

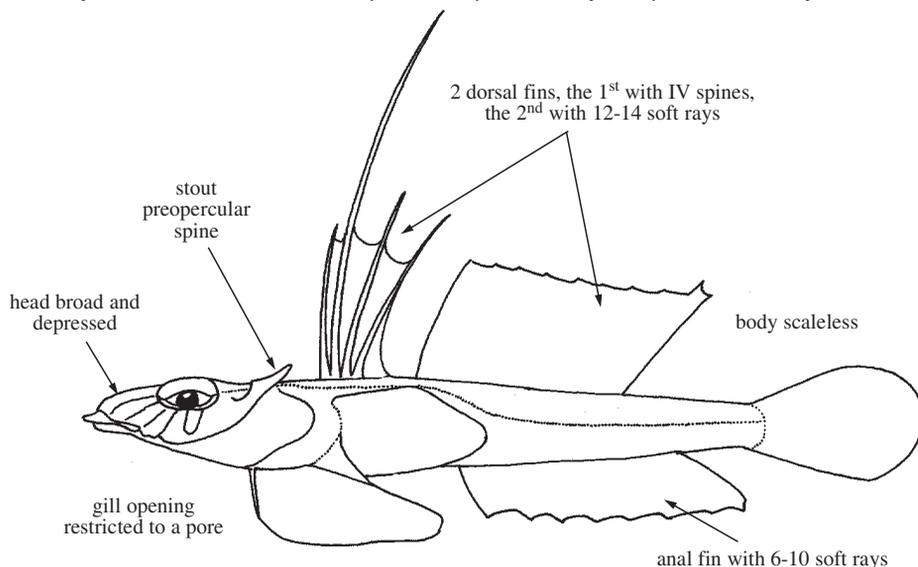
Suborder CALLIONYMOIDEI

CALLIONYMIDAE

Dragonets

by R. Fricke

Diagnostic characters: Small to medium-sized (to 45 cm) fishes; body elongate, moderately depressed. **Body scaleless.** **Head usually broad and depressed.** **Eyes moderate to large, directed dorsally.** Upper jaw protrusible. Rows of very small, villiform teeth usually restricted to jaws. **Preopercle armed with a stout spine** but opercle and subopercle spineless. **Gill opening restricted to a small dorsal or sublateral pore.** Lateral line consisting of pores. **Spinous and soft dorsal fins separate,** consisting of IV (rarely III or V) flexible spines and **7 to 10 segmented soft rays** (last divided at base). **Anal fin spineless, with 6 to 10 soft rays** (last divided at base). **Pelvic fins jugular in position, widely separated from each other,** each with I spine and 5 soft rays. **Colour:** ranging from more or less uniform sand to conspicuously marked with colourful stripes and spots; nearly all species sexually dichromic.

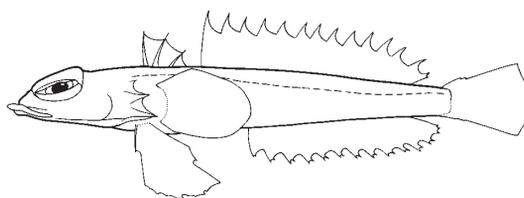


Habitat, biology, and fisheries: Benthic, found on sandy or muddy substrates, among seagrass, or in coral reefs. Dragonets live from intertidal pools and the surf zone to depths of about 800 m. They spawn in pairs, usually at sunset, ascending into the water column about 0.7 to 1 m above the bottom. Eggs and larvae pelagic. Many species are taken as bycatch in bottom trawls (e.g. prawn trawls), but a few species are commercially used for production of fish meal, or are marketed fresh.

Similar families occurring in the area

Draconettidae: preopercle spineless, but 1 simple spine present on both opercle and subopercle; gill opening not reduced to a pore, but developed as a slit opposite to pectoral-fin base; soft dorsal-fin rays 12 to 14 (7 to 10 in Callionymidae); lateral line consisting of a broad channel.

Other superficially similar families: none has the following combination of characters: naked body, widely separated pelvic fins, a stout preopercular spine, and III to V flexible spines in the first dorsal fin.



Draconettidae

Key to species of interest to fisheries occurring in the area

- 1a. Opercle with a free flap of skin → 2
- 1b. Opercle without a free flap of skin → 3

- 2a. Body with lateral fold of skin below lateral line; interorbital distance less than 1/3 of eye diameter (Fig. 1) *Diplogrammus goramensis*
- 2b. Body without lateral fold of skin below lateral line; interorbital distance more than eye diameter (Fig. 2) *Eleutherochir opercularis*

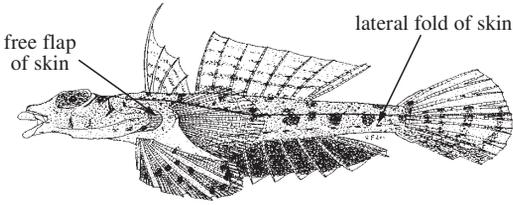


Fig. 1 *Diplogrammus*

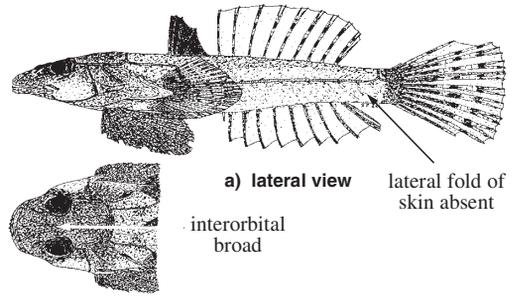


Fig. 2 *Eleutherochir opercularis*

- 3a. Sides of body with a number of small dermal cirri; a pair of cirri on dorsoposterior edge of eye; a few small teeth on jaws (Fig. 3) *Anaora tentaculata*
- 3b. Sides of body without small dermal cirri; no cirri on the dorsoposterior edge of eye; many small villiform teeth in bands on jaws. → 4
- 4a. Pelvic fins with 4 soft rays, plus 1 soft ray elongate and separated from rest of fin (Fig. 4) *Dactylopus dactylopus*
- 4b. Pelvic fins with 5 soft rays, the first soft ray not elongate and not separated from rest of fin → 5

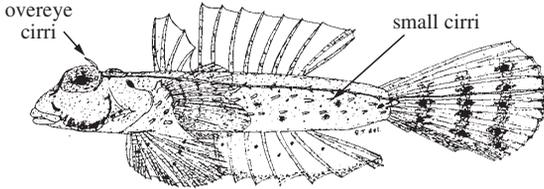


Fig. 3 *Anaora tentaculata*

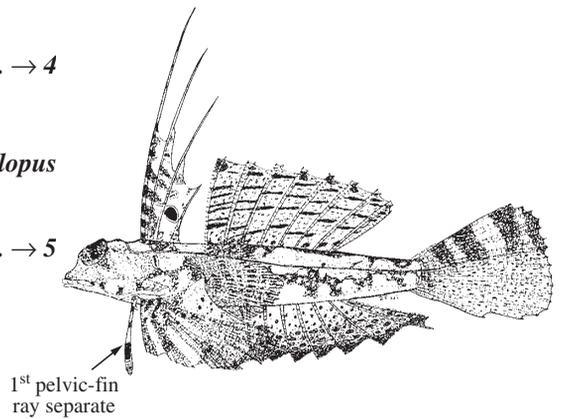


Fig. 4 *Dactylopus dactylopus*

- 5a. Rays of second dorsal fin unbranched except for the last, which is divided to its base; gill opening dorsal in position; snout equal to, or longer than, eye diameter (Fig. 5) (*Callionymus*) → 7
- 5b. Rays of second dorsal fin branched (the last divided to its base); gill opening sublateral; snout shorter than eye diameter (Fig. 6) (*Synchiropus*) → 6

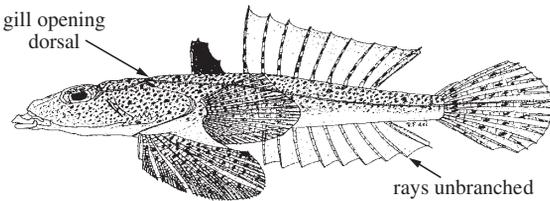


Fig. 5 *Callionymus*

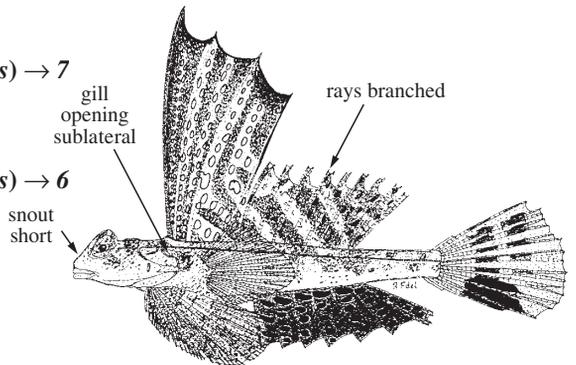


Fig. 6 *Synchiropus*

- 6a. Preopercular spine with a dorsal point additionally to main tip, but without an antrorse spine at its base; first dorsal fin not much higher than second dorsal fin; caudal fin in males with 5 or 6 median filaments *Synchiropus calauropomus*
- 6b. Preopercular spine with 4 to 11 small antrorse serrae on its dorsal margin and an antrorse spine at its base; first dorsal fin at least twice as high as second dorsal fin; caudal fin in males without filaments *Synchiropus rameus*
- 7a. Dorsal margin of preopercular spine with small antrorse serrae; main tip usually straight, not upcurved (Fig. 7a) *Callionymus (Calliurichthys)* → 8
- 7b. Dorsal margin of preopercular spine with large curved points; main tip usually upcurved (Fig. 7b) *Callionymus (Callionymus)* → 11
- 8a. Anal fin with 7 rays (the last divided to its base); base of first dorsal fin 0.8 to 0.9 times in head length *Callionymus grossi*
- 8b. Anal fin with 8 or 9 rays (the last divided to its base); base of first dorsal fin 1.4 to 1.9 times in head length → 9
- 9a. Anal fin with 8 rays (the last divided to its base) *Callionymus japonicus*
- 9b. Anal fin with 9 rays (the last divided to its base) → 10
- 10a. Ventral margin of preopercular spine concave (Fig. 7c) *Callionymus belcheri*
- 10b. Ventral margin of preopercular spine convex (Fig. 7d) *Callionymus filamentosus*

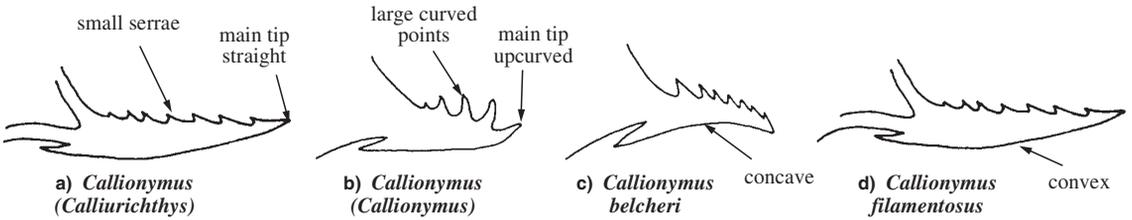


Fig. 7 preopercular spine

- 11a. Preopercular spine with 1 dorsal point (additionally to main tip) → 12
- 11b. Preopercular spine with 2 or more dorsal points (additionally to main tip). → 14
- 12a. First dorsal fin without filaments or with first spine filamentous only (Fig. 8a) *Callionymus meridionalis*
- 12b. First dorsal fin with first and second spines filamentous, third and fourth spines occasionally with short filaments (Fig. 8b) → 13

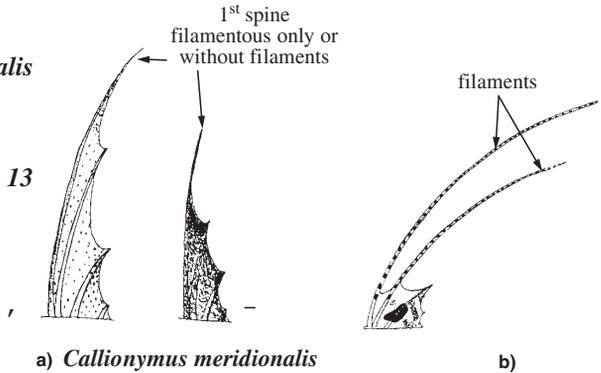


Fig. 8 first dorsal fin

- 13a.** Occipital region with 2 small bony ridges and a smaller median bony protuberance covered by skin; no granular rugosities in occipital region; males without a black blotch on third spine of first dorsal fin (Fig. 9) *Callionymus sublaevis*
- 13b.** Occipital region without bony ridges or protuberances, but with numerous small granular rugosities; males with a black spot on third spine of first dorsal fin (Fig. 10) . . . *Callionymus limiceps*

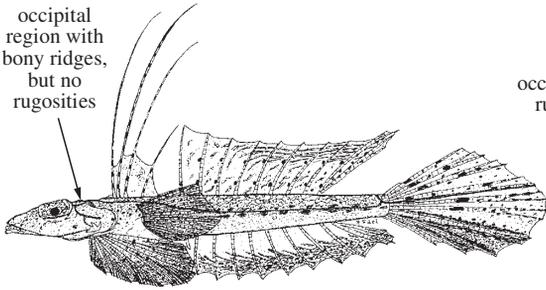


Fig. 9 *Callionymus sublaevis*

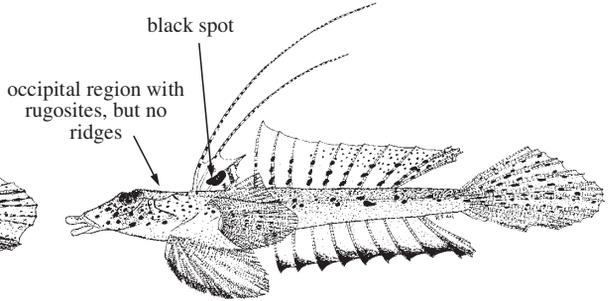


Fig. 10 *Callionymus limiceps*

- 14a.** First and second spine of first dorsal fin with filaments of equal length, at least 2 times longer than first ray of second dorsal fin; third and fourth spines of first dorsal fin not filamentous (Fig. 11) *Callionymus sublaevis* (female)
- 14b.** First dorsal fin without filaments or only first spine filamentous (Fig. 12) → 15

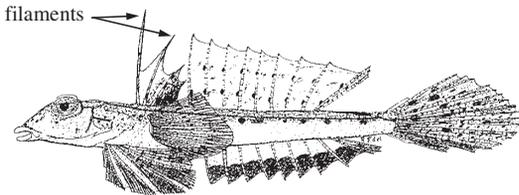


Fig. 11 *Callionymus sublaevis*

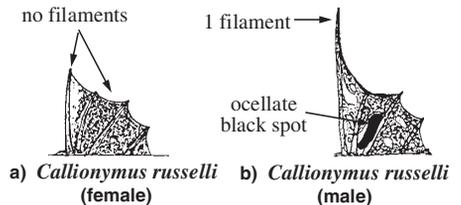


Fig. 12 first dorsal fin

- 15a.** Second dorsal fin with X spines (the last divided to its base) → 16
- 15b.** Second dorsal fin with VII to IX spines (the last divided to its base) → 19
- 16a.** First spine of first dorsal fin not filamentous (Fig. 12a) *Callionymus russelli* (female)
- 16b.** First spine of first dorsal fin filamentous (Fig. 12b). → 17
- 17a.** First dorsal fin with an ocellate black blotch (Fig. 12b) *Callionymus russelli* (male)
- 17b.** First dorsal fin without an ocellate black blotch. → 18

- 18a.** First dorsal fin higher than second dorsal fin; first spine of first dorsal fin longer than second spine; anal fin dusky; second dorsal fin with white bands (Fig. 13) *Callionymus melanopterus*

- 18b.** First dorsal fin lower than second dorsal fin; first spine of first dorsal fin shorter than second spine; anal fin pale; second dorsal fin without white bands (Fig. 14) . *Callionymus fluviatilis*

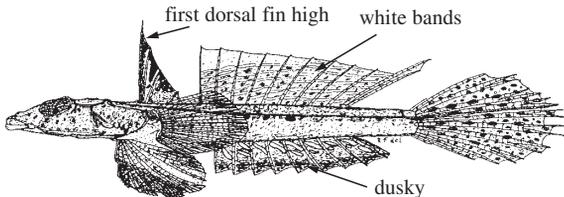


Fig. 13 *Callionymus melanopterus*

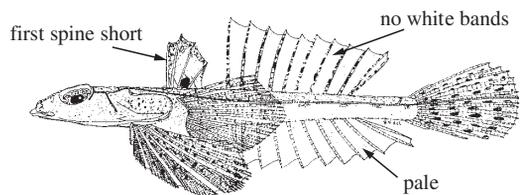


Fig. 14 *Callionymus fluviatilis*

- 19a. Preopercular spine with 2 dorsal tips (additionally to main tip) (Fig. 15a) → 20
- 19b. Preopercular spine with 3 to 5 dorsal tips (additionally to main tip) (Fig. 15b) → 27
- 20a. First dorsal fin with an ocellate black blotch (Fig. 12b) *Callionymus russelli* (male)
- 20b. First dorsal fin without an ocellate black blotch → 21
- 21a. First dorsal fin black or with large dark areas → 22
- 21b. First dorsal fin translucent (occasionally with small dark spots) → 26
- 22a. First membrane of first dorsal fin translucent → 23
- 22b. First membrane of first dorsal fin (at least in large part) blackish → 25
- 23a. Caudal fin elongate, distally dark (Fig. 16) *Callionymus russelli* (female)
- 23b. Caudal fin not elongate, distally light → 24

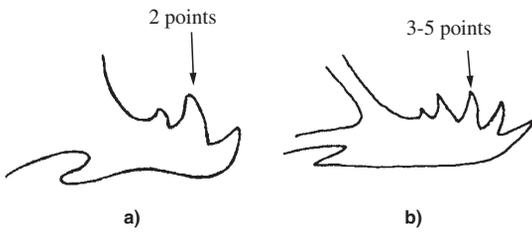


Fig. 15 preopercular spine

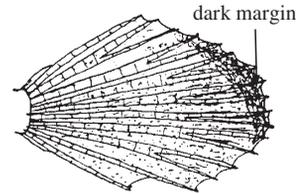


Fig. 16 *Callionymus russelli* (female)

- 24a. First and second spines of first dorsal fin with filaments (Fig. 17) . . *Callionymus sublaevis* (female)
- 24b. First dorsal fin without filaments *Callionymus sagitta*
- 25a. First spine of first dorsal fin at least 1.5 times longer than first ray of second dorsal fin (Fig. 18) *Callionymus meridionalis* (female)
- 25b. First spine of first dorsal fin shorter than first ray of second dorsal fin *Callionymus sagitta*

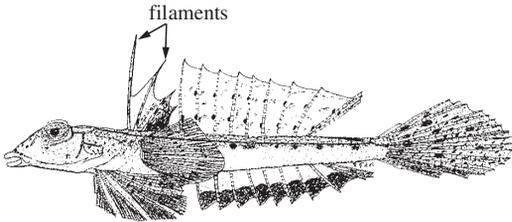


Fig. 17 *Callionymus sublaevis* (female)

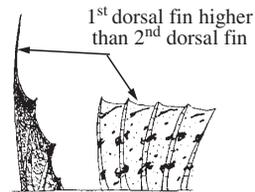


Fig. 18 *Callionymus meridionalis* (female)

- 26a. Second and third spines of first dorsal fin filamentous (first and fourth spines may be filamentous) (Fig. 19) *Callionymus sublaevis* (male)
- 26b. Second and third spines of first dorsal fin not filamentous (first spine filamentous) *Callionymus meridionalis*

- 27a. Anal fin with 8 rays (the last divided at its base) → 28
- 27b. Anal fin with 9 or 10 soft rays (the last divided at its base) → 30

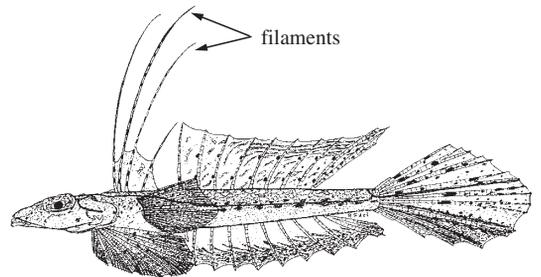


Fig. 19 *Callionymus sublaevis* (male)

- 28a. First spine of first dorsal fin filamentous (Fig. 20) *Callionymus russelli* (male)
- 28b. First spine of first dorsal fin not filamentous (Fig. 21) → 29

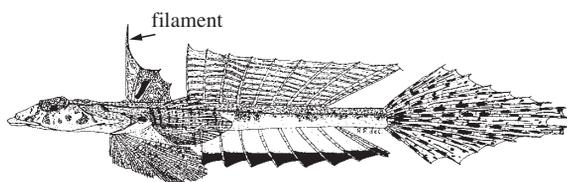


Fig. 20 *Callionymus russelli* (male)

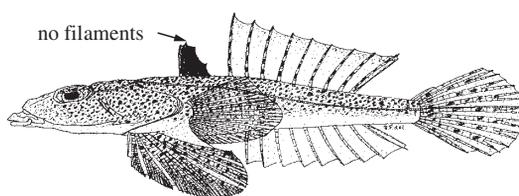


Fig. 21 *Callionymus sagitta*

- 29a. First dorsal fin plain black *Callionymus sagitta*
(northern Indonesia)
- 29b. First dorsal fin dusky, first membrane whitish *Callionymus russelli* (female)
(Australia and New Guinea)
- 30a. Second spine of first dorsal fin filamentous *Callionymus octostigmatus* (male)
- 30b. Second spine of first dorsal fin not filamentous → 31
- 31a. First spine of first dorsal fin filamentous *Callionymus russelli* (male)
- 31b. First spine of first dorsal fin not filamentous → 32
- 32a. First dorsal fin pale or translucent, occasionally with blackish spots
. *Callionymus octostigmatus* (female)
- 32b. First dorsal fin black or with large blackish areas → 33
- 33a. Caudal fin distally elongate, blackish *Callionymus russelli* (female)
(Australia and New Guinea)
- 33b. Caudal fin not elongate, distally not blackish *Callionymus sagitta*
(northern Indonesia)

List of species occurring in the area

The symbol is given when species accounts are included.

- Anaora tentaculata* Gray, 1835
- Callionymus acutirostris* Fricke, 1981
- Callionymus amboina* Suwardji, 1965
- Callionymus annulatus* Weber, 1913
- Callionymus belcheri* Richardson, 1844
- Callionymus bleekeri* Fricke, 1983
- Callionymus brevianalis* Fricke, 1983
- Callionymus colini* Fricke, 1993
- Callionymus delicatulus* Smith, 1963
- Callionymus doryssus* (Jordan and Fowler, 1903)
- Callionymus enneactis* Bleeker, 1879
- Callionymus filamentosus* Valenciennes, 1837
- Callionymus fluviatilis* Day, 1875
- Callionymus grossi* Ogilby, 1910
- Callionymus guentheri* Fricke, 1981
- Callionymus hainanensis* Li, 1966
- Callionymus hildae* Fricke, 1981
- Callionymus hindsi* Richardson, 1844
- Callionymus japonicus* Houttuyn, 1782
- Callionymus kaianus* Günther, 1880
- Callionymus keeleyi* Fowler, 1941

- Callionymus leucobranchialis* Fowler, 1941
 ➤ *Callionymus limiceps* Ogilby, 1908
Callionymus luridus Fricke, 1981
Callionymus macclesfieldensis Fricke, 1983
Callionymus macdonaldi Ogilby, 1911
 ➤ *Callionymus melanopterus* Bleeker, 1851
 ➤ *Callionymus meridionalis* Suwardji, 1965
Callionymus moretonensis Johnson, 1971
Callionymus mortenseni Suwardji, 1965
Callionymus neptunius (Seale, 1910)
Callionymus obscurus Fricke, 1989
 ➤ *Callionymus octostigmatus* Fricke, 1981
Callionymus platycephalus Fricke, 1983
Callionymus pleurostictus Fricke, 1982
Callionymus rivatoni Fricke, 1993
 ➤ *Callionymus russelli* Johnson, 1976
 ➤ *Callionymus sagitta* Pallas, 1770
Callionymus scabriceps Fowler, 1941
Callionymus schaapi Bleeker, 1852
Callionymus semeiophor Fricke, 1983
Callionymus simplicicornis Valenciennes, 1837
Callionymus sphynx Fricke and Hecke, 1984
 ➤ *Callionymus sublaevis* McCulloch, 1926
Callionymus superbus Fricke, 1983
Callionymus tethys Fricke, 1993
Callionymus umbrithorax Fowler, 1941
Callionymus whiteheadi Fricke, 1981
 ➤ *Dactylopus dactylopus* (Bennett in Valenciennes, 1837)
Diplogrammus goramensis (Bleeker, 1858)
 ➤ *Eleutherochir opercularis* (Valenciennes, 1837)
Synchiropus altivelis (Temminck and Schlegel, 1845)
Synchiropus australis (Nakabo and McKay, 1989)
Synchiropus bartelsi Fricke, 1981
 ➤ *Synchiropus calauropomus* (Richardson, 1844)
Synchiropus circularis Fricke, 1984
Synchiropus claudiae Fricke, 1990
Synchiropus delandi Fowler, 1943
Synchiropus grinnelli Fowler, 1941
Synchiropus kiyoeae Fricke and Zaiser, 1983
Synchiropus kuiteri Fricke, 1992
Synchiropus laddi Schultz, 1960
Synchiropus lateralis (Richardson, 1844)
Synchiropus lineolatus (Valenciennes, 1837)
Synchiropus morrisoni Schultz, 1960
Synchiropus moyeri Zaiser and Fricke, 1985
Synchiropus novaecaledoniae Fricke, 1993
Synchiropus ocellatus (Pallas, 1770)
Synchiropus picturatus (Peters, 1876)
 ➤ *Synchiropus rameus* (McCulloch, 1926)
Synchiropus splendidus (Herre, 1927)
Synchiropus springeri Fricke, 1983
Synchiropus zamboanganus Seale, 1910

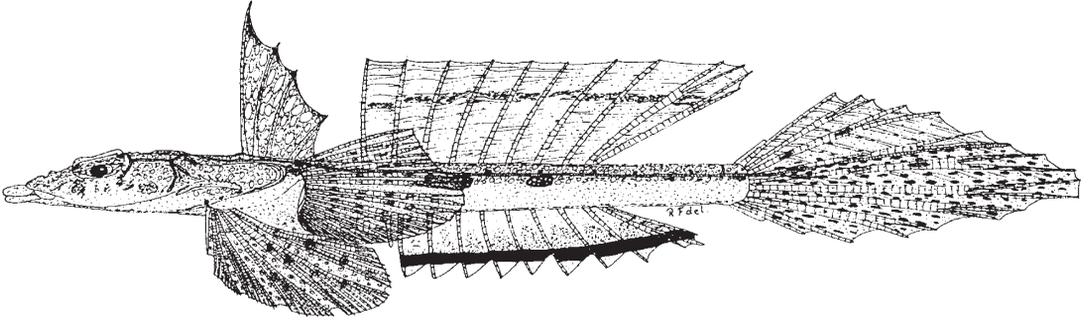
References

- Fricke, R. 1983. Revision of the Indo-Pacific genera and species of the dragonet family Callionymidae (Teleostei). Theses Zoologicae 3. Braunschweig, J. Cramer, 774 p.
- Fricke, R. 1993. Pisces Teleostei: Callionymidae of New Caledonia with descriptions of new species. *Mem. Mus. Natl. Hist. Nat.*, 158:361-376.

Callionymus belcheri Richardson, 1844

Frequent synonyms / misidentifications: *Callionymus recurvispinnis* (Li, 1966); *Calliurichthys belcheri* (Richardson, 1844) / None.

FAO names: En - Flathead dragonet; Fr - Dragonnet à tête plate; Sp - Lagarto aplanado.



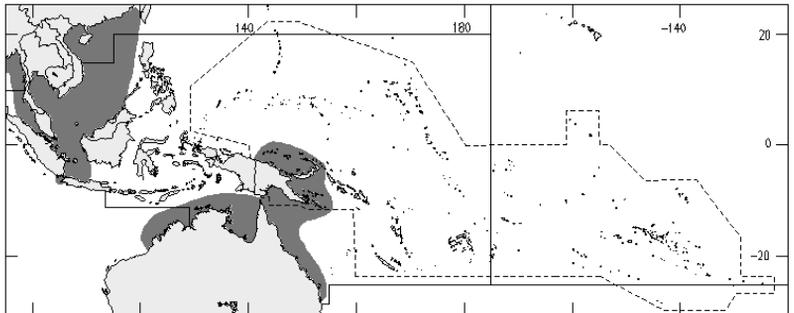
(from Fricke, 1983)

Diagnostic characters: Body elongate, depressed. **Head extremely depressed, its length 3.9 to 4.6 times in standard length.** Eye diameter 2.4 to 3.1 times in head length (measured to gill opening). **Preopercular spine long, ventral margin concave, with 3 to 9 antrorse serrae on its dorsal margin, a straight or downcurved main tip,** and a strong antrorse point at its base. First dorsal fin with IV spines, without filaments. **Second dorsal fin with 9 unbranched soft rays** (the last divided to its base). **Anal fin with 8 (rarely 9) unbranched soft rays** (the last divided to its base). **Caudal fin symmetrical,** often elongate in males. Lateral line reaching from hind margin of eye to end of third branched caudal-fin ray, with 2 ventral branches in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle. **Colour:** head and body yellowish to brown; back with many small white spots; sides of body with white blotches surrounded with dark brown; belly whitish; first dorsal fin brownish, distal margin often blackish, in males with white spots; second dorsal fin with light and dark streaks or small white spots; anal fin in males with a dark streak, in females colourless or with distal dark spots; lower two-thirds of caudal fin spotted with brown.

Size: Maximum total length 13 cm, commonly to 11 cm.

Habitat, biology, and fisheries: Benthic, common on sand bottoms at depths of 4 to 37 m. Feeds on small bottom organisms (crustaceans and worms). Caught as bycatch by prawn trawlers. Used for fish meal production; occasionally marketed fresh (Thailand, Malaysia, Singapore, Indonesia).

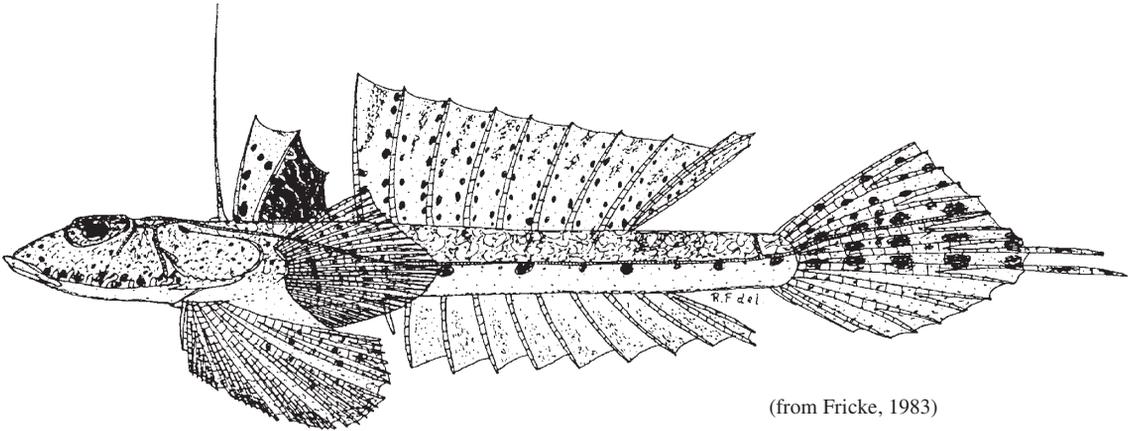
Distribution: Two subspecies; *Callionymus belcheri belcheri* around the northern half of Australia and New Guinea, *Callionymus belcheri recurvispinnis* from India to China, Thailand, and northern Indonesia.



Callionymus filamentosus Valenciennes, 1837

Frequent synonyms / misidentifications: *Callionymus brunneus* Fowler, 1941; *C. haifae* Fowler and Steinitz, 1956; *C. longi* Fowler, 1941; *C. punctilateralis* Fowler, 1941; *C. stigmatipteron* Smith, 1963; *Calliurichthys filamentosus* (Valenciennes, 1837) / None.

FAO names: En - Filamentous dragonet; Fr - Dragonnet à filaments; Sp - Lagarto filamentoso.



(from Fricke, 1983)

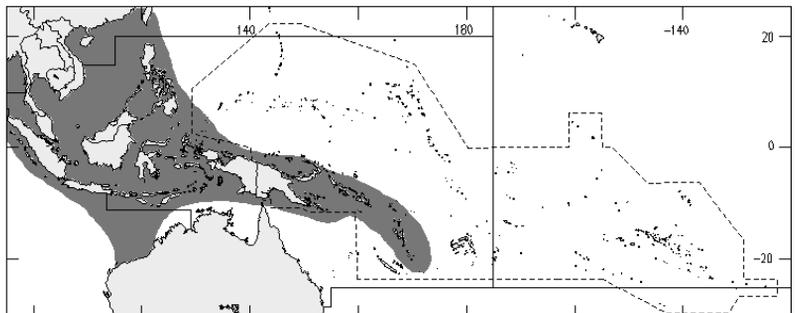
Diagnostic characters: Body elongate, depressed. **Head depressed, its length 4 to 4.9 times in standard length.** Eye diameter 2.2 to 2.8 times in head length (measured to gill opening). **Preopercular spine long, ventral margin convex, with 4 to 9 antrorse serrae on its dorsal margin, a strong main tip,** and a strong, straight antrorse point at its base. First dorsal fin with IV spines, without filaments in females; first spine separate in males, with a long filament (see figure). **Second dorsal fin with 9 unbranched soft rays** (the last divided to its base). **Anal fin with 9 unbranched soft rays** (the last divided to its base). **Caudal fin symmetrical,** with 2 median filaments in males. Lateral line reaching from hind margin of eye to end of third branched caudal-fin ray, with 2 long ventral branches in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle.

Colour: body whitish or brown, dorsally with many small whitish and/or dark brown spots; sides with a row of dark spots; ventral sides silvery white; first dorsal fin distally blackish, or with a black blotch on third membrane; second dorsal fin, caudal fin, pectoral and pelvic fins spotted with brown; anal fin white.

Size: Maximum total length 15 cm, commonly to 11 cm.

Habitat, biology, and fisheries: Benthic, common on sand bottoms from the shore to depths of 100 m. Feeds on small bottom organisms (crustaceans, worms, and snails). Present fishing grounds Thailand, Indonesia, and Philippines. Caught by trawl or seine fisheries. Used for fish meal production; often marketed fresh (Thailand, Indonesia, Philippines).

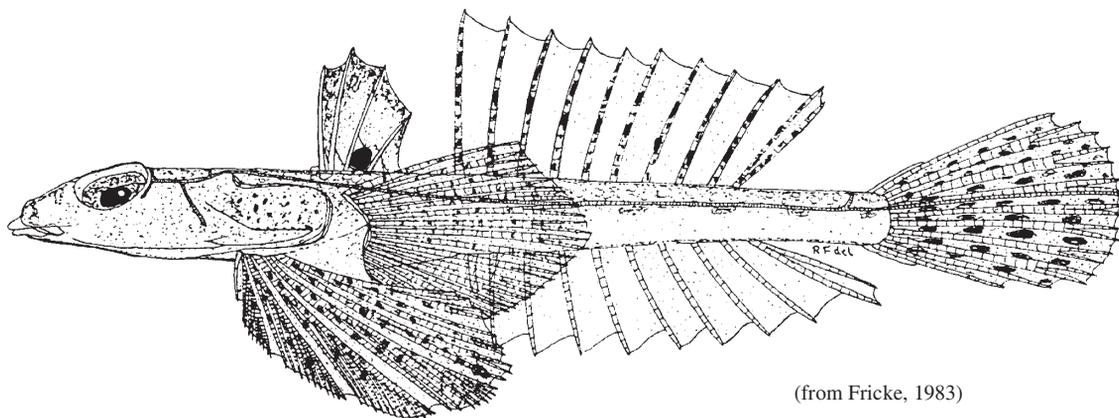
Distribution: Red Sea, East and South Africa to Taiwan Province of China, northwestern Australia, and Vanuatu; immigrated through Suez Canal into eastern Mediterranean.



Callionymus fluviatilis Day, 1875

Frequent synonyms / misidentifications: *Repomucenus fluviatilis* (Day, 1875) / None.

FAO names: En - River dragonet; Fr - Dragonnet de rivière; Sp - Lagarto fluvial.



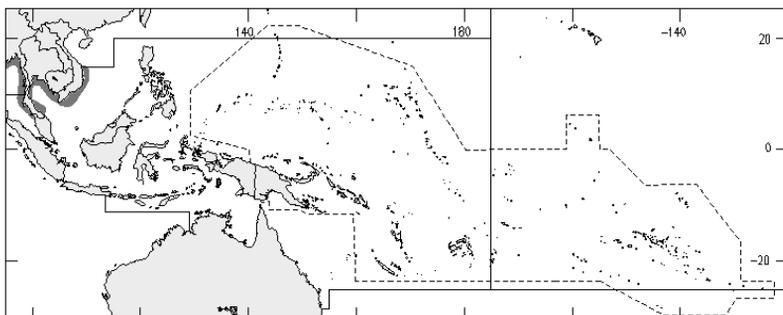
(from Fricke, 1983)

Diagnostic characters: Body elongate, depressed. **Head depressed, its length 3.7 to 4.1 times in standard length.** Eye diameter 2.8 to 3.2 times in head length (measured to gill opening). **Preopercular spine relatively long, ventral margin smooth or slightly convex, with 2 to 6 curved points on its dorsal margin, a short slightly upcurved main tip, and a strong antrorse point at its base.** First dorsal fin with IV spines, without filaments. **Second dorsal fin with 10 unbranched soft rays** (the last divided to its base). **Anal fin with 9 unbranched soft rays** (the last divided to its base). Caudal fin distally convex, not elongate. Lateral line reaching from hind margin of eye to end of third branched caudal-fin ray, with 2 short ventral branches in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle. **Colour:** sandy yellow, ventrally lighter; first dorsal fin with a black blotch basally on third membrane; second dorsal fin, caudal fin, pectoral and pelvic fins spotted with brown; anal fin white.

Size: Maximum total length 10 cm, commonly to 9 cm.

Habitat, biology, and fisheries: Benthic, common in lower reaches of rivers and estuaries, on sand and mud bottom. Feeds on small bottom organisms. Caught by seine fisheries and in fish traps. Marketed fresh in Viet Nam and Thailand.

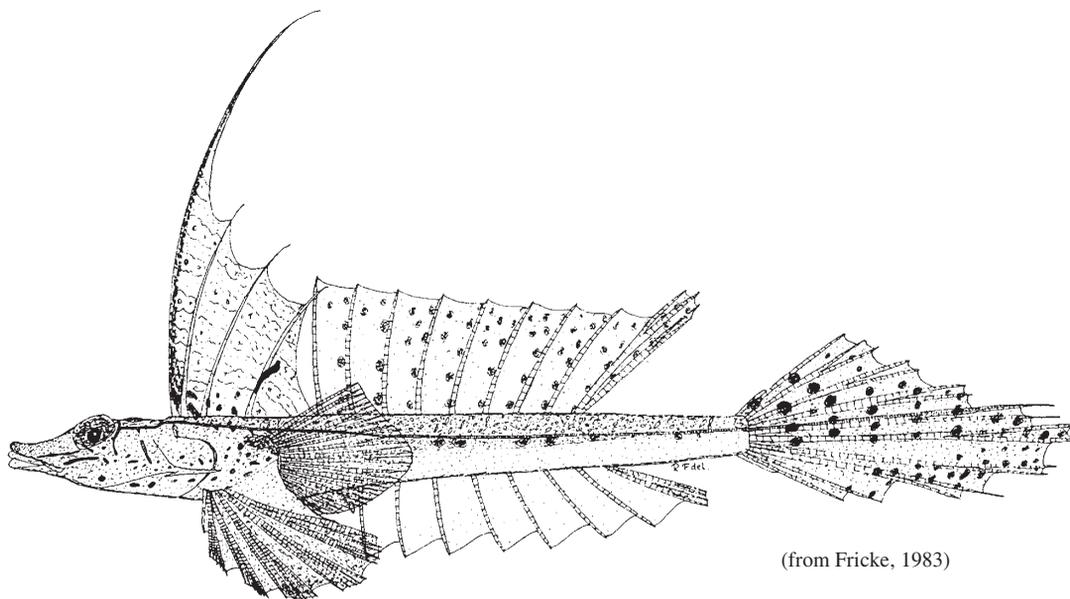
Distribution: India to Thailand and Viet Nam. Vietnamese populations may represent a separate species.



***Callionymus grossi* Ogilby, 1910**

Frequent synonyms / misidentifications: *Callionymus nasutus* McCulloch, 1926; *Calliurichthys grossi* (Ogilby, 1910) / None.

FAO names: **En** - Gross's dragonet; **Fr** - Dragonnet de Gross; **Sp** - Lagarto de Gross.



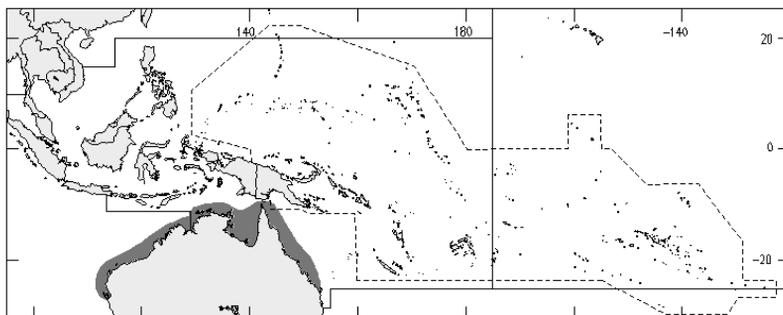
(from Fricke, 1983)

Diagnostic characters: Body elongate, depressed. **Head depressed, its length 4 to 5 times in standard length.** Eye diameter 2.6 to 3.3 times in head length (measured to gill opening). **Preopercular spine long and slender, with 7 to 18 small antrorse serrae at its dorsal margin, a straight main tip, and a strong antrorse point at its base.** First dorsal fin with IV spines, very large in both sexes, with a characteristic shape. First dorsal-fin base length 0.8 to 0.9 times in head length. **Second dorsal fin with 9 unbranched soft rays** (the last divided to its base). **Anal fin with 8 (rarely 7) unbranched soft rays** (the last divided to its base). **Caudal fin asymmetrical**, lower rays longer than upper rays. Lateral line reaching from hind margin of eye to end of third or fourth branched caudal-fin ray; lateral lines of opposite sides interconnected by a transverse branch across occipital region. **Colour:** ground coloration dark brown or grey, ventral parts of body yellowish; sides of body with a row of dark blotches; first dorsal fin light, anterior margin dusky, with 3 to 5 oblique white dark-edged stripes consisting of spots and lines; second dorsal fin, caudal fin, pectoral and pelvic fins with darkish spots; anal fin colourless.

Size: Maximum total length 25 cm, commonly to 17 cm.

Habitat, biology, and fisheries: Benthic, common on sand bottoms of shallow coastal areas. Feeds on small bottom organisms (crustaceans, worms, and snails). Caught as bycatch by prawn trawlers. Used for fish meal production; rarely marketed (as bait).

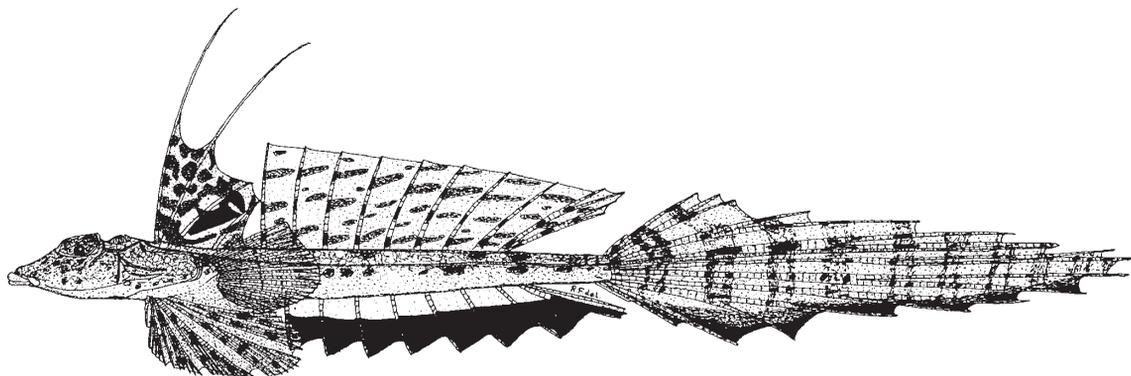
Distribution: Northern half of Australia, from Moreton Bay (southern Queensland) to Exmouth Gulf and Shark Bay (Western Australia).



Callionymus japonicus Houttuyn, 1782

Frequent synonyms / misidentifications: *Callionymus longicaudatus* Temminck and Schlegel, 1845; *Calliurichthys japonicus* (Houttuyn, 1782) / None.

FAO names: **En** - Longtailed dragonet; **Fr** - Dragonnet à queue longue; **Sp** - Lagarto de cola larga.



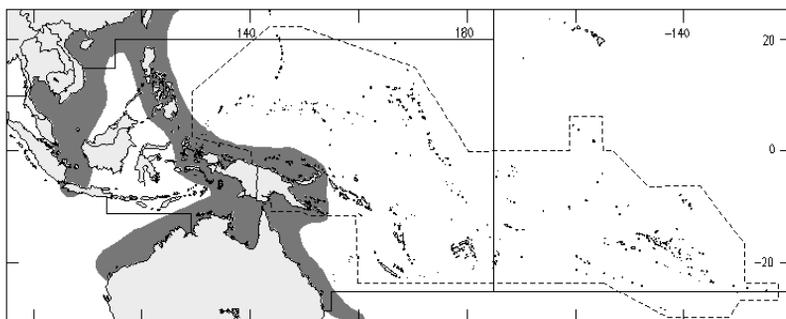
(from Fricke, 1983)

Diagnostic characters: Body elongate, depressed. **Head broad and depressed, its length 4 to 5 times in standard length.** Eye diameter 2.8 to 3.8 times in head length (measured to gill opening). **Preopercular spine long, with 5 to 8 small antrorse serrae on its dorsal margin, a straight main tip,** and a strong antrorse spine at its base. First dorsal fin with IV spines (first and second filamentous in males). **Second dorsal fin with 9 unbranched soft rays** (the last divided to its base). **Anal fin with 8 unbranched soft rays** (the last divided to its base). Distal margin of pelvic fins convex. **Caudal fin symmetrical,** median rays extremely elongate. Lateral line reaching from hind margin of eye to end of third or fourth branched caudal-fin ray, with 2 branches at its ventral side in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region, and by 2 transverse branches across dorsal side of caudal peduncle. **Colour:** ground coloration dark brown, ventral parts of body light brown or white; back with some darker saddles, sides of body with a row of black blotches; first dorsal fin with an ocellate black blotch on third membrane; anal fin with a broad distal black streak; second dorsal fin, caudal fin, pectoral and pelvic fins with brownish spots and blotches.

Size: Maximum total length 44 cm, commonly to 35 cm.

Habitat, biology, and fisheries: Benthic, common on sand and mud bottoms at depths of 25 to 150 m. Feeds on small bottom organisms (mostly worms and crustaceans). Present fishing grounds Gulf of Thailand and Philippines. Caught as bycatch by prawn trawlers. Often marketed fresh in Thailand and the Philippines.

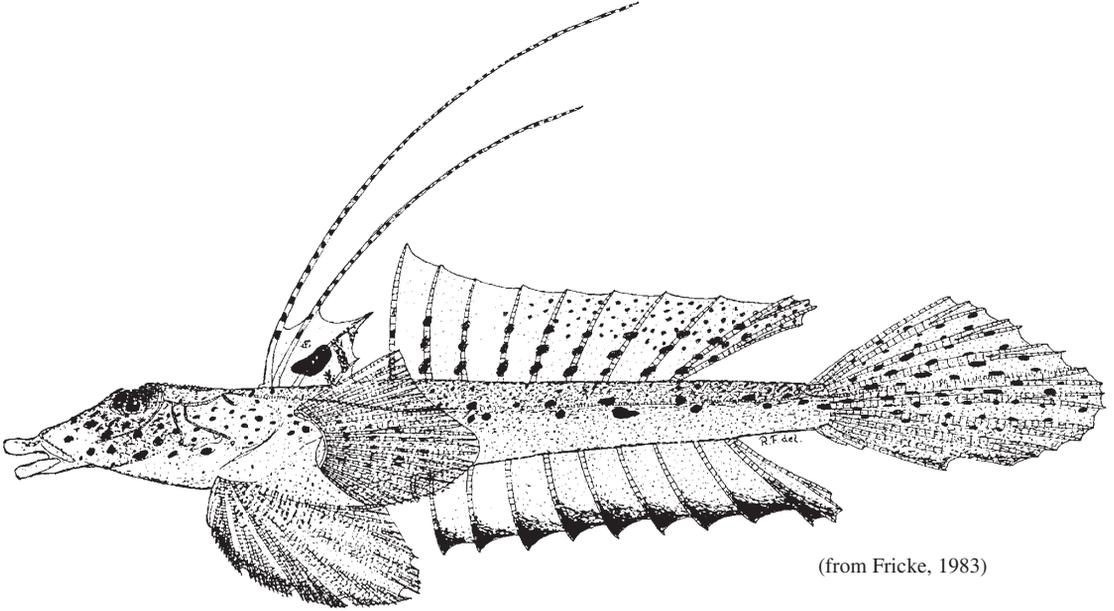
Distribution: Japan and China to Gulf of Thailand, Philippines, New Guinea, eastern Australia, and Lord Howe Island. Australian and New Guinea populations possibly represent a separate species.



***Callionymus limiceps* Ogilby, 1908**

Frequent synonyms / misidentifications: *Repomucenus limiceps* (Ogilby, 1908) / None.

FAO names: **En** - Roughheaded dragonet; **Fr** - Dragonnet à tête rugeuse; **Sp** - Lagarto de cabeza ruda.



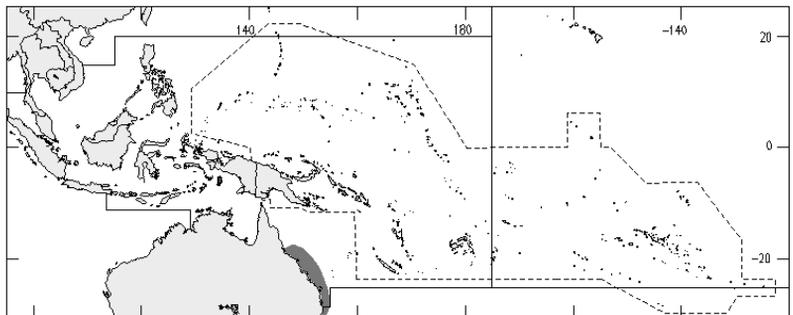
(from Fricke, 1983)

Diagnostic characters: Body elongate, depressed. **Head broad and depressed, its length 3.5 to 4.2 times in standard length.** Eye diameter 3.8 to 4.4 times in head length (measured to branchial opening). **Preopercular spine short, with an upcurved main tip, one curved point at its dorsal side,** and a short antrorse spine at its base. First dorsal fin with IV spines (first and second with long filaments in males, with short filaments in females). **Second dorsal fin with 9 unbranched soft rays** (the last divided to its base). **Anal fin with 9 unbranched soft rays** (the last divided to its base). **Caudal fin symmetrical,** with a convex distal margin. Lateral line reaching from hind margin of eye to end of third branched caudal-fin ray; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle. **Colour:** body brown above, closely speckled with darker spots of varying sizes, whitish below; first dorsal fin with a black spot on third spine; filamentous spines with numerous grey annuli; second dorsal fin, caudal fin, pectoral and pelvic fins with darker spots; anal fin with a broad dusky margin.

Size: Maximum total length 18 cm, commonly to 14 cm.

Habitat, biology, and fisheries: Benthic, living on sand bottoms at depths of 24 to 48 m. Feeds on small bottom organisms (crustaceans, worms, and snails). Present fishing grounds in Queensland, Australia. Caught as bycatch by prawn trawlers. Used for fish meal production; occasionally marketed (as bait).

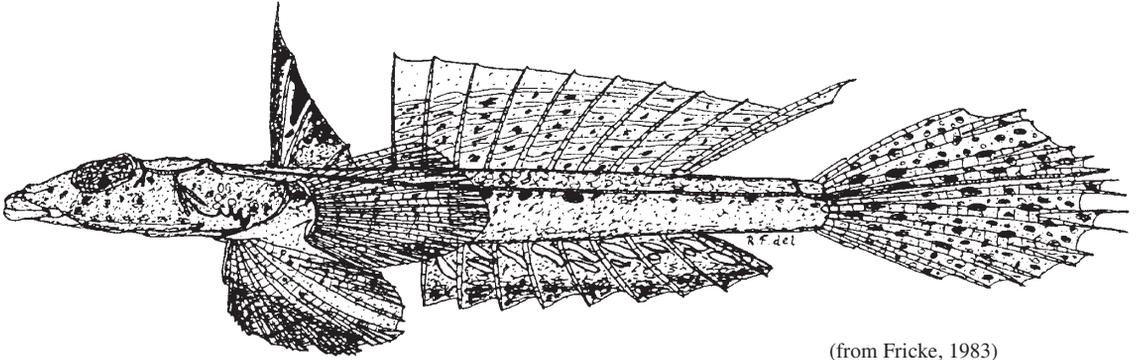
Distribution: Northern half of Australia, southern Queensland to Shark Bay (Western Australia).



Callionymus melanopterus Bleeker, 1851

Frequent synonyms / misidentifications: *Repomucenus melanopterus* (Bleeker, 1851) / None.

FAO names: En - Darter dragonet; Fr - Dragonnet flèche; Sp - Lagarto flecha.



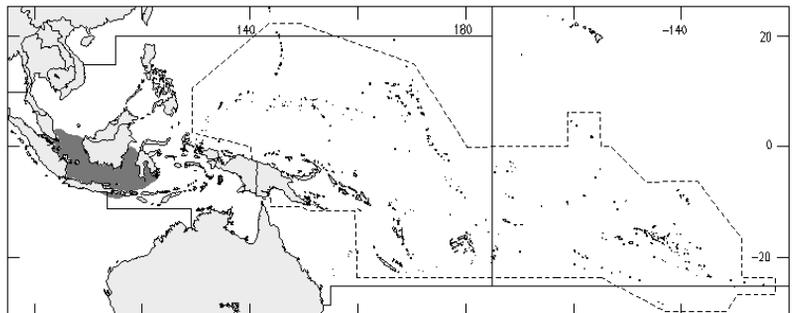
(from Fricke, 1983)

Diagnostic characters: Body elongate, depressed. **Head depressed, its length 4.1 to 4.4 times in standard length.** Eye diameter 2.1 to 2.6 times in head length (measured to gill opening). **Preopercular spine with a straight, smooth ventral margin, 3 to 4 curved points on its dorsal margin, an upcurved main tip, and a strong antrorse point at its base.** First dorsal fin with IV spines, without filaments; first spine longest. **Second dorsal fin with 10 unbranched soft rays** (the last divided to its base). **Anal fin with 9 unbranched soft rays** (the last divided to its base). Caudal fin distally slightly elongate. Lateral line reaching from hind margin of eye to end of third branched caudal-fin ray, with 2 short ventral branches in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle. **Colour:** dark brown, ventrally lighter, cheeks with dark spots, sides with a row of dark spots; first dorsal fin distally dark, second membrane with an ocellate black blotch; second dorsal, caudal, pectoral, and pelvic fins spotted with dark; anal fin distally dusky, basally with whitish streaks.

Size: Maximum total length 10 cm, commonly to 9 cm.

Habitat, biology, and fisheries: Benthic, on inshore sand and mud bottoms. Feeds on small bottom organisms. Caught by seine and trawl fisheries. Occasionally marketed fresh in Singapore and western Indonesia.

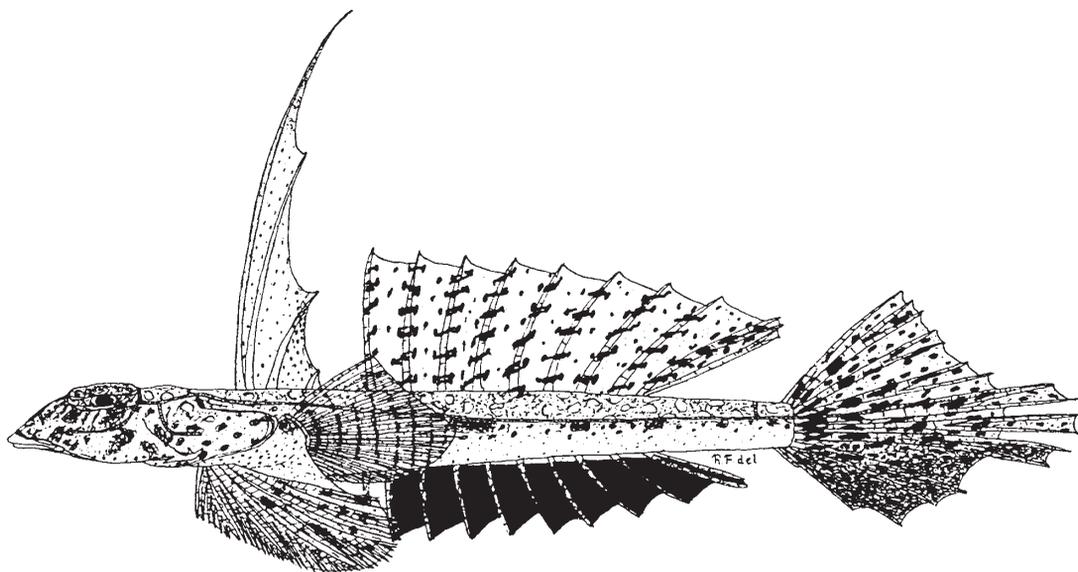
Distribution: Malaysia, Singapore, and Western Indonesia.



Callionymus meridionalis Suwardji, 1965

Frequent synonyms / misidentifications: *Callionymus monofilispinnus* Li, 1966; *Repomucenus meridionalis* (Suwardji, 1965) / *Callionymus limiceps* Ogilby, 1908 (Thailand).

FAO names: En - Highfin dragonet; Fr - Dragonnet à nageoire haute; Sp - Lagarto de aleta alta.



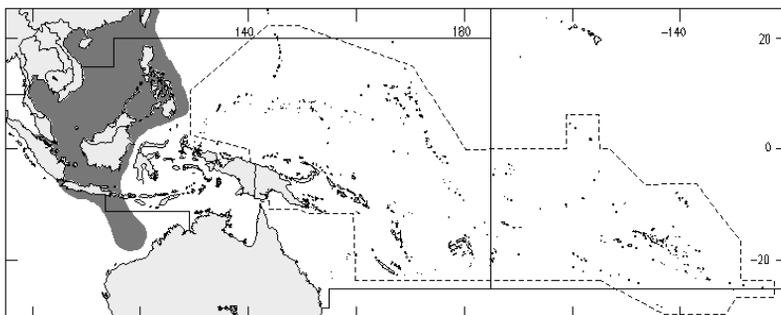
Diagnostic characters: Body elongate, depressed. **Head depressed, its length 4 to 4.7 times in standard length.** Eye diameter 2.7 to 3.3 times in head length (measured to gill opening). **Preopercular spine short, ventral margin straight, with 1 or 2 curved points on its dorsal margin, a strong main tip directed upwards,** and a strong, straight antrorse point at its base. First dorsal fin with IV spines, without filaments in females. **Second dorsal fin with 9 (rarely 8) unbranched soft rays** (the last divided to its base). **Anal fin with 9 unbranched soft rays** (the last divided to its base). **Caudal fin elongate in males, median rays may bear short filaments,** distally convex in females. Lateral line reaching from hind margin of eye to end of fourth branched caudal-fin ray, with 2 long ventral branches in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle. **Colour:** head and body light brown, back with many light spots, ventral parts yellowish to white; sides with a row of dark blotches; pectoral-fin base with a dusky spot; first dorsal fin in males whitish, in females black; second dorsal, caudal, pectoral, and pelvic fins spotted with brown; anal fin black in males, with a distal black streak in females.

Size: Maximum total length 15 cm, commonly to 12 cm.

Habitat, biology, and fisheries: Benthic, common on sand and mud bottoms from the shore to depths of 80 m. Feeds on small bottom organisms (crustaceans, worms, and snails). Present fishing grounds Thailand, Indonesia, and Philippines.

Caught by trawl or seine fisheries. Used for fish meal production; occasionally marketed fresh (Thailand, Indonesia, Philippines).

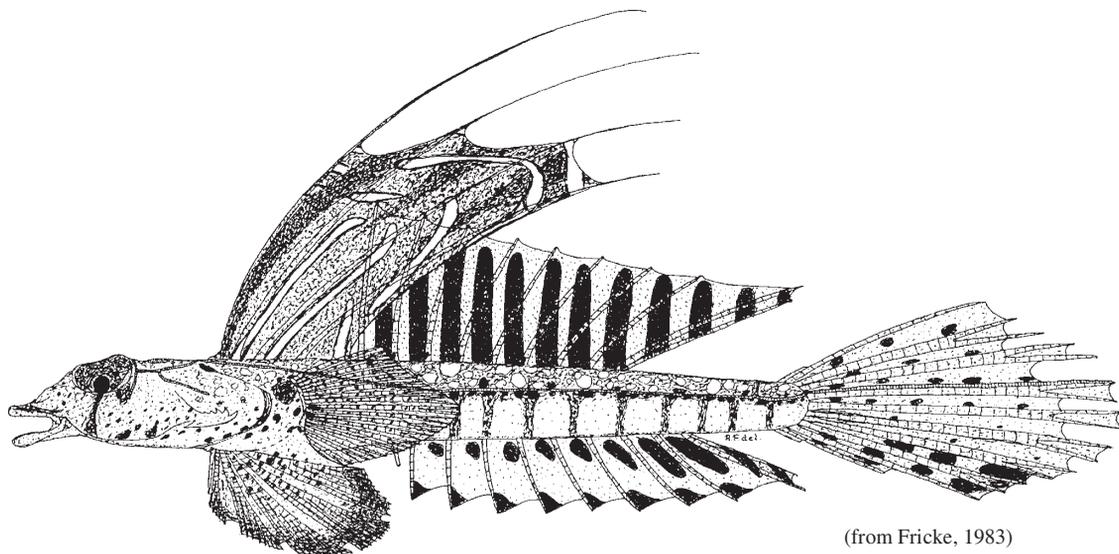
Distribution: China (including Taiwan Province) to the Gulf of Thailand, the Philippines, western Indonesia, and off northwestern Australia.



***Callionymus octostigmatus* Fricke, 1981**

Frequent synonyms / misidentifications: *Repomucenus octostigmatus* (Fricke, 1981) / None.

FAO names: En - Eightspot dragonet; Fr - Dragonnet à huit points; Sp - Lagarto de ocho manchas.

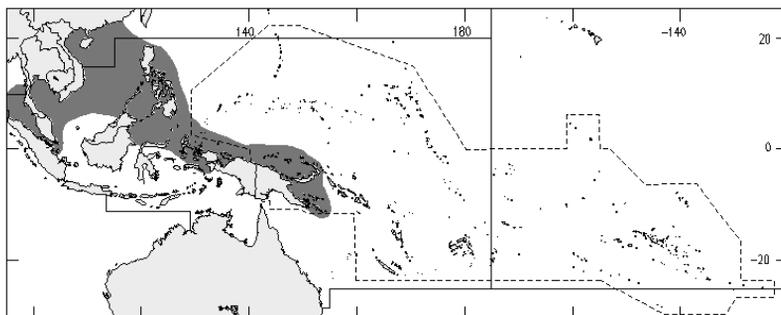


Diagnostic characters: Body elongate, depressed. **Head depressed, its length 3.4 to 4 times in standard length.** Eye diameter 2.1 to 2.9 times in head length (measured to gill opening). **Preopercular spine with a smooth, straight ventral margin, with 2 to 6 curved points on its dorsal margin, a strong main tip directed upwards,** and a strong, straight antorse point at its base. First dorsal fin with IV spines, very high in males, each spine filamentous; low in females, without filaments. **Second dorsal fin with 9 unbranched soft rays** (the last divided to its base). **Anal fin with 9 unbranched soft rays** (the last divided to its base). **Caudal fin elongate in males, median rays filamentous,** distally convex in females. Lateral line reaching from hind margin of eye to end of fourth branched caudal-fin ray, with 2 long ventral branches in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle. **Colour:** head and body brown, dorsally with many white-edged dark spots; ventral sides whitish; sides with 1 or 2 rows of dark blotches; first dorsal fin in males with many irregular white-edged dark lines; fin distally blackish in females and young males; second dorsal fin in males with vertical blackish streaks; **anal fin with 8 basal blackish spots;** caudal, pectoral, and pelvic fins spotted with brown.

Size: Maximum total length 15 cm, commonly to 12 cm.

Habitat, biology, and fisheries: Benthic, common on sand and mud bottoms at depths of 49 to 148 m. Feeds on small bottom organisms (crustaceans, worms, and snails). Present fishing grounds only the Philippines. Caught by trawl fisheries. Used for fish meal production; occasionally marketed fresh.

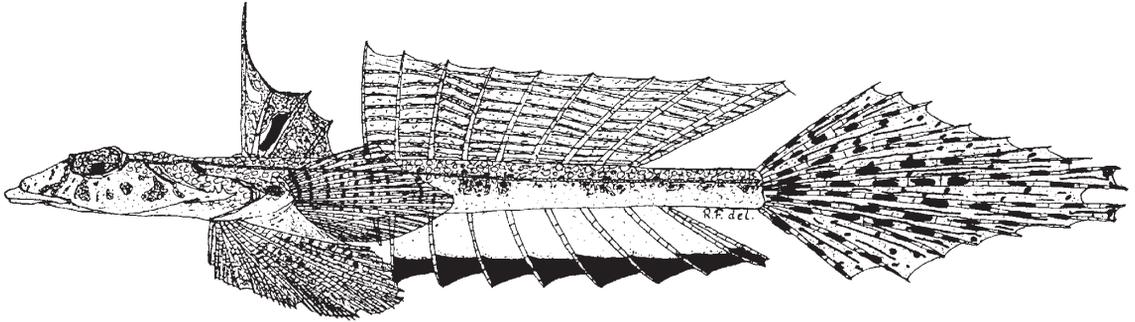
Distribution: Andaman Sea to China, the Philippines, and New Guinea.



***Callionymus russelli* Johnson, 1976**

Frequent synonyms / misidentifications: *Repomucenus russelli* (Johnson, 1976) / None.

FAO names: En - Russell's dragonet; Fr - Dragonnet de Russell; Sp - Lagarto de Russell.



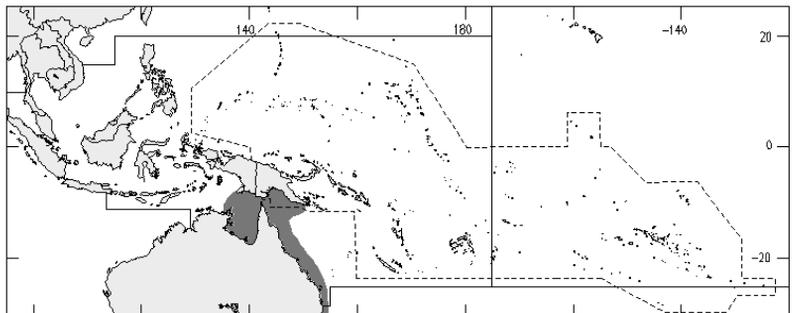
(from Fricke, 1983)

Diagnostic characters: Body elongate, depressed. **Head depressed, its length 3.7 to 4.8 times in standard length.** Eye diameter 2.7 to 3.7 times in head length (measured to gill opening). **Preopercular spine with a smooth, straight ventral margin, with 2 to 4 slightly recurved points on its dorsal margin, a strong, slightly upcurved main tip, and a strong, straight antrorse point at its base.** First dorsal fin with IV spines, first spine with a short filament. **Second dorsal fin with 9 (rarely 8 to 10) unbranched soft rays** (the last divided to its base). **Anal fin with 8 (rarely 7 to 10) unbranched soft rays** (the last divided to its base). **Caudal fin elongate in males, median rays may bear short filaments, distally convex in females.** Lateral line reaching from hind margin of eye to end of fourth branched caudal-fin ray, with 2 long ventral branches in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle. **Colour:** head and body light brown, back with small whitish spots, sides with dark blotches and small dark spots; first dorsal fin dusky in males, distal margin blackish, with an elongate black blotch basally on second membrane; first dorsal fin blackish in females, first membrane whitish; second dorsal fin in males with narrow horizontal streaks, anal fin in males with a distal black streak; caudal, pectoral, and pelvic fins spotted with brown.

Size: Maximum total length 13 cm, commonly to 11 cm.

Habitat, biology, and fisheries: Benthic, common on sand and mud bottoms from the shore to depths of 30 m. Feeds on small bottom organisms (crustaceans, worms, and snails). Present fishing grounds around Queensland, Australia, and New Guinea. Caught by seine and trawl fisheries. Used for fish meal production; occasionally marketed fresh (Papua New Guinea).

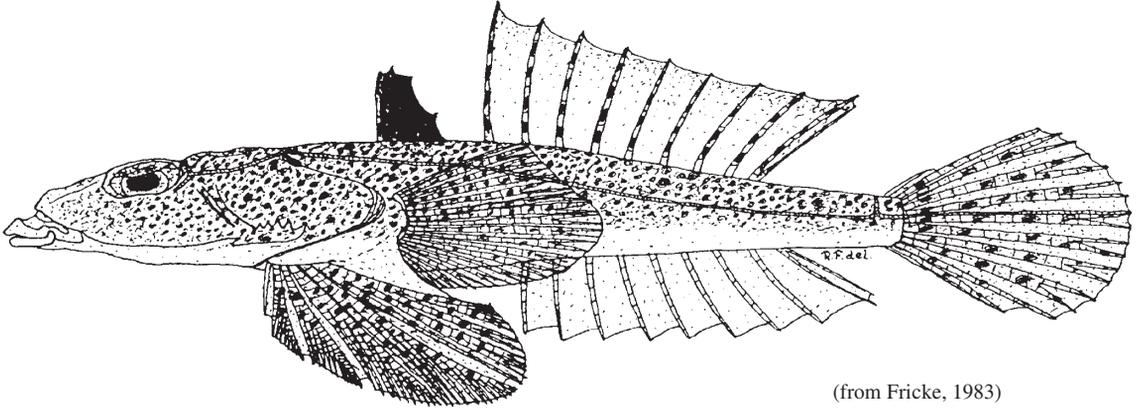
Distribution: Queensland including Gulf of Carpentaria to northern New South Wales, Australia, and to Papua New Guinea.



Callionymus sagitta Pallas, 1770

Frequent synonyms / misidentifications: *Repomucenus sagitta* (Pallas, 1770) / None.

FAO names: En - Sand dragonet; Fr - Dragonnet de Sable; Sp - Lagarto de arena.



(from Fricke, 1983)

Diagnostic characters: Body elongate, depressed. **Head depressed, its length 3.5 to 4.4 times in standard length.** Eye diameter 2.6 to 3.6 times in head length (measured to gill opening). **Preopercular spine with a smooth, straight ventral margin, with 2 to 6 curved points on its dorsal margin, an upcurved main tip,** and a strong, straight antrorse point at its base. First dorsal fin with IV spines, low, without filaments. **Second dorsal fin with 9 unbranched soft rays** (the last divided to its base). **Anal fin with 9 unbranched soft rays** (the last divided to its base). **Caudal fin distally convex in both sexes, not elongate.** Lateral line reaching from hind margin of eye to end of fourth branched caudal-fin ray, with a ventral branches in postorbital region; lateral lines of opposite sides interconnected by a transverse branch across occipital region and across dorsal side of caudal peduncle. **Colour:** head and body sand yellow, covered with numerous small dark spots; ventral sides whitish; dorsal fin black, first membrane often (at least basally) whitish in females; anal fin white; second dorsal, caudal, pectoral, and pelvic fins spotted with brown.

Size: Maximum total length 11 cm, commonly to 9 cm.

Habitat, biology, and fisheries: Benthic, common on inshore sand bottoms. Feeds on small bottom organisms (crustaceans, worms, and snails). Present fishing grounds in western Indonesia and the Gulf of Thailand. Caught by seine and trawl fisheries. Used for fish meal production; occasionally marketed fresh (Thailand, western Indonesia).

Distribution: India to Gulf of Thailand and western Indonesia including Sulawesi.

