‘CURVED-NORMAL’ VERTEBRAL MUTANTS IN CIRRHINA MRIGALA

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ABSTRACT

This paper reports for the first time the occurrence of curved and normal vertebral mutations in hypophysed Cirrhina mrigala fry.

A good many numbers of literature on the deformities of fishes have been produced by several previous workers, and some of the important causative factors for the vertebral abnormalities indicated by them are discrepancies and or defects in the embryonic stages of development; fusion of vertebrae; hump, twisting, bending, shortening or even complete separation of the vertebral column; mechanical injury to the fish; etc. But the nature of vertebral anomalies in induced-bred Mrigal fry, obtained through hypophysation of deformed mother fish being paired with normal male breeders, seemed to be first time recorded here as far as known to the author.

5 abnormal specimens out of a sample of 57 fry of Cirrhina mrigala could be collected per chance during field work in August, 1971, from the nursery pond No. 1 of Larmada Fish Farm at Agra (India). The farm belongs to the
Fisheries Department of Uttar Pradesh. Mention may be made that it is a seasonal farm. In 1971, only induced-bred spawn, which were produced in the farm itself, was stocked there. The information further gathered from the then Inspector of Fisheries of the State, who conducted the breeding of the particular pair and initiated stocking of spawn produced from the same set in Nursery No. 1, that a good number of alike deformed fry were also collected afterwards by them from the same stock, but the actual number was not recorded. It is needless to say that this type of deformed fishes of the same stock are still available in the farm.

The deformed fry were preserved carefully in 5% formalin and utilised for the present study.

Deformed morphological characters

Excepting the abnormalities occurred only in the tail region, all the specimens were found to agree in all essential respects with the normal specimen of this species. The standard length of the fry along the midlateral line was between 37.0 and 47.0 mm, average being 41.8 mm. The abnormal features in all the cases were almost identical — the tail with caudal fin lobe being twisted upwards, excepting in one (Specimen 1) where the caudal fin was totally absent. The lobe in Specimen No. 2 was rudimentary and in others (Specimens Nos. 3, 4 & 5) very prominent, and was in normal length in relation to the total length of the fish.

Specimen 1: Standard length 37.0 mm. The curvature of the twisting on the dorsal profile started from the posterior end of the dorsal fin and that on the ventral-line from the insertion of the anal fin. The twisting of the caudal peduncle was about 45° to the mid-lateral plane.

Specimen 2: Standard length 39.5 mm. The dorsal-line curvature commenced at the posterior one-third of the caudal peduncle, whereas the ventral-line curvature, which actually started from the posterior end of a depression at the anterior one-third of the caudal peduncle, was not much prominent. The curvature of the tail excluding the rudimentary caudal fin lobe was about 90° to the mid-lateral line.

Specimen 3: Standard length 47.0 mm. The curvatures on both the dorsal and ventral profiles were uniform and in the shape of a parabola. The angle of the curvature along with the caudal fin lobe was about 45°.

Specimen 4 & 5: Standard length 44.5 and 41.0 mm respectively. The curvature of the ventral line were almost identical and started from the posterior end of the depression at the anterior half of the caudal peduncle. The dorsal-line curvature in both the specimens commences at the posterior one-third of the caudal peduncle, but the twisting along with the thin caudal fin lobe in Specimen No.
Fig. 1. 'Curved-normal' vertebral mutants in C. mrigalu

4 was more becoming 90° than in the Specimen No. 5, where the bend along with the broad caudal fin lobe was about 80° to the mid-lateral line.

However, the trend of curvature in all the specimens under descriptions were more or less same and in the pattern of their mother.

The deformity in skeleton

The X-Ray photographs of the deformed fry (Fig. 2) showed that the curvature at the tail region was owing to the twisting in the vertebral column, the bend being commenced at 35th vertebra and continued posteriorly in the form of a hook. From 36th vertebra, the vertebral column ran posteriorly along the periphery of the ventral line.

The number of vertebrae in all these deformed specimens were like a normal one of this species and varied between 37 and 38, including the last half-vertebra. The neural and haemal arches and their spines of all the vertebrae were normal except that the reduced haemal spine of 35th vertebra, and absence of the haemal elemental from 36th vertebra to last one. Excepting the upper lobe of the hypurals, the other components of the last half-vertebra were missing. The upper lobe of the hypurals was rather pointed and free at its distal end and directed towards the anterior region of the body, giving a shape of the hook.

The caudal fin-rays in all the fry, excepting in Specimens No. 1, was very few in number and varied between 8 and 12, as against 31 in normal specimens. There were 9 complete rays in Specimens Nos. 2 and 5; and 12 in Speci-
men No. 3. Out of the 8 rays present in Specimen No. 4, the first seven were complete and 8th one was incomplete. Counting of the rays were made from the dorsal line towards the central rays.

The influence of the ecological condition of the area (Holt 1890), early developmental aberration (Gemmill 1912, Hora 1921, Oraks 1962), piscine

Fig. 2. Curved-normal vertebral mutants in C. mrigala.
tuberculosis, mycobacterial infection (Reichenbach-Klinke 1957, Nigrelli and Vogel 1963, Conroy 1965), change in the environmental temperature, mechanical injury, etc., are some of the probable causes for this type of vertebral deformity. None of the present specimens can be placed strictly under these categories because of the fair declaration in the uniformity of the deformed characters in all the specimens otherwise hardly maintained.

The general external appearance of the abnormal portion; nature of the ascending bend of the tail; the shape of the caudal fin with single lobe comprising of limited fin-rays (excepting specimen 1, where the caudal fin was wanting); trend of curvature in the vertebral column forming a hook like shape at its distal end being directed towards the anterior region of the body; nature of vertebral elements at the deformed parts pointed and curved upper lobe of the hypural bone; absence of the haemal elements from 36th, 37th and or 38th vertebrae, and other components from last-half vertebrae; were almost similar in all the specimens and showed alike characteristic features with their mother. The absence of the caudal lobe in specimen No. 1 might have caused by some mechanical injury as rudiments of the basal parts of some of the fin-rays were found by minute observations.

Lastly the circumstantial evidence also support the view that the vertebral deformity in all these specimens seemed to be genetical and inherited from their mother.

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