SOME PROPERTIES OF MORPHOLOGICAL AND RELATIONSHIP WEIGHT – LENGTH WITH CONDITION FACTOR OF THE *Coptodon zillii* (Gervais, 1848) IN THE TIGRIS RIVER , BAGHDAD, IRAQ

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ABSTRACT

The study was conducted in the Tigris River south of Baghdad for the period from July 2016 to June 2017. The environmental and morphological properties of *Coptodon zillii* (Gervais, 1848) were recorded and the age, growth and value of the condition factor were determined as far as the fish could reach. Fish were collected by a sample each month with total lengths ranging from 6.1 to 24.4 cm and total weights from 4.48 to 295.32 g. The average temperature was 20-24 C° and the dissolved oxygen rate was 8.46 mg / L. The pH was 7.6 and the salinity of the tigris was 0.59 ppm. The total condition factor of the two sexes was 1.165. and reached an expected length of 25.68 cm. The value of (b) 3.124 which indicates the increase in the cube weight at the expense of length. The number of gil reckers was 10-16, the fin spine (Dorsal fin) was 14-15, and the soft rays Dorsal fin 11-13 and fin spin anal fin ranged from 3 to 3 and the number of anal fin rays from 8-10. The average body depth was 36.18, while the average head length was 30.43 and its height was 41.78**.**

Key words: *Coptodon zilii*, Morphology, Tigris River, Condition factor.

بعض الخصائص المظهرية وعلاقة الطول – بالوزن مع معامل الحالة لل *Copton zilli* (Gervais, 1848) في نهر دجلة / بغداد/ العراق

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المستخلص

أجريت الدراسة في نهر دجلة جنوب بغداد للمدة من تموز 2016 الى حزيران 2017 سجلت بعض الخصائص البيئية والمظهرية لل*Copton zilli* والعمر والنمو ومعامل الحالة للاسماك التي تم الحصول عليها جمعت عينات الاسماك كل شهر وبطول يتراوح بين 601 الى 24.4سم

وبوزن كلي 4.48 الى 295.32غم وبمتوسط ودرجة حرارة 20-24مْ والاوكسجين المذاب يساوي 8.46 ملغم / لتر بلغ الاس الهيدروجين 7.6 والملوحة 0.59 جزء بالف ومعامل الحالة لكلا الجنسين 1.165 وبلغ متوسط الطول المتوقع 25.68سم وكانت قيمة b 3.124 والتي توضح زيادة على حساب الطول بلغ طول الغلاصم 10-16 والزعنفة الظهرية 14- 15اما الزعانف الناعمة الظهرية 11-13 و الزعانف الشوكية 3-3 وعدد الاشعة 8-10 وكان عمق الجسم 36.18 ومتوسط طول الراس 30.43 وارتفاعة 41.78.

الكلمات المفتاحية: البلطي الزيلي ، المظهرية ، نهر دجلة ، معامل الحالة.

Introduction

The *C.zillii* (Gervais, 848) and its common name redbelly tilapia belong to the Cichlidae family of 1524 species (Eli, 2004).*C.zill*ii is spread in southern Morocco, Turkey, Egypt, Jordan, America and the Philippines**.** The *C. zillii* (Gervais, 1848) is widespread in the tropics and sub-tropical regions and is widely spread in Africa and Russia. In Africa, its distribution extends from Morocco and Egypt in the North, Côte d'Ivoire and nigeria in the West to Democratic Republic of Congo in central Africa (El- Shazly, 1993). It reaches a maximum length of 26.0 cm, 289 g weights and can live for about seven years (Kariman, A.S.H; Nadhan, 2009).*C. zillii* is economically and ecologically important as food fish, for aquaculture, commercial aquarium trade, weed control and recreational fishery in its native range and in many countries it has been introduced (Mehanna , 2004). *C. zilli* is one of the most valued fish in North Africa. It constitutes an important part of inland fish production especially in the brackish lagoons of Morocco, Senegal River, Egypt and Libya (Hadi,2008).

Materials and Methods

Study Area:

The study area south of the Tigris River (fig. 1) covers the Iraqi territories through three stations distributed by the study. The number of thorns of the dorsal fin, number of thorns of dorsal fins, number of thorns of the dorsal fin, number of thorns of the anal flap, number of rays Depth of body, head height, head length, as well as physical and chemical variables according to standard methods.

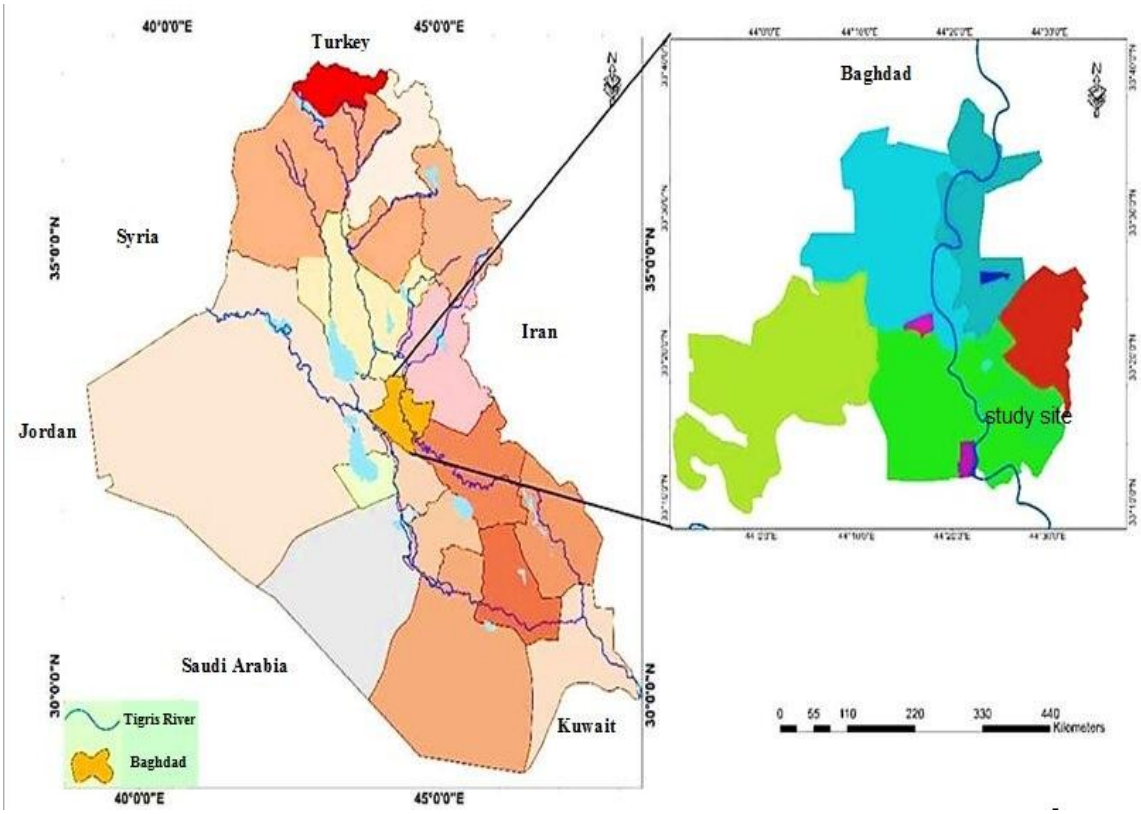

Fig.1. The study area to the *Coptodon zillii* in the Tigris River, south of Baghdad.

Table 1 Taxonomic Hierarchy.

Kingdom	Animalia – Animal, animaux, animals
Subkingdom	Bilateria
Infrakingdom	Deuterostomia
Phylum	Chordata – cordés, cordado, chordates
Subphylum	Vertebrata – vertebrado, vertébrés, vertebrates
Infraphylum	Gnathostomata
Superclass	Actinopterygii – ray-finned fishes, spiny rayed fishes, poisson épineux, poissons à nageoires rayonnées
Class	Teleostei
Superorder	Acanthopterygii
Order	Perciformes – perch-like fishes
Suborder	Labroidei – parrotfishes, rainbowfishes, wrasses, labres, poissons-perroquets
Family	Cichlidae – cichlids, cichlidés, tilapias y mojarras de agua dulce
Genus	Coptodon Smith, 1840 – African mouthbrooders, speckled tilapias
Species	*Coptodon zillii* (Gervais, 1848) – redbelly tilapia, Zilli's tilapia

Mesurements:

Measure the total length and standard length to the nearest (cm) using the included ruler and measure the total weight to the nearest 0.1 g using a sensitive electrical balance type Sartorius**.**

Length- weight relationship:

The relationship between the total length (TL) and the total weight (TW) was extracted by the following equation.

W = aLb (LeCren,1951)

where **W** = weight in grams, **L** = total length in centimeters, **a** is a scaling constant and **b** the allometric growth parameter.

Calculate the maximum expected length using the following equation.

L∞ = Lm.x/0.95 (FAO, 1998)

According to the condition factor as reported in Holopainen and Oikari (1992).

C.F = W/L3×100

where **W**=gutted body weight (gm) and **L**=total length in (cm).

Water analysis:

Temperature:

Water temperature was recorded using a mercury fraction of 0-100 C° after submerging it under water.

Dissolved oxygen:

Determination of the dissolved oxygen using the (Azid Modification) method described by APHA (2003). After the field sample was installed and corrected with standard sodium thiosulfate 0.025 N and results were expressed in mg / l unit.

Salinity:

The equation used in APHA (1998) was used to calculate the salinity values of the electrical conductivity values: Salinity °*100*= EC (µ semins) / cm × 0.00064

pH:

A pH meter of pH-009 (1) A was used to measure the pH of the tigris river area after being calibrated with Buffer solution (4, 7 and 9 pH)

Results and Discussion

Water analysis:

Water is a substance of great environmental importance. It is described as 'the liquid of life' and has two measurements that are firmly

connected, amount and quality. Water quality is a network of physical, chemical, and biological variables affect each.

Temperature:

Hot water is one of the main factors affecting the overall vital activities of fish. As it affects nutrition and growth in all environments (Liu, Smith, 2004 and others,2013). Peterson *et al*. (2005) reported that the minimum lethal temperature of tilapia ranges from 9 to 21 C°. Karisa-Charo et al. (2005) noted that tilapia has the ability to adapt to low temperatures up to 13.6 m. In Table 2 shows that the temperature ranges ranged from 8.5 to 30.5 and an average of 20.24. The results of the study differed with (Hussein, 2008) where the highest temperature was recorded at 30 C° and the lowest value was 11.7 C°.

pH:

Quantitative measures the acidity or basicity of aqueous or other liquid solutions (McCarty and Sawyer 1978). In general, most natural waters tend to be slightly alkaline due to the presence of carbonate ions and bicarbonates (APHA, WPCF, AWWA, 1998). The values of the PH were within normal limits at an average of 7.6 and tended to the basal Table (2). *C. zillii* was found to be able to live at a pH of 6-9 (Froses and Pauly, 2011).

Salinity:

Table (2) show the highest salinity rate of 0.82 g/L , the lowest of 0.44 g/L and the average of 0.59 in the Tigris River south of Baghdad. Most tilapia species *C.zillii, Oreochromis aureus* and *O. mossambicus* tolerates the salinity level with salinity levels of 5-30 ppm and depends on species, sex and size (El-Seyed and moharram, 2007).

Dissolved oxygen:

The dissolved oxygen in the water is essential for the breathing and living of aquatic animals as well as its importance in the process of self-purification that occurs naturally by the microorganisms and prevent the formation of harmful odors (Tchobauoglous, 1979). Lowest oxygen record in Tigris river water rate 7.1 mg/l and highest rate 11.5 mg/l **Table (2)**. The tilapia can live in the concentration of oxygen 1.0 mg/l but optimal growth occurs in concentration 2 mg/l Some species of Tilapia resist the lack of oxygen dissolved in water used oxygen near the water surface (babiker and Majid, 1975).

Table 2. showing some water Parameters in Tigris river - Baghdad.

Parameters	Rang	Mean(± SD)
Temperature	8.5-30.5	20.24(± 8.23)
pH	7.2-8.2	7.6(± 0.27)
O_2	7.1-11.5	8.46(± 1.69)
Salinity	0.44-0.82	0.59(± 0.10)

Meristic and Morphometric Characteristics:

The length of the *C.zillii* in the Tigris River recorded 10.35 cm, with a maximum length of 24.4 cm and a total weight of 32.39 g **(Tab.3)**. The highest weight was 295.32 g, the number of gil reckers ranged from 10 - 16 , the fin spine (Dorsal fin) was 14-15 (Soft rays Dorsal fin from 11-13), the Fin spin anal fin (3-3) and the number of anal fin (soft rays 8-10). At the same time the average Body depth was 36.18, while the average head length was 30.43 and the high was 41.78 **(Tab.3)**. The number of soft rays in the dorsal fin 12-13 and the spine 15 to 16. The anal fin with

9-10 in the soft rays and 3-3 on the spine (Khalifa, S.Z; and Atee, 2018). These results are consistent with (Qadoory, 2012) found that the total length of the *C.zillii* in the Soeib was 60-180 mm and with a total weight of 6.93 - 115.70 g. In Ghorrah the length was 70-111 mm and the total weight was from 6.7 to 164.38 g. Dorsal fin contains 13- 16 fin spine), 10-14 soft rays, and an anal fin containing three fin-spins and 8-10 soft rays (Beckman, 1962). On the other hand (Jawad, 2001) register a difference in the number of vertebrae and soft rays of the pectoral of *C.zillii* when studying this species in three different lakes in Libya. And differed with the results of Atee *et al*. (2017) where the length ranges from 68 to 274 mm and the ranges of total weights from 6.6 to 378.79g in Nile tilapia. There is an affinity with the results of the Khalifa (2017) study, since the lengths of the kidneys ranged from 68 - 279 mm and weights total of 6.6 to 379.68 g for Nile tilapia in the Tigris River south of Baghdad. In a study of the blue tilapia in the diyala river it was found that the total length ranges from 16 cm to 18 cm and the total weight from 98.8 to 136.2 g Khalifa (2018).

Table 3. Some numerical and morphological characteristics of the tilapia fish in the Tigris river - Baghdad – Iraq.

Meristic and Morphometric Characteristics	Rang	Mean	SD
Total length (cm)	6.1-24.4	10.35	3.90
Stander length(cm)	3-19.5	.188	3.24
Body depth% IN TL	4.32-117.28	36.18	50.00
Total weight(g)	4.48-295.32	32.39	19.69
Head length% IN TL	14.01-67.13	30.43	11.54
Head heigth% IN TL	25.71-57.64	41.78	10.41
Gill reckers	10-16	13.65	1.54
Dorsal fin Fin spine	14-15	14.90	0.31
Soft rays Dorsal fin	11-13	12	0.81
Fin spine Anal fin	3-3	3	0.00
Anal fin Soft rays	8-10	8.9	0.56

Length- weight relationship:

The length-weight relationship is useful for estimating the weight of a fish of a given length and can be used in studies of gonads development and the rate of feeding, maturity and condition (Le Cren, 1951) .

$$\mathbf{Y = 0.087x^{3.124}}$$

$$\mathbf{R^2 = 0.965}$$

The weight- lenght relationship for a study of tilapia in the Kanye Nigeria dam indicates that the growth was close to the ideal value of fish (b= 3) (Ikomi,1996; Oniye *et al* 2006). Abd-Allah *et al*. (2000) and Shalloof (2009) recorded the same value of (b) =2.69 in Lake Qaurun and in Edko Lake.

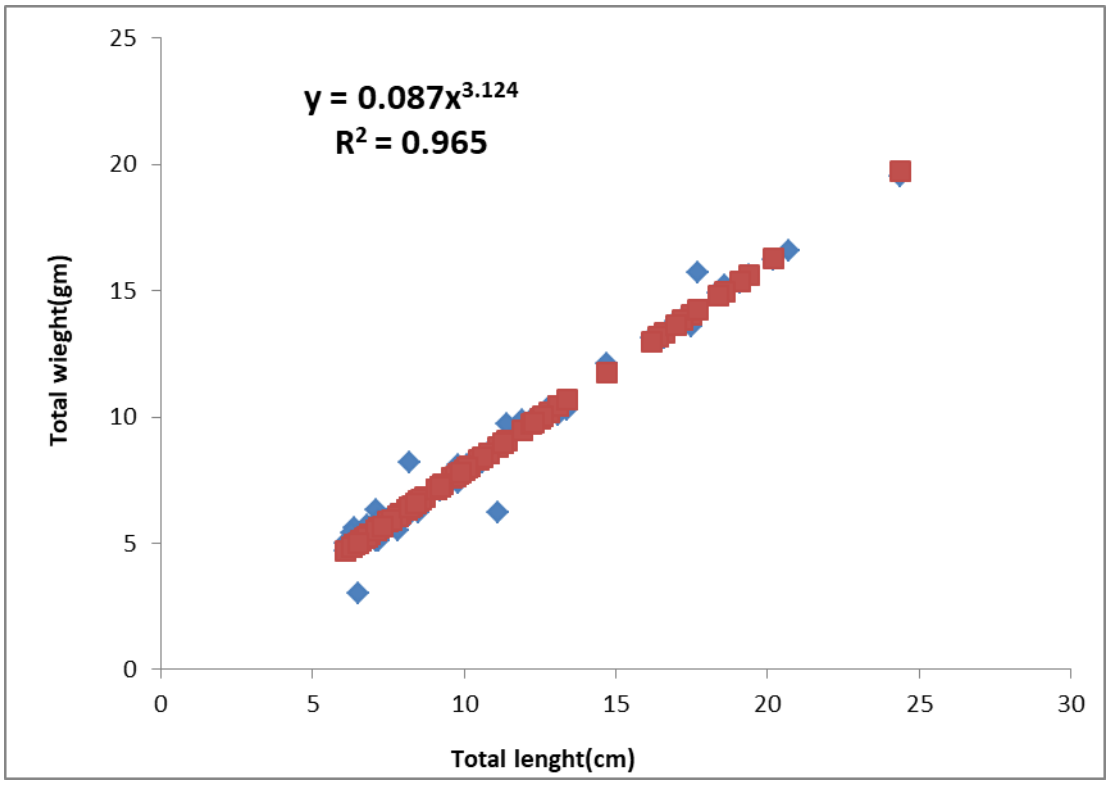

Figure 2. Showed Length–weight relationship of *C. zillii* from tigris river.

The condition factor (k).

The condition factor was used to measure the various environmental and biological factors such as the degree of obesity and gonads and the environmental adequacy of the feeding condition (Mac Gregoer, 1959). The mean value of the condition factor for the total length from 5 cm to 25 cm was 2.300, 2.344, 1.188, 2.248 and 2.216, respectively (Fig. 3). The total value of (k) was 1.165. Hadi (2008) found that the value of k (2.195) in Lake Umhfein. While Shallof (2009) recorded the value of (k) 2.01 in Qarun Lake.

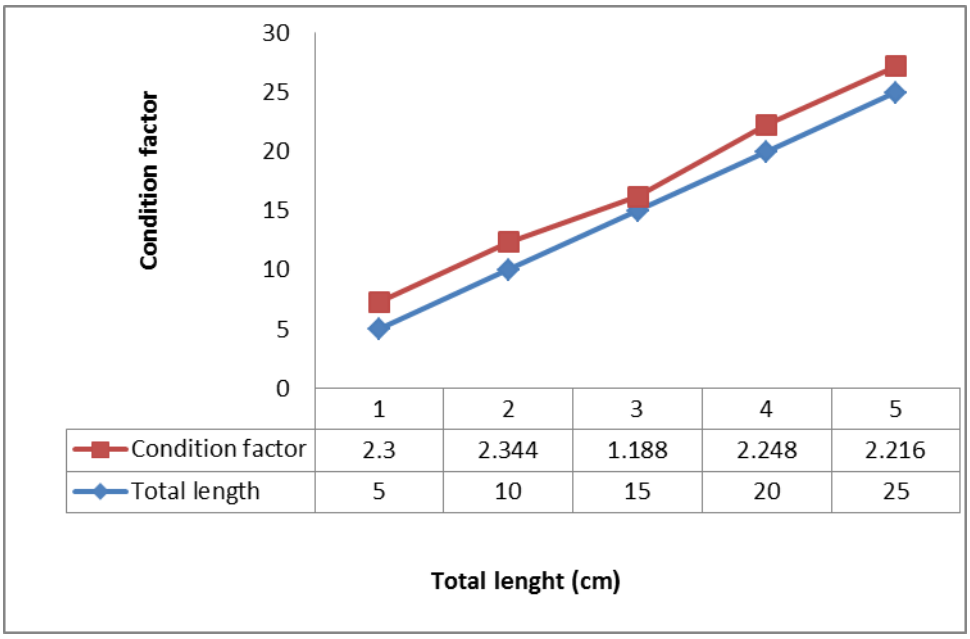

Figure 3. Showed Condition factor (k) of *C. zilli* from tigris river.

Calculate the maximum expected length using the following equation:

The maximum expected length of the *C. zillii* fish in the Tigris was 25.68 cm.

$$L_{\infty} = \frac{Lmax}{0.95}$$

$L_{\infty} = 25.68(c\ m)$

The results differed with the results of Mehana (2004), where the maximum length of *C.zillii* in the valleys of Wadi Al Rayyan was 305 mm and in the Lake Umhfein in Libya it reached a maximum length of 270 mm (Hadi, 2008).

Conclusion

1-The results of the study indicate that the environment of the Tigris River suitable for the growth and reproduction of this type of fish.
2-The possibility of *C. zillii* living in high thermal and saline levels.

3. It is necessary to increase the production of tilapia artificially and cultivate it for its high productivity efficiency.

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