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IDENTIFYING THE TYPES OF MUGILIDAE SPECIES FROM BARDAWIL LAGOON, NORTH SINAI, EGYPT

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ABSTRACT

This study was conducted to identify the genera and species of mullets in Bardawil lagoon, and this study should be a reference for researchers to identify and differentiate among species. To distinguish among species, it took the formal and anatomical characteristics, it became clear through the study, that there are six species belongs to three genera (*Mugil, Liza and Chelon)*. Four species belong to the genus *Liza* (*Liza ramada, Liza aurata, Liza saliens* and *Liza carinata).* One species belongs to the genus *Mugil* (*Mugil cephalus)*. While one of the species belongs to the genus *Chelon (Chelon labrosus)*. Results showed that the most common characteristic of each type are: *Mugil cephalus* distinguished by the eye is covered with a transparent lipid membrane, the pyloric caeca have 2 caeca. *Liza ramada* distinguished by fusiform and not plump, the nose is widely space, short, between scales, the caudal fin is deep and forked. *Liza aurata* distinguished by the body is compress on both sides with an oval section on the sides, there is a golden spot on the cheek. *Liza saliens* distinguished by having long pyloric caeca from the rest of the mullet family. *Liza carinata* distinguished by developed the oily eyelid of the eye to an extent, the pyloric caeca have 5 caeca. *Chelon labrosus* distinguished by the body is full, and the head is broad and flat, the lips were cracked and smooth, and the upper lip is thick and has papillae.

INTRODUCTION

Morphological studies have long been useful to delimit marine fish stocks and describe their spatial distribution (**Ihssen *et al*., 1981; Palma and Andrade, 2002**). Morphometric studies are based on a set of measurements which are continuous data, revealing the size and shape variation (**Turan, 1999**). The species of Mugilidae are characterized not only by both a remarkably uniform external morphology, but also a scarcely less so internal anatomy. This can be demonstrated by a comparison of the attributes commonly employed to identify mullets, as the number of scales, fin spines and fin rays, and measurements of body proportions (**González-Castro, 2007**). This study was conducted to determine the genera and species of mullets in Bardawil lagoon, this study should be a reference for researchers to identify and differentiate among species. To distinguish among species, it took the formal and anatomical characteristics, it became clear through the study, that there are six species belongs to three genera (*Mugil, Liza* and *Chelon)*. Four species belong to the genus *Liza* (*Liza ramada, Liza aurata, Liza saliens* and *Liza carinata).* One species belongs to the genus *Mugil* (*Mugil cephalus*). While one of the species belongs to the genus *Chelon (Chelon labrosus)*.

MATERIALS AND METHODS

Study Area

Bardawil lagoon is a shallow and saline bond bordered by the Mediterranean Sea; in

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the North Sinai Peninsula. These areas vary according to their environmental traits such as temperature, depth and salinity. The survey was conducted in Bardawill Lagoon at 3 stations (El-Nasr, Egswan, Tulul) in Season 2019 from May 2019 to January 2020.

Samples

Specimens of Family Mugilide were collected from the three sites distributed along Bardawil lagoon. These samples covered the northeast (Tulul), the center (Egzwan), and the southwest (El-Nasr). The fishing gear used included Dabba, The Dahbana gear and Bouss. Fishes were transported to the laboratory in iced boxes. Each sample was grouped using morphological analyses.

Morphological Analysis

The meristic counts and morphometric measurements were recorded according to **Holden and Raitt (1974) and Jayaram (1981)**.

In this study, a total of six species of Mugilidae were identified morphologically. Through a virtual examination and a microscopic examination inside laboratory, each species was determined separately by studying its phenotype.

RESULTS AND DISCUSSION

It became clear through the study, that there are six species belong to three genera (*Mugil, Liza and Chelon)*. Four species belong to the genus *Liza* (*Liza ramada, Liza aurata, Liza saliens* and *Liza carinata).* One species belongs to the genus *Mugil* (*Mugil cephalus)*. While one of the species belongs to the genus *Chelon (Chelon labrosus).*

Key Identify *Mugil* Species from Bardawil Lagoon

a1- The body is subcylindrical, slender and covered with large adhering scales. The head is solid, flattened dorsally, with a short, obtuse snout and lateral eyes……. Go to b1 or 2.

b1-The large nostril has triangular shape, the eye is covered with a transparent lipid membrane. The body is cylindrical, full and wide, and the head is hard and flattened on the dorsal side, the lips are thick and wide, and their width is greater than the width of the pupil ……. …… Go to a3.

a2- The body is spindle and slender, the head is solid and broad on the dorsal side, the lips are small and thin, and their width is smaller than the width of the pupil. The large nostril has oval shape, the eye is covered with a primitive or semi-developed fatty membrane ……..…… Go to 4.

b2- The body is semi-cylindrical, with a thin head, solid and broad on the dorsal side, the lips are thick and smooth. The large nostril has oval shape, the eye is covered with a primitive or semi-developed fatty membrane….Go to b3.

a3- Lateral line has about 39:45 scales and 2 of pyloric caeca, short pectoral fin with 17 rays, dark olive green back with blue reflections…... (*Mugil cephalus*).

b3- The lateral line has 41:46 scales and 6 of pyloric caeca, the upper lip has about 2: 3 papillae, the pectoral fin is long and with 17 rays. The back is gray with dark silver and the abdomen is white ……..... (*Chelon labrosus*).

a4- The pectoral fin has 16 rays…Go to a5.

b4- The pectoral fin has 14 rays… Go to b5.

a5- The pyloric caeca have 7caeca… Go to a7.

b5- The pyloric caeca have 5caeca. ……. Go to b7.

a6- The number of scales on the lateral line is 40:46…Go to (a7or b8).

b6- The number of scales on the lateral line is 40:47……. Go to a8.

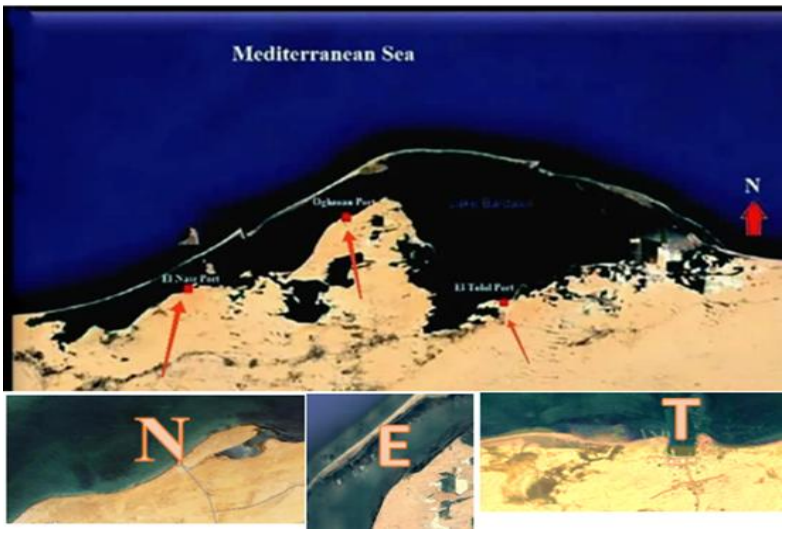

Fig. 1. Bardawil lagoon

Fig. 2. Lateral view of the head showing the fatty membrane covering the eye, the shape and the space between the nostrils. (a)*Mugil* (b) *Liza.*

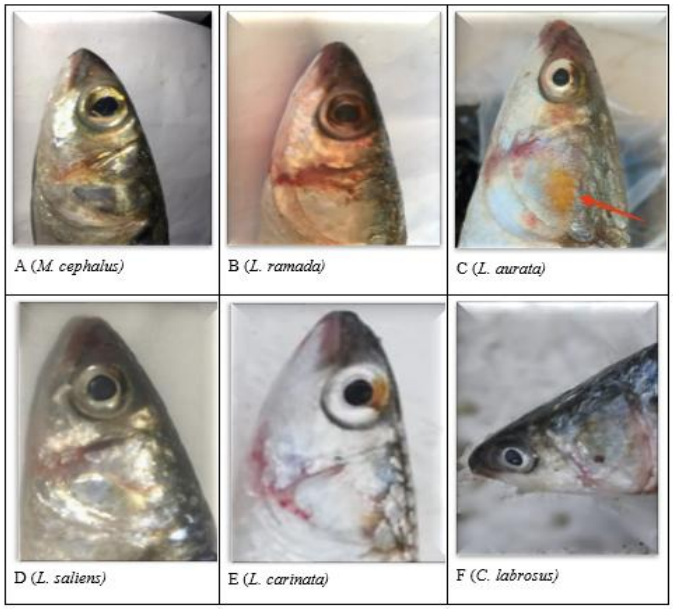

Fig. 3. Lateral view of head of the six species of Mugilidae

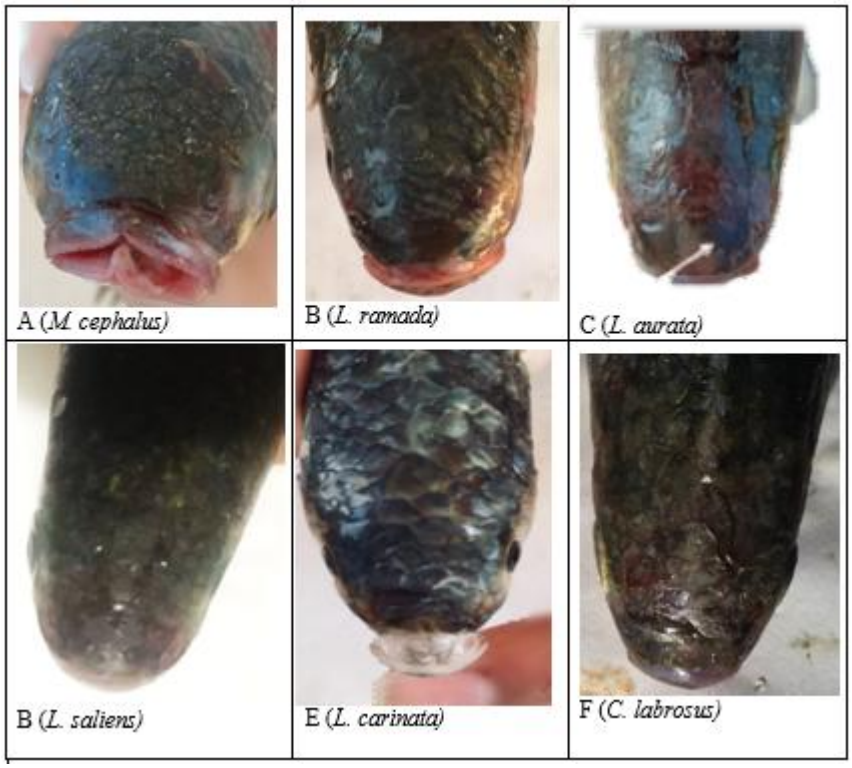

Fig. 4. The scales are on the top of the head of the six species of Mugilidae

Fig. 5. *Mugil cephalus*

Fig. 6. *Chelon labrosus*

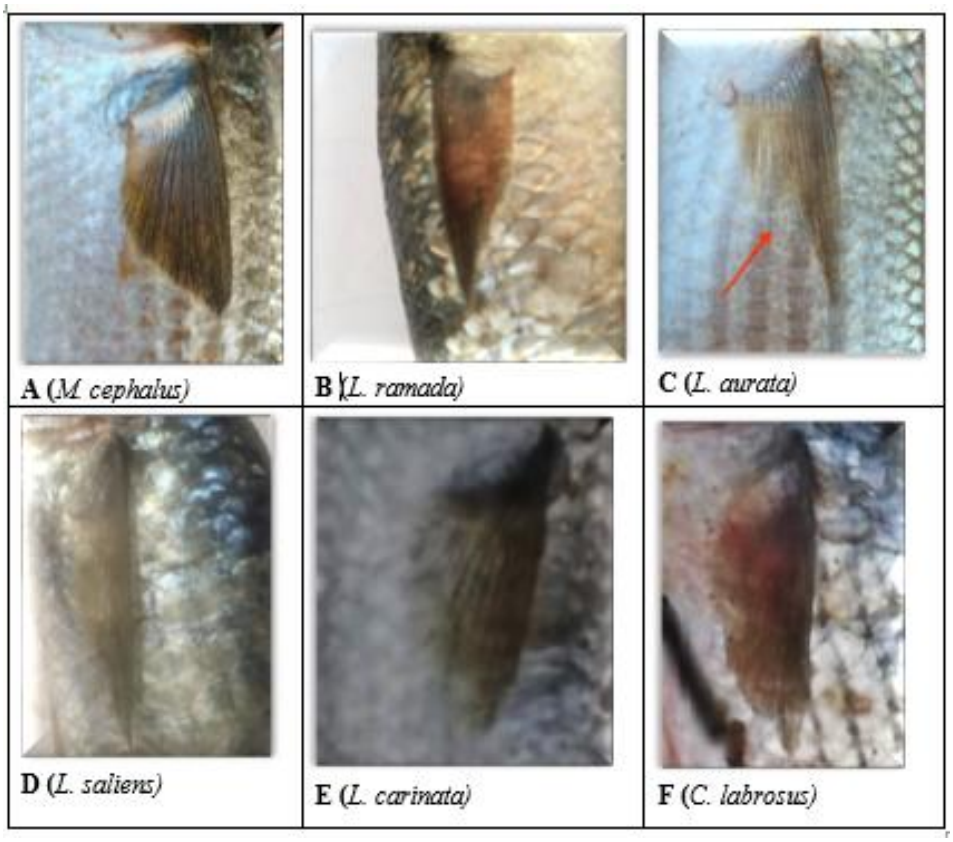

Fig. 7. The pectoral fin of the six species of Mugilidae

Fig. 8. *Liza ramada*

a7- The pyloric caeca have 6:8caeca, the body is long and slender with golden spots are scattered over it, the caudal fin is fissured and forked, the second dorsal fin has 7 rays and 1 spine…….. (*Liza ramada*).

b7- The back is flat, a distinct keel in the front of the first dorsal fin, the eye has a semi-developed fatty membrane, the second dorsal fin has 7 rays and 1 spine…… (*Liza carinata*).

a8- The head has one golden spot on the operculum……. Go to a9.

b8-The head has more spots than a golden spot on the operculum…. Go to b9.

a9- The body has an oval section on both sides, the area from the mouth to the nose in the head is smooth and has no scales…. (*Liza aurata*).

b9- The dorsal fin is long, the caudal fin has 8 rays and 1 spine, the pyloric caeca are the longest among the six species…..... (*Liza saliens*).

Fig. 9. ***Liza carinata***

Fig. 10. ***Liza aurata***

Fig. 11. ***Liza salienss***

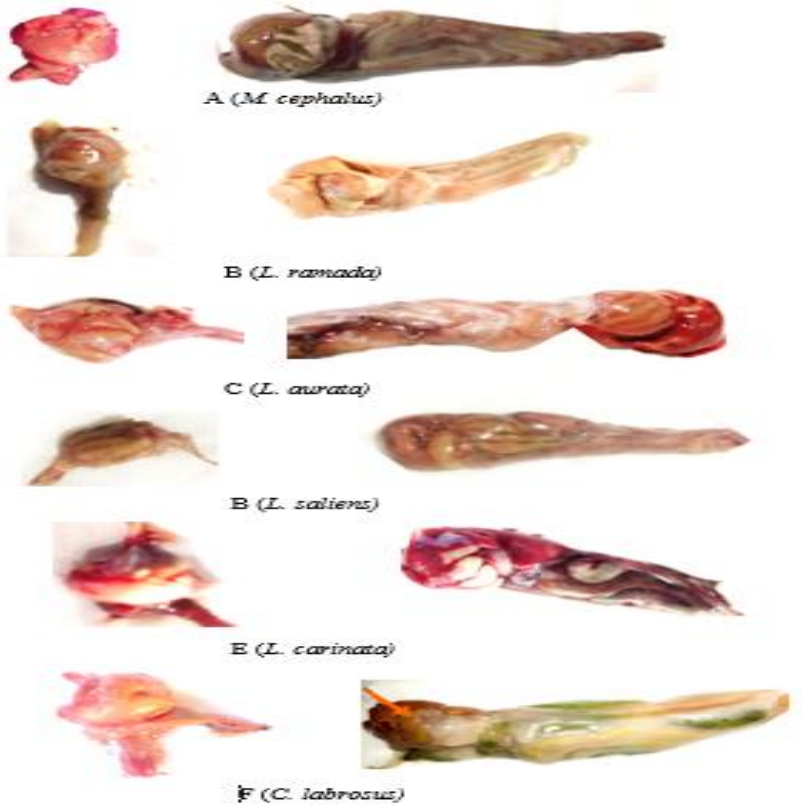

Fig. 12. The pyloric caeca of the six species of Mugilidae

The study showed that the morphology of *Mugil species* was as follows

Mugil cephalus

Body full and cylindrical, the head is wide and flattened these results agreed with **Albaret (2003)**, The nose is small and spaced, one triangular and the other circular, and between them are small and decorated scales, The eye has a thick, smooth, transparent and developed oily eyelid that covers most of the eye (This distinguishes this gender *Mugil*). The pectoral fin is short, strong, and beveled with a slope these results agree with those recorded by **Kara and Quignard (2019)** found that the two nostril orifices are apart and the eyes are protected by a fat eyelid. The pectoral fins are short and do not reach the eye when they are turned forward. Pre dorsal scales extend until the snout tip. The pyloric caeca have 2 caeca. These results agree with those of **Turan *et al.* (2011)**. The back color is dark olive green with blue reflections, the color of the sides is blue-gray and the color is grayish-gray until it becomes pale white at the belly and with golden-yellow reflections on the head and body, these results agree by **Bester (2004)**.

Liza ramada

Body fusiform and not plump, the nose is widely space, short, between scales, with two oval and circular openings on each side, the caudal fin is deep and forked. These results agrees with those of **Rochard and Elie (1994) and Trape *et al.* (2012)**. The pyloric caeca have 6:8 caeca. These results are supported by **Turan *et al.* (2011)**.

Liza aurata

The body is compress on both sides with an oval section on the sides, the head is slightly flattened, has small scales, does not extend beyond the eye and there is a golden spot on the cheek, the nostrils are far apart and there are no scales between them, These results supported by **Bauchot and Pras (1980) and Trape *et al.* (2012).** There are 7 pyloric caeca. These results are supported by **Louisy (2002) and Turan *et al.* (2011)**. The number of scales on the lateral line is 40:47. These results are in harmony with **Keith and Allardi (2001).** A golden spot on the cheek in the head with a golden yellow color around the eye. These results agree with **Muus and Nielsen (1999) and Trape *et al.* (2012)**.

Liza saliens

The body is slender and fusiform. The head is broad; it has small scales that extend into the nostrils; the mouth is cleft; the upper lip is thin and its diameter is less than that of the pupil. These results agree with **Farrugio (1975)**. *Liza saliens* was distinguished by having long pyloric caeca from the rest of the mullet family.

Liza carinata

It developed the oily eyelid of the eye to an extent. These results supported by **Trewavas and Ingham (1972), Senou *et al.* (1987) and Torcu and Mater (2000)**. The pyloric caeca have 5 caeca **Torcu and Mater (2000**) supported these results.

Chelon labrosus

The body is full, and the head is broad and flat, the lips were cracked and smooth, and the upper lip is thick and has papillae. These results agree with **Kara and Quignard (2019)**. The pyloric caeca have 6 caeca, these results are like to **Turan *et al.* (2011**).

Conclusion

This study concluded that there are six species belongs to three genera (*Mugil, Liza and Chelon*). Four species belongs to the genus *Liza* (*Liza ramada, Liza aurata, Liza saliens* and *Liza carinata).* One species belongs to the genus *Mugil* (*Mugil cephalus*). While one of the species belongs to the genus *Chelon* (*Chelon labrosus*) in Bardawil lagoon. and recommend completing an inventory study of the species and genera of fish and their abundance in Bardawil lagoon.

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الملخص العربي

تحديد أنواع العائلة البورية بمنخفض البردويل شمال سيناء- جمهورية مصر العربية

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أجريت هذه الدراسة لتحديد أجناس وأنواع العائلة البورية في بحيرة البردويل، وينبغي أن تكون هذه الدراسة مرجعا للباحثين للتعرف والتمييز بين الأنواع. تم فحص الخصائص الشكلية والتشريحية للتمييز بين الأنواع. واتضح من خلال الدراسة، أن هناك ستة أنواع تنتمي إلى ثلاثة أجناس (*Mugil*، *Liza* و*Chelon*)، أربعة أنواع منها تنتمي إلى جنس *Liza* (الطوبارة، الدهبانه، الجرانه، السهيلي)، وينتمي نوع واحد إلى جنس *Mugil* وهو البوري الحر. بينما ينتمي نوع واحد إلى جنس الكالون *Chelon*. كانت السمة الأكثر شيوعًا لكل نوع هي: تميز البوري الحر بالعين المغطى بغشاء دهني شفاف، ووجود اثنان من الزوائد الاعورية. وتميزت الطوبارة بأنها مغزلية وليست ممتلئة، ووجود مساحة واسعة بين فتحتي الأنف، الأنف قصيرة وبينهما قشور، الزعنفة الذيلية عميقة ومتشعبة. وتتميز الدهبانه بجسم مضغوط على الجانبين مع وجود قسم بيضاوي على الجانبين، وهناك بقعة ذهبية على الخد. وتتميز الجرانه بامتلاكها أطول زوائد اعورية عن باقي انواع العائلة البورية. وتتميز السهيلي بتطور الجفن الدهني للعين إلى حد ما، ووجود خمسة من الزوائد الأعورية. ويتميز الكالون بجسم ممتلئ، والرأس عريض ومسطح، والشفتان مشقوقتان وملساء، والشفة العلوية سميكة وبها حليمات.

الكلمات الاسترشادية: تحديد الأنواع، العائلة البورية، بحيرة البردويل، مصر.