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Occurrence of Scale Deformities in Cirrhinus Mrigala (Hamilton, 1822)

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Abstract

This study reports scale deformities in *Cirrhinus mrigala*, an economically significant Indian Major Carps, freshwater cyprinid in India. Specimens (160-257 mm standard length) with integumentary lesions and associated scale anomalies were obtained from a fish market in Chidambaram, Tamil Nadu. The scale deformities manifested as morphometric irregularities (shape and orientation) with disoriented scales exhibiting increased surface roughness. Notably, the lesions were encircled by these deformed scales.

Keyword: Aquaculture, Indian Major Carps, Cirrhinus mrigala, Scale Deformities.

Introduction

Aquaculture is one of the fastest growing food production sectors in the world and is now responsible for more than half of the global seafood production. Due to overfished wild fish sources and dwindling agricultural land, it is anticipated that this industry will become an even more significant source of food in the future. Freshwater Aquaculture in India mainly involves in the three species of Indian Major Carps (IMC) viz. Catla (*Catla catla*), rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigala*). In this *Cirrhinus mrigala* is a species of cyprinid, native inhabitant of rivers, streams, lakes and canals, of Bangladesh, India, Pakistan and Nepal. Nearly all river systems in India have received it as a transplant, including the Andaman freshwater, where a successfully established population is currently present. From a production perspective, a direct decrease in the average price of 2% occurs when injuries are present in 10% or more of the fish Furthermore, the current market demand for premium seafood goods suggests that physical appearance including skin is a criterion for selecting products of high quality. Injuries and deformities can occur in both wild and farmed fish and can happen at any point in the life cycle, from the larval to the adult stage (Slooff, W. 1982; MATSUOKA, M.2003). Skin injuries and lesions can affect any area of the body and are described as a visible loss of epidermis accompanied by color changes, hemorrhages, or ulcers involving dermal, subcutaneous, and/or muscular tissues (Vaagsholm, I., & Djupvik, H. O.1998). Research on fish scale development is crucial to understanding the histology and morphology of developing scales. Because of this, it has long been a primary focus for numerous researchers who have a keen interest in fish scales. Fish scale morphology, development patterns, and the association among genetic and environmental factors have all been previously documented (Bereiter-Han & Zylberberg, 1993; Yamanda, 1961; Fouda, 1979; Sire, 1986; Blair, 1942). Systematic traits have been used for decades to

represent the form and arrangement of surface structures seen on scales, such as radii, circuli, and ctenii (Van Oosten, 1957; Casteel, 1972). In this present study reports the record of scale deformity in *Cirrhinus mrigala*.

Materials and Methods

Cirrhinus mrigala specimens having standard lengths ranging from 160 to 257 mm were collected during April 2024 at the fish market in Chidambaram Town, Tamil Nadu, India. The specimens seemed to have originated from several localities of farms in the Chidambaram region of India. Each specimen exhibited deformed scales with lesions in the surfaces of their bodies. The entire lesion is covered in petechial, especially in regions where the deformed scales around the lesion. Every deformed scale's growth angle in relation to the normal scales was documented (Figure 1). The fish was taken to the lab to be investigated in further detail. Both endo and ectoparasites were investigated. Samples of blood and other internal organs were taken in order to perform bacteriological and fungal inspections. The sample of the scales is placed onto the surface of a microscope slide, a drop of tank water is added, and a coverslip is applied if needed to prepare the sample for microscopic examination.

Result and Discussion

In this study revealed that the deformities of scales include irregularities in shape, and irregularities in the orientation. There were several disoriented scales in every patch of abnormal scales. In contrast to the nearby scales (Figure 3 and Figure 4), the disoriented scales felt harshly to the touch. Moreover, the deformed scales observed to be found and encircled on the region where the lesion is existing (Figure 2). The results present a significant question regarding the nature of the etiologic factor or factors that cause anomalies in scale morphology to develop as well as disorientation. According to (Corrales et al.2000), there are four categories of agents that could have contributed to the overall development of scale anomalies: genetic, infectious, chemical, and physical. Numerous diseases and gross fish abnormalities, such as various spinal abnormalities, have been linked to genetic factors. (Schultz, 1963; Tave *et al*., 1982; Jawad & Oktener, 2006; Jawad & Hosie, 2007; Al-Mamry *et al*., 2010; Jawad *et al*., 2010). Considering there are currently no research or reports on the impact of genetic factors on the development of fish scale anomalies in India, it is not possible to comment on the genetic factor as an agent producing the scale deformity in *Cirrhinus mrigala.* Smears of wet skin, gills, and feces did not reveal any parasites. Furthermore, no fungus and bacteria could be separated from the projecting masses. The organic and inorganic substances that are absent from the sediments and water column where specimens of *Cirrhinus mrigala* once resided make up the group of possible etiologic factors. The chemical agents cannot be the cause of these abnormalities. The last group of potential etiologic factors is the Physical. In this the research on the pathology of skin ulcerations in different fish species has demonstrated that fishing gear injuries can be the source of these lesions (Mellergaard & Bagge, 1998). The research findings indicate that the skin lesions linked to fishing gear and scale abnormalities were acute in nature, resulting from the forceful capture, but sub-acute in the environment, stemming from the fish's wound healing process.

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Reference

1. Al-Mamry, J. M., Jawad, L. A., Al-Rasady, I. H., & Al-Habsi, S. H. (2010). First record of dorsal and anal fin deformities in silver pomfrets, Pampus argenteus (Stromateidae, Actinopterygii). In *Anales de Biología*. Murcia: Universidad de Murcia, Servicio de Publicaciones.
2. Bereiter-Hahn, J., & Zylberberg, L. (1993). Regeneration of teleost fish scale. *Comparative Biochemistry and Physiology Part A: Physiology*, *105*(4), 625-641.
3. Blair, A. A. (1942). Regeneration of the scales of Atlantic salmon. *Journal of the Fisheries Board of Canada*, *5*(5), 440-447.
4. Casteel, R. W. (1972). *A key, based on scales, to the families of native California freshwater fishes*. California Academy of Sciences.

5. Corrales, J., Nye, L. B., Baribeau, S., Gassman, N. J., & Schmale, M. C. (2000). Characterization of scale abnormalities in pinfish, Lagodon rhomboides, from Biscayne Bay, Florida. *Environmental Biology of Fishes*, *57*, 205-220.
6. Fouda, M. M. (1979). Studies on scale structure in the common goby Pomatoschistus microps Krøyer. *Journal of Fish Biology*, *15*(2), 173-183.
7. Jawad, L. A., & Öktener, A. (2007). Incidence of lordosis in the freshwater mullet, Liza abu (Heckel, 1843) collected from Atatürk Dam Lake, Turkey. In *Anales de Biologia* (No. 29, pp. 105-108). Servicio de Publicaciones de la Universidad de Murcia.
8. Jawad, L. A., Sadighzadeh, Z., & Valinassab, T. (2010). Malformation of the caudal fin in the freshwater mullet, Liza abu (Actinopterygii Mugilidae) collected from Karkhe River, Iran. In *Anales de biología*. Murcia: Universidad de Murcia, Servicio de Publicaciones.
9. Jawad, L., & Hosie, A. (2007). On the record of pug-headedness in snapper, Pagrus auratus (Forster, 1801)(Perciformes, Sparidae) from New Zealand. *Acta Adriatica*, *48*(2), 205-210.
10. MATSUOKA, M. (2003). Comparison of meristic variations and bone abnormalities between wild and laboratory-reared red sea bream. *Japan Agricultural Research Quarterly: JARQ*, *37*(1), 21-30.
11. Mellergaard, S., & Bagge, O. (1998). Fishing gear-induced skin ulcerations in Baltic cod, Gadus morhua L. *Journal of fish diseases*, *21*(3), 205-213.
12. Schultz, R. J. (1963). Stubby, a hereditary vertebral deformity in the viviparous fish Poeciliopsis prolifica. *Copeia*, 325-330.
13. Sire, J. Y. (1986). Ontogenic development of surface ornamentation in the scales o fHemichromis bimaculatus (Cichlidae). *Journal of Fish Biology*, *28*(6), 713-724.
14. Slooff, W. (1982). Skeletal anomalies in fish from polluted surface waters. *Aquatic toxicology*, *2*(3), 157-173.Skeletal anomalies in fish from polluted surface waters. *Aquatic toxicology*, *2*(3), 157-173.
15. Tave, D., Bartels, J. E., & Smitherman, R. O. (1982). Stumpbody Sarotherodon aureus (Steindachner) (= Tilapia aurea) and tail-less S. niloticus (L.)(= T. niloticd): two vertebral anomalies and their effects on body length. *Journal of Fish Diseases*, *5*(6), 487-494.
16. Vaagsholm, I., & Djupvik, H. O. (1998). Risk factors for skin lesions in Atlantic salmon, Salmo salar L. *Journal of fish diseases*, *21*(6), 449-454.
17. Van Oosten, J. (1957). The skin and scales. *The physiology of fishes*, 207-244.
18. YAMADA, J. (1961). Studies on the structure and growth of the scales in the goldfish. *Memoirs of the Faculty of Fisheries Hokkaido University*, *9*(2), 181-226.

FIGURES

Fig 1: *Cirrhinus mrigala* Specimen showing abnormal Scales with Lesions.

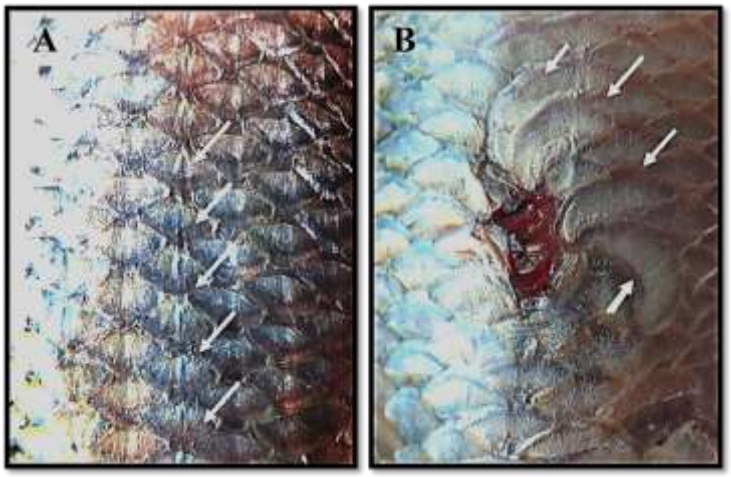

Fig 2: Orientation of the scales in the Normal / Un-Infected (A), Abnormal / Infected (B).

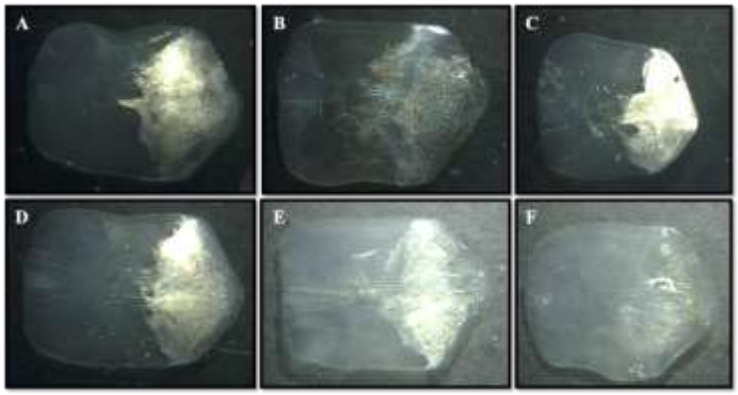

Fig 3: Wet-mount examination under the microscope shows the scales from Normal / Un-Infected Fishes

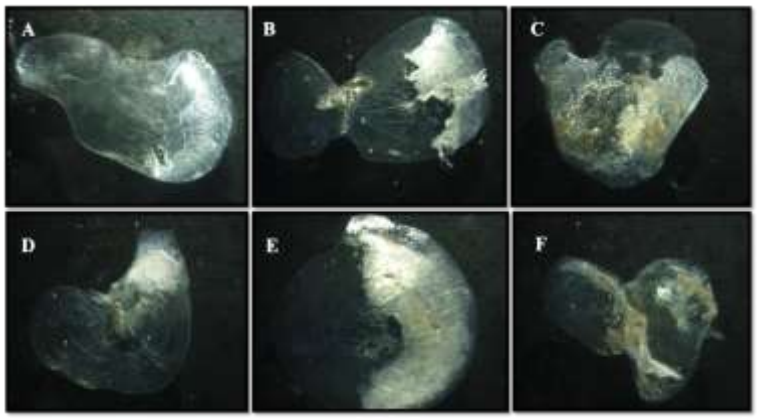

Fig 4: Wet-mount examination under the microscope shows the scale deformities from Abnormal / Infected Fishes