A COMPARISON OF THE DIFFERENCES IN SOME CRANIAL BONES OF TWO SPECIES COMMON CARP CYPRINUS CARPIO AND THE COMMON TILAPIA COPTODON ZILLII

Mohammed I. Ghazwan Aljanabi
Iraq Natural History Museum and Research Center, University of Baghdad, Iraq
muhammadinad@yahoo.com

ABSTRACT
This study attempts to identify some of the differences between two species Common Carp, Cyprinus carpio, and Common Tilapia, Coptodon zillii, by studying some of the characteristics of their cranial bones as an analytical and taxonomic study of two types of species that belong to two different types of fish, which are most common in the Iraqi aquatic environment. Keywords: Cranial Bones, Common Carp, Cyprinus Carpio, Common Tilapia, Coptodon Zillii

Introduction

There is a considerable extent of convergence between fish species and sexes in terms of the general structure of the skeleton, especially the bones of the skull that differ from one type to another and between males and females. Bones of the skull and cranial bones of the same family fish are similar in somewhat different races and differ between fish families in terms of the shape and division of the cranial bones (Akmal et al., 2020). The study of the bone characteristics of fish gives valuable information for the classification of fish and the study of genetic relations between fish as agreed upon by researchers in their most significant studies (Keivany, & Nelson, 1998, 2004, 2006; Diogo, & Bills, 2006; Keivany 2014a, b, c, d).

The skeleton in fish is very complex and has a highly efficient articulart kinetics (Ferry-Graham and Laud, 2001), and the study of bones in general and the study of the bones of the skull in particular provides a great impression of the formation of the fish body and the characteristic of this formation. The skeletal system is needed for one type rather than the other type, and the vertebrate skeleton in general attracted many specialists in the study of comparative anatomy as indicated by Goethe (1824) and confirmed by H. Hiawa and S. Kuratani (2015); in order to understand Taxonomic relationships of fish, the physiological characteristics of fish must be understood, including the study of bone and comparative anatomy between species in a single family, and species between different fish families (Ramaswami, 1951; Howes, 1982; Bogutskaya, 1994; Mafakheri, et al., 2014).

It was shown that the development of the skull in fish is closely related to the development and growth of fish bones (Bogutskaya et al., 2008), and many research studies and morphological studies of many fish families that researchers have been interested in diagnosing and studying such as the Cyprinidae family (Takeuchi and Hosoya. 2011; Nasri et al., 2016), and the Cichlidae family had a share of interest and studies related to morphology of its skeletal structure (Dierickx et al., 2017).

Hilton (2011) indicates that skulls among the vertebrates have the function of protecting the brain and the delicate sensory organs, as the skull is divided into two parts: the nerve skull, which includes the brain, nerves, and sensory organs, and the second section, facial and venereal bones (Jalili and Nasri, 2015). The shape of the skull in fish is influenced by genetics first, type and nature of food, in addition to the quality and nature of water secondly (Cooper and Westneat, 2009).

Studies concerning fish bones are still rare and scarce compared to the study of the bones of some mammals and birds (Leprevost and Sire, 2014). Despite the availability of a few previous studies on the skeleton and the bones of the type Tor tambroides (Akmal et al., 2020), detailed studies of the skull bones of this species were not studied, and detailed studies on the bones of the species Coptodon zillii and Cyprinus carpio and the study of the skull and cranial bones of these two species were not available in detail (Akmal et al. 2018a; 2018b; Zulfahmi et al., 2018); therefore, this study attempts to identify some of the bones of the skulls of these two types and make a comparison between them in terms of the shape as the two families are characterized by differences within their families and sexes, while also aiming to identify some of the characteristics of these bones for these two types.

Materials and Methods

Ten heads were collected from both species. C. carpio and C. zillii were isolated. Then, the heads were cooked to a boiling level for only five minutes and placed in cold water immediately after cooking to stop the cooking process, as they were soaked for 15 minutes in cold water. The tissues, muscles, gills, and other tissues and organs, which are not included in the study, were removed using forceps and scalp, then the skulls were washed carefully with running water and the skulls were kept in diluted formaldehyde with a concentration of 10% for one week only.
The bones were taken from the 10% diluted formaldehyde solution and the skulls washed with clean running water for five minutes; then, they were stored in a diluted ethyl alcohol solution at a concentration of 70% for a week to get rid of the fat and the remaining water in the bones. After that, it was left to dry at room temperature on blotting paper for a week as a preparation to photograph it and perform the rest of the required biometrics. This method of preparing the bones is close to what Taylor and Dyke (1985) prepared.

Results and Discussion

Although there are some phenotypic differences, such as a phenotypic sex-related difference, which came in line with the findings of the researchers (SL HOR and KS Misra, 1936) between male and female Cyprinus carpio fish. We notice from figures (1) and (2), the difference in the shape of the mouth and its size, the shape of the pectoral fins and their thickness, the location of the eye at the front of the head has a distinct difference in the two images, in addition to the depth of the female body, which is significantly evident from that in the male's. The same case of a phenotypic sex-related differentiation of Coptodon zillii fish, as in figures (3) and (4), show that the male was more distinctive in the distribution of colors, especially the area under the head towards the abdomen with a red color, and an olive color evident in the male with a sort of sharpness in the distribution of black lines in the male, which may reach up to six color packages, unlike with the female whose colors were somewhat dull, not to mention the clear presence of colors in the eye of the male in comparison to that in the female.
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