

THE LIFE HISTORY AND FEEDING HABITS OF A TRIPOD FISH
(*TRIACANTHUS BREVIROSTRIS* TEMM. & SCHLEG.)
OF THE INDIAN SEA

by

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The present paper deals with part of the results of the investigation undertaken by the author at the Madras University Zoological Research Laboratory on fish eggs and larvae occurring in the Madras plankton. The process of collecting, hatching and rearing of the eggs and larvae in the laboratory up to identifiable juvenile stage has been already dealt with by the author (KUTHALINGAM 1959). With the exception of GOPINATH (1946) and VIJAYARAHAVAN (1953) who have described some larval stages of this species nothing is known regarding the life history and feeding habits of species of the genus. Since the author was able to rear the eggs of *Triacanthus brevirostris* for fifty-two days till the juvenile stage was reached, he was able to establish the specific identity of the eggs and of the different larval stages and to gather data regarding their feeding habits.

My sincere thanks are due to Dr. C. P. GNANAMUTHU, Professor of Zoology University of Madras, Dr. G. A. STEVEN, of the Laboratory, Citadel Hill, Plymouth, and Dr. M. V. LEBOUR for offering their valuable suggestions.

Eggs

Sixty-eight eggs were collected from the off-shore surface waters of the area, eighteen miles away from the coast at about 9 a.m. on 2nd April 1957. The eggs were of an average diameter of 2.1 mm and were held together in a cluster by the intertwining of the numerous slender, short, silky filaments springing all over the surface of the eggs. A tuft of long filaments at the base of each egg appeared capable of floating the egg by spreading out in water. Since one cluster of dead eggs was washed ashore opposite to the laboratory, it is possible that the egg clusters were disseminated miles round the place of spawning. The embryo was well formed within the egg. A colourless oil globule was situated at the tail region of the embryo. Black pigment spots were seen on the head as well as on the

body of the embryo. The auditory vesicles, a pulsating heart, eyes, and myotomes were clearly visible (fig. 1). At about 2 p.m. on the day after collection, all the eggs hatched into larvae in the laboratory.

Larvae just hatched (fig. 2)

The larvae measured 3.2 mm in length. As in the unhatched embryo, dark black pigment spots were scattered all over the body of the larvae. The oil globule was seen in the anterior portion of the yolk mass. The end of the tail was slightly curved upwards, and the posterior part of the alimentary canal was clearly visible with the anus opening under the 15th myotome, but the post-anal myotomes were not clear. The eyes were silvery and the iris was devoid of any pigmentation.

Larvae 24 hours after hatching (fig. 3)

The yolk was much reduced and the oil globule smaller in size. The pro-larvae now had an average standard length of 3.8 mm. The dark black pigment spots which were scattered on the body of the larvae in the previous stage were now restricted to the dorsal and ventral fin-folds and to the yolk mass. Three patches of black pigment cells were noticed in the head region. The auditory vesicle became large in size. There was no reduction in the number of pre-anal myotomes since the anus continued to open under the 15th myotome.

Larvae 48 hours after hatching (fig. 4)

The yolk was completely absorbed and the post-larvae measured 4.3 mm in length. The eyes acquired a metallic shine and the iris became black. The dark black pigment spots which were present on the fin-folds in the previous stage disappeared completely. Numerous small stellate black chromatophores were scattered on the head region between the eyes and behind the eyes as far as the pectoral fin. Pectorals were prominent and fan-shaped, but without rays. There was no change in the number of the pre-anal myotomes whereas eighteen post-anal myotomes could be roughly counted at this stage. The mouth was large and ventral.

On the morning of the third day after hatching nine larvae were found dead.

One lot of twenty larvae were supplied with diatoms *Nitzschia* sp., *Oscillatoria* sp., *Coscinodiscus* spp., *Asterionella* sp., and *Trichodesmium*, copepods nauplii and adults of *Euterpina* sp., *Oithona* sp., and *Macrosetella* sp., polychaete larvae, chopped bits of worm, larval bivalves and *Balanus nauplii*. However, the post-larvae fed mainly on copepod nauplii and diatoms

of *Trichodesmium* sp., *Oscillatoria* sp., and *Nitzschia* sp. The experiment was repeated by giving the larvae unsorted plankton. The larvae fed on nauplii of copepods and a few diatoms rejecting all other planktonic animals. Another lot of thirteen larvae were denied copepod nauplii, but were supplied with molluscan larvae, polychaetes larvae, diatoms, cirripede nauplii, and appendicularia. These post-larvae started taking *Trichodesmium* and *Oscillatoria*, but did not survive beyond two days. Therefore it was concluded that copepod nauplii are essential items of diet.

Larvae 8th day after hatching (fig. 5)

The post-larvae attained a length of 9.7 mm. Minute teeth appeared in both the jaws. There were fifteen pre-anal myotomes as in the previous stage but twenty post-anal myotomes were formed. There was no change in the pigmentation of the larvae. The fin-rays in the anal, dorsal, and caudal fins were distinct and four gills began to appear. The height of the body had increased. About three or four xanthophores were present dorsally near the margin of the body where the spinous dorsal would appear later. Pectorals were prominent and fan-shaped but were still without rays.

No change in the larvae was noticed for another five days and they continued to feed on copepod nauplii.

Larvae 14th day after hatching (fig. 6)

The larvae measured 14.3 mm. The spinous ventrals appeared as soft small nodes on the ventral margin of the body below the origin of the pectoral fin. The lower jaw had grown forward. The xanthophores on the dorsal margin had increased in number. Ramified erythrophores and black pigment cells crowded the region above, behind and below the pectoral fins. The larvae had become less transparent and the myotomes could be made out only with difficulty.

A lot of fifteen larvae were supplied with unsorted plankton. After about three hours eight larvae were killed and it was found that they had fed on copepod nauplii and adults. The copepods were identified as *Macrosetella* sp., *Temora* sp., *Oithona* sp., *Paracalanus parvus* and *Euterpina* sp. Another lot of fifteen larvae which were supplied with diatoms declined to feed on this plant material and preferred to starve suggesting that the larvae were carnivorous and preferred a diet of copepods.

There was no change in diet for another four days.

Larvae 19th day after hatching (fig. 7)

The larvae had grown to 18.8 mm in length and had also increased in height. The dorsal margin formed a very conspicuous angle while the ven-

tral margin was more or less straight. Fin-rays were faintly marked. Fin-rays appeared in dorsal and ventral fins which had thus become conspicuous and shifted forwards following the forward displacement of the anus. The xanthophores on the dorsal margin had increased in number and the pigmentation was as in the earlier stage.

When about twenty larvae were fed with concentrated unsorted plankton and killed after about four hours, their stomach contents consisted of adult copepods and cirriped larvae, showing that there was practically no change in diet except for the addition of cirriped larvae.

Larvae 25th day after hatching (fig. 8)

Though the larvae had grown to 19.2 mm, yet the general outline of the body remained unchanged. The median fins were separated and rays became more distinct on the dorsal, ventral, and caudal fins. Rudiments of the developing spinous dorsal began to appear. The spinous ventrals had grown longer. The mouth was much reduced. Pigmentation of the body was not changed except for the appearance of grey chromatophores at the base of the anal fin. Nearly 6-8 minute spines appeared between the eyes and the base of the pectoral fins.

There was no change in food for the next thirteen days when the post-larvae passed into the juvenile stage.

Larvae 39th day after hatching (fig. 9)

The juvenile measured 26.4 mm and could now be recognised as *Triacanthus brevirostris*. Both the spinous dorsals and the second dorsal were well formed with soft rays. The caudal fin was forked and did not have the adult shape though it had developed rays. The mouth was much reduced and had developed minute teeth on both jaws. There were numerous spines all over the body, and were conspicuous on the cheek. Pigmentation was almost the same as in the previous stage.

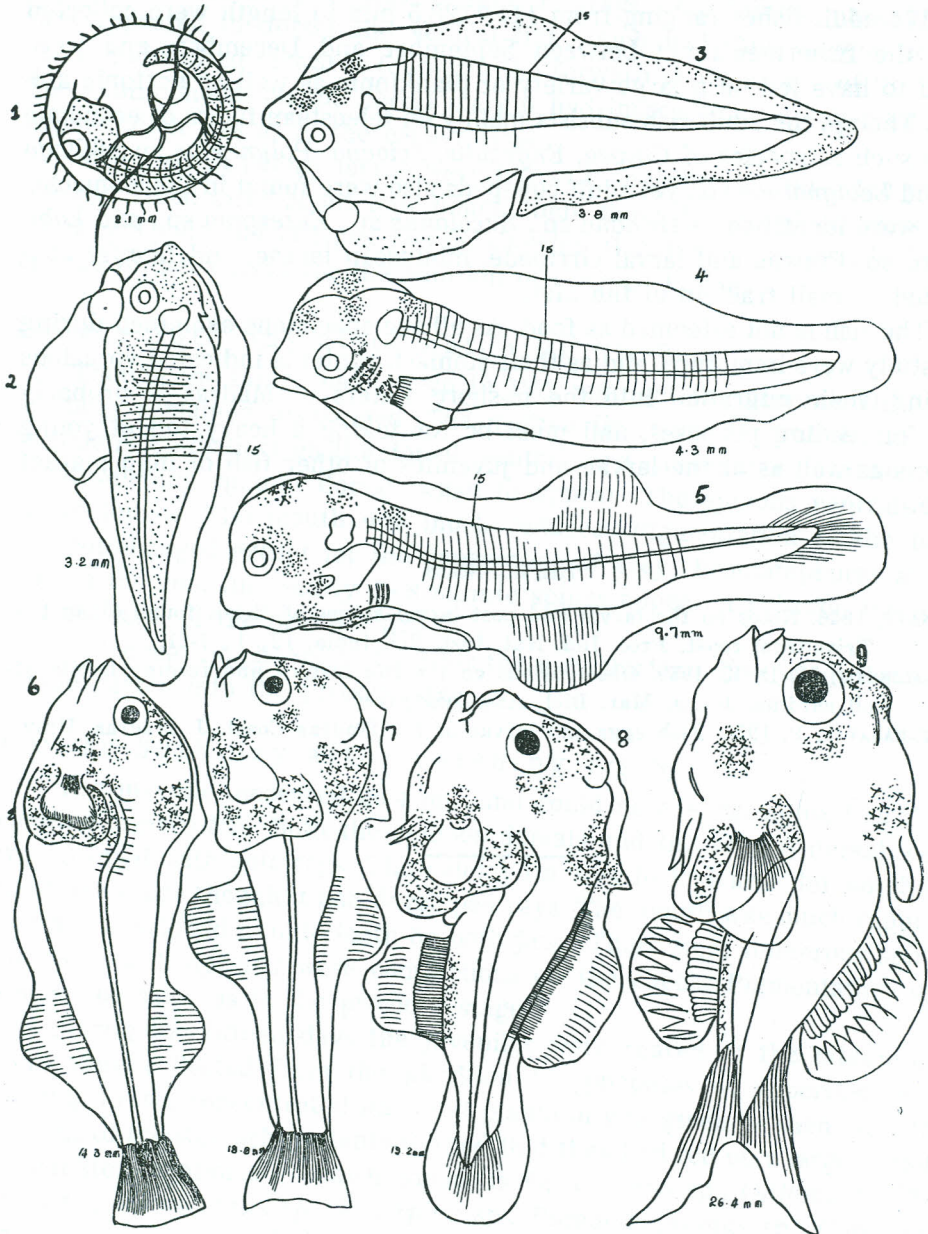
During the fifteen days the juveniles were reared in the laboratory, more were collected from the plankton for purposes of experiments in feeding. Fresh, concentrated unsorted plankton was given to them and the analysis of the stomach contents showed that they had fed on a large variety of planktonic animals of which copepods *Paracalanus* sp., *Oithona* sp., *Temora* sp., *Macrosetella* sp., *Euterpina* sp., *Pseudodiaptomus* sp., *Corycaeus* sp., *Acartia* sp., and *Labidocera* sp. formed the major item of food. Decapod larvae *Penaeus* sp., *Metapenaeus* sp., *Brachyuran* zoea, polychaete larvae, molluscan larvae, and larval forms of *Engraulis*, *Stolephorus* sp. and *Elops* sp. constituted the rest of the bulk.

174 adult fishes ranging from 110 - 128.5 mm in length were collected from the fishermen's net between September and December, and were found to have fed on a large variety of planktonic as well as nectonic animals. Though the adult fish subsists mainly on teleostean fishes of economic value such as species of *Clupea*, *Engraulis*, *Sciaena*, *Polynemus* sp., *Sillago* sp. and *Leiognathus* sp., yet adult copepods also were found in the stomachs. They were identified as *Oithona* sp., *Eucalanus* sp., *Euterpina* sp., and *Labidocera* sp. Prawns and larval cirripede, molluscan larvae, and *Lucifer* constituted a small fraction of the diet.

The fish is not esteemed as food. As all the specimens examined during this study were immature, and as their stomach contents indicated voracious feeding, their migration into the in-shore waters of Madras is probably only for feeding purposes, and must be for taking a heavy toll of young prawns as well as of the larvae and juveniles of other fish of high market value.

REFERENCES

- GOPINATH, 1946. Notes on the larval and post larval stages of fishes found along the Trivadrurn coast. Proc. Ind. Nat. Inst. Sci. India. 12; 1., 7-21.
- KUTHALINGAM, M. D. K. 1959. Observations on the life history and feeding habits of oil sardine. Journ. Mar. Biol. Assn. (in press).
- VIJAYARAHAVAN, P. 1958. Fish eggs and larvae of the Madras Coast. J. Madras. Univ.
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Figs. 1-9. *Triacanthus brevirostris* TEMM. & SCHLEG. — Fig. 1, egg; figs. 2-3, pro-larvae; figs. 4-8, post-larvae; fig. 9, juvenile.

NOTE FROM THE EDITOR

This issue introduces a new cover which is different in make up from previous publications.

Dr. M. A. Lieftinck, joint editor of Treubia for many years is now associated with this journal as honorary-cooperator.

Mr. A. M. R. Wegner has resigned to take up another position.

The editor wishes to express his sincere appreciation and thanks for their devotion and tireless efforts in publishing this journal.

The Editor.