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

II. *Istiophorus gladius* (Broussonet)

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In the course of the cruise undertaken by the author on board the Research Vessel "Kalava" in February 1958, surface plankton collections were made from Station Nos. 205–220 and also from the anchorages of the vessel in the proximity of the Islands visited (Fig. 1). The larval swordfish from Station No. 218 has already been described in the first article of this series (Jones, 1958). There were sixteen larval specimens of the sailfish, *Istiophorus gladius* (Broussonet) ranging in length from 3·4–11·75 mm., the particulars of which are given in Table I. This appears to be the first record of larval sailfish from Indian waters and since there are no descriptions of larvæ of this species, some of the typical stages are described briefly and figured.

3·40 *mm. Stage* (Fig. 2 *a*).—This specimen from Station No. 208 collected on 20–2–1958 is the smallest in the collection and is an early prolarva with an appreciable part of the yolk, still persisting. The measurements are given in the table. The tip of the lower jaw is slightly in advance of the upper jaw at this stage and teeth are absent. The orbital crest which becomes prominent during the later stages is very small and without serrations. The pterotic and preopercular spines are short and weak. The caudal fin is protocercal. Chromatophores are comparatively few and are distributed as shown in the figure.

3·77 *mm. stage.*—This specimen was collected from Station No. 209 on 21–2–1958 and is very much similar to the previous stage except in the marked elongation of the pterotic and preopercular spines. Yolk is still present.

4·17 *mm. stage* (Fig. 2 *b*).—This specimen was collected from Station No. 209 on 21–2–1958 and the measurements are given in Table I. The jaws are of equal length and are provided with minute teeth. The orbital crest shows serrations. The preopercular and pterotic spines are more prominent and the chromatophores have increased. Most of the yolk has been absorbed.

4·74 *mm. stage* (Fig. 2 *c*).—This specimen, collected from Station No. 215 on 26–2–1958, belongs to a stage slightly in advance of the previous one.

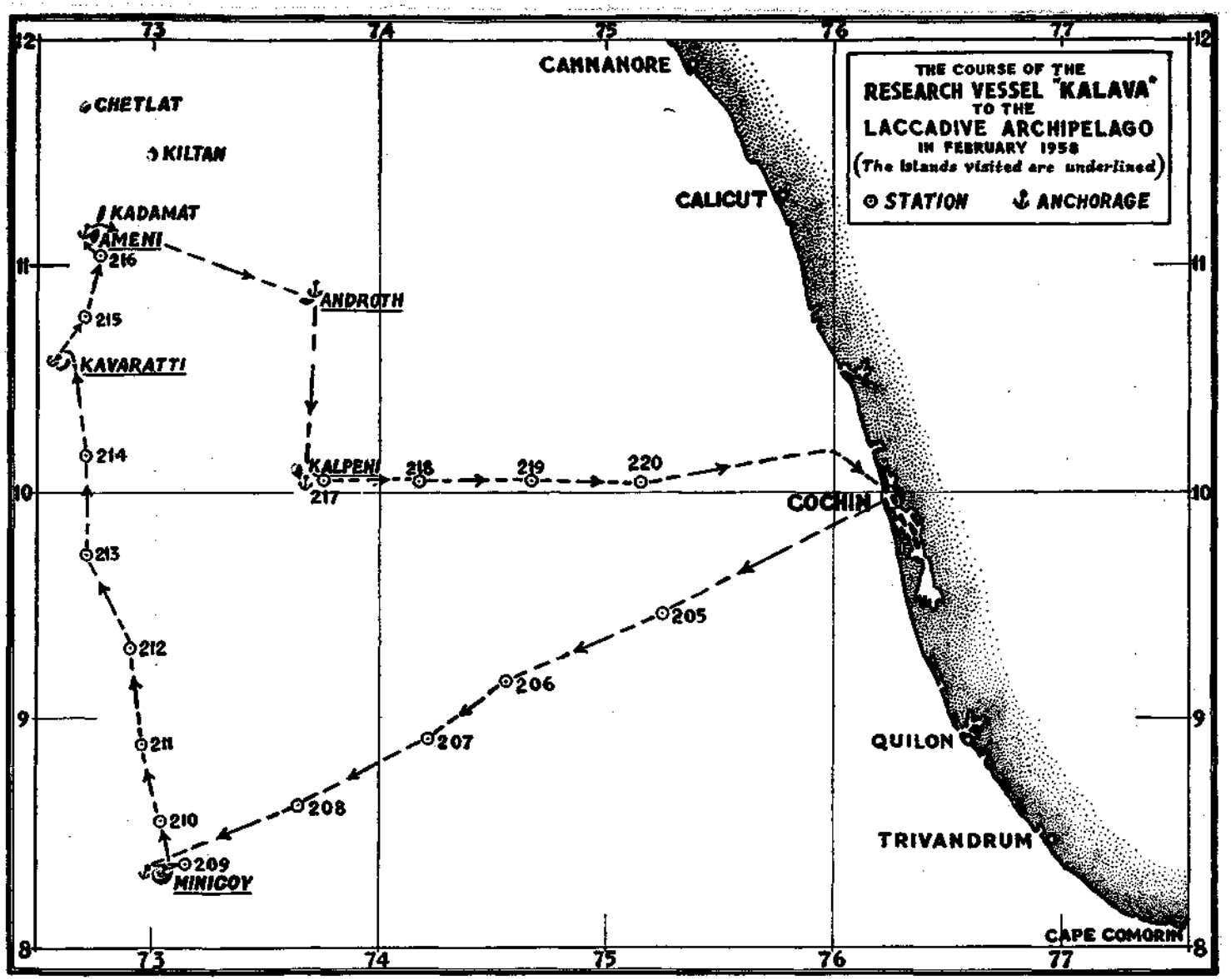

FIG. 1. Track of the Research Vessel "KALAVA" in the Laccadive Sea showing stations and anchorages.

All the yolk has been absorbed; *i.e.*, it is an early postlarva. The upper jaw projects a little beyond the lower one. The ventral fins appear as buds. The preanal finfold is broader than in the earlier and subsequent stages. Though the caudal fin is protocercal, it has a slight thickening at the lower side.

5·42 mm. stage (Fig. 2 *d*).—The specimen was collected from Minicoy Lagoon during night on 22-2-1958. A light was suspended from the side of the ship and fish larvæ and other small organisms that were attracted to it were hauled up vertically with the help of a plankton net. The chromatophores have increased. The pterotic and preopercular spines have grown longer and the latter extend almost as far as the vent. The preanal finfold is reduced and the caudal fin shows faint indications of rays.

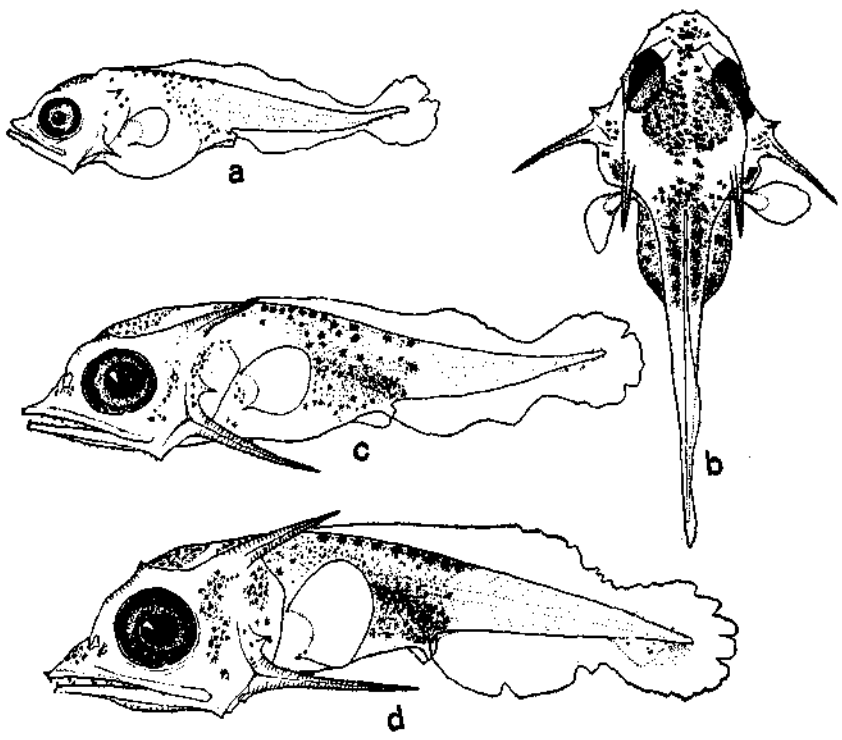

FIG. 2. Larval stages of *Istiophorus gladius*: (*a*) 3·40 mm. stage; (*b*) Dorsal view of 4·17 mm. stage; (*c*) 4·74 mm. stage; (*d*) 5·42 mm. stage.

6·51 mm. stage (Figs. 3 *a* and *b*).—The specimen was collected from Station No. 209 close to Minicoy on 21-2-1958. The preopercular spines extend a little beyond the vent and there are two smaller spines above on each side on the preopercle. The dorsal half of the pectoral has fin rays.

TABLE I

*Details of the sailfish larvæ collected from the Laccadive Sea**

S. No.	Date	Station No.	T.L.	St. L.	H.L.	W.H.	Sn. L.	Eye	Pt. sp.	P.O. sp.	Sn. to D.	Sn. to V.	S. Temp. °C.
1†	20—2—1958	208	3·40	3·20	·97	·57	·20	·37	·12	·23	·86	1·83	28·3
2†	21—2—1958	209	3·77	3·54	1·30	·85	·43	·51	·62	·91	1·48	2·28	28·4
3	24—2—1958	212	3·88	3·65	1·50	·85	·54	·51	·68	·80	?	2·28	28·5
4	28—2—1958	Kalpeni	4·11	3·83	1·43	·97	·48	·51	·63	·80	1·66	2·51	..
5†	21—2—1958	209	4·17	3·94	1·43	·91	·48	·48	·57	·80	1·66	2·28	28·4
6	21—2—1958	209	4·17	3·94	1·43	·97	·51	·51	·63	·80	1·77	2·34	28·4
7	20—2—1958	208	4·17	3·88	1·63	1·03	·57	·57	·68	1·08	1·77	2·50	28·3
8†	26—2—1958	215	4·74	4·48	1·71	1·08	·46	·57	·80	1·20	1·71	2·80	28·3
9	21—2—1958	209	4·80	4·51	1·94	1·14	·63	·68	·80	1·31	1·83	2·86	28·4
10	22—2—1958	Minicoy Lagoon	5·08	4·74	1·94	1·08	·51	·63	·74	1·20	2·00	2·80	..
11†	22—2—1958	do.	5·42	5·08	2·11	1·20	·63	·68	·80	1·31	2·06	2·91	..
12	24—2—1958	212	5·88	5·60	2·23	1·26	·68	·74	·80	1·60	2·23	3·60	28·5
13	21—2—1958	209	6·11	5·71	2·68	1·37	·91	·91	·91	1·83	2·74	4·11	28·4
14†	21—2—1958	209	6·51	6·11	2·63	1·48	·91	·91	·91	2·05	2·74	4·05	28·4
15†	24—2—1958	211	7·88	7·08	3·43	1·77	1·14	1·14	1·14	2·46	3·31	4·97	28·45
16†	20—2—1958	208	11·75	10·21	5·14	2·06	2·17	1·20	1·31	2·74	5·02	7·61	28·3

T.L. = Total Length. St. L. = Standard Length. H.L. = Head Length. W.H. = Width of Head. Sn. L. = Snout Length. Pt. sp. = Pterotic spine. P.O. sp. = Preopercular spine. Sn. to D. = Snout to Dorsal. Sn. to V. = Snout to Vent. S. Temp. = Surface Temperature.

* Two specimens, measuring 4·28 mm. and 5·37 mm. in total length, collected on 24–2–1958 and 8–4–1959 respectively from Station No. 212 and No. 431 (Lat. 10° 38′ N, Long. 72° 58′ E) are not included in this list.

† Stages described are marked with a dagger.

The median finfold shows constriction at the caudal peduncle. The dorsal and anal fins show indications of rays anteriorly. The specimen looks comparatively dark from the dorsal aspect.

7·88 *mm. stage* (Fig. 3 *c*).—This was collected from Station No. 211 on 24–2–1958. The nasal opening on each side shows constriction in the middle. The pterotic spine is somewhat reduced while the preopercular spine has grown longer. The caudal fin is separate and the anterior part of the dorsal fin shows a thickening at its base. The preanal finfold has disappeared.

11·75 *mm. stage* (Fig. 3 *d*).—This was collected from Station No. 208 on 20–2–1958 and is the largest postlarva in the collection. Teeth are large and numerous. The orbital crest is high. The pterotic and preopercular spines are reduced in length. The ventral fins are long and narrow. The caudal fin is distinctly heterocercal. Chromatophores have spread over the greater part of the body surface except anteriorly below the pectoral fins and posteriorly at the base of the caudal fin. There is a dark blotch in the dorsal fin above the tip of the pectorals.

The shape of the snout, the presence of orbital crests and pterotic and preopercular spines, the nature and disposition of the fins and the distribution of chromatophores help to fix the identity of the above larvæ as that of *I. gladius*, the only sailfish known from Indian waters.

Lütken (1880) has described some Istiophorid larvæ collected from the western part of the Indian Ocean but their identity is not clear. Larvæ of *Istiophorus orientalis* (Schlegel) have been described by Yabe (1953) and of *I. americanus* (Cuvier) by Voss (1953) and Gehringer (1956). The smallest among these are the 3·4 mm. larva of *I. orientalis* (Yabe, *op. cit.*) and 3·6 mm. larva of *I. americanus* (Gehringer, *op. cit.*). The larvæ of the three species resemble each other in all essential features except in certain minor points. It is proposed to compare the larvæ of the different species at a later date after older stages of *I. gladius* become available.

It may be mentioned here that the taxonomy of fishes of the genus *Istiophorus* is in a state of confusion. Some believe that there is only one valid world wide species whereas others recognise at least four distinct species. In describing the larvæ collected from the Laccadive Sea, de Beaufort's (1951) nomenclature is followed except that in the place of *Histiophorus* the older spelling *Istiophorus* is used. The author has had occasion to examine a fairly large number of specimens of sailfish especially from the west coast of India and all these belong to the above species. The American workers

do not recognise the name *I. gladius* and consider the species occurrring in the Indian Ocean to be *I. immaculatus*. The reason for this is not clear.

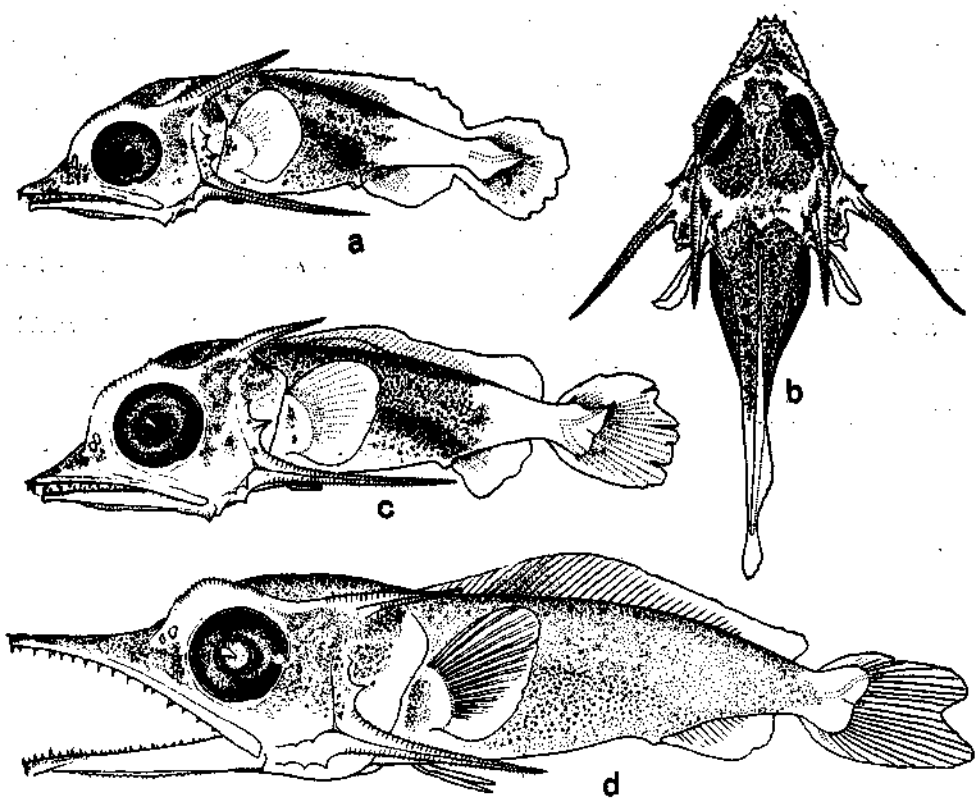

FIG. 3. Larval stages of *Istiophorus gladius*: (*a*) 6·51 mm. stage; (*b*) Dorsal view of the above; (*c*) 7·88 mm. stage; (*d*) 11·75 mm. stage.

In spite of the limited nature of the collection it is evident from the available material that the sailfish breeds over a fairly extensive area in the Laccadive Sea. It is of interest to note that both the smallest and the largest specimens were collected from the same Station. Regular observations over a wider area for a longer period will throw interesting light on the breeding of this fish in this part of the Indian Ocean.

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