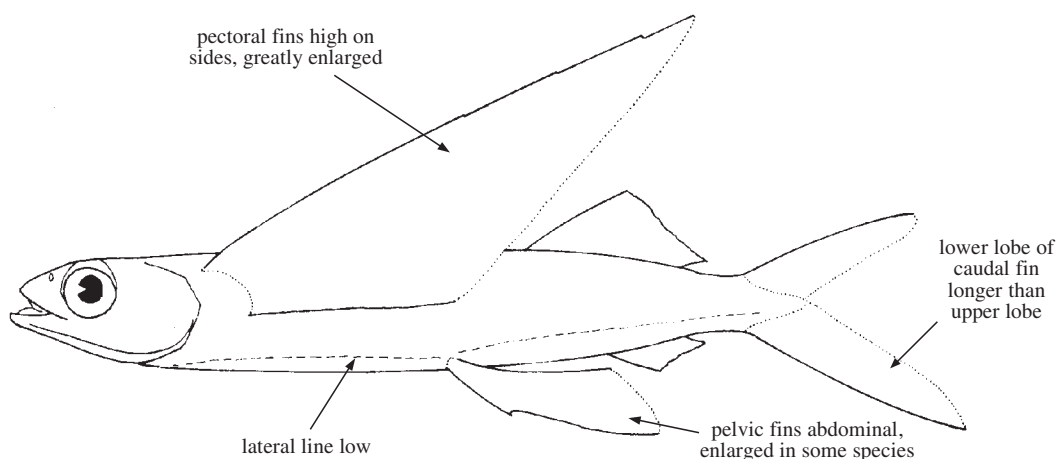


## EXOCOETIDAE

### Flyingfishes

by N.V. Parin

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



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

#### Similar families occurring in the area

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



*Hemiramphus*  
(a typical representative)

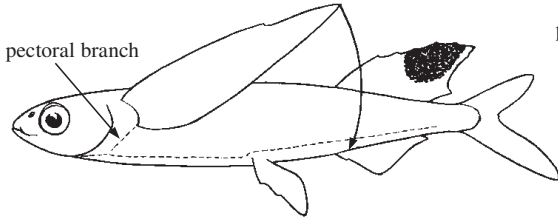


*Oxyporhamphus*  
(a representative without prolonged lower jaw)

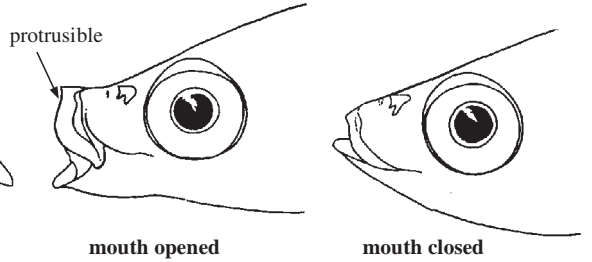
#### Hemiramphidae

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

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

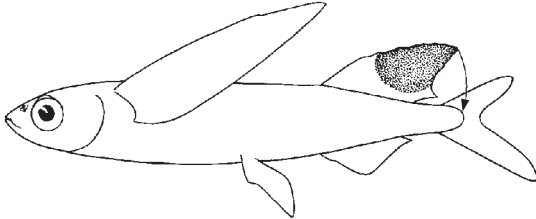


**Fig. 1** *Parexocoetus*

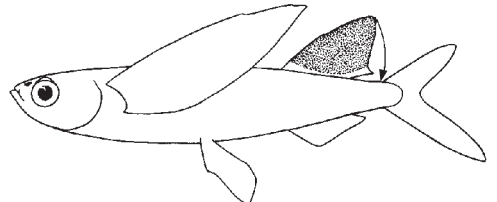


**Fig. 2** *Parexocoetus*

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



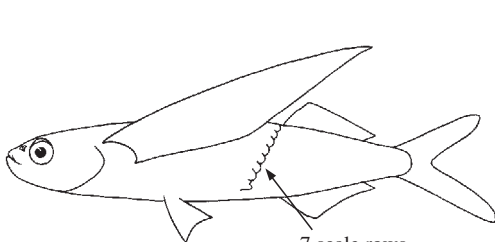
**a)** *Parexocoetus brachypterus*



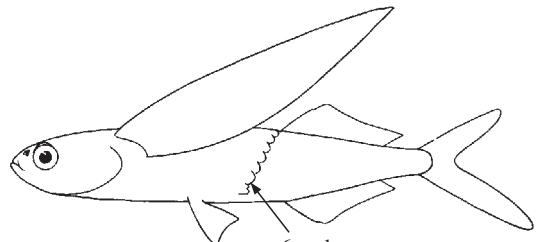
**b)** *Parexocoetus mento*

**Fig. 3**

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



**a)** *Exocoetus monocirrhus*



**b)** *Exocoetus volitans*

**Fig. 4**

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

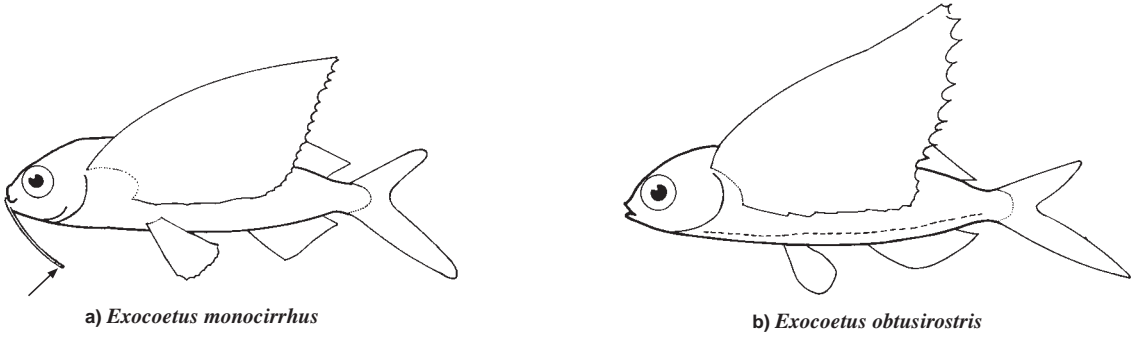


Fig. 5 juveniles

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

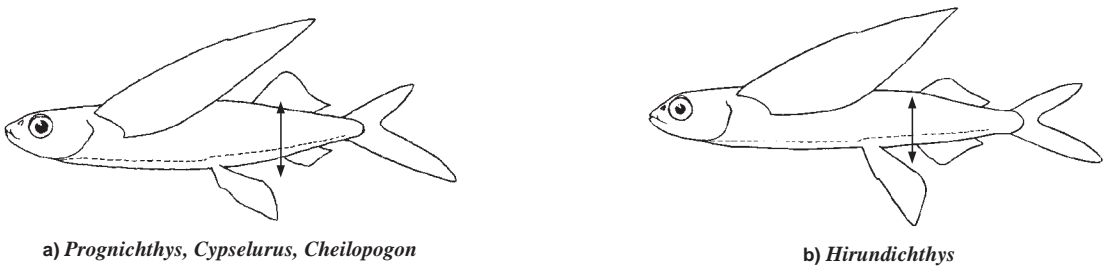
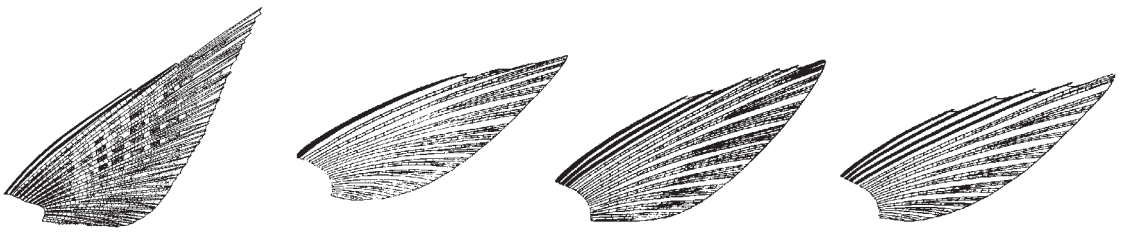


Fig. 6

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



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

Fig. 7

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

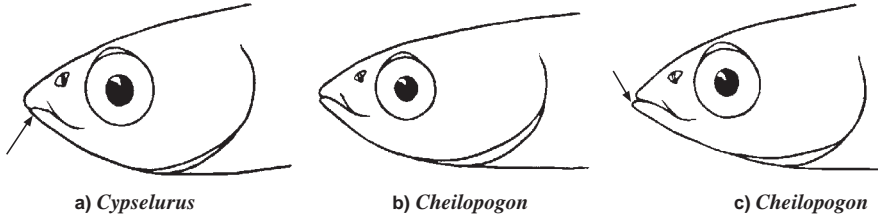


Fig. 8 lateral view of head

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

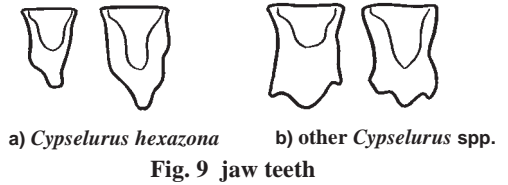


Fig. 9 jaw teeth

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

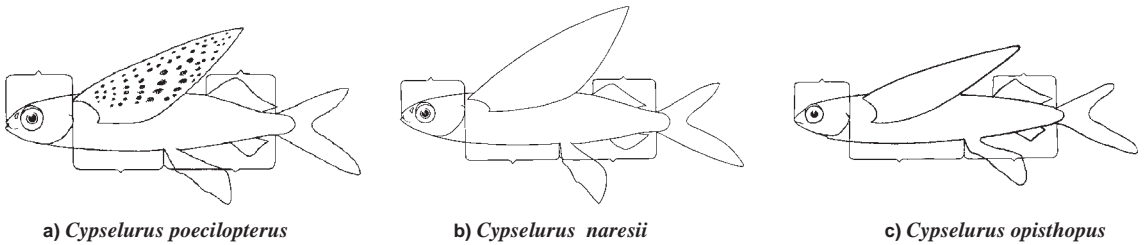


Fig. 10

- 12a. Pectoral fins without dark spots, their tip light (Fig. 11a) . . . . . *Cypselurus oligolepis*
- 12b. Pectoral fins with dark spots, their tip not light (Fig. 11b, c) . . . . . → 13

- 13a. Predorsal scales 28 to 34; pectoral fins with varying number of dark spots not arranged in regular transverse bands (Fig. 11b) . . . . . *Cypselurus simus*
- 13b. Predorsal scales 24 to 28; pectoral fins with numerous dark spots arranged in regular transverse bands (Fig. 11c). . . . . *Cypselurus poecilopterus*

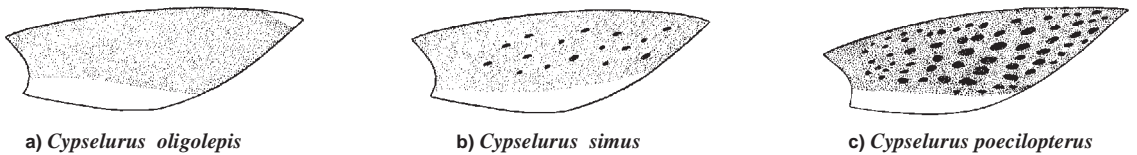


Fig. 11

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

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

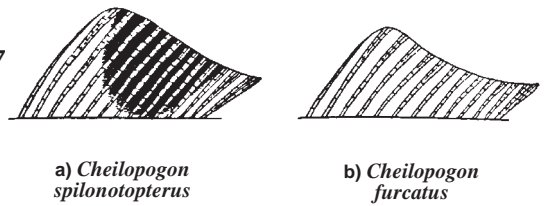


Fig. 12 dorsal fin

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

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

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

18a. Pectoral fins without dark spots . . . . . → 19

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

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

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

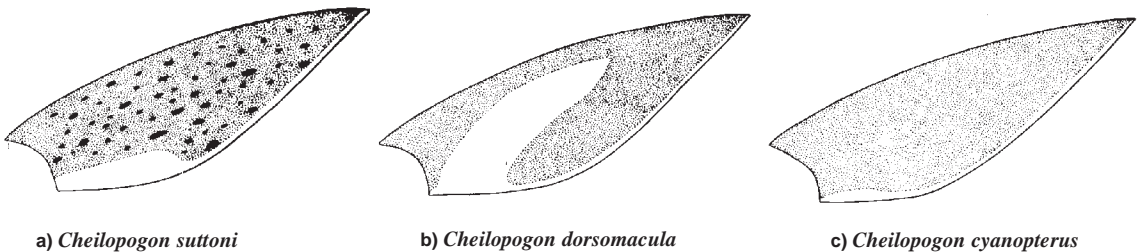


Fig. 13 pectoral fin

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

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

- 21a. Pelvic fins with a prominent black spot; cross band of pectoral fins usually yellow . . . . . *Cheilopogon abei*
- 21b. Pelvic fins without black spot; cross band of pectoral fins not yellow. . . . . → 22
  
- 22a. Dorsal fin usually with a greyish or blackish spot; predorsal scales 25 to 29 . . . . . *Cheilopogon dorsomacula*
- 22b. Dorsal fin uniformly pale; predorsal scales 23 to 26 . . . . . *Cheilopogon katoptron*
  
- 23a. Predorsal scales 28 to 34; dorsal fin usually without black spot . . . . . *Cheilopogon spilopterus*
- 23b. Predorsal scales 33 to 42; dorsal fin with black spot . . . . . → 24
  
- 24a. Pelvic fins inserted nearer head than origin of lower caudal-fin lobe; head shorter than distance from dorsal-fin origin to origin of upper caudal-fin lobe (Fig. 14a) . . . . . *Cheilopogon atrisignis*
- 24b. Pelvic fins inserted about midway between head and origin of lower caudal-fin lobe; head subequal to distance from dorsal-fin origin to origin of upper caudal-fin lobe (Fig. 4b) . . . . . *Cheilopogon suttoni*

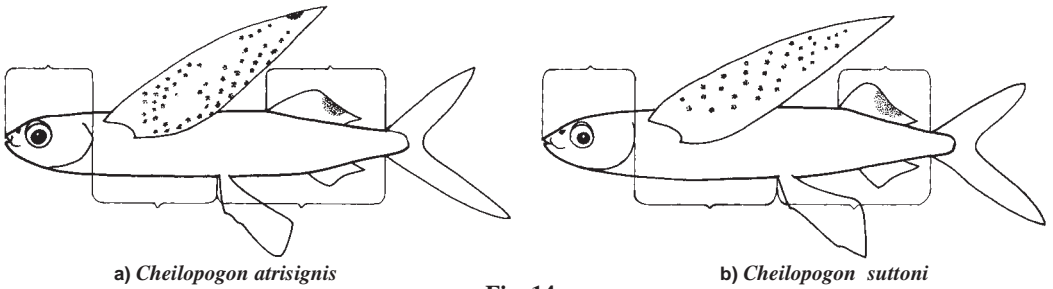


Fig. 14

- 25a. Jaws subequal (Fig. 8b); palatine teeth usually present; pelvic fins inserted about midway between head and origin of lower caudal-fin lobe . . . . . *Cheilopogon intermedius*
- 25b. Lower jaw a little longer than upper jaw (Fig. 8c); no palatine teeth; pelvic fins inserted nearer head than origin of lower caudal-fin lobe. . . . . → 26
  
- 26a. Pectoral fins usually with varying number of scattered dark dots; 8 or 9 transverse rows of scales between dorsal-fin origin and lateral line . . . . . *Cheilopogon pitcairnensis*
- 26b. Pectoral fins without dark dots; 7 or 8 transverse rows of scales between dorsal-fin origin and lateral line . . . . . → 27
  
- 27a. Anal-fin rays 8 or 9; predorsal scales 26 to 29 . . . . . *Cheilopogon arcticeps*
- 27b. Anal-fin rays 9 to 11; predorsal scales usually 29 to 33 . . . . . → 28

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

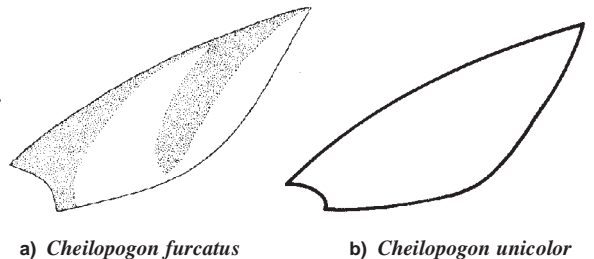
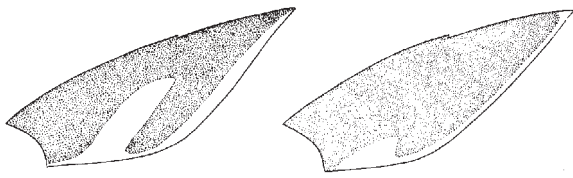


Fig. 15 pectoral fin

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


































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

Fig. 16 pectoral fin

**List of species occurring in the area**

The symbol  is given when species accounts are included.

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

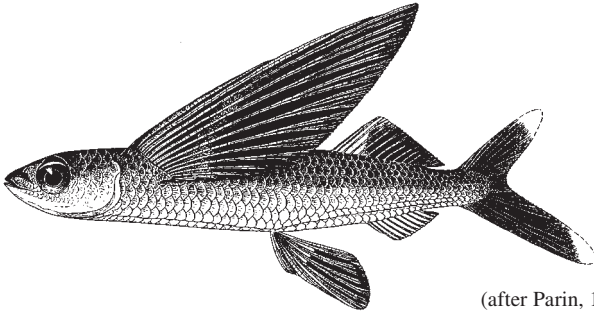
**Reference**

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

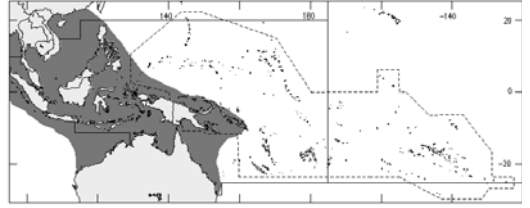


***Cheilopogon abei* Parin, 1996****En** - Abe's flyingfish.

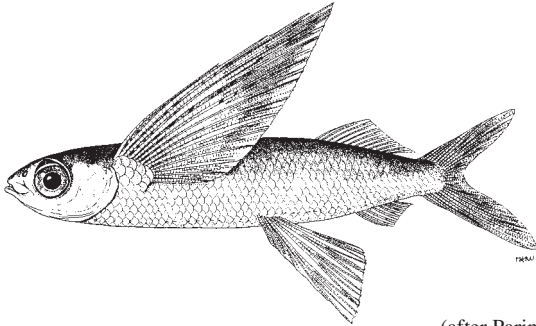
Maximum standard length about 22 cm. Pelagic in neritic surface waters. No importance in fisheries. Distributed in the northern Indian and western Pacific oceans from East Africa to Solomon Islands.



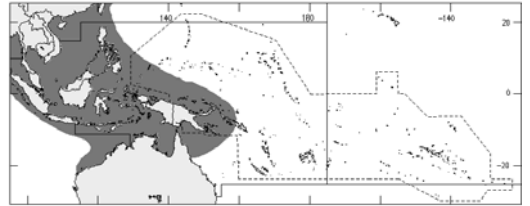
(after Parin, 1996)

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

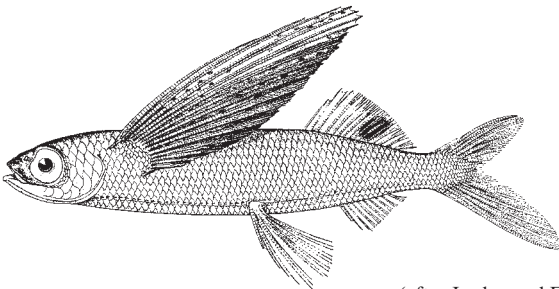
Maximum standard length about 21 cm. Pelagic in nearshore and neritic surface waters, never spread to open sea. No importance in fisheries. Distributed in the western Pacific Ocean (southern China, Viet Nam, Thailand, Indonesia, New Guinea, Solomon Islands).



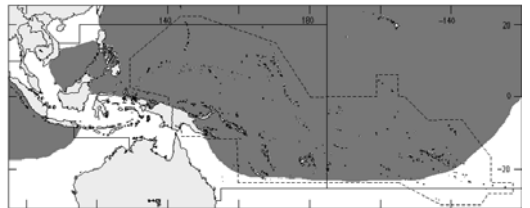
(after Parin, 1961)

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

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



(after Jordan and Evermann, 1905)

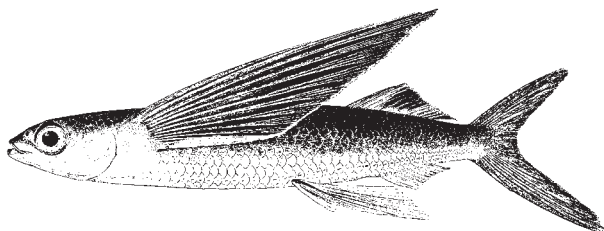




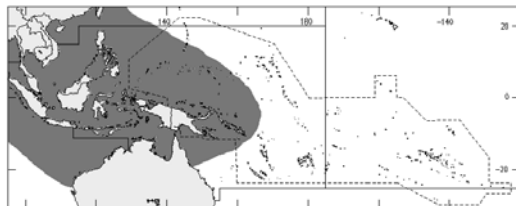
***Cheilopogon cyanopterus*** (Valenciennes, 1846)

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

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



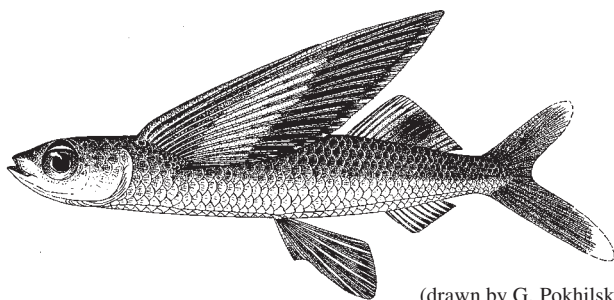
(after Bruun, 1935)



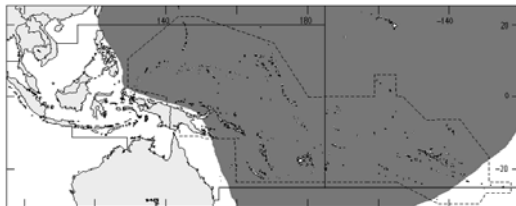
***Cheilopogon dorsomacula*** (Fowler, 1944)

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

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



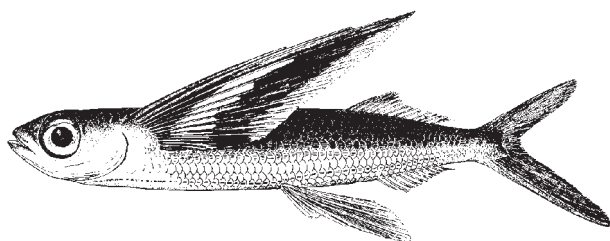
(drawn by G. Pokhilskaya)



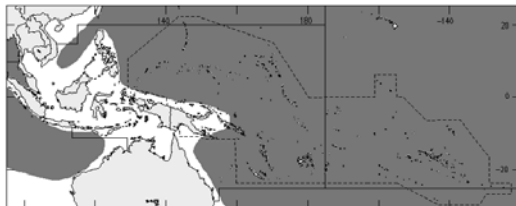
***Cheilopogon furcatus*** (Mitchill, 1815)

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

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



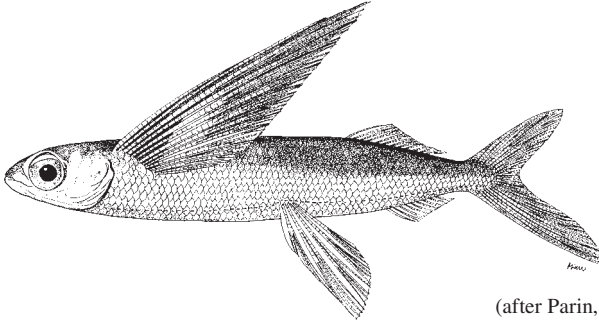
(after Bruun, 1935)



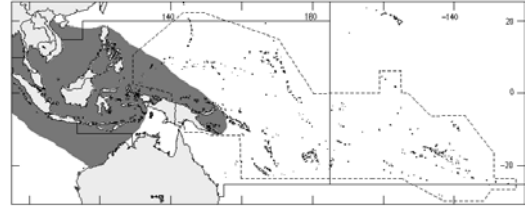
***Cheilopogo intermedius* Parin, 1961**

**En** - Intermediate flyingfish.

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



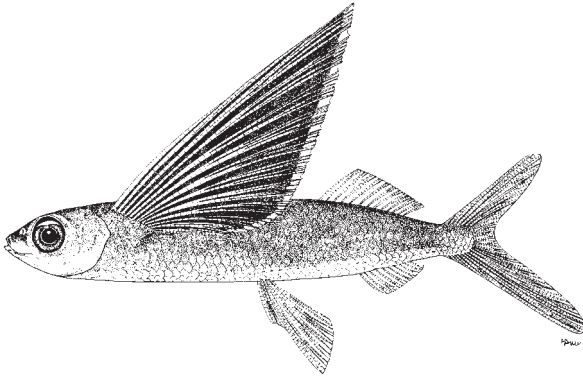
(after Parin, 1961)



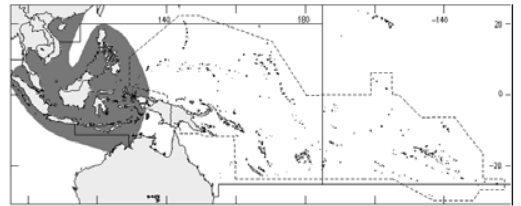
***Cheilopogon katoptron* (Bleeker, 1866)**

**En** - Indonesian flyingfish.

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



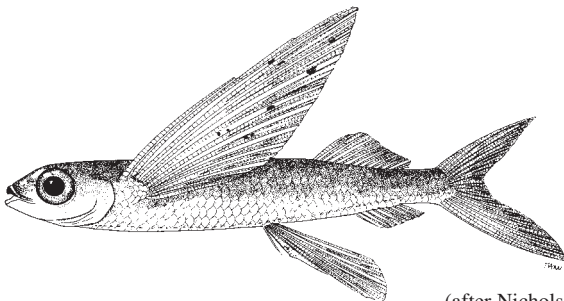
(after Parin and Besednov, 1965)



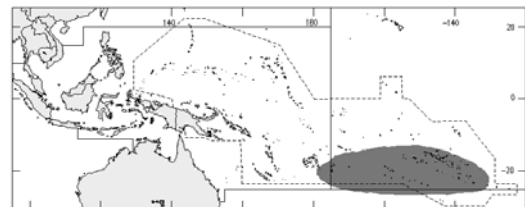
***Cheilopogon pitcairnensis* (Nichols and Breder, 1935)**

**En** - Pitcairn flyingfish.

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



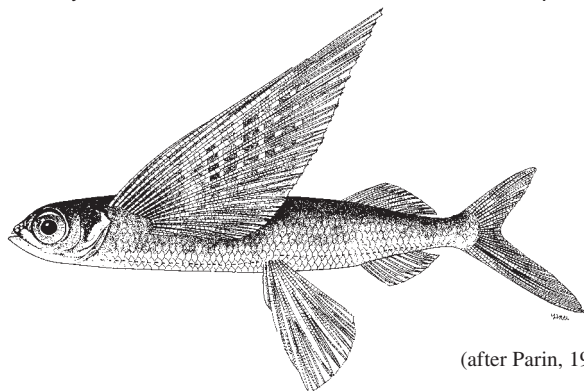
(after Nichols and Breder, 1935)



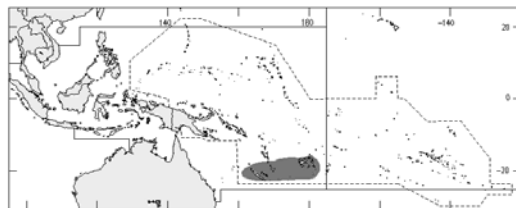
***Cheilopogon rapanouiensis* Parin, 1962**

**En** - Rapanoui flyingfish.

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



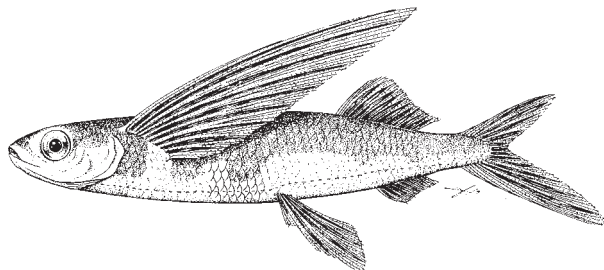
(after Parin, 1961)



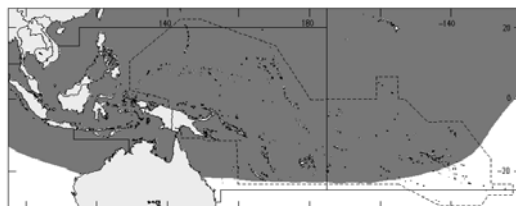
***Cheilopogon spilonotus* (Bleeker, 1866)**

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

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



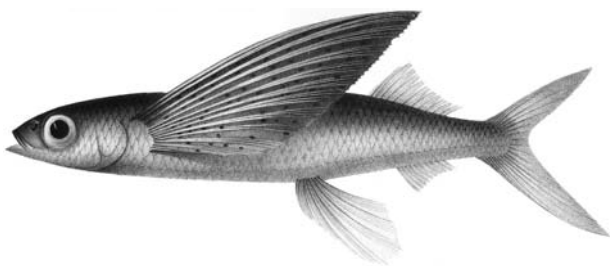
(after Parin, 1960)



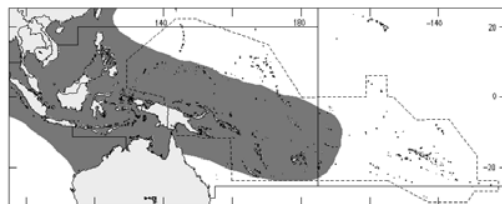
***Cheilopogon spilopterus* (Valenciennes, 1846)**

**En** - Manyspotted flyingfish.

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



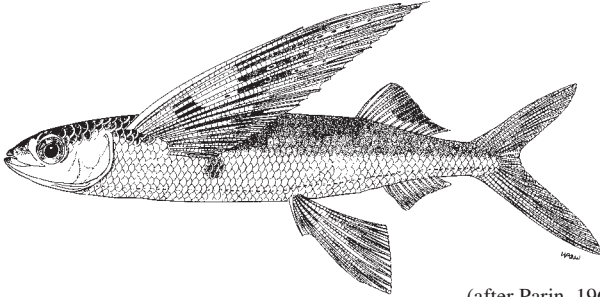
(from Bleeker, 1866-72)



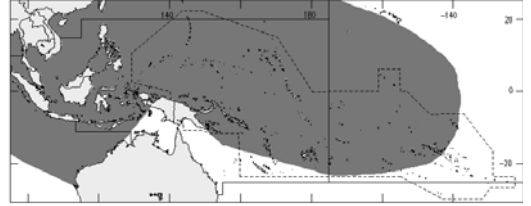
***Cheilopogon suttoni*** (Whitley and Colefax, 1938)

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

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

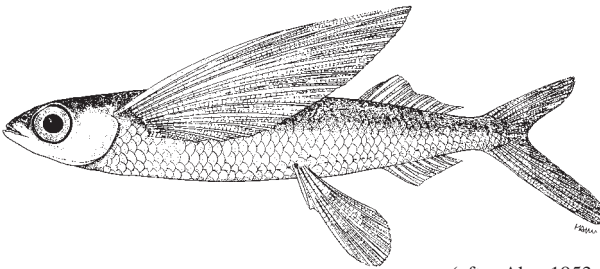


(after Parin, 1960)

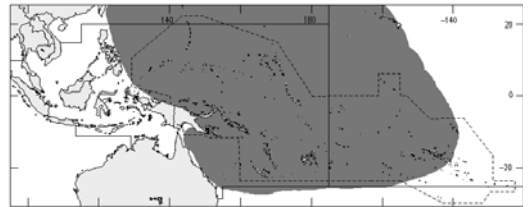
***Cheilopogon unicolor*** (Valenciennes, 1846)

**En** - Limpidwing flyingfish.

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

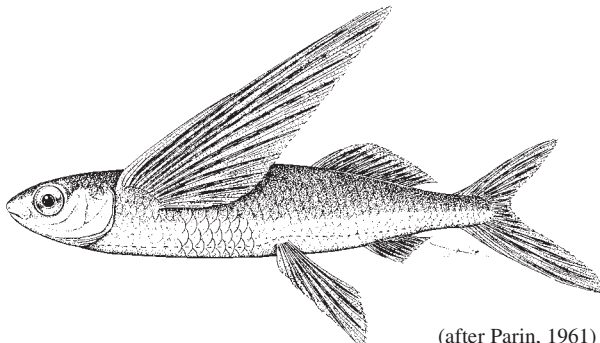


(after Abe, 1953-56)

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

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

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



(after Parin, 1961)

