MORPHOLOGICAL STUDY OF OTOLITH IN TWO MUGILID SPECIES *LIZA SUBVIRIDUS*(VALENCIENNES,1863) *& L.ABU* (HECKEL,1843)

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ABSTRACT

In order to study the otolith (sagitta) of *Liza abu* (total length ranged 88-120 mm, body weight was from 7 to 9 g) and *L. subviridus*(total length ranged 155-205 mm, body weight was from 10 to15 g) 20 specimens of each of them were collected from local markets, sagitta was removed from head by making cross section .Some differential characteristics were observed between the two species sagitta in shape of anterior and posterior sides , notch was found in the mid of posterior margin in *L.abu*, while in *L. subviridus* the notch locates in posterioventral margin, so sagitta can be used to identify the two species.

INTRODUCTION

The auditory-equilibrium organ or "labyrinth" of fishes locates in the bony auditory capsules at the back of the cranium and comprises three fluid-filled semicircular canals that are connected with three sac-like champers, the sacculus, utriculus and lagena, each chamber contains a hard bone-like otolith(ear-stone): the sagitta, lapillus and astericus, respectively (1).

Otoliths are not bones; they are a kind of sedimentary formation that mainly consists of layers of $CaCO_3$ (2).They are initially formed of protein granules which merge, forming a sub-primordium ;this is then covered by a layer of calcium and a layer of protein. Large amounts of protein are accreted around this, forming the primordium (1).

In most teleosts the sagittae are the largest pair of otoliths, they act as the transmitters of mechanical stimuli to the cilia of the macula inserted in the sulcus (sulcus acusticus) (3).

The configuration of the sagitta is usually more complicated than that of the other two otoliths ,and show more characteristic features that can be used to distinguish various species, genera and families, it is also possible to identify fish species in the form of otoliths through the analysis of the stomach content of the predators (piscivorous) (4), and stomach analysis with systematic research of fossil fish (5).

Many studies have been carried out about using otolith in identification different fish species. (6)studies the sagitta morphology of *Channa* spp. from southern area of Thailand, (7) mentioned that there are many different kinds of otoliths shapes belong to the species of *Cephalopholis* in southern Thailand and they referred that the different morphology of sagitta among these fishes may be associated with differences in environmental and biological factors so the purpose of this study is to investigate the morphology of sagitta of two species that belong to the same genus and show the

differences between them.

MATERIAL AND METHODS

A total of 20 specimens of each of the two species *Liza subviridus*(total length ranged 155-205 mm,body weight was from 10 to15 g) and *Liza abu*(total length ranged 88-120 mm, body weight was from 7 to9g) (figure 1,2) were collected from local markets from 5_{th} October to 4_{th} December in order to study of otoliths .In the laboratory the fishes were identified by (8) ,the total length was measured then the head was dissected by making cross section behind the eyes to remove the otoliths especially the sagittae , which was placed in bleach (sodium hypochlorite) for few minutes to help remove the otic membrane and any other tissues (9).Otoliths were stained by aniline-blue (10).In order to measure the length of otoliths the ocular micrometer was used after calibration ,photographs were taken using a digital camera type cyperlink after mounting on dissecting microscope.

RESULTS

The otolith length was ranged from 2.9 to 4.1 mm in *L.abu* (the total length of the body was 88-120 mm), while in *L. subviridus* the otolith length was ranged from 6.6 to 7.4mm (total length body was 155-205 mm). Table (1) reveals that otoliths (sagittae) have two margins dorsal and ventral. In the anterior there is rosterum and antirosterum ,notch was found in the mid of posterior margin in *L.abu* (figure 3) ,while in *L. subviridus* the notch locates in posterioventral margin(figure 4). In the dorsal a projection can be noted in the two species but it is still more obvious in *L.subviridus* than it is in *L.abu*. The excisura in *L.abu* can be watched that it is narrower than this of *L. subviridus*. In the ostial surface of sagittae in two fishes a longitudinal groove can be noted which may be divided into ostium (up) and cauda (down).

Table (1) Characteristics of the otolith of each of the two species L. abu & L. subviridus

Feature	**Otolith of *L. abu***	**Otolith of *L. subviridis***
Shape	Ovate	Oblong
Dorsal margin	Entire	Entire
Ventral margin	Lobed	Dentate
Excisura	Narrow& Shallow	Shallow & Notched wide moderately
Ostium	Wide & Short	Rhomboid
Cauda	Straight then slightly flexed at posterior	Straight then strongly flexed at posterior
Rostrum	Small, Round &Short	Large & Elongate
Antirostrum	Minute	Short
Posterior	Wide & Rounded with a notch in the middle	Rounded & Smaller than the anterior one

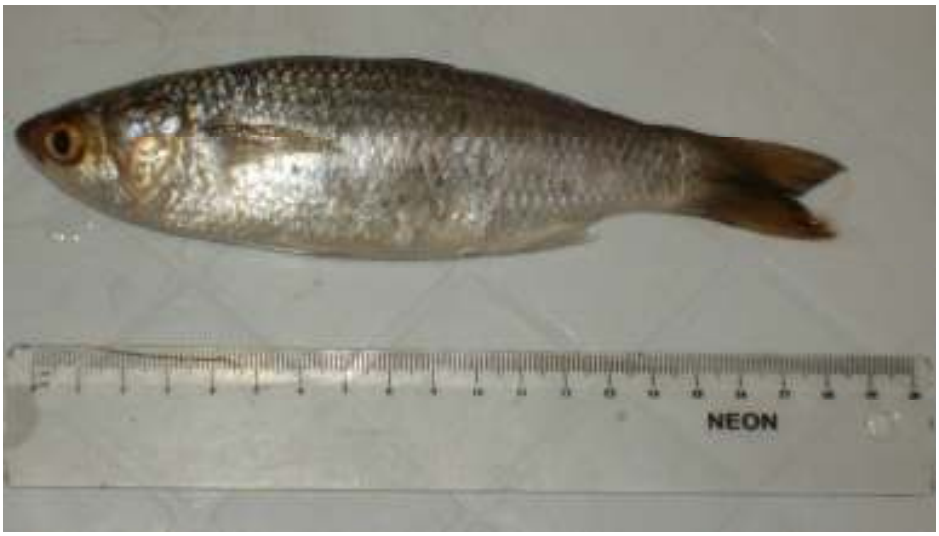

Fig. 1 *Liza carinidus* with 180 mm total length.

Fig. 2 *Liza abu* with 115 mm total length.

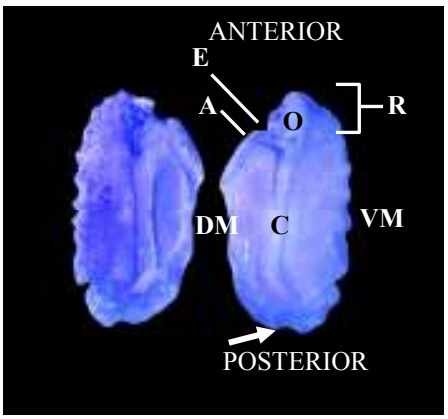

Fig. 3 Otoliths (Sagittae) of *L. abu*. Rostrum (R),Excisura(E),Antirostrum (A), Ostium(O), Cauda(C),Ventral Margin(VM), Dorsal Margin(DM), Arrow: a notch in posterior margin (Total body length 100 mm, otolith length 3.5mm)10x.

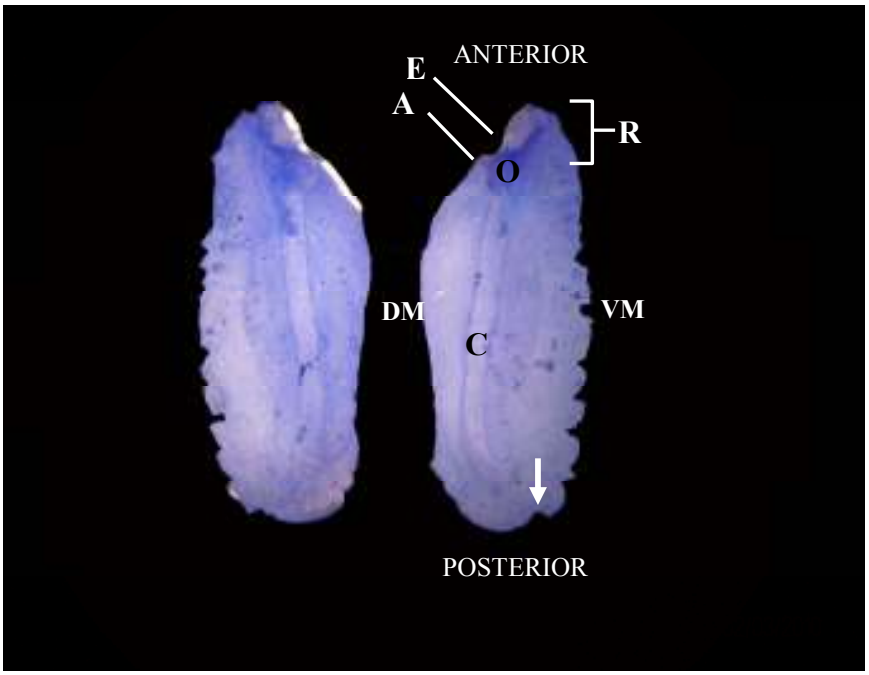

Fig. 4 Otoliths (Sagittae) of ***L. subviridis.*** Rostrum (R),Excisura(E),Antirostrum (A), Ostium(O), Cauda(C),Ventral Margin(VM), Dorsal Margin(DM), Arrow: a notch in posterioventral margin (Total body length 170 mm, Otolith length 7mm)10x .

DISCUSSION

Otoliths were used by many researchers to identify the species belong to same genera from each other ,(4) used otolith to identify the species of sparidae in bay of Izmir.. The reason of define otoliths is not only for the identification of the species but also for the stomach analysis and the systematic research of fossil fish (5).

The results reveal that it can use the sagitta to recognize between *L.abu* and *L.subviridus* in spite of the two species belong to same genus .The cauda turns up in *L. subviridus* while in *L. abu* the same part to lent to posterioventral margin .The microstructure of the ventral margin is different from species to another, it is lobed in *L.abu* whereas dentate in *L.subviridus* ,the main difference between the two species is the presence of notch in the mid of post margin in *L. abu* otolith while the comparable part in *L. subviridus* otolith has a similar notch but it locates in posterioventral margin . The results of this study reveal clearly that the otoliths of the two fishes are species specific and they are useful tool to recognize and identify the two species from each other and in the stomach content of the piscivorous.

دراسة مظهرية لصخرة الاذن في نوعين من عائلة البياح (البياح العربي و الخشني subviridus Liza Valenciennes,1863)) (L. abu (Heckel,1843

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الخلاصة

لغرض دراسة صخرة الاذن (السهيم) في الخشني(تراوحت الاطوال الكلية من ٨٨-١٢٠ملم ووزن الجسم من ٧-٩غم) و البياح العربي(تراوحت الاطوال الكلية من ١٥٥-٢٠٥ملم ووزن الجسم من ١٠-١٥غم) و بواقع ٢٠ عينة لكل منهما من الاسواق المحلية. استخرجت صخرة الاذن بعمل شق عرضي في راس السمكة، لوحظت بعض الاختلافات المظهرية بين صخرتي الاذن للنوعين من ناحية الشكل والجهتين الامامية والخلفية، وجد ثلم في منتصف الحافة الخلفية في الخشني بينما في البياح العربي يقع الثلم في الحافة الخلفية البطنية ، وعليه فان صخرة الاذن يمكن ان تستخدم للتمييز بين النوعين.

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