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Anal Fin Deformity in the Longfin Trevally, *Carangoides armatus* (Rüppell, 1830) Collected from Nayband, Persian Gulf

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ABSTRACT A malformation of the anal fin in longfin trevally, *Carangoides armatus*, is described and compared with normal specimens. The fish specimen is clearly shown anal fin deformity with missing of 3 spines and 6 rays. The remaining eleven anal fin rays are shorter than those in the normal specimen. The causative factors of this anomaly were discussed.

Key words : *Carangoides armatus*, pelvic fin, malformation, X-ray image, Iran

INTRODUCTION

Morphological abnormalities in fish in general and skeletal anomalies in particular have been widely described and reviewed since the comprehensive survey of fish anomalies by Dawson (1964, 1971) (Tutman *et al.*, 2000; Al-Mamry *et al.*, 2010; Jawad and Al-Mamry, 2011, 2012). Because of high incidence in polluted wild areas, the fish anomalies are used as indicators of water pollution (Bengtsson, 1979). Fin abnormalities in general are extremely well documented in both wild and reared fish (Divanach *et al.*, 1996), but those of the anal fin are not adequately reported (Hussain, 1979).

Longfin trevally, *Carangoides armatus*, family Carangidae is a reef associated marine species that lives in the Indo-West Pacific region. It is reported from the Red Sea, Gulf of Oman, and Persian Gulf. It extends along the African coast and the west coast of Madagascar to southern India and Sri Lanka (Froese and Pauly, 2010). In the Persian Gulf area, it has high local economical importance as it is considered as among the high commercial fish species (Laith Jawad, personal unpublished data). It is exposed to many physical and chemical factors variations, from temperature to pollution (Araghi, 2010). This study describes a case of anal fin deformity in one specimen of the trevally, *C. armatus* caught in coastal Iranian waters of the Persian Gulf.

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MATERIALS AND METHODS

One specimen of *C. armatus* showing complete deformation of the anal fin (TL 354 mm, SL 265 mm, Weight 588 g) were obtained by fishermen around 5-8 km away from Nayband, Iranian side, Persian Gulf on 27th March 2012 at depth of 10 m. A normal specimen (TL 350 mm, SL 260 mm) was obtained from the same locality for comparison (Figs. 1, 3). The specimens were radiographed with ordinary X-rays to interpret any other skeletal anomaly (Figs. 2, 4). X-ray of a normal specimen was obtained from National Museum of Natural History, Smithsonian Institution, Washington, Catalogue no. 139504 for comparison with the abnormal specimen.

RESULTS AND DISCUSSION

Carangoides armatus has 3 spines and 17 soft rays in its anal fin. Anal fin deformity was visible on the fish body with missing of 3 spines and 6 rays when compared with the normal specimen. The remaining eleven anal fin rays are shorter than those in the normal specimen (Figs. 1-4). The radiograph confirms this missing and also showed that the pterygiophores of the missing rays

Fig. 1. Abnormal fish specimen of *Carangoides armatus* (TL 354 mm) with deformed anal fin.

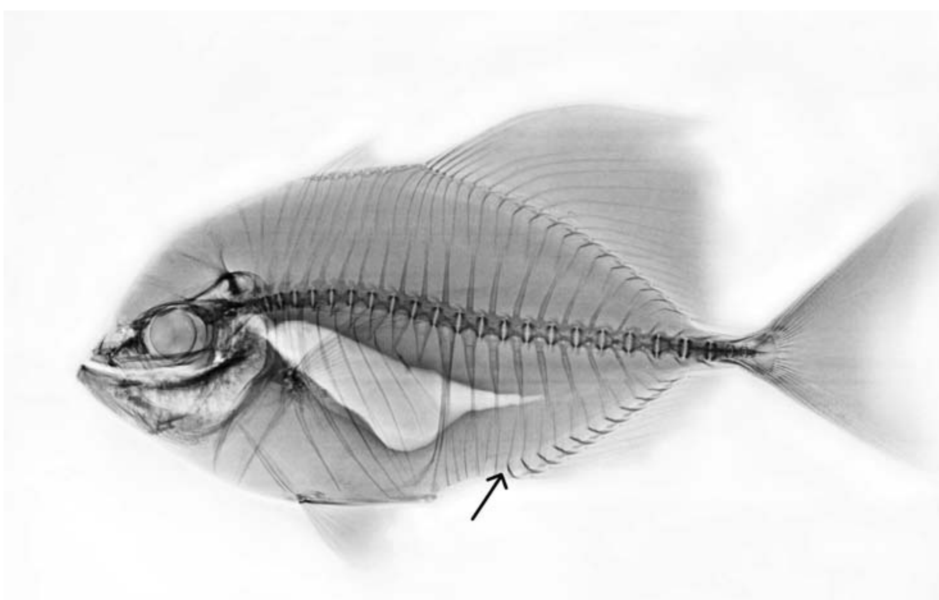

Fig. 2. X-ray image for the abnormal specimen of *Carangoides armatus* (TL 354 mm).

are very thinner and shorter than those of the normal specimen. This is also true for the pterygiophores supporting the existing rays. X-ray did not show other skeletal deformities.

Anal fin has an important role in stabilizing function the fish; therefore it must be constructed so as to cope with hydrodynamic stresses with the least possible expenditure of energy (Boglione *et al.*, 1993). Any anomaly in the anal fin will impair its flexibility, so hindering the performance of the fish.

The phenotype can be produce by the combination of genome, environment and developmental noise (Scheiner, 1993). It is clear that diversities in the genetic pool can determine variations in the developmental pattern. Developmental noise is a factor which can theoretically induce phenotype differences in genetically identical individuals developing in identical environments (Divanach *et al.*, 1996). Accordingly, morphological variability

Fig. 3. Normal fish specimen of *Carangoides armatus* (TL 350 mm).

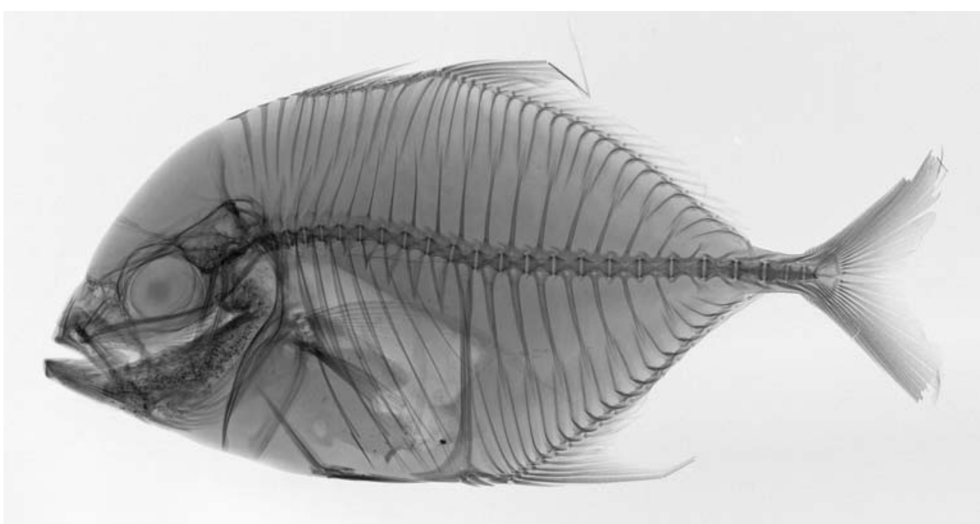

Fig. 4. X-ray image for the normal specimen of *Carangoides armatus* (TL 350 mm).

in a genetically related population can supply a "size" of the developmental noise. In this regard, Soulè (1982) maintains that an augmentation of the phenotypic variability is a characteristic of biologic systems subjected to stress (like intensive rearing conditions, for instance) and that developmental noise reveals itself as a reduction of the intracellular order. The second factor, the environment, includes the influences exercised by external conditions, such as biotic and abiotic factors (Divanach *et al.*, 1996).

Skeletal abnormalities can be induced during embryonic and postembryonic periods of life through a complicated mechanism (Koumoundouros *et al.*, 1995; Cataudella *et al.*, 1996). In the present case of anal fin deformity in the longfin trevally, without additional data it is impossible to support the biotic and abiotic hypotheses in causing such anomalies. Establishment of both nutritional and abiotic parameters involved in the mechanisms leading to the appearance of this deformity must be determined in order to prevent a high incidence of malformations.

Among the xenobiotic substances, heavy metals such as Cd, Pb, Zn and Cu are suspected to cause reduction or absence of fins (Sloof, 1982). On the other hand, evidence is emerging of a malformation effect of photo and thermo-period induction of reproduction where, in some fish species, these factors might cause complete or partial absence of the caudal complex (including caudal vertebrae) (Koo and Johnston, 1978). Vitamin C deficiency has been associated with the fin degeneration in fishes (Halver, 1972). Biotic factors such as expected attack during the juvenile stage from aquatic organisms such as piscivorous fishes or large crustaceans cannot be eliminated (Dulčić and Soldo, 2005). Without additional data, it is impossible to support the biotic and abiotic hypotheses in causing the anal fin deformity. Therefore, further researches and studies are needed to locate the prime cause of such anomaly.

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