

NOTES ON EGGS, LARVAE AND JUVENILES OF FISHES FROM INDIAN WATERS

XII. *Myripristis murdjan* (Forskål) and XIII. *Holocentrus* sp.

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XII. *Myripristis murdjan* (Forskål)

DURING the cruises of R. V. *Kalava* in the Laccadive Sea in 1958 and 1959 a few postlarval stages of *Myripristis murdjan* (Forskål) were obtained from the surface plankton collections along with postlarval specimens belonging to the genus *Holocentrus* the specific identity of which is not definite. These along with a postlarval specimen of *M. murdjan* obtained from a plankton collection from Vizhingam near Trivandrum are described here.

Holocentrids occur only in stray numbers along the coastal waters of the mainland of India but they appear to be comparatively more numerous around the islands of the Laccadive Archipelago from where the following eight species have been collected by us. *Myripristis murdjan* (Forskål), *M. adustus* Bleeker, *Holocentrus diadema* Lacépède, *H. sammara* (Forskål), *H. laevis* Günther, *H. candimaculatus* Rüppell, *H. lacteo-guttatus* Cuvier and Valenciennes and *H. violaceus* Bleeker. Of these, *M. murdjan* and *H. sammara* appear to be the most common species there. As food-fish holocentrids are of very little importance since they are rarely caught in appreciable numbers but the larval and early juvenile stages are extremely interesting in view of their bizarre appearance brought about by the spiny armature on the head.

There is hardly any information on the life-history stages of holocentrids from the Indo-Pacific. The only reference we could find from the Indian Ocean is about *Rhynchichthys pelamidis* by Cuvier and Valenciennes (1831). This has been considered to be a postlarva of some species of *Myripristis* by Woods (1955) as the dorsal and anal fin ray counts of X, I, 12 and IV, 12 respectively approximately agree with the genus *Myripristis* with which view we also agree.

Eighteen postlarval specimens ranging from 2.72-16.30 mm. in total length are available in the collections of which five are damaged and therefore not listed (Table I). Of the remaining 13 specimens the measurements of

TABLE I
 Measurements of Postlarval *Myripristis murdjan* (Forskål) in mm.

Sl. No.	Station	Date and time of collection	Location	T.L.	S.L.	Head	Snout	Eye	Pre-op. sp.	Sup. occ. sp.	Depth	Sn. to D.	Sn. to A.
1*	448	29-4-1959 (0030-0045 hrs.)	10° 46' N. 72° 26' E.	2.72	2.54	0.89	0.31	0.29	0.62	0.78	0.68	1.04	1.33
2	212	24-2-1959 (0900-0920 hrs.)	9° 18' N. 72° 53' E.	3.19	3.01	1.09	0.47	0.33	0.78	0.99	0.78	1.30	1.53
3*	448	29-4-1959 (0030-0045 hrs.)	10° 46' N. 72° 26' E.	3.40	3.13	1.24	0.52	0.38	0.99	1.25	0.89	1.41	1.77
4	do.	do.	do.	3.87	3.66	1.70	0.84	0.52	1.15	1.57	1.04	1.93	2.40
5	do.	do.	do.	4.03	3.76	1.73	0.89	0.58	1.30	1.57	1.15	1.93	2.46
6	Vizhin- gam	15-2-1957 (Morning)	8° 21' N. 76° 58' E.	4.35	4.19	1.67	0.78	0.55	1.20	1.57	1.09	1.77	2.25
7	219	1-3-1958 (0050-0110 hrs.)	10° 03' N. 74° 40' E.	4.39	4.12	1.83	0.84	0.58	1.15	1.62	1.15	1.93	2.46
8*	212	24-2-1958 (0900-0915 hrs.)	9° 18' N. 72° 53' E.	4.71	4.45	1.88	0.84	0.58	1.25	1.62	1.17	1.93	2.51
9	443	26-4-1959 (1135-1150 hrs.)	11° 29' N. 72° 59' E.	6.04	5.23	2.30	1.04	0.78	1.57	1.78	1.55	2.77	3.40
10*	441	25-4-1959 (0645-0700 hrs.)	11° 19' N. 73° 10' E.	6.74	5.84	3.08	1.46	0.92	2.15	1.88	1.67	3.14	3.81
11	205	19-2-1958 (0615-0630 hrs.)	9° 27' N. 75° 14' E.	15.68	12.91	5.48	1.93	1.93	1.57	1.88	4.92	5.59	8.84
12	208	20-2-1958 (0810-0825 hrs.)	8° 36' N. 73° 38' E.	16.10	13.23	5.65	1.93	2.09	1.67	2.14	5.13	5.80	9.27
13*	205	19-2-1958 (0615-0630 hrs.)	9° 27' N. 75° 14' E.	16.30	13.43	5.69	2.01	1.98	1.51	1.97	5.13	5.77	9.18

* Denotes specimens described and figured.

which are given, 10 form a connected series and fall under the category of early postlarvae and measure from 2.72–6.74 mm. The damaged specimens also come within this size range and two of these have been collected from station 448 and one specimen each from station Nos. 212, 215 (10°46' N., 72°42' E.) and 446 (11°20' N, 72°11' E.). There is a fairly wide gap between the above and the next lot which consists of late postlarval specimens of the same size group ranging from 15.68–16.30 mm. in total length.

Definitions of the measurements expressed in mm. are as follows:

Standard length (S.L.).—Tip of the rostral spine to the tip of the urostyle in small specimens or to the middle of the base of caudal in large specimens where the end of the vertebral column is turned up.

Head length.—Tip of rostral spine to the posterior border of the opercle excluding the opercular and preopercular spines.

Snout length.—Tip of rostral spine to the anterior margin of the orbit.

Eye.—Horizontal diameter of orbit.

Preopercular spine length (Preop. sp.).—Angle of the preopercle to the tip of the opercular spine.

Supraoccipital spine (Sup.occ. sp.).—From the origin of the spine to the tip.

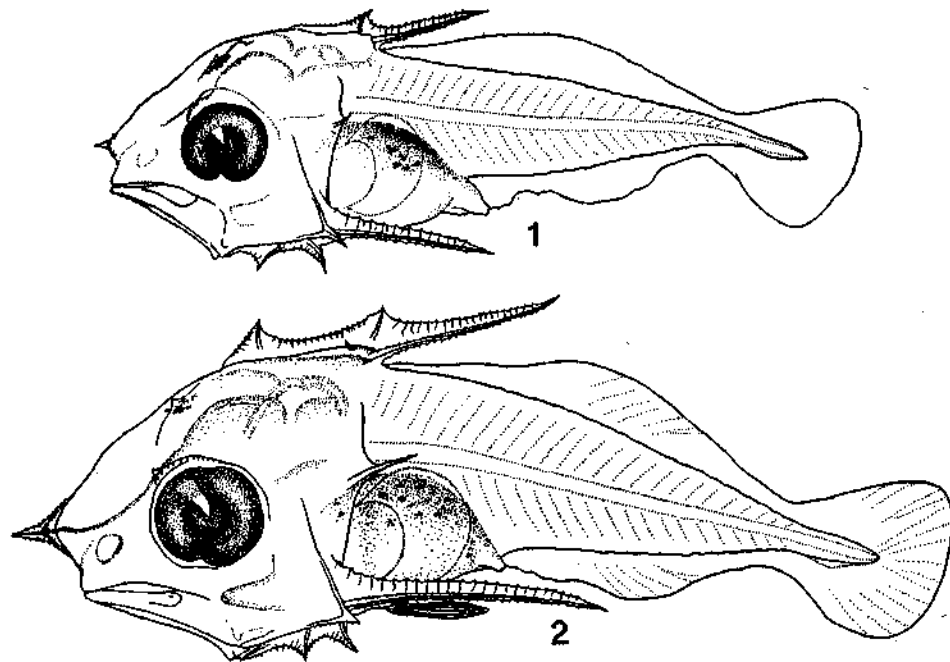
Body depth.—From the dorsal origin of the finfold or from the base of the first dorsal spine vertically down to a median ventral line.

Snout to dorsal (Sn. to D).—Horizontal distance from the tip of rostral spine to a vertical from the dorsal origin of finfold or first dorsal spine.

Snout to anal (Sn to A).—Horizontal distance from the tip of rostral spine to a vertical from the anal finfold or first anal spine.

2.72 mm. stage (Fig. 1).—This is the smallest specimen in the collection. There is no indication of any yolk and it appears to be an early postlarva. The head is somewhat blunt and is fairly large, being about 35% of standard length. The body is slender and tapered posteriorly. The mouth is terminal and oblique and the maxillary reaches to a vertical from the anterior border of the pupil. Eye is about 11.4% of standard length. Snout is slightly longer than the diameter of the eye and is about 12.2% of standard length. There is a characteristic conical projection at the tip of the snout which is made up of two compactly placed spinous structures presumably covered over by a thin layer of epidermis as is evident in the later stages. There

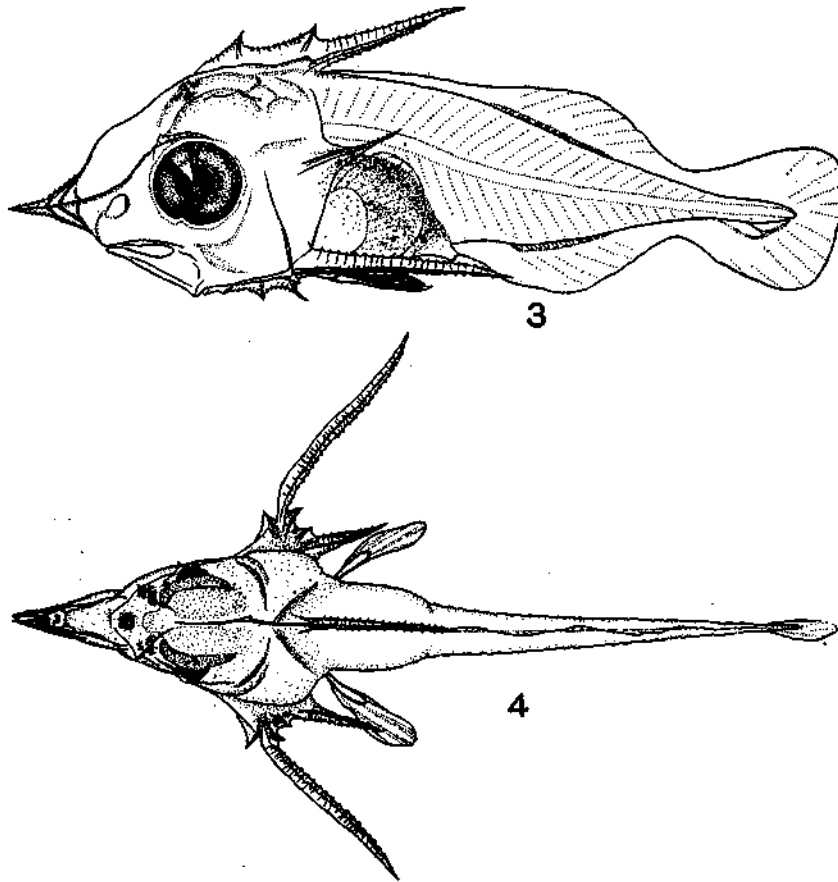
is a long serrated spine at the angle of the preopercle directed backwards and outwards which measures about 24.4% of standard length. There are two short curved spines along the lower limb of the preopercle and a very small one at its angle just below the long preopercular spine. On the supra-occipital part one long serrated spine measuring 30.7% of standard length is present with a short-curved spine at its anterior part. A small spine is visible on the upper part of the operculum. Minute wart-like thickenings are present over the upper part of head. Twenty-five myotomes could be counted. The median finfold is continuous but is narrow in the region of the caudal peduncle. Pectorals are rounded and devoid of fin rays. Pelvic fins are absent. A group of pigment is visible over the eye on each side in front of the region of the forebrain. Small chromatophores are present on the dorsal aspect of the abdominal sac.



Figs. 1 and 2. *Myripristis murdjan*. Fig. 1. 2.72 mm. stage. Fig. 2. 3.40 mm. stage.

3.40 mm. stage (Fig. 2).—Considerable development has taken place when compared to the former stage. The head length has increased to 39.6% of standard length mainly due to the elongation of the snout including the rostral spine which is now 16.6% of standard length. Nostril is clearly visible. The snout is less blunt than in the 2.72 mm. stage and the mouth

has shifted to a slightly ventral position. Maxillary reaches to a vertical below the middle of the eye. The rostral spines appear serrated. The preopercular spine has increased considerably to 31.6% of standard length. Lower limb of the preopercle has three spines instead of the two in the preceding stage. Another curved spine has appeared near the base of the supraoccipital spine which is now 39.6% of standard length. Serrations have increased in the preopercular and supraoccipital spines. The opercular spine has lengthened considerably with a slight wavy margin indicating faintly the formation of serration. A low ridge is present between the base of the rostral spine and the supraorbital region. The preanal portion has elongated considerably. Fin rays have not yet developed. Ventral fins are pigmented lightly on the posterior third. Chromatophores on the head and on the peritoneal lining of the abdominal cavity have increased.



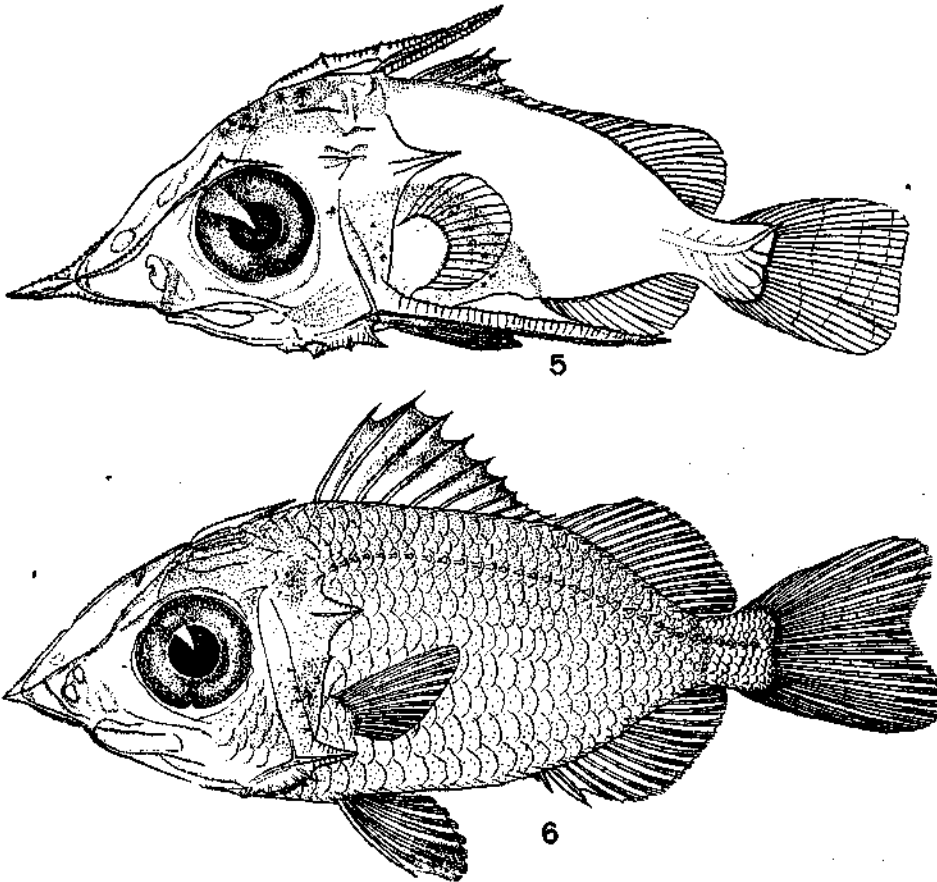
FIGS. 3 and 4. *Myripristis murdjan*. Fig. 3. 4.71 mm. stage. Fig. 4. Dorsal view of the above.

4.71 mm. stage (Figs. 3 and 4).—The most striking developments in this stage are the elongation of the snout and the thickening of the bases of dorsal, anal and caudal. The snout has increased to 18.8% of standard length and appears to overhang the somewhat inferior mouth. The diameter of the eye has increased to 13% of standard length. Rostral spine is longer and the serration has increased. Cross ribs on the preopercular and supraoccipital spines are well developed. The opercular spine which is directed obliquely upwards has increased considerably in length. The ridge on the snout connecting the rostral spine and the supraoccipital crest is well discernible and serration is faintly visible on the supraoccipital crest. There are four spines on the lower limb of the preopercle of which the one near the angle is the longest as in the earlier stages. Twenty five myotomes plus the urostyle region of the caudal could be counted. Base of the finfold of the median fins has thickened and rudiments of fin rays are discernible. Fin rays are visible in the pectoral and ventral fins. Caudal fin shows a tendency towards heterocercal condition. Chromatophores on the abdominal sac are more densely distributed. Pigmentation on the dorsal part of the head has become prominent and the overall colouration of the head is slightly deeper than before. The ventral fins are heavily pigmented posteriorly.

6.74 mm. stage (Fig. 5).—The head appears conspicuously large and is about 52.6% of standard length. The dorsal profile of the snout is less inclined and the mouth is situated ventrally. Maxillary reaches to a vertical from the centre of pupil of the eye. Nasal opening shows a constriction in the middle. The rostral spine has lengthened and the snout including the rostral spine is about 25% of standard length. The supraoccipital spine has decreased in length in relation to the increase in size of the specimen, being only 32.2% of standard length. The preopercular spine has increased in length considerably and it is about 36% of standard length. The ridge connecting the median part of the rostral spine and the supraoccipital crest is serrated almost completely. A serrated ridge has developed below the base of the supraoccipital spine. Wart-like thickenings on the upper half of head are only faintly discernible. A slight increase in the depth of the body could be observed at this stage. The preanal portion has increased to 65.2% of standard length. Five dorsal spines have developed and the rudiments of the rest could be seen. Fifteen dorsal rays are visible. Anal has 4 spines and 13 rays. Pectorals show 15 fin rays. Pelvic fins have grown conspicuously longer. Caudal is separate from the dorsal and anal fins and the soft rays show indications of branching. The body has thickened considerably and hence myotomes are not visible at this stage except near

the caudal region. The caudal fin is distinctly heterocercal. Several chromatophores have appeared on the dorsal part of the head. There is sparse pigmentation in the membrane between the anterior dorsal spines. Pigmentation on the abdominal sac is more dense.

16.30 mm. stage (Fig. 6).—Considerable development has occurred in this large postlarva which nearly approaches the juvenile in general appear-



FIGS. 5 and 6. *Myripristis murdjan*. Fig. 5. 6.74 mm. stage. Fig. 6. 16.30 mm. stage.

ance especially in the reduction in length of the rostral, supraoccipital and preopercular spines and in the increase in depth of the body. The head length has considerably decreased, being about 42% of standard length. Snout is only 15% of standard length, this being mainly due to the decrease in length of the rostral spine. Nostril is double in this stage. Eye is prominent though its size is slightly smaller than in the preceding stage, 14.8%

in relation to standard length. Supraoccipital and preopercular spines have greatly decreased in size, being only 14.7 and 11.3% respectively of standard length. Six narrow ridges have developed on the dorsal part of the head. There is a serrated ridge below the eye. Spination on the lower limb of the preopercle has increased. There has been a backward shifting of the vent and increase in the depth of the body. The full complement of spines and rays have developed though the shape and proportions observed in the adult have not yet been attained. The general colour in formalin is light brown. Black pigments are present all over the body with the exception of snout, below the eye and caudal peduncle. Body is darker dorsally. Outer side of the membrane between the first four rays of ventral is lightly pigmented. The spinous dorsal is sparsely pigmented distally. Scales have developed and 32 could be counted in a lateral series.

The smallest juvenile in the collection measuring 51 mm. in total length is similar to the adult in all essential external features. The rostral spine is entirely absent and the supraoccipital spine is very much reduced to a broad ridge. The preopercle is serrated and the rudiment of preopercular spine is faintly visible at its angle.

The localities of capture of larval *M. murdjan* and *Holocentrus* sp. are shown in Fig. 7. All the larval specimens were collected by surface plankton hauls and majority of them during night time. No information is available on the breeding of *M. murdjan*. It would appear that the species is breeding over a fairly extensive area in the Laccadive Sea. The available records show that it breeds during February, March and April but collections have not been made throughout the year and hence nothing further could be said about the spawning period of this species.

XIII. *Holocentrus* sp.

Nine postlarval specimens of *Holocentrus* sp. ranging from 2.56–4.60 mm. were collected in one haul from station No. 448 on 29-4-1959. The particulars of 8 which were in good condition are given in Table II. This appears to be the first record of larval *Holocentrus* from the Indian Ocean and hence some of the typical stages are described and figured.

2.56 mm. stage (Fig. 8).—The eye in the smallest specimen available measuring 2.56 mm. in total length is damaged and hence the same is indicated by thick dotted lines in the figure. Body is slender and tapering with a large head measuring 40.8% in standard length. There is a serrated spine at the end of the snout the base of which is broad and supported by

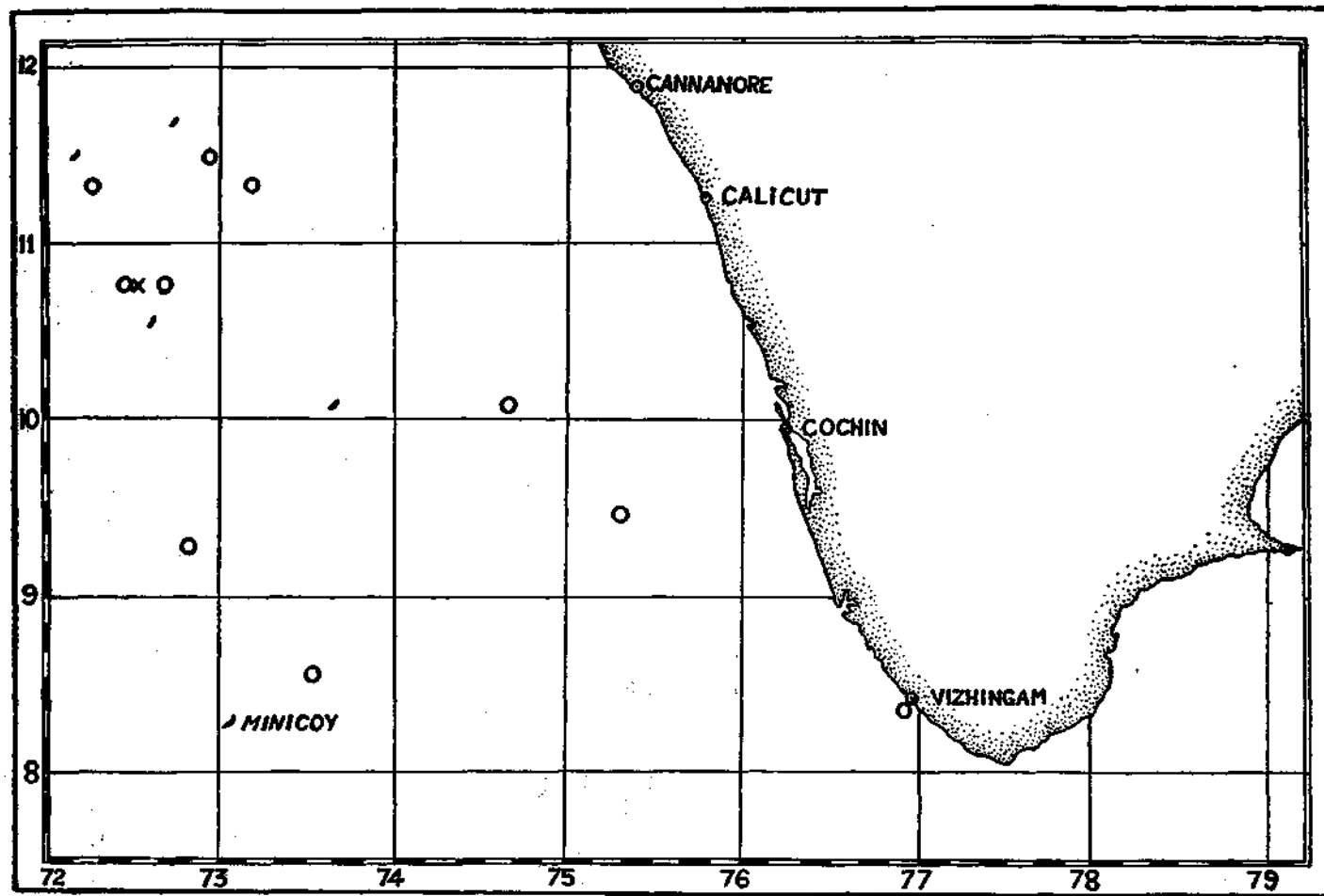


FIG. 7. Records of capture of larval *Myripristis murdjan* (Forskål) and *Holocentrus* sp. O *M. murdjan*., X *Holocentrus* sp.

TABLE II

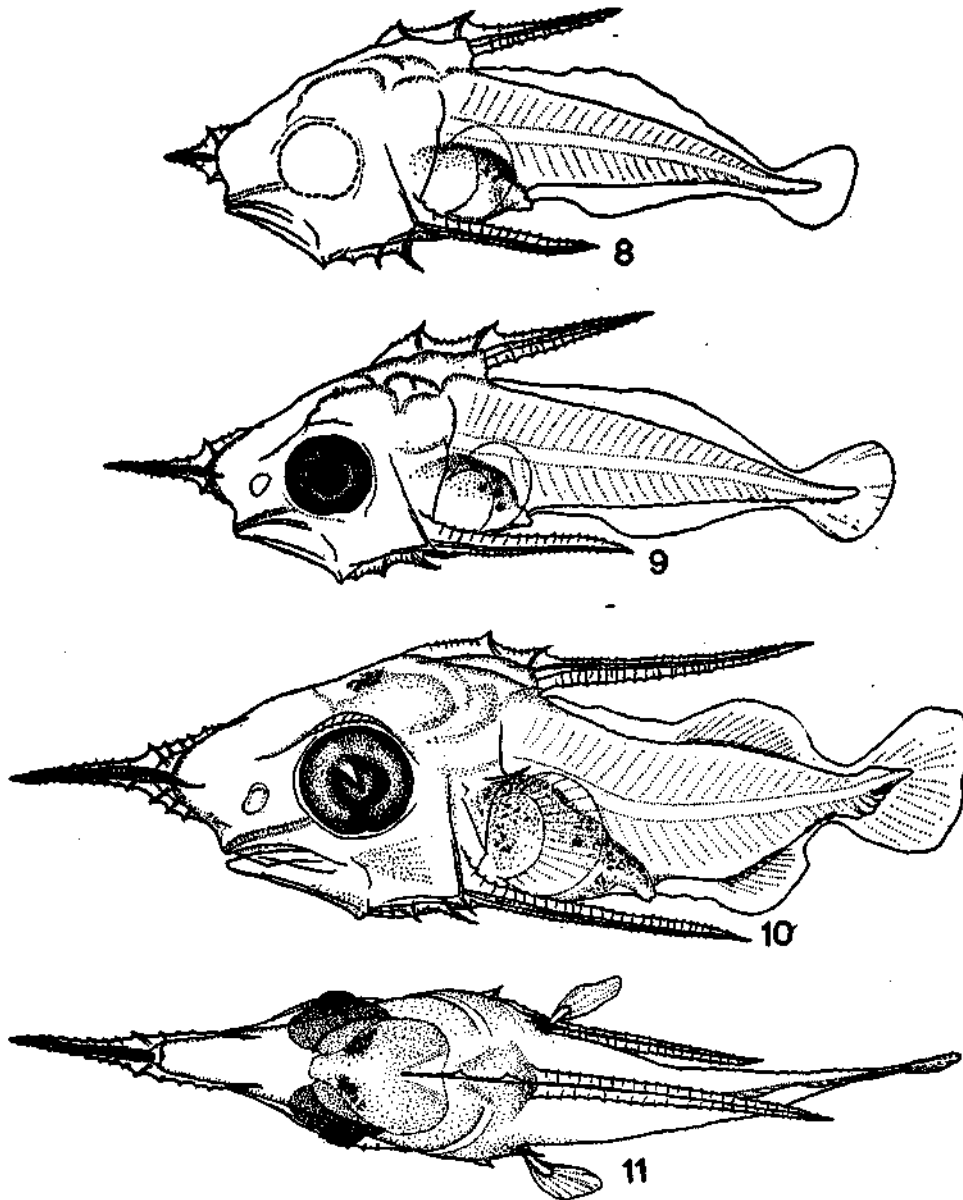
Measurements of postlarval Holocentrus sp. in mm. collected from station No. 448 (10° 46' N., 72° 26' E.) on 29-4-1959 (0030-0045 hrs.)

Sl. No.	T.L.	S.L.	Head	Snout	Eye	Pre- op. sp.	Sup. occ. sp.	Depth	Sn. to D.	Sn. to A.
1*	2.56	2.46	1.04	0.68	0.94	0.59	1.09	1.35
2*	2.89	2.74	1.31	0.69	0.31	0.78	1.09	0.62	1.41	1.57
3	3.50	3.29	1.78	1.09	0.36	1.04	1.36	0.73	1.98	2.09
4	3.66	3.45	1.78	1.04	0.39	1.04	1.41	0.73	1.93	2.04
5	3.71	3.50	1.88	1.04	0.43	1.09	1.67	0.78	2.04	2.25
6	4.08	3.87	1.88	1.19	0.41	1.20	1.83	0.78	2.04	2.42
7	4.18	3.92	2.09	1.30	0.49	1.51	1.95	0.89	2.14	2.61
8*	4.60	4.34	2.34	1.36	0.55	1.51	2.04	1.04	2.56	2.98

* Denotes specimens described and figured.

strong spines on the sides. Mouth is slightly oblique. There is a serrated preopercular spine at the angle of each preopercle, the length of which is about 27.6% of standard length. The lower limb of the preopercle has three curved spines, the posterior one near the angle being the longest. The supraoccipital spine measuring 38.2% of standard length has two short spines in the basal part. Minute wart-like thickenings are discernible over the snout, supraorbital and postorbital parts of head. Myotomes are distinct and 25 could be counted. The median finfold is continuous and is narrow in the caudal region. Pectoral is devoid of fin rays. Pelvic fins have not developed and the caudal fin is protocercal. A row of chromatophores are present along the ventral midline of the caudal region. Dorsal part of the visceral sac is pigmented.

2.89 mm. stage (Fig. 9).—In overall appearance this resembles the foregoing one except for the conspicuously elongated rostral, preopercular and supraoccipital spines. Head has increased to 47.6% of standard length and the snout including the rostral spine is 25.2% of standard length. Snout is less blunt than in the preceding stage. Nasal openings are represented by opaque areas on either side of the snout. The mouth is slightly



FIGS. 8-11. *Holocentrus* sp. Fig. 8. 2.56 mm. stage. Fig. 9. 2.89 mm. stage. Fig. 10. 4.60 mm. stage. Fig. 11. Dorsal view of the above.

inferior and the maxillary reaches to a vertical from the pupil of the eye. Eye is prominent and its diameter is 11.3% of standard length. There is a small spine just near the origin of the long preopercular spine. Cross-ribs on the preopercular and supraoccipital spines have increased in number.

25 myotomes are clearly visible. No significant change from that of the preceding stage was observed in the development of the fins. A small patch of chromatophores is present over the region of the forebrain. The chromatophores along the ventral midline of the caudal region appear better defined than in the previous stage. Pigmentation has increased in the abdominal sac.

4.60 mm. stage (Figs. 10 and 11).—This shows considerable advance in development over the preceding stage. Head length has increased to 53.8% of standard length. The dorsal profile of the snout is less inclined and the snout has increased in length. The mouth is inferior and the maxillary reaches to a vertical below the middle of eye. Eye is very prominent and its diameter is 12.6% in standard length. Supraoccipital and preopercular spines have grown to 47% and 34.8% of standard length respectively. An opercular spine directed obliquely upwards has developed on the upper part of the operculum. There are four spines on the lower limb of the preopercle and the one near the angle remains the longest among them. The supraoccipital ridge with small serrations is well developed. The preanal portion has elongated considerably. Finfold is still continuous with the caudal but in the region of the caudal peduncle the breadth of the membrane is much less. Traces of fin rays are discernible in the region of the soft dorsal, anal and caudal. Pectoral is rounded and fin rays have formed. Ventral fins are observed as small projections. The overall pigmentation in the abdominal sac is much more than in the previous stage. Pigmentation over the forebrain is well developed. The chromatophores in the caudal region appear larger and localised.

The accompanying table (Table III) gives the most important distinguishing features of the postlarval stages of *M. murdjan* and *Holocentrus* sp.

There is close similarity between the larvae of *Holocentrus vexillarius* Poey collected from the Atlantic and described by McKenney (1959) and the larval specimens of *Holocentrus* collected from the Laccadive Sea. In the absence of a connected series the specific identity of postlarval *Holocentrus* from the Laccadive Sea could not be determined. The smallest *H. vexillarius* described by McKenney (*op.cit.*) measured 1.8 mm. in standard length and in the absence of a rostral spine and the presence only of two short spines in the supraoccipital region in this stage, it was presumed by him that the rostral and probably the supraoccipital spines are absent at hatching.

Among the several hypotheses put forward about the biological significance of the development of spriny armature in larval fishes during their

TABLE III

Distinguishing features of postlarvae of M. murdjan and Holocentrus sp.

<i>Myripristis murdjan</i>	<i>Holocentrus sp.</i>
Rostral spines appear as a paired serrated structure, their length never more than the diameter of the eye, and sides more or less uniformly serrated.	Rostral spine appears as a single structure, much longer than the diameter of eye, and supported by strong short spines at the basal part in specimens longer than 2.8 mm.
Chromatophores absent along the ventral midline of caudal region.	Chromatophores present along the ventral midline of caudal region.

planktonic existence, the most important two are the following: (i) The spines supposedly serve as a flotation device since the increase in surface area due to the presence of spines helps to slow down vertical movements and thus prevent the larvae from sinking. (ii) They give the larva a larger head size which might afford considerable protection from some predatory species (McKenney, *op.cit.*). These however require corroboration.

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