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SHORT REPORT

Record of a wild specimen of Redline torpedo fish, *Puntius denisonii* (Actinopterygii: Cyprinidae) with vertebral deformity

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Resumen

Registro de un ejemplar silvestre de barbo de línea roja, Puntius denisonii *(Actinopterygii: Cyprinidae), con deformidad vertebral*

Se registró una deformidad vertebral en un ejemplar silvestre de *Puntius denisonii* de los Ghats occidentales, India. El estudio radiológico y morfológico comparativo de un pez normal y el deforme revelaron una malformación vertebral en la zona caudal de la aleta dorsal. Se discuten las posibles causas de la deformidad vertebral.

Palabras clave: Malformación, Imagen de rayos X, Ghats occidentales, India.

Abstract

Vertebral deformity was recorded in a wild specimen of *Puntius denisonii* from Western Ghats, India. Radiological and morphological study of a normal and deformed fish revealed vertebral malformation in the caudal to the dorsal fin. The possible etiologies of vertebral deformity are discussed.

Key words: Malformation, X-ray image, Western Ghats, India.

Introduction

Morphological anomalies are not infrequent in fish, having been recorded in both freshwater and marine fish species. Deformities in fishes are known to be caused as a result of environmental pollutants, scarcity of nutrients, sudden changes in temperature, water current, mutation, inbreeding, parasitic infestation, and attack from predators (Hickey 1973, Amitabh & Ahmed 2010, Tave et al. 2011). *Puntius denisonii* (Day, 1865) an ornamental fish popularly known as redline torpedo fish or Miss Kerala is endemic to the rivers flowing through the Western Ghats hotspots of India (Mercy et al. 2013). Due to over exploitation from wild for global ornamental fish trade, this species has been listed as Endangered (Sekharan & Ramachandran 2006). This was reported for the first time, a case of deformity in wild population of *P. denisonii* from Western Ghats of India.

Materials and Methods

Deformed specimen of *P. denisonii* (Total Length= 57 mm, Standard Length= 44 mm, Total Weight= 19.5 mg) was caught by drag net from Vallithode region of River Valapattanam, (12° 1' 49.44" N, 75° 42' 55.44" E), in August 2013. Morphological abnormality was photographed with a digital camera (Nikon Coolpix L22) and deformity was further examined by digital X-ray system (Fujifilm FCR Capsula XL II Reader). For the comparison with deformed specimen, a normal fish (Fig. 1B) of same catch (Total Length= 60

mm, Standard Length= 46 mm) was also collected. Deformed specimen stored at the museum of department of fishery biology, College of Fisheries, Kerala.

Results and Discussion

Compared to the normal fish (Fig. 1B), the deformed specimen of *P. denisonii* possessed vertebral abnormality in the post-dorsal fin region by the examination of morphological length variation (Fig. 1A; Table 1) and radiological observation (Fig. 2A). Similar types of vertebral deformity have been reported in *Esox lucius* L., 1758 (Orska 1962), *Cirrhinus mrigala* (Hamilton, 1822) and *Hypothalmichthys molitrix* (Valenciennes, 1844) (Raj et al. 2004) and *Poecilia wingei* Poeser, Kempkes & Isbrücker, 2005 (Arbuatti et al. 2013). The deformed vertebrae in *P. denisonii* were not radiologically differentiated due to the smaller size of the specimen (Standard length= 44 mm).

In several fish species the vertebral malformation was found to be associated with the absence of a functional swim-bladder (Andrades et al. 1996). But in deformed *P. denisonii* had double chambered functional swim-bladder (Fig. 2A), similar to the normal specimen (Fig. 2B). Vertebral deformities in fishes are more common in smaller fishes as compared to larger one which may be due to high mortality of deformed fish at early life stage (Hore and Ahmad 2010). Arbuatti et al. (2013) reported vertebral deformity associated with inbreeding depression in *Po. wingei*; but no genetic study was analysed to find whether the deformity due to heritable or non-heritable. Vitamin C deficiency in the diet was also found responsible for the vertebral deformity in *Cyprinus carpio* L., 1758 (Al-Harbi 2001). In present study, out of 155 normal specimens from the same habitat only one has been found to be deformed, hence the nutrient deficiency theory does not appear to be plausible.

Pesticide exposure has been reported to cause vertebral deformities in *Oryzias latipes* (Tem-

Figura 1. Ejemplares deforme (**A**) y normal (**B**) de *Puntius denisonii*.

Figure 1. Deformed (**A**) and normal (**B**) specimens of *Puntius denisonii*

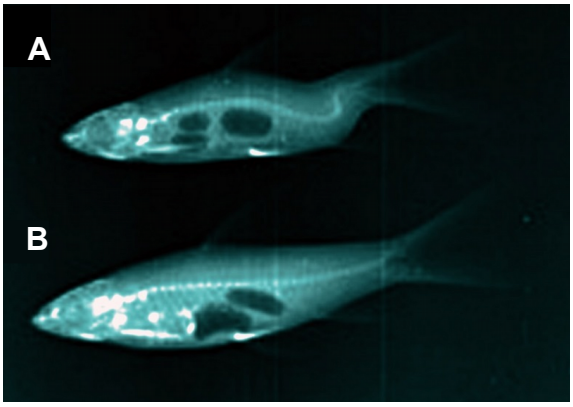

Figura 2. Imagen de rayos X de ejemplares deforme (**A**) y normal (**B**) de *Puntius denisonii*.

Figure 2. Deformed (**A**) and normal (**B**) specimens of *Puntius denisonii*

Variable	NF	AF	NF (% L_S)	AF (% L_S)	% of variation
Standard length (L_S)	4.6	4.4			
Fork length (L_F)	5.1	4.9	110.9	111.4	0.5
Head depth (D_H)	0.7	0.7	15.2	15.9	0.7
Total length (L_T)	6.0	5.7	130.4	129.5	0.9
Body depth at dorsal fin (D_{BDF})	1.2	1.1	26.1	25.0	1.1
Head length (L_H)	1.2	1.2	26.1	27.3	1.2
Body depth at anal fin (D_{BAF})	0.9	0.8	19.6	18.2	1.4
Caudal peduncle depth (D_{CP})	0.6	0.5	13.0	11.4	1.7
Pre anal fin length (L_{PrAF})	3.4	3.4	73.9	77.3	3.4
Post anal fin length (L_{PoAF})	2.6	2.3	56.5	52.3	4.2
Pre dorsal fin length (L_{PrDF})	2.1	2.2	45.7	50.0	4.3
Caudal peduncle length (L_{CP})	0.8	0.5	17.4	11.4	6.0

Tabla 1. Medidas corporales de los ejemplares normal y anormal de *Puntius denisonii*. NF: Normal; DF: Deforme.

Table 1. Morphological measurements of normal and abnormal specimens of *Puntius denisonii*. NF: Normal specimen; DF: Deformed specimen

minck & Schlegel, 1846) (Hiraoka & Okuda 1983), *Channa punctatus* (Bloch, 1793) (Sen et al. 1991), and *Ci. mrigala* (Dutta et al. 2011). Recent study by Kerala State Council for Science, Technology and Environment (KSCSTE) (The Hindu 2013) documents that River Valapattanam has been polluted by the extensive usage of pesticides in adjacent land for agriculture and also by dynamite or chemical fishing methods. Such high levels of pollutants in the River Valapattanam could affect the embryonic and early larval stages of fishes. Malformations in fishes are used as indicators of water pollution, because of their incidence in polluted areas (Sun et al. 2009). Environmental stress related deformities were recorded in *Ci. mrigala* and *Hypothalmichthys molitrix* (Valenciennes, 1844) from Bhavani River in Tamil Nadu (Raj et al. 2004). We found that dynamite fishing is one of the major threats over the freshwater fishes of River Valapattanam. However, the dynamite fishing has been banned vide by The Travancore Cochin Fisheries Act of 1950, there is very little or no enforcement from the concerned authorities and the practice continues in the rivers of Kerala (Baby et al. 2011).

From the above discussion, it is clear that the fish deformities are very complex and are caused by multiple factors. Even though the exact cause of deformity was not being determined; combination of pollutants, pesticides, or genetic factors can be supposed to be involved in *P. denisonii*. Other factors might be equally responsible for developmental anomalies. Detailed investigation is required to determine the cause of deformity and genetically its impacts over the standing stock. However, the present record is nevertheless significant owing to the occurrence of deformity in wild population of *P. denisonii* (Kerala- India).

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