

Taxonomic Notes on a Collection of Flying Fishes from Ceylon Waters

by

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INTRODUCTION

A day light, lure-fishery for flying fish is conducted off the north-east coast of Ceylon from May to August each year. In the course of a two-year study of this small but potentially important fishery several thousand specimens of flying fish were collected. At the same time flying fish were also collected from the catch of the scoop-net fishery for squid and from the drift-net fishery for blood-fish which were carried out in the same area during this season, but at night ; some fish specimens were also collected in other months on the opposite, south-west, coast of the Island.

A taxonomic examination of those specimens has revealed that besides *Hirundichthys coromandelensis* Hornell, on which is based the local lure-fishery, several other species are present in Ceylon waters, at least seven of which have not been reported before. The earliest report of a flying fish in these waters was probably that by Emerson Tennent (1861) who included "*Exocoetus evolans* Linn." in the list of Ceylon fishes appended to his "Sketches of the Natural History of Ceylon". Deraniyagala reported this fish again in 1933 by its correct name *Exocoetus volitans* L. In 1955 Munro added two more species (recorded earlier by Day 1875-78 and by Cuvier and Valenciennes 1847) and De Silva in 1956 another five, bringing the total to eight. The present study reports another seven species and brings the total for Ceylon to fifteen. Eleven of these fifteen species are represented in the author's collection. A key based on Breder (1938) and Parin (1960) and descriptive notes for these eleven species are given in this paper.

A Key to Ceylonese Exocoetidae

1. Pectoral fin short, hardly reaching ventral base *Oxyporhamphus* Gill.
Pectoral fin long, reaching beyond ventral base..... 2
2. Pectorals not reaching to end of dorsal base. Dorsal fin usually black, highest in the middle, lower jaw prominent with a bony mental process..... 3
Pectorals usually reaching beyond end of dorsal base ; often reaching caudal base. Dorsal fin, greyish, bluish, or colourless with or without a posterior dark spot, highest anteriorly, no bony process on lower jaw 4
3. Snout long and pointed, exceeding eye diameter ; no teeth on tongue ; ventral not reaching anal origin
..... *Fodiator* Jordan et Meek.

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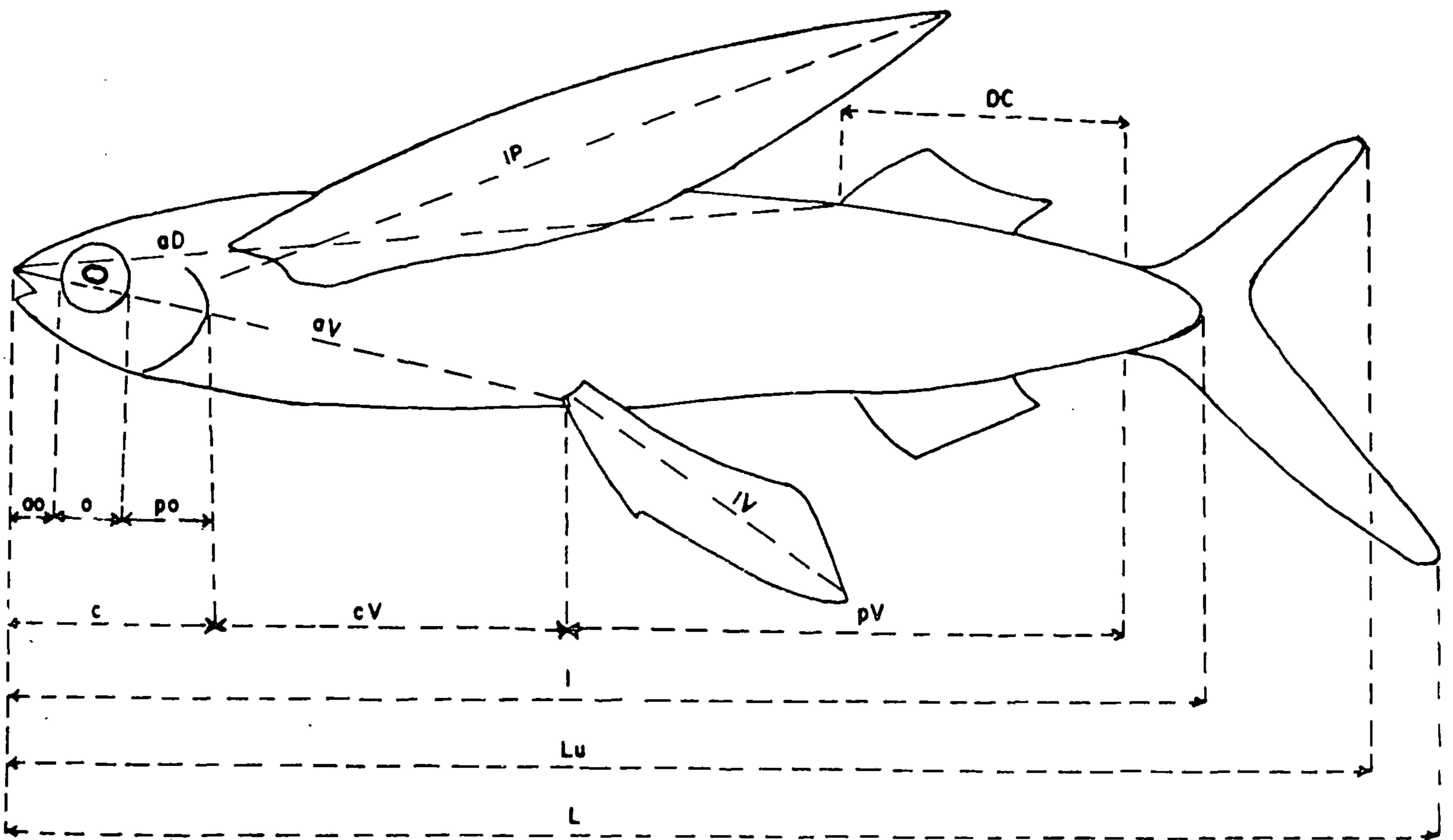
- Snout short and obtuse, shorter than eye diameter ; teeth present on tongue. Ventrals reaching or almost reaching anal origin, *Parexocoetus* Bleeker.
4. Ventral base nearer to tip of snout than to caudal base ; ventrals short failing to reach anal origin by their own length *Exocoetus volitans* L.
- Ventral base nearer to caudal base than to tip of snout ; ventrals long, longer than head, reaching behind anal origin 5
5. First pectoral ray unbranched, second pectoral ray branched 6
- First, second, third or even fourth pectoral rays unbranched.....*Prognichthys* Breder.
6. Dorsal and anal in the same vertical or anal not further behind than two dorsal rays. Anal rays equal dorsal rays or more than dorsal rays *Hirundichthys* Parin..... 7
- Dorsal fin always anterior to anal fin at least by four dorsal fin rays, anal rays less than dorsal rays *Cypselurus* Swainson 8
7. Pectoral fin with a central transparent patch which is clear in living or freshly dead specimens. Predorsal scales 29-33. Vertebrae 42-45..... *H. coromandelensis* Hornell.
- No central transparent patch on the pectoral fin. Predorsal scales 32-37. Vertebrae 44-45..... *H. oxycephalus* Bleeker.
8. Pectoral fins with black spots between rays, large or small, numerous and covering fin or few and confined to base and/or tip 9
- Pectoral fin without spots 11
9. Ventral fin base midway between posterior edge of opercle and first rudimentary ray of lower caudal lobe origin 10
- Ventral fin base nearer posterior edge of opercle than first rudimentary ray of lower caudal lobe origin *C. spilopterus* (Cuv. et Val.)
10. Head length equals distance between origin of dorsal fin and first rudimentary ray of upper caudal lobe origin *C. suttoni* (Whitley et Colefax)
- Head length shorter than distance between dorsal origin and first rudimentary ray of upper caudal lobe origin *C. atrisignis* (Jenkins)
11. Pectoral fin with oblique transverse light band.....12
- Pectoral without oblique transverse light band13
12. Palatine teeth present..... *C. katoptron* (Bleeker)
- No palatine teeth *C. furcatus* (Mitchill)

13. Ventral base midway between posterior edge of opercle and first rudimentary ray of lower caudal lobe origin
 *C. comatus* s. sp *naresii* (Gunther)

Ventral base not midway between posterior edge of opercle and first rudimentary ray of lower caudal lobe origin
 14

14. Ventral base closer to posterior edge of opercle than to rudimentary ray of lower caudal lobe origin
 *C. oligolepis* (Bleeker)

Ventral base closer to first rudimentary ray of lower caudal lobe origin than to posterior edge of opercle
 *C. opisthopus* (Bleeker)



- | | | |
|--------------------------|--|--|
| oo - Snout | IP - Pectoral length | Lu - Distance between upper caudal tip and snout tip |
| o - Diameter of eye | IV - Ventral length | DC - Distance between dorsal origin and first rudimentary ray of upper caudal lobe origin. |
| po - Post orbital length | cV- Distance between post opercle and ventral base. | oD - Predorsal length |
| c - Head | pV- Distance between ventral base and first rudimentary ray of lower caudal lobe origin. | |
| av - Pre-ventral length | | |
| l - Fork length | | |
| L - Total length | | |

Fig. 1. Characters indicating the meristic measurements.

Exocoetus voltians L. (Fig. 2)

Exocoetus voltians Linne' 1758 : 316, Jenkins 1904 : 435, (Hawaii), Jordan and Evermann 1905 : 132 (Hawaii), Seale 1069 : 13 (Tahiti), Kendall and Coldsborough 1911 : 262 (435 N, 136 54W) Weber and de Beaufort 1922 : 177 (Indonesia), Fowler and Ball 1925 : 8 (Hawaii), Jordan and Hubbs 1925 : 203 (east of Yokohama), Fowler 1932 : 6 (Galapagos), Brunn 1935 : 28 (Atlantic) Seale 1935 : 346 (Fiji), Breder 1938 : 38 (Atlantic), Tinker 1948 : 96 (Hawaii), Herre 1958 : 137 (Philippines), Herre 1950 : 70 (South Korea), Woods and Schults 1953 : 178 (Marshall Islands), Mann 1954 : 174 (Chile), Munro 1955 : 75 (Ceylon), De Silva 1956 : 29 (Ceylon).

Exocoetus evolans Linne' 1776 : 521, Cuvier et Valenciennes 1846 : 138 Günther 1866 : 282 (Java, India, China, Northern Australia, East Africa), Günther 1910 : 303 (in all warm seas), Jordan, Tanaka, and Snyder 1913 : 106 (Japan).

Exocoetus volans Richardson 1846 : 264 (China and Polynesia),

Halocypselus evolans Jordan and Evermann 1896 : 729 (*partim*).

D 12-15 ; A 13-14 ; P I 13-15 ; Predorsal scales 17-20 ; L 43-48.

6½ vertical rows of scales between lateral line and dorsal fin base. Inter-orbital space flat. No palatine teeth. Pectoral fin reaches caudal base, bluish when fresh, dark brown when preserved ; no white border along the posterior edge. Ventral fin reaches half distance to anal, ventral base closer to posterior edge of opercle than to first rudimentary ray of lower caudal lobe origin ; colourless when fresh, greyish when preserved. Dorsal fin opposite anal, colourless when fresh, greyish when preserved.

MERISTIC MEASUREMENTS —From 2 specimens

l. 82.5-83.3, *Lu.* 94.4-95.3, *ao.* 4.4-4.6, *o.* 5.8-6.0, *po.* 9.3-9.5, *c.* 20.0-20.8 *cV.* 16.6-18.1, *pV.* 42.6-43.1, *lP.* 50-51, *lV.* 10.0-10.8, *aD.* 53.3-54.1, *aV.* 36.6-38.0, *DC.* 23.3-25.3

This species has been reported off the west coast of Ceylon from July to August. Surface water temperature here as measured by me when the fish were present, ranged from 26.5° C.-28.2° C.

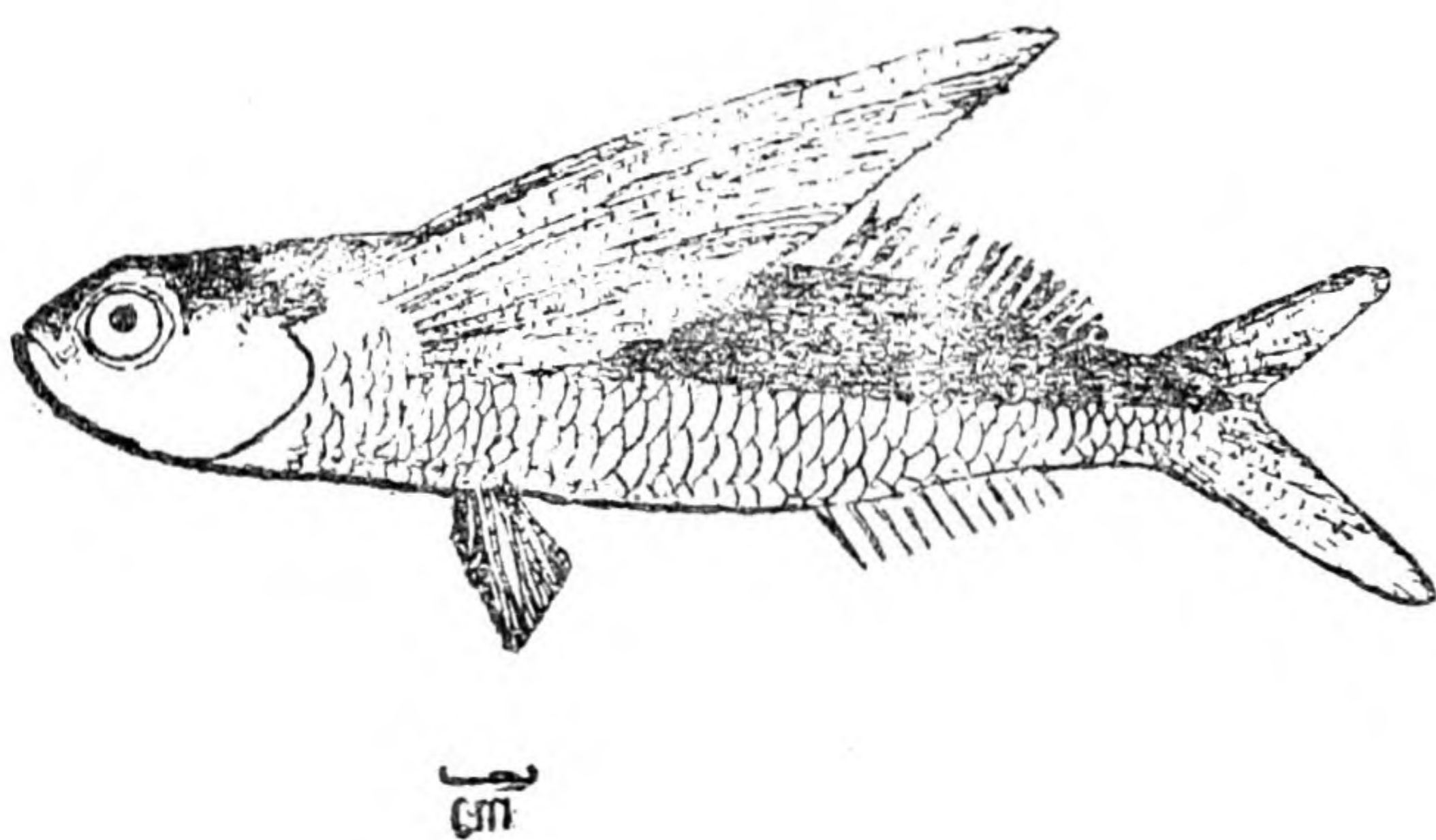


Fig. 2 *Exocoetus voltians*

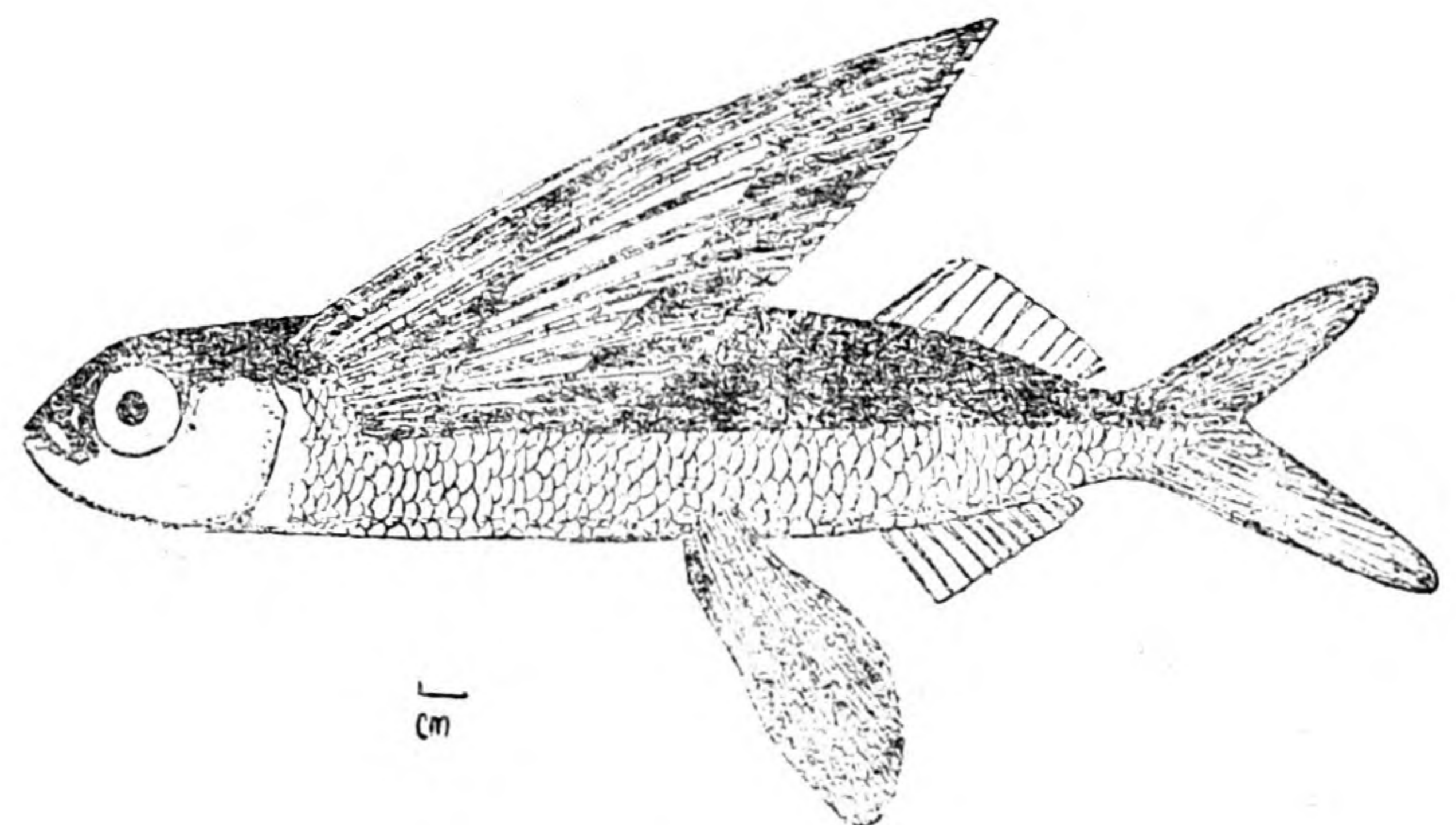


Fig. 3 *Hirundichthys coromandelensis*

Hirundichthys coromandelensis (Hornell) (Fig. 3)

Cypselurus coromandelensis Hornell (East coast of India),

Hirundichthys coromandelensis Parin 1960,

D-9-II ; A 10-12 ; P. I 16-18 ; Predorsal scales 29-33 ; L 45-53 ; Vertebrae 42-45.

6 vertical rows of scales between lateral line and dorsal fin base. Inter-orbital space slightly concave. No palatine teeth. Pectoral fin reaches caudal base; dark blue while alive, brown when preserved; a colourless central transparent patch is very clearly seen in the live swimming fish in which, also the posterior half of this fin is greyish, and the posterior edge is white. These colours disappear in dead specimens. Ventral fin reaches $\frac{2}{3}$ anal, closer to posterior edge of opercle than to first rudimentary ray of lower caudal lobe origin. Colourless in dead specimens, posterior half greyish in living specimens. Dorsal fin and anal opposite except in 3 specimens out of 75, where the fin was under second dorsal ray. Anal fin colourless. Sides of fish silvery below and intense blue above merging into greenish blue dorsum.

MERISTIC MEASUREMENTS—From 75 specimens

l. 82 (81–83), *Lu.* 92 (93–91), *ao.* 4.2 (4–4.5), *o.* 5.5 (5–6), *po.* 8.3 (8.2–8.4), *c.* 19.5 (19–20), *cV.* 26.5 (25–28), *pV.* 28 (27–29.6), *IV.* 20 (19.5–20.5), *IP.* 50.5 (49–52), *aD.* 58.5 (57–59), *aV.* 46 (45–47), *DC.* 16.5 (16–17.5)

This is the commonest species on the east coast of Ceylon and India during Mid-May to Mid-July, when special lure fisheries operate for it from both countries. Surface water temperatures, as measured by me on the Ceylon fishing grounds during the two seasons of 1969 and 1970 ranged from 28° C–30° C.

Hirundichthys oxycephalus (Bleeker) (Fig. 4)

Exocoetus oxycephalus Bleeker 1852 : 771 (Java), Bleeker 1866 : 124 (Indonesia), Bleeker 1866–72 : 75 (Indonesia) Gunther 1866 : 294 (Indonesia, Taiwan,)

Exocoetus oxycephalus McCulloch 1929 : 107 (Australia),

Cyselurus oxycephalus Weber do Beaufort 1922 : 81 (Indonesia),

Cupselurus oxycephalus Fowler and dall 1925 : 8 (Hawaii), Seale 1936 : 48 (Soloman Islands), Tinker 1944 : 96 (from Madagascar to Australia) Samoa, and Hawaii), Herre 1959 : 157 (Philippines)

Hirundichthys oxycephalus Imai 1952 : 2 (Kyushu), Abe 1956 : 1061 (Japan).

D 10–12 ; A 11–13 ; P I 14–15 ; Predorsal scales 32–37 ; L 51–56.

6 vertical rows of scales between lateral line and dorsal fin base. Inter-orbital space slightly concave. No palatine teeth. Pectoral fin reaches end dorsal, greyish while alive, brownish when preserved; no central transparent patch even in live specimens; posterior edge white. Ventral fin reaches mid anal, ventral base closer to first rudimentary ray of lower caudal lobe origin than to posterior edge of opercle, bluish when fresh, colourless when preserved. Dorsal fin opposite anal, bluish alive, colourless preserved. Anal fin; bluish alive, colourless preserved. Sides of fish silvery below and intense blue above merging in to greenish blue on dorsum.

MERISTIC MEASUREMENTS—From 2 specimens

l. 80.5–81, *Lu.* 91.3–92, *ao.* 4.8–5.0, *o.* 5.7–6.0, *po.* 8.6–8.8, *c.* 18.7–20.0, *pV.* 25.6–26.2, *cV.* 30–30.3, *IV.* 20.0–20.3, *IP.* 52.2–62.4, *aD.* 58.7–58.9, *aV.* 44.4–44.8, *DC.* 17.4–17.8.

This species was recorded by me off the west coast of Ceylon, during July to August 1969. Surface water temperatures as measured by me on the fishing grounds ranged from 26.5° C to 28.2° C.

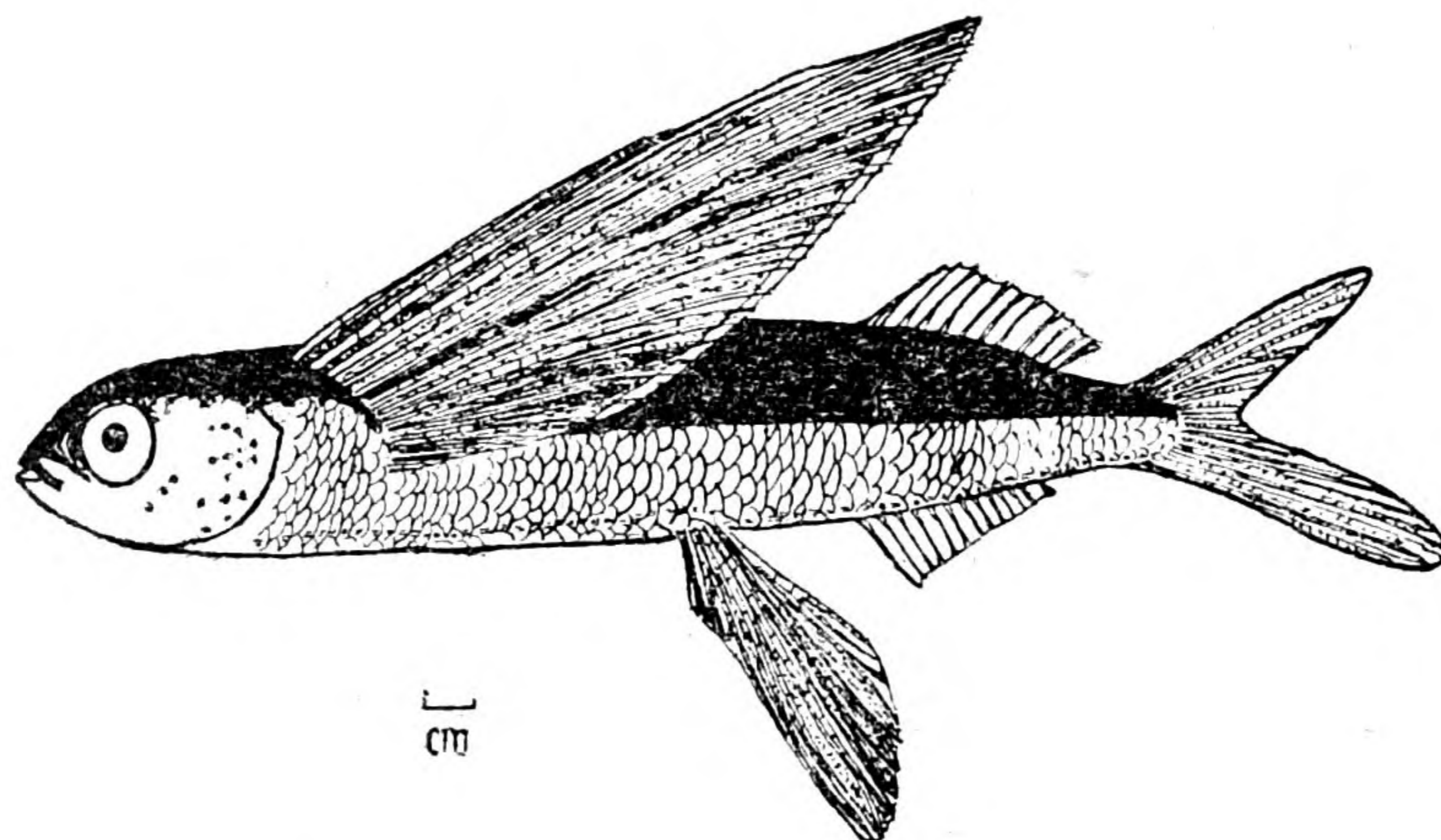


Fig. 4 *Hirundichthys oxycephalus*

***Cypselurus spilopterus* (Cuv. et Val) (Fig. 5)**

Exocoetus spilopterus Cuv. et Val 1846 : 113 (Caroelines), Bleeker 1866 : 166 (*Celebes*), Bleeker 1866-72 : 74 (*Celebes*) Günther 1866 : 292 Günther 1910 : 368 (Tahiti),

Exocoetus poecelopterus (non Cuv. et Val), Day 1878-88 : 518 (India),

Cypsilurus spilopterus Weber and de Beaufort 1922 : 187 (Indonesia) Okada and Matsubara 1938 : 119 (Taiwan, Indian Ocean),

Cypselurus spilopterus Fowler 1928 : 83 (Hawaii, Tahiti) Tinker 1944 : 100, (Hawaii) Herre 1950 : 137 (Philippines),

Maculocoetus spilopterus Fowler 1949 : 59

D 12-15 ; A 10-11 ; P I 13-14 ; Predorsal scales 32-27 ; L 53-57.

7 vertical rows of scales between lateral line and dorsal fin base. Inter-orbital space concave. Palatine teeth present. Head length equals distance between first rudimentary ray of upper caudal lobe origin and dorsal origin.

Pectoral fin reaches caudal base ; when fresh light blue with large oval black spots between rays, increasing in size towards lower margin, scattered over entire fin or restricted to one or both extremities, apex black, when preserved dark grey with spots faint. Ventral fin reaches mid anal, base closer to posterior edge of opercle than to first rudimentary ray of lower caudal lobe origin ; bluish with a black patch distally between V 1 & 5, greyish when preserved. Dorsal fin D 6-7 opposite anal ; bluish when fresh with a black patch on D5-10, greyish when preserved. Anal fin bluish when fresh ; greyish when preserved. Sides of fish silvery below and intense blue above merging into dark blue on dorsum.

MERISTIC MEASUREMENTS From 5 specimens

l. 82.4 (79-86), *Lu.* 94.1 (93.6-94.8), *ao.* 5.1 (4.6-5.2), *o.* 5.7 (5.3-6.1), *po.* 8.0 (7.4-8.7), *c.* 18.6 (17.4-19.7), *pV.* 29.6 (27-32.5) *cV.* 28.3 (27-30), *IV* 20.1 (20.6-21.4) *IP.* 49.9 (49-50.7), *aV.* 46.8 (45.5-48.7), *aD.* 56.7 (55-58.2), *DC.* 18.3 (17.3-19.3),

This species was found off the east coast of Ceylon during May to July, and off the west coast of Ceylon during January to February. Surface water temperatures as measured by me on the east coast fishing grounds during the two seasons of 1969 and 1970 ranged from 28° C. to 30° C.

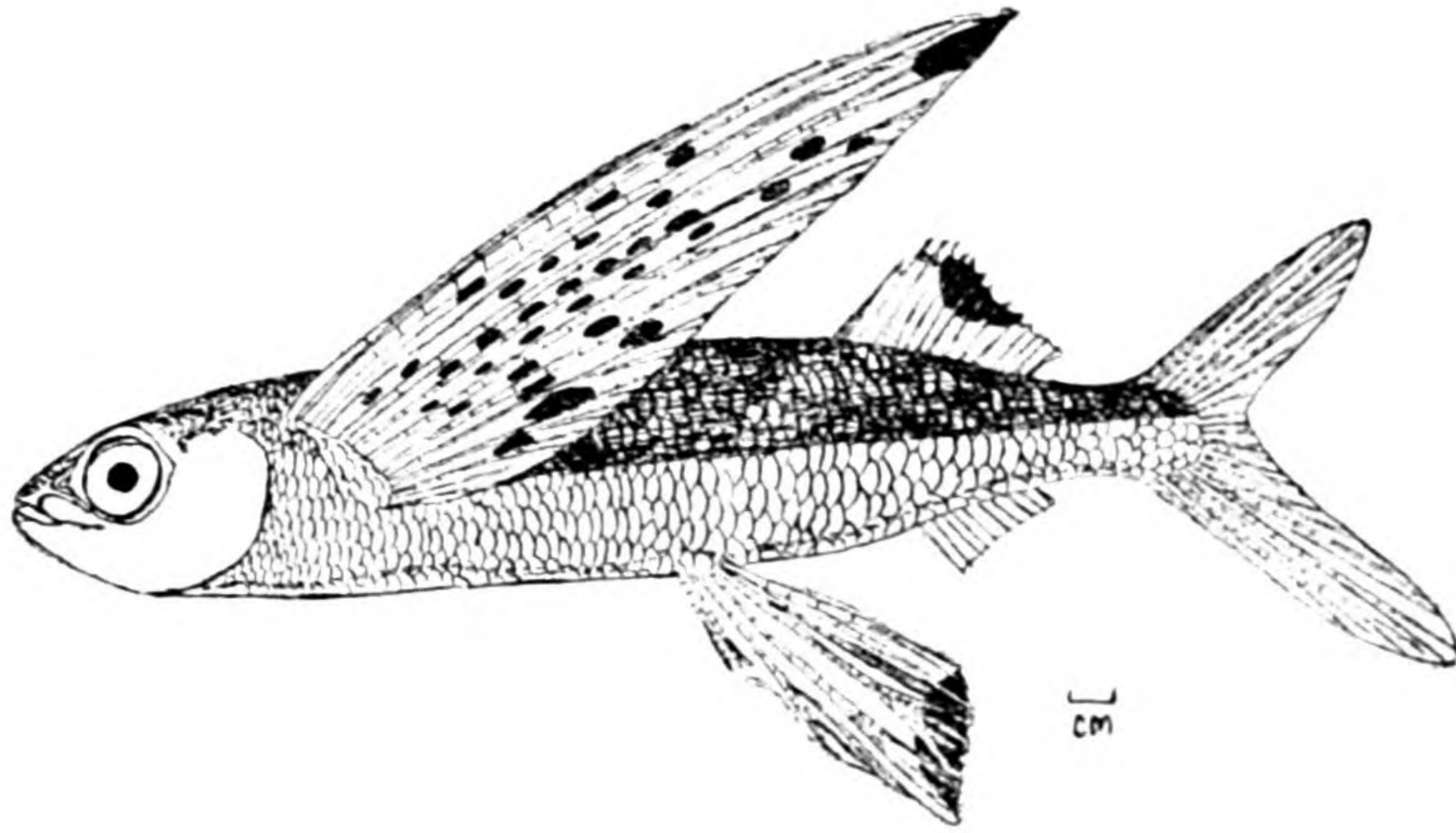


Fig. 5 *Cypselurus spilopterus*

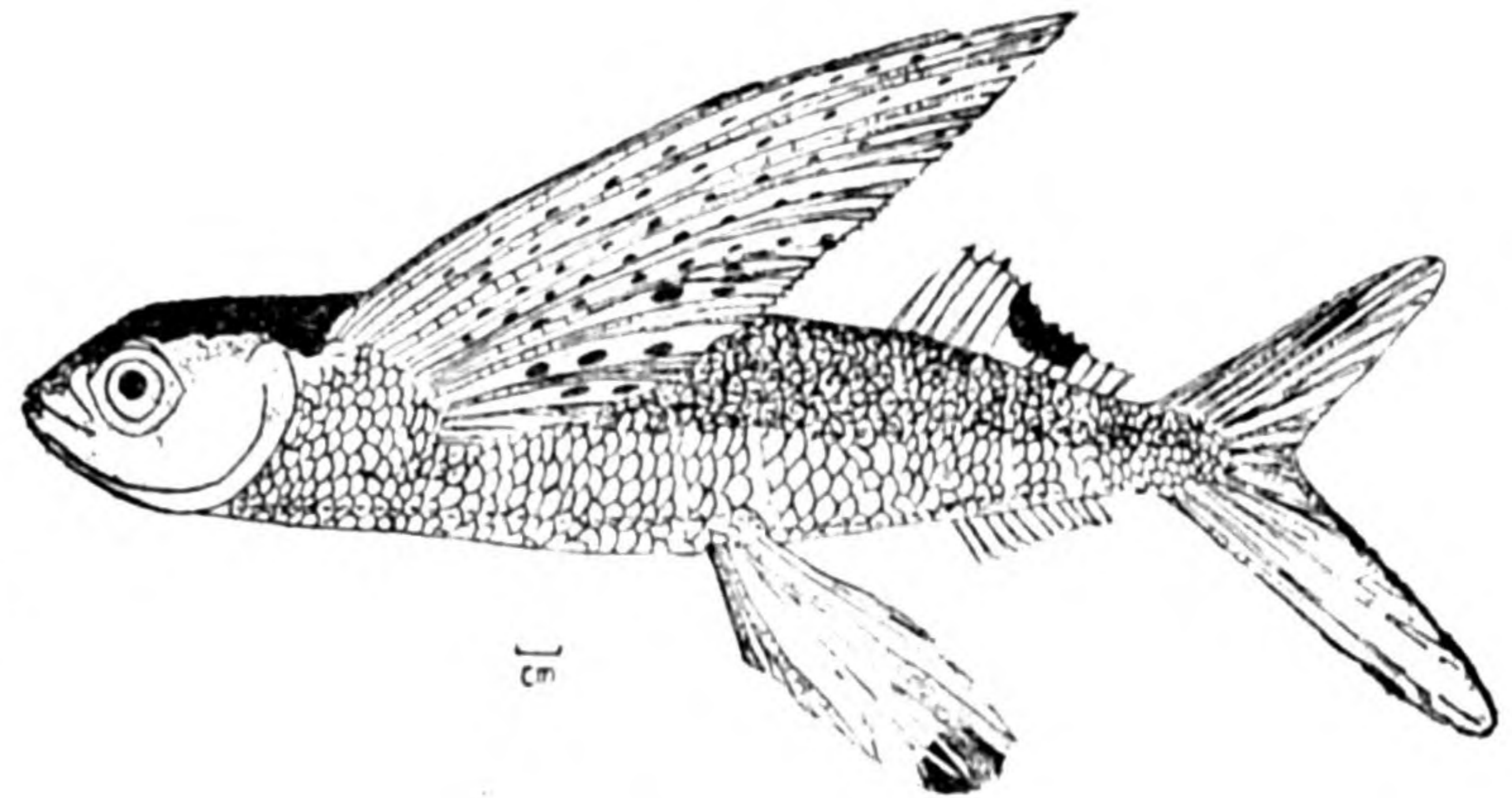


Fig. 6 *Cypselurus suttoni*

Cypselurus suttoni (Whitley et Colefax) (Fig. 6)

Cypselurus spilopterus non (Cuv. et Val), Fowler 1928 : 82 (Hawaii),

Cypselurus atrisignis (non Jenkins) Fowler 1932 : 6 (Tuamotu), Arnoult ; Bauchot-Soutia et Roux-Esteve 1958 : 55 (Indian Ocean),

Maculocoetus suttoni Whitley and Colefax 1958 : 287 (Gilber Islands), Fowler 1944 : 59 (Gilbert Islands),

Cypselurus vitiazi Parin 1958 : 1412 (Southern Japan to Gilbert Islands).

D 12-13 ; A 10-11 ; P 1 12-14 ; Predorsal scales 38-41 ; L 51-59.

7 vertical rows of scales between lateral line and dorsal base. Inter-orbital space concave, Palatine teeth present. Head length equals distance between first rudimentary ray of upper caudal lobe origin and dorsal origin.

Pectoral fin reaches dorsal end ; bluish when fresh with small black oval spots between rays on entire fin ; or confine to base and/or tip ; when preserved greyish with faint spots. Ventral fin reaches mid anal ; bluish when fresh with a black patch distally between V I & 5 greyish when preserved. Dorsal fin D 5-6 opposite anal, bluish when fresh with a black patch between D 5 & 9, greyish when preserved. Anal fin bluish when fresh ; greyish when preserved. Sides of fish silvery below and intense blue above merging into dark blue on dorsum.

MERISTIC MEASUREMENTS From 3 specimens

l. 80.9 (79.2-83.3), *Lu*, 90.0 (94.6-95.3), *ao.* 4.5 (4.4-4.6), *o.* 5.3 (4.9-5.6), *po.* 7.9 (8.3-7.2), *c.* 18.2 (17.9-18.8), *pV.* 28.9 (28.8-29), *cV.* 29.3 (29.0-30.6), *IV.* 22.3 (2.11-24.3), *IP.* 50.5 (50.5-51.6) *aD.* 60.3 (56.8-66.6), *aV.* 46.6 (45.9-47.3), *DC.* 18.3 (18.0-19.0).

This species was collected by me off the east coast of Ceylon during May to July and off the west coast of Ceylon during January February. Surface water temperatures as measured by me on the eastern fishing grounds during the two seasons of 1969 and 1970, ranged from 28° C to 30° C.

Cypselurus atrisignis Jenkins (Fig. 7)

Cypselurus atrisignis Jenkins 1904 : 436 (Hawaii), Jordan and Evermann 1905 : 136 (Hawaii), Jordan and Seale 1906 : 210 (Carelines), Weber and de Aaufort 1922 : 187 (Malacca a Straits).

Exocoetus atrisignis Günther 1910 : 368 (Hawaii),

Cypselurus atrisignis Fowler 1928 : 83 (Hawaii), Tinker 1944 : 88 (Hawaii), Woods and Schults 1953 : 184 (Hawaii), Herre 1953 : 161 (from Hawaii to Malacca Straits),

Mauclocoetus atrisignis Fowler 1949 : 59

D 12-15 ; A 9-10 ; P I 13-14 ; Predorsal scales 33-41 ; L 51-59.

7-7½ rows of scales between lateral line and dorsal fin base. Inter-orbital space concave. Palatine teeth present. Head length shorter than distance between first rudimentary ray of upper caudal lobe origin and dorsal origin.

Pectoral fin reaches dorsal end ; bluish when fresh ; with small oval black spots between rays, on entire fin or confined to base and/or tip, increasing in size towards lower margin ; when preserved dark grey with spots faint. Ventral fin reaches mid anal, ventral base midway between first rudimentary ray of lower caudal lobe origin and posterior edge of opercle ; bluish when fresh, greyish when preserved no black patch distally. Dorsal fin D 6-7 opposite anal, bluish when fresh with a black patch on D 5 & 9 greyish when preserved. Anal fin bluish when fresh greyish when preserved. Sides of fish silvery below and intense blue above merging into dark blue on dorsum.

MERISTIC MEASUREMENTS From 6 specimens

l. 83.1 (81.2-85.7), *Lu*, 92.6 (91.9-93.4), *ao.* 4.8 (4.4-5.2), *o.* 5.7 (4.8-7.1), *po.* 8.5 (7.1-9.7), *c.* 18.3 (17.2-19.4), *pV.* 29.5 (28.6-32.2), *cV.* 28.9 (24-32.4), *IV.* 24.5 (20-31.1), *IP.* 50 (47.2-51.7), *aD.* 56.9 (55.5-58.0), *aV.* 46.9 (41.7-50.8), *DC.* 19.2 (17.0-20).

This species was found by me off the east coast of Ceylon during May to July. The surface water temperatures as measured by me on these grounds during the two seasons of 1969 and 1970 ranged from 28° C to 30° C.

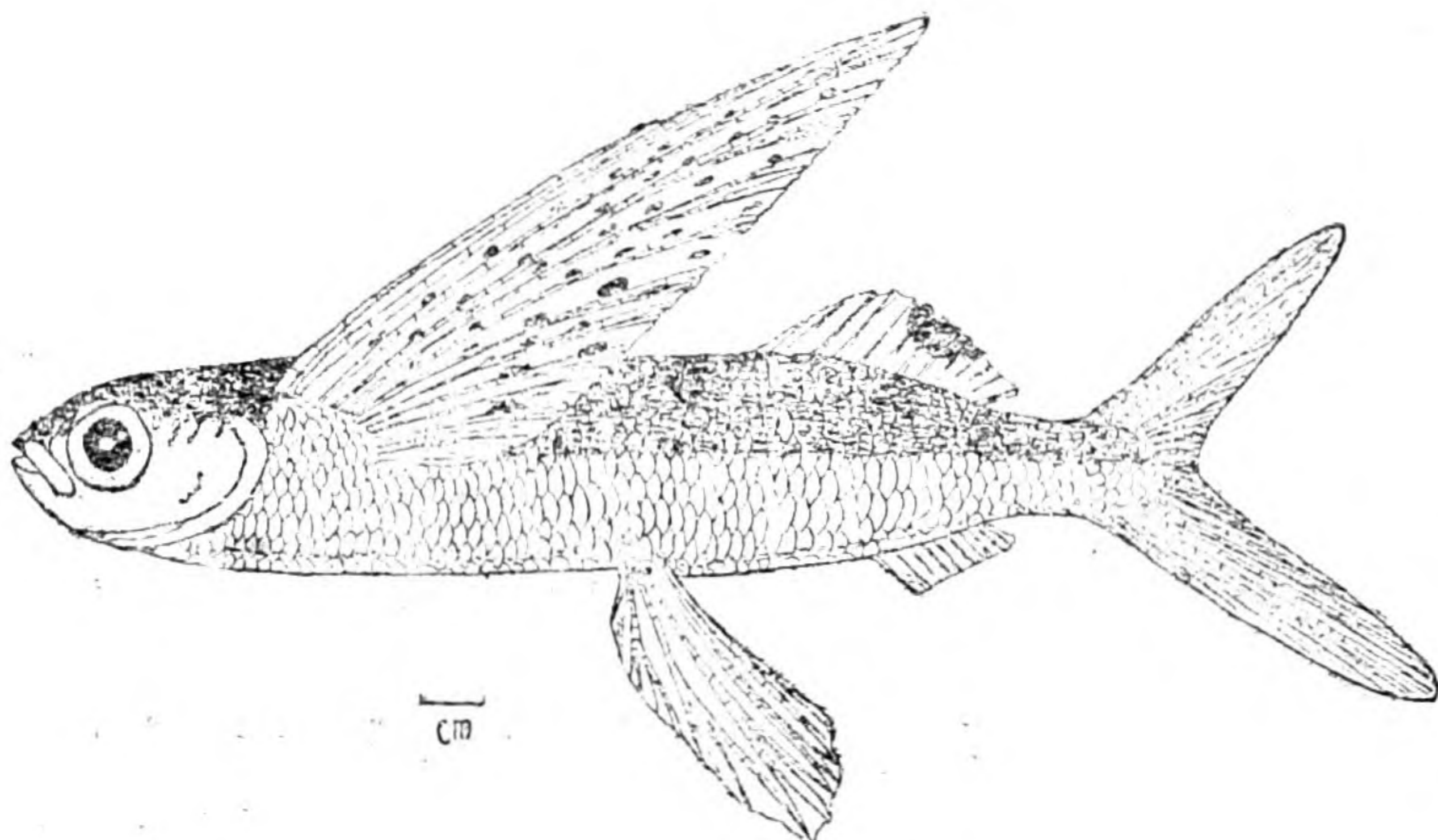


Fig. 7 *Cypselurus atrisignis*

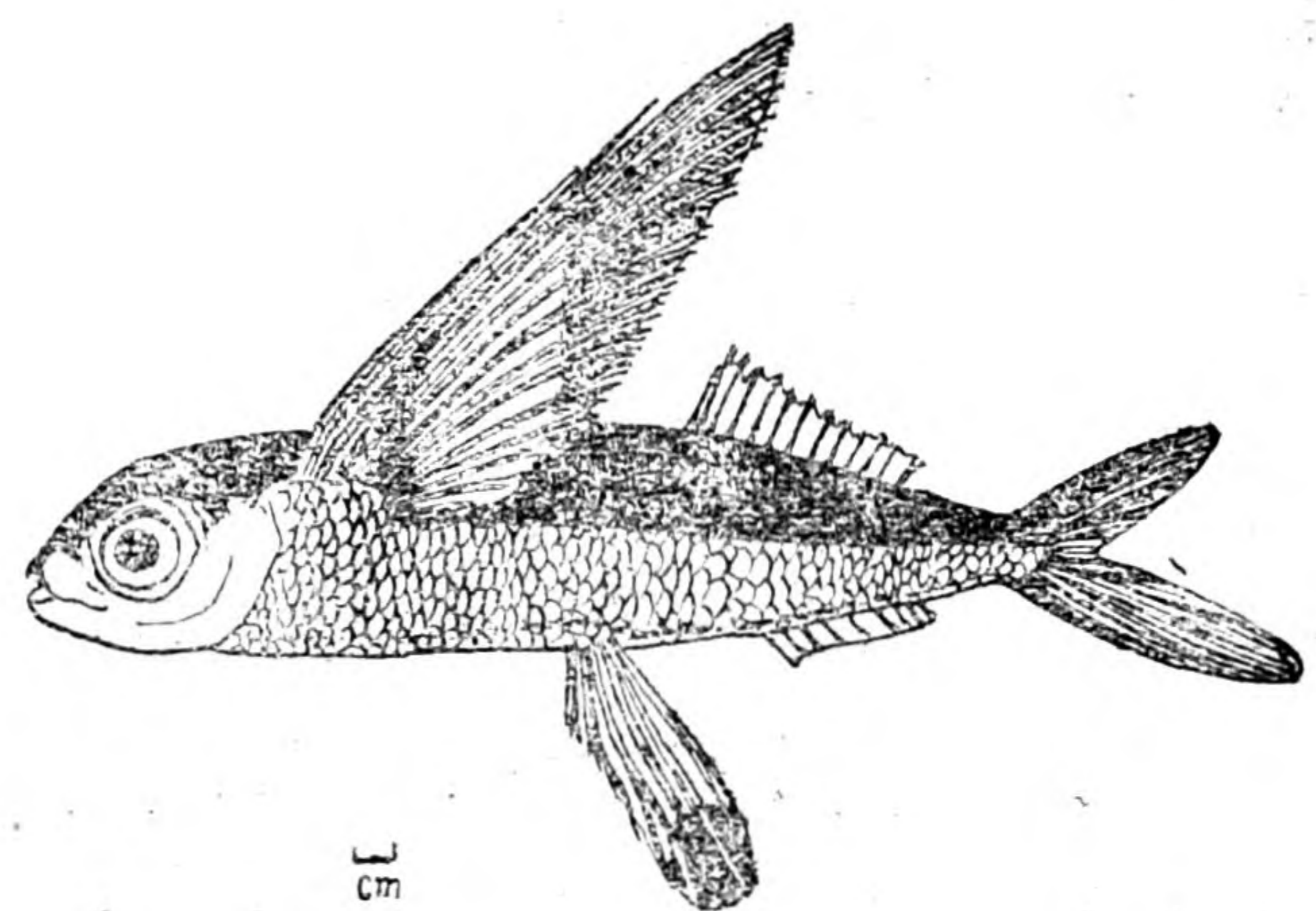


Fig. 8. *Cypselurus katoptron*

Cypselurus katoptron (Bleeker) (Fig. 8)

Exocoetus kaptotron Bleeker 1866 : 72 : 115 (Sumatra) Günther 1866 : 289 (Sumatra, Australia).

Exocoetus robustus Günther 1866 : 289 (Australia),

Cypselurus katoptron Jordan and Seale 1906 : 211 (Samoa Australia),

Cypselurus katoptron Abe 1956 : 1049 (Japan).

D 12-14 ; A 9-11 ; P I 12-16 ; Predorsal scales 22-28 ; L 43-51.

7 vertical rows of scales between lateral line and dorsal fin base. Inter-orbital space concave Palatine teeth present. Head length shorter than the distance between first rudimentary ray of upper caudal lobe origin and dorsal origin.

Pectoral fin reaches caudal base ; bluish when fresh a bright yellow transverse oblique band ; yellow colour disappears when preserved, leaving the band transparent colourless, rest dark grey, posterior edge white. Ventral fin reaches mid anal, bluish when fresh with a black patch distally between V 2-5, greyish when preserved. Ventral base closer to posterior edge of opercle than to first rudimentary ray of lower caudal lobe origin. Dorsal fin D 5-7 opposite anal, bluish when fresh, no black patch, greyish when preserved. Anal fin light blue when fresh ; greyish ; when preserved. Sides of fish silvery below and blue above merging into dark blue on dorsum.

MERISTICS MEASUREMENTS (From 3 specimens)

l. 83.8 (81.4-86.2), *Lu.* 94.4 (92.9-96.5), *ao.* 5.5 (4.8-6.2), *o.* 5.9 (5.2-6.4), *po.* 8.2 (7.5-8.8) *c.* 19.1 (17.5-20.7), *cV.* 26.9 (25.6-27.6), *pV.* 31.4 (30.4-32.7), *IV.* 23.6 (23.1-24.0), *IP.* 50.6 (50-51.8), *aD.* 54.5 (48.2-58.2), *aV.* 46 (44.4-48.2), *DC.* 20.7 (19.6-21.3).

This species was collected off the east coast of Ceylon during May to July. The surface water temperature there during the two seasons of 1969 and 1970 ranged from 20° C. to 30° C.

Cypselurus furcatus (Mitchill) (Fig. 9)

Exocoetus altipinnis (non. Cuv. et Val) Day 1889 : 430 (India),

Cypselurus altipennis (non Cuv. et Val) Weber and de Beaufort 1922 : 184. (Java, Philippines, Samoa, Australia : India, Red Sea),

Cypselurus altipennis (non Cuv. et Val) Folwer 1928 : 82 (between Hawaii and California), Shults 1943 : 57 (10° N lat and 165° W. long.), Tinker 1944 : 96 (Hawaii, Woods and Schults 1953 : 183, Herre 1953 : 160 (Philippines) McCulloch 1929 : 106 (Western Australia).

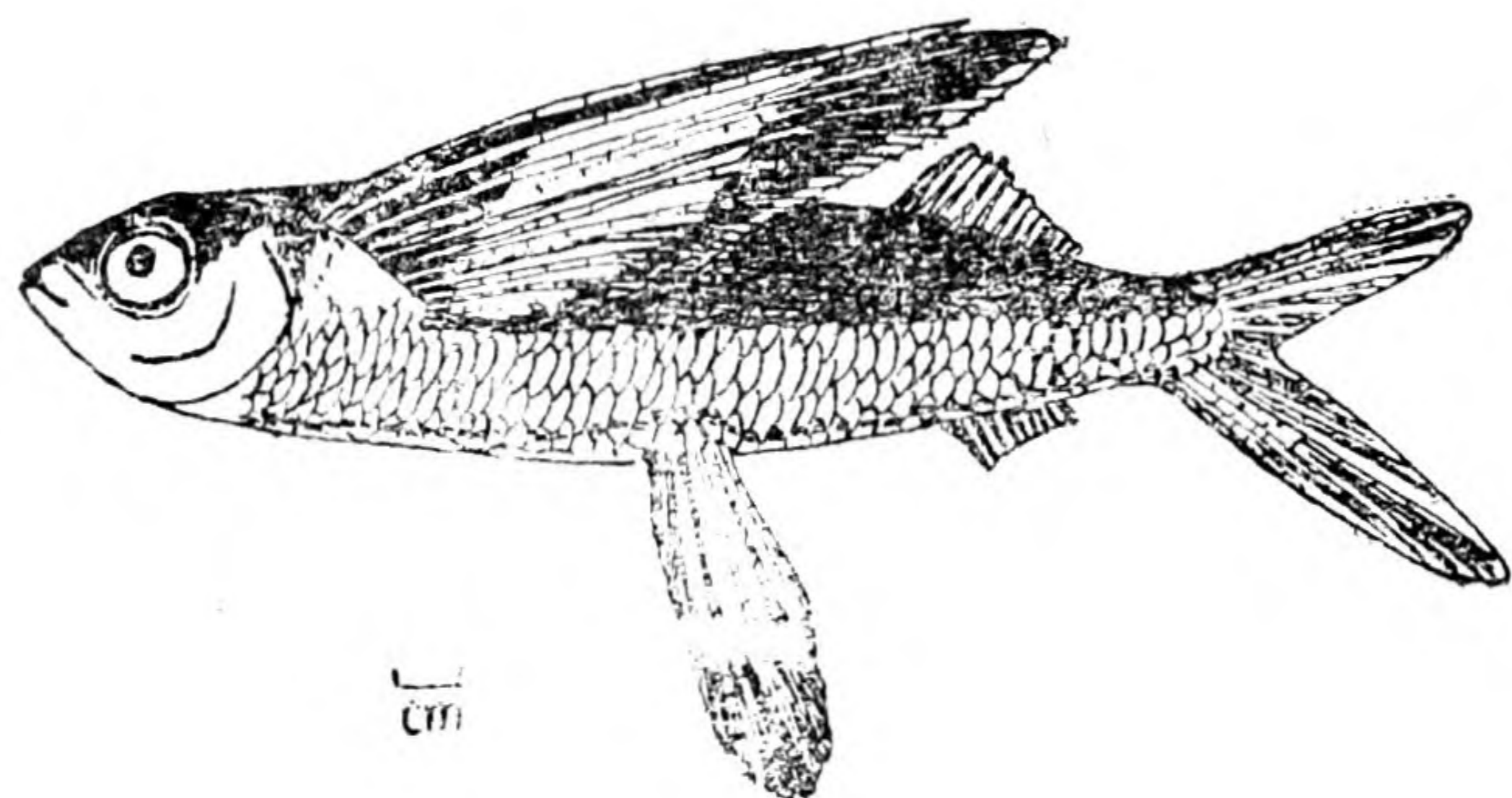
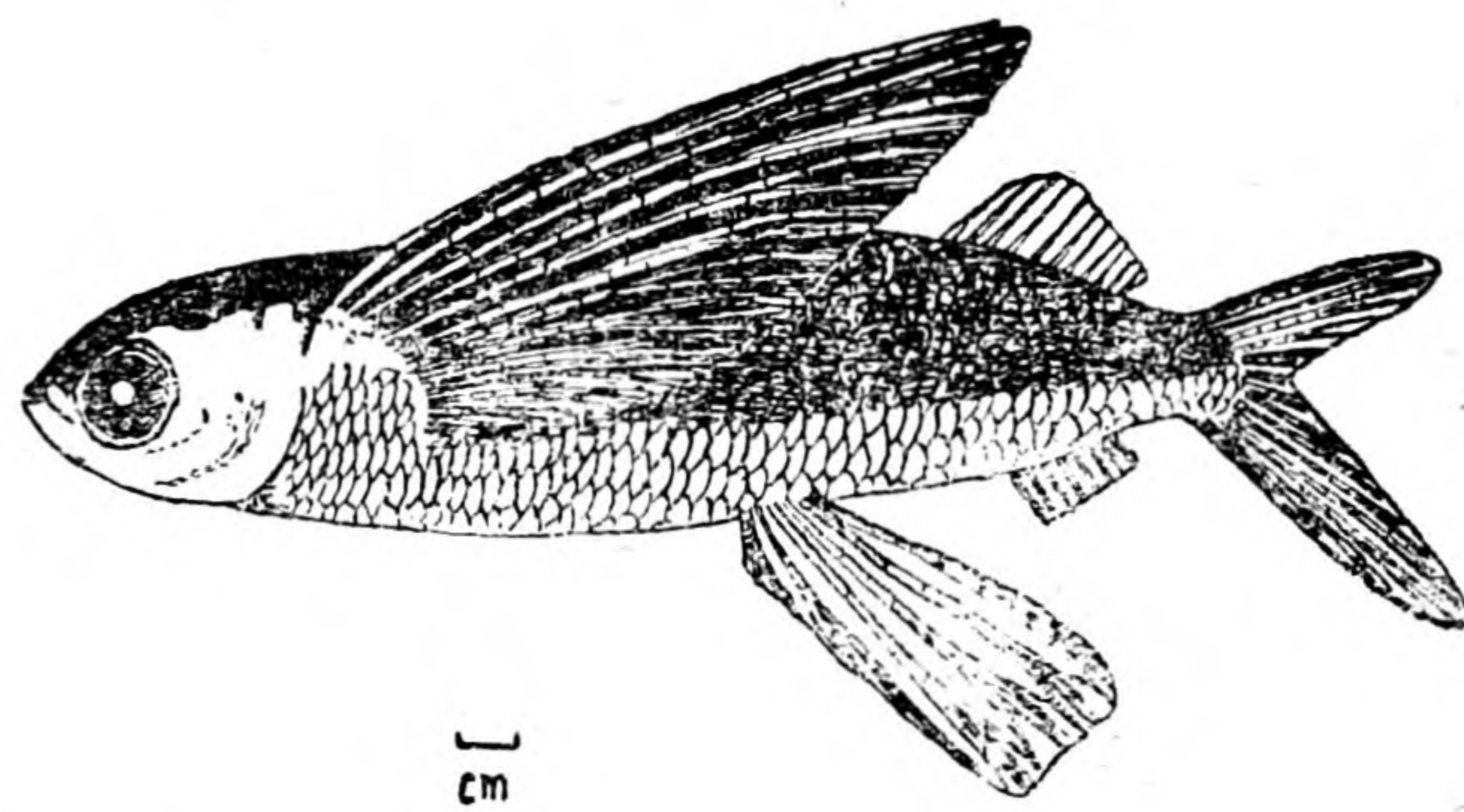
D 12-14 ; A 9-11 ; P I 13-16 ; Predorsal scales 27-35 ; L 51-55.

7 vertical rows of scales between lateral line and dorsal fin base. Inter-orbital space flat. No palatine teeth. Pectoral fin reaches dorsal end ; bluish when fresh, and brown when preserved, with an oblique transverse band which is colourless transparent, posterior edge with white border. Ventral fin reaches beyond mid anal, base closer to posterior edge of opercle than to first rudimentary ray of lower caudal lobe origin with a black patch between V 2-5, except black patch rest of the fin colourless when fresh and greyish when preserved. Dorsal fin D 6 opposite anal ; no black patch in the middle, colourless when fresh and greyish when preserved. Anal fin colourless. Sides of fish silvery below and dark blue above merging into greenish blue on dorsum.

MERISTICS MEASUREMENTS (From 1 specimen)

l. 61.9, *Lu.* 92.0, *ao.* 5.5, *o.* 6.4, *po.* 6.7, *c.* 18.6, *pV.* 31.7, *cV.* 25.4, *IV.* 20.0, *IP* 48.4, *aD.* 53.5, *aV.* 48.9, *DC.* 20.6.

This species was collected off the east coast of Ceylon, from May to July. Surface water temperatures there during the two seasons of 1969 and 1970 ranged from 28° C. to 30° C.

Fig. 9 *Cypselurus furcatus*Fig. 10 *Cypselurus comatus naresii****Cypselurus comatus naresii* (Günther) (Fig. 10)**

Exocoetus: naresii Günther 1889 : 36 (between Fiji and New Hebrides),

Cypselurus naresii Jordan and Seale 1906 : 211, Weber and de Beaufort 1922 : 188 (Indo-Malayan Archipelago),

Cypselurus naresii Fowler 1928 : 28 ,

Cypselures comatus Abe 1953 : 973 (Japan), Munro 1955 : 75 (Indian Ocean), Day 1866 : 88 (Indian Ocean).

D 10-12 ; A 8-9 ; P I 13-14 Predorsal scales 27-32 ; L. 45-50.

7 vertical rows of scales between lateral line and dorsal fin base. Inter-orbital space flat. Palatine teeth present. Head length longer than the distance between first rudimentary ray of upper caudal lobe origin and dorsal origin.

Pectoral fin reaches caudal base ; light brown above lighter below when fresh, dark brown when preserved. Ventral fin reaches anal and ventral base midway between first rudimentary ray of lower caudal lobe origin and posterior edge of opercle : colourless when fresh with a black patch between V 2-5 : greyish when preserved. Dorsal fin D 4-6 opposite anal ; colourless when fresh, without black patch in the middle, greyish when preserved. Anal fin colourless when fresh, greyish when preserved. Sides of fish silvery below and dark blue above merging into greenish blue on dorsum.

MERISTIC MEASUREMENTS (From 4 specimens)

l. 84 (82-86.6), *Lu.* 92.8 (91.6-94.4), *ao.* 4.8 (4.4-5.2), *o.* 6.0 (5.8-6.1), *po.* 9.2 (8.8-9.7), *c.* 19.5 (17.1-20.0), *cV.* 27.7 (27.9-30.4), *pV.* 27.9 (29.7-30.4), *IV.* 22.3 (22.12-3.2), *IP.* 49.1 (49.9-50.6),

aD. 56.2 (55.8-59.3), *aV.* 47.1 (46.3-49.4), *DC.* 17.8 (17.4-18.6).

This species was collected by me off the east coast of Ceylon during May to July, and off the west coast of Ceylon from January to April. Surface water temperature as measured by me on the east coast fishing grounds during the two seasons of 1969 and 1970 ranged from 28° C. to 30° C.