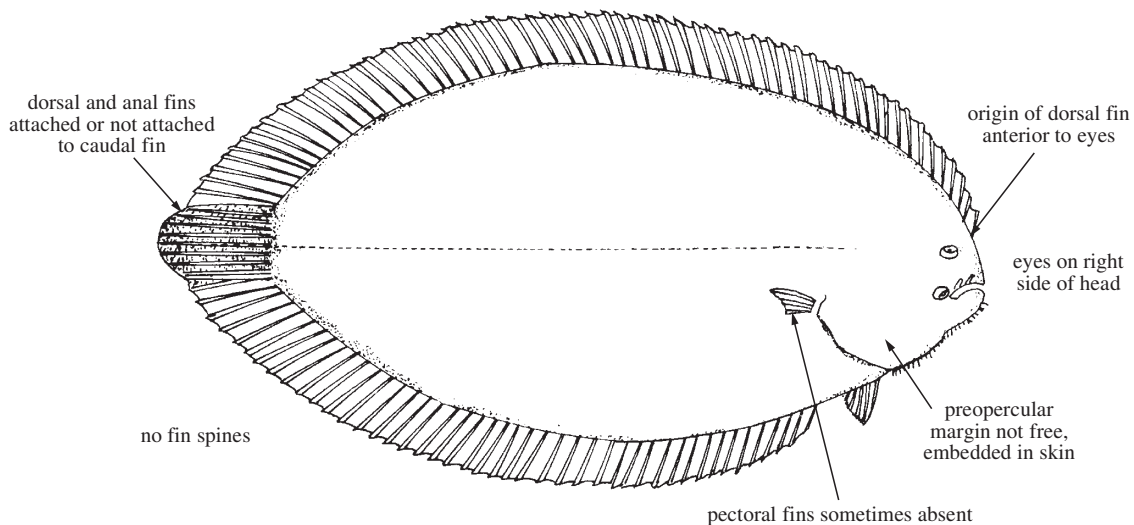


**SOLEIDAE**

**Soles**

by T.A. Munroe

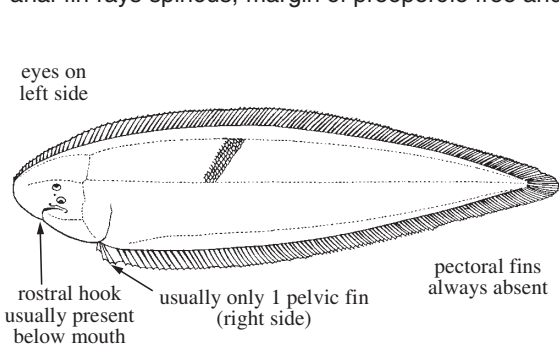
**Diagnostic characters:** Oval or somewhat elongate and strongly compressed flatfishes with **eyes on right side of body** (size to about 32 cm). **Preopercle without free margin, embedded in skin.** Mouth small and asymmetrical, terminal or slightly inferior; snout sometimes hook-shaped; teeth small, villiform, better developed on blind-side jaws. No spines in fins; **dorsal fin extending far forward on head**; dorsal and anal fins completely separate from, adherent to, or fused with caudal fin; pectoral fins sometimes absent, when present, right usually longer than left; pelvic fins sometimes asymmetrical, either free or joined to anal fin. Scales moderately large, cycloid or ctenoid, **sometimes modified into skin flaps fringed with sensory filaments.** Lateral line single and straight on body, sometimes branched on head. **Colour:** highly variable according to substratum; from uniformly dull brown to strikingly coloured with scattered black spots or blotches or dark cross bands on eyed side of body and vertical fins; blind side usually uniformly yellowish or white.



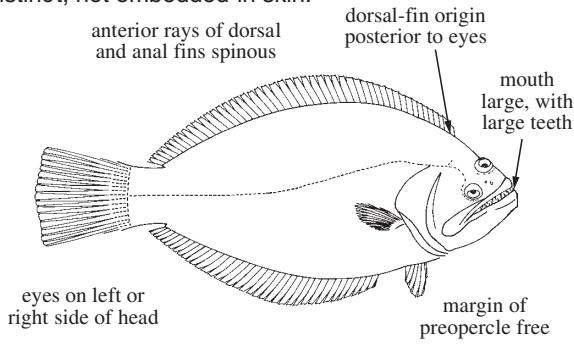
**Similar families occurring in the area**

**Cynoglossidae:** also with small mouth, dorsal-fin origin far forward on head, no fin spines, and preopercular margin embedded in skin, but eyes on left side of body (on right side in Soleidae) and a rostral hook usually present. Also, usually only 1 pelvic fin, pectoral fins always absent, and dorsal and anal fins always joined to caudal fin.

**Psettodidae:** mouth large, with large teeth; dorsal fin not extending forward on head; anterior dorsal- and anal-fin rays spinous; margin of preopercle free and distinct, not embedded in skin.

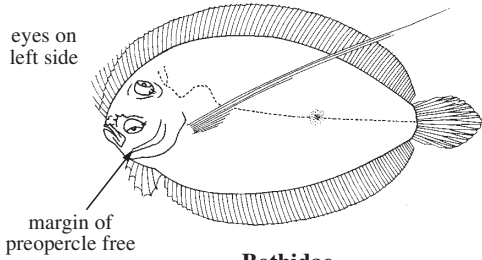


**Cynoglossidae**

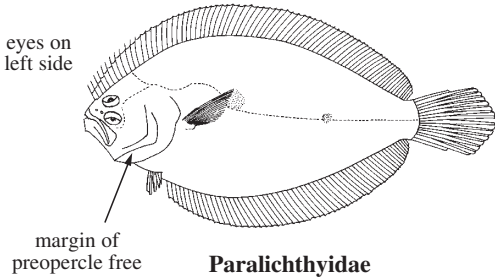


**Psettodidae**

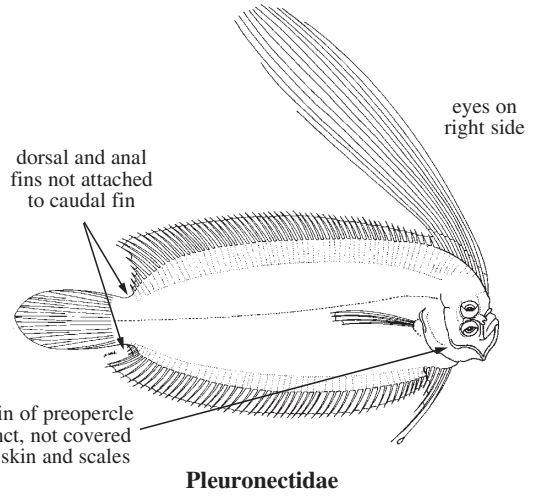
Pleuronectidae, Bothidae, Paralichthyidae: also with dorsal-fin origin far forward on head and no spines in fins, but margin of preopercle free and distinct, not embedded in skin.



**Bothidae**

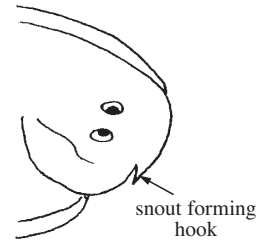


**Paralichthyidae**



**Key to the genera of Soleidae occurring in the area**

- 1a. Snout forming distinct hook (Fig. 1); mouth inferior, markedly contorted; caudal fin completely separate from dorsal and anal fins; branchial septum perforated . . . . . → 2
- 1b. Snout not forming a distinct hook; mouth only slightly contorted; caudal fin separate or joined to dorsal and anal fins; branchial septum entire . . . . . → 3



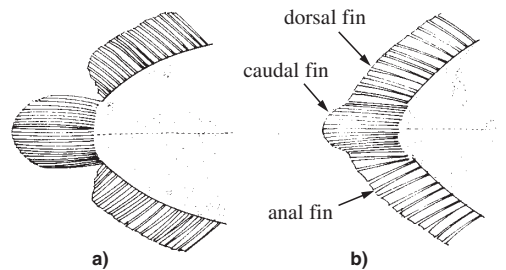
**Fig. 1 Heteromycteris**

- 2a. Eyed-side lips not fringed with labial papillae; branchial septum perforated by a foramen in its dorsal region; posterior nostril of eyed side placed close to anterior edge of lower eye . . . . . **Heteromycteris**
- 2b. Eyed-side lips with well-developed labial papillae; branchial septum perforated by a foramen in its ventral region; posterior nostril of eyed side placed in the labial groove . . . **Rendahlia**

- 3a. Nearly every fin ray of dorsal and anal fins with a pore at base of each fin ray (eyed and blind side) . . . . . **Pardachirus**
- 3b. No pores at bases of dorsal- and anal-fin rays . . . . . → 4

- 4a. Caudal fin separate from dorsal and anal fins (Fig. 2a) . . . . . → 5
- 4b. Caudal fin joined to dorsal and anal fins (Fig. 2b) . . . . . → 8

- 5a. Pectoral fins absent . . . . . → 6
- 5b. Pectoral fins well developed to rudimentary . . . . . → 7



**Fig. 2 posterior part of body (dorsal view)**

- 6a. First dorsal-fin ray prolonged . . . . . *Coryphillus*
- 6b. First dorsal-fin ray not prolonged . . . . . *Aseraggodes*

- 7a. Anterior nasal tube on eyed side long, reaching to or beyond midpoint of lower eye; body and head usually with numerous transverse wavy lines or broad blotches . . . . . *Soleichthys*
- 7b. Anterior nasal tube on eyed side short, not reaching beyond midpoint of lower eye; body and head without transverse wavy lines, but with more or less distinct black blotches . . . . . *Solea*

- 8a. Pectoral fins absent . . . . . *Achiroides*  
(2 species of fresh-water soles, *A. leucorhynchos* Bleeker, 1851 and *A. melanorhynchos* Bleeker, 1850)
- 8b. Pectoral fins present (even if only rudimentary) . . . . . → 9

- 9a. Opercular membrane not joined to distal tips of upper rays of pectoral fins on either side of body (may be attached to fin at base of fin rays) (Fig. 3a) . . . . . → 10

- 9b. Opercular membrane usually on both sides of body joined nearly to distal tips of upper rays of pectoral fins and forming continuous membranous connection with gill opening (Fig. 3b) . . . . . → 13

- 10a. Body very elongate, a bony process on snout . . . . . *Synaptura*

- 10b. Body more or less oval, no bony process on snout . . . . . → 11

- 11a. Eyes contiguous and pedunculate; pectoral fins extremely small, that of blind side rudimentary . . . . . *Dexillichthys*

- 11b. Eyes separated by an interorbital space with or without scales; eyes not pedunculate; pectoral fins comparatively large and well developed on both sides of body . . . . . → 12

- 12a. Opercular openings restricted, widely separated from each other; lips fringed with labial papillae . . . . . *Paradicula*

- 12b. Opercular openings of both sides not restricted, confluent in front of pelvic fins; lips with or without labial papillae . . . . . *Brachirus*

- 13a. Pelvic fin of eyed side broadly joined to anal fin; head and body without numerous dark cross bands (small number of wavy cross bands present in *Phyllichthys munroi*) . . . . . *Phyllichthys*

- 13b. Pelvic fin of eyed side not broadly joined to anal fin; head and body usually with numerous dark cross bands . . . . . → 14

- 14a. First ray of dorsal fin not enlarged; scales rough, distinctly ctenoid . . . . . *Zebrias*

- 14b. First ray of dorsal fin enlarged and free; scales smooth, cycloid or weakly ctenoid (Fig. 4) . . . . . *Aesopia*

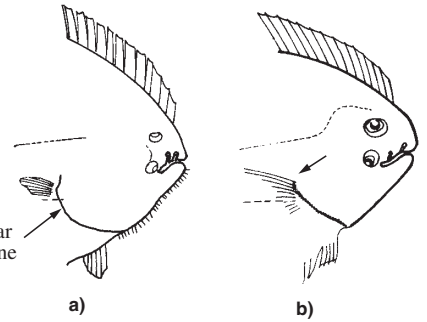


Fig. 3

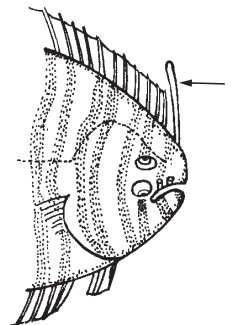



Fig. 4 *Aesopia*

**List of species occurring in the area**

Note: due to degree of taxonomic uncertainty for most genera and species of soleids from the area, the following list is presented with knowledge that it contains omissions, synonyms, or taxa that eventually may be found to be extralimital to the area. Given the status of knowledge for these fishes, it should serve as a starting point for future endeavors.

The symbol  is given when species accounts are included. A question mark indicates that presence in the area is uncertain.

- Aesopia cornuta* Kaup, 1858
- Aseraggodes cyaneus* (Alcock, 1890)
- Aseraggodes dubius* Weber, 1913
- Aseraggodes herrei* Seale, 1940
- Aseraggodes kaianus* (Günther, 1880)
- Aseraggodes klunzingeri* (Bleeker, 1851)
- Aseraggodes macleanianus* Ramsay, 1881
- Aseraggodes melanostictus* (Peters, 1876)
- Aseraggodes microlepidotus* Weber, 1913
- Aseraggodes normani* Chabanaud, 1926
- Aseraggodes persimilis* (Günther, 1909)
- Aseraggodes texturatus* Weber, 1913
- Brachirus aenea* (Smith, 1931)
- Brachirus aspilos* (Bleeker, 1851)
- Brachirus dicholepis* (Peters, 1876)
- Brachirus heterolepis* (Bleeker, 1856)
- Brachirus macrolepis* (Bleeker, 1858)
-  *Brachirus orientalis* (Bloch and Schneider, 1801)
- Brachirus pan* (Hamilton-Buchanan, 1822)
- Brachirus panoides* (Bleeker, 1851)
- Brachirus selheimi* (Macleay, 1883)
-  *Brachirus sorsogonensis* (Evermann and Seale, 1907)
- Brachirus villosus* (Weber, 1908)
- Coryphillus filiger* (Weber, 1913)
-  *Dexillichthys muelleri* (Steindachner, 1879)
- Heteromycteris hartzfeldii* (Bleeker, 1853)
- Heteromycteris oculus* (Alcock, 1889)
- Liachirus melanospilus* (Bleeker, 1854)
- Paradicula setifer* Paradiçe and Whitley, 1927
- Pardachirus hedleyi* Ogilby, 1916
-  *Pardachirus pavoninus* (Lacepède, 1802)
- Pardachirus poropterus* (Bleeker, 1851)
- Phyllichthys munroi* (Whitley, 1966)
- Phyllichthys sclerolepis* (Macleay, 1878)
- Phyllichthys sejunctus* Whitley, 1935
- Pseudoaesopia japonica* (Bleeker, 1862)
- Rendahlia jaubertensis* (Rendahl, 1921)
- Solea elongata* Day, 1877
-  *Solea ovata* Richardson, 1846
- Soleichthys heterorhinos* (Bleeker, 1856)
- Soleichthys siammakuti* Wongratana, 1975
- ? *Strabozebrias cancellatus* (MacCulloch, 1916)
- ? *Synaptura albomaculata* Kaup, 1858
-  *Synaptura commersonii* (Lacepède, 1802)

*Zebrias altipinnis* (Alcock, 1890)  
*Zebrias craticulus* (McCulloch, 1916)  
*Zebrias lucapensis* Seigel and Adamson, 1985  
*Zebrias quagga* (Kaup, 1858)  
*Zebrias scalaris* Gomon, 1987  
*Zebrias synapturoides* (Jenkins, 1910)  
➤ *Zebrias zebra* (Bloch, 1787)

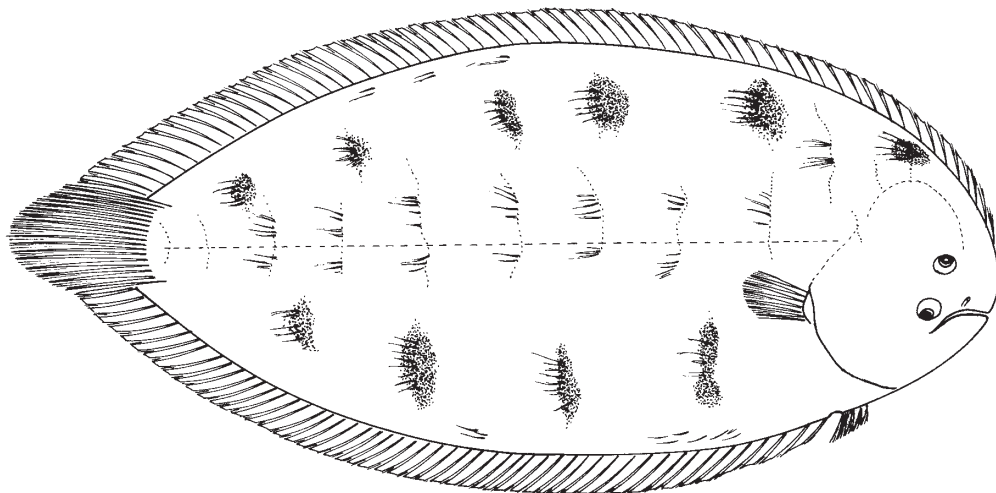
## References

- Fischer, W. and P.J.P. Whitehead (eds). 1974. *FAO species identification sheets for fishery purposes. Eastern Indian Ocean (Fishing Area 57) and Western Central Pacific (Fishing Area 71)*. 4 Vols. Rome, FAO (unpaginated).
- Gloerfelt-Tarp, T. and P.J. Kailola. 1984. *Trawled fishes of southern Indonesia and northwestern Australia*. Jakarta, Dir. Gen. Fish. (Indonesia), German Tech. Coop., Aust. Dev. Assoc. Bur., 406 p.
- Grant, E. 1987. *Fishes of Australia*. E.M. Grant Pty. Limited, 480 p.
- Menon, A.G.K. 1978. Taxonomic status of the genera *Synaptura* Cantor, 1550 [sic] and *Euryglossa* Kaup, 1858 with descriptions of species referable to these occurring in seas of India. *J. Mar. Biol. Assoc. India*, 20(1-2):10-21.
- Punpoka, S. 1964. A review of the flatfishes (Pleuronectiformes: Heterosomata) of the Gulf of Thailand and its tributaries in Thailand. *Kasetsart Univ. Fish. Res. Bull.*, (1):86 p.
- Randall, J.E., G.R. Allen, and R.C. Steene. 1990. *Fishes of the Great Barrier Reef and Coral Sea*. Univ. Honolulu, Hawaii Press, 507 p.
- Shen, S.C. 1994. Pleuronectiformes. In *Fishes of Taiwan*, edited by S.C. Shen. National University of Taiwan, Department of Zoology, pp. 565-585.
- Weber, M. and L.F. de Beaufort. 1929. *The fishes of the Indo-Australian Archipelago. V. Anacanthini, Allotriognathi, Heterosomata, Berycomorphi, Percomorphi: Families: Kuhliidae, Apogonidae, Plesiopidae, Pseudoplesiopidae, Priacanthidae, Centropomidae*. Leiden, E.J. Brill, 458 p.

***Brachirus orientalis*** (Bloch and Schneider, 1801)

**Frequent synonyms / misidentifications:** *Euryglossa orientalis* (Bloch and Schneider, 1801); *Synaptura orientalis* (Günther, 1862) / None.

**FAO names:** **En** - Oriental sole; **Fr** - Sole d'orient; **Sp** - Lenguado oriental.

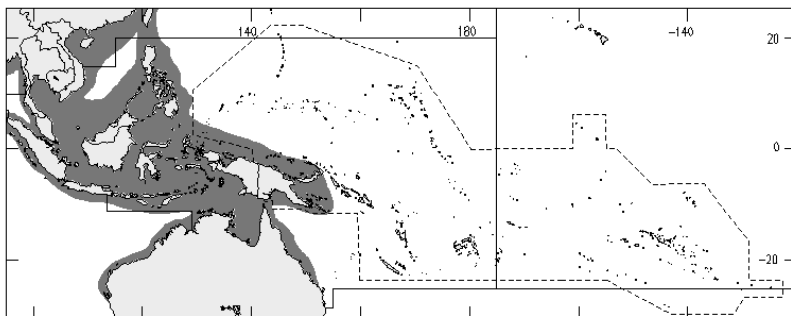


**Diagnostic characters:** **Body oval**, both contours equally arched. **Scales strongly ctenoid on eyed side, mostly weakly ctenoid on blind side with some cycloid.** Eyed side with 3 longitudinal rows of small patches of scales with obvious black sensory filaments on scales. **Head scales of blind side modified into cutaneous sensory processes.** **Eyes on right side, separated by small scaly interorbital space.** Mouth small, jaws curved, cleft reaching to vertical through middle of lower eye. **Lateral line with high rounded arch on head not directed posteriorly, ending above upper eye.** **Dorsal and anal fins joined to caudal fin; pectoral fins well developed**, the left somewhat shorter than the right; pelvic fins moderately symmetrical in size, and symmetrical in position. **Colour:** eyed side grey or brown with numerous, cloudy, and indistinct patches and with 3 longitudinal series of black circular blotches corresponding to regions of filamentous scales; **blind side uniformly light yellow, without sooty blotches;** dorsal, anal, and caudal fins uniformly dark throughout their lengths, except distal tips of fins with white margin; eyed-side pectoral fin darkly pigmented with black blotch near distal tip and with white margin; eyed-side pelvic fin dark with white margin; blind-side pelvic fin white.

**Size:** Maximum total length about 30 cm, commonly 10 to 12 cm.

**Habitat, biology, and fisheries:** Inhabits shallow sand or mud bottoms in coastal waters. Feeds predominantly on bottom-living invertebrates, especially small crustaceans. Caught mainly with bottom trawls on the inner continental shelf. Marketed fresh, frozen, and dried-salted.

**Distribution:** Common throughout most tropical coastal waters of Indo-West Pacific area from Gulf of Thailand northward to Taiwan Province of China and southern Japan, southward through the Philippines, New Guinea to north-central Australia (both coasts); westward to India and Persian Gulf.

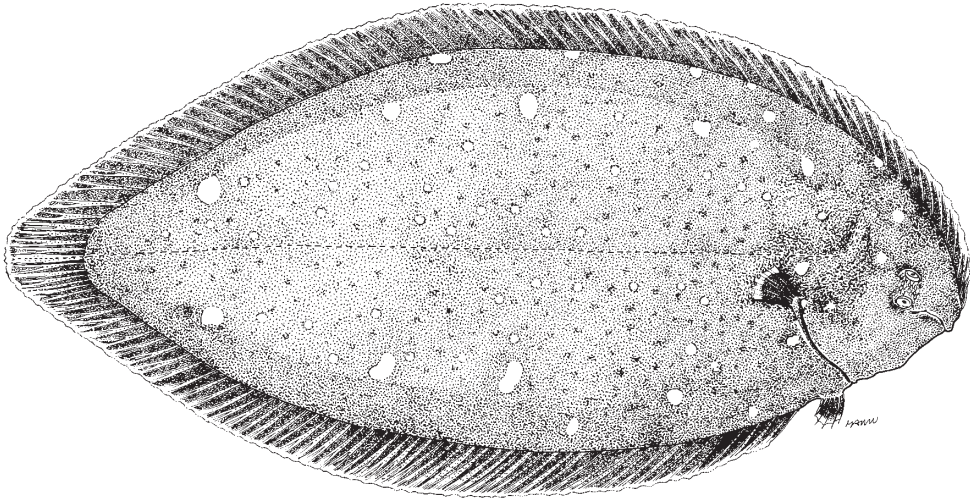




*Brachirus sorsogonensis* (Evermann and Seale, 1907)

**Frequent synonyms / misidentifications:** None / *Brachirus orientalis* (Bloch and Schneider, 1801).

**FAO names:** En - Ocellated sole.

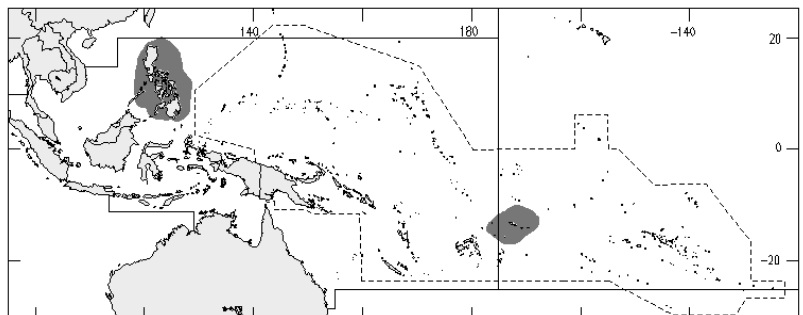


**Diagnostic characters:** Body oval, both contours equally arched. **Scales ctenoid on eyed side, cycloid on blind side.** Head scales of blind side modified into rugose area of cutaneous sensory papillae. Eyed-side scales with filamentous projections scattered randomly over body surface. Eyed-side nostrils 2; anterior a short tube, posterior a small slightly elevated horizontal slit. Blind-side nostrils 2; both large, foliaceous, and pedunculate; anterior nostril larger than posterior. **Eyes on right side and separated by comparatively wide, scaly interorbital space.** Mouth small, jaws curved; cleft reaching posteriorly to vertical through pupil of lower eye. Lateral line with high, rounded arch on head, not directed posteriorly and ending above anterior end of upper eye. **Dorsal and anal fins joined to caudal fin; pectoral fins well developed on both sides of body; left pectoral fin slightly shorter than right pelvic fin.** Pelvic fins moderately symmetrical, united basally. **Colour:** eyed side uniformly greyish brown, with many nearly spherical or elliptical white and black blotches scattered throughout; 2 widely separated longitudinal series of 4 to 6 larger white blotches along dorsal and ventral contours of eyed side; blind side of body uniformly white, sometimes with small violet spots scattered over surface; dorsal, anal, and caudal fin on eyed side darkly pigmented along lengths of fin rays; fin rays with white margin distally; fin membranes more darkly pigmented than fin rays; blind sides of dorsal, anal, and caudal fins uniformly white except for continuous dark grey stripe on distal half of fin rays around entire lengths of fins; eyed-side pectoral fin black with whitish yellowish margin distally; blind-side pectoral fin white; eyed-side pelvic fin dark with white margin; blind-side pelvic fin white.

**Size:** Maximum standard length 30 cm, commonly to 25 cm.

**Habitat, biology, and fisheries:** Inhabits shallow sandy muddy bottoms in coastal waters. Feeds predominantly on small fishes and bottom-living invertebrates.

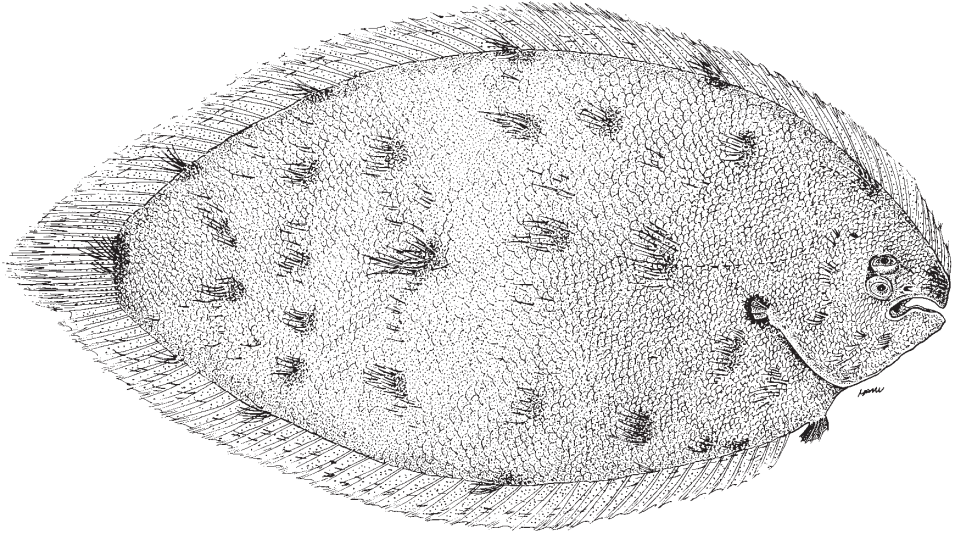
**Distribution:** The Philippines and Samoa, but probably more widespread (more data needed).



***Dexillichthys muelleri*** (Steindachner, 1879)

**Frequent synonyms / misidentifications:** *Synaptura muelleri* (Steindachner, 1879) / None.

**FAO names:** En - Tufted sole.

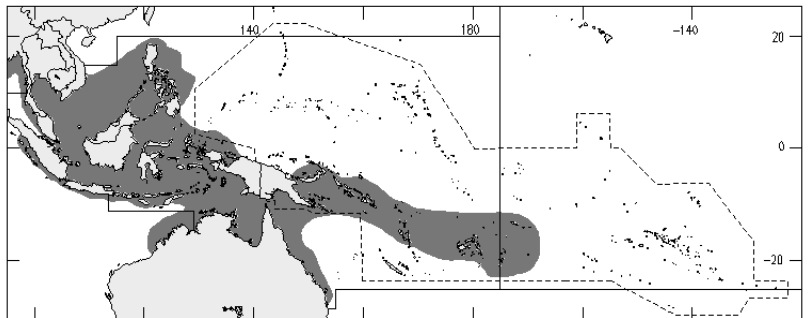


**Diagnostic characters:** Body oval, both contours equally arched. **Strongly ctenoid scales on both sides of body.** Blind-side head with large scaleless area. **Eyed surface with many irregular patches of scales with long hair-like sensory processes.** **Eyes on right side, small, contiguous, pedunculate.** Mouth small, jaws curved, cleft reaching to vertical through anterior margin of lower eye. **Lateral line with high pointed arch slanting posteriorly on head.** **Dorsal and anal fins joined to caudal fin; pectoral fins small; left pelvic fin rudimentary. Pelvic fins moderately symmetrical, united basally.** **Colour:** uniformly brown, with 3 longitudinal series (1 each along dorsal and anal contours, third median) of irregular black blotches arranged somewhat along same vertical plane; snout tip with dark blotch; **blind side off-white, with large sooty patches, those on caudal one-third of blind side more darkly pigmented than anterior blotches;** dorsal and anal fins with a series of nearly circular spots at bases of fin rays (about 4 in each fin); dorsal, anal, and caudal fins with pepper-dot pattern throughout fins; caudal fin with dark spot at base of fin; **eyed-side pectoral fin dark brown, with dark blotch immediately beneath fin;** blind-side pectoral fin white; eyed-side pelvic fin uniformly brown; blind-side pelvic fin whitish.

**Size:** Maximum standard length about 20 cm, commonly to 12 cm.

**Habitat, biology and fisheries:** On sandy and muddy substrates on the inner continental shelf, often entering bays and mouths of estuaries. Feeds on a variety of benthic invertebrates. Collected commonly in small trawls. Marketed fresh or dried-salted.

**Distribution:** Indo-West Pacific from Sri Lanka to Thailand, Indonesia, the Philippines, northern Australia, eastward to Samoa and Tonga, and south to Palau.

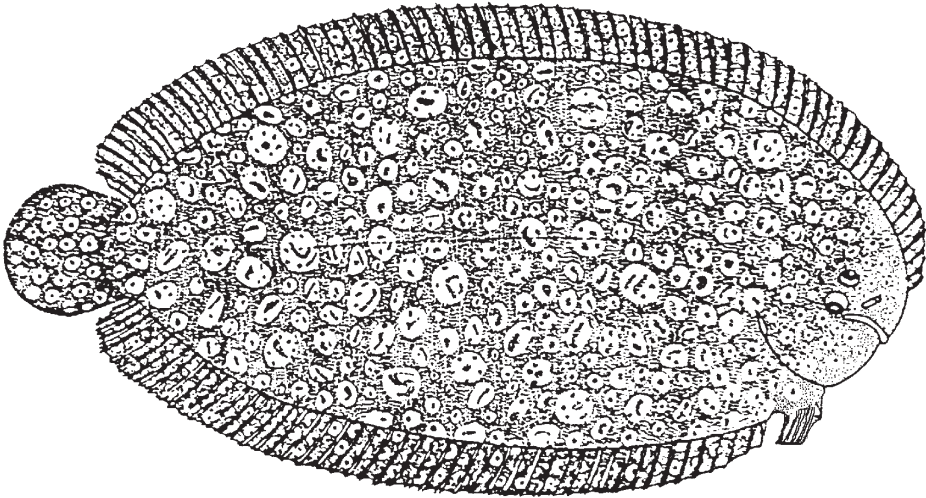




*Pardachirus pavoninus* (Lacepède, 1802)

**Frequent synonyms / misidentifications:** *Achirus pavoninus* Lacepède, 1802 / None.

**FAO names:** En - Peacock sole.

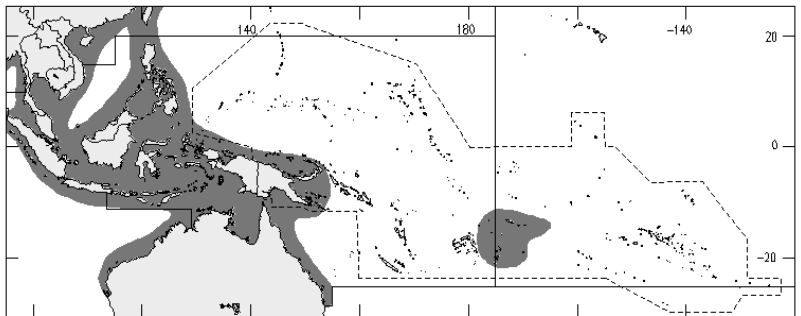


**Diagnostic characters:** Body oblong and very compressed. Feebly ctenoid scales on both sides of body and extending over head and onto eyed-side fin rays of dorsal and anal fins. **Eyes on right side**, separated by scaly interorbital space. Mouth strongly curved, cleft reaching to vertical through anterior border of lower eye. Blind-side snout and anterior part of eyed-side snout with papillae and some long filaments. Nostrils on eyed side with short tubes. **Dorsal and anal fins separate from caudal fin; pectoral fins absent; pelvic-fin bases unequal in length, the right one with an elongated base and attached posteriorly to genital papilla. Series of toxin glands with pores along bases of dorsal- and anal-fin rays.** Lateral line distinct, straight, single. **Colour:** reddish brown, densely spotted on head; body and fins of eyed surface also with spots of various sizes and shapes, bordered by a dark rim and some with a blackish spot in centre.

**Size:** Maximum total length about 22 cm, commonly 10 to 15 cm.

**Habitat, biology, and fisheries:** Inhabits shallow sand or mud bottoms in coastal waters down to about 40 m. Feeds mainly on bottom-living invertebrates, including worms, small crustaceans, and mollusks. Milky fluid from dorsal-and anal-fin pores may be toxic and lethal to small fishes. Some authors have suggested that toxin secreted on the blind side may aid in capturing prey. Small quantities of toxin from related species reported to repel sharks and other large fishes (barracuda, moray eels). Skin reported to have bitter taste, but flesh described as good to eat. Caught mainly with bottom trawls in shallow waters of inner continental shelf. Marketed fresh or frozen.

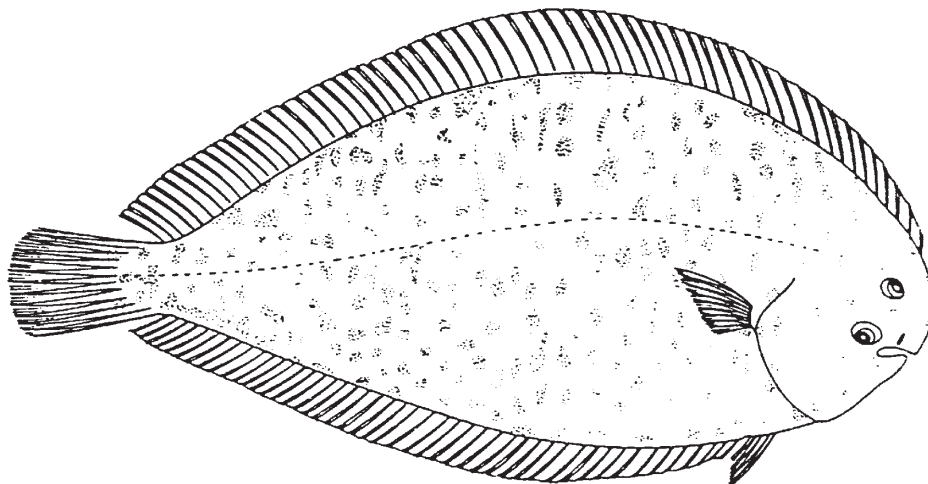
**Distribution:** Widespread tropical Indo-West Pacific northward to southern Japan, including the Philippines, and southward to northern coasts of Australia.



***Solea ovata*** Richardson, 1846

**Frequent synonyms / misidentifications:** *Solea humilis* Cantor, 1850 / None.

**FAO names:** En - Ovate sole.

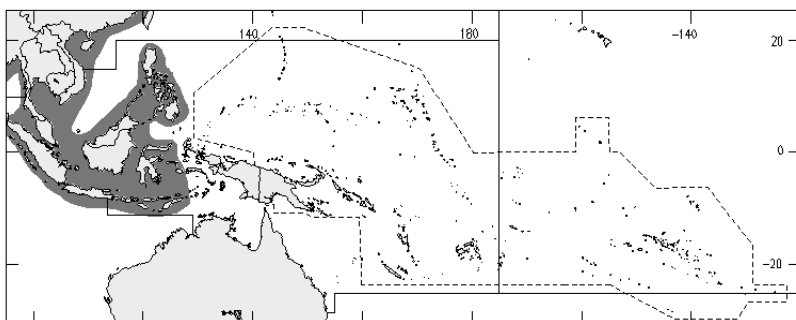


**Diagnostic characters:** Body ovate with small ctenoid scales on both sides. **Eyes on right side**, separated by a small concave interorbital space. Snout obtusely pointed with series of short cutaneous sensory processes on blind side. Mouth small, curved, cleft reaching point between verticals through anterior and midpoint of lower eye. **Dorsal and anal fins separate from caudal fin; pectoral fin on eyed side about twice as long as that on blind side**; both pelvic fins present. **Colour:** olive or brown with spots and black blotches on eyed side of body and fins; deep black blotches on outer two-thirds of pectoral fins.

**Size:** Maximum total length about 10 cm, commonly to 8 or 9 cm.

**Habitat, biology, and fisheries:** Inhabits shallow sand or mud bottoms in coastal waters. Feeds mainly on bottom-living invertebrates, especially crustaceans. Caught mainly with bottom trawls on the inner continental shelf. Marketed fresh, frozen, and dried-salted.

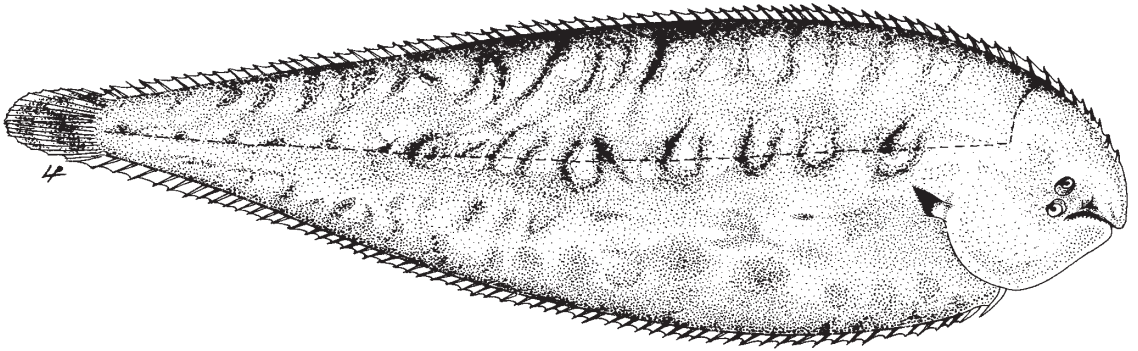
**Distribution:** Widespread throughout northwestern Indo-West Pacific area including the northern China Sea, Gulf of Thailand, the Philippines, and southward to Indonesia, but apparently not to New Guinea or Australia; westward to Pakistan.



*Synaptura commersonii* (Lacepède, 1802)

**Frequent synonyms / misidentifications:** None / None.

**FAO names:** **En** - Commerson's sole; **Fr** - Sole de Commerson; **Sp** - Lenguado de Commerson.

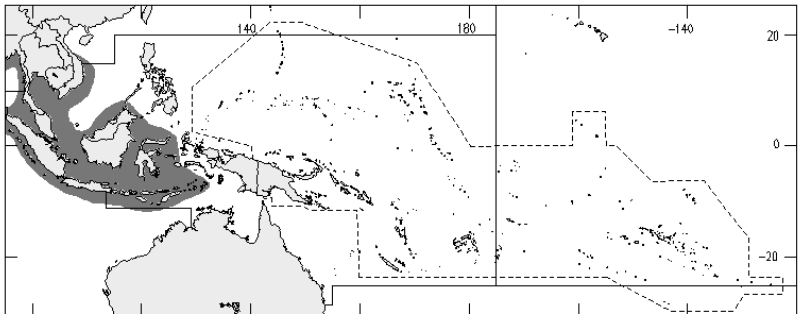


**Diagnostic characters:** Body elongate, broad anteriorly and tapering posteriorly, with ctenoid scales on eyed side, and cycloid scales on blind side; **scales on head and nape of eyed side larger than those on body; scales on blind side of head modified into cutaneous sensory processes. Eyes on right side**, with scaly interorbital space. **Anterior part of snout with a bony process.** Mouth curved, cleft reaching posteriorly only to vertical through middle of upper eye. **Dorsal and anal fins joined to caudal fin;** pectoral fins symmetrical in size; pelvic fins short and bases asymmetrical in position. **Colour:** grey or brown on eyed side of body; dorsal, anal, and caudal fins dusky towards edges of both sides and with a conspicuous white margin; right pectoral fin dusky.

**Size:** Maximum total length about 32 cm, commonly 20 to 30 cm.

**Habitat, biology, and fisheries:** Inhabits mainly sand or mud bottoms in coastal waters. Feeds mainly on bottom-living invertebrates, especially small crustaceans. Caught mainly with bottom trawls on inner continental shelf. Marketed fresh, frozen and dried-salted.

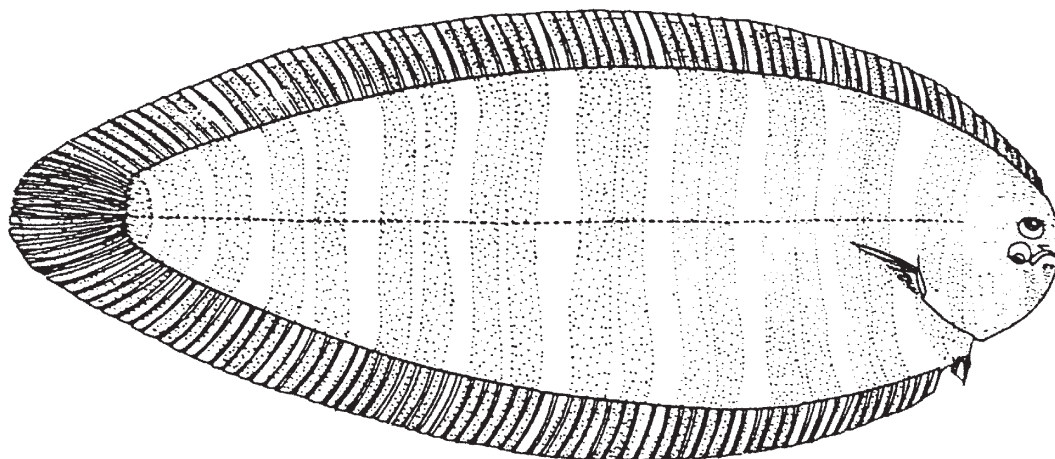
**Distribution:** Northwestern part of Indo-West Pacific area, including Gulf of Thailand, Borneo, Indonesia, but not to Philippines, New Guinea, or Australia; westward to India and Pakistan.



***Zebrias zebra*** (Bloch, 1787)

**Frequent synonyms / misidentifications:** *Synaptura zebra* (Günther, 1862) / None.

**FAO names:** En - Zebra sole; Fr - Sole zèbre; Sp - Lenguadillo acebrado.



**Diagnostic characters:** Body elongate, with strongly ctenoid scales on both sides. **Eyes on right side**, separated by scaly interorbital space. Mouth curved, cleft reaching to vertical through anterior border of lower eye. **Dorsal and anal fins completely joined to caudal fin; pectoral fins well developed, attached to opercular membrane**, the right much longer than the left; upper 2 rays of right pectoral fin longer than others; pelvic fins shorter than right pectoral fin; asymmetrical, with right pelvic-fin base longer than left. **Colour:** yellow-brown on eyed side, with 12, paired, dark brown cross bands continued onto fins, where they bend posteriorly; a white-bordered, dark, ocellus on caudal fin.

**Size:** Maximum total lengths to about 19 cm, commonly 15 to 17 cm.

**Habitat, biology, and fisheries:** Inhabits shallow sand or mud bottoms in coastal waters. Feeds mainly on bottom-living invertebrates, especially small crustaceans. Caught mainly with bottom trawls on inner continental shelf. Marketed fresh, frozen, and dried-salted.

**Distribution:** Northwestern part of Indo-West Pacific area including Gulf of Thailand to northern China Sea and southern Japan (but apparently not to the Philippines), and southward to Borneo and Indonesia, but not to New Guinea or Australia.

