

## EGGS AND LARVAE OF A HEMIRHAMPHID FISH FROM MANDAPAM\*

By D. SUDARSAN

*Central Marine Fisheries Research Institute, Mandapam Camp*

DURING April 1959 a bunch of eggs attached to seaweeds were collected from the beach at Mandapam (Gulf of Mannar). The eggs were hatched in the laboratory and the larval development was followed for a few days. On the basis of the characters observed, the eggs and larvae are provisionally assigned to the hemirhamphid fish *Hyporhamphus quoyi* (C.V.).

Published information on the eggs and early larval stages of Indian half-beaks is rather meagre. The eggs and larvae of *Hemirhamphus georgii* C.V. were described by Devanesan (1937) from Palk Bay and Chidambaram and Menon (1948) from West Hill, Calicut. Vijayaraghavan (1957) made some observations on the eggs and young stages of *Hemirhamphus far* (Forsk.) from the Madras waters. Talwar (1960) studied the eggs and larvae of *Hemirhamphus marginatus* C.V. from Mandapam. In the works of Bhattacharya (1916), Job and Jones (1938), Nair (1952), Jones and Sujansinghani (1954), Jones and Pantulu (1958) and Kuthalingam (1959) accounts on post-larval stages of different species of hemirhamphids are available.

The eggs were brought to the laboratory in a porous mud pot containing fresh sea water. After carefully separating the eggs from the seaweeds they were transferred to a series of glass troughs containing sea water and were placed in the aquarium. The variation of the temperature of the sea water in the glass troughs was kept as low as possible and nearer to the surface temperature of sea water in the natural environment during that season i.e. 26-28°C. by proper ventilation and keeping wet towels around the troughs. During the course of the experiments the water in the troughs was renewed everyday in the morning.

### DEVELOPMENT

*Eggs and embryos* (Fig. 1a): The fertilized eggs were translucent, slightly pinkish in colour, and nearly spherical, measuring 2.2 to 2.6 mm. across. A number of long hyaline filaments were seen arising from the zona radiata. There were as many as 45-60 such filaments arranged in 14-16 tufts of 3-4 filaments. The embryo was in a rather early stage of development, forming less than half a circle around the translucent and unsegmented yolk. But the caudal portion of the embryo was already free from the yolk mass. The eyes were fully formed but not pigmented. The heart was well formed and functioning with about 120 beats per minute. The vascular flow was clearly visible. Approximately 40 myotomes could be recognised at this stage. Pigmentation was absent.

\* Published with the permission of the Director, Central Marine Fisheries Research Institute, Mandapam Camp.

By the next day the embryo had grown larger forming more than half a circle around the yolk (Fig. 1b). Pectoral fins were under formation and the auditory vesicles were discernible. Rudiments of the caudal fin could be recognized. The vascular flow was more pronounced with the vitelline blood vessels assuming an undulated course over the yolk mass. Pigmentation of the eye had commenced. Numerous dark pigment spots appeared all over the body of the embryo.

After about 48 hours the yolk had become much reduced (Fig. 1c) and the embryo was very active. The caudal fin was well demarcated though continuous with the median fin, with rudiments of rays visible. The pectoral fins were flapping vigorously. The mouth was visible. The eyes had attained iridescence. The heart beat had increased to about 160-170 per minute and the blood flow was much faster. Pigmentation of the body had increased, with the spots concentrated along the dorsal and ventral borders and under the pectoral fins. A few stellate chromatophores were seen on the head and a few pigment spots were also seen on the myotomes.

*Newly hatched larva* (Fig. 2): The larvae hatched out around 12.00 noon after another 48 hours. They measured about 6.3 mm. each and were found active. A considerable part of the yolk still remained unabsorbed and the blood vessels were very prominent. Though the dorsal, caudal and anal portions were clearly demarcated, the median fin was still continuous. The transparent pectoral fin had grown broader. Rudiments of rays were seen on the dorsal and anal portions of the median fin also. There were 52 myotomes in all and the anus opened under the 34th myotome. At this stage the heart beat was 170-180 per minute and the vascular fluid had a light pink colour. The mouth and jaws were fairly well developed with the lower jaw protruding slightly. Pigmentation was very marked and could be seen all over the body except the yolk. A few pigment spots were arranged along the length of the myotomes. The stellate chromatophores on the head were more numerous. A few pigment spots could also be seen in the posterior part of the dorsal fin.

*Larva-140 hours old* (Fig. 3): The larva measured 7 mm. in length. The yolk was completely used up and the eyes had attained a metallic sheen. The dorsal, caudal and anal fins were isolated and the fin rays had become distinct. The blood vessels were lying deeper in the body. The number of myotomes i.e. 52, remained the same as in the previous stage. The prolongation of the lower jaw was more distinct.

#### DISCUSSION

Of the 8 species of hemirhamphids known to occur around Mandapam, four species namely, *Hemirhamphus far*, *Hyporhamphus georgii*, *H. cantori* and *H. quoyi* are found to breed during April (Talwar, 1960). The eggs and larvae of *H. far* have been described by Vijayaraghavan (1957) and those of *H. georgii* by Devanesan (1937). The eggs of the former are slightly larger than those under study having an average diameter of 2.8 mm. with the filaments arranged in 6-10 tufts as against 14-16 tufts observed in the present material. The eggs of *H. georgii* (Devanesan, *loc. cit.*) are very much smaller being only about 1.5 mm. in diameter. Further, the number of filaments and tufts are fewer than in the eggs described in this account. Chidambaram and Menon (1948) observed only 6 knobs, each having 2-6 individual filaments, in *H. georgii*.

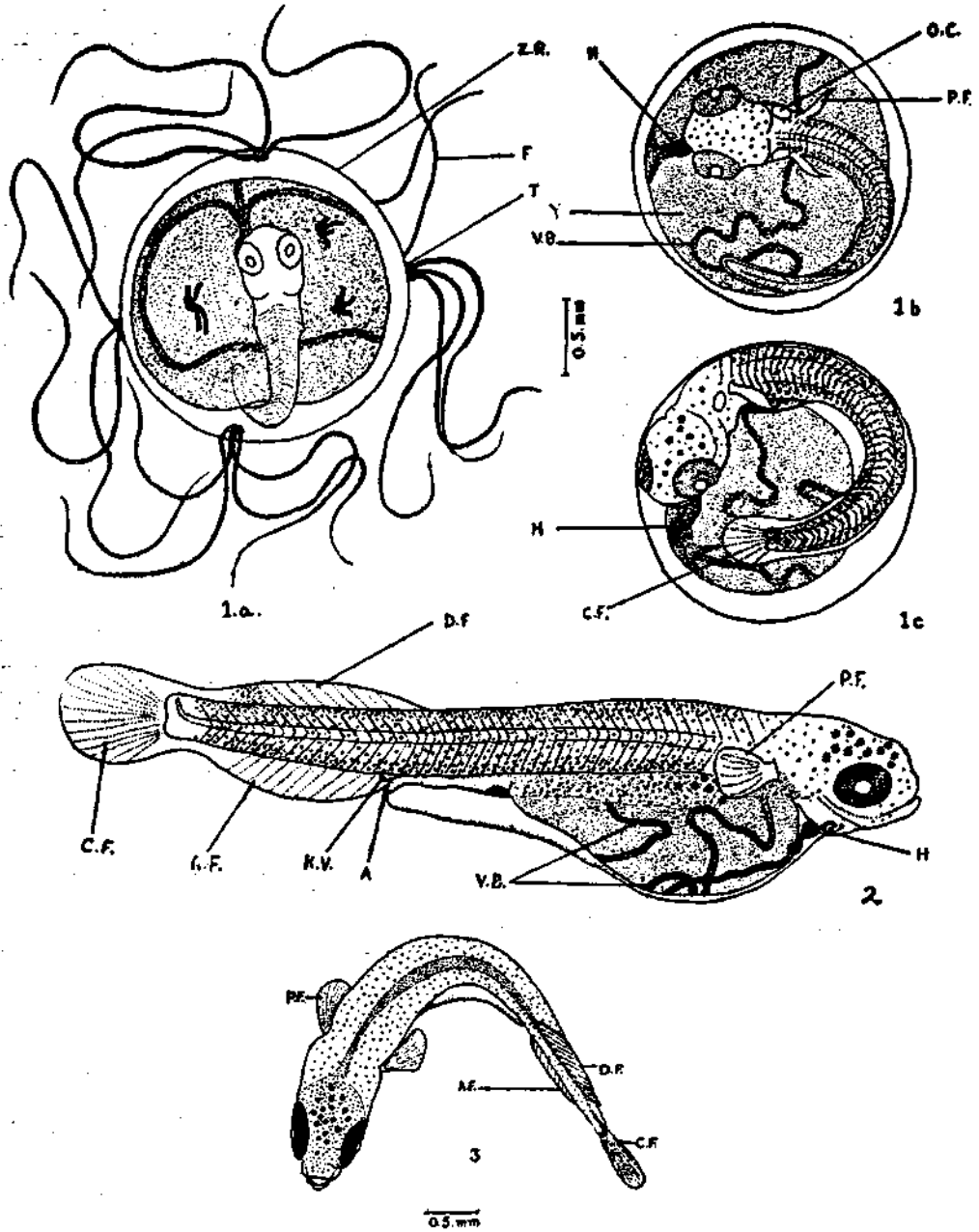


FIG. 1 a, 1 b, & 1 c. Embryo inside the egg membrane.

FIG. 2. Newly hatched larva. FIG. 3. 140 hour old larva.

A. Anus, A.F. Anal fin, C.F. Caudal fin, D.F. Dorsal fin, F. Filament, H. Heart, K.V. Kupfer's vesicle, O.C. Otocyst, P.F. Pectoral fin, T. Tuft of filaments, V.B. Vitelline blood vessels, Y. Yolk, Z.R. Zona radiata,

Talwar (*loc. cit.*) made a study of the vertebral counts of the hemirhamphids of the Mandapam area and his counts for *Hyporhamphus cantori* and *H. quoyi* are as follows :

	<i>Prehaemal</i>	<i>Haemal</i>	<i>Total</i>
<i>H. cantori</i>	36-38	17-18	54-46
<i>H. quoyi</i>	35-36	17-18	52-54

In the larvae described in this account 34 pre-anal and 18 post-anal myotomes (total 52) were observed. This appears to correspond closely with the vertebral count for *H. quoyi*. Delsman (1924) described certain egg and larvae from the Java Sea as belonging to *Hemirhamphus quoyi*, but later studies by Breder (1935), Hubbs and Kampa (1946) and Jones and Pantulu (1958) have revealed that they probably belong to *Oxyporhamphus*, an exocoetid.

The general nature, shape and size of the eggs in the above account readily suggest that the eggs and larvae described belong to the Order Synentognathi. The number of myotomes in the larvae and the season of collection of the eggs, which coincides with the spawning season of *Hyporhamphus quoyi* at Mandapam, indicate that the eggs and larvae described here probably belong to *H. quoyi* (C.V.). However, in the absence of successful artificial fertilisation of the eggs or rearing experiments leading upto a stage where the specific identity of the juveniles could be established, the present identification should be considered as strictly provisional.

#### SUMMARY

A bunch of hemirhamphid eggs, attached to seaweeds and found washed ashore at Mandapam, were collected and the embryonic and larval development was followed in the laboratory. The probable identity of the eggs and larvae is discussed. Based on the characters observed in the eggs and larvae and the available circumstantial evidence they have been provisionally assigned to *Hyporhamphus quoyi* (C.V.).

#### ACKNOWLEDGEMENTS

I wish to express my grateful thanks to Dr. R. Raghu Prasad for his interest in the investigation and constant guidance. My thanks are also due to Dr. P. K. Talwar for allowing me to make use of his notes and for critically going through the manuscript and offering suggestions for improvements.

#### REFERENCES

- BHATTACHARYA, D. R. 1916. Stages in the life-history of *Gobius*, *Petroscirtes*, and *Hemirhamphus*: Fauna of Chilka Lake. *Mem. Indian Mus.*, 5 : 383-392.
- BREDER, C. M. 1938. A contribution of the life-histories of Atlantic flying fishes. *Bull. Bingham Oceanogr. Coll.*, 6 : 1-126.
- CHIDAMBARAM, K. AND MENON, M. D. 1948. Notes on the development of *Megalops cyprinoides* and *Hemirhamphus georgii*. *Proc. Zool. Soc. London*, 117 : 756-763.
- DELSMAN, H. C. 1924. Fish eggs and larvae from the Java Sea—A pelagic scombresocid egg. *Treubia*, 5 : 408-418.

- DEVANESAN, D. W. 1937. On the spawning and hatching experiments with the eggs of *Hemirhamphus georgii* C.V. *Proc. 12th Intern. Cong. Zool. Lisbon, 1935* : 2175-2181.
- HUBBS, C. L. AND KAMPA, E. M. 1946. The early stages (eggs, prolarvae and juveniles) & the classification of California flying fish. *Copeia*, 4 : 188-218.
- JOB, T. J. AND JONES, S. 1938. Studies on the development of the Indian garfish, *Tylosurus strongylurus* (Van Hass.) with notes on the younger stages of *Hemirhamphus gaimardi* C.V. *Rec. Indian Mus.*, 40 : 245-253.
- JONES, S. AND PANTULU, V. R. 1958. On some larval and juvenile fishes from the Bengal and Orissa coasts. *Indian J. Fish.*, 5 : 118-143.
- JONES, S. AND SUJANSINGHANI, K. H. 1954. Fish and fisheries of the Chilka Lake with statistics of the fish catches for the years 1948-'49. *Ibid.*, 1 : 256-344.
- KUTHALINGAM, M. D. K. 1959. Observations on the food and feeding habits of post-larvae, juveniles and adults of some Madras fishes. *J. Madras Univ.*, B. 29 : 139-150.
- NAIR, R. V. 1952. Studies on some post-larval fishes of the Madras plankton. *Proc. Indian Acad. Sci.*, (B) 35 : 225-244.
- TALWAR, P. K. 1960. The biology and fishery of *Hemirhamphus* Cuvier in the Gulf of Mannar and Palk Bay. *Thesis submitted to the University of Rajasthan.*
- VIJAYARAGHAVAN, P. 1957. Studies on fish eggs and larvae of Madras coast. *Publ. Univ. Madras*, Madras-5.