

## Observation of Crainal Nodules in Stinging Catfish *Heteropneustes fossilis*

A. Jesu Arockia Raj<sup>1,\*</sup>, S. Seetharaman<sup>1</sup>, Mohamed A. Haniffa<sup>1</sup>

<sup>1</sup> Centre for Aquaculture Research and Extension (CARE), St. Xavier's College (Autonomous), Palayamkottai 627 002, Tamil Nadu, India.

\* Corresponding Author: Tel.: + 91.462 2560813 / 277; Fax: + 91.462 2561765;  
E-mail: jesuaraj@yahoo.com

Received 02 December 2003  
Accepted 17 February 2004

### Abstract

Whitish unilateral, smooth and conspicuous cranial nodules are observed from *Heteropneustes fossilis* fry got from natural catch in and around Palayamkottai area. Histological studies revealed that cerebrum was good and cerebellum also appeared normal but was dorsally displaced. The epidermal cells devoid of karyohectic malpighian cells, but the meninges were found to be normal. There was no trace cerebellum contact with water apparently and no evidence of parasite, bacterial or fungal infections. The fish of this condition showed 15 to 20% mortality. The aetiologic status of the fish under this condition is yet to be studied in detail.

*Key Words:* Palayamkottai, Catfish, *Heteropneustes fossilis*, crainal nodules

### Introduction

Malformations in the head or body occur largely in marine fishes during on boundary limits of distribution facing low salinity (Lundbeck, 1928; Marquard, 1936). Deformities of various degrees are quite unknown in inland fishes but occasionally evident in groups or batches of eggs or hatchlings. The deformities concerned with decoloration, egg weight loss, pigmentation of the egg, twin fry, kyphosis, lordosis, the evidences in most of the fry (Hora and Pillai, 1962; Biswas, 1992). Some of the cranial deformities are also appeared in salmonid and carps (Bruno, 1997). The study of deformities occurring in a wide variety of animal species is of value particularly in search for aetiological agents (Rowlatt, 1967). Abnormality can be caused by various factors like infectious agents (Hoffman, 1990), no proper husbandry or rearing, hypoxia, nutritional imbalance and genetic factors (Bruno, 1997), which ultimately lead into permanent ailments. Increased appearance of vertebral column as a sort of malfunctions was reported by Wunder (1971) in cod fishes due to the action which was originally considered to be exclusively hereditary. Disrupted osteogenesis have been also reported by infectious agents, such as *Myxobolus cerebralis* that cause deformities especially in cranium (Hoffman, 1990). This paper attempts to reveal the detailed information of both morphologically and histologically about the cranial nodules observed in *H. fossilis* fry during natural catch.

The fish were caught during the earlier monsoon period (June-July) from ponds in and around

Palayamkottai and transported to Centre for Aquaculture Research and Extension (CARE), St. Xavier's College. During sorting, *H. fossilis* fish of a particular batch were found to be with abnormal development in the head (plate 1). The fish weighed 22-30g morphological examination revealed one or two prominent, whitish, round, smooth cranial nodules found above the tectum measuring upto 2 mm diameter. In some larger sized fishes also the nodules were present either on left or right side of the cranium laterally posterior to the eye. Some fishes were observed with one or two smaller nodules on the basal side of the larger ones. More or less 15% of mortality was observed, attributed to this defect in certain groups of fishes. Growth of fish was not affected and the behavioral patterns seems to be normal. There was no exophthalmic condition observed in these fishes.

*H. fossilis* were grossly examined and then whole fish were fixed in 8% phosphate buffered formalin and prepared for light microscopy studies. Serial wax sections were taken using a microtome both transversely and across the width of the head and horizontally from the dorsal side. Hematoxylin and eosine stains were used. The fish were acclimatized and stocked in round plastic tanks of 40 L capacity in which a flow through system having water flow of 2 l/h was maintained with water pH of  $7.2 \pm 0.1$  with dissolved oxygen of 6mg O<sub>2</sub> / l with 12:12 (D:L) cycles. Normal fish were selected from the same stock and were similarly processed and examined.

Histological studies revealed that, the epidermal layer (E) surrounding the cranial nodule was intact. The granular layers (G) of the cerebellum (C) were displaced upward towards the frontal plate without

any change in the purkinje cell layer (P). Karyohectic malpighian cells were disintegrated or absent from the epidermal layer, but the meninges (M) appeared to be normal. Dark pigmentation seen around the epidermal region and concentrated towards the base of the epidermis. The eye section appeared to be normal but decreased in volume with the vitreous chamber (VC). All the other tissues surrounding the nodules showed no abnormal development and the cartilage was devoid of any fungal or bacterial or parasitic infections. The nodules comprised of loose, oedomatous connective tissue (OE) overlying epidermis was intact at the apex of the nodule. The meninges were loosely packed from the neural tissue but no inflammation or infection of any sort was recorded (Plate 2, 2a and 3).

Reports on malformations in the head especially in the frontal region or in the dorsal side of the optic cups or on the lateral sides of the head was reported in farmed salmon fry (Kent *et al.*, 1987; Bruno, 1997) and marine fishes (Marquard, 1936). The present report was similar with the study of Kent *et al.*, (1987) and Bruno, (1997) as no infections evidenced in Atlantic salmon fry however the epidermis appeared intact with a upward movement of the cerebellum which created swelling of the cranial region. Contrary report was also available for cranial defect in salmon fry to an oedomatous reaction following infection by a non-septate fungus (Hanke *et al.*, 1991). Morphologically eye size was normal, histologically seen no folds in the retina which ensures clean vision of fish. The behaviour of the fish appeared normal suggesting the cerebellum was not in paired. Therefore, the exact causes of these nodules in *H. fossilis* was unknown and yet to be found out.

## Acknowledgement

Thanks are due to Rev. Dr. A. Antonysamy, S.J., Principal, St. Xavier's College, Palayamkottai for providing necessary facilities to carry out this study.

## References

- Andler, R. 1932. Uncertainties in determining the number of vertebrae due to deformities. *J. Cons. Perm. Int. Explor. Mar.*, 7: 373-385.
- Biswas, K.P. 1992. Prevention and control of fish and prawn diseases. Narendra Pub. House. New Delhi: 2-137.
- Bruno, D.W. 1997. Cranial nodules in farmed Atlantic salmon, *Salmo salar* L., fry. *J. Appl. Ichthyology*, 13: 47-48.
- Hora, S.L. and Pillai, T.V.R. 1962. Hand book on fish culture in the Indo-Pacific Region. Fisheries Technical paper, No. 14.
- Hoffman, G.L. 1990. *Myxobolous cerebralis*, a world wide cause of salmonid whirling diseases, *J. Aquat. Animal Health*, 22: 30-37.
- Hanke, A.R., Backman, S., Speare, D.J. and Frainars, G.W. 1991. An uncommon presentation of fungal infection in Atlantic salmon fry. *J. Aquat. Animal Health*, 3: 192-197.
- Kent, M.L., Wellings, S.R., Yasutake, W.T. and Elston, R.A. 1987. Cranial nodules associated with cranial fenestrae in juvenile Atlantic salmon, *Salmo salar* L. *J. Fish Dis*, 10: 419-421.
- Lundbeck, J. 1928. Observations on malformations and diseases of cod at the east Prussian coast, *J. Fisheries*, 26: 458-472.
- Marquard, O. 1936. Malformations on the head of cod of the Baltic sea. *J. Fisheries*, 34: 249-256.
- Rowlatt, V. 1967. Spontaneous epithelial tumours of the pareress of mammals, *Br. J. Cancer*, 21: 82-107.
- Wunder, W. 1971. Malformations in the cod, *Gadus morhua*, caused by shortening of the vertebral column. *Helgol. Wiss. Micresunters*, 22: 201-212.