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FIRST OBSERVATION OF *CHELON LABROSUS* (RISSO, 1827) IN UM- HUFAYAN LAGOON, LIBYA

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ABSTRACT

A presence of *Chelon labrosus* (Risso, 1827) was recorded for the first time in Um-Hufayan Lagoon, Libya; between November 2017 to January 2018. Samples ranged between 11.1 and 25.9 cm in length, and ranged between 25.594 and 166.647 g in weight. The fish's morphometric characters and meristic countswere recorded. The relationships between total length and other morphometric measurements and meristic counts, in addition to length – weight relationship and condition factors were studied.

Results showed that the descriptive traits were matched with the previously recorded *Chelon labrosus* description, and there are some insignificant differences in meristic counts. Also, results revealed that the growth is non-isometric between length and weight of this species. The relationships between length and morphometric traits were statistically non-significant, indicating that they do not change as fish grow.

Keywords: Chelon labrosus, Um Hufayan lagoon, Eastern Libya

1. INTRODUCTION

It cannot be hidden that some rare species have recently been noticed on the eastern coast of Libya, and its shores and estuaries, especially if they have an economic importance. [1] stated that grey mullets are recognized easily from other fishes by the two widely separated small dorsal fins (4 slender spines in anterior fine and a soft-rayed posterior fine). This family is cumbersome to identify, because of the high morphological similarities shared between species, especially in juveniles [2].

Mugllids family includes 64 moderate-sized inshore pelagic species in all tropical and temperate seas. Eight species in the Mediterranean, all in the eastern basin. Some mugllid species often occur unexpectedly in new regions [3 & 4], including the thick-lipped grey mullet *Chelon labrosus* (Risso 1827) in the North Atlantic till the West African coast, and to southern Norway according to [5], and in the Mediterranean Sea and the western Black Sea as well [6]. *Chelon labrosus* is characterized distinctively by its depth as pupil diameter; four spines in first dorsal fin, meanwhile the second dorsal fin has a single spine and 8 rays; thick upper lip and 9 rays in anal fin [7, 8, 9 and 10].

These inshore pelagic fishes swim along the shore, in schools. Spawning season in the winter, and feeding on great variety of food types [11]. Juveniles feed on zooplankton; adults feed on algae, vegetal detritus and sediment [2]. According to [12], females grow faster than males, in the Mediterranean thick-lipped grey mullet get mature sexually at 35.5 cm, and maximum reported length was 60.0 cm [5]. This euryhaline species enters estuaries, lakes and protected shores [10 & 11], caught by trammel net and purse seine in Libyan eastern coast. [13] mentioned that this species annually appears rarely in Susah coast in November.

In general, morphometric and meristic methods remain the simplest and most direct way among methods and techniques to identify fish species [14-24]. [25] mentioned that descriptive traits are non-measurable non countable body morphological characters, and they often vary clinically along geographic gradients [26]. Meanwhile the external measurements of an organism are called morphometric, while meristic is serial counts of body elements.

[27] stated that length-weight relationships are important to: (i) incorporate fisheries and growth models, (ii) to predict weight from length measurements made in the yield assessment, and

(iii) to indicates the robustness and the general well-being of fishes [28]. It is influenced by sex, gonad maturity, health of the fish, seasonal effect, degree of stomach fullness and preservation techniques [29]. The condition factor in fish contributes to understand its life cycle and to adequate management, hence, to maintain the equilibrium in the ecosystem [30 & 31].

This study aims to characterize and identify a new-appearing Mugilidae specimen from Um Huffayen lagoon, using the taxonomic reference collection, and to compare the metric and meristic characters of this species, to that determined in this work.

2. MATERIAL AND METHODS

2.1. Study site (Um-Hufayan: 32° 33' 13.5'' N, 23° 05' 57.2'' E):

This location in Bumba bay, about 80 km east of Darna towards to Tobruk, covers an area of about two Km^2 and depth 0.5 - 3m **(Fig. 1)**, through it sea water enter the lagoon on tide times. Underground springs at the inner side of the Lagoon discharge water at the inner side of the Lagoon and the salinity may be as low as about 11‰. This ecosystem of this lagoon gave it ability as resting site for migratory birds and nesting site for sea-turtles [32]. Also, this area is important as nursery and feeding ground for many commercial fishes; such as those of the family Cichlids, Sparids, Mugilids and Serranids [32 - 36].

2.2. Fish identification and morphometrics:

The fish specimens **(Fig. 1)** were caught in Um-Hufayan Lagoon between November 2017 and January 2018, and taken to the Marine Biology Laboratory of Omar Al-Mukhtar University for identification according to specific literatures **[5, 9, 10, 11, 37, 38 & 39]**.

2.2.1. Descriptive traits: [body shape, body color, strips color, shape of mouth and fins].

2.2.2. Meristic traits: [Dorsal fin (DF), Pectoral fin (PF), Pelvic fin (PvF), Anal fin (AF), Caudal fin (CF) and Lateral line scales (LL)] according to [**13, 39 & 40**].

2.2.3.Total length (TL) – morphometric traits relationships: TL with **[**Standard Length (**SL**), Forked Length (**FL**), Body Depth (**BD**), Head Length (**HL**), Cheek Length (**CL**), Eye Diameter (**ED**), Pre-orbital Length (**PoL**), Post-orbital Length (**PoOL**), Pre-Anal length (**PAL**), Pre-dorsal length(**PDL**), Pre-pelvic Length (**PPL**), Mouth Width (**MW**) and Total Weight (**TW**)(gm.)], following [**24**].

2.3. Length-weight relationship (LWR): [41- 46]

$$W = aL^b$$

[W= total weight, L= total length,
a = Constant value,
b = Variable value (2 – 4)].

Condition factors of Fulton: [45 & 47]

$$K_F = 100\ W_t L^{-3}$$

[W_t = total weight (g),
L = total length (cm)].

Condition factors of Clark: [45 & 48]

$$K_c = 100\ W_g L^{-3}$$

[W_g = gutted weight (g),
L = total length (cm)].

2.4. Statisticall studies: Statistical analyses were done by MS Excel 2010, using power equation

3. RESULTS AND DISCUSSION

3.1. Descriptive traits:

According to the descriptive traits, the spindle-shaped and elongated body, with strongly flattened head, with two short dorsal fins; and thick upper lip and its depth as pupil diameter. Most body is shiny and silvery, upper-side is dark-gray with an olive tinge; sides are light-gray, with elongated and dark stripes. Silvery abdomen, with a whitish shade and dark gray fins, Most of these distinctive characters are matching with the recorded descriptions **[5, 10 & 11]**.

3.2. Meristic traits:

Taxonomical formulae [D1: IV; D2: I + 7-10; A: III + 9; P: 17; Pv: I +5; LL: 41-46] is typical meristic characters of *C. Labrosus* specimen **(Table, 1)** according to **[5 & 10]**. As expected, differences between individual meristic

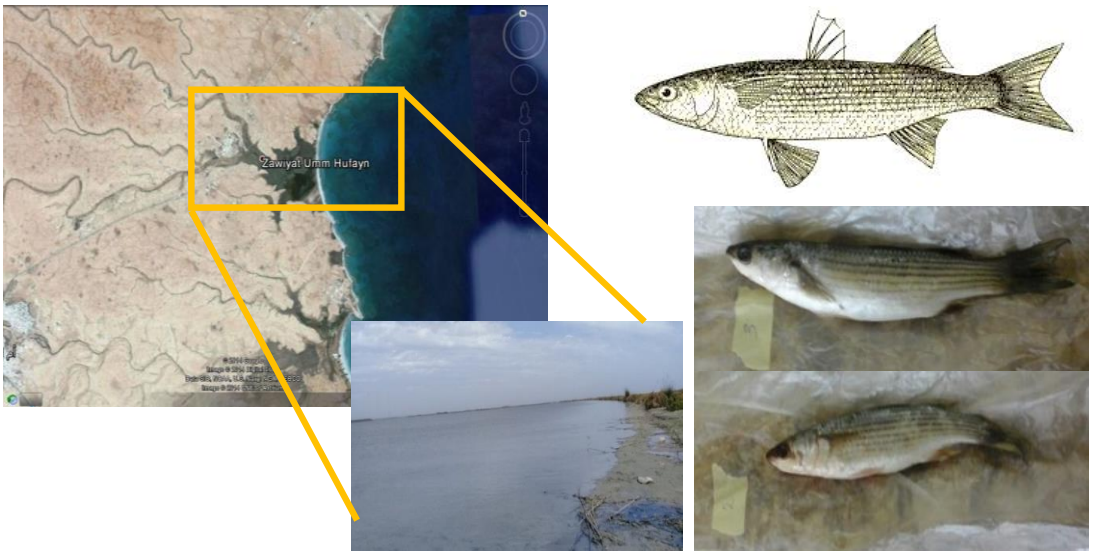

Fig. (1): Um-Hufayn lagoon, Bomba bay, eastern Libya, and *Chelon labrosus* (Risso 1827) individuals.

parameters and fish length were very weak and insignificant for fish indicating that meristic traits are conservative and do not change as fish grows; hence meristic formulae based on these traits can be used to identify and characterize different fish species, although some errors are more likely to increase at high sample size [**24 & 49].**

3.3. Total length-Morphometric traits relationships:

Samples of *C. labrosus* were ranged from 12.0 ±3.5 to 24.8 ± 1.1 cm in length and from 34.547 ± 11.212 to 172.531 ± 86.710 g in weight. Results showed that morphometric parameters were also related to fish length by power equations **(Table, 1** and **Fig. 2 A & B).** These results showed insignificant relationships between total length and most morphometric traits of specimen of *C. labrosus* from Um-Hufayn, these results are mainly close to the results of **[24]** on *L. aurata* at the same study area**.** As well as, all the relationships were negative, indicating that traits increase insignificantly with increase in length, except Pre-dorsal Length (PDL) (2.8221).

3.4. Length-weight relationship (LWR)

The length weight relationship of *C .labrosus* was expressed by: $W= 30.61\ L^{1.0068}$ **(Table, 1** and **Fig. 2A)**. The constant b of *C .labrosus* was not close to 3, the value that indicated that the growth is unisometric. These results are mainly close to results of [**24**] about *Liza aurata* at the same study area.

3.5. Condition factors of Fulton & Clark

Fulton and Clark condition factors were close to 1. In this study, relatively high magnitude of Fulton condition factor (K_F) was dropped from 1.99 ± 0.59 (in size group of 12.0 cm) to 0.87 ± 0.08 (in size group of 24.8 cm). Meanwhile, Clark condition factor (K_C) ranged from 1.46 ± 0.49 (in the smallest specimens) to 0.63 ± 0.05 (in the largest ones) as shown in **Figure (2 B)** .These average values of condition factors [K_F = 1.22 and K_c =0.89 **(Table 1)**] were higher than that recorded for *L. aurata* in the same location **[24]**. Correlations of K_F and K_c with total length of *C. labrosus* were statistically insignificant, indicating that they do not change as fish grow. **[50]** stated that growth is strongly influenced by both biotic and abiotic environmental conditions, and as index of status of the aquatic ecosystem in fish spam.

3.6. Total length frequency distribution

As shown in **Fig (2 B)**, mode of stock was recognized in size group of 21.6 cm (41.9 %), and this zenith for juveniles has larger size than that was recorded for *Liza carinata* samples in Al-Hamamah coasts **[55]**. Generally, these juveniles are in critical sizes, where sexual maturity begins **[56]**.

Table (1) . Morphometric and meristic traits (related to fish total length by power equations) of *C. labrosus* from Um-Huffayn, East of Libya, between November 2018 and January 2019.

Morphometric Parameter	Size groups (cm)					a -	b -	R^2 -
	11.1 - 14.0	14.1 - 17.0	17.1 - 20.0	20.1 - 23.0	23.1 - 26.0			
Size Groups (average) (cm.)	12.0	15.8	18.5	21.6	24.8	-	-	-
Count	3	5	6	13	5	-	-	-
Total Length (TL) (cm.)	12 ± 0.9	15.8 ± 0.8	18.5 ± 1.3	21.6 ± 1.3	24.8 ± 1.2	-	-	-
Standard Length (SL) (cm.)	10.2 ± 1.0	13.7 ± 0.8	16.8 ± 0.8	19.4 ± 1.1	22.6 ± 0.6	9.9998	0.487	0.994
Forked Length (FL) (cm.)	11.0 ± 0.9	14.6 ± 0.8	17.5 ± 1.1	20.5 ± 1.0	23.8 ± 0.7	10.755	0.4709	0.991
Pre-orbital Length (POL)(cm.)	1.1 ± 0.3	0.9 ± 0.2	1.1 ± 0.4	1.2 ± 0.2	1.2 ± 0.4	1.0028	0.091	0.2423
Post-orbital Length(PoOL)(cm.)	1.7 ± 0.5	1.5 ± 0.8	1.9 ± 0.4	2.1 ± 0.7	2.1 ± 0.6	1.5653	0.1716	0.5665
Body depth (BD) (cm.)	3.6 ± 1.3	3.4 ± 0.4	3.9 ± 1.4	4.3 ± 1.2	4.3 ± 1.6	3.4114	0.1352	0.6682
Pre-anal Length (PAL) (cm.)	2.9 ± 0.7	3.8 ± 2.0	3.8 ± 1.3	4.1 ± 1.3	4.4 ± 1.9	2.9925	0.2395	0.9281
Pre-pelvic Length(PPvL) (cm.)	7.2 ± 0.9	6.4 ± 0.6	6.6 ± 0.8	7.6 ± 1.0	7.3 ± 0.6	6.7968	0.0316	0.0775
Pre-dorsal Length (PDL) (cm.)	7.2 ± 1.5	8.8 ± 2.0	9.1 ± 1.4	9.9 ± 1.4	11.3 ± 1.2	0.0175	2.8221	0.9881
Head Length (HL) (cm.)	4.4 ± 0.8	4.1 ± 0.6	3.9 ± 0.4	4.5 ± 0.8	5.0 ± 0.7	4.1261	0.0586	0.1537
Cheek Length (CL) (cm.)	1.4 ± 0.2	1.5 ± 0.5	1.5 ± 0.3	1.6 ± 0.5	1.7 ± 0.7	1.385	0.1085	0.8779
Caudal Peduncle Length (CPL)	0.1± 0.6	0.09 ± 0.4	1.9 ± 0.2	1.5 ± 0.8	0.8 ± 0.6	0.119	0.097	0.374
Caudal Peduncle Width (CPD)	2.1 ± 0.2	2.4 ± 0.9	2.6 ± 0.7	2.3 ± 0.4	2.2 ± 0.5	0.141	0.828	0.401
Mouth Gape (MG) (cm)	1.3 ± 0.1	0.4 ± 0.6	1.2 ± 0.7	1.1 ± 0.3	1.9 ± 0.4	0.709	0.318	0.228
Mouth Width (MW) (cm.)	1.7 ± 0.5	1.5 ± 0.8	2.4 ± 0.4	1.9 ± 0.7	2.1 ± 0.6	0.851	0.595	0.223
Eye Diameter (ED) (cm.)	0.7 ± 0.2	0.7 ± 0.1	0.8 ± 0.2	0.9 ± 0.2	1.0 ± 0.1	0.6562	0.2223	0.8127
Dorsal Fin Length (DFL) (cm)	6.2 ± 1.4	6.8 ± 2.0	6.4 ± 1.2	7.6 ± 1.2	6.3 ± 1.2	0.540	0.593	0.429
Anal fin Length (AFL) (cm)	2.6 ± 0.5	3.4 ± 2.1	3.6 ± 1.3	3.4 ± 1.4	4.6 ± 1.2	0.240	1.185	0.604
Pectoral Fin Length (PFL) (cm)	0.8 ± 0.3	0.5 ± 0.1	0.3 ± 0.9	0.4 ± 0.7	0.9 ± 0.1	1.71	0.172	0.430
Snout Length (SL) (cm)	1.3 ± 0.5	1.1 ± 0.2	1.2 ± 0.6	1.9 ± 0.2	1.5 ± 0.1	1.316	0.726	0.646
Pelvic Fin Length (PvFL) (cm)	1.0 ± 0.5	0.6 ± 0.2	1.5 ± 0.6	1.3 ± 0.1	1.5 ± 0.5	0.734	0.665	0.184
Total Weight (TW) (g)	34.5 ± 11.2	53.1 ± 20.8	79.92 ± 13.5	131.5 ± 56.6	172.1 ± 86.7	30.609	1.0068	0.9572
Condition factor – Fulton (K_F)	1.99 ± 0.59	1.27 ± 0.36	1.00 ± 0.14	0.97 ± 0.19	0.87 ± 0.08	0.227	1.004	0.64
Condition factor – Clark (K_C)	1.46 ± 0.49	0.92 ± 0.33	0.73 ± 0.14	0.71 ± 0.37	0.63 ± 0.05	0.295	0.864	0.182
Dorsal fin 1 (D1)	IV	IV	IV	IV	IV	0.290	0.971	0.758
Dorsal fin 2 (D2)	I + (8 ± 1)	I + (8 ± 1)	I + (8 ± 2)	I + (9 ± 1)	I + (8 ± 2)	0.089	0.277	0.812
Anal fin (A)	III + (9)	III + (9)	III + (9)	III + (9)	III + (9)	0.317	0.815	0.941
Pectoral fin (P)	14 ± 2	16 ± 1	17 ± 0	17 ± 0	17 ± 0	0.852	0.452	0.317
Pelvic fin (Pv)	I + (5)	I + (5)	I + (5)	I + (5)	I + (5)	0.904	0.354	0.548
Lateral line (LL)	43 ± 2	42 ± 3	44 ± 2	44 ± 3	45 ± 3	0.671	0.931	0.538
Gill rakers	58 ± 9	62 ± 9	65 ± 10	61 ± 10	59 ± 8	1.352	0.825	0.643

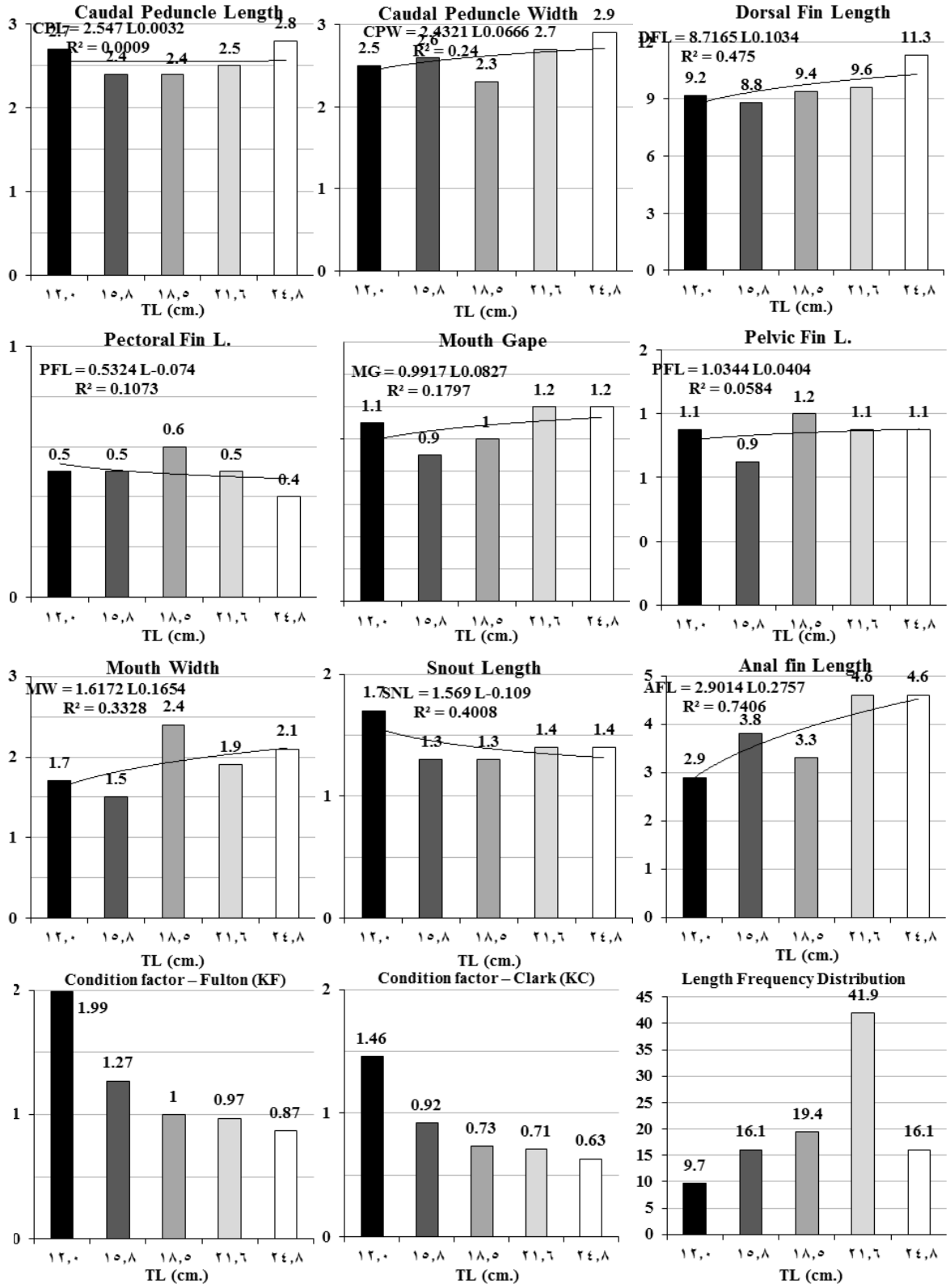

Fig (2–A): Meristic and Morphometric traits and total length relationships (related to fish total length by power equations), with condition factors and length frequency distribution of *C. labrosus* from Um-Huffayn, East of Libya, between November 2018 and January 2019.

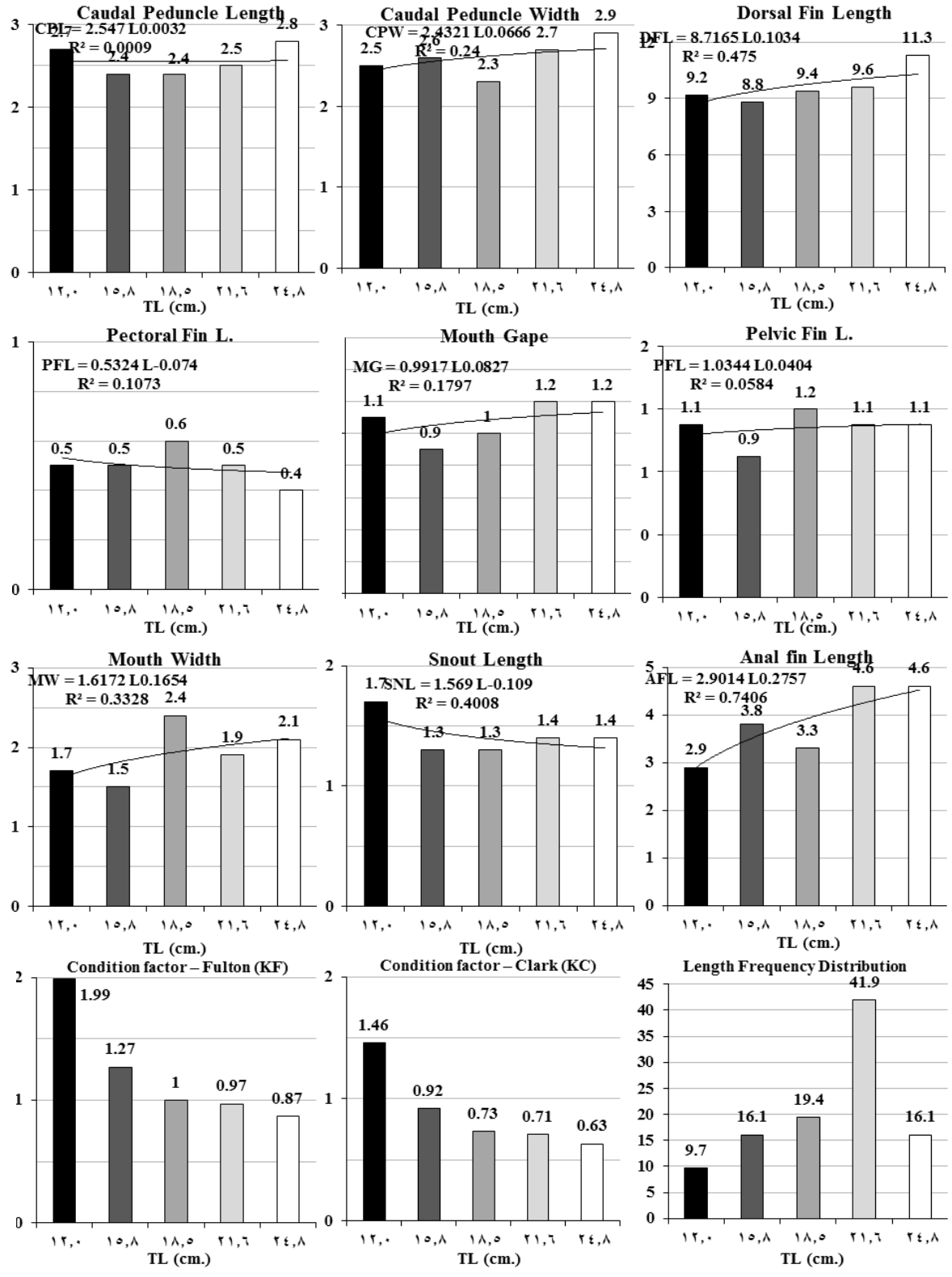

Fig (2–B): Meristic and Morphometric traits and total length relationships (related to fish total length by power equations), with condition factors and length frequency distribution of *C. labrosus* from Um-Huffayn, East of Libya, between November 2018 and January 2019.

4. CONCLUSION

The recent record of *C. labrosus* in this area, is probably evidence that species is highly adaptable to new environmental conditions, meaning that occurrence of this species is significantly related to its euroyhaline nature and a wide temperature range (4–37°C), and great variety of food menu **[10, 12 & 51]**. As well as, this expansion of rare species into wider ranges, might be related to climate change or human activity **[36]**, Mugilids prompt to enter bays and lower reaches of the Mediterranean brackish waters **[10, 52, 53 & 54]**. According to **[32]**, Um Huffayn is almost exposed to immigration of juvenile eels and optimum ecosystem for tilapias and mullets. It is essential to perform a detailed characteristic of the new recorded specimen, which may constitute a threat to the fish-diversity in this lagoon.

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الرصد الأول لأسماك البوري *Chelon labrosus* (Risso, 1827) فى بحيرة أم حفين، ليبيا

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الملخص العربي

تم تسجيل ظهور سمك البوري الكيلونى من النوع *Chelon labrosus* لأول مرة في منطقة أم حفين، ليبيا في الفترة من نوفمبر 2017 إلى يناير 2018، حيث تراوحت أطوال العينات بين 11.1 - 25.9 سم في الطول وأوزانها بين 25.594 - 166.647 جم. كما تم تسجيل القياسات التشكلية والصفات العددية لديها. وقد تمت دراسة العلاقة بين الطول الكلي والقياسات التشكلية والصفات العددية الأخرى، بالإضافة إلى تعيين العلاقة بين الطول والوزن للأسماك واستنباط معامل الحالة لها.

وقد أوضحت النتائج تطابق وصف العينات مع الصفات المسجلة سابقاً لهذا النوع، وأن الاختلافات طفيفة وغير معنوية أحصائياً في الصفات العددية. كما أوضحت النتائج أن نمو هذه الأسماك غير متماثل ما بين الطول والوزن؛ وأن العلاقة بين طول الجسم والصفات التشكلية غير معنوية احصائياً مما يدل على أن هذه الصفات لاتتغير مع زيادة الطول.