleshy", posterior adipose eyelid poorly developed.	Gnathanodon
Adipose eyelid covers all but central slit of eye, last dorsal and anal ray finlet-like not separated from fin	Atule
Both jaws with a single row of comb-like teeth, posterior adipose eyelid well-developed	Alepes
Outer jaw with outer series of canines and an inner band of fine teeth, lower jaw with a single row of teeth	Caranx
Naked thoracic area very wide, snout short, wide protrusion of upper-jaw symphysis	Atropus
Conical teeth on both jaws, whole straight part of lateral line usually covered by scutes	Carangichthys
Breast completely scaly, second dorsal fin higher than the first, vomerine tooth patch triangular	Craterognathus
Naked thoracic area reaching to ventral fin insertion but not extending beyond it.	Ferdaulia
Naked thoracic area very small, placed anteriorly along ventral midline	Flavocarax
Breast completely scaly, second dorsal fin lower than the first, vomerine tooth patch anchor-shaped	Kaiwarinus
Naked thoracic area very wide, snout long, round and narrow protrusion of upper-jaw symphysis	Platycarax
Naked thoracic area very wide, snout long, wide protrusion of upper-jaw symphysis	Turrum
A two-rayed finlet detached from soft dorsal and anal fins.	Elagatis
Maxilla broadly rounded at end, terminating below posterior margin of eye	Seriolina
Upper lip joint to snout at midline by bridge of skin, semi-detached finlets on soft dorsal and anal fins	Scomberoides
Maxilla slightly rounded, terminating below anterior margin of eye; no scutes; anal rays 18-22	Seriola
Soft dorsal and anal fin rays greatly extended	Pantolabus



Alectis ciliaris



Scyris indica



Alepes djedaba



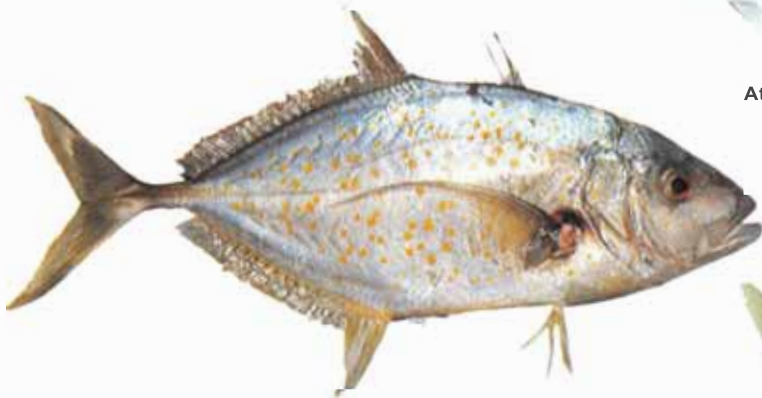
Alepes melanoptera



Alepes apercna



Atule mate



Flavocaranx bajad



Turrum coeruleopinnatum

Alectis ciliaris

Scales minute and embedded, so creating an impression of naked skin. Body diamond-shaped in young, becoming elongate and deep in adults. Head profile broadly rounded; eye diameter nearly equal to suborbital; suborbital narrow. Dorsal spines minute in young and disappear with growth. Soft dorsal and anal fin lobes very long and filamentous in young, falcate in adults. Straight portion of lateral line with 12-30 scutes; paired dorsal keel present on peduncle.

Body silvery with metallic blue tinge; fins dusky-grey, black base between 3rd and 6th ray in soft dorsal.

D VII, 18-20. A II; I, 15-17. GR 4-6 + 12-17.

(voucher: 117 mm SL)

Alepes djedaba

Body rounded. Adipose tissue covers posterior half of eye.

Jaws with a single row of numerous, comb-like teeth.

Lateral line with 31-36 scales in curved portion and 39-51 scutes in straight part. A dusky blotch on upper edge of operculum; body bluish on back, silvery below; all fins yellowish; membrane of spinous dorsal fin pale to dusky. D VIII, I, 23-25. A II; I, 18-20. GR 10-14 + 27-33, total 38-47.

(voucher: 220 mm SL)

Alepes apercna

Body oblong, moderately compressed. Dorsal and ventral profiles evenly rounded. Adipose tissue covers posterior half of eye. Jaws with a single row of numerous comb-like teeth. Straight part of lateral line with 48-56 scutes, curved part only half as long. Body bluish green above, whitish below. Spinous dorsal fin membrane distinctly black, other fins pale yellow. Large black spot on upper operculum.

D VIII, I, 23-26. A II; I, 18-21. GR 7-9 + 17-24, total 32-38.

(voucher: 160 mm SL)

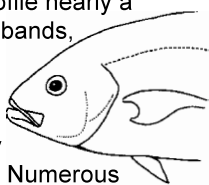
Flavocarax bajad [Carangoides bajad]

Oblong and compressed body; head profile nearly a straight line. Jaws with villiform teeth in bands, vomerine tooth patch a simple triangle.

Lateral line gently curved anteriorly followed by straight part with 20-30 scutes. Breast fully scaled. Body brassy silvery above, silvery on sides and belly. Numerous and conspicuous orange spots on sides.

D VIII; I, 24-26. A II; I, 21-24. GR 7-9 + 18-21.

(voucher: 272 mm SL)



Scyris indica [Alectis indica]

Scales minute and embedded, so creating an impression of naked skin. Body very deep and compressed; head profile nearly angular and body contours in almost straight lines. Eye diameter more than 1½ times in suborbital; suborbital broad. Dorsal spines not visible in adults soft dorsal and anal fin lobes elongated, especially in young. Lateral line anteriorly wavy and strongly curved, straight part with 5-12 scutes. Juveniles with vertical bars on body adults bluish on back, silvery white on belly. Soft dorsal, anal and ventral fins blue, other fins dusky. D VI; I, 18-20. A II; I, 15-17. GR 8-11 + 21-26

Alepes melanoptera

Body oblong, moderately compressed. Dorsal and ventral profiles evenly rounded. Adipose tissue covers posterior half of eye. Jaws with a single row of numerous comb-like teeth.

Straight part of lateral line with 48-56 scutes, curved part only half as long. Body bluish green above, whitish below. Spinous dorsal fin membrane distinctly black, other fins pale yellow. Large black spot on upper operculum.

D VIII, I, 23-26. A II; I, 18-21. GR 7-9 + 17-24, total 24-33.

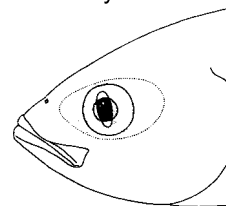
(voucher: 170 mm SL)

Atule mate

Last rays in dorsal and anal fins about twice as large as adjacent rays and resembling a finlet, but still joined to fin. Body somewhat elongate with dorsal and ventral profiles evenly rounded. Adipose tissue covering all of eye but a narrow slit over pupil. Anterior part of lateral line gently curved with 39-57 scales, straight part with 0-10 scales and 38-49 scutes. Body greenish on back, a yellowish-green tinge on sides often with distinct dark bars, silvery-white on belly; black spot on upper operculum margin; soft dorsal yellow with white tip on lobe, caudal fin dark yellow, other fins transparent in dorsal and anal fins sometimes.

D VIII; I, 22-25. A II; I, 18-21. GR 10-13 + 26-31.

(voucher: 140 mm SL)

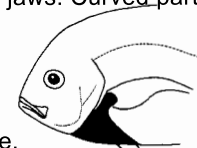


Turrum coeruleopinnatum [Carangoides coeruleopinnatus]

Body almost ovate and strongly compressed; head profile steep at level of eye. Bands of villiform teeth in both jaws. Curved part of lateral line longer than straight part, which has 6-26 scutes. Lobe of soft dorsal fin elongate; filamentous in young individuals but shorter with age; anal fin lobe somewhat elongate. Body bluish-grey to dark blue above, greyish silver below, flanks with few to many small yellow to golden spots; black area on edge of operculum indistinct. Anal fin white-tipped and spotted yellow, other fins dusky or yellowish. D VII; I, 20-23. A II; I, 16-20. GR 5-8 + 15-19.

Note: Juvenile shown on pg 168.

(voucher: 235 mm SL)





Platycaranx chrysophrys



Carangichthys dinema



Kaiwarinus equula



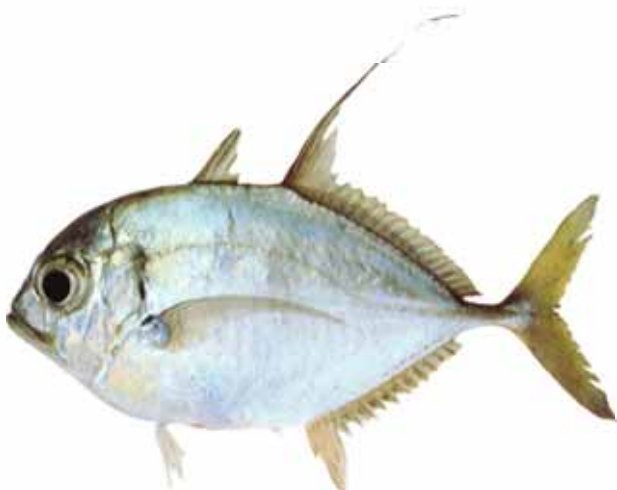
Ferdauia ferdaui



Turrum fulvoguttatum



Turrum gymnostethus



Atropus hedlandensis



Carangichthys humerosus

Platycaranx chrysophrys [Carangoides chrysophrys]

Body very compressed and oblong in adults. Tip of snout adults. Tip of snout abruptly vertical. Teeth in both jaws in villiform bands, in larger fishes some outer teeth conical. Naked area from pectoral fin base to br ventral fin. Lateral line moderately curved straight part with 20-37 weak scutes. Body colour highly variable with size but in general silver-blue on back, silver-white below with yellow reflections especially below eye. In large specimen body washed with black. Black spot on edge of operculum, white spots often present at base of anal fin. Fins variable from pale to dusky yellow and even very dark in large adults. D VIII; I, 18-20. A II; I, 14-17. GR 5-9 + 15-18. (voucher: 320 mm SL)

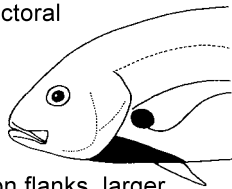


Kaiwarinus equula [Carangoides equula]

Body oval and compressed. Head profile a straight line from snout to spinous dorsal. Jaws with narrow bands of small teeth, the outer ones slightly larger. Vomerine tooth patch anchor-shaped. Lateral line moderately arched, curved part noticeably longer than straight portion. Breast fully scaled. Soft dorsal and anal fins yellow with dusky black stripes below fin margins on anterior half. D VIII; I, 23-25. A II; I, 21-24. GR 7-10 + 18-23, total 27-32. (voucher: ? mm SL)

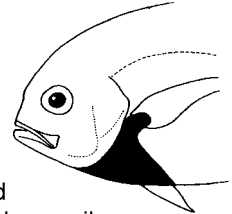
Turrum fulvoguttatum [Carangoides fulvoguttatus]

Body elongate, nearly ovate, and compressed. Head profile angular, becoming steeper with age. Villiform teeth in band in both jaws. Naked patch on pectoral base and on breast, sometimes forming one patch. Lateral line in a low arc anteriorly, straight part with 15-21 small scutes. Body green-blue with a metallic tinge, becoming silvery on sides. Many golden or brassy spots on flanks, larger individuals sometimes with 3 irregular black blotches on side. An indistinct dark spot at edge of operculum. Dorsal and anal fins dusky-yellow, caudal olive to dusky with dusky edges, ventral fin whitish. D VIII; I, 25-30. A II; I, 21-26. GR 6-8 + 17-21.



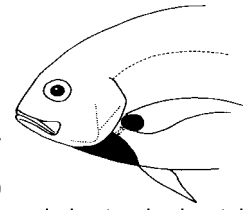
Atropus hedlandsis [Carangoides hedlandensis]

Body deep and compressed. Head profile very steep with a distinct "hump" before eye. Villiform tooth band in both jaws. Lateral line moderately arched, straight part with 17-29 weak scutes. Lobes of soft dorsal and anal fins filamentous; in mature males 3-8 rays of central portion of rayed fins produced into filaments of varying length. Naked area from pectoral fin base to breast and beyond ventral fin. Body greenish-blue above, silvery below; a black spot on edge of operculum. Spinous dorsal with elongated rays and edge of caudal fin blackish, other fins pale to dusky. D VIII; I, 20-22. A II; I, 16-18. GR 6-11 + 14-17. Note: Can easily be confused with *C. armatus* (Forsskål) but that species lacks the 'hump' before the eye and has 20-24 lower gill rakers on first arch. (voucher: 205 mm SL)



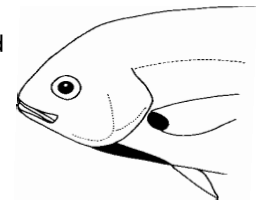
Carangichthys dinema [Carangoides dinema]

Strongly compressed, body nearly ovate; head profile almost a straight line. Both jaws with bands of small teeth, in upper jaw also an irregular outer series of moderately large teeth. Curved part of lateral line slightly longer than straight portion with 23-30 scutes. Naked patch on pectoral base and short naked patch on breast. Body bluish green above, silvery-white below. A very conspicuous characteristic colour pattern just below soft dorsal fin consisting of alternating dark and silvery blotches. Opercular blotch diffuse. Fins pale to dusky, edge of soft dorsal and upper caudal lobe yellowish, anal fin tips whitish. Note: Can be confused with *C. oblongus* which has 37-45 scutes in lateral line. D VIII; I, 17-19. A II; I, 15-17. GR 7-9 + 16-19.



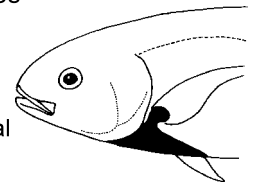
Ferdauia ferdau [Carangoides ferdau]

Body oblong, compressed with bluntly rounded snout. Jaws with teeth in villiform bands, becoming indistinct with age. Lateral line only slightly arched anteriorly, straight portion with 10-30 scales followed by 21-37 small scutes. Naked patch on pectoral base and short naked patch on breast. Body with faint dark bars; bluish green above, paler below. Often golden spots on upper sides. Edges and tips of soft dorsal and anal fins dark blue to dusky, and fin margin white. Ventral fin pale. D VIII; I, 26-34. A II; I, 21-26. GR 7-10 + 17-20. (voucher: 340 mm SL)



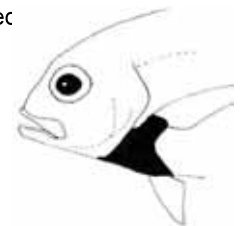
Turrum gymnostethus [Carangoides gymnostethus]

Dorsal profile more convex than ventral; snout rounded. Both jaws with bands of villiform teeth. Naked patch from pectoral base to breast and behind ventral fin. Lateral line moderately arched, straight portion with 14-25 scales followed by 20-31 weak scutes. Soft dorsal and anal fin lobes falcate. Body blue-green on back and sides, white on belly. Ventral and pectoral fins pale, other fins pale greenish to dusky; anal fin with white margin. D VIII; I, 27-30. A II; I, 23-26. GR 7-9 + 19-22.



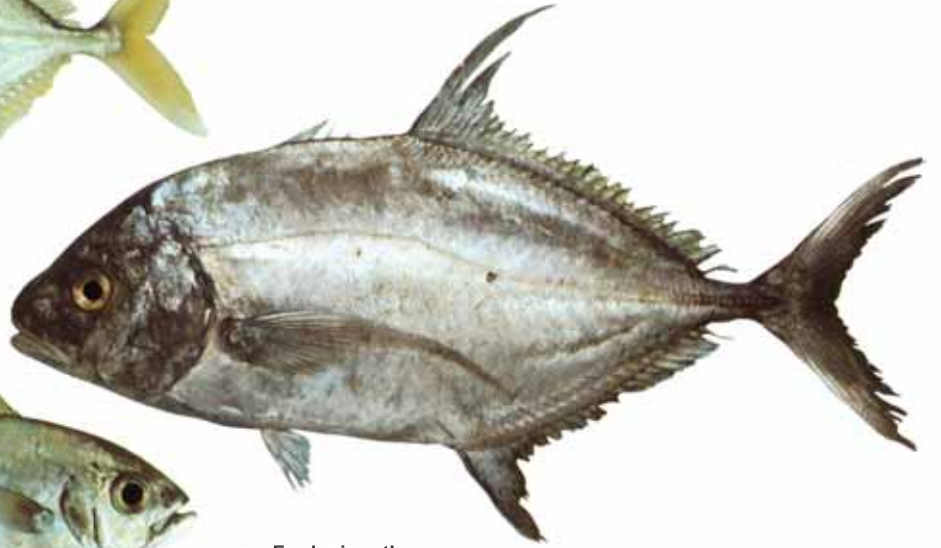
Carangichthys humerosus [Carangoides humerosus]

Body oblong; eye equal to snout. Curved line nearly as long as straight part which has 26-30 weak to moderate scutes. Breast to pectoral fin base naked. Soft dorsal and anal lobes falcate. Body greenish on back, silvery below; 5-6 faint broad dark bands across back; large black spot on shoulder and pectoral fin axil black. Spinous dorsal black, base of soft dorsal with white spots, caudal fin dusky, other fins white. D VIII; I, 19-21. A II; I, 18-19. GR 6-7 + 16-17. (voucher: 160 mm SL)





Platykarax malabaricus



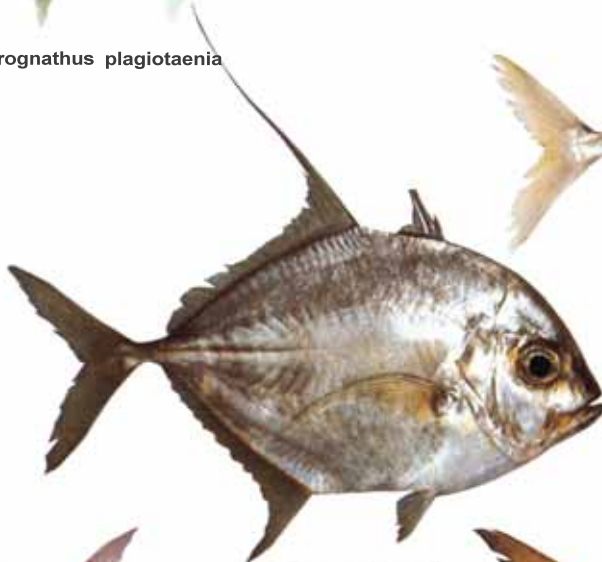
Ferdauia orthogrammus



Craterognathus plagiotaenia



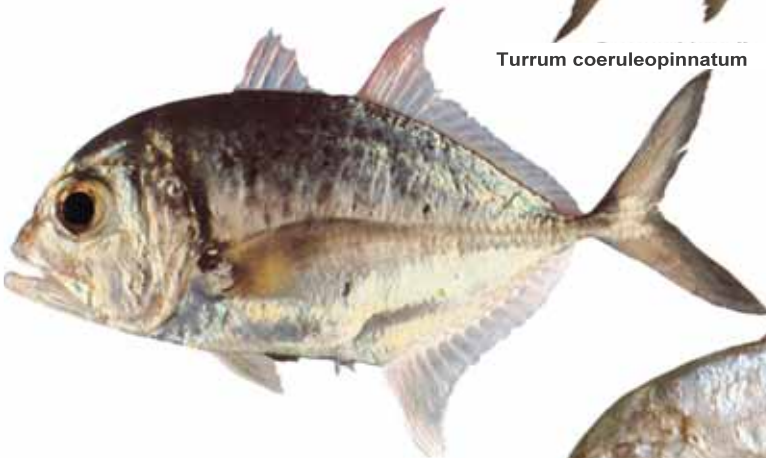
Platykarax talamparoides



Turrum coeruleopinnatum



Alepes kleinii



Caranx bucculentus



Caranx ignobilis

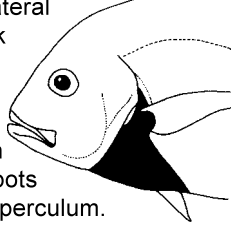
Platyctenax malabaricus [Carangoides malabaricus]

Strongly compressed, almost-ovate; head profile nearly straight. Both jaws with villiform teeth in bands, small conical teeth in front. Curved part of lateral line long, straight part with 19-36 weak scutes. Naked patch from pectoral fin base to breast and beyond ventral fin.

Body silvery to blue-grey above, silvery-white below. Fins dusky or with a greenish tinge. Anal fin with white spots at base; small black spot on edge of operculum.

Tongue greyish-brown.

D VIII; I, 20-23. A II; I, 17-19. GR 8-12+21-27, total 32- 38. (voucher: 185 mm SL)



Craterognathus plagiotaenia [Carangoides plagiotaenia]

Body very oblong and compressed. Lower jaw enlarged and projecting in front of upper jaw. A narrow band of small teeth in upper jaw, lower jaw with a row of small teeth and a narrow band anteriorly. Lateral line in a low arch anteriorly, straight part with only 11-18 small scutes. Breast completely scaled. Body bluish above, silvery below, occasionally with a few yellow spots on flanks; edge of ventral fin and margin of anal with a narrow white border, pectoral pale, other fins dusky; distinctive black to dark margin on posterior edge of preoperculum.

D VIII; I, 22-24. A II; I, 18-20. GR 8-14 + 19-27. (voucher: 270 mm SL)

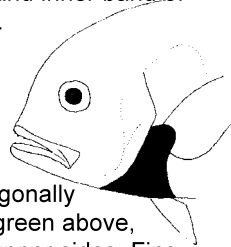
Caranx bucculentus

Upper jaw with outer series of canines and inner band of fine teeth; one row of teeth in lower jaw.

Body oval, head profile steep in front of eye. Upper jaw reaching past middle of eye. Lateral line strongly arched anteriorly and shorter than straight part which has 35-38 strong, large scutes.

Breast naked from pectoral fin base diagonally down to beyond ventral fin. Body olive-green above, silvery below, often with blue spots on upper sides. Fins dusky yellow-green. A black spot on operculum.

D VIII; I, 18-19. A II; I, 16-17. GR 6 +20. (voucher: ? mm SL)



Ferdauia orthogrammus [Carangoides orthogrammus]

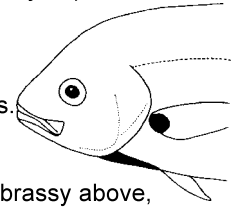
An oblong and compressed species; snout slightly angular and eye low set. Lips fleshy in adult; upper jaw protractile.

Both jaws with a narrow band of villiform teeth which become indistinct with age.

Lateral line gently curved, straight part with 21-34 scales and 19-31 small scutes.

Naked patch on pectoral base and short naked patch on breast. Soft vertical fins falcate anteriorly. Body grey to greenish brassy above, paler below. Flanks with dusky or yellow oval spots, darker at centers. Margin of anal white, ventral fin white; other fins pale brownish to dusky.

D VIII; I, 28-31. A II; I, 24-26. GR 8-10 + 20-23. (voucher: 320 mm SL)

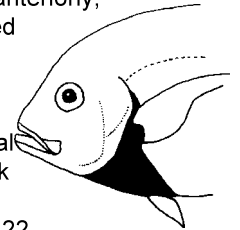


Platyctenax talamparoides [Carangoides talamparoides]

Strongly compressed body; head profile almost straight. Jaws with bands of villiform teeth, some outer conical teeth anteriorly. Lateral line moderately arched anteriorly, straight part with 20-32 weak scutes. Naked patch from pectoral fin base to breast and beyond ventral fin.

Body bluish above, silvery-white below; a small black spot on margin of operculum. Fins dusky, caudal fin with central rays dusky-yellow and black distal margin. Tongue white to pale grey.

D VIII; I, 20-23. A II; I, 17-19. GR 6-9 + 19-22. (voucher: 210 mm SL)



Alepes kleinii

An oblong, very compressed species. Ventral profile much more curved than dorsal profile. Adipose tissue covers posterior half of eye. Upper jaw with 2 irregular rows of short conical teeth anteriorly and blunt teeth posteriorly. Lower jaw with a single row of short conical teeth except 2 rows anteriorly. Lateral line strongly curved anteriorly, straight portion with 35-45 strong, large scutes. Body brownish blue on back, silvery white below. A distinct black blotch at beginning of lateral line. Upper caudal lobe dusky with black edge, other fins yellow. Upper caudal lobe longer than lower.

D VIII; I, 23-26. A II; I, 19-22. GR 10-12 + 27-32. (voucher: 120 mm SL)

Caranx ignobilis

Upper jaw with outer series of canines and inner band of fine teeth; one row of teeth in lower jaw.

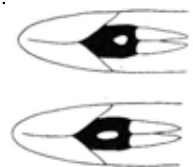
Body robust, moderately compressed.

Upper jaw reaching to below posterior eye margin. Curved part of lateral line

moderately arched and a little longer than the straight part with 26-38 strong scutes. Breast naked ventrally although

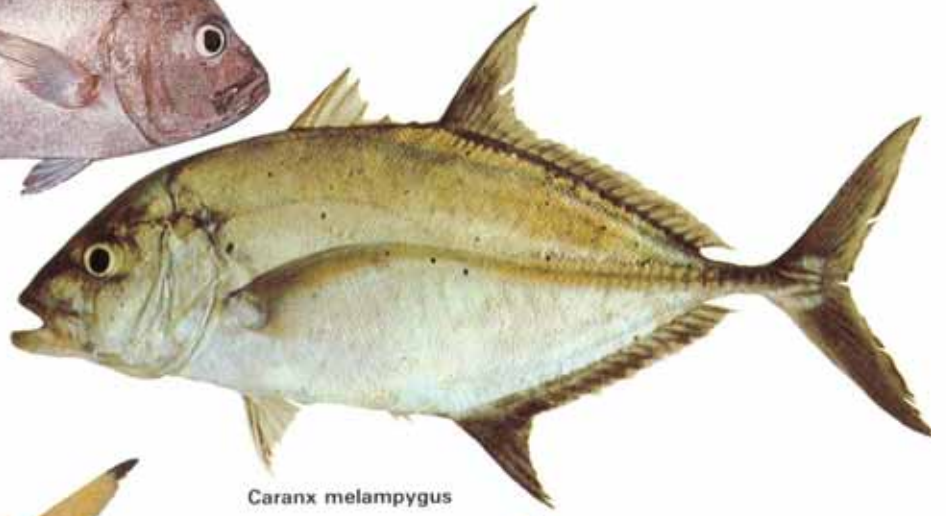
often a patch of scales present before ventral fin. Body colour very variable from blue above and silver below to dusky or black with many dark spots or blotches, apparently due to sexual dimorphism in specimens larger than 500 mm.

D VIII; I, 18-22. A II; I, 15-17. GR 5-7 + 15-17. (voucher: 345 mm SL)





Caranx lugubris



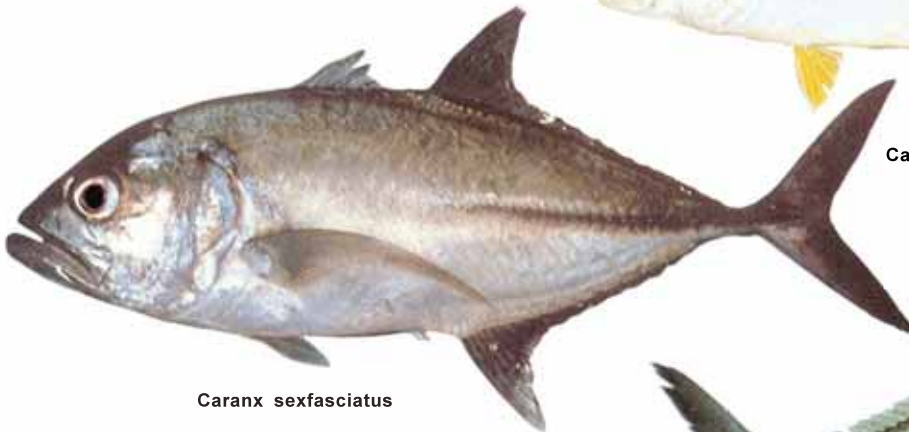
Caranx melampygus



Pantolabus radiatus



Caranx heberi



Caranx sexfasciatus



Caranx tille



Decapterus kurroides



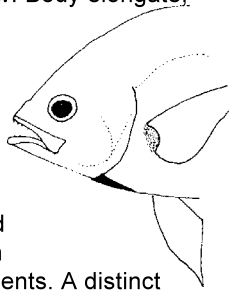
Decapterus macarellus

Caranx lugubris

Upper jaw with outer series of canines and inner band of fine teeth; one row of teeth in lower jaw. A robust deep-bodied species. Head profile steep and with distinct notch before eye, snout blunt. Adipose tissue well-developed on posterior part of eye. Curved and straight parts of lateral line nearly equal in length, the latter with 26-32 strong scutes. Breast fully scaled. Soft dorsal and anal fin lobes falcate, spinous dorsal not high. Body uniformly grey to dark brown, dusky when alive. All fins dark.
D VIII; I, 20-22. A II; I, 16-19. GR 6-8 + 17-22.

Pantolabus radiatus

Upper jaw with outer series of canines and inner band of fine teeth; one row of teeth in lower jaw. Body elongate, snout rounded, profile somewhat concave in front of eye. Upper jaw reaching below anterior part of eye. Lateral line strongly curved anteriorly, straight part about twice in length and with 38-45 moderately strong scutes. Breast fully scaled, but rarely a small naked patch anteriorly. Soft dorsal and anal fins with scaly sheaths at base, in males the rays are produced into filaments. A distinct black spot on edge of operculum. Body blue above, silvery below, sometimes with dark vertical bars on side. Tip of upper caudal lobe black, dorsal and anal fins yellow, other fins white to transparent.
D VIII; I, 23-26. A II, I, 18-20. Total GR 36-41.



Caranx sexfasciatus

Upper jaw with outer series of canines and inner band of fine teeth; one row of teeth in lower jaw. Body rather elongate and moderately compressed. Head profile evenly curved; upper jaw reaching to below posterior border of eye. Adipose eye tissue well-developed reaching to posterior part of pupil. Breast fully scaled. Anterior part of lateral line gently curved, straight part with 29-34 black scutes. Body grey to dusky above, whitish below; small black spot on upper edge of operculum. All fins dusky, lobes of soft dorsal and anal fins with white tips.
D VIII; I, 19-21. A II; I, 14-17. GR 6-8 + 15-19.

Decapterus kurroides

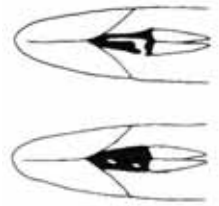
Body slender. Single, 2-rayed, distinctly separate finlet behind dorsal and anal fins. Shoulder girdle with 2 papillae; adipose tissue covers all of eye but for a central slit; scales on top of head reaching to anterior margin of eye. Pectoral fin long, reaching a vertical line from soft dorsal origin. Curved part of lateral line with 42-64 scales and 0-4 scutes, straight part of lateral line with 0-4 scales followed by 30-40 scutes, total of 77-102 elements. Body blue-green above, silvery-white below. A dark blotch on margin of operculum. Caudal fin conspicuously red, spinous dorsal and soft dorsal lobes sometimes dark, other fins dusky to white.
D VIII; I, 28-30. A II; I, 22-26 (incl finlet). GR 9-12 + 26-32. (voucher: 170 mm SL)

Caranx melampygus

Upper jaw with outer series of canines and inner band of fine teeth; one row of teeth in lower jaw. Body oblong and very compressed. Head profile straight from the pointed snout to above eye. Upper jaw reaching to below anterior part of eye. Adipose eye tissue weakly developed. Lateral line gently curved anteriorly and a little shorter than the straight portion with 30-40 scutes. Soft dorsal and anal fin lobes falcate. Breast fully scaled. Body green-blue above, silvery white below with scattered dark or blue spots on head, back and sides. Tip of dorsal and anal fins white, fins often bright blue or dusky.
D VIII; I, 21-24. A II; I, 17-20. GR 5-9 + 17-21, total 25-29. (voucher: 280 mm SL)

Caranx heberi

Upper jaw with outer series of canines and inner band of fine teeth; one row of teeth in lower jaw. Body moderately deep; head profile rounded. Upper jaw reaching to below end of pupil. Lateral line gently curved anteriorly, shorter than straight part with 30-40 strong scutes. Breast scalation variable, from fully scaled to small pre-ventral naked patch. Body bronze-blue above, sometimes with dark spots; white below. Dorsal fin dusky, tip of upper caudal lobe black, other fins yellow.
D VIII; I, 19-21. A II; I, 15-17. GR 6-8 + 17-19. (voucher: ? mm SL)



Caranx tille

Upper jaw with outer series of canines and inner band of fine teeth; one row of teeth in lower jaw. Body elongate, slightly compressed. Head profile very steep, ventral body profile nearly a straight line. Upper jaw reaching to below posterior margin of eye. Adipose eye tissue well-developed, covering nearly posterior half of eye. Lateral line slightly curved anteriorly, same length as straight part with 28-37 strong scutes. Breast fully scaled. Prominent black spot at beginning of lateral line. Body green-blue to light brown above, white below. Pectoral fin with black axillary spot; caudal fin dusky; other fins pale.
D VIII; I, 19-21. A II; I, 16-18. GR 6-8 + 15-17. (voucher: 235 mm SL)

Decapterus macarellus

Body slender and elongate. Single, 2-rayed, distinctly separate finlet behind dorsal and anal fins. Shoulder girdle with 2 papillae; adipose eyelid almost covering eye but for the pupil; scales on top of head reaching to front of pupil. Pectoral fin short, not reaching beyond vertical line from posterior end of spinous dorsal. Curved part of lateral line with 58-75 scales and no scutes, straight part of lateral line with 18-39 scales followed by 24-40 scutes, totaling 110-138. Metallic blue to black above, silvery-white below; a small black spot on margin of operculum; symphysis of upper jaw white. Caudal fin dusky yellow; other fins dusky-white.
D VIII; I, 31-37. A II; I, 27-31. GR 10-13 + 34-41. (voucher: 280 mm SL)



Decapterus macrosoma



Decapterus russelli



Elagatis bipinnulata



Gnathanodon speciosus



Megalaspis cordyla



Parastromateus niger



Scomberoides commersonianus



Scomberoides tala



Scomberoides tol



Selar boops

Decapterus macrosoma

Body very elongate and nearly rounded in cross section. Single, 2-rayed, distinctly separate finlet behind dorsal and anal fins. Shoulder girdle with 2 papillae; adipose tissue covers all of eye but for a central slit exposing the pupil; scales on top of head only reaching to posterior part of eye. Pectoral fin short, reaching to below posterior part of spinous dorsal. Lateral line in a low regular arch anteriorly with 58-72 scales, followed by straight part with 14-29 scales and 24-40 scutes, in total 110-126 elements. Body metallic blue above, silvery below; a small black blotch on upper margin of operculum; caudal fin hyaline to dusky, dorsal fin lobe sometimes dark, other fins pale. D VIII; I, 33-39. A II; I, 27-31. GR 10-21 + 34-38. (voucher: 160 mm SL)

Elagatis bipinnulata

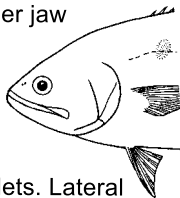
Body fusiform; head and snout pointed; small mouth, upper jaw not reaching to below front of eye. A two-rayed finlet present behind soft dorsal and anal fins. Lateral line curves only slightly. Pectoral fin very short; anal fin base noticeably shorter than soft dorsal fin base. Body dark olive-blue on back, a broad yellow mid-lateral band with two narrow light blue bands on each side of it, belly white. Fins dark with an olive-yellow tinge. Caudal fin deeply forked. D VI; I, 25-30. A I; I, 18-22. (voucher: 300 mm SL)

Megalaspis cordyla

Body elongate and only slightly compressed; hind portion of dorsal and anal fins each comprise 7-10 distinct finlets; caudal peduncle with a medial keel. Adipose eye-tissue covers all but a central slit of eye. Lateral line with a short, strongly curved anterior section and a straight posterior section comprising 51-59 very large scutes. Distinct black spot on edge of operculum. Body dark blue to almost black above, belly white, all fins dusky. D VIII; I, 18-20. A II; I, 16-17. GR 8-11+18-22. (voucher: 265 mm SL)

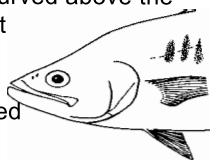
Scomberoides commersonianus

A very compressed and elongate species. Upper jaw reaching well behind posterior margin of eye. Snout blunt, head profile with a depression above eye. Spinous dorsal of short spines, depressible into a groove; soft dorsal and anal fin bases nearly equal in length, posterior part of both fins comprising semi-detached finlets. Lateral line almost straight, wavy in its anterior portion. Pectoral fin short; lobes of short dorsal and anal fins falcate. Scales partially embedded on mid-body and broadly lanceolate. Body green-bronze above, silvery-golden below. Five to 8 dark round blotches on sides mostly above lateral line. Fins dusky, soft dorsal and anal lobes dark brown. D VI-VII; I, 19-21. A II, 16-19. GR 0-3+7-12, total 8-15.



Scomberoides tol

Very compressed body; head profile concave from the pointed snout to nape. Upper jaw just reaching to below hind margin of eye. Lateral line slightly curved above the short pectoral fin. Spinous dorsal of short spines, depressible into a groove; soft dorsal and anal fin lobes low, posterior part of both fins comprising semi-detached finlets. Six to 8 rounded oval spots on and above the lateral line. Body blue above, white below. Outer tip of soft dorsal distinctly black. Skin very rough, almost with needle-like scales partially embedded in skin. D VI-VII; I, 19-21. A II, 18-20. GR 4-7+17-20, total 21-26. (voucher: 145 mm SL)



Decapterus russelli

Body elongate and slightly compressed. A single, 2-rayed, distinctly separate finlet behind dorsal and anal fins. Shoulder girdle with 2 papillae; adipose tissue well-developed, covering all of eye except for a central slit for pupil; scales on top of head to above pupil. Pectoral fin to or just past a vertical line from soft dorsal origin. Lateral line in a low, regular arch anteriorly with 42-46 scales and 0-4 scutes, followed by 0-4 scales and 30-40 scutes in the straight part, altogether totaling 77-102 elements. Body bluish green above, silvery below; a small black spot on upper margin of operculum; caudal fin dusky brown, other fins hyaline except for dusky outer soft dorsal fin. D VIII; I, 30-33. A II; I, 25-26. GR 10-14 + 30-33. (voucher: 230 mm SL)

Gnathanodon speciosus

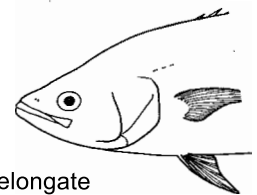
A deep-bodied, compressed species. Head profile rather steep and with slight concavity before eye; adipose eyelid poorly-developed. No teeth in upper jaw, juveniles with few weak teeth in lower jaw; no teeth on vomer and palatine. Breast completely scaled. Younger individuals with a yellow tinge and black vertical bars on side, adults paler and with faint bars on side. Fins yellow, tips of caudal lobes black. D VII; I, 18-20. A II; I, 15-17. GR 7-9+19-22. (voucher: 225 mm SL)

Parastromateus niger

Body deep and compressed, body profiles equally convex. Lateral line gently curved anteriorly, posterior straight part with 8-19 weak scutes; pectoral fin falcate, and longer than HL. Mouth small; a single row of small conical teeth in both jaws. Dorsal and anal fin spines become embedded in the skin with growth, lobes of soft dorsal and anal fins broadly rounded. Ventral fin absent in adults. Scales small, extending onto dorsal and anal fins. Body uniformly bluish brown to grey; fins with dark edges. D IV-V; I, 41-44. A II; I, 35-39. (voucher: 173 mm SL)

Scomberoides tala

Body very compressed; head profile slightly concave from snout to nape. Upper jaw just reaching to below posterior margin of eye. Lateral line curved only above the short pectoral fin. Spinous dorsal of short spines, depressible into a groove; soft dorsal and anal fin lobes falcate, posterior part of both fins comprising semi-detached finlets. Six to 9 vertically elongate dark spots on and above the lateral line; soft vertical fin lobes dark brown, pectoral yellow, other fins yellow. Body blue above, silver-white below. Skin rough to touch. D VI-VII; I, 19-21. A II, 16-19. GR 1-3+7-11, total 11-15. (voucher: 235 mm SL)



Selar boops

Body elongate and moderately compressed. Eye very large, adipose tissue well-developed and covering eye except for pupil. A deep furrow on margin of shoulder girdle and a large papilla immediately above it (see fig). Lateral line with 21-24 pored scales in anterior curved part and 37-46 strong and large scutes in straight part, scutes $\frac{3}{4}$ eye diameter. Body bluish bronze on back, silvery-white below, narrow yellow stripe sometimes present from operculum to caudal peduncle. D VIII; I, 23-25. A II, I, 19-21. GR 8-12 + 25-29.



Selar crumenophthalmus



Selaroides leptolepis



Seriola dumerili



Seriola rivoliana



Seriolina nigrofasciata



Atropus aurochs



Atropus mentalis



Uraspis uraspis

Selar crumenophthalmus

Body elongate and moderately compressed. Eye very large, adipose tissue well-developed and covering eye except for pupil. Deep furrow on margin of shoulder girdle and large papilla immediately above it. Lateral line with 48-56 pored scales and 0-4 scutes in curved part, followed by 0-11 pored scales and 29-42 scutes in straight part, scutes 2-3 times in eye diameter. Body metallic blue on back, silver-white below, often with a broad dusky yellow band from operculum to upper part of caudal peduncle; fins dusky to transparent.

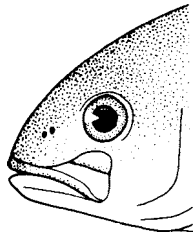
D VIII; I, 24-27. A II; I, 21-23. GR 9-12 + 27-31.
(voucher: 190 mm SL)

Seriola dumerili

Body elongate and only slightly compressed. Head profile evenly curved. Upper jaw very broad at end (supra-maxilla) reaching to below middle of eye (see fig.).

Teeth minute and in broad bands. Gill rakers (total 18-24) decreasing in numbers with increased body size. Last spine in spinous dorsal and the first two spines in anal fin become covered with skin in larger fishes. Grooves present on caudal peduncle. Lobes of soft dorsal and anal fins low, nearly equal to length of pectoral fin. Body metallic green-blue with a rosy tinge; a dark band from above eye to base of spinous dorsal. Pectoral fin with orange tint, other fins dusky.

D VII; I, 29-35. A II I, 18-22. GR 18-24.
(voucher: 430 mm SL)



Seriolina nigrofasciata

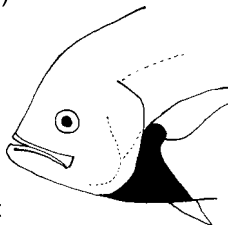
An oblong robust species. Head profile steep; upper jaw broadly rounded at end reaching to below hind margin of eye. Gill rakers knob-like and few. Lateral line gently curved; no scutes. Anal fin base approximately half the length of soft dorsal fin base. Breast fully scaled. Body blue-green to brownish above, creamy below; 5-6 oblique dark irregular bands on sides, fading with age. Fins brown, tips of soft dorsal and anal fin lobes clear white.

D V-VII; I, 31-34. A II; I, 16. Lower GR 5.
(voucher: 270 mm SL)

Atropus mentalis (Ulua mentalis)

Body very deep and compressed. Head profile strongly arched; lower jaw nearly rectangular in shape and projects in front of upper jaw. Gill rakers numerous, very long and feather-like, extending into mouth alongside the tongue. Tongue without central band of villiform teeth. Lateral line moderately arched anteriorly, straight portion with 29-33 scutes. Soft dorsal lobe falcate. Body blue-green above, silvery-white below; lower jaw white; corner of mouth with a black patch.

D VIII; I, 21-22. A II; I, 17-19. Lower GR 51-61.
(voucher: 315 mm SL)



Selaroides leptolepis

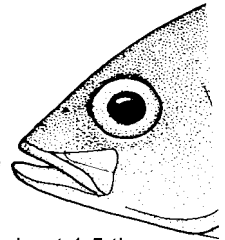
A small, oblong, compressed species with dorsal and ventral profiles evenly curved. Adipose eye tissue well-developed on posterior part of eye. Upper jaw only reaching to below front margin of eye. No teeth in upper jaw, vomer or palatines, a single series of minute teeth in lower jaw. Lateral line only slightly curved. Body bluish green above, white below; a bright yellow band from snout to caudal peduncle; distinct black operculum spot; unpaired fins pale to yellowish.

D VIII; I, 24-26. A II; I, 21-23. GR 10-14+27-32
(voucher: 150 mm SL)

Seriola rivoliana

Body elongate and moderately deep. Head profile nearly straight from snout to above eye. Upper jaw very broad at end reaching to below middle of eye (see fig.). Gill rakers well-developed. First anal spines may be reduced in larger fish; soft dorsal lobe about 1.5 times longer than pectoral fin; dorsal and ventral groove on caudal peduncle. Dark band through eye to anterior part of spinous dorsal nearly always present. Body bluish on back; bluish silver below. Fins dusky, tip of anal fin white.

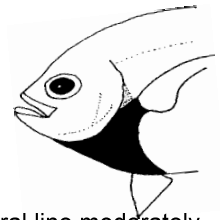
D VII; I, 27-33. A II; I, 18-22 GR 6-9+18-26
(voucher: 250 mm SL)



Atropus aurochs (Ulua aurochs)

Body oval and very compressed. Upper jaw reaching to below middle of eye; lower jaw slightly projecting beyond upper jaw. Tongue with central band of villiform teeth; gill rakers long, feather-like, extending into mouth. Lateral line moderately curved anteriorly, 38-40 weak scutes in straight part. Anterior dorsal rays produced as filaments, lobe of anal fin somewhat elongate. Body silvery-blue above, silvery below. Operculum with a large diffuse black blotch. Caudal fin margin black.

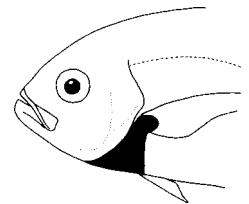
D VIII; I, 20-22. A II; I, 17-18. GR 16-21 + 37-41.



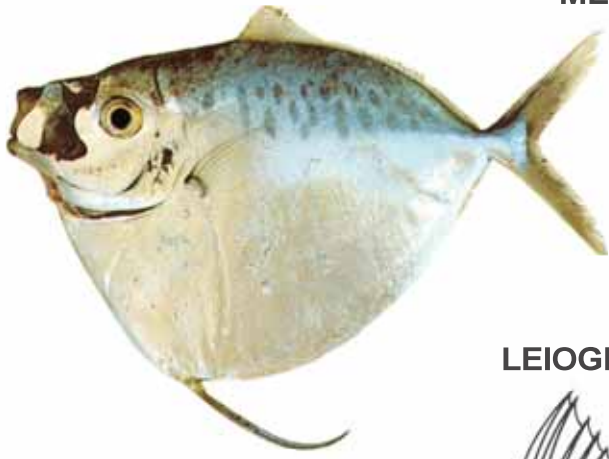
Uraspis uraspis

Body oblong and compressed, head profile rounded. Upper jaw reaching to below anterior part of eye. No teeth on vomer or palatines. Curved part of lateral line moderately arched with 61-82 scales, straight portion with 28-32 scutes. Spinous dorsal fin low, soft dorsal and anal fins high, sometimes with elongated lobes. Body metallic blue with darker vertical bands; fins dusky. Tongue, roof and floor of mouth brilliant white, rest black.

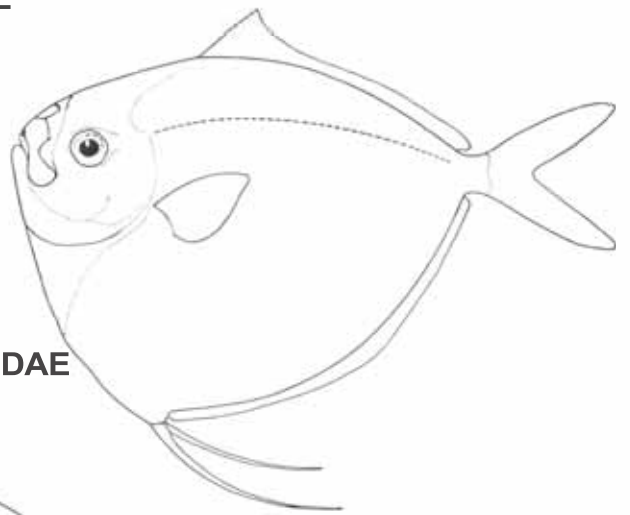
D VIII, I, 25-30. A II; I, 17-22. GR 5-7 + 13-16.
(voucher: 175 mm SL)



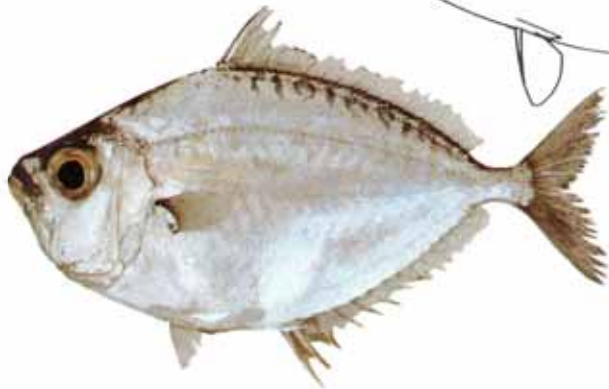
MENIDAE



Mene maculata



LEIOGNATHIDAE



Gazza rhombea



Gazza minuta



Photopectoralis aureus



Equulites klunzingeri



Photopectoralis bindus



Nuquequula glenysae



Nuquequula gerreoides



Equulites elongatus

MENIDAE

Moon fishes - Peperek kodi

Body disc-like, very compressed, with almost straight dorsal profile and a deeply curved and sharp ventral profile; mouth protractile, pointing upward. A single long dorsal fin without spines; anal fin long, beginning close to ventral fin base, fin rays short; first ventral fin ray prolonged in adults. A single species known.

Mene maculata

Body blue-green above, silvery white below; black spots on head and back.
D 43-45. A 30-33.
(voucher: 151 mm SL)

REFERENCE: Woodland, 2001.

LEIOGNATHIDAE

Ponyfishes - Petah; Caria; Peperek

Small to medium-sized fishes with round to oblong, compressed bodies. Mouth strongly protrusible; at nape a well-developed nuchal spine. Body covered with small cycloid scales except on top of head; there is variable breast scalation, and scales may be present on cheek. Single dorsal fin with 8 spines and 16 rays, anal fin with 3 spines and 14 rays; caudal fin forked. Body usually silvery with different but distinct markings on upper side of body, often characteristic colours on dorsal and anal fins. Ponyfishes are bioluminescent and in some species luminous organs are visible on throat (light is dispersed to belly from organs forming a ring around throat in which light-emitting bacteria live).

Ten genera and 51 species in the family; representatives of nine genera were obtained on the Survey.

REFERENCES: Chakrabarty & Sparks, 2008; Chakrabarty, Chu, Nahar & Sparks, 2010; Charkraborty, Sparks & Ho, 2010; Jawad, Kimura & Al-Mamry, 2012; Woodland, Premcharoen & Cabanban, 2001; Sparkes & Chakraborty, 2015; Mochizuki & Hayashi, 1989; Yamashita, Kimura & Iwatsuki, 1998; Suzuki & Kimura, 2017; Kimura, Yamashita & Iwatsuki, 2000; Kimura, Kimura & Ikejima, 2007; Kimura, Iro, Peristiwady, Iwatsuki, Yoshino & Dunlop, 2005; Jawad, Kimura & Al-Mamry, 2012.

Gazza rhombea

Mouth with canine-like teeth. Scales covering most of body except below pectoral fin base and abdomen, no scales on cheeks. Tip of ventral fins not reaching anal fin origin. Greatest body depth 34-52% SL. Irregular, narrow dark bands on upper part of body reaching a little below lateral line. Outer part of dorsal spines black, edge of soft dorsal grey, caudal fin margin dusky, all other fins colourless.
(voucher: 133 mm SL)

Photopectoralis aureus

Jaw teeth small and pointed. Scales on breast but not on cheeks. Lateral line incomplete. Black line from front of eye to lower jaw. Body depth 31-45% SL. Dense irregular brown, ring-like markings on upper body, snout tip blackish, also pectoral fin axil; bases of vertical fins darkly spotted. Fins yellow, caudal sometimes dusky, low fins colourless. L. lat. 67-85.
(voucher: 95 mm SL)

Photopectoralis bindus

Scales absent from cheeks, nape and breast; teeth small and villiform; snout short. Lateral line incomplete. A very deep-bodied (more than 50% SL) and compressed species. Males with conspicuous translucent patch in pectoral fin axil. Upper part of body with dark irregular semi-circular and oval markings. Outer half of spinous dorsal bright orange with a black line beneath, anal spines tipped orange; soft dorsal greyish, other fins colourless. L. lat. 45-49.
(voucher: 88 mm SL)

Nuchequula gerreoides

Breast and cheeks naked, anterior part of dorso-lateral surface of body almost completely scaled. Teeth villiform. Lateral line almost complete. Body depth 44.5-49% SL. Second dorsal spine somewhat elongate. Distinct brown blotch across nape; brown on snout; dark irregular lines on upper half of body. Pectoral axil with a clear yellow patch and a second larger one on body below and behind pectoral fin. Distal half of spinous dorsal fin yellow; soft dorsal and anal fins with yellow margins. L. lat. 54-62.
(voucher: 91 mm SL)

Gazza minuta

Mouth with canine-like teeth. No scales on breast to a line from pectoral fin base to anal fin origin; no scales on cheeks. Greatest body depth 28-46.5% SL. Irregular dark brown bands on upper part of body and a row of bluish spots along lateral line. Snout and underside of pectoral fin base with black dots. Edge of spinous dorsal black, soft dorsal and anal fins grey on edges, caudal fin margin dusky.
(voucher: 100 mm SL)

Equulites klunzingeri

Breast and body fully scaled but no scales on cheeks. Teeth villiform. Body depth 30-43% SL; second anal spine never extended. Upper side of body brownish with short oblique and vertical, irregular black lines and blotches which extend below lateral line.
(voucher: 80 mm SL)

Nuchequula glenysae

Breast and cheek fully scaled. Villiform teeth in jaws, lateral line almost complete. Body depth 35- 42% SL. Unique complicated sensory canals present on the suborbital area, extending to the nape. Grey vertical lines on back not reaching lateral line; distinct brown blotch on nape. Outer half of spinous dorsal black, soft dorsal, anal and caudal fin lobes yellow with grey edges. Pectoral and ventral fins colourless.

Equulites elongatus

Breast fully scaled but no scales on cheeks. Villiform teeth in jaws. Posterior margin of adipose eyelid deeply incised. Snout pointed and sharp, body very slender, 20-30% SL. Dorsal part dusky with irregular large and small dark blotches extending to below lateral line. The fish photographed is a female (there is a sexually dimorphic pattern of melanophores that occurs below the lateral line in males).
Tr 5-9+9-14. L. lat. 55-59.
(voucher: 63 mm SL)



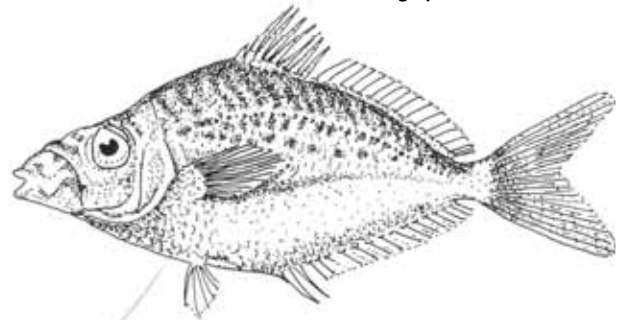
Leiognathus equula



Aurigequula fasciata



Equulites sp cf leuciscus



Photolateralis moretoniensis after Whitley, 1932



Eubleekeria rapsoni



Aurigequula longispinis



Eubleekeria jonesi



Photolateralis stercorarius



Deveximentum indicium



Deveximentum insidiator



Deveximentum megalolepis

Leiognathus equula

Large scales on breast but these are easily lost, no scales on cheeks. Teeth fine and sharp. Predorsal profile strongly sloping, with pronounced occipital hump. Body depth 1.7-1.9 in SL. Upper side of body with many close-set narrow dusky bars, notably in juveniles. A dark saddle on caudal peduncle; soft dorsal with black margin, caudal edge dusky, all other fins colourless or slightly grey. Membrane between anal fin spines markedly yellow. (voucher: 155 mm SL)

Equulites sp cf leuciscus

Breast fully scaled but no scales on cheeks. Body depth 38-47% SL. Teeth small and conical. Males with a translucent triangular lateral flank patch. Head naked, body fully scaled. Irregular, sometimes semi-circular markings on back; in large individuals several round to oval yellow marks on body below lateral line. Dorsal and anal fins and caudal lobe with yellow markings. Second dorsal spine extended and second anal spine elongated (often broken in trawled material). (voucher 108 mm SL)

Eubleekeria rapsoni

Breast, cheek and body fully scaled, scales present before ventral fin insertions. Teeth villiform. Lower margin of inner preopercular ridge serrated. Body deep, 53-57% SL. A dark line below dorsal fin, numerous faint lines on upper side of body; often dark markings on snout, operculum and on flanks. Outer half of spinous dorsal dark to black. (voucher: 67 mm SL)

Eubleekeria jonesi

Breast fully scaled but no scales on cheeks; area on nape and before dorsal fin scaled except for a semicircular naked area, and no scales before ventral fin insertions. Lower margin of inner preopercular ridge smooth. Body deep, 51-58% SL. Faint vertical lines on upper part of body in adults; juveniles with a few dark blotches above lateral line. Scales on lateral line bright yellow. Outer part of dorsal spines often with a dark blotch, dorsal and anal fin margins yellow, margin of caudal fin dusky. (voucher: 111 mm SL)

Deveximentum indicium

Mouth directed upwards. No scales on cheek, isthmus and breast; scales very small. Body slender, depth 41-50%. Dark bars on upper side of body narrow and irregular. P 17-19. GR 5-7+19-22. L. lat. 87-111. (voucher: ? mm SL)

Deveximentum megalolepis

Mouth directed upwards; breast, cheek and body fully scaled. A very small fish with almost circular body, body depth 59-63% SL. Lateral line terminates below middle of soft dorsal. Distinct broad metallic blue-green bars on upper side of body extend to mid-side of body; fins yellow. P 15-16. GR 4-6+15-19. Tr 6-7+13-15. L. lat. 43-49. (voucher: 42 mm SL)

Aurigequula fasciata

Breast and cheeks without scales. Predorsal profile concave but humped at nape. Teeth villiform. Second dorsal fin spine elongate (often broken in trawled material). Superficially resembles a small *L. equula* but the dark vertical yellow lines on upper part of body are more distinct and well-spaced; horizontal row of large yellow oval blotches below lateral line. Posterior margin of caudal lobes dusky to black, pectoral fin axil and fin bright yellow. (voucher: 154 mm SL)

Photolateralis moretoniensis

Breast, cheek and body fully scaled; lateral line incomplete, ending opposite last dorsal fin ray. Body depth 30-45% SL. Dense irregular markings on back, markings breaking up into zig-zag lines and blotches below lateral line. A black line below the dorsal fin. All fins colourless. translucent flank stripe in males broken into independent windows. L. lat. about 38.

Aurigequula longispinis

Breast and cheeks naked. Body deep, 49-60% SL. Three to six distinct greenish-yellow blotches in a row on flanks below lateral line, scattered blotches below dorsal fin. Pectoral fin axil yellow; margins of caudal fin dusky. Second dorsal and anal fin spines greatly elongated. L. lat, 64-70. (voucher: 120 mm SL)

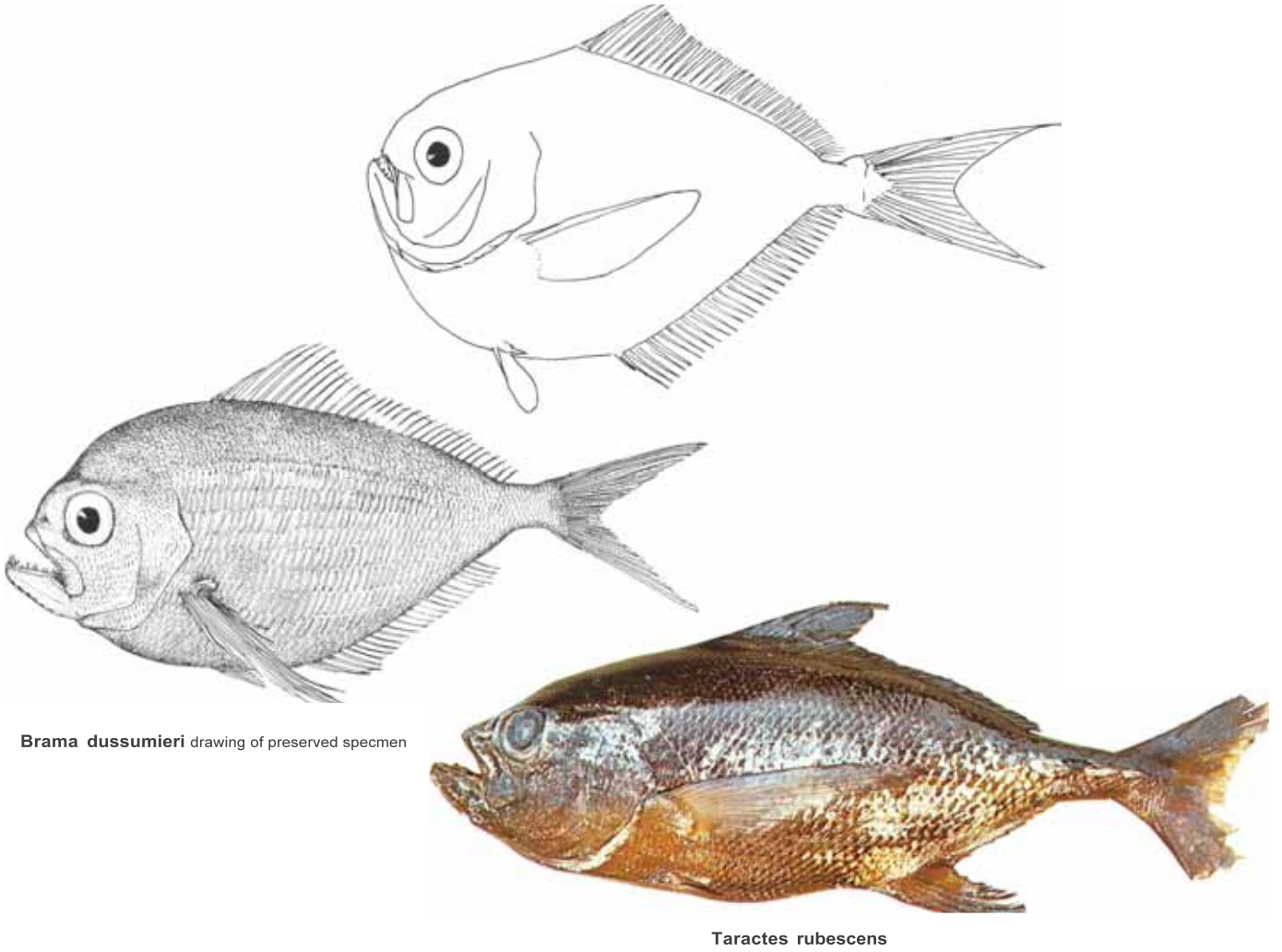
Photolateralis stercorarius

Breast and cheeks with scales. Body slender. Irregular dark lines on upper part of body. Translucent flank stripe in males, broken into independent windows. L. lat. 42-43. (voucher: 102 mm SL)

Deveximentum insidiator

Mouth directed upwards; body strongly compressed, ventral profile much more convex than dorsal profile. Scales very small, lateral line incomplete, no scales on cheek, isthmus and breast. Body slender in young, deeper in adults, 40-60% SL. Vertical dark bars on upper side ill-formed, sometimes becoming large blue spots and dashes; fins dull yellow. P 17-18. GR 5-7+17-22. P 16-17. L. lat. 84-107. (voucher: 57 mm SL)

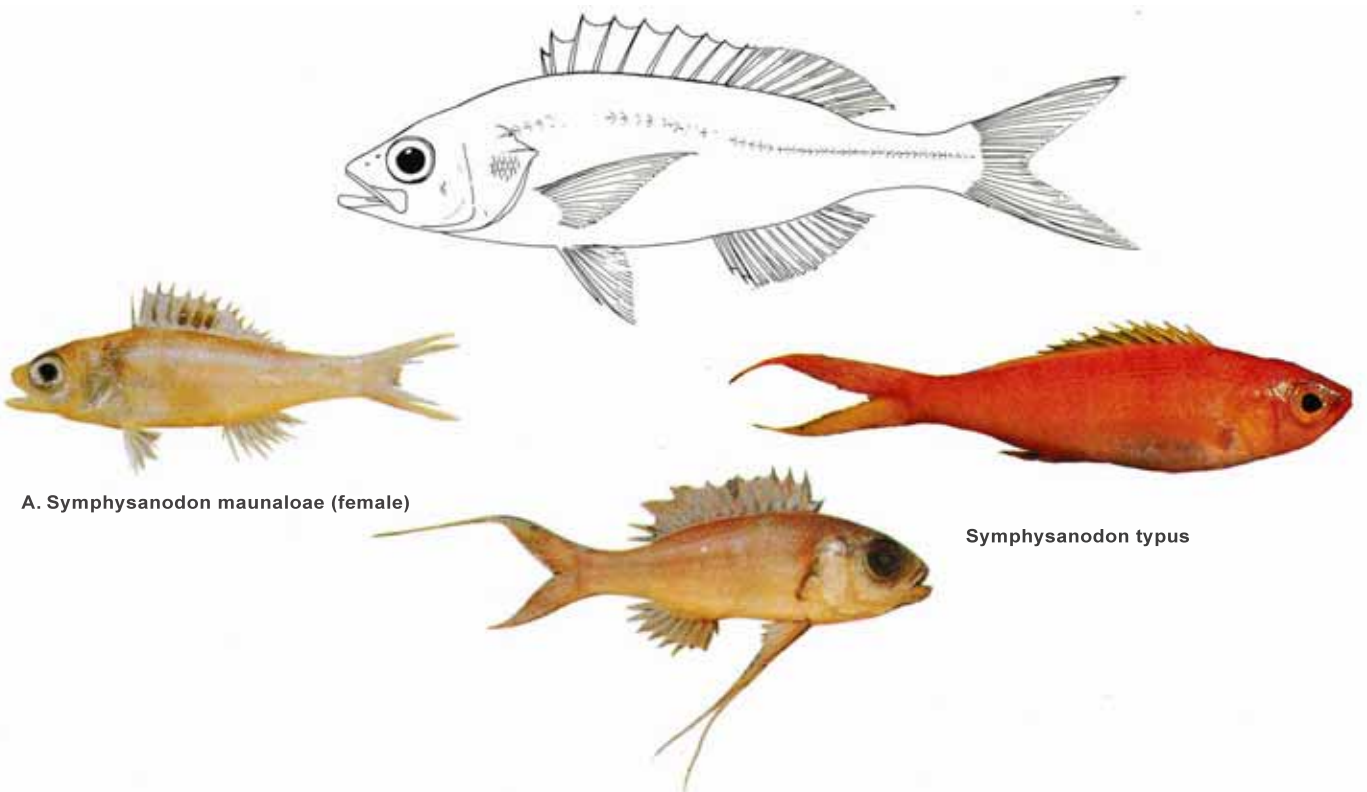
BRAMIDAE



Brama dussumieri drawing of preserved specimen

Taractes rubescens

SYMPHYSANODONTIDAE



A. *Symphysanodon maunaloae* (female)

Symphysanodon typus

B. *Symphysanodon maunaloae* (male)

BRAMIDAE

Pomfrets -

Body deep, ovoid and compressed; head deep. Scaled maxilla expanded posteriorly. Scales firmly attached, usually each with a median keel or denticle. Dorsal fin single, long-based, sometimes scaled and sometimes wholly depressible. Pectoral fin long; ventral fin with an axillary scale; caudal fin strong and forked. Oceanic fishes in all oceans. Seven genera with 20 species, two collected in the survey area.

REFERENCES: Last & Moteki, 2001; Ray, Mohapatra & Mohanty, 2018.

Brama dussumieri

Scales extending over vertical fins; head profile rounded at eye level; interorbital convex and relatively narrow; predorsal scales 32-43. Pectoral fin low on sides; anterior rays of anal fin not much differentiated to remaining rays. Lower edges of mandibles (lower jaw bones) touching each other at ventral midline. Body dark grey with silvery-blue iridescence; unpaired fins blackish or charcoal-coloured.

P 19-21. 59-68 scales in longitudinal series.
(voucher: 165 mm SL)

Taractes rubescens

Scales extending over vertical fins. Lower jaw projecting, interorbital broad and almost flat. Strong 'keel' of large scales on caudal peduncle. Pectoral fin long, at least 36% of SL. Body and fins black, paler below; white tip to caudal keel, and edges of pectoral, ventral and caudal fins.

L. lat. 21-23.
(voucher: 540 mm SL)

SYMPHYSANODONTIDAE

Slopefishes -

Small, oblong fishes. Scales ctenoid, extending over head except for snout tip, forming free sheaths at bases of dorsal and anal fins. Mouth large, terminal, slightly upturned; upper jaw notched at symphysis. Teeth small, conical, larger on lower jaw. Dorsal fin single and continuous, with 9 spines. Three spines in anal fin. Ventral fin with large axillary scale. Caudal fin forked. Operculum with 2 flattened spines, lower one more prominent. Gill rakers well-developed.

Family comprises two genera and 13 species; two species obtained in the Survey area.

REFERENCES: Anderson, 1970; Anderson & Springer, 2005.

Symphysanodon maunaloae

Rosy, darker above; two or 3 dusky cross-bands below dorsal fin, the first from fin origin to above pectoral fin more noticeable. Fins pale, dorsal fin dusky posteriorly. Body depth 3.9-4.7 in SL; least depth of caudal peduncle 10-13% SL; length of 3rd anal fin spine 13-16% SL. First ventral fin ray and caudal fin lobes produced into filaments in males.

D IX, 9-10. A III, 7. Total GR 31-37. P 15-17. Scale rows 42-47.

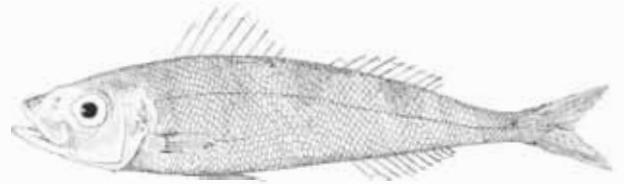
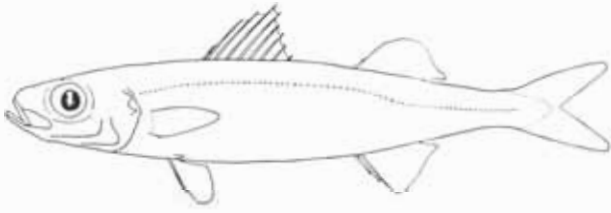
- A. Female: (voucher: 131 mm SL)
B. Male: (voucher: 75 mm SL)

Symphysanodon typus

Scarlet-orange, paler below; head and lower caudal fin lobe bright yellow, dorsal fin bright yellow, membrane olive. Body depth 3.4-4.5 in SL; length of anal fin base 15-21% SL. First ray of ventral fin only slightly produced. Caudal fin lobes produced, but apparently not into long filaments.

D IX, 10. A III, 7. P 15-18. Total GR 36-40. Scales in longitudinal series 49-55.
(voucher: ? mm SL)

EMMELICHTHYIDAE

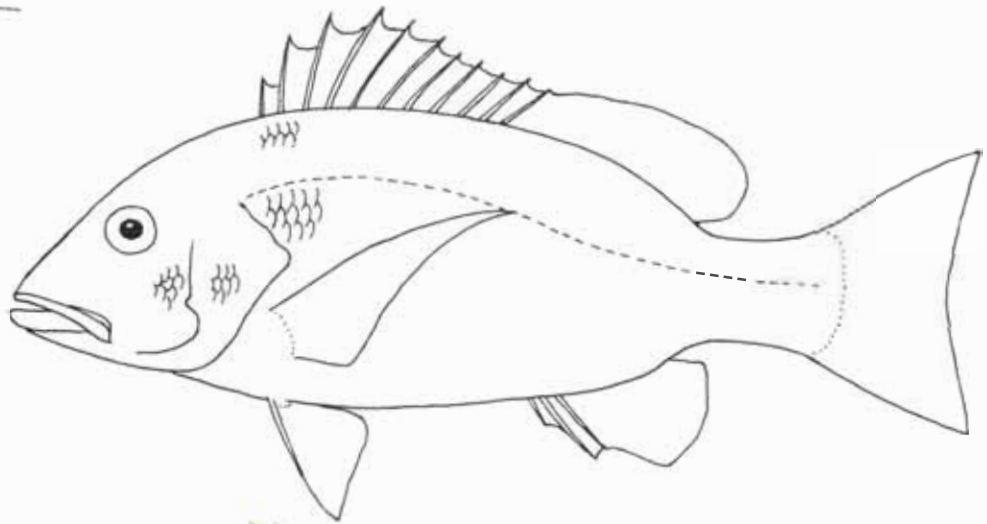


Erythrocles schlegelii

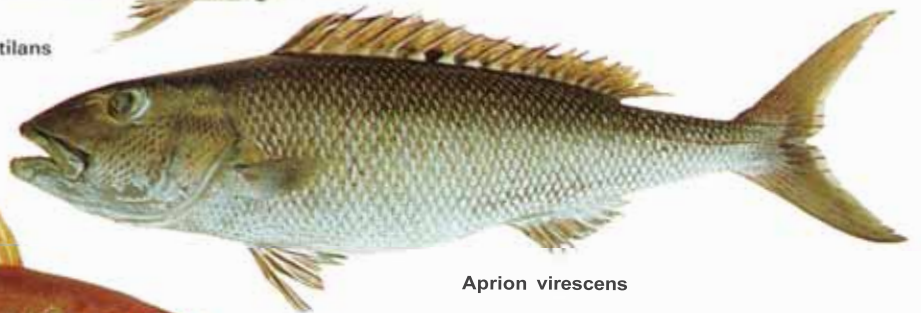


Maxilla scaled

LUTJANIDAE



Aphareus rutilans



Aprion virescens



Etelis carbunculus



Etelis radius

EMMELICHTHYIDAE

Bonnet mouths -

Slender fishes. Mouth toothless or almost so, very protractile. Maxillary broad posteriorly, scaled, with well-developed supramaxillary bone; 3 ascending processes from premaxilla. Lower jaw prominent; feeble opercular spines. Gill rakers long and numerous. Dorsal fin continuous, notched or separated into 2 parts of 11-14 spines (posterior ones often low and isolated) and 9-12 rays. Anal fin with three spines, 9 rays. Scaly basal sheath to anal and second dorsal fins; well-developed axillary process to ventral fin. Caudal fin deeply forked, its base scaly.

Family comprises three genera and 18 species; one species from the Survey.

REFERENCE: Carpenter, 2001a.

Erythrocles schlegelii

Body reddish pink, dusky above, silvery-white below and faintly shaded pink. Dorsal, anal and ventral fins pale pink, pectoral and caudal fins pinkish orange. Dorsal fin deeply divided between spinous and rayed parts; length of spinous dorsal fin base shorter than HL. Body depth 3.8-4.5 in SL; HL 3.2-3.6 in SL. Two protuberances ("lumps") on hind border of gill cavity. D XI, 10-12. A III, 9-10. Tr below 15-17. L. lat. 66-72. (voucher: 85 mm SL)

LUTJANIDAE

Snappers; Jobfishes; Sea-perches - Tanda-tanda; Jenaha; Gorara; Kahap

Oblong to deep-bodied, moderately compressed and perch-like fishes. Mouth terminal, small to large, usually some canine teeth in jaws; margin of preoperculum usually serrate. Scales ctenoid, anterior part of head without scales. Single continuous dorsal fin, rarely deeply notched, with 9-12 spines and 10-17 branched fin rays; anal fin with 3 spines and 7-11 branched fin rays; ventral fin with an axillary scale; caudal fin truncate to deeply forked.

The family comprises 17 genera and 113 species. Representatives of 11 species were obtained on the Survey.

REFERENCES: Allen & Talbot, 1985; Anderson & Allen, 2001; Iwatsuki, Akazaki & Yoshino, 1993; Randall, Allen & Anderson Jr., 1987.

KEY TO GENERA FOUND ON SURVEY

- 1a. Dorsal and anal fins not covered by scales and without scaly sheaths at their bases; D X, 10 or 11 2
 2a. Last dorsal and anal fin rays shorter than fin rays immediately before them; D X, 10. 3
 3a. Interorbital space almost flat; upper jaw extending farther toward than lower jaw; upper jaw in adults with thickened fleshy knob at tip; dorsal and anal spines robust **Lipocheilus**
 3b. Interorbital space distinctly convex; jaws about equal in size; no fleshy knob at tip of upper jaw **Paracaesio**
 2b. Last dorsal and anal fin rays longer than the rays immediately before them; D X, 11 4
 4a. Dorsal fin deeply notched at junction of spinous and soft portions; maxilla scaled **Etelis**
 4b. Dorsal fin not deeply notched; no scales on maxilla 5
 5a. Pectoral fin short, about equal to snout in length; deep groove before eye **Aprion**
 5b. Pectoral fin long, about equal to HL; no groove before eye 6
 6a. Jaw teeth minute, no teeth on palate. **Aphareus**
 6b. Jaw teeth moderate to strong, teeth on palate. **Pristipomoides**
 1b Scales extending onto soft dorsal and anal fin membranes, or present as low scaly sheaths to those fins; D X-XII, 11-17 7
 7a. No teeth on vomer 8
 8a. Deep groove before eye; head profile gently sloping **Symphorus**
 8b. No groove before eye; head profile almost vertical **Symphorichthys**
 7b. Teeth on vomer 9
 9a. More than 50 gill rakers on lower half of first gill **Macolor**
 9b. Less than 25 gill rakers on lower half of first gill arch 10
 10a. Mouth small, jaw teeth small; tip of snout level with middle of eye **Pinjalo**
 10b. Mouth larger, some jaw teeth canine-like; snout tip usually below level of eye centre . **Lutjanus**

Aphareus rutilans

Body red-brown above, becoming greenish below; body and head with grey or metallic hue. Fins greenish rosy, except for rosy pectoral fin and dark red-brown caudal fin. D X, 11. A III, 8. Lower GR 30-35. (voucher: 560 mm SL)

Etelis carbunculus

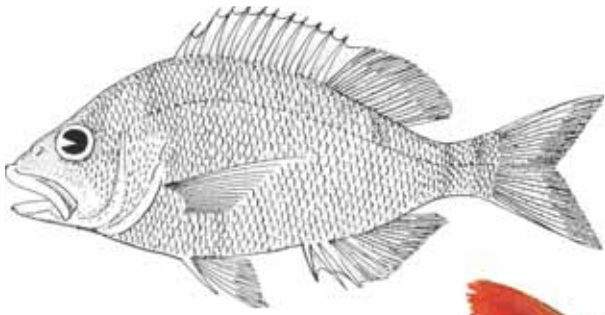
Body red, darker on back, yellow shades on lower sides; unpaired fins red. D X, 11. A III, 8. GR (total) 17-22 (10-13 not counting rudiments). L. lat. 48-50. (voucher: ? mm SL)

Aprion virescens

Body olive or dusky green, darker above; fins dusky yellow; violet or yellow blotches basally on membrane of first dorsal fin. Caudal fin deeply forked, lobes pointed. D X, 11. A III, 8. (voucher: 540 mm SL)

Etelis radiosus

Crimson, darker on back, paler below. Fins crimson, maxillary groove dusky. D X, 11. A III, 8. GR (total) 33-36 (30-33, not counting rudiments). L. lat. 50-51. (voucher: ? mm SL)



Lipocheilus carnolabrum drawing after slide (David Cook)



Lutjanus argentimaculatus



Lutjanus bengalensis



Lutjanus bitaeniatus



Lutjanus bohar



Lutjanus bouton



Lutjanus carponotatus



Lutjanus decussatus



Lutjanus erythropterus



Lutjanus fulviflamma

Lipocheilus carnolabrum

Body greenish yellow or golden-olive, darker above; juveniles with 5 diffuse dusky bars on upper body. Fins plain dusky yellow; snout and lips yellowish. No scales on maxilla which ends below middle of eye. Pectoral fin long and falcate, only slightly shorter than HL in adults. Preoperculum slightly notched in adults, otherwise entire. D X, 10. A III, 8.
(voucher: ? mm SL)

Lutjanus bengalensis

Four pale blue, dark-edged bands from head along upper half of body, longest from snout to caudal peduncle; orange-yellow border on spinous dorsal fin. Notch in preopercular edge well-developed. Scales on top of head begin above eye. Vomerine tooth patch an inverted "V". D XI-XII, 13-14. Lower GR 18-20.
(voucher: 132 mm SL)

Lutjanus bohar

Body dark brown-red on back, plain red ventrally; pale spot on scales often present and forming rows; juveniles with two larger white spots on back below dorsal fin. Fins red; dorsal and anal fins washed brown; black on outer anal and ventral fins; maxillary groove black. Nostrils in deep groove before eye. Scale rows above lateral line rise obliquely below all of dorsal fin. D X, 13-14.
(voucher: 500 mm SL)

Lutjanus carponotatus

Seven to 8 yellow bands along body, beginning on head. Fins yellow; black patch in pectoral fin axil. Vomerine tooth patch diamond-shaped or triangular with posterior extension. D X, 15-16.
(voucher: 252 mm SL)

Lutjanus erythropterus

Body red, grading to white on lower sides; fins orange-red. Juveniles with pale-ringed black spot on upper caudal peduncle. Scale rows rise obliquely above and below lateral line. Head profile convex, eye noticeably below head profile; interorbital broad, 11 in SL. Snout long, 3 in HL. D XI, 13-14. Tr above 9.
(voucher: 410 mm SL)

Lutjanus argentimaculatus

Red with dark green or brown tints over scales and fins. Strong canine teeth. Scale rows above lateral line parallel to it anteriorly, rising obliquely below posterior part of spinous dorsal fin. Caudal fin truncate. D X, 14.
(voucher: 620 mm SL)

Lutjanus bitaeniatus

Red body; ventral and anal fins yellow-orange. Predorsal profile straight, snout length more than 2.7 in HL. Vomerine tooth patch a triangle or inverted "V"; preorbital depth equal to interorbital. Notch on preopercular edge weak. D X, 13-14. A III, 8.
(voucher: 247 mm SL)

Lutjanus bouton

Greenish red on back, sides red with yellow lines. Large brown pale-edged spot across lateral line below soft dorsal fin. Fins yellowish red, caudal fin darker. Scales on top of head begin above eye; vomerine tooth patch triangular or an inverted "V"; preorbital depth more than 5 in HL. D X-XI, 13-14.

Lutjanus decussatus

Background colour whitish blue; five horizontal broad red-brown stripes along body (lower-most from mouth), upper two stripes crossed by vertical red-brown bars. Large black spot at caudal fin base. Vomerine tooth patch an inverted "V" or triangle. D X, 13-14.
(voucher: ? mm SL)

Lutjanus fulviflamma

Green, cream or rosy on lower sides of body, darker above. Six or 7 yellow horizontal stripes from head to caudal peduncle. Large diffuse black blotch over lateral line below soft dorsal fin. Fins yellow. Vomerine tooth patch triangular with posterior extension. D X, 12-13.
(voucher: 130 mm SL)



Lutjanus fulvus



Lutjanus gibbus



Lutjanus johnii



Lutjanus lemniscatus



Lutjanus lunulatus



Lutjanus lutjanus



Lutjanus xanثopinnis



Lutjanus malabaricus



Lutjanus monostigma



Lutjanus quinquelineatus

Lutjanus fulvus

Body rosy or greenish; sometimes golden flecks and lines on head and rosy stripes on body may be present. Dorsal fin margin and caudal fin dusky red. Pectoral, anal and ventral fins yellow to orange; dark brown in pectoral fin axil. Preopercular notch moderately or weakly developed. Vomerine tooth patch in shape of inverted "V".

D X, 13-15.

(voucher: 209 mm SL)

Lutjanus johnii

Silvery mauve-red body, head and lower sides mauve-pink. Rows of brown spots along scale rows; scattered black spots and flecks over upper $\frac{2}{3}$ of body. A large black, silvery blotch may be present on lateral line below soft dorsal fin. Scale rows above lateral line parallel to it; scales on head begin above middle of eye. Vomerine tooth patch in shape of an inverted "V".

D X, 13-14.

Lutjanus lunulatus

Body rosy above, white below; a broad, black, crescentic band on caudal fin. Jaws, underside of head, pectoral, ventral and anal fins yellow. Vomerine tooth patch in shape of an inverted "V"; preopercular notch weak.

D X, 13-14.

(voucher: 180 mm SL)

Lutjanus xanthopinnis

Body pinkish brown above shading to white below, yellow-green lines along mid-sides. Pectoral fin bright yellow, other fins greenish-blue. Vomerine tooth patch triangular with posterior extension. Preorbital width $\frac{1}{2}$ to $\frac{3}{4}$ of vertical eye diameter.

D X, 12-13. Lower GR 9-11.

(voucher: 160 mm SL)

Lutjanus monostigma

Body brownish yellow, pinkish white below and dusky yellow lines along scale rows. Dark brown spot across lateral line below second dorsal fin usually present. Ventral, anal and caudal fins orange. Vomerine tooth patch in shape of an inverted "V"; preopercular notch weak.

D X, 12-13. Tr above 6-7.

(voucher: 300 mm SL)

Lutjanus gibbus

Dark reddish brown or crimson, fins darker. Scale rows above and below lateral line rise obliquely. Preopercular notch deep and strong spur on interoperculum. Caudal fin large and deeply forked, lobes rounded, upper lobe larger than lower.

D X, 13-15.

Lutjanus lemniscatus

Body dark mauve-crimson or greyish, dorsal fin with dark brown margin. Head profile concave above eyes, convex at nape; eye close to head profile and snout long. Scale rows above lateral line rise obliquely. Vomerine tooth patch in shape of an inverted "V"; preopercular notch weak.

D X, 13-14.

(voucher: 490 mm SL)

Lutjanus lutjanus

Body cylindrical; eye large. Fawn to olive above, body dusky white below; horizontal dusky yellow lines along body; band from snout through eye to upper caudal fin base broadest and bright yellow. Vomerine tooth patch triangular with short posterior extension. Preorbital width about half of vertical eye diameter.

D X-XI, 12-13. Lower GR 14-18.

(voucher: 135 mm SL)

Lutjanus malabaricus

Dark brown-red body and fins, yellow marks on snout, narrow brown edge to caudal fin. Soft dorsal and anal fins large and triangular; caudal fin truncate. Head profile concave, eye close to head profile; interorbital narrow, 14-17 in SL. Scale rows of upper $\frac{2}{3}$ of body rise obliquely.

D XI, 14-15. A III, 9. Tr above 7-8.

(voucher: 530 mm SL)

Lutjanus quinquelineatus

Bluish-yellow above, body paler below. Five brown-edged blue stripes across head and along body, first ending at anterior soft dorsal fin, 5th passing through pectoral fin base to lower caudal peduncle. Dark blotch may be present below soft dorsal fin. Fins yellow. Snout 3.2-3.4 in HL. Preopercular notch deep.

D X-XI, 13-15.

(voucher: 150 mm SL)



Lutjanus rivulatus



Lutjanus russellii



Lutjanus sebae



Lutjanus timoriensis



Lutjanus vitta



Macolor niger



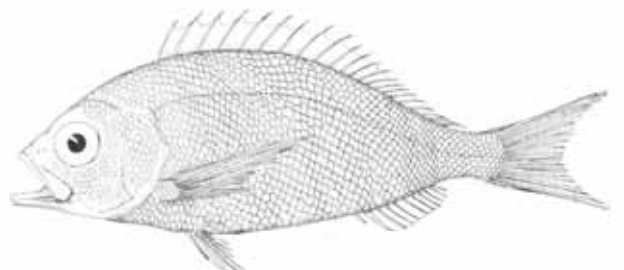
Paracaesio kusakarii



Paracaesio xanthurus



Pinjalo pinjalo



Pinjalo lewisi drawing of preserved specimen

Lutjanus rivulatus

Olive-green above, cream below. Each body scale with grey or white spot, forming rows; head with many wavy, thin blue lines running horizontally. White spot on lateral line below soft dorsal fin. Body deep, 2.2-2.4 in SL. Soft dorsal and anal fins triangular and extended.

D X, 15-16.

(voucher: 500 mm SL)

Lutjanus sebae

Body dull red, crimson or pink; pearly spots may be present on many scales; fin edges dark. Juveniles with 3 broad dark red-brown diverging bands across body. A deep-bodied fish, its depth 2-2.5 in SL. Soft dorsal and anal fins enlarged and acute. All scale rows rise obliquely; strong spur on interoperculum.

D XI, 15-16. A III, 10-11.

(voucher: 490 mm SL)

Lutjanus vitta

Body rosy green above, paler below. Thin olive or yellow lines along scale rows; broad dark green or brown band from snout through eye to upper caudal fin base. Ventral fin white, other fins yellow, white margin on dorsal and anal fins. Vomerine tooth patch triangular with posterior extension. Preorbital width sub-equal to vertical eye diameter.

D X, 13. Lower GR 12.

(voucher: 225 mm SL)

Paracaesio kusakarii

Maxilla scaled. Body deep, metallic blue or violet-brown, back, top of head and undersides of body with pink hue. Four dark cross-bands may be visible on back. Dorsal fin greenish, yellow posteriorly anal and outer $\frac{1}{3}$ of caudal fin yellow.

D X, 10. A III, 8. L. lat. 48-50. Body depth 2.4-2.5 in SL.

(voucher: 450 mm SL)

Pinjalo pinjalo

Pale crimson or rosy, dorsal and caudal fins brownish crimson, edges darker; ventral and anal fins dusky yellow. Scale rows above and below lateral line rise obliquely. Interorbital 3.5-4.1 in HL.

D XI, 14. A III, 10. L. lat. 50-55.

(voucher: 170 mm SL)

Lutjanus russellii

Deep violet-crimson above, scarlet to cream below; 6-8 dusky yellow narrow stripes from head to caudal peduncle: upper ones oblique, lower ones horizontal. Large black blotch mostly above lateral line below soft dorsal fin. Pectoral, ventral and anal fins may be yellow; yellow hind margin to brown caudal fin. Vomerine tooth patch triangular with posterior extension.

DX, 14-15.

(voucher: 230 mm SL)

Note: black spot may be absent in large fish and those from deep water.

Lutjanus trimoriensis

Crimson body and fins, brown over back and on margin of dorsal and caudal fins. Pectoral fin axil black. Soft dorsal and anal fins enlarged and acute.

D XI, 14-15. A III, 8. Lower GR 13.

(voucher: 280 mm SL)

Macolor niger

Body and fins black, charcoal or dark olive; juveniles with black and white spots and horizontal bands on sides.

Pectoral fin falcate, about as long as head; head profile convex; teeth in jaws conical. Preopercular notch deep, interopercular spur strong. Scales on bases of enlarged and pointed soft dorsal and anal fins; caudal fin lobes rounded, fin slightly forked.

D X, 13-14. A III, 10-11.

(voucher: ? mm SL)

Paracaesio xanthurus

Head and anterior part of body violet-blue, back below dorsal fin and caudal peduncle yellow. Juveniles rosy yellow-green on back, 3 or 4 olive bands across body. Fins dusky yellow, caudal fin bright yellow. Maxilla usually naked. Body depth 2.6-3.1 in SL.

D X, 10. A III, 8.

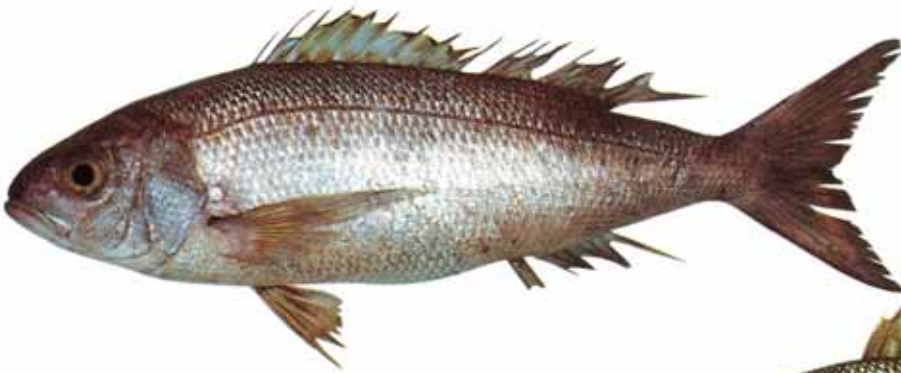
(voucher: 55 mm SL)

Pinjalo lewisi

Body red, scarlet over head, darker red over back. Pectoral fin axil brown to charcoal and anal fins pink, becoming orange-yellow towards margins; edges of dorsal and caudal fins dark brown or black; pectoral and ventral fins rosy. Scale rows above and below lateral line rise obliquely. Interorbital 3-3.5 in HL.

D XII, 13. A III, 9. L. lat. 49-52.

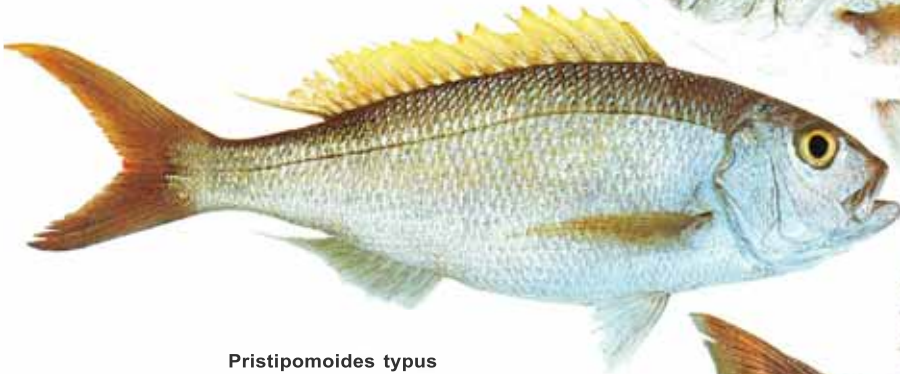
(voucher: 125 mm SL)



Pristipomoides filamentosus



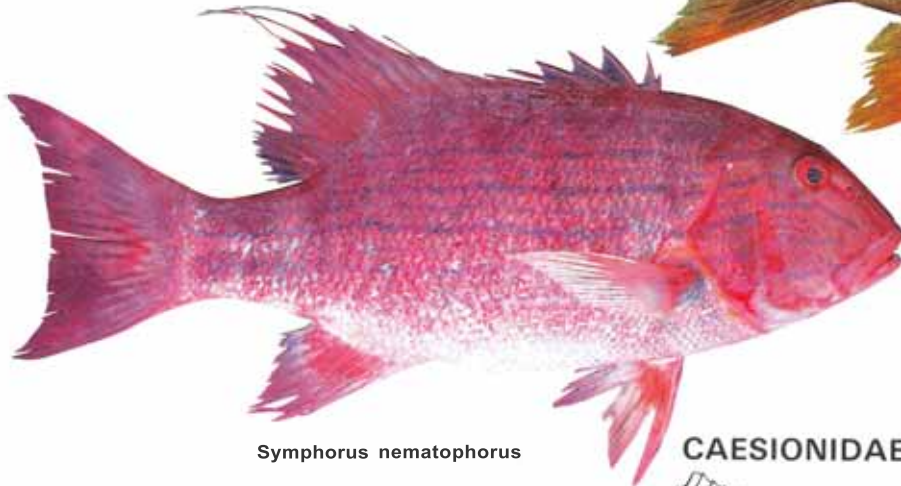
Pristipomoides multidentis



Pristipomoides typus



Symphorichthys spilurus



Symphorus nematophorus

CAESIONIDAE



Caesio caerulaurea



Caesio cuning

Pristipomoides filamentosus

Body violet-rosy, silvery below. Snout and interorbital with narrow yellow lines and small blue spots; blue spots on scales, distinct on back. Dorsal and caudal fins light blue or lavender, margins yellow or orange. Upper jaw 2.4-2.6 in HL. Vomerine tooth patch triangular. D X, 11. A III, 8. L. lat. 57-63. Total GR 22-26. (voucher: 495 mm SL)

Pristipomoides typus

Reddish blue, iridescent; suborbital and snout plain; interorbital with many wavy bands running lengthwise. Blue dorsal fin with many vertical wavy yellow lines; caudal fin brown-red, lower lobe pale. Upper caudal fin lobe elongate in juveniles. D X, 11. A III, 8. Total GR 17-23. L. lat. 48-50. (voucher: 400 mm SL)

Symphorus nematophorus

Body pale crimson with violet and brown shades; narrow wavy blue longitudinal lines or rows of spots over head and upper $\frac{2}{3}$ of body. Head profile convex. Caudal fin emarginate. Anterior dorsal and anal fins rays produced into filaments in juveniles. D X, 15-16. A III, 9. (voucher: 450 mm SL)

Pristipomoides multidentis

Iridescent pale blue, orange over back. Dorsal fin blue with 3 orange longitudinal bands; caudal fin orange. Two or 3 blue-edged yellow bands across suborbital and snout and many wavy yellow bands across interorbital. D X, 11. A III, 8. L. lat. 48-50. Total GR 17-23. (voucher: 420 mm SL)

Symphorichthys spilurus

Head profile steep, convex above. Body brown or yellow above, orange-brown below. Many brown-edged blue bands on upper body; bands horizontal over head and anterior body, oblique below soft dorsal fin. Black or dark brown saddle on upper caudal peduncle; sometimes an orange bar across nape. Anterior dorsal and anal fin rays produced into filaments (in juveniles?). D X, 14-16. A III, 8-10. (voucher: 415 mm SL)

CAESIONIDAE

Bananafish; Fusiliers - Pisang-pisang; Lalosi; Ekor kuning

Oval to slender fishes, body moderately compressed. Mouth small, protractile; premaxilla with 1 or 2 distinct, elongate, lateral processes which slip under maxilla and are visible inside mouth; fine teeth (no canines) in jaws (absent in *Dipterygnotus*); preopercular margin entire. Scales small and ctenoid, side of head scaly, maxilla naked. Single dorsal fin with 10-15 slender spines, usually continuous with rayed portion but appearing as two separate parts in *Dipterygnotus*; anal fin with 3 spines; last ray of dorsal and anal fins slightly produced. Scaly process in axil of ventral fin; caudal fin deeply forked.

The colour of caesionids is darker when caught at night, pale areas becoming reddish or blotches appearing.

The family comprises four genera and 23 species; representatives of those four genera were obtained on the Survey.

REFERENCES: Allen & Erdmann, 2006; Carpenter, 1987; Carpenter, 2001b.

Caesio caerulea

Distinct black streak along each caudal fin lobe. Back deep blue, shading to white below; a single golden yellow stripe about 3 scales wide and bordered by pale blue, passes just above lateral line from above eye to caudal peduncle where it curves slightly to end at upper caudal base; pectoral fin axil and base black. Body depth 3.2-2.5 in SL. Band of scales above and behind eye usually interrupted by naked gap at middle on predorsal profile; dorsal fin scaled except distally. D X, 15-(16). A III, 12-(13). P ii, 18-20. (voucher: 141 mm SL)

Caesio cuning

Body dusky grey blue or dark blue, paler below, broadening yellow band over back from dorsal fin origin covers caudal peduncle and fin; blue lines around eye. Black-edged dorsal fin yellow or bluish yellow; upper pectoral base black. Body depth 2.3-2.5 in SL. Band of scales above and behind eye crosses predorsal profile without gap; scales cover dorsal fin except distally. D X, 15-(16). A III, 11. P ii, 15-17. (voucher: 100 mm SL)



Caesio lunaris



Caesio teres



Caesio xanthonota



Dipterygonotus balteatus



Gymnocaesio gymnoptera



Pterocaesio chrysozona



Pterocaesio digamma



Pterocaesio pisang



Pterocaesio tessellata

Caesio lunaris

Each caudal fin lobe with dark brown or black tip. Violet-blue body lacks stripes or blotches; silvery grey on lower sides, caudal fin and peduncle and other fins sometimes yellowish; dark edge on dorsal fin; black upper pectoral base. Body depth 2.4 in SL. Band of scales above and behind eye interrupted at mid-dorsal line by space either naked or with tiny embedded scales; dorsal fin scaled except distally.

D X, 14. A III, 10-11. P ii, 17-18.
(voucher: 200 mm SL)

Caesio xanthonota

Caudal fin plain reddish yellow. Top of head, upper one third of sides and upper caudal peduncle dusky yellow, middle of sides bright blue, lower sides white; black or purple spot on upper pectoral base. Dorsal and anal fins bright yellow. Body depth 2.9-3.4 in SL. Band of scales above and behind eye interrupted by naked gap at middle on predorsal profile; scales cover dorsal fin except distally.

D X, 14-15. A III, 11-12. P ii, 18-20.
(voucher: 200 mm SL)

Gymnocaesio gymnoptera

Tip of each caudal fin lobe reddish brown. Back brownish blue with pale centres on scales; green-yellow stripe from behind eye covers lateral line to caudal fin base, usually pale of bluish horizontal streak below it. Body depth 5-5.5 in SL. No scales on dorsal fin.

D X, 15. A III, 12. P ii, 18-20. L. lat. 65-72.
(voucher: 112 mm SL)

Pterocaesio digramma

Each caudal lobe with dark reddish brown tips. Violet or rosy above, white below, 2 bright yellow stripes along back: first from nape to below dorsal fin base; 2nd from snout through eye, passing horizontal just below lateral line, crossing lateral line opposite end of dorsal fin. Body depth 3.3-3.7 in SL. Scales cover only lower part of dorsal fin.

D X, 14-15. A III, 11-12. P ii, 17-19. Tr above 9.
(voucher: 185 mm SL)

Pterocaesio tessellata

Each caudal lobe with a distinct black tip. Brilliant silvery blue, darker above, scale centres paler blue. Golden yellow stripe about 2 scales wide passes from top of eye and covers lateral line, crosses over lateral line in middle of its length and ends at upper caudal base. Pectoral base plain. Body depth about 3.4-3.7 in SL. Scales cover only lower part of dorsal fin.

D X, 15. A III, 12. P ii, 18-20. L. lat. 69-76.
(voucher: 138 mm SL)

Caesio teres

Usually all of back and caudal peduncle from dorsal fin origin to end of anal fin yellow; in larger fish, yellow restricted to more posterior part. Top of head and sides brilliant blue, lower sides white; black spot on upper pectoral base. Body depth 3.2 in SL. Band of scales above and behind eye interrupted by naked gap at middle on predorsal profile; dorsal fin scaled except distally.

D X, 15. A III, 12. P ii, 18-20

(voucher: 128 mm SL)

(Note: very similar to *C. xanthonota* but always blue on top of head).

Dipterygonotus balteatus

Mostly plain brown or reddish brown above, silvery below, horizontal dusky golden stripe from head to tail base; caudal fin plain translucent or faintly pink. Body depth 4.5-5 in SL. No scales over dorsal fin; spinous and soft dorsal separated from each other by low isolated spines.

D X+V; 9-11. A III, 10. L. lat. 71-77. P ii, 15-17.

(voucher: 74 mm SL)

Pterocaesio chrysozona

Tip of each caudal lobe dark red or black. Back brown or reddish white below; very broad (anteriorly) yellow gold stripe from eye passes below and adjacent to lateral line to caudal fin base covering lateral line on peduncle; 2nd thin yellow stripe along dorsal profile. Body depth 3.4-3.7 in SL. Scales cover only lower part of dorsal fin.

D X, 15. A III, 12. P ii, 16-18. Tr above 8.

(voucher: ? mm SL)

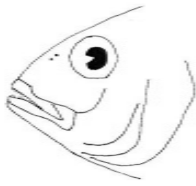
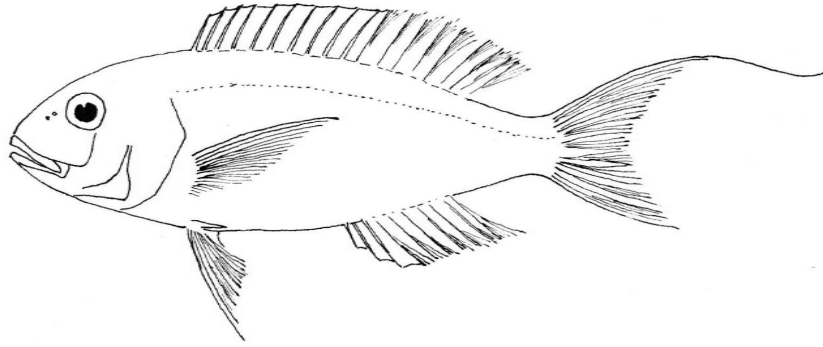
Pterocaesio pisang

Tip of each caudal lobe dark reddish brown or blackish. Body plain dusky pale red, or fawn. Body depth 3.9-4.1 in SL. Scales cover only basal part of dorsal fin.

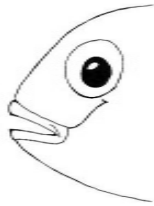
D X, 15. A III, (11)-12. P ii, 16-19. L. lat. 65-72.

(voucher: 65 mm SL)

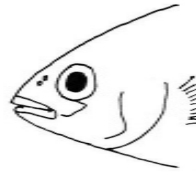
NEMIPTERIDAE



Nemipterus



Parascalopsis



Pentapodus



Scolopsis



Nemipterus balinensis



Nemipterus bathybius



Nemipterus furcosus



Nemipterus hexodon



Nemipterus isacanthus

NEMIPTERIDAE

Threadfin breams; Monocle breams - Juku eja; Jamban; Gurisj; Pasir-Pasir

Small to moderate-sized fishes: body slightly compressed and elongate oval. Mouth terminal with bands of teeth, sometimes outer row enlarged; eye moderate or large; suborbital hind margin entire, serrated or produced into spine below eye. Scales ctenoid, small to moderate, 3-5 rows across cheek. Dorsal fin single with 10 spines and 9 rays; anal fin with 3 spines and 7 rays; pectoral fin with 14-19 rays; ventral fin usually with medium-sized axillary scale; caudal fin forked, lunate or emarginate; sometimes a filament from spinous dorsal fin and/or upper and/or lower caudal fin lobe. Identification based primarily on colouration, which is variable and less obvious after death.

The family contains five genera, all but one (*Scaevius*) represented in Survey material.

KEY TO GENERA FOUND ON SURVEY

	<i>Nemipterus</i>	<i>Pentapodus</i>	<i>Parascolopsis</i>	<i>Scolopsis</i>	<i>Scaevius</i>
Spine below eye	-	-	+ (small)	+	-
Suborbital naked	+	+	+	+	+
Anterior canine teeth present	+	+	-	-	-
Suborbital hind border smooth	+	+	+/-	-	-
Scales on top of head reaching eye level	+	+	+	+	-
Number of scale rows on cheek	3	4-5	4-5	5-6	5-6

REFERENCES: Russell, 1993; Russell, 2001; Russell & Gloerfelt-Tarp, 1984.

Nemipterus balinensis

Upper part of body pinkish, becoming pearly white below. Two yellow lateral stripes: upper stripe faint and diffuse, from operculum and beneath lateral line to upper caudal base; lower stripe with a golden sheen, narrow, from just above pectoral base to middle of caudal base. Dorsal fin suffused with yellow, its margin sulphur-yellow with a dusky mauve sub-marginal band; caudal fin pinkish yellow, tip of upper lobe and filament a brilliant yellow, fin below edged red; anal fin transparent; pectoral and ventral fins translucent pink; base of ventral fins bright yellow.
(voucher: 117 mm SL)

Nemipterus hexodon

Upper part of body pinkish, silvery white below; 6-8 pale yellow stripes on sides from below lateral line. Blood red, ovoid spot below origin of lateral line, bordered below by bright yellow; double yellow stripe running from isthmus to lower caudal fin base. Dorsal fin translucent, its margin yellow, and a narrow yellow stripe running from base at front of fin backwards to about mid-height of last soft fin rays, this stripe bordered by a translucent narrow pale bluish-white stripe. Caudal fin pink, upper lobe tipped with yellow; anal fin translucent with a narrow yellow stripe running from near base of fin anteriorly to mid-height of posterior fin rays (extending to tip of fin along posterior ray in larger individuals), base of fin pale bluish white; pectoral and ventral fins pale translucent pink; base of ventral fins and axillary scale lemon-yellow.
(voucher: 215 mm SL)

Nemipterus bathybius

Upper part of body pinkish, becoming silvery below. Two yellow lateral stripes: first from operculum and beneath lateral line to upper caudal base; second from behind upper pectoral fin base to middle of caudal base. Dorsal fin pink, edged with yellow and with a median stripe of yellowish undulating lines; caudal fin pink, upper lobe and filament yellow; anal fin transparent but pinkish on outer margin; other fins hyaline; bases of ventral fins bright sulphur-yellow.
(voucher: 131 mm SL)

Nemipterus furcosus

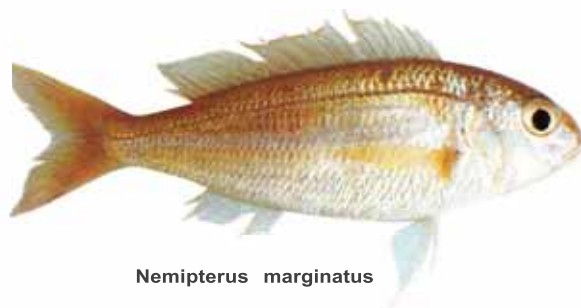
Head and body pale iridescent pink, silvery-white below; traces of indistinct yellowish stripes along body, one above and several below lateral line. Back with 9 indistinct blotches extending to just beneath lateral line; third blotch somewhat darker and more distinct and forming a reddish shoulder spot behind origin of lateral line in some individuals. Upper jaw rosy, lower jaw silvery. Dorsal fin pale rosy, sometimes with yellowish tinge, its outer margin dark pink; caudal fin pale rosy and with yellow tinge, lower margin of fin white; anal fin bluish white, with row of transparent or faint yellowish spots near base; ventral fins and axillary scales white; pectoral fins rosy.
(voucher: 137 mm SL)

Nemipterus isacanthus

Body pinkish mauve, silvery on lower part of sides and ventral surface; top of head and back yellow, tinged with pink; two broad pale golden stripes along body, the first from beneath origin of lateral line to upper caudal fin base; second from behind pectoral fin base to lower caudal fin base; pale yellow stripe on either side of ventral midline; snout pinkish; yellow teardrop-shaped bar beneath eye, extending obliquely forwards about halfway down suborbital; upper lip yellow; bluish patch on upper part of operculum. Dorsal fin translucent, with narrow, red-edged yellow margin, and narrow yellow sub-medial stripe; caudal fin pink, tip of upper lobe bright yellow, lower lobe tinged yellow; anal fin and ventral fins translucent whitish; pectoral fins translucent pinkish.



Nemipterus japonicus



Nemipterus marginatus



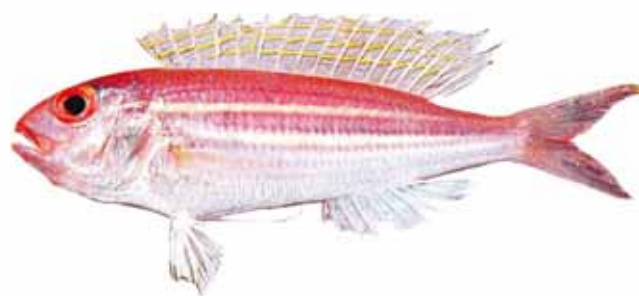
Nemipterus zysron



Nemipterus mesoprion



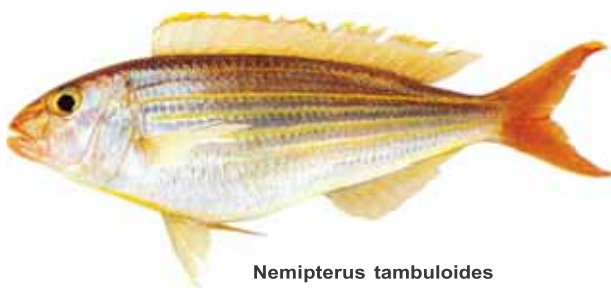
Nemipterus nematophorus



Nemipterus nematopus



Nemipterus peronii



Nemipterus tambuloides



Nemipterus sugillatus

Nemipterus japonicus

Upper part of body pinkish, becoming silvery below; top of head from behind eye with a golden sheen; 11-12 pale golden-yellow stripes along body from behind head to base of caudal fin; a prominent red-suffused yellow blotch below origin of lateral line. Dorsal fin whitish, margin of fin yellow, edged with red; a lemon-yellow stripe running along base of dorsal fin, broadening posteriorly. Caudal fin pink, upper tip and filament yellow; anal fin whitish with pale lemon-yellow broken lines or scribbles over most of it; pectoral fin translucent pinkish; ventral fins whitish with yellow axillary scale.

(voucher: 168 mm SL)

Nemipterus zysron

Upper part of body reddish, silvery below; sides below lateral line with indistinct yellow stripes along the middle of each scale row; head pinkish, suffused with mauve on the snout; yellow stripe in front of eye through nostril, another from upper lip to beneath eye; less distinct golden stripe from behind eye to origin of lateral line then across upper part of operculum to upper base of pectoral fin. Dorsal fin pale yellow with a bright yellow margin (blue in photo), a pale mauve sub-marginal stripe and pale mauve stripe along base of fin; caudal fin pinkish, upper and lower lobes pale yellowish, filament yellow; anal fin pale lilac with a series of elongate yellow spots or yellow stripe along lower $\frac{1}{3}$ of fin; pectoral fins pale yellow; ventral fin translucent white, base of fin and axillary scale pale yellow.

(voucher: 90 mm SL)

Nemipterus nematophorus

Upper part of head and body pinkish, silvery-white below; broad golden-yellow stripe beneath lateral line, with distinct gold patch anteriorly beneath origin of lateral line; 3 narrow golden-yellow stripes laterally along ventral half of the body and a double yellow stripe along ventral midline. Dorsal fin translucent pink, its anterior dorsal filament and margin yellow; caudal fin pink, upper tip and filament yellow; anal fin translucent, a faint yellow or orange stripe along fin extending from near base of first spine to middle of last ray, basal part of fin pale bluish-white; pectoral fins pale pink; ventral fins pink, axillary scale lemon-yellow.

Nemipterus peronii

Upper part of body pink, with 7 or 8 indistinct darker pink saddles reaching to or just below the lateral line; lower part of body silvery, with faint golden stripes running along each scale row; a diffuse pale reddish spot below and just behind origin of lateral line. A golden-yellow stripe on snout in front of eye, upper lip yellow, suborbital silvery-mauve. Dorsal fin pale whitish pink, a pale yellow line or series of spots just above base of fin; tips of spinous part of fin reddish-yellow; caudal fin pinkish; anal fin pale whitish-pink suffused pale yellowish over its middle part; ventral fins whitish; pectoral fins translucent. Membrane of spinous dorsal fin emarginate.

(voucher: 191 mm SL)

Nemipterus tambuloides

Upper part of head and body rosy, silvery white on ventral surface; 5 well-defined sulphur-yellow stripes along body, the first beginning above lateral line and following the scale row to posterior of dorsal fin, second running from snout through eye and continuing as a more or less straight line to upper caudal fin base, remaining stripes beginning behind head and following each scale row to caudal fin base. Dorsal fin translucent pink with yellow margin and bluish grey infra-marginal stripe and a narrow sulphur-yellow stripe running along base of dorsal fin; caudal fin bright rosy, tip of upper lobe sulphur-yellow; anal fin translucent bluish white with pale yellow stripe near base of fin bent posteriorly and extending to tip of last anal ray; pectoral fins pale pink; ventral fins pale yellow, spine and first ray bluish-grey.

(voucher: 231 mm SL)

Nemipterus marginatus

Upper part of body rosy, silvery-white below; head with a narrow yellow stripe from below nostrils to eye, another from middle of upper jaw to eye. Broad yellowish-orange stripe, divided above pectoral fin, runs along body from below origin of lateral line to upper part of caudal peduncle, this stripe with a reddish spot near its origin; a second yellowish-orange stripe from above base of pectoral fin to lower part of caudal peduncle. Dorsal fin pale blue with a yellow margin and broad yellow median stripe which divides into three posteriorly; caudal fin and its filament red, its median rays yellowish; anal fin pale blue with 2 narrow yellow stripes; ventral fins pink; pectoral fins translucent.

(voucher: 101 mm SL)

Nemipterus mesoprius

Upper part of head and body pinkish, silvery-white below; back with indistinct golden stripe beneath dorsal fin; red shoulder spot beneath third to fifth lateral line scales; golden stripe beneath lateral line extending from shoulder spot to upper caudal fin base; a second golden stripe, broader and tapering posteriorly, from base of pectoral fin to mid-caudal fin base. Head with oblique golden yellow stripe from beneath eye to middle of upper jaw, and less distinct oblique yellow stripe from anterior of eye to near tip of snout; upper lip pale mauve; operculum with golden reflections. Spinous dorsal fin with red margin, rayed part of fin with yellow margin, base of fin pale mauve; anterior part of dorsal fin with broad pale yellow stripe which divides into 3 or 4 narrow yellow stripes posteriorly; caudal fin pinkish, upper and lower margins tinged yellow; anal fin pale bluish white, with two yellow stripes; pectoral fins pale pink; first two rays of ventral fins pink, other rays hyaline.

(voucher: 144 mm SL)

Nemipterus nematopus

Head and body pinkish, paling to pearly-white below; two distinct sulphur-yellow almost horizontal stripes beneath lateral line: first from below origin of lateral line to upper caudal-fin base, second from above pectoral fin base to middle of caudal fin base; sometimes 1 or 2 less distinct, narrow, yellow stripes present beneath mid-lateral stripe. Dorsal fin translucent, with narrow yellow margin and 3 to 4 narrow yellow stripes (number varies between younger and older individuals). Caudal fin pinkish, upper tip bright sulphur-yellow; anal fin translucent, lacking stripes; ventral fins pale white, anterior-most spine and axillary scale yellow; pectoral fins translucent pink.

(voucher: 152 mm SL)

Nemipterus sugillatus

Body silvery pink with bluish iridescent tinge, darker above; 5 pale golden-yellow stripes on sides beneath lateral line; ventral surface silvery-white with broad lemon-yellow double stripe along ventral midline. Head with golden iridescent reflections, ovoid, pinkish-mauve blotch extending from beneath eye to upper part of operculum; eye pinkish silver; upper lip yellow. Dorsal fin pale pink, with broad yellow margin edged below by red, a greyish mauve sub-marginal stripe on posterior half of fin; caudal fin pink, upper tip yellow; anal fin translucent pink with reddish margin and narrow yellow sub-marginal stripe; narrow yellow stripe just above base of anal fin, extending to tip of last fin ray; ventral fins pinkish, with bright yellow stripe along second ray from base to tip of fin; pectoral fins pinkish; peritoneum silvery-white.

(voucher: 195 mm SL)



Nemipterus gracilis



Nemipterus balinensoides



Nemipterus thosaporni



Parascalopsis inermis



Parascalopsis eriomma



Parascalopsis tosensis



Parascalopsis tanyactis



Parascalopsis qantasi



Pentapodus caninus



Pentapodus emeryii

Nemipterus gracilis

Body pinkish above with silvery blue reflections, silvery below; scale rows on body with pale yellow stripes: 2 rows above lateral line, 5 rows below; head pinkish mauve with golden reflections, faint yellow stripe through nostrils, and golden yellow stripe from upper lip to below eye (continued across preoperculum and operculum in larger individuals); snout with violet reflections; lips yellow or reddish yellow; upper and middle part of operculum pale yellow. Dorsal fin pink with narrow yellow margin and pinkish-red sub-margin and broad median stripe of pale yellow (stripe broken along its length by a series of pale mauve spots or continuous pale mauve line); caudal fin pink, upper lobe yellowish, its tip reddish; anal fin transparent with faint, broken yellowish stripe near base which extends onto posterior rays to tip of fin; pectoral fins transparent; ventral fins are whitish, base of fins lemon-yellow.

(voucher: 143 mm SL)

Nemipterus thosaporni

Body pinkish, silvery below; 2 narrow golden yellow stripes on sides, the first from above upper preopercular margin to upper caudal fin base, second from behind upper opercular margin, extending to middle of caudal fin base; cheeks and operculum tinged bluish gold. Dorsal fin pale pinkish yellow with bright yellow margin and pale dusky sub-marginal stripe; caudal pinkish, upper tip bright yellow; anal fin translucent; pectoral fins pale pink; ventral fins translucent, yellow stripe extending down second soft ray, axillary scale yellow.

(voucher: ? mm SL)

Parascolopsis eriomma

Body rosy above, silvery below; yellow band from head to upper caudal fin base; brown, oval patch at beginning of lateral line, axil of pectoral fin black. Dorsal fin pink, margin red; pectoral fin yellow, caudal fin yellow or pink. Head scales reach forward to above eyes; posterior suborbital margin serrated, small spine at its upper corner; no scales on lower limb of preoperculum.

P ii, 14-15. L. lat. 34-36. Total GR 17-19.

(voucher: 165 mm SL)

Parascolopsis tosenis

Body rosy yellow, violet over back; 3 indistinct broad rosy bars across back and one on caudal peduncle; sometimes 2 pale green longitudinal bands below lateral line; fins silvery white, yellow band from base of anterior of dorsal fin to outer middle of soft rays. Head scales reach forward to between front eye margin and posterior nostrils; posterior suborbital margin serrated; no scales on lower limb of preoperculum.

P ii, 12. L. lat. 35. Total GR 10.

(voucher: 93 mm SL)

Parascolopsis qantasi

Body brownish pink above, violet-pink below, pale blue lines along scale rows on lower sides. Pectoral fin base covered by dark brown blotch; dorsal and caudal fins pale blue crossed by many oblique yellow lines and black checks along fin elements. Head scales reach forward to above eyes. Lower limb of preoperculum naked.

P ii, 14. L. lat. 34-35. Total GR 12-14.

(voucher: 78 mm SL)

Nemipterus balinensoides

Upper part of body pale silvery-rose, silvery below; 2 or 3 pale yellow stripes along sides, the first just below lateral line, second from behind pectoral fin base to caudal fin, third (often indistinct) from below pectoral fin base to lower part of caudal peduncle; a distinct golden-yellow spot, edged red above and below, just above upper pectoral fin base at beginning of second stripe; operculum silvery. Dorsal fin pinkish, edged with greenish yellow, an indefinite greenish yellow stripe at base of fin; caudal fin pale yellowish pink, upper tip dark pink in some individuals; anal fin translucent whitish; pectoral fins rosy; ventral fins pale yellow.

(voucher: 98 mm SL)

Parascolopsis inermis

Body pale pinkish violet, paler below; four broad dark red bars across back extending two-thirds across body: first from nape, 2nd below mid-dorsal fin, 3rd across caudal peduncle, 4th across caudal fin base. Dorsal, caudal and pectoral fins yellow, red spots and lines scattered over unpaired fins. Head scales reach forward to above eyes; posterior suborbital margin serrated, small spine at upper corner; lower limb of preoperculum without scales.

P ii, 14. L. lat. 35. Total GR 9-10.

(voucher: 127 mm SL)

Parascolopsis tanyactis

Body rosy violet, silvery below; dark edges to some scales on middle of sides, 3 red-brown bars across back: first extending in width from nape to 4th dorsal spine, 2nd from 8th to 11th spine, 3rd on caudal peduncle. Dark brown band between eyes; fins rosy, black blotches basally on dorsal fin between first to 4th spine, 8th spine to first ray, and 5th to 7th ray. Head scales reach forward to above eyes; posterior margin of suborbital smooth. Lower limb of preoperculum naked.

P ii, 14-15. L. lat. 35-38. Total GR 8-10.

(voucher: 142 mm SL)

Pentapodus caninus

Body violet blue, darker above; narrow yellow line above lateral line from eye to upper caudal peduncle, broad yellow band mid-laterally from eye to caudal fin base; narrow blue line from upper lip passes under eye and across operculum. Fins pink, caudal fin edged darker. Head scales reach forward to just before anterior nostrils; scales on lower limb of preoperculum; caudal fin tips very acute, upper lobe distinctly longer than lower.

P ii, 13-15. L. lat. 43-47.

(voucher: 60 mm SL)

Pentapodus emeryii

Body violet or blue-brown above, paler below; narrow yellow lines above lateral line from eye to upper caudal peduncle, broader greenish yellow band mid-laterally from eye to upper caudal fin base. Most fins pinkish yellow, caudal fin violet, central area yellow. Head scales reach forward to level of posterior nostrils; scales on lower limb of preoperculum. Both lobes of caudal fin produced into long filaments (at least in adults).

P ii, 14-15. L. lat. 51-55.

(voucher: 136 mm SL)



Pentapodus nagasakiensis



Pentapodus porosus



Pentapodus setosus



Pentapodus trivittatus



Pentapodus vitta



Scolopsis affinis



Scolopsis aurata



Scolopsis bilineata



Scolopsis ciliata



Scolopsis margaritifera



Scolopsis lineata

Pentapodus nagasakiensis

Body dusky yellow above, pale or white below; upper lip blue; pearly pale blue or yellow band from snout, through lower part of eye to caudal fin base. Fins pale blue or pink. Head scales reach forward to between eye and posterior nostrils; no scales on lower limb of preoperculum. Eye diameter more than or equal to snout length; body slender, depth 3.9-4.5 in SL. Caudal fin moderately forked. P ii, 13-15. L. lat. 44-47. (voucher: 82 mm SL)

Pentapodus setosus

Back brown; two blue bands across snout; broad dusky orange band mid-laterally from eye to tail base; broad yellow-green band behind eye sloping upward to upper caudal peduncle and ending in a black spot; blue line from yellow band joining a blue line from anal fin in a horizontal "V" behind black spot. Blue line along dorsal fin base; caudal fin pink, filament dusky. Head scales reach forward to between eye and posterior nostrils; no scales on lower limb of preoperculum. Upper caudal fin lobe produced into long filament. P ii, 14-15. L. lat. 46-48. (voucher: 63 mm SL)

Pentapodus vitta

Two broad, blue-edged brown bands along body: first from eyes along back midline to caudal peduncle, second from snout, through eye to upper caudal fin base; lower half of body pinkish white. Fins pale pink or translucent. Head scales reach forward to or before anterior nostrils; no scales on lower limb of preoperculum; caudal fin lobes equal in length. P ii, 14-15. L. lat. 45-50. (voucher: 109 mm SL)

Scolopsis aurata

Body silvery blue, dusky over top of head and back; broad horizontal yellow band from eye to tail base, narrow blue band between eyes. Caudal fin golden yellow, other fins pale yellowish blue. Head scales reach forward to level of front eye margin, front border of scale patch squarish; temporal region scaled and scales on lower limb of preoperculum. P ii, 15-16. L. lat. 46-48. Tr above 4. (voucher: 180 mm SL)

Scolopsis ciliata

Body orange-olive above, silvery grey below; conspicuous short yellow band on back beneath dorsal fin, usually row of yellow spots on sides from pectoral fin to tail base. Fins orange-yellow, upper and lower edges of caudal fin red. Upper external margin of maxilla roughened or denticulate; small forward-directed spine present below eye. P ii, 14-16. L. lat. 41-43. (voucher: 108 mm SL)

Scolopsis margaritifera

Dark olive or bluish above, rosy cream below; 2 pearly bands on snout; centre of each scale with pale spot - pearly-white on back, yellow or orange on sides - forming longitudinal and vertically diagonal lines. Fins dusky yellow, red over lower caudal fin lobe. Head scales reach to or almost to posterior nostrils, temporal region scaled. Body depth 2.4-2.8 in SL. P ii, 14-15. L. lat. 35-39. (voucher: 151 mm SL)

Pentapodus porosus

Three blue bands across snout, spaces between them yellow; 2 yellow bands from eye to upper and lower parts of pectoral fin base; prominent yellow band from eye slants upward on body, ending in black spot on upper caudal peduncle; narrow blue band along dorsal fin base, blue line bordering yellow body band arching in horizontal "V" behind black peduncle spot, continuing towards anal fin. Fins pale blue or yellow. Head scales almost reach to level of posterior nostrils; no scales on lower limb of preoperculum. Body depth 3-3.7 in SL. P ii, 14-15. L. lat. 46-48.

Pentapodus trivittatus

Body olive brown above, silvery white below. Narrow white band along predorsal profile to dorsal fin origin; white band from eye to upper caudal peduncle; white horizontal band from eye to caudal fin base, broadest behind pectoral fin. White band across snout between eyes. Black bar across pectoral fin base; fins translucent. Head scales reach forward to or before front of eye; scales on lower limb of preoperculum. P ii, 13-15. L. lat. 42-46. (voucher: 60 mm SL)

Scolopsis affinis

Top of head and back dusky grey or fawn, lower sides silvery white; broad brown yellow-edged band from snout through eye to tail base; thin bluish white line from upper lip to below eye. Fins pale yellow, dorsal spines and caudal fin margin pale blue. Head scales reaching forward to level of posterior nostrils; temporal region scaled. Scales present on bony opercular ridge and lower limb of preoperculum. P ii, 14-16. L. lat. 43-46. Tr above 4-5. (voucher: 107 mm SL)

Scolopsis bilineata

Body dusky olive above, pearly white below; 2-3 narrow yellow lines from snout and eye to front part of dorsal fin, conspicuous broad white, reddish brown-edged band from mouth to base of soft dorsal fin; pale patch on back below posterior dorsal rays. Spinous dorsal fin yellow or orange, outer anterior half of soft dorsal fin scarlet or black, remainder white; anterior half of anal fin dark red or black, remainder white; outer margins of ventral and caudal fins red. Head scales reach forward to anterior nostrils; small forward directed spine present below eye; pectoral fin reaches opposite anus. Body depth 2.5-3 in SL. P ii, 14-16. L. lat. 43-47.

Scolopsis lineata

Body dark olive-brown above, silvery white below; 3 horizontal pale yellow bands on upper body: along dorsal profile, from top of eye to end of dorsal fin, from operculum to below dorsal fins; in larger fish, white vertical bars are visible between these bands. Fins white or dusky, young fish with white spot anteriorly on dorsal fin, pectoral fin pink. Head scales reach forward to anterior eye margin; snout length less than eye diameter. P ii, 12-15. L. lat. 40-46. Tr above 3. (voucher: 155 mm SL)



Scolopsis monogramma



Scolopsis taenioptera



Scolopsis trilineata



Scolopsis vosmeri

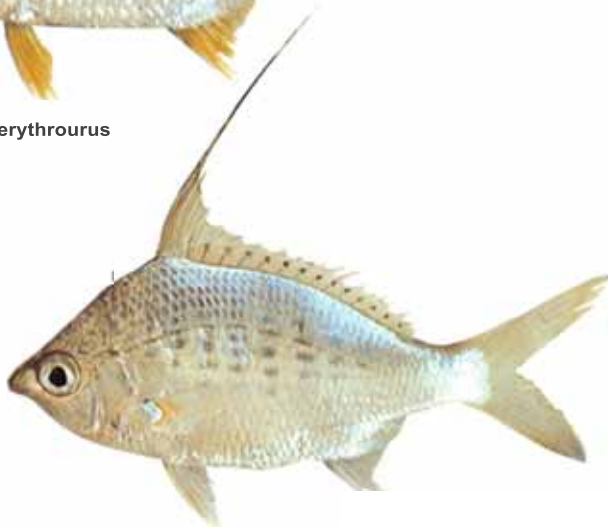
GERREIDAE



Gerres erythrouus



Gerres longirostris



Gerres filamentosus



Gerres oyena



Pentaprion longimanus

Scolopsis monogramma

Body fawn above, white below; thin brown lines on back anteriorly; broad brown and broad yellow horizontal band mid-laterally below lateral line; 3 blue bands on snout between eyes, blue band behind eye on preoperculum, curved blue band from eye to pectoral fin base, yellow interspace between all bands. Brown bar on pectoral fin base. Unpaired fins dark yellow, their edges blue. Head scales reach forward to between front of eyes and posterior nostrils, front border of scale patch curved; temporal region scaled; scales on lower limb of preoperculum.

P ii, 15-17. L. lat 46-49. Tr above 5-6.

Scolopsis trilineata

Body dusky grey or blue above, silvery white below, with pale blue centres on lateral scales. Five pale blue or yellowish white lines from eye over back: first two above eye before dorsal fin, 3rd curving to nape, along back to beneath dorsal fin, 4th broader, curving up to end of dorsal fin, 5th above pectoral fin, joining 4th band at about level of lateral line; 3 bluish white bands on snout. Fins pale blue or grey. Head scales reach forward to above eyes; snout length about equal to eye diameter.

P ii, 13-14. L. lat. 41-44.

(voucher: 77 mm SL)

Scolopsis taenioptera

Body dusky olive or yellow above, white below; blue and yellow lines on scale rows run obliquely on sides, horizontally on caudal peduncle; blue band across snout, another from upper lip to lower edge of eye; a scarlet and a white spot on upper pectoral fin base. Fins yellow; blue band along mid-height of dorsal fin, caudal fin with blue spot at upper base, bright yellow tip to upper fin lobe. Head scales reach forward to between front eye margin and posterior nostrils; no scales on lower limb of preoperculum.

P ii, 15-16. L. lat. 45-48.

(voucher: 150 mm SL)

Scolopsis vosmeri

Body either brownish and tinged red, or violet, or dark olive brown; broad vertical white bar across nape and operculum; usually horizontal white band below lateral line from head ending about opposite mid-dorsal fin; dark spots on scales on back and sides; operculum membrane crimson or scarlet. Fins grey or orange, edges often red. Pectoral fins not reaching to level of anus. Head scales reaching to anterior nostrils; small forward-directed spine present below eye.

P ii, 15-17. L. lat. 39-45.

(voucher: 124 mm SL)

GERREIDAE

Mojarras; Silver biddies - Kapas

Silvery, small fishes; body oblong and compressed. Mouth can be extended into a downward-pointed tube. Scales large, thin and easily lost, covering head and body and forming a sheath along dorsal and anal fin bases. A single continuous dorsal fin of 9 spines and 10 rays; dorsal and anal fin spines weak. Pectoral fin long and pointed; a long scale-like process in axil of ventral fin. Caudal fin deeply forked.

Eight genera, members of two collected on the Survey. They are distinguished as follows:

Pentaprion - A V-VI, 12-13; ***Gerres*** - A II-IV, 7-10

REFERENCES: Chakraborty, Venugopal, Hidaka & Iwatsuki, 2006; Iwatsuki, Kimura, Kishimoto & Yoshino, 1996; Iwatsuki, Kimura & Yoshino, 1999a; Iwatsuki, Kimura & Yoshino 1999b; Iwatsuki, Kimura, Yoshino & Schaefer, 2001; Woodland, 2001a;

Gerres erythrourus

Predorsal scales 17-20, not extending to nostril level. Body deep, 2-2.2 in SL. Pectoral fin reaches anal fin origin or further; 2nd dorsal fin spine longer than HL without snout; second anal fin spine robust and strong. Body silvery, dark spots on scales forming longitudinal lines along body; dorsal fin black-edged and with row of black spots at mid-height of fin; ventral fin yellow; anal fin and lower lobe of caudal fin tipped white.

D IX, 10. A III, 7. L. lat 32-38 (to caudal fin base). Tr 6-6.5 +9.5-11.5

(voucher: 73 mm SL)

Gerres filamentosus

Predorsal scales 13-22, not extending to nostril level. Second dorsal fin spine produced into a filament, its length about equal to body depth. Body depth 2-2.8 in SL. Pectoral fin reaches anal fin origin or farther. Seven to 8 vertical bars of brown blotches or checks over sides; a row of brown checks along mid-dorsal fin and second dorsal fin spine dark brown.

D IX, 10. A III, 7-9. L. lat. 43-46 to caudal fin base. Tr 5-5.5 above.

(voucher: 111 mm SL)

Gerres longirostris

Predorsal scales 22-24, not extending to nostril level. Body slender, 2.1-2.3 in SL. Pectoral fin reaches anal fin origin or further; 2nd dorsal fin spine shorter than HL without snout; 2nd anal fin spine robust and strong. Caudal fin deeply forked. Dusky above, silvery white below; sometimes up to ten dusky bars along upper body; dorsal fin margined in black; dorsal and caudal fins dusky yellow, a broad dark posterior margin to caudal fin.

D IX, 10. A III, 7. L. lat 43-46 (to caudal fin base).

(voucher: 240 mm SL)

Gerres oyena

Predorsal scales 15-20, not extending to nostril level. Body slender, 3-3.3 in SL. Pectoral fin barely reaches anal fin origin. Body silvery white, dusky above; spinous dorsal fin margin black, and row of dusky checks along base of dorsal fin; ventral and anal fins yellow.

D IX, 10. A III, 7-9. 37-40. L. lat. 37-40 to caudal base. Tr above 3-4.

(vouchers: 147 and mm SL)

Pentaprion longimanus

Body silvery, pale pink or grey when scales lost. Body soft and flabby; anal fin base longer than soft dorsal fin base. Body depth 2.6-2.8 in SL. Silvery white with a silver stripe from snout, through eye to tail base; fins dusky yellow.

D IX-X, 12-15. A V-VI, 12-14. L. lat. 44-46 to caudal fin base.

(voucher: 86 mm SL)

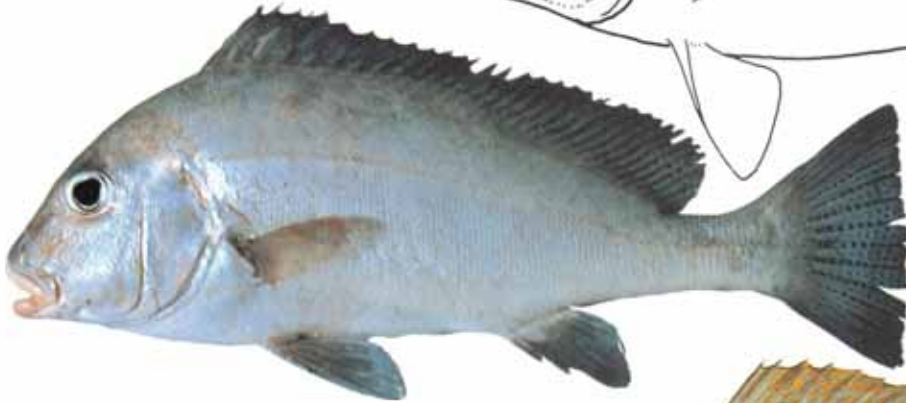
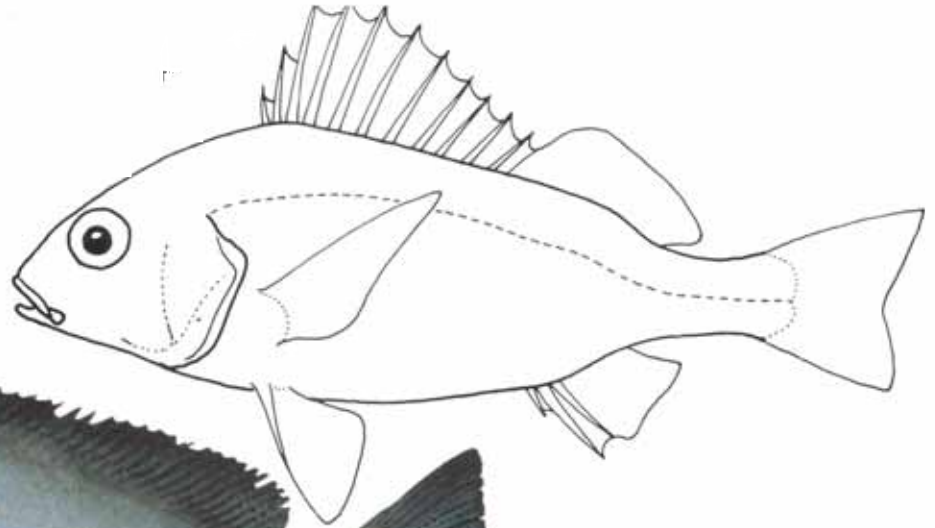
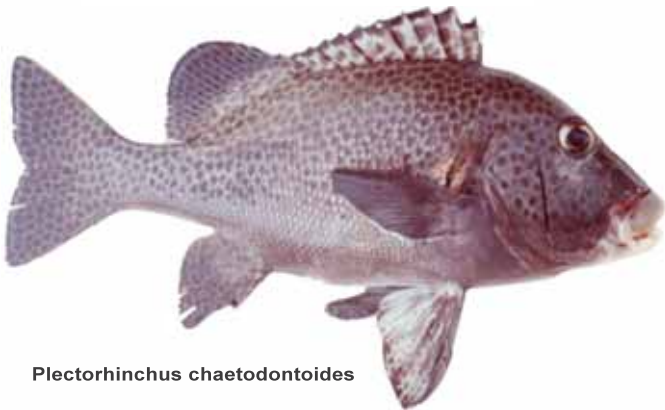


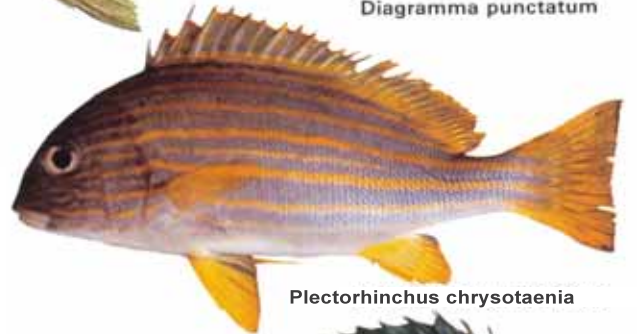
Diagramma pictum



Diagramma punctatum



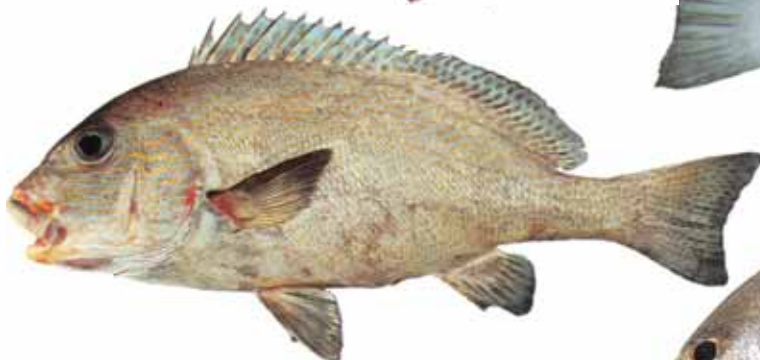
Plectorhinchus chaetodontoides



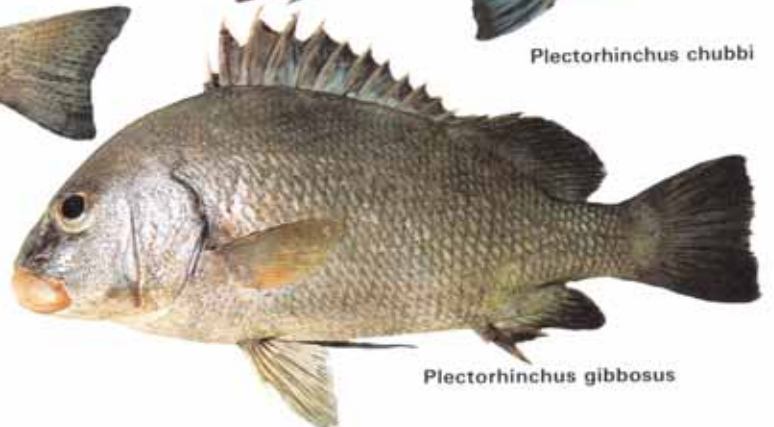
Plectorhinchus chrysotaenia



Plectorhinchus chubbi



Plectorhinchus flavomaculatus



Plectorhinchus gibbosus