

Occurrence of Innate Morphological Deformities in Fishes of Tripura, North East India-A Possible Case of Inbreeding

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Abstract: Tripura is a small Northeastern state (approximate Longitude 92°E, Latitude 23°N) of India comprising of several water bodies and fish farms. Where, morphological deformity in fishes has been reported in various species and was attributed to various factors *viz*, nutritional deficiency, stressed conditions in the ecosystem and genetic factors. The present study reported for the first time some innate deformities such as absence of one operculum, eye; two conjoint baby fish; scoliosis like lateral undulation of spinal cord; bending in caudal fin in different fishes, absence of caudal fin and deformed body with protruded lower jaw. Etiological agents are supposed to be related to genetics due to inbreeding problems. And further detailed studies are needed for ascertaining the actual causatives.

Key words: Fishes • Innate Deformities • Etiological Agents • Inbreeding

INTRODUCTION

In recent years, there has been increasing concern raised by traditional and commercial fishermen about fish deformities. Many fishermen indicate that they are seeing both more kinds of deformities and an increased frequency of deformities. Fish deformities are not necessarily related to water pollution or toxic discharges [1-6]. Injury, disease, parasites, stresses related to spawning, unusual water quality conditions (e.g., high temperatures, low dissolved oxygen, low pH), poor nutrition and toxic algal blooms can also cause abnormalities [7-18]. On the other hand, fish hatching alterations, increases in mortality, spinal malformations, reduced size, cardiac dysfunction, edema and reduction in the size of the jaw and other craniofacial structures have been observed by various scientists all over the world [19-24]. However, during surveying different farms and ponds of Tripura, North East India, we observed certain abnormalities in the fishes. We hesitate to publish these rather coincidental/ enigmatic findings. However, as we have not encountered these abnormalities in fishes since, we have decided to present our observation in order to draw attention of future investigators to these deformities.

MATERIALS AND METHODS

Farmed reared fishes, wild fishes as well as aquarium fishes at different hatchery of Tripura (approximate Longitude 92°E, Latitude 23°N) were sampled on regular basis from January 2007 to January 2011 for abnormalities. Fishes were caught by a number of traditional gears generally used by the fishermen of Tripura, such as gill net, dip net, fishing basket and small fishing boats. Only abnormal fishes out of the fish catches were selected for the study. The fish samples were transported to the research laboratory situated at College of Fisheries, Tripura from the site of sampling in metal containers or buckets with battery operated aerator. Fishes were then preserved in alcohol or formalin for future study.

RESULTS AND DISCUSSION

Several fish samples were observed with abnormalities such as scoliosis, lordosis, eroded fins, eroded scales, popped eyes. Those abnormalities were diagnosed to be due to bacteria, parasites and also due to nutritional deficiency. During the study period we also observed six abnormalities which fishes carries from the beginning of their life, such as: absence of operculum of



Fig. 1: Absence of operculum of one side of *Catla catla*



Fig. 2a: Absence of one eye in gold fish (*Carassius auratus*)



Fig. 2b: Absence of one eye in gold fish (*Carassius auratus*)



Fig. 3: Scoliosis like lateral undulation of spinal cord of *Labeo rohita*



Fig. 4: Bending in one caudal fin among twin fin of *Carassius auratus*



Fig. 5a: Absence of caudal fin in *Labeo calbasu*



Fig. 5b: Absence of caudal fin in *Carassius auratus*



Fig. 6: Deformed carp with protruded lower jaw

one side of *Catla catla* (Fig. 1), absence of one eye in gold fish (*Carassius auratus*) (Fig. 2a & 2b) and Two conjoint baby fish of black molly. Scoliosis like lateral undulation of spinal cord of *Labeo rohita* (Fig. 3), bending in one caudal fin among twin fin of *Carassius auratus* (Fig. 4) and absence of caudal fin in *Labeo calbasu* (Fig. 5a) and gold fish (Fig. 5b). Exotic carp (*Hypophthalmichthys* sp.) with deformed body shape and protruded lower jaw was also observed (Fig. 6). Those innate deformities were observed in many individuals of the population but the conjoint baby of black molly was observed only once.

According to Noga *et al.* [25], genetic anomalies are most common in captive bred fish and our deformed fishes were also from captive environment. Thus, those innate deformities are supposed to be due to some genetic alteration as they were not infected with any pathogens as well as not malnourished. Moreover, the collected deformed specimens were from farms where water quality, nutrition and health managements were done at optimum level. However, the anomalies may arise due to inbreeding

between same stocks of fishes. Inbreeding has also been shown to cause some other deformities, including scoliosis, lordosis, curved neural spines, fused vertebrae and compressed vertebrae [26-28]. There are many other possible causes for the above developmental anomalies and determining a genetic link is often accomplished by ruling out other possible causes such as improvement in the husbandry conditions that may be predisposing to these problems; paying special attention to proper types and amounts of feed, proper stocking density, adequate biological filtration and oxygenation and frequent water changes. Exposure to teratogenic chemicals, such as malachite green and organophosphates, should also be ruled out.

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