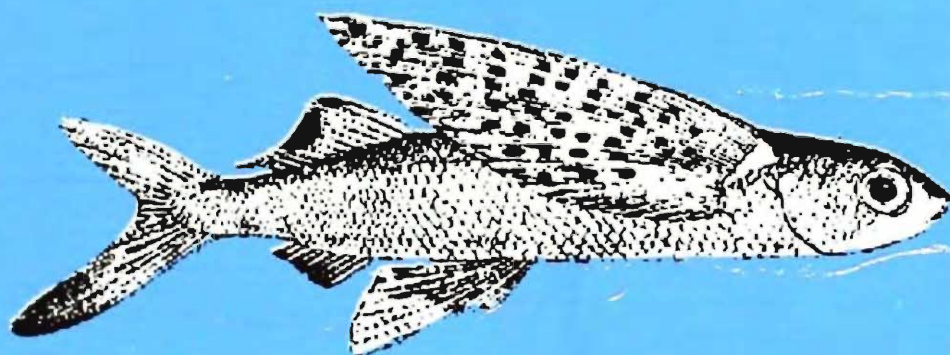


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**Records of the
Zoological Survey of India**

**Review of the Flying Fish Family Exocoetidae
in the Indian Waters**



**R. P. Barman
S. S. Mishra**

ZOOLOGICAL SURVEY OF INDIA

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Edited by the Director, Zoological Survey of India, Kolkata



**Zoological Survey of India
Kolkata**

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INTRODUCTION

Flying fishes are typical members of the epipelagic fish community that inhabits surface waters of the open-ocean and inshore areas. They are prone to emerge rapidly from the water by beating the water with the large lower lobe of the caudal fin and glide over fairly long distances, for about 200m or more, by means of their expanded pectoral fins. They are well known for their gliding capacity, rather than flying. They use their gliding ability to protect themselves from their enemies/predators. Generally a flying fish can glide at double its swimming speed. Some species have been known to accelerate from a fast swimming speed of about 36 km per hour to as much as 72 km per hour. The maximum size of these fishes known is 10 cm to 30 cm standard length.

The flying fishes are usually appreciated as good food fishes, but only a few contribute to commercial fisheries and most of them are of minor fishery importance.

The taxonomy of flying fishes is very much confusing, especially for those of Indian coast. Some of their identifying characters are overlapping. Therefore, an attempt has been undertaken to specify more precisely the identifying characters of these interesting fishes.

Day (1877) described only 5 species of flying fishes from India and a halfbeak fish (Hemiramphidae) as *Exocoetus micropterus* Valenciennes (= *Oxyporhamphus micropterus*). Day (1889) added one more species to the list. Weber and de Beaufort (1922) recorded one species of *Parexocoetus*, one species of *Exocoetus* and 17 species under genus *Cypselurus* of which only 6 species mentioned from Indian coast. Hornell (1923) reported *Cypselurus coromandelensis* from Madras and Nagapattinum as new to science. Chandy (1954) gave the description of 4 species and an undetermined species of which two are additions to the flying fish fauna of India. Jones and Kumaran (1965) described *C. oligolepis* (Bleeker) from our region. Rao and Basheeruddin (1973) reported the occurrence of *Parexocoetus brachypterus* (Richardson) from Madras coast that considered as misidentified *P. mento* (Valenciennes). Report of *C. starksi* Abe by Kyushin *et al.* (1977) is probably erroneous. Talwar (1984) included the flying fishes of India under 12 species belonging to 5 genera, which is mostly based on old information and is in need of revision. Rao *et al.* (2000) has reported only two species of flying fishes from Andaman and Nicobar Islands.

The flying fish holdings at National Zoological Collection at Zoological Survey of India, Kolkata, The Andaman and Nicobar Regional Station, Z. S. I., Port Blair and the recent collections made are studied for the purpose and incorporated in this present work.

Family EXOCOETIDAE

Body elongate, sub-cylindrical to laterally compressed, usually flattened ventrally. Snout blunt, shorter than eye in all Indian Ocean species. Mouth small, maxilla not extending anterior border of the orbit. Eyes with flattened corneas that enable the fish to focus in and out of the water. Jaws short, the upper rounded; teeth absent or very small on jaws. Gill rakers well developed. Lower pharyngeal bones fused, upper pharyngeal bones of third gill arches close together, but not fused. Nasal organ is a pit, with protruding lobate tentacle. *No spines in fins*. Dorsal and anal fins posterior in position, their bases short and opposed. Pelvic fins are abdominal in position, with 6 soft rays. Generally most of the species are with enlarged pelvic fins, usually extending to the origin of anal fin; a few species have small or medium sized pelvic fins, either reaching anal fin origin or short of it. *Pectoral fins high on sides, strikingly long, extending beyond dorsal fin origin*. Caudal fin deeply forked; lower lobe longer than upper. Scales large, cycloid, easily detached. Lateral line low; runs along ventral margin of body. Swimbladder is large, extending posteriorly beyond body cavity. Vertebrae 35 to 52.

Colour : dark above, pale below; the dark colour usually iridescent blue or green in life. Pectoral fins in some species with dark spots or pale transverse stripes. Dorsal fin in some species is with black pigmentation.

Juveniles often with single or paired chin barbels and usually quite unlike the adults in colour pattern and relative size of the fins.

Parin (1961) first placed *Cheilopogon* Lowe, 1840 and *Cypselurus* Swainson, 1838 as subgenera under the genus *Cypselurus*, a splitting which was not accepted by Staiger (1965) on the ground that the distinguishing characters of the proposed subgenera are either overlapping, intermediate or are similar. Hence, the genus *Cheilopogon* included in *Cypselurus* by many authors. But in the present work, in parlance with the current nomenclature, both the genus kept separate. Staiger (1965) accepted a similar arrangement of *Danichthys* Bruun, 1935 and *Hirundichthys* Breder, 1928 as subgenera under the genus *Hirundichthys* by considering the two are clearly separable as presented by Parin (1961). At present, *Danichthys* is raised to a monotypic genus status. The total genera of the family are numbered at eight, including the genus *Fodiator* Jordan and Meek, 1885.

The family is comprised of 8 genera and a total of 67 species in the world (Eschmeyer, 2005) and is represented by only 6 genera and 14 species in Indian waters.

LIST OF THE SPECIES OCCURRING IN THE INDIAN WATERS

1. *Cheilopogon cyanopterus* (Valenciennes)
2. *Cheilopogon furcatus* (Mitchill)
3. *Cheilopogon nigricans* (Bennett)
4. *Cheilopogon spilopterus* (Valenciennes)
5. *Cypselurus naresii* (Gunther)
6. *Cypselurus oligolepis* (Bleeker)
7. *Cypselurus poecilopterus* (Valenciennes)
8. *Exocoetus monocirrhus* (Richardson)
9. *Exocoetus volitans* Linnaeus
10. *Hirundichthys coromandelensis* (Hornell)
11. *Hirundichthys oxycephalus* (Bleeker)
12. *Hirundichthys speculiger* (Valenciennes)
13. *Parexocoetus mento* (Valenciennes)
14. *Prognichthys brevipinnis* (Valenciennes)

Key to the genera

- 1a. Pelvic fins short, not reaching or just reaching anal fin origin 2
- 1b. Pelvic fins long, reaching beyond anal fin origin 3
- 2a. Pectoral fins reaching beyond anal fin base; its length about 69% of standard length; pelvic fins short, far from reaching anal fin origin, its insertion nearer to pectoral fin base than to anal fin origin; lateral line without a branch to pectoral fin origin; upper jaw not protrusible *Exocoetus*
- 2b. Pectoral fins not reaching beyond anal fin base, its length about 60% of standard length; pelvic fins medium, hardly reaching anal fin origin, its insertion closer to

- anal fin origin than to pectoral fin base; lateral line with a branch extending upwards to pectoral fin base; upper jaw protrusible *Parexocoetus*
- 3a. Anal fin origin anterior to 3rd ray of dorsal fin; dorsal fin usually with less, or equal number of rays than anal fin (rarely with 1 or 2 more)
..... *Hirundichthys*
- 3b. Anal fin origin under or behind 3rd ray of dorsal fin; dorsal fin rays usually 2-4 rays (rarely 1) more than the rays in anal fin. 4
- 4a. First 2-4 rays of pectoral fin unbranched *Prognichthys*
- 4b. Only the first pectoral fin ray unbranched 5
- 5a. Lower jaw usually a little shorter than upper, and included beneath the upper jaw; at least some jaw teeth tricuspid; juveniles with a single chin barbel or without barbel *Cypselurus*
- 5b. Jaws subequal, or lower jaw a little longer than upper jaw; jaw teeth mostly unicuspid or with smaller supplementary cusps laterally; juveniles with two barbels (or fused)..... *Cheilopogon*

Genus *Cheilopogon* Lowe

1841. *Cheilopogon* Lowe, *Proc. Zool. Soc. Lond.*, : 38 (Type species : *Cypselurus pulchellus* Lowe = *Cheilopogon pinnatibarbatu*s (Bennet)).

Body elongate, thick, flattened ventrally to some extent. Upper jaw not protrusible. Jaws subequal, or lower jaw a little longer than upper jaw and, so lower jaw not included beneath the upper. Teeth in jaws mostly unicuspid or with smaller supplementary cusps laterally. Dorsal fin low, anterior rays longest. Anal fin origin under or behind 3rd ray of dorsal fin; dorsal fin rays usually 2 to 4 (rarely 1) more than in the rays in anal fin. Pectoral fins strikingly long, reaching beyond anal fin base. Pelvic fins long, reaching beyond anal fin origin; their insertion closer to anal fin origin than to pectoral fin base. Lateral line without a branch to pectoral fin origin. Juveniles usually with two barbels.

Around the world 30 species are recognized, whereas only 4 species are definitely known from Indian waters. Apart from these 4 species, other 3 species are known to occur in the Indian Ocean, viz., *C. atrisignis* (Jenkins, 1903); *C. katoptron* (Bleeker, 1866) and *C. suttoni* (Whitley and Colefax, 1938). These species are likely to be captured from Indian waters and so included in key with an asterisk (*) mark.

Key to species

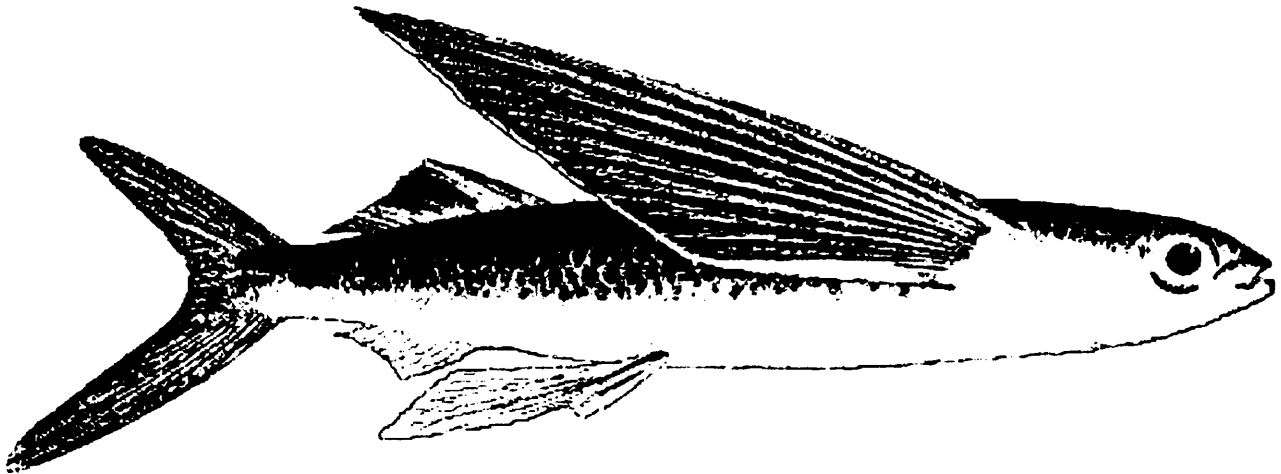
- 1a. Pectoral fin of adults with small dark spots scattered on pale background 2
- 1b. Pectoral fin without spots, uniformly dark or with pale cross band 4
- 2a. Dorsal fin with 14 to 16 rays; pectoral fin spots round and oblique, arranged in rows; distance between dorsal fin origin and caudal fin base distinctly shorter than head *C. atrisignis**
- 2b. Dorsal fin with 12 to 14 rays; pectoral fin spots round and scattered; distance between dorsal fin origin and caudal fin base subequal or slightly longer than head 3
- 3a. Predorsal scales 34 to 40; pelvic fin origin midway between head and caudal fin base *C. suttoni**
- 3b. Predorsal scales 30 to 32; pelvic fin origin nearer to head than caudal fin base *C. spilopterus*
- 4a. Predorsal scales 33 to 41; pectoral fin uniformly dark, with out transverse stripe *C. cyanopterus*
- 4b. Predorsal scales 24 to 33; pectoral fin dark, with a pale transverse stripe 5
- 5a. Dorsal fin with prominent black spot; palatine teeth present; jaw teeth clearly noticeable *C. nigricans*
- 5b. Dorsal fin uniformly pale; palatine teeth absent; jaw teeth barely visible 6
- 6a. Pectoral fin with a pale triangular cross band and a wide pale margin *C. furcatus*
- 6b. Pectoral fin with a broad yellowish white cross band *C. katoptron**

1. *Cheilopogon cyanopterus* (Valenciennes)

- 1846. *Exocoetus cyanopterus* Valenciennes, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, 19 : 97 (Type locality : Brazil).
- 1984. *Cheilopogon cyanopterus* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Cheil 2.

Materials examined : Not examined by us. Information based on earlier publications.

Common name Margined flying fish.



Description : Head length 4.0 to 4.5 times in standard length; sub-equal to distance between dorsal fin origin and origin of upper lobe of caudal fin. Upper jaw not protrusible; lower jaw not included beneath the upper; palatine teeth usually present. Total gill rakers 21 to 28 on first arch. Dorsal fin with 12 to 14 rays. Anal fin with 9 to 11 rays, its origin 5 to 7 rays behind origin of dorsal fin. Pectoral fins strikingly long, 65 to 70% of standard length; with 1 unbranched ray and 12 to 14 branched rays. Pelvic fins large, reaching well beyond anal fin origin, their insertion closer to anal fin origin than to pectoral fin base and much nearer to hind margin of head than to origin of lower caudal fin lobe. Predorsal scales 33 to 41. Pectoral branch of lateral line absent. Juveniles with a pair of long chin barbels and without lateral flaps.

Colour : Dark iridescent blue above, pale below. Dorsal fin with a prominent black spot. Pectoral fins dark, blue in life, without a pale transverse stripe or dark spots. Pelvic fins without spots in adults, but with a dark spot in juveniles.

Size : Maximum about 29 cm standard length.

Distribution : Indo-West Pacific : South Africa to southern Japan, Taiwan, Mariana, Caroline, Solomon Island, Queensland and Arafura Sea; West Atlantic : New Jersey, USA, northern Gulf of Mexico to Rio de Janeiro, Brazil; East Atlantic : Guinea to Gaza.

Remarks : *Exocoetus bahiensis* Ranzani, 1842 is considered to be a synonym of *Cheilopogon cyanopterus* (Valenciennes, 1846). Hence, the report of the former from India by Day (1877 and 1889) and Weber and de Beaufort (1922) probably refers to the later species.

2. *Cheilopogon furcatus* (Mitchill)

1815. *Exocoetus furcatus* Mitchill, *Trans. Lit. Philosoph. Soc. New York*, 1 : 449, pl. 5, fig. 2
(Type locality : New York, USA).

1877. *Exocoetus furcatus* : Day, *Fishes of India* : 519.

1889. *Exocoetus furcatus* : Day, *Fauna of Br. India, Fishes*, 1 : 429.

1984. *Cypselurus furcatus* : Talwar, *Commercial Sea Fishes of India* : 299.

1984. *Cheilopogon furcatus* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Cheil 3.

Materials examined : 2 ex., 200–230 mm SL, Reg. No. F 9723/2, Nagapattinam, Tamil Nadu. R. P. Barman and party, 08-07-2003; 2 ex., 182–187 mm SL, Reg. No. 2335, Nancowry Island (Nicobar Group), D. V. Rao and party, 10-02-1993.



Common name : Spotfin flying fish.

Description Body depth 5.4 to 6.1 and head length 4.3 to 4.5 times in standard length. Head length is considerably shorter than distance between dorsal fin origin and origin of upper caudal fin lobe. Upper jaw not protrusible; lower jaw somewhat longer than the upper. Palatine teeth absent. Total gillrakers 18 to 24 on first arch. Dorsal fin with 12 to 14 rays. Anal fin with 9 to 11 rays, its origin below 5th to 7th ray of dorsal fin. Pectoral fins long, 60 to 70% of standard length, with 1 unbranched and 13 to 16 branched rays. Pelvic fins reaching well beyond anal fin origin, their insertion closer to anal fin origin than to pectoral fin base, and much nearer to hind margin of head than to origin of lower caudal fin lobe. Predorsal scales 26 to 33. Pectoral branch of lateral line absent. Juveniles with a pair of short chin barbels, its length less than 35% of standard length, and without lateral flaps.

Colour : Dark iridescent blue or greenish-blue dorsally, pale ventrally. Dorsal fin not pigmented, without a black spot. Pectoral fins grayish with a pale margin, the central portion crossed by a pale transverse stripe becoming narrower towards fin margin; hind margin hyaline. Pelvic fins without spots.

Size Maximum about 30 cm standard length.

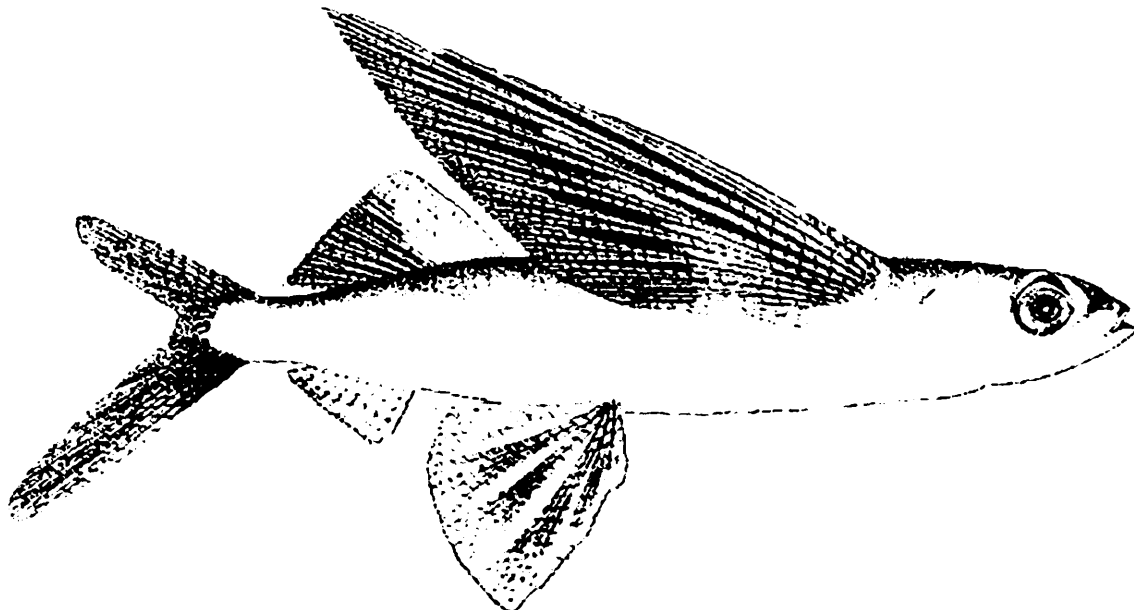
Distribution : Widely distributed in the tropical Indian Ocean and also in the Atlantic and Pacific Oceans.

Remarks : Talwar (1984) considered *Exocoetus altipennis* Valenciennes reported from Bombay coast by Day (1889) and Weber and de Beaufort (1922) as *C. furcatus*. But, considering the description given by Day (1877), we are of the opinion that his specimen belongs to a closely allied species *C. katoptron* (Bleeker, 1866) that differs from *C. furcatus* without having a broad pale margin. *E. attipennis*, presently considered as *Cheilopogon pinnatibarbus altipennis*, differs from *C. furcatus* and *C. katoptron* in having 39 to 45 predorsal scales, teeth on palatine and usually dark brownish grey pectoral fin with narrow, pale, transverse stripe (Heemstra and Parin, 1986).

3. *Cheilopogon nigricans* (Bennett)

1840. *Exocoetus nigricans* Bennett, *Whalling Voyage II* : 287 (Type locality : Atlantic and Pacific oceans in lat. 5° N)

1984. *Cheilopogon nigricans* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51). 2* : EXOC Cheil 4.



Materials examined : 3 ex., 171–182 mm SL, Reg. No. F 9668/2, Dhanuskodi, Rameswaram, Tamil Nadu, R. P. Barman and party, 19-01-2002.

Common name : African flying fish.

Description : Body depth 5.3 to 6.4 and head 4.0 to 4.4 in standard length. Head shorter than the distance between dorsal fin origin and origin of upper caudal lobe. Jaws of equal length; upper jaw not protrusible; lower jaw not included beneath the upper; palatine teeth present. Total gill rakers 20 to 27 on first arch. Dorsal fin with 13 to 15 rays. Anal fin with 8 to 11 rays, its origin below 5 to 7 rays behind origin of dorsal fin. Pectoral fins long, 67 to 73% of standard length, with 1 unbranched ray and 13 or 14 branched rays. Pelvic fins abdominal, large, reaching well past 5th anal fin ray, their insertion closer to anal fin origin than to pectoral fin base and nearer to hind margin of head than to origin of lower caudal lobe. Lateral line low on body with 45 to 50 scales, without a branch to pectoral fin base. Predorsal scales 24 to 28. Juveniles with a pair of chin barbels, their length about 35% of standard length, each bearing a small lateral flap.

Colour : Dark iridescent blue above and pale below. Dorsal fin with a prominent black spot. Pectoral fins black with a pale margin, the central portion crossed by a yellow or grayish-yellow transverse stripe becoming narrower towards fin margin. Pelvic fins usually with a prominent black spot.

Size : Maximum about 24 cm standard length.

Distribution : Worldwide in tropical waters.

Remarks : Chandy (1954) erroneously recorded *Cypselurus exsiliens* (Linnaeus) from Indian waters, which definitely refers to this species. *Cypselurus exsiliens* is known to occur in the Western Atlantic Ocean only and so, unlikely to occur in the Indian coast.

4. *Cheilopogon spilopterus* (Valenciennes)

1846. *Exocoetus spilopterus* Valenciennes, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, 19 : 113 (Type locality : Strong I., Caroline Is.).

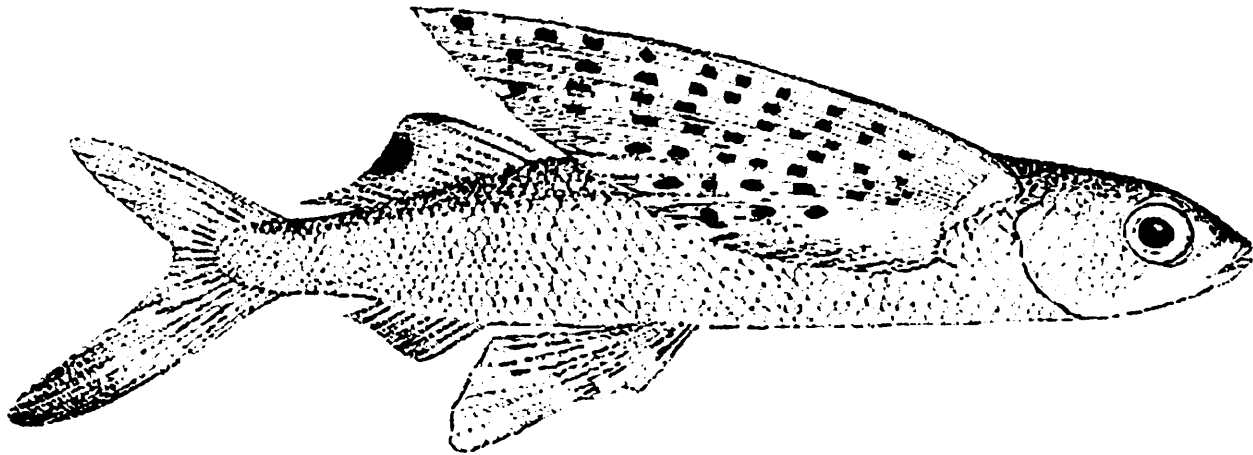
1954. *Cypselurus spilopterus* : Chandy, *Rec. Indian Mus.*, 52 : 178.

Materials examined : Not examined by us. Information based on earlier works.

Common name : Manyspotted flying fish.

Description : Body depth 5.0 to 5.3, head 4.0 to 4.3 times in standard length. Lower jaw longer, not included beneath upper jaw. Palatine with a few teeth. Distance between

origin of dorsal fin and origin of upper caudal fin lobe equal to or scarcely longer than head. Dorsal fin with 12 to 15 rays. Anal fin with 9 or 10 rays, its origin below 6th ray of dorsal fin. First ray of pectoral fin undivided, with total 14 to 15 rays. Pectoral fin



long, reaching to posterior part of dorsal fin or beyond. Pelvic fins longer than head length, extending to about middle of anal fin base, its origin nearer to head than to lower caudal fin lobe. Predorsal scales 30 to 32. Lateral line low on body, with 50 to 55 scales; without a branch to pectoral fin base. Scale rows along transverse series between dorsal fin origin to lateral line 7 and 3 rows below lateral line.

Colour Back iridescent blue, silvery ventrally. Pectoral fin light bluish, with a narrow hyaline border and a conspicuous hyaline transverse band, with numerous scattered round black spots. Caudal fin dusky; dorsal and pelvic fins with a black spot posteriorly.

Size Maximum about 25 cm standard length.

Distribution : East coast of India to Samoa, Ryukyu Islands in the Pacific Ocean.

Remarks Talwar (1984) united *Cypselurus poecilopterus* (Valenciennes) described by Day (1877) from Bombay coast, India with *Cheilopogon spilopterus*, following statements of earlier workers (Weber and de Beaufort, 1922; Chandy, 1954). But it has been found that this is not the only species along Indian coast with spotted pectoral fin (Barman, Mishra and Das, in press). The generic allocation to this species is based on the recent studies (Parin, 1996).

Fishery information : This species is commonly found along Tamil Nadu and Andhra Pradesh coast. It is a large sized flying fish of Indian waters and occurs along with the catches of *Hirundichthys coromandelensis* (Hornell).

Genus *Cypselurus* Swainson

1838. *Cypselurus* Swainson, *Natural History of Animals, Fishes*, 1 : 299 (Type species : *Exocoetus appendiculatus* Wood = *E. comatus* Mitchell)

Body elongate, robust, flattened ventrally to some extent. Upper jaw not protrusible. Lower jaw usually a little shorter than upper, and included beneath the upper jaw; teeth small on jaws, at least some jaw teeth tricuspid; palatine teeth may or may not present. Dorsal fin low, anterior rays longest. Anal fin origin under or behind 3rd ray of dorsal fin; dorsal fin rays usually 2 to 4 (rarely 1) rays more than the rays in anal fin. Pectoral fins strikingly long, reaching beyond anal fin base. Pelvic fins long, reaching beyond anal fin origin; their insertion closer to anal fin origin than to pectoral fin base. Lateral line without a branch to pectoral fin origin.

There are 12 species recognized in the world, only 3 species recorded from our coast. Apart from these three, *C. opisthopus* (Bleeker, 1866) is known to occur in the Indian Ocean (de Bruin *et al.*, 1995) and likely to be captured from our coastal waters, and so included in the Key with an asterisk (*) mark. *C. starksi* Abe was reported from Andaman Seas (Kyushin *et al.*, 1977), but the identification seems to be erroneous since the species is known only from Southern Japan (Parin, 1996).

Key to species

- 1a. Pectoral fin pale, with numerous dark spots arranged in bands
..... *C. poecilopterus*
- 1b. Pectoral fin dark, without dark spots 2
- 2a. Pelvic fin origin nearer to head than to caudal fin base; predorsal scales 23 to 27; juveniles without barbels *C. oligolepis*
- 2b. Pelvic fin origin not nearer to head than to caudal fin base; predorsal scales 27 to 38 3
- 3a. Pelvic fin origin nearer to caudal fin base than to head; pectoral fin with upper two thirds black and lower third hyaline; anal fin with 9 rays
..... *C. opisthopus**
- 3b. Pelvic fin origin midway between head and caudal fin base; pectoral fin grayish brown, lower portion and posterior tip colourless, anal fin with 7 to 9 rays
..... *C. naresii*

5. *Cypselurus naresii* (Gunther)

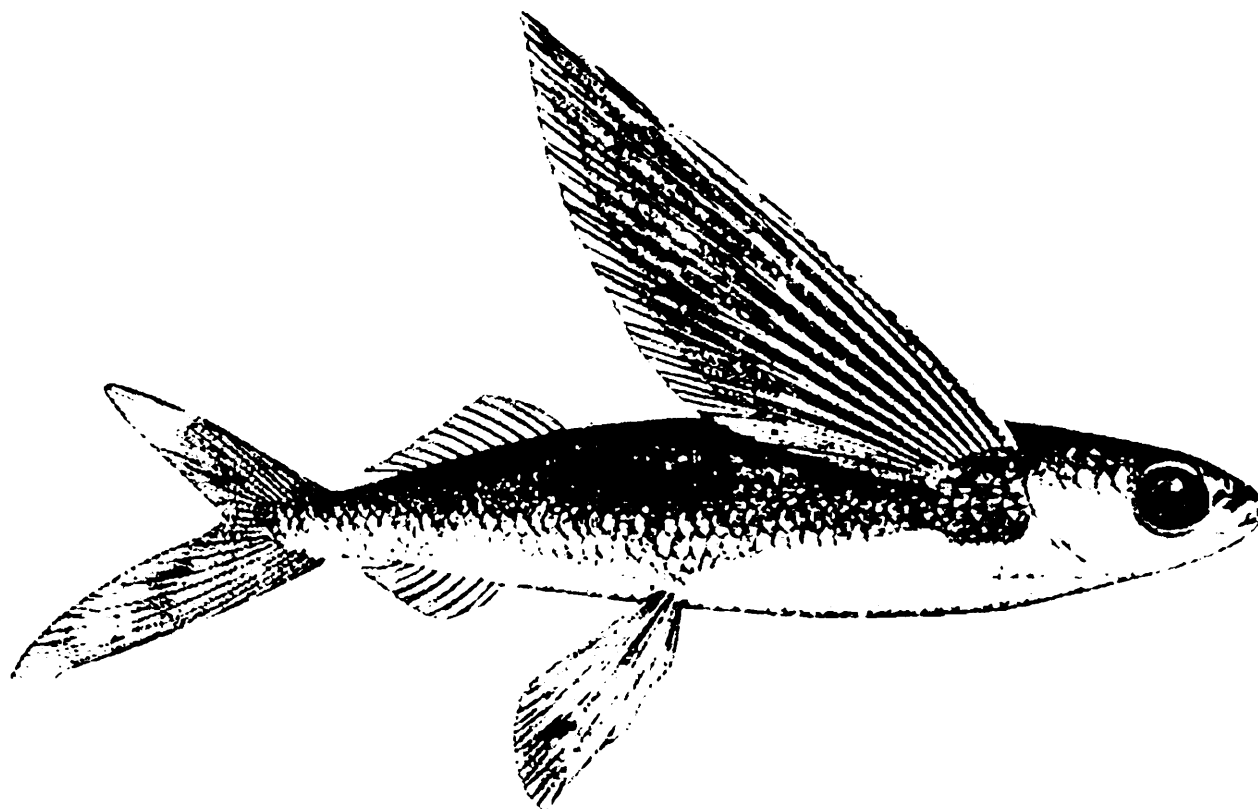
1889. *Exocoetus naresii* Gunther, *Zool. Challenger Exp.*, 31 : pt. 78 (Type locality : Cape York, Queensland, Australia).

1922. *Cypselurus naresi* : Weber and de Beaufort, *Fish. Indo-Aust. Archip.*, 4 : 188.

1984. *Cypselurus naresii* : Parin, in Fischer and Bianchi, *110 species identification sheets for fishery purposes. Fishing Area 51 (W. Indian Ocean)*, 2 : EXOC Cyp 10.

Materials examined : 1 ex., 165 mm SL; Reg. No. ZSI F 9678/2, Nagapattinam, Tamil Nadu, S. India; R. P. Barman and party, 08-07-2003.

Common name : Pharaoh flying fish.



Description : Body depth less than 20%, head length about 26.5% of standard length. Upper jaw not protrusible; lower jaw included beneath the upper; palatine teeth present. Distance between dorsal fin origin and origin of upper caudal fin lobe equals head length. Total gillrakers 22 on first arch. Dorsal fin with 10 to 12 rays and anal fin with 7 to 9 rays. Anal fin originate 4 to 7 rays behind origin of dorsal fin. Pectoral fin long, its length about 65 to 70% of standard length; reaching to caudal peduncle, beyond anal fin base; with 1 unbranched ray and 14 branched rays. Pelvic fin large; reaching to end of anal fin base; their insertion closer to anal fin origin than to pectoral fin base and approximately at midpoint of distance between hind margin of head and origin of lower

caudal fin lobe. Caudal fin deeply forked, its lower lobe longer than upper. Scales large, cycloid, easily shed. Predorsal scales 27 to 32. Lateral line low on body, with 48 scales; pectoral branch of lateral line absent; 9 scale rows above lateral line and origin of dorsal fin base. Juveniles with a single barbel, that is triangular in cross-section.

Colour Dark above, pale below; dorsal fin grayish; pectoral fin brownish black, not pigmented below 9th ray; pelvic fins with distal half black between 2nd and 4th ray.

Size : Maximum about 21 cm standard length.

Distribution : Tropical waters of Indian and Pacific Ocean from Gulf of Aden and East Africa to Southern Japan, Fiji and New South Wales, Australia.

Remarks : This has recently been reported from Indian coast (Barman, Mishra and Mukherjee, 2005). Report of *Cypselurus comatus* (Mitchill, 1815) from Ceylon by Munro (1955) is erroneous and is a misidentification of *Cypselurus naresii* (Gunther) (de Bruin *et al.*, 1995) and probably this is also true with the specimens dealt by Padmanabhan (1963).

6. *Cypselurus oligolepis* (Bleeker)

1866. *Exocoetus oligolepis* Bleeker, *Ned. Tijdschr. Dierk.*, 3 : 111 (Type locality : Singapore; Jakarta, Java; Boelong, Bali; Sumatra; Makasar, Sulawesi (Celebes); Labuha, Batjan; Neiva, Banda Is.).

1954. *Cypselurus oligolepis* : Chandy, *Rec. Indian Mus.*, 52 : 179.

1965. *Cypselurus oligolepis* : Jones and Kumaran, *J. mar. biol. Ass. India*, 7(1) : 111, fig. 5.

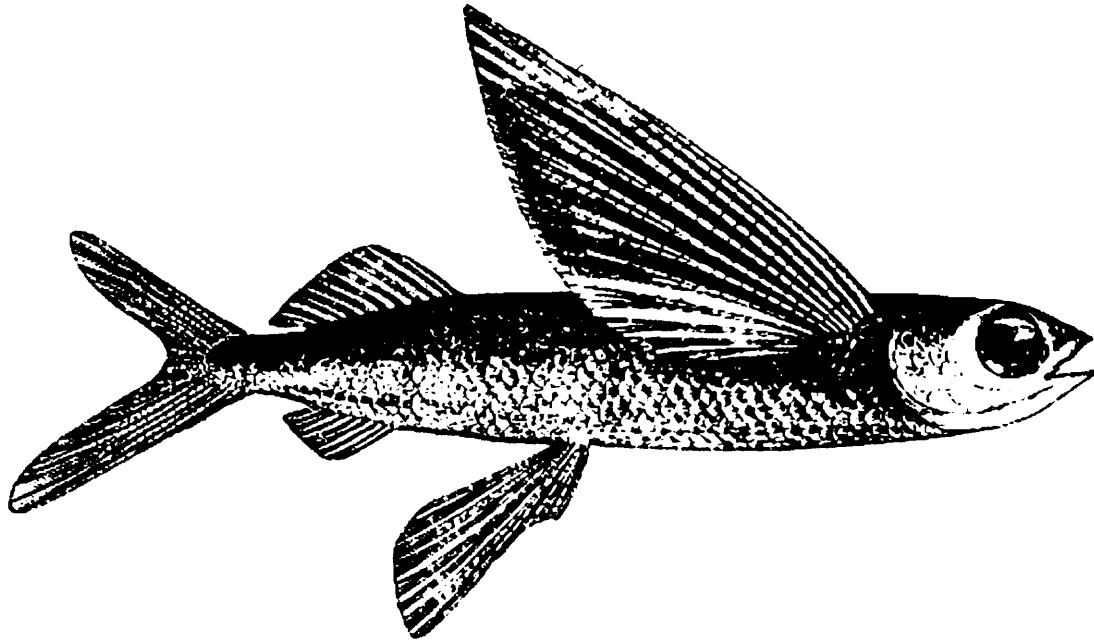
1984. *Cypselurus oligolepis* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Cyp 11.

Materials examined : 10 ex., 138–145 mm SL, Reg. No. F 9667/2, Dhanuskodi, Rameswaram, Tamil Nadu, R. P. Barman and party, 01-10-2002; 3 ex., 140–145 mm SL, Reg. No. 2336, Mayabunder (North Andaman), D. V. Rao and party, 09-01-1992.

Common name Largescale flying fish.

Description : Body depth 4.7 to 5.5 times in standard length. Head much shorter than distance between dorsal fin origin and origin of upper caudal fin lobe. Upper jaw not protrusible; lower jaw a little shorter than the upper, included beneath the upper jaw. Palatine teeth present. Dorsal fin with 10 to 12 rays. Anal fin with 7 to 9 rays, its origin 4 to 7 rays behind dorsal fin origin. Pectoral fin long, 65 to 70% of standard length, only the first ray undivided and with 13 to 14 branched rays. Pelvic fins reaching well beyond anal fin origin, their insertion closer to anal fin origin than to pectoral fin base and much

nearer to hind margin of head than to origin of lower caudal fin lobe. Lateral line with 39 to 40 scales without a pectoral branch. Predorsal scales 23 to 27. Juveniles without chin barbel.



Colour : Usually iridescent greenish-blue above and pale below. Dorsal fin grayish. Pectoral fins grayish-brown, their lower portion and hinder tip colourless. Pelvic fins without spots, but dark in juveniles.

Size : Maximum about 27 cm standard length.

Distribution : Indo-West Pacific in tropical waters.

7. *Cypselurus poecilopterus* (Valenciennes)

1846. *Exocoetus poecilopterus* Valenciennes, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, **19** : 112 (Type locality : New Britain Is., Bismark Archipelago).

1877. *Exocoetus poecilopterus* : Day, *Fishes of India* : 518, pl. 70, fig. 4.

1889. *Exocoetus poecilopterus* : Day, *Fauna Br. India, Fishes*, **1** : 430, fig. 138.

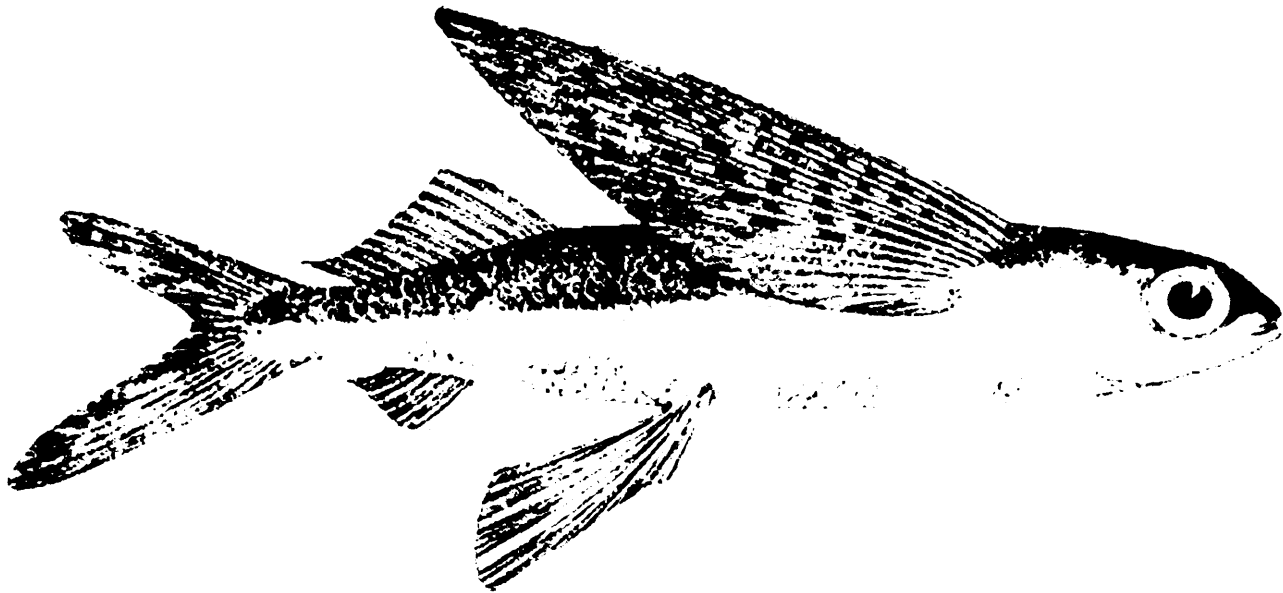
1922. *Cypselurus poecilopterus* : Weber and de Beaufort, *Fish. Indo-Aust. Archip.*, **4** : 186.

1984. *Cypselurus poecilopterus* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, **2** : EXOC Cyp 12.

Materials examined : 2 ex., 165–170 mm SL; Reg. No. ZSI F 9669/2; Dhanuskodi, Tamil Nadu, S. India, R. P. Barman and party, 01-10-2002.

Common name : Yellow-wing flying fish.

Description : Body elongate, more or less flattened ventrally. Body depth 4.7 to 4.8 times in standard length. Head distinctly shorter than the distance from dorsal fin origin to origin of upper caudal fin lobe. Lower jaw included beneath the upper jaw. Total gill rakers 21 to 22 on first arch. Dorsal fin with 11 to 13 rays. Anal fin with 7 to 9 rays; originates below 6th or 7th ray of dorsal fin. Pectoral fins strikingly long, reaching almost last ray of dorsal fin; with 1 unbranched ray and 14 branched rays. Pelvic fins long, reaching to middle of anal fin, its origin nearer to hind margin of head than to origin of lower caudal fin lobe, and close to anal fin origin than to base of pectoral fins. Predorsal



scales 24 to 28. Lateral line low on body with about 45 scales and without a branch to pectoral fin base. Juveniles without a chin barbel.

Colour : Body dark, iridescent blue dorsally, silvery white below. Pectoral fins with numerous rather large ovate, black spots distinctly arranged in bands, but absent in lower part of the fin. Pelvic fins with a few ovate, black spots. Dorsal and anal fins hyaline and caudal fin dusky.

Size : Maximum about 21 cm standard length.

Distribution : Scattered distribution in the tropical Indian Ocean and Pacific Ocean.

Remarks : This species have been reported by Day (1877), but Weber and de Beaufort (1922) opined that 'the identification is erroneous' and Chandy (1954) supported this by stating 'our spotted variety is not *Exocoetus poecilopterus*'. This prompted Talwar (1984) to put this species of Day (1877) under *Cypselurus spilopterus* (= *Cheilopogon spilopterus*). Recently, Barmani, Mishra and Das (in press) have reported *Cypselurus pocilopterus* confirming its availability along Indian coast.

Genus *Exocoetus* Linnaeus

1758. *Exocoetus* Linnaeus, *Systema Naturae* (ed. 10), 1 : 316 (Type species : *Exocoetus volitans* Linnaeus).

Body elongate, thick, somewhat flattened ventrally. Snout short and blunt. Teeth very small, palatine edentulous. Upper jaw not protrusible. Dorsal fin low, anterior rays longest. Pectoral fins long, extending to caudal peduncle, usually reaching caudal fin base, its length greater than 69% of standard length. Pelvic fins short, not reaching anal fin origin, its length 21% of standard length; inserted nearer to pectoral fin base than to anal fin origin. Lateral line low on body, without a branch to pectoral fin base.

Five species recognized around the world, only two in our area.

Key to species

- 1a. Body depth 3.5 to 5.1 times in standard length. Gill rakers 21 to 29 on first arch. Usually 7 rows of scales between dorsal fin origin and lateral line. Juveniles hump-backed, with a chin barbel *E. monocirrhus*
- 1b. Body depth 5.1 to 6.0 times in standard length. Gill rakers 29 to 37 on first arch. Usually 6 rows of scales between dorsal fin origin and lateral line. Juveniles elongate, without chin barbel *E. volitans*

8. *Exocoetus monocirrhus* (Richardson)

1846. *Exocoetus monocirrhus* Richardson, *Rep. Br. Ass. Advmt. Sci., 15th meet, 1845* : 256 (Type locality : China).

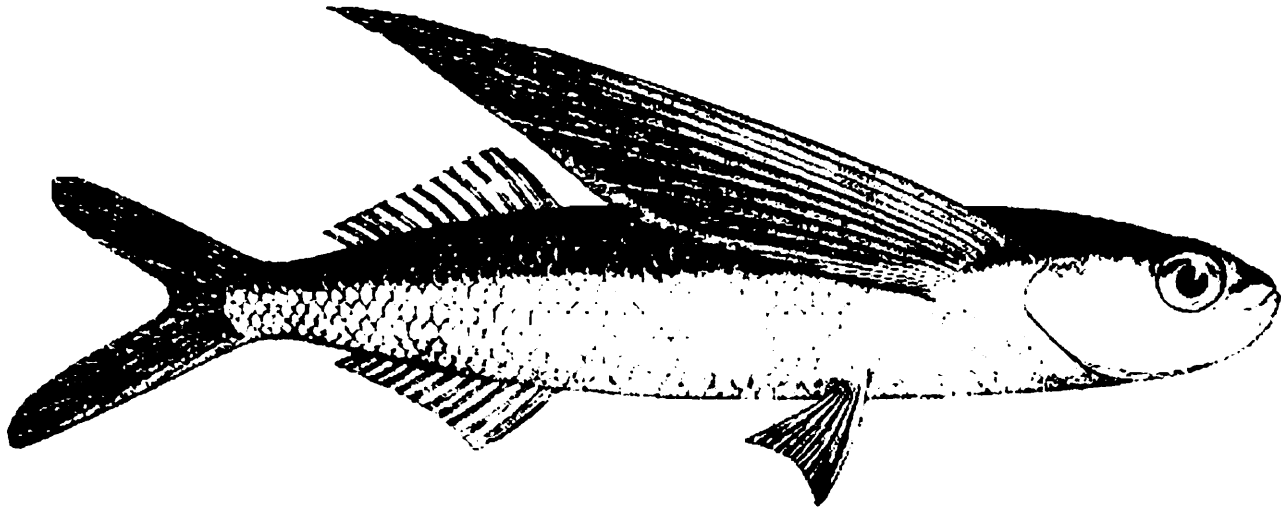
1984. *Exocoetus monocirrhus* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Exoc 3.

Materials examined : 1 ex, 155 mm SL, Reg. No. ZSI-F 9670/2, Dhanuskodi, Rameswaram, Tamil Nadu, R. P. Barman and party, 01-10-2002.

Common name : Barbel flying fish.

Description Body depth 3.5 to 5.1 times in standard length (usually greater than 20% of standard length). Head length 3.6 to 3.8 times in standard length. Jaws unequal, lower jaw slightly longer than upper; with very small teeth; palate edentulous. Mouth (upper jaw) not protrusible. Total gillrakers on first arch 21 to 29. Dorsal fin with 13 or 14 rays, anal fin with 12 to 14 rays, their bases opposite and equal in length. Pectoral fins with 1 unbranched and 14 to 16 rays and strikingly long, 70 to 75% of standard length; reaching to base of caudal fin. Pelvic fins short, far from reaching anal fin

origin; its origin closer to pectoral fin base than to origin of anal fin. Lateral line with about 45 scales, without a branch to pectoral fin base. Usually 7 transverse scales between dorsal fin origin and lateral line and 2 scales below it. Predorsal scales 17 to 21. Juveniles hump-backed, with a single chin barbel and with black pelvic fin.



Colour : Body dark iridescent blue dorsally, silvery white ventrally. Pectoral and caudal fins grayish, other fins without any pigment.

Size : Maximum about 20 cm standard length.

Distribution Indo-West Pacific and east Pacific.

Remarks : Although Parin (1984) has indicated its presence in the Indian Ocean, this is only recently reported from Indian coast (Barman, Mishra and Saren, 2004).

9. *Exocoetus volitans* Linnaeus

1758. *Exocoetus volitans* Linnaeus, *Systema Naturae* (ed. 10) : 316 (Type locality : open ocean off Europe and America).

1877. *Exocoetus evolans* : Day, *Fishes of India*, (3) : 519.

1889. *Exocoetus evolans* : Day, *Fauna Br. India. Fishes.* 1 : 429.

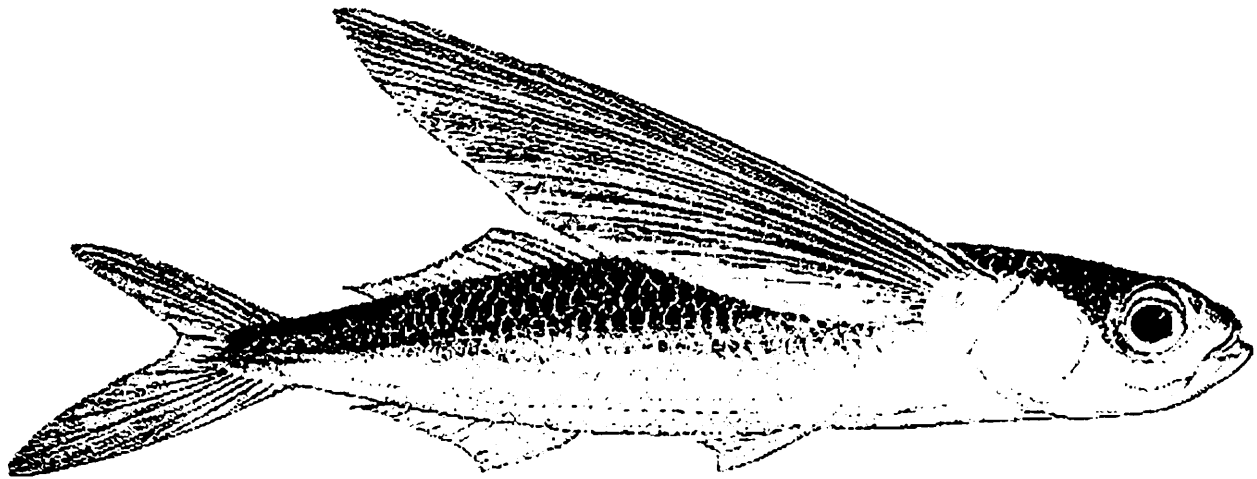
1984. *Exocoetus volitans* : Talwar, *Commercial Sea Fishes of India* : 302.

1984. *Exocoetus volitans* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Exoc 2.

Materials examined : 1 ex., 120 mm SL, Reg. No. F 7016/2, Lat. 12° N and 60° E, A. G. K. Menon, 08-11-1962; 3 ex., 138–163 mm SL, Reg. No. F 6258/2, Indian Ocean Stn. 358, K. V. Rama Rao, 11-06-1964; 2 ex., 78–80 mm SL, Reg. No. F 6257/2, Indian Ocean Stn. 375, K. V. Rama Rao, 16-06-1964.

Common name Tropical Two-wing flying fish.

Description Body depth 5.1 to 6.0 times in standard length, usually less than 19% of standard length. Head length 3.5 to 3.9 times in standard length. Jaws unequal, lower jaw slightly longer than upper; with very small teeth; palate edentulous. Mouth (upper jaw) not protrusible. Total gillrakers on first arch 29 to 37. Dorsal fin with 13 or 14



rays. Anal fin with 13 or 14 rays, their bases opposite. Pectoral fin strikingly long, 70 to 75% of standard length, with one undivided ray and 13 to 15 branched rays. Pelvic fins short, far from reaching anal fin origin. Usually 6 transverse scale rows between dorsal fin origin and lateral line. Predorsal scales 17 to 21. Juveniles elongated, without chin barbel and with unpigmented pelvic fin.

Colour : Dark, iridescent blue dorsally, silvery white ventrally. Dorsal and caudal fins grayish, other fins unpigmented. Juveniles sometimes with black bars.

Size : Maximum about 18 cm standard length.

Distribution Worldwide in tropical waters.

Genus *Hirundichthys* Breder

1928. *Hirundichthys* Breder, *Bull. Bingham Oceanogr. Coll., Yale Univ.*, 2(2) : 14, 20 (Type species : *Exocoetus rubescens* Rafinesque = *E. speculiger* Valenciennes).

Body elongate, thick, flattened ventrally to some extent. Snout blunt, shorter than eye. Vomer and tongue edentulous; palatine teeth may or may not present. Dorsal and anal fins placed in posterior half of body. Upper jaw not protrusible. Origin of anal fin slightly before, under or not more than 3 rays behind origin of dorsal fin. Dorsal fin

usually with equal or not more than 2 rays less than anal fin rays. Pectoral fins strikingly long, reaching beyond last ray of dorsal fin, usually extend up to caudal fin base. Pelvic fins long, reaching beyond anal fin origin, inserted nearer to caudal fin base than to tip of snout. Lateral line low on body, without a branch to pectoral fin base.

Eight species recognized in the world, three species occur in Indian waters. Earlier, *Danichthys* Bruun, 1935 was considered to be a subgenus of the genus *Hirundichthys*, but in the recent studies it is raised to the status of a monotypic genus and is known only from Atlantic Ocean. *H. affinis* (Gunther, 1866) known to occur in the Atlantic Ocean and in Arabian Sea and *H. socotranus* (Steindachner, 1902) recorded from Red Sea are never reported from Indian coast.

Key to species

- 1a. Predorsal scales 32 to 35; jaw teeth in a single row; pectoral fin with a small pale basal triangle and a narrow pale margin *H. oxycephalus*
- 1b. Predorsal scales 28 to 32; jaw teeth in 3 or 4 irregular rows 2
- 2a. Palatine teeth usually present; pectoral fin with a wider pale margin and with a broad pale basal triangle *H. speculiger*
- 2b. Palatine teeth absent; pectoral fin with a broad pale transverse stripe and a narrow pale margin *H. coromandelensis*

10. *Hirundichthys coromandelensis* (Hornell)

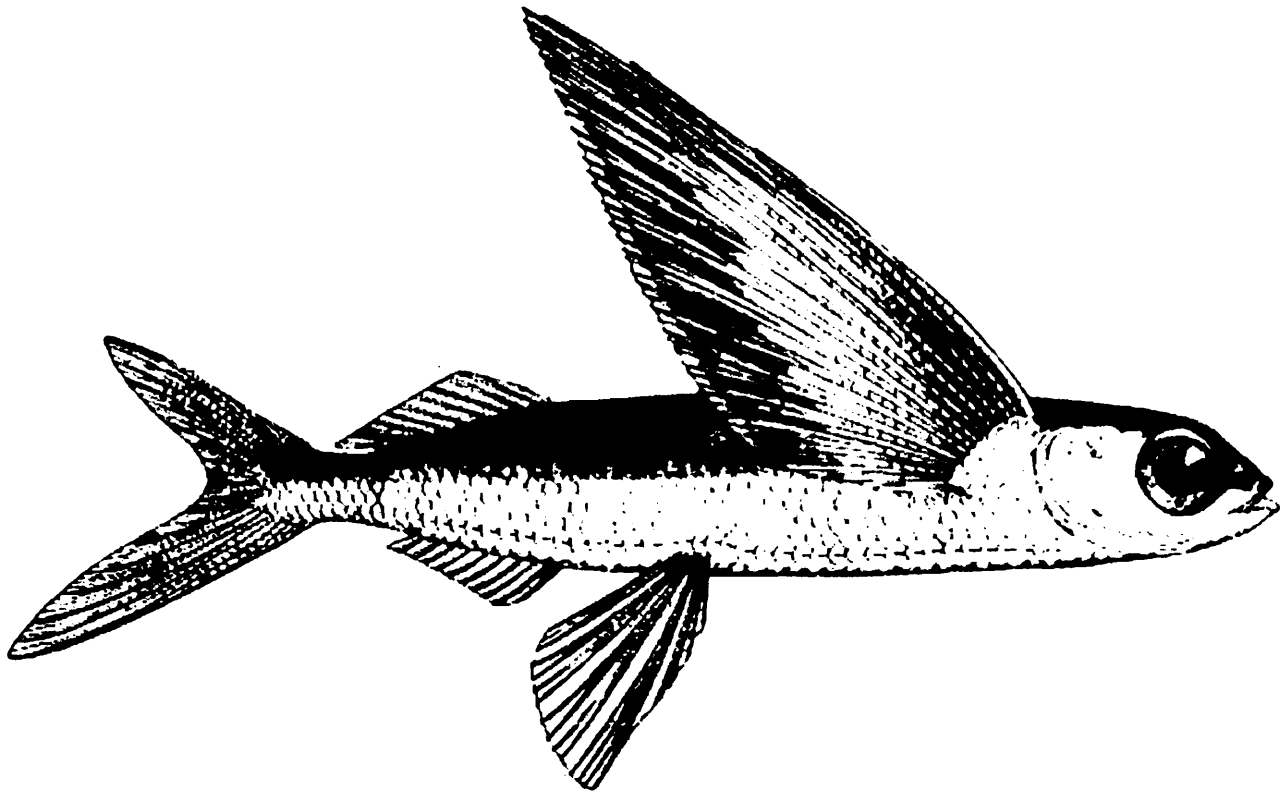
- 1923. *Cypsilurus coromandelensis* Hornell, *Madras Fish. Bull.*, 15 (4) : 100 (Type locality : Nagapattinam, Tamil Nadu).
- 1954. *Cypselurus coromandelensis* : Chandy, *Rec. Indian Mus.*, 52 : 181.
- 1973. *Hirundichthys (Hirundichthys) coromandelensis* : Vijayaraghavan, *Indian J. Fish.*, 20 (1) : 135, fig. 1.
- 1984. *Hirundichthys coromandelensis* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Hir 4.

Materials examined : Not examined by us. Information based on the earlier works.

Common name : Coromandel flying fish

Description : Body depth 5.3 to 6.7, head 4.1 to 4.8 times in standard length. The distance from dorsal fin origin to origin of upper caudal fin lobe equal to head length. Jaws of equal length, lower jaw not included beneath the upper. Teeth conical, in 3 or 4

irregular rows in jaws, absent in palatines. Dorsal fin with 9 to 12 rays, anterior rays longest. Anal fin with 10 to 12 rays, its origin under or before 2nd ray of dorsal fin. Pectoral fin with one undivided ray and 16 to 18 branched rays; it is long, 65 to 70% of standard length. Pelvic fins abdominal, large, reaching to middle of anal fin base, their insertion closer to anal fin origin than to pectoral fin base. Scales large, 29 to 32 scales before dorsal fin; 45 to 50 scales in lateral line; lateral line without pectoral branch.



Colour Dark iridescent greenish-blue dorsally, pale silvery white ventrally. Dorsal and caudal fins dusky, anal fin hyaline, pelvic fins slightly dusky in outer half. Pectoral fins dark with a broad, pale, transverse stripe in the center and a white trailing margin.

Size Maximum about 19 cm standard length.

Distribution : Indian Ocean- Arabian Sea and Bay of Bengal, except Red Sea, the Persian Gulf.

Fishery Information This species contribute a very important seasonal fishery along Tamil Nadu coast during May to July or August and amounts for nearly 90% of the flying fish landings of the country.

11 *Hirundichthys oxycephalus* (Bleeker)

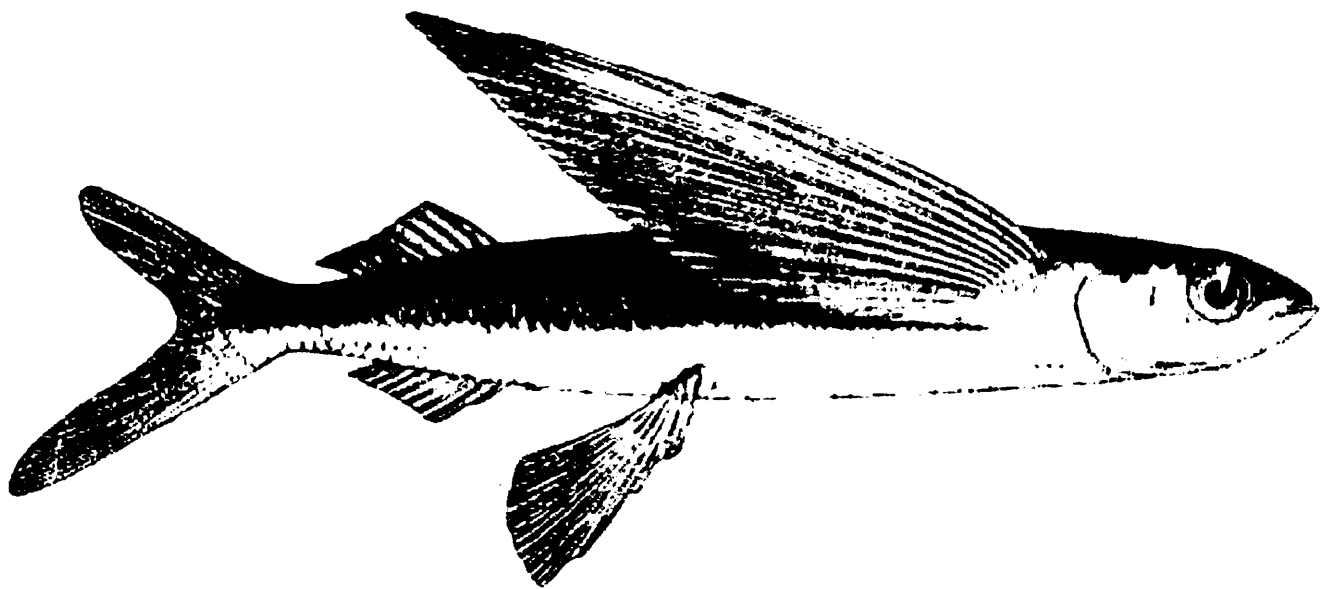
1852. *Exocoetus oxycephalus* Bleeker, *Nat. Tijdschr. Ned.-Indie*, 3 : 771 (Type locality : Jakarta [Batavia], Java, Indonesia; Makasar [Ujung Pandang], Sulawesi [Celebes]).

1984. *Hirundichthys oxycephalus* : Talwar, *Commercial Sea Fishes of India* : 304.

1984. *Hirundichthys oxycephalus* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Hir 5.

Materials examined : 1 ex., 130 mm SL, Reg. No. F 6259/2, Indian Ocean stns. 41-42, K. V. Rama Rao, in the year 1964, 31 ex., 150 –180 mm SL, Reg. No. F 9716/2 & F 9717/2, Nagapattinam, Tamil Nadu, R. P. Barman and party, 07-07-2003; 1 ex., 195 mm SL, Reg No. F 9671/2, Vinzhin, Trivendrum, Kerala, R. P. Barman and party, 19-01-2002.

Common name : Bony flying fish



Description Body depth 5.0 to 5.6, head 4.0 to 4.3 times in standard length. The distance from dorsal fin origin to origin of upper caudal fin lobe equal to or a little less than head length. Jaws of equal length, lower jaw not included beneath the upper. Teeth in jaws simple, conical, pointed, in a single row. Palatine edentulous. Dorsal and anal fins with 10 to 12 rays. Anal fin origin before 2nd ray of dorsal fin. Pectoral fins with one undivided ray and 14 to 16 branched rays, strikingly long, 62 to 70% of standard length. Pelvic fins abdominal, large, reaching to middle of anal fin base or further; their insertion closer to anal fin origin than to pectoral fin base, about midway between head and caudal fin base. Predorsal scales 32 to 35; lateral line with 50 to 55 scales, without a pectoral branch.

Colour : Dark iridescent blue or greenish-blue dorsally, pale silvery white ventrally. Dorsal fin unpigmented or dusky, middle rays of pelvic and caudal fins dusky, anal fin hyaline. Pectoral fins dark with a small, pale basal triangle and a narrow whitish trailing margin.

Size : Maximum about 20 cm standard length.

Distribution : Indo-West Pacific, from the Arabian Sea to Southern Japan, New Guinea, New South Wales, Australia.

Remarks : The name *H. affinis* (Gunther, 1866) has been used by some authors for the Western Indian Ocean population of *H. oxycephalus*, whereas *H. affinis* forms a distinct population in the Atlantic Ocean and also known to occur in the Arabian Sea (Parin, 1996), but not recorded from Indian waters.

12. *Hirundichthys speculiger* (Valenciennes)

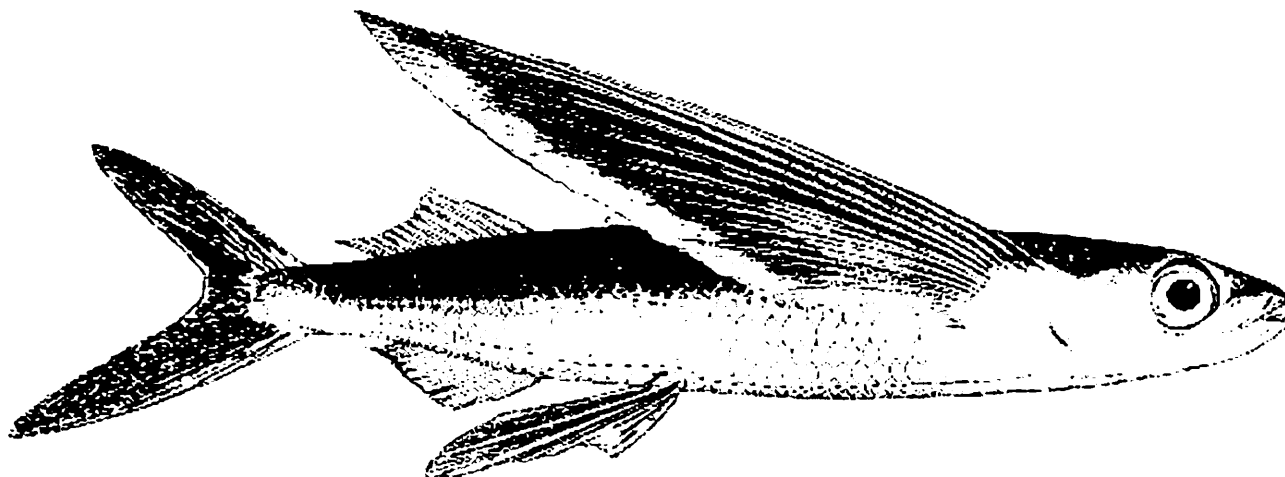
1846. *Exocoetus speculiger* Valenciennes, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, 19 : 94 (Type locality : Mauritius).

1922. *Cypsilurus speculiger* : Weber and de Beaufort, *Fish. Indo-Aust. Archip.*, 4 : 181.

1984. *Hirundichthys speculiger* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Hir 3.

Materials examined : 1 ex., 176 mm SL, Reg. No. 13810, Indian Ocean, Marine Survey, in the year 1889 (labeled as *Exocoetus speculiger*); 2 ex., 116–215 mm SL, Reg. No. F 6255, off Chochin, 8° N and 74° E, A. G. K. Menon and A. Ghosh, 27-11-1962.

Common name Mirror-wing flying fish



Description : Body depth 5.6 to 6.3, head 4.0 to 4.4 times in standard length. Head more or less equal to the distance between dorsal fin origin and origin of upper caudal fin lobe. Teeth simple, conical, pointed, in about 3 rows in the jaws. A few teeth present on palatine. Jaws of equal length, lower jaw not included beneath the upper. Dorsal fin with 10 to 12 rays, anterior rays longest. Anal fin with 11 to 13 rays, its origin before 2nd ray of dorsal fin. Pectoral fins with one undivided ray and 15 to 18 branched rays, strikingly long, 65 to 75 % of standard length. Pelvic fins abdominal, large, reaching middle of anal fin or further, their insertion closer to anal fin origin than to pectoral fin base. Gill rakers 23 to 29 on first arch. Predorsal scales 28 to 32; lateral line with about 50 scales, without a pectoral branch. Juveniles elongate, without chin barbel.

Colour : Dark iridescent blue dorsally, pale silvery white ventrally. Dorsal and caudal fins grayish, other fins hyaline. Pectoral fin with a pale transverse stripe and a wider pale margin. Paired fins in juveniles mottled.

Size : Maximum about 25 cm standard length.

Distribution : Worldwide in tropical waters.

Genus *Parexocoetus* Bleeker

1866. *Parexocoetus* Bleeker, *Ned. Tijdschr. Dierk.*, 3 : 126 (Type species : *Exocoetus mento* Cuvier).

Body elongate, fairly robust; snout blunt, shorter than the orbit. Upper jaw protrusible. Jaws and palatine toothed. Dorsal fin high, middle rays longest with dark pigmentation. Pectoral fins long, but not reaching beyond anal fin base, less than 60% of standard length. Pelvic fins short, hardly reaching anal fin origin, its insertion closer to anal fin origin than to pectoral fin base. Lateral line low on body with a branch to pectoral fin base. Caudal fin deeply forked, lower lobe longer.

Three species recognized in the world, two species known to occur in Indian Ocean, but only one recorded from Indian waters. *P. brachypterus* (Richardson, 1846) is included in the key with an asterisk mark (*) for it is likely to occur.

Key to species

- 1a. Predorsal scales 16 to 20; anal fin rays 10 to 12; dorsal fin rays 9 to 12, depressed dorsal fin hardly reaching origin of upper caudal fin lobe; depth 4.5 to 5.0 and head 3.7 to 4.0 in standard length; juveniles without chin barbel..... *P. mento*
- 1b. Predorsal scales 20 to 24; anal fin rays 12 to 14; dorsal fin rays 12 to 14, depressed dorsal fin reaching beyond origin of upper caudal fin lobe; depth 5.0 to

6.5 and head 4.1 to 4.5 in standard length; juveniles with short chin barbel
 *P. brachypterus**

13. *Parexocoetus mento* (Valenciennes)

1846. *Exocoetus mento* Valenciennes, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, 19 : 124 (Type locality : Pondicherry, India).

1877. *Exocoetus mento* : Day, *Fishes of India* : 520, pl. 121, fig. 9.

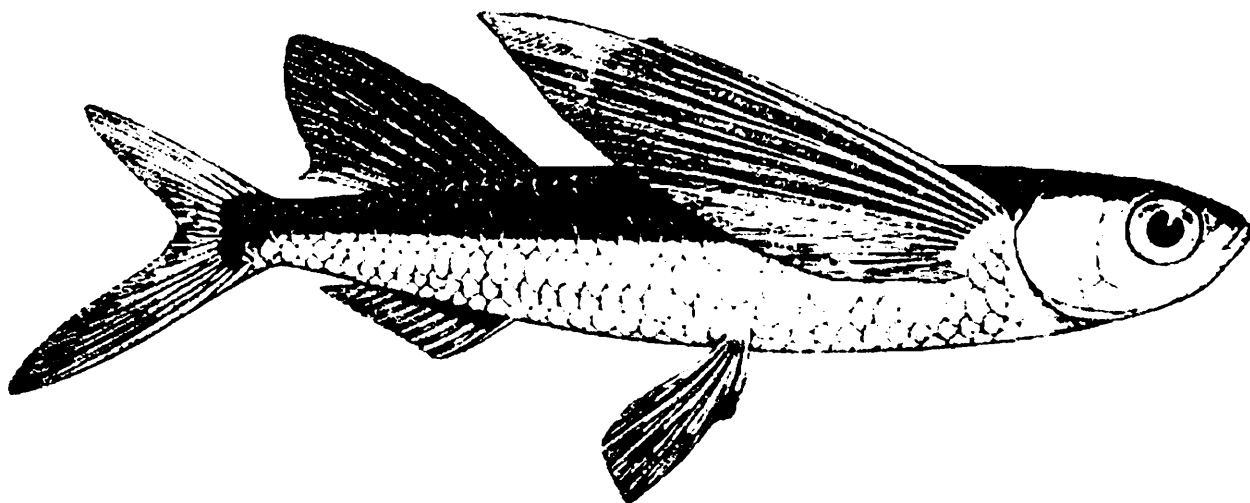
1889. *Exocoetus mento* : Day, *Fauna Br. India, Fishes.* 1 : 431.

1984. *Parexocoetus mento* : Talwar, *Commercial Sea Fishes of India* : 306.

1984. *Parexocoetus mento* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Par 2.

Materials examined : 1 ex., 78 mm SL, Reg. No. ZSI- 2508, Madras, F. Day, date not recorded (labeled as *Exocoetus manmina*).

Common name African sailfin flying fish.



Description : Body depth 4.5 to 5.0, head 3.7 to 4.0 times in standard length. Upper jaw protrusible; snout blunt, shorter than eye. Dorsal fin with 9 to 12 rays, the middle rays longest; depressed dorsal fin almost reaching to origin of upper caudal fin lobe. Anal fin with 10 to 12 rays. Pectoral fin long, 50 to 55% of standard length, with one undivided ray and 12 to 14 branched rays. Pelvic fin of medium size, not or just reaching anal fin origin, their insertion closer to anal fin origin than to pectoral fin base. Scales large, usually 16 to 20 predorsal scale rows. Lateral line with 38 to 42 scales, with a branch rising to pectoral fin base. Juveniles with a bony knob at front of lower jaw, which often remain in adults, but without chin barbels.

Colour : Dark iridescent greenish-blue dorsally, pale silvery white ventrally. Dorsal fin mostly blackish; pectoral and caudal fins grayish, other fins transparent.

Size : Maximum about 10 cm standard length. This is the smallest known flying fish.

Distribution : Indo-Pacific.

Remarks : Rao and Basheerudin (1973) reported *P. brachypterus brachypterus* (Richardson, 1846) from inshore waters of Madras. Although the specimens are not examined by us, from the descriptions given, we agree with Talwar (1984) in recording their identification as erroneous and consider it as *P. mento*, thus ruling out any definite record of *P. brachypterus* in Indian waters even though Parin (1984) indicated its presence.

Genus *Prognichthys* Breder

1928. *Prognichthys* Breder, *Bull. Bingham Oceanogr. Coll., Yale Univ.*, 2(2) : 14, 20 (Type species : *Exocoetus gibbifrons* Valenciennes).

Body elongate, thick, flattened ventrally to some extent. Upper jaw not protrusible; lower jaw included beneath the upper. Palatine edentulous. Dorsal fin low, anterior rays mostly longer. Pectoral fin long with 2 to 4 unbranched rays. Pelvic fin large reaching well beyond anal fin origin. Lateral line low on body, but without a pectoral branch.

Six species recognized in the world, 2 species known to occur in the Indian Ocean, but only one recorded from our coast. Since, *P. sealei* Abe, 1953 is likely to occur along our coast it is included in the key with an asterisk (*) mark.

Key to species

- 1a. Pectoral fin with upper 3 rays unbranched *P. brevipinnis*
- 1b. Pectoral fin with upper 4 rays unbranched *P. sealei**

14. *Prognichthys brevipinnis* (Valenciennes)

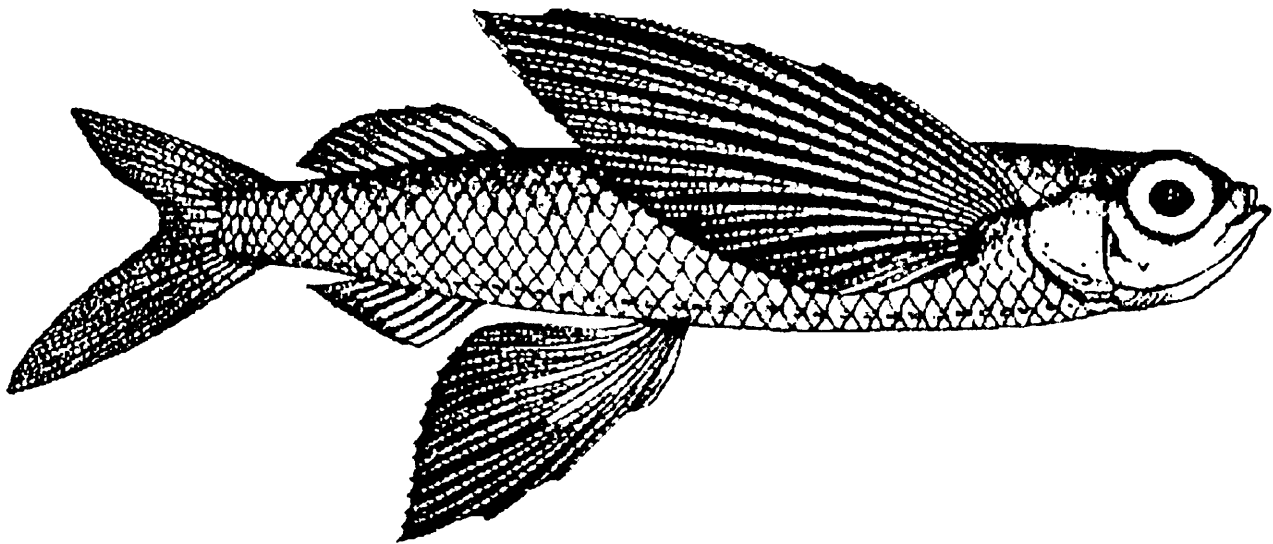
1846. *Exocoetus brevipinnis* Valenciennes, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, 19 : 125 (Type locality : New Ireland).

1984. *Prognichthys brevipinnis* : Parin, in Fischer and Bianchi, *FAO species identification sheets for fishery purposes. W. Indian Ocean (Fishing Area 51)*, 2 : EXOC Progn 2.

Materials examined : 2 ex., 160–170 mm SL, Reg. No. ZSI-F 9719/2, Cuddalore, Tamil Nadu, 12-07-2003.

Common name Shortfin flying fish.

Description : Body depth 5.4 to 6.3, head 4.0 to 4.3 times in standard length. Head shorter than the distance between dorsal fin origin and origin of upper caudal fin lobe. Lower jaw a little shorter than the upper and included beneath the upper. Palatine teeth absent. Gill rakers 26 to 31 on first arch. Dorsal fin with 10 or 11 rays, anterior rays longest. Anal fin with 8 to 10 rays, its origin below 3rd to 5th ray of dorsal fin. Pectoral fins long, 65 to 70% of standard length, with 3 undivided rays and 13 to 15 branched rays. Pelvic fins large, reaching well beyond anal fin origin, their insertion closer to anal fin origin than to caudal fin base. Scales large, with 25 to 28 predorsal scales. Juveniles without chin barbels.



Colour Body dark iridescent blue dorsally, pale silvery white ventrally. Pectoral fin gray; pelvic fin rays and tip transparent; dorsal and caudal fins gray, the other fins hyaline. Paired fins in juveniles black.

Size Maximum about 19 cm standard length.

Distribution : Indo-Pacific-East coast of Africa to Okinawa, Palau, Fiji.

Remarks This species was probably misidentified as *P. gibbifrons* (Valenciennes) by Munro (1955) (de Bruin *et al.*, 1995) and Talwar (1984) followed the same in stating its presence in Indian coast, which is known to occur in the Atlantic Ocean.

SUMMARY

The present work reviews the flying fishes (Family : Exocoetidae) of Indian waters reported in past and by examining the recent collections. This study has described 14 species of flying fishes under 6 genera from our region with two additional records viz., *Cypselurus naresii* (Gunther) and *Exocoetus monocirrhus* (Richardson) in our country. Another species, *Cypselurus poecilopterus* (Valenciennes) reordered in this work, which has confirmed its presence along with *Cheilopogon spilopterus* (Valenciennes) in our country. Both of the species were erroneously combined together in the Indian region. Further, the reports of *Cypselurus exsiliens* (Linnaeus), *Cypselurus comatus* (Mitchill) and *Prognichthys gibbifrons* (Valenciennes) in India was ruled out as erroneous identification, for these three species occur in Atlantic Ocean only and they were replaced by *Cheilopogon nigricans* (Bennett), *Cypselurus naresii* (Gunther) and *Prognichthys brevipinnis* (Valenciennes) respectively. In the current parlance of nomenclature the genus *Cheilopogon* and *Cypselurus* are kept separate based on length of jaw and jaw teeth. All the 14 species has been described along with outlined drawings. Another six extralimital species are also included in the key to species for proper identification, since they are likely to occur in our area.

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