Indian Journal of Geo Marine Sciences
Vol. 52 (01), January 2023, pp. 41-43
DOI: 10.56042/ijms.v52i01.5442

Short Communication

Observation on skeletal deformity in band fish, *Acanthocepola indica* (Day, 1888)

P Kodeeswaran, C P Abhilash & T T Ajith Kumar*

ICAR-National Bureau of Fish Genetic Resources,
Lucknow – 226 002, India

*[E-mail: ttajith87@gmail.com]

Received 13 September 2022; revised 07 January 2023

First observation on the skeletal deformity in band fish, *Acanthocepola indica* (Day, 1888) is documented herewith from the west coast of India, Arabian Sea. The deformed specimen was diagnosed with 45 dorsal-fin rays; 48 anal-fin rays; 10 caudal-fin rays; 12+28 vertebrae; length of anal fin 71.0 % SL; length of dorsal fin base 81.8 % SL and length of caudal fin 14.9 % SL. Further, identity of the specimen was confirmed with molecular analysis and the results show no deviation from the normal population.

[**Keywords**: Arabian Sea, Band fish, Deformity, Molecular analysis]

Introduction

Observing the skeletal deformities in the fishes was relatively meagre in both cultured and wild waters fishes. Since the 16th century[1], observation of skeletal deformities in fishes has been documented and studied around all parts of the world. Most of the studies put forward several reasons for the abnormalities in fishes *viz*., contamination in open waters, genetic mutation, inbreeding depression, parasites and disease infestation, nutritional shortfall, environmental undulation during ontogenetic stages, predatory attacks and fishing activities[2-4]. The deformities reported are manifold based on location, morphology and the most of the distortions were observed at the fish head, trunk and caudal portion[5]. Further, the deformities in fish were mainly diagnosed with the help of modern techniques such as radiography, ultrasonography and magnetic resonance imaging.

Materials and Methods

During regular sampling at Kalamukku fish landing centre (9º59' N; 76º14' E) Kochi, Kerala, west coast of India on 28th May 2022, encountered a fish specimen of *Acanthocepola indica* with caudal skeletal deformity along with a normal specimen (Fig. 1). Subsequently, the radiograph X-ray of the specimen was taken to study the impact of deformity, particularly in the caudal portion. In addition, identity of the species was also confirmed with the phylogenetic analysis following, Kodeeswaran *et al*.[6]. The phylogenetic tree was reconstructed using the HKY+G+I model and 1000 bootstrap replicates using MEGA X software[7].

Results and Discussion

In general, *Acanthocepola indica* has an elongated body, greatly compressed laterally, gradually tapering to the caudal fin; 320.7 mm standard length (SL); 88 dorsal-fin rays; 97 anal-fin rays; 10 caudal-fin rays; 12+64 vertebrae; length of anal fin 83.2 % SL; length of dorsal fin base 90.1 % SL and length of caudal fin 10.2 % SL (Fig. 1a). But the abnormal specimen was diagnosed with a completely reduced and fused body. The caudal region ends with 40 vertebrae, which are fused, and nearly half of the body posteriorly is completely deformed compared to the normal specimen; 170.4 mm SL; 45 dorsal-fin rays; 48 anal-fin rays; 10 caudal-fin rays; 12+28 vertebrae; length of anal fin 71.0 % SL; length of dorsal fin base 81.8 % SL and length of caudal fin 14.9 % SL (Fig. 1b).

Radiographic examination reveals that a normal specimen image shows the complete arrangement of vertebrae column up to the hypural bone (Fig. 1c); while in a deformed specimen, the hypural bone is deformed and fused at the 40th vertebrae and the caudal fin regenerates (Fig. 1d). In the maximum likelihood tree (Fig. 2), the deformed specimen does not show any genetic variation and forms in the same clade as the normal specimen.

To the best of our knowledge and based on the previous reports, there were no such reports on the skeletal deformities in *Acanthocepola indica* from world oceans, even from its congeners. Hence, only with the evidence of a single specimen the actual cause for deformity cannot be confirmed; but it can be hypothesized that it may be due to the environmental irregularities during its ontogenetic developmental stages or due to a predatory attack on its caudal region during its initial developmental stages, that may lead for physical injury; however, the fish might have escaped, survived and healed. The skeletal deformity causes various impacts on fish behaviours and physiological processes *viz*., buoyancy, reproduction, swimming, growth parameters, disease resistance,

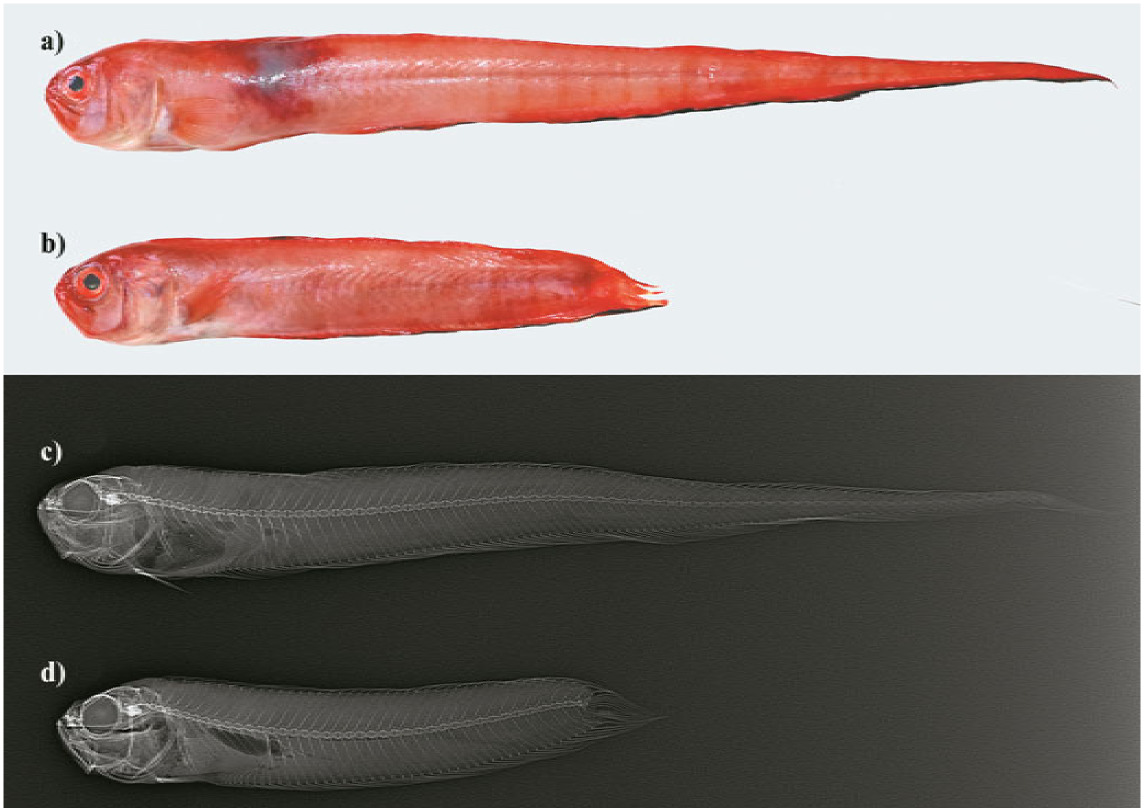

Fig. 1 — (a) Normal, and (b) abnormal *Acanthocepola indica* collected from the Kalamukku fish landing centre, Kochi, southwest coast of India, Arabian Sea; (c) normal radiograph showing complete caudal region with hypural bone; and (d) abnormal radiograph showing fused caudal portion

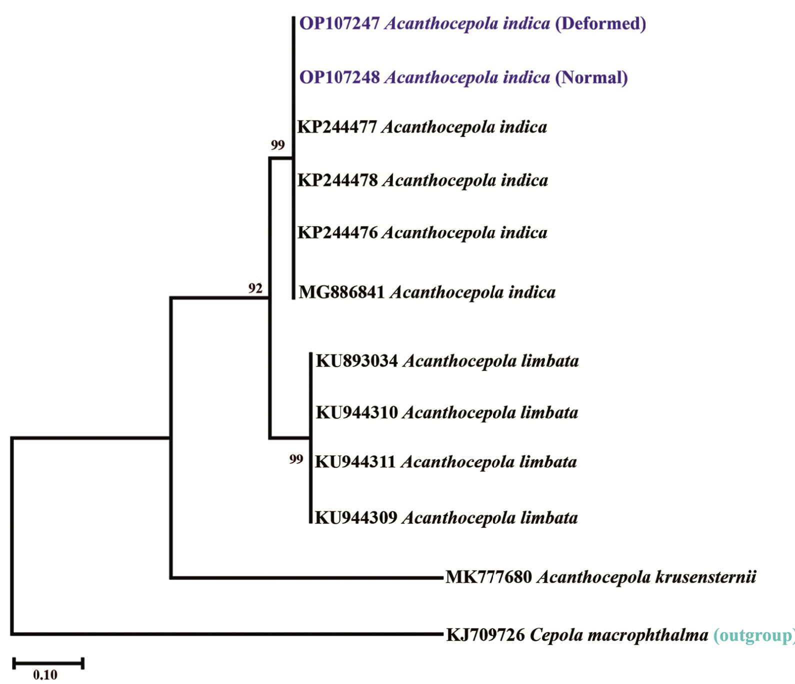

Fig. 2 — The maximum likelihood tree of *Acanthocepola indica* and other congeners of the family Cepolidae. The tree is plotted with the best model of HKY+G+I based on partial mitochondrial COI gene sequences (528 bp). The blue colour highlighted sequences were generated in the present study

difficulties in avoiding predation and feeding activities, and even mortality in young ages[5]. In the aquaculture sector, skeletal deformities cause a major impact on marketing the fish owing to their bad-looking appearance and ultimately lead to economic damage to the culture[8].

The present study provides the baseline information and first observation of skeletal deformity in *A. indica*, which was not reported so far. In the future, keen observation of deformities of marine species is warranted to attain the proper data on deformities, which will reveal the environmental conditions in the fishing areas and will pave the way for prompt protection and management strategies.

Acknowledgments

The authors extend gratitude to the Director, ICAR-National Bureau of Fish Genetic Resources, for facilities and encouragements.

Conflicts of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical Statement

The organisms under the study are not under schedule list/protection categories, thus ethical clearance certification is not applicable.

Authors Contributions

PK: Collection, identification, molecular analysis and manuscript preparation; CPA: Collection; and TTA: Critical analysis and manuscript edition.

References

1 Gudger E W, Beginning of fish teratology, 1555–1642. Belon, Rondelet, Gesner and Aldrovandi, the fathers of Ichthyology, the first to figure abnormal fishes, *Sci Mon*, 43 (1936) 252–261.

2 Browder J A, Nelson C M, Kandroshoff M, Kandroshoff W & Bernstein J W, *Prevalence of abnormal fish as an indicator of environmental quality in the St. Lucie estuarine system*, (Southeast Fisheries Science Centre, NOAA Fisheries, Miami, Florida, USA), 2007.

3 Debnath S, *Occurrence of morphological deformities in wild catfish Clariasbatrachus in a natural ecosystem of Tripura, north east India, and a possible case of stress induced polyploidy as revealed by erythrocyte examination*, (BioAsia, Queen Sirikit, National Convention Center, Bangkok, Thailand), 2008.

4 Eissa A E, Moustafa M, El-Husseiny I N, Saeid S, Saleh O, *et al.*, Identification of some skeletal deformities in freshwater teleost's raised in Egyptian aquaculture, *Chemosphere*, 77 (3) (2009) 419-425.

5 Eissa A E, Abu-Seida A M, Ismail M M, Abu-Elala N M & Abdelsalam M, A comprehensive overview of the most common skeletal deformities in fish, *Aquac Res*, 52 (6) (2021) 2391-2402.

6 Kodeeswaran P, Abhilash C P, Kumar T T & Lal K K, New distributional record of Canarytop Wrasse, *Halichoeres leucoxanthus* (Perciformes: Labridae) from East coast of India, Bay of Bengal, *Thalassas: Int J Mar Sci*, 38 (1) (2022) 41–48.

7 Kumar S, Stecher G, Li M, Knyaz C & Tamura K, MEGA X: molecular evolutionary genetics analysis across computing platforms, *Mol Biol Evol*, 35 (6) (2018) p. 1547.

8 Boglione C, Costa C, Di Dato P, Ferzini G, Scardi M, *et al.*, Skeletal quality assessment of reared and wild sharp snout sea bream and pandora juveniles, *Aquaculture*, 227 (2003) 373–394.