

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

VI. Genus *Auxis* Cuvier. VII. *Sarda orientalis* (Temminck & Schlegel)

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VI. GENUS *Auxis* CUVIER

THERE are under this genus two distinct species distinguished mainly by the nature of their corselets. In the first species, *A. thazard* the corselet is short, abruptly constricting immediately behind the vertical from the hind end of the first dorsal, whereas in the second species it gradually tapers and extends to well behind the second dorsal. Bleeker described *A. tapeinosoma* (Bleeker, 1854), and *A. thynnoides* (Bleeker, 1855) from Indonesian waters and these have been relegated as synonyms of *A. thazard* by Beaufort (1951). Wade (1949), while working on Philippine tunas, recognised the presence of a long corseletted form distinct from the short corseletted form and fixed the identity of the former as *A. tapeinosoma*, a name used by subsequent workers (Herre and Herald 1951; Herre, 1953; Jones, 1958). Recently Matsumoto (1959) after a critical study of the original descriptions and examination of the type specimens of both *A. tapeinosoma* and *A. thynnoides* found that the former is a short corseletted form and as such is synonymous with *A. thazard*, while the latter is a long corseletted form. Therefore in this account *A. tapeinosoma* is relegated as a synonym of *A. thazard* and the long corseletted form will be referred to as *A. thynnoides*. Both the species are distributed in the Indo-Pacific but the former appears to be better known and from a wider area than the latter.

Larval Auxis

Auxis larvæ could be distinguished from the larvæ of other thunnids by the presence of conspicuous chromatophores along the mid-ventral and mid-dorsal lines of the caudal peduncle. Chromatophores develop along the mid-lateral line of the caudal peduncle also in the older specimens. There is close similarity between the early larvæ of *Euthynnus* and *Auxis* and the characters which would enable them to be distinguished from one another have already been detailed by Wade (1951) and Matsumoto (1958).

There are in all 9 larvæ in the collection ranging in total length from 3.36 mm. to 7.94 mm. which could be assigned to the genus *Auxis* but their specific identity is not known. All the specimens have been collected from the Laccadive Sea and their measurements and other particulars are given in Table I.

TABLE I
Measurements of *Auxis* Larvae in mm.

Sl. No.	Date	Station	T.L.	St. L.	Head	Max. W.	Snout	Eye	Sn. to D.	Sn. to V.
1*	10-4-1959	426	3.36	3.20	1.03	.97	.31	.34	.91	1.38
2	29-4-1959	448	3.37	3.25	.97	.91	.31	.34	.91	1.42
3	29-4-1959	448	3.65	3.54	1.20	1.14	.34	.40	1.14	1.59
4	28-4-1959	447	3.65	3.48	1.20	1.03	.34	.40	1.20	1.59
5	10-4-1959	436	4.34	4.11	1.50	1.31	.51	.46	1.60	2.11
6*	6-1-1959	73° .07' E. 8° .40' N.	4.40	4.17	1.49	1.37	.54	.49	1.71	2.17
7*	29-4-1959	448	5.08	4.85	1.88	..	.57	.57	1.94	2.28
8	6-1-1959	73° .07' E. 8° .40' N.	5.20	4.90	1.83	1.60	.60	.53	1.94	2.39
9*	Do.	Do.	7.94	6.85	2.85	2.22	1.08	.90	2.91	3.77

* Denotes specimens described and figured.

T., Total, L., Length, St., Standard, Max. W., Maximum width, Sn., Snout, D., Dorsal, V., Ventral.

3.36 mm. larva (Fig. 1).—This is the smallest larva in the series and was collected from *Kalava* station No. 436 on 10-4-1959 and is provisionally

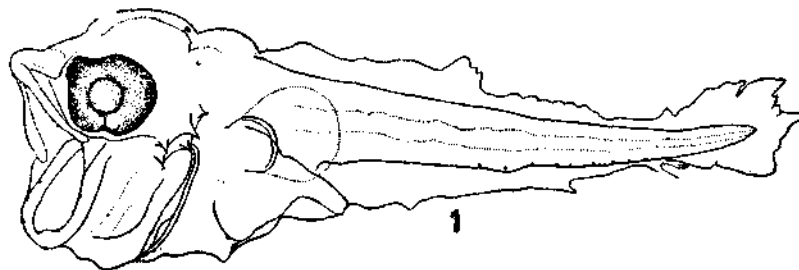
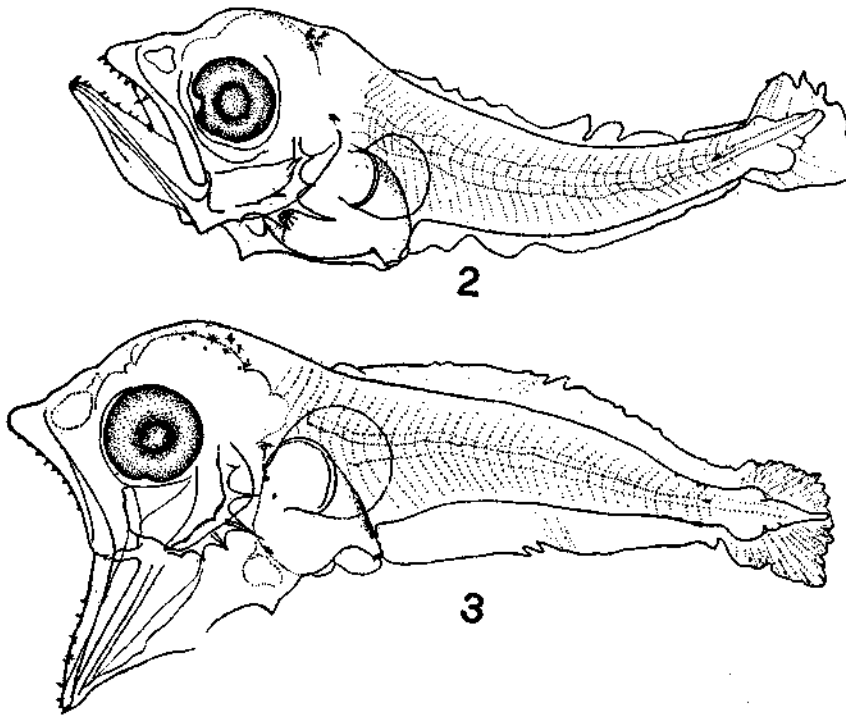


FIG. 1. 3.36 mm. *Auxis* larva.

assigned to *Auxis*. The snout and median fins are somewhat distorted and teeth are absent but the general features leave no doubt of its being a larval thunnid. The preopercular spines are three in number and are all more

or less of the same size at this stage whereas at the subsequent stage there are five in all and the central one becomes conspicuously larger than the rest. Though the characteristic chromatophores on the caudal peduncle are absent, evidently due to its being a very early larva, the presence of a row of chromatophores along the ventral side of the body, the distribution of the chromatophores on the head and absence of any pigment on the side of the lower jaw helps to place it provisionally as an *Auxis* larva.

4.40 mm. larva (Fig. 2).—This specimen was collected from 73° 07' E. and 8° 40' N. on 6-1-1959 on board *I.N.S. Jumna*. Chromatophores at



FIGS. 2 and 3. *Auxis* larvae 4.40 mm. and 5.08 mm. respectively.

the caudal peduncle, characteristic of the *Auxis* larvae are present. There is a group of chromatophores on the head over the region of the mid-brain and a single one at the tip of the lower jaw. The one at the symphysis of the pectoral girdle is more conspicuous than in the previous stage and more of them are seen in the abdominal region.

Teeth are present in both the jaws. In addition to the preopercular spines a small spinous growth is discernible immediately above the angle

of the operculum at the post-temporal region. The median fins which appear frayed due to shrinkage are devoid of rays and the myomeres at the caudal end are not distinct.

5.08 mm. larva (Fig. 3).—This is a slightly older stage than the previous one. The row of chromatophores on the ventral side has disappeared except at the caudal peduncle where they are more conspicuous than in the previous stage. The disposition of the other chromatophores is more or less the same. There are faint indications of rays in the median finfold.

7.94 mm. larva (Fig. 4).—This is a distinctly more advanced stage than the previous ones described. A distinct row of chromatophores have

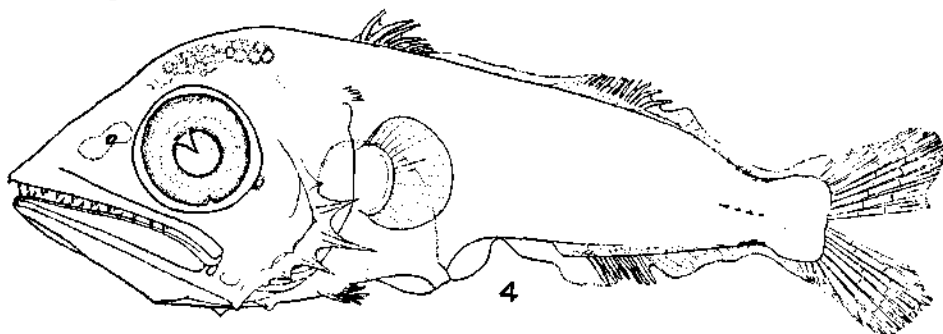


FIG. 4. 7.94 mm. *Auxis* larva.

developed on each side of the caudal peduncle making the characteristic pigmentation there markedly conspicuous. There are more chromatophores on the head and in the abdominal region.

The specimen is proportionately broader. Pelvic fins are present and all the fins possess spines and rays as the case may be, though the full complement has not developed in the dorsal and anal fins. All the median fins are still connected by narrow fin folds. The preanal finfold is still present. The wide gap between the two dorsals which are still connected by a narrow finfold which does not show any indication of spines or rays distinguishes the advanced larvæ of *Auxis* from larvæ of other thunnids of corresponding size (Wade, 1951; Matsumoto, 1958 and 1959 and Jones, 1959 and 1960).

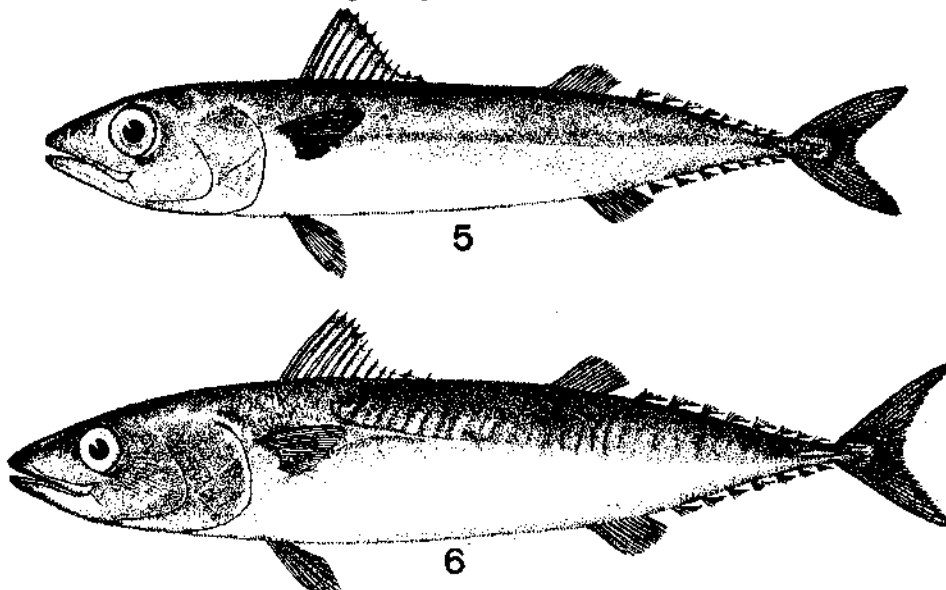
So far characters distinguishing the larvæ of *Auxis thazard* from those of *A. thynnoides* have not been properly delineated though Ehrenbaum (1924) has given descriptions of *A. thazard* from the Mediterranean where only this species occurs. Larval *Auxis* have been described from the Pacific by Wade, 1951, Matsumoto, 1958 and 1959 but their specific identity does

not appear to be certain since both the species occur there. Though both the species occur in the Indian waters so far only *A. thazard* has been recorded from the Laccadive Sea from where these specimens have been collected and the possibility is that the larvae described could be of this species. But the chances of *A. thynnoides* also occurring there are equal and therefore any inference could only be tentative.

Juveniles of Auxis thynnoides Bleeker

There are in all 26 juveniles in the collection measuring from 44 mm. to 209.8 mm. Of these the measurements of 20 are given in Table II. All the specimens have been collected from Vizhingam on the west coast and so far specimens within the above length range have not been obtained from any other locality.

46.8 mm. Juvenile (Fig. 5).—This has a total length of 53 mm. and is one of the smallest among the juveniles collected and is listed as No. 3



FIGS. 5 and 6. Juvenile *Auxis thynnoides* 46.8 mm. and 79.50 mm. respectively.

in the series in Table II. The corselet scales have not developed and the lateral lines are also absent. The colour is dark brown above and whitish below.

The wide gap between the two dorsal fins in combination with other characters places it as an *Auxis* and comparison with the graded series available shows that it is *A. thynnoides*.

TABLE II
Measurements of Juveniles Auxis thynnoides Bleeker in mm.

Sl. No.	Date	Std. L.	Head	Snout	Eye	Maxilla	Max. depth.	Sn. to D.	Sn. to A.	D. spine L.	Gill-rakers
1	?	44.0	13.0	4.0	3.5	5.4	8.5	15.0	30.0	4.6	..
2	29-5-1958	46.7	13.8	4.4	3.4	5.7	8.2	16.2	33.2	5.8	7+20
3*	29-5-1958	46.8	14.0	4.1	3.2	5.5	8.6	16.3	33.9	5.0	7+20
4	?	48.0	13.9	4.4	3.5	5.8	8.4	16.2	33.6	5.8	8+22
5	26-3-1959	49.2	15.1	4.4	3.3	6.1	8.0	17.3	35.7	5.2	8+21
6	26-3-1959	61.7	17.4	5.7	3.9	7.0	11.2	21.0	42.3	6.2	8+22
7	26-3-1959	67.0	19.2	6.2	4.0	8.0	12.0	23.0	46.2	7.5	8+23
8	?	69.2	18.8	5.9	4.1	7.5	12.8	22.5	47.2	7.3	8+26
9*	26-3-1959	79.5	22.0	6.3	4.5	8.1	14.7	26.1	55.0	8.0	9+31
10*	30-9-1958	125.0	33.0	9.8	6.1	12.0	22.0	38.5	85.0	12.6	9+31
11	?	126.1	33.7	10.1	7.0	13.0	21.8	38.8	87.0	14.0	..
12	30-9-1958	128.5	33.8	10.2	6.3	12.8	23.0	41.0	89.2	13.7	10+31
14	30-9-1958	132.0	35.0	10.4	6.4	12.9	23.3	41.0	89.4	14.8	10+30
17	30-9-1958	181.0	48.0	13.5	9.0	15.7	34.0	55.3	131.1	16.5	10+36
19	30-9-1958	183.0	49.0	11.8	11.0	16.5	36.0	51.2	128.0	20.0	11+35
20*	30-9-1958	185.3	46.7	11.9	9.0	15.3	33.8	57.0	131.5	16.8	11+35
21	30-9-1958	187.5	49.0	12.0	10.0	16.5	36.0	59.5	131.9	19.0	10+34
22	3-10-1958	189.0	49.0	12.4	9.0	15.5	36.0	59.7	134.0	18.7	11+34
23	3-10-1958	191.0	50.1	12.8	9.2	16.0	36.2	59.5	134.5	19.5	10+35
24	3-10-1958	196.0	51.5	13.2	10.2	17.2	36.0	62.5	142.0	19.2	10 36
25	3-10-1958	205.2	51.5	12.5	9.2	16.0	38.0	61.0	139.5	20.2	11+34
26	3-10-1958	209.8	55.8	14.0	10.5	17.2	41.0	65.6	150.2	22.2	10+36

* Denotes specimens described and figured.

?, Dates of Collection not known. Std., Standard. L., Length. Sn., Snout. D., Dorsal. A., Anal.

79.50 mm. Juvenile (Fig. 6).—This has a total length of 87 mm. and was collected from Vizhingam on 26-3-1959. The corselet scale extends vertical to the first dorsal fin. The lateral line is incomplete and does not extend to the caudal region. The dorsal half bears indistinct oblique dark

lines. The general colouration is darker than in the previous stage described.

125 mm. *Juvenile* (Fig. 7).—This has a total length of 136 mm. and was collected from Vizhingam on 30-9-1958. The corselet scales are better developed but they extend only up to midway between the dorsals. The lateral line is complete. The general colouration is darker than in the previous stage described.

185.3 mm. *Juvenile* (Fig. 8).—This has a total length of 198.5 mm. and was collected from Vizhingam on 30-9-1958. The corselet scales extend to behind the second dorsal and specimen though immature has all the unmistakable features of adult *A. thynnoides*.

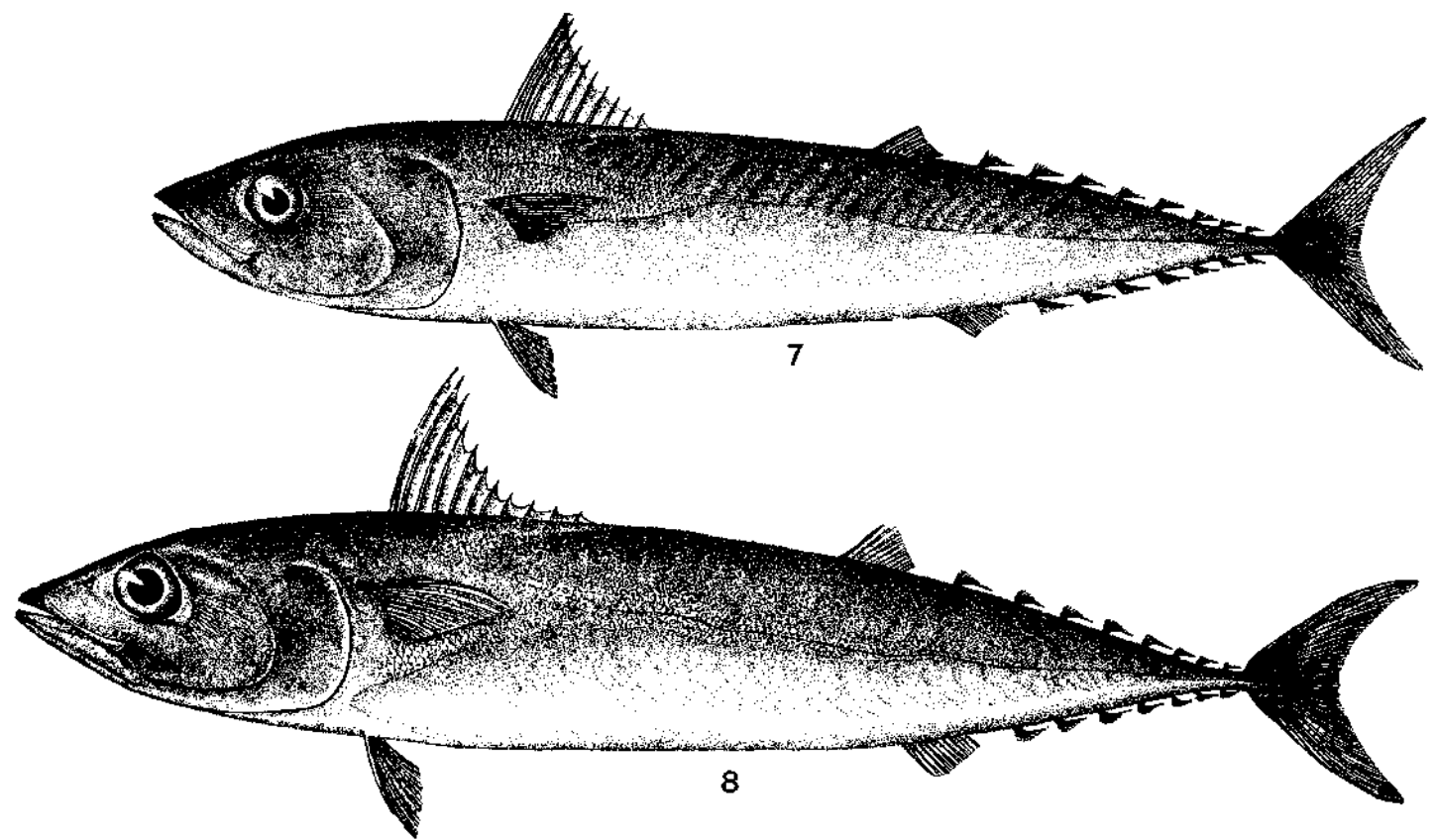
Juvenile of Auxis thazard (Lacépède)

Juveniles of *Auxis thazard* have been described from the western Pacific by Wade (1951) and Mead (1951). Though the adults of this species have been recorded from more localities in the Indian region than its congener only a single juvenile specimen described below has been obtained so far.

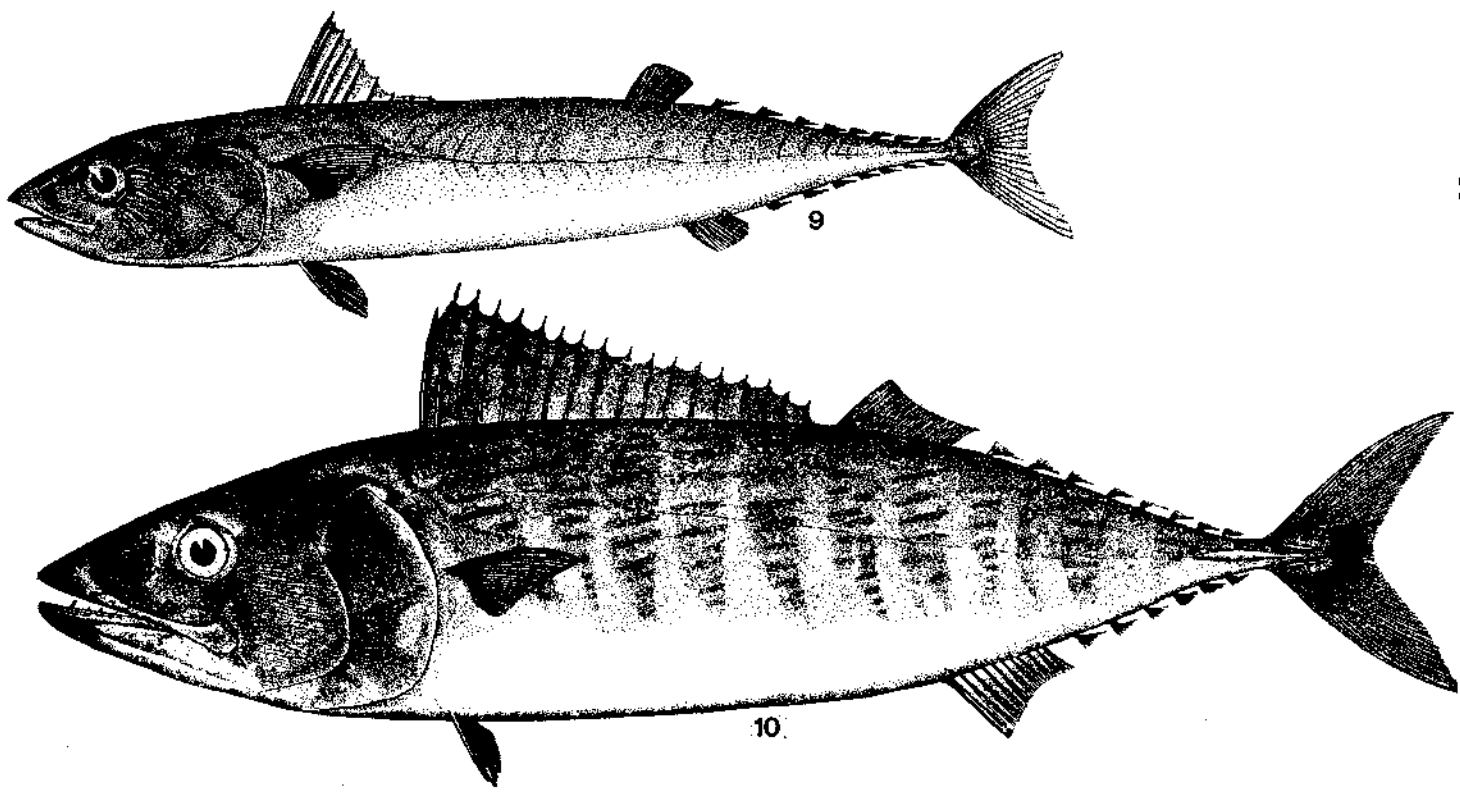
118 mm. *Juvenile* (Fig. 9).—This has a total length of 131 mm. and a reference about this has already been made by the author in an earlier article (Jones, 1958). This was collected by Mr. S. Iswaramurthy of this Research Station who found it washed ashore at Mandapam Camp on 26-5-1956. The specimen is large enough to be distinguished from the juvenile of *A. thynnoides* of the same length by its more compressed body, rather tapering caudal region and abruptly narrowing corselet of scales bordering the lateral line.

VII. *Sarda orientalis* (TEMMINCK & SCHLEGEL)

Three valid species are recognised (Fraser-Brunner, 1950) under the genus *Sarda*, viz., *S. chilensis*, *S. sarda* and *S. orientalis*, the last one being the species occurring here though according to Day (1878) it is *S. chilensis* (= *pelamys chilensis*). *S. orientalis* has a wide distribution in the Indo-Pacific from the East Coast of Africa to the West Coast of America. It grows to a length of over half a metre and does not form a regular fishery of any appreciable magnitude anywhere. Usually it is caught in stray numbers along with other fishes though occasionally juveniles come in shoals as in November 1959 when large catches of specimens ranging in length between 160 mm. and 200 mm. were reported from some fishing centres between Trivandrum and Cape Comorin on the west coast. Larger specimens are caught in hook and line and gill nets whereas the juveniles are caught in shore-seines and boat-seines.



Figs. 7 and 8. Juvenile *Auxis thynnoides* 125 mm. and 185.3 mm. respectively.



FIGS. 9 and 10. Fig. 9. Juvenile *Auxis thazard* 118 mm. and Fig. 10. Juvenile *Sarda orientalis* 58 mm.

There appears to be little information on the development of fishes of the genus *Sarda* except the observations on the larvæ of *S. sarda* by Ehrenbaum (1924).

The smallest specimen available is a juvenile 80 mm. in standard length and 89 mm. in total length (Fig. 11) collected from Vizhingam near Trivandrum on the west coast.

The body bears twelve transverse bands which are broad at the dorsal aspect and taper laterally to become imperceptible on reaching the sides of the abdomen and above the anal. The jaws possess small teeth. The eyes are comparatively larger and head larger in proportion to the head and body length respectively than in the adult. Conspicuous even in the juvenile stage is the wide cleft of the mouth and the posterior end of the maxilla surpassing a vertical line below the posterior end of the orbit.

One of the larger juvenile specimens measuring 158 mm. in standard length and 174 mm. in total length collected from Vizhingam during November 1959 is given in Fig. 10. The transverse bands referred to the previous stage have subdivided into more or less horizontal streak, which ultimately unite to give rise to the lines so characteristic in the adult. In a specimen 262 mm. in total length all the lines immediately above the pectoral fins have already been formed as in the adult.

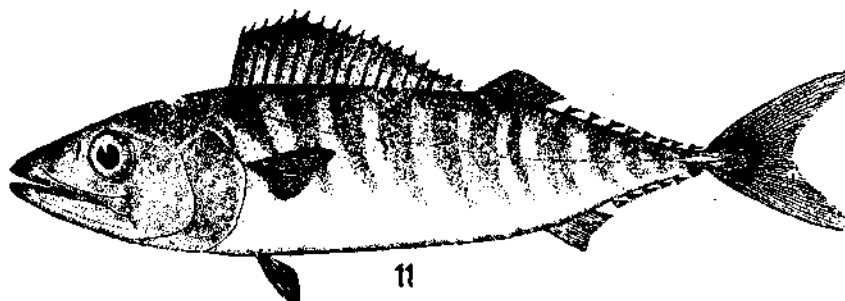


FIG. 11. Juvenile *Sarda orientalis* 80 mm.

The food of juvenile *S. orientalis* consists of larval and juvenile fishes and crustaceans. Adults feed on young and small-sized fishes, crustaceans and squids.

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