Embriology and larval development of *Tilapia galilae* Art.

by

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Tilapia galilae Art. represent about one third of *Tilapia* fishes present in our lakes.

Methods and material :

As the *Tilapia galilae* is a mouth breeder, the male collects the eggs as soon as they were fertilised. It was nearly impossible to us to collect eggs just after fertilisation, since the taking of eggs in the mouth is an instantaneous action which is done during fertilisation. The eggs were thus taken from the mouth and put in a small hatchery to follow the developmental changes. The eggs and larvae were fixed in a solution of neutralized formalin 4 p. 100.

I-*Gastrula* (Plate 3-1) : This is the first stage we were able to collect during this study. The egg is oval (2,5 mm × 2,1 mm), yellow, with greenish tint. Melanophores are seen on the dorsolateral part of the yolk sac behind the head region. This stage is supposed to take place 10 to 12 hours after fertilisation.

II-*14 hour stage* (Plate 1-1) : The embryonic streak is clear. Melanophores are more distinct, of brown coloration in the form of small spots. The embryo encircle the yolk bulk. Optic cups are seen and myotomes four in number.

III-*24 hour stage* : The embryonic streak is more clear, but the number of myotomes could not be reliably counted, owing to the vagueness of the choroin. They are nearly about 21 myotomes. Brain divisions are clear,

IV-*Hatching* (Plate 1-2) : After about 48 hours from fertilisation, the egg hatches (temperature about 24° C.). The hatched larva had a total length of about 4,5 mm, the yolk sac diameter 3,5 mm. The heart is just a space under the head region. Eye primordia are present, but the iris is not closed. Pectoral fin is in the form of a flap. The intestine is present with a well developed wall. Myotome number is about 21. The larva was moving on the bottom of the hatchery, but had no ability to swim, owing to the heaviness of the yolk sac. The dorsal, caudal and anal fin flaps are continuous. The head is still adhering to the yolk sac.

V-*One day after hatching* (Plate 3-2) : The larva (total lenght, 4,3 mm) still moving on the bottom of the tank. Mouth not yet opened, head free from the yolk sac, and the brain divisions are still clear. The iris is not yet closed. No melanophores are seen on the larval body. The mouth still not opened.

VI-*Two days* (Plate 3-3) : Mouth began to be opened. The iris diaphragm is closed. The gills are uncovered. Caudal, anal and dorsal fins are still continous. Melanophores are seen on the dorsolateral part of the yolk sac and on the midbrain. Total length about 5,5 mm, number of myotomes about 32, diameter of the yolk sac about 2,1 mm.

VII-*Three days* (Plate 1-3) : Pigments began to appear on the larval body. Melanophores of brownish coloration take star shaped formation, more dense on the midbrain than on the fore and hind brain. At the base of the dorsal fin, melanophores are also seen extending till nearly half its length. On the dorsolateral part of the yolk sac, pigmentation becomes more dense than before. The mouth is opened

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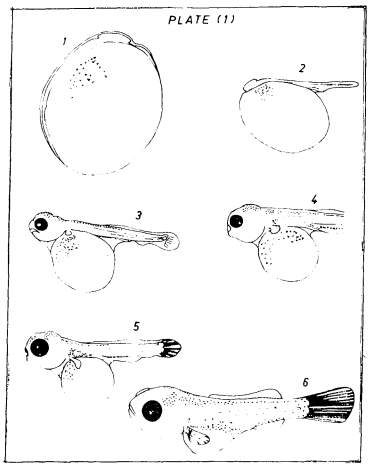
and the lower jaw is well developed. The iris is complete and the eye is pigmented. Gill primordia are present but no operculum is yet formed. Number of myotomes is about 36. Six primordial fin rays are seen, on the dorsal fin. Pectoral and anal fins are still flaps.

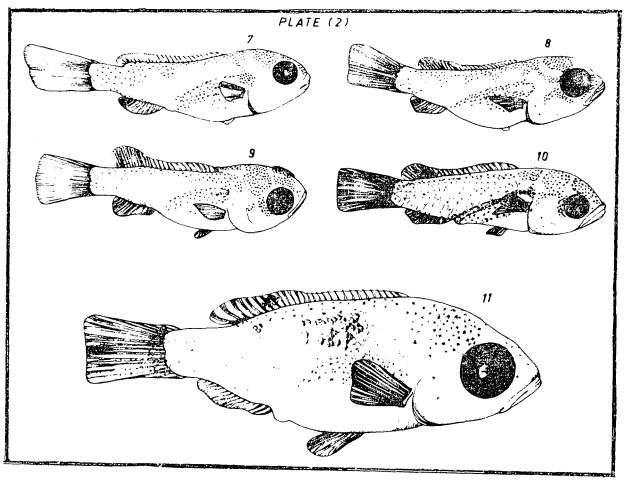
VIII-*Four days* (Plate 1-4) : Melanophores are dense especially in the region of the mid brain, the dorso-lateral part of the yolk sac and the anterodorsal. The pigments under the dorsal fin extend backwards till its end. Bones of the lower jaw are well developped. The larva was seen moving its jaws actively. Operculum begins to be formed. At the junction of the caudal fin with the dorsal and anal ones two small constrictions appear. No pigmentation is found on the caudal fin. Blood starts to take the red color. Total length, 6,5 mm, diameter of the yolk sac, about 2 mm.

IX-*Five days* (Plate 1-5) : On the midbrain region, melanophores have a dark center with a faint brownish coloration, around it. On the fore and hind brain, pigments have dark brown coloration. At the base of the dorsal fin, as well as the anal fin pigments are arranged in single rows. In the pectoral, three primordial fin rays are found. Constriction between the dorsal and caudal fin is more clear. Also between the anal and caudal, a deep constriction is found. The posterior end of the dorsal and anal fins are opposite each other. No pigments are found on the caudal fin, or on its finrays. The operculum has grown covering the anterior gills but not the posterior ones. Total length, about 6,7 mm. The fish begins to feed and move upwards in the water.

X-*Six days* (Plate 1-6) : Pigmentation at the base of the dorsal fin is more dense anteriorly. At the base of the anal fin and the caudal peduncle, some pigments are present. Operculum is completely formed. Five primordial fin rays are seen in the pectoral fin and also in the anal. Dorsal, caudal and anal fins are completely separated. Total length, 7,2 mm. The fish is swimming actively.

XI-*Seven days* (Plate 3-4) : Operculum is completely formed with five branchiostegal rays. The intestine begins to be convoluted, although the yolk is not yet completely absorbed. Pigmentation below the dorsal fin is heavier. Pigments are also seen on the sides of the body. In the dorsal fin, the fin rays are twelve in number, spines are not yet formed. The caudal fin rays are 18. On all the fin rays no melanophores are seen: the tail is no more heterocercal. Pelvic fin bud is seen clearly at the antero-ventral part of the yolk. Total length, 8,5 mm.





XII-*Nine days* (Plate 2-7) : Nostrils could be observed clearly. Pigments are distributed on the body but not the fins. Few melanophores are seen on the posterior part of the dorsal fin. Anal fin spines begin to be formed. Yolk sac is nearly completely absorbed. The pelvic fin bud is seen. Total length, 9 mm, number of spines in the dorsal fin, 14.

XIII-*Ten days* (Plate 2-8) : Pigments are accumulated at the base of the caudal fin and distributed evenly on the sides of the body. Large melanophores are found on the mouth. Yolk sac is completely absorbed. Anal fin spines formed. Total length, 9,7 mm.

XIV-*Eleven days* (Plate 2-9) : The pigments now invade the anterior part of the dorsal fin. At the begining of the soft part of the dorsal fin, melanophores are accumulated as a dark spot. In the caudal fin, some pigments are arranged on either side of each fin ray. Pelvic fin flap, have four primordial fin rays. Total length, 11 mm.

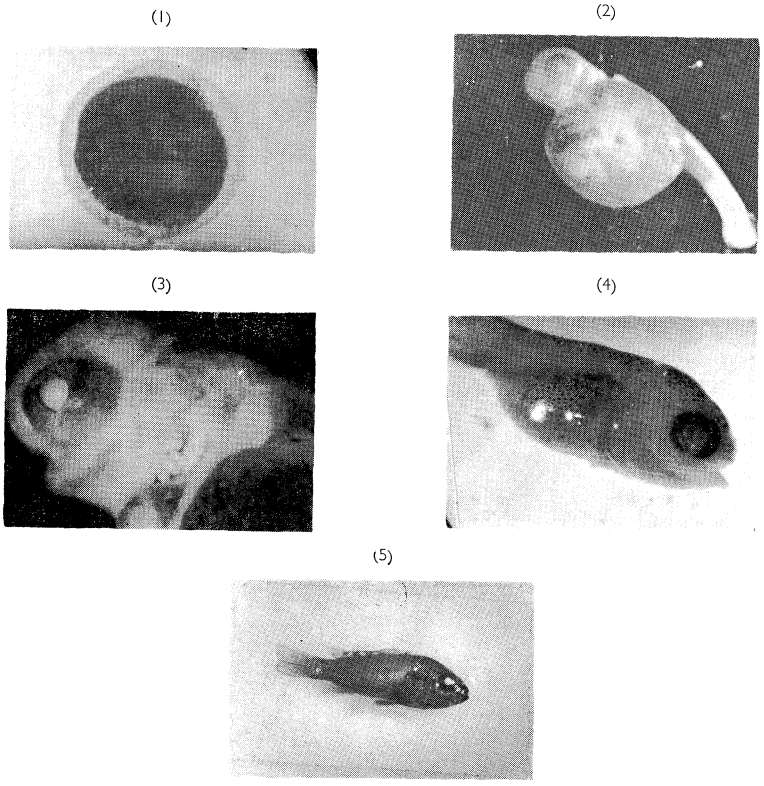
XV-*Thirteen days* (Plate 2-10) : Pigments are arranged on either side of each of the caudal fin rays. Pectoral fin rays are completely developed. The black spot at the beginning of the soft part of the dorsal fin is clear. At the rim of the spiny part of the dorsal fin, pigments are accumulated at the top of each spine so that one can count the spines easily. Pigments are distributed on the rays at the base of the caudal fin. Minute pigments are distributed on the sides of the fish and at the top of the midbrain. Five pelvic fin rays are well developed. Total length, about 12,5 mm.

XVI-*Thirty three days* (Plate 2-11) : Fin rays in the caudal fin begin to be branched, pigments are still at the base of the caudal fin. Scales begin to appear. They are first seen on the sides of the body between the posterior part of the dorsal and anal fins. This area is mostly covered by scale buds, but some scales are present behind the pectoral fin. Total length, 18,5 mm.

XVII-*Forty eight days :* (Plate 3-5) : Pigments begin to be distributed along the whole of the caudal fin. The black spot is quite clear at the base of the soft part of the dorsal fin. Scale buds are present along the whole body and scales on the anterior part of the body. Total length, 30 mm.

XVIII-*Fifty six days :* Color of the eye is silvery brown. Scale buds on the ventral region are more than on the dorsal part of the body. Total length of the young fish is now about 35 mm. The black spot still persists in the dorsal fin, fades later and is replaced by oblique dark streaks on the soft part of the dorsal fin.

PLATE 3.



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