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A Study of the Morphological Differences in Otolith for Some Fish Species of Two Families: Cyprinidae and Cichlidae

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Abstract
The current research paper aims at identifying and clarifying the main morphological differences in Otolith for some fish species belonging to two families, Cyprinidae and Cichlidae. These two families exist in the local Iraqi waters. This paper tries to identify each species and diagnose them microscopically to arrive at these differences among these Otolith.
Keywords: Otolith , Diagnosis , Carp , Tilapia , Local species.

Introduction

The Otolith is considered as one of the biological indices through which fish ages could be estimated as well as other bones and fish scales especially those of Leiodermatous fish which do not have scales (H. Peltonen et al., 2002) .The other important point of the Otolith is that it helps in estimating fish ages and size , development and the ratio of survival (J. A. Waessle et al., 2003) . It is possible for Otolith to be used in estimating fish ages of its whole shape or calcariod development that occurs by virtue of advanced age (E. Avigliano et al., 2015) as in (**Fig no.1**).

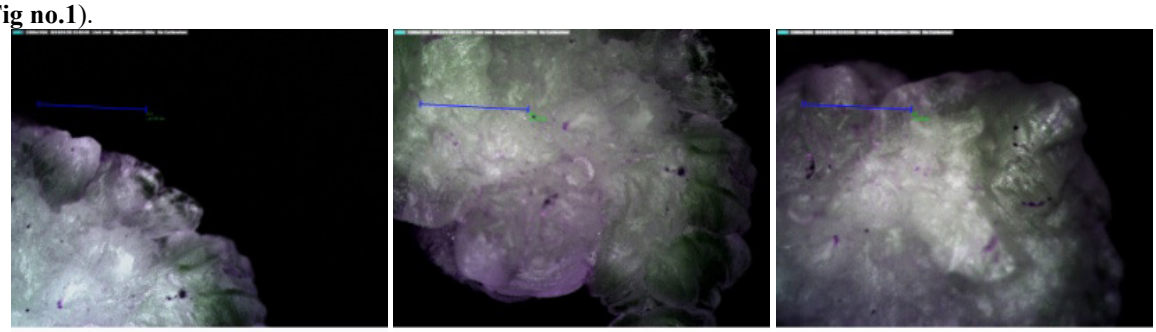

Figure (1) The accumulation of calcareous growths on the Otolith indicates the age of fish.

Otolith can be used as it is without making any changes of different biological studies related to development , age and pigmentation of these bones to attain very accurate results when taking different readings to estimate age and weight increases (T. L. Gerard and E. Malca , 2011) and (H. Peltonen et al., 2002). Besides , it might be possible to use some peptic enzyme with pigmentation to analyze Otolith components and to find the relationship between development , age or development and weight increases (B. S. Green et al., 2002). The components of the Otolith can be analyzed as comparative analysis of fish species and this difference could be as a result of tissues components of different species (S. Saygin et al., 2017), or analysis of some of these elements existing in the components of the Otolith that differ in their species according to the comparative analysis of these elements in the bones of comparative species (E. Avigliano et al., 2015). Otolith is deemed to be one of the important proofs in the modern anatomy that can be deduced that there are different types of fish according to the shape or form of these bones and then the family of these fish and through diagnosing the Otolith (Campana, S. E. and Casselman, J. M., 1993).

The Otolith remains important on the part of defining fish ages, correlation of age to development or relationship of size to age and age increases as well as the study of development of larva in different fish percomorph and areas of existence. Moreover , the Otolith is the sensitive member of hearing and balance in different fish species (R. P. Rodríguez, 2006).

Materials and Methodology

The fish sample of the study consists of fifty species of different species. Two species are restricted to the current study namely , Cyprinidae represented by *Cyprinus carpio*. The average weight of these samples is 2250 gm and the average of total length is (42,5) cm . The second species is Cichlidae represented by *Oreochromis zilli* where the average weight is 340 gm and the average of total length is 20cm . Otolith has been drawn up of the two species by following the well-known of method according to fish specialist (D. A. Milton and S. R. Chenery, 1998) and (M. W. Easey and R. S. Millner, 2008). Otolith of the two species have been kept in alcohol with concentration of about 70% for one month and the Otolith is left to dry on transparent paper at room temperature and it is stored in small plastic bottles marked to its type and species and the microscope that is used for this purpose is called Dino-lite digital microscope pro with a power of magnification of about 40 x in

diagnosing the Otolith of the two species.

Results and Discussion

The differences in the length of the Otolith are not similar in the two species because the Otolith of Tilapia are relatively taller than Carp and the average length in the back side of Carp is 8,5 mm and the average length of Otolith in the back side of Tilapia is 11 mm whereas the average length of Otolith in the abdomen side in Carp is 5,5 $\pm$ 5.0 mm and the average length of Otolith in the abdomen side in Tilapia is 7,5 $\pm$ 5.0 mm whereas the average width of Otolith of Carp is 6 mm and of Tilapia 7 mm whereas the average width of Otolith in the abdomen size of Carp is 3,5 $\pm$ 5.0 mm and of Tilapia is 6 mm as illustrated (Harvey JT et al., 2000) and points to that (B. S. Green et al., 2002).There is a well-known relationship between the length of the fish species and the length of Otolith as illustrated (Harvey JT et al., 2000) and points to that (R. P. Rodríguez, 2006).Otolith of Carp is more glittering and lustering than the Otolith of Tilapia. The reason behind this brilliantness stems from the type of nutrition between the two species of fish family as well as there are some mineral elements in the nutrition and the environment of the two different species, points to that (M. Jobling et al., 2008). Moreover, it could be attributed to the different ages of the fish family. Furthermore , the weight of Otolith in the two species since the average length of Carp is 0,045 g m and the average weight of Tilapia is 0,105 g m (S. Saygin et al., 2017). Arcuation of Otolith from the center in Tilapia is more clearer than Carp since the length of arcuation for Carp 0,5 mm and in Tilapia 1,25 mm as illustrated ((J. A. Waessle et al., 2003) as show in (**Fig no. 2 and no. 3**).

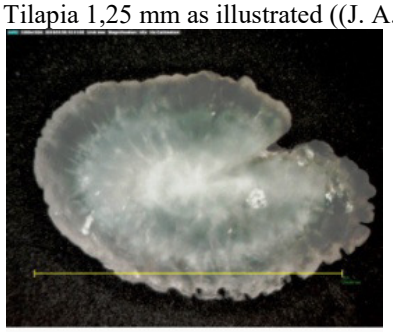

Figure (3) Tilapia Otolith

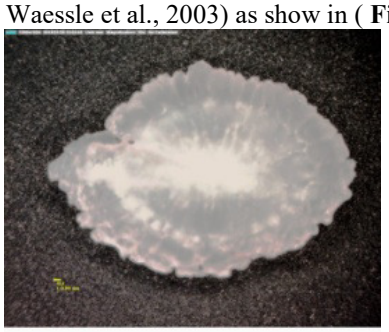

Figure (2) Carp Otolith

To sum up , the modern studies are still under way for examining the Otolith of different fish bones as an evidence to diagnose and clarify fish species that overlap with other nutritional or environmental or biological natural world of different fish species .

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