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COMPARISON OF THE MORPHOMETRICS AND MERISTICS OF *TILAPIA ZILLII* IN TWO ECOLOGICALLY DIFFERENT LAKES

KOMPARACIJA MORFOMETRIJSKIH I MERISTIČKIH KARAKTERISTIKA *TILAPIA ZILLII* IZ DVA EKOLOŠKI RAZLIČITA JEZERA

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The morphometrics and meristics of *T. zillii* (Gervais) in the brackish water Lake Manzalah and the saline water Lake Qarun, were studied, and regression equations relating different body measurements to total length were deduced.

To verify the mode of growth of different body parts the variance technique was adopted and it was proved that there is a significant difference both in the mode of growth in different body measurements and in meristic characters.

The mean observed rations of the different body proportions to either total fish length, head length or interorbital width, were used for the comparative growth studies of the species.

Counts of different meristic characters were also carried out, and the general characteristic features of the species were recorded. It is concluded that there is a significant difference in the morphometric and meristic characters of *T. zillii* in brackish and saline waters.

INTRODUCTION

Lake Manzalah is a shallow brackish water Lake situated along the Northern Mediterranean coast (Fig. 1), it is of particular importance to the fisheries of Egypt. The lake (160,000 hektars) has afree access to the sea an average depth of one meter, several fresh water drains pour into it. It salinity varies between 1 and 10‰ (1—10 g/kg.).

Tilapia species constitute about 75% by weight of the total fish yield of Lake Manzalah.

On the other hand, Lake Qarûn is a closed inland lake, of about 25,000 hektars in area and lies in the Faiyum Province. The Faiyum Province is a nearly circular depression in the Libyan (western) desert that lies about 100 kilometers to the South West of Cairo. The lake receives the drainage water through twelve drains.

The lake is a relatively shallow one, with an average depth of about 4 meters. Due to excessive evaporation its salinity rose gradually and now it exceeds 30‰.

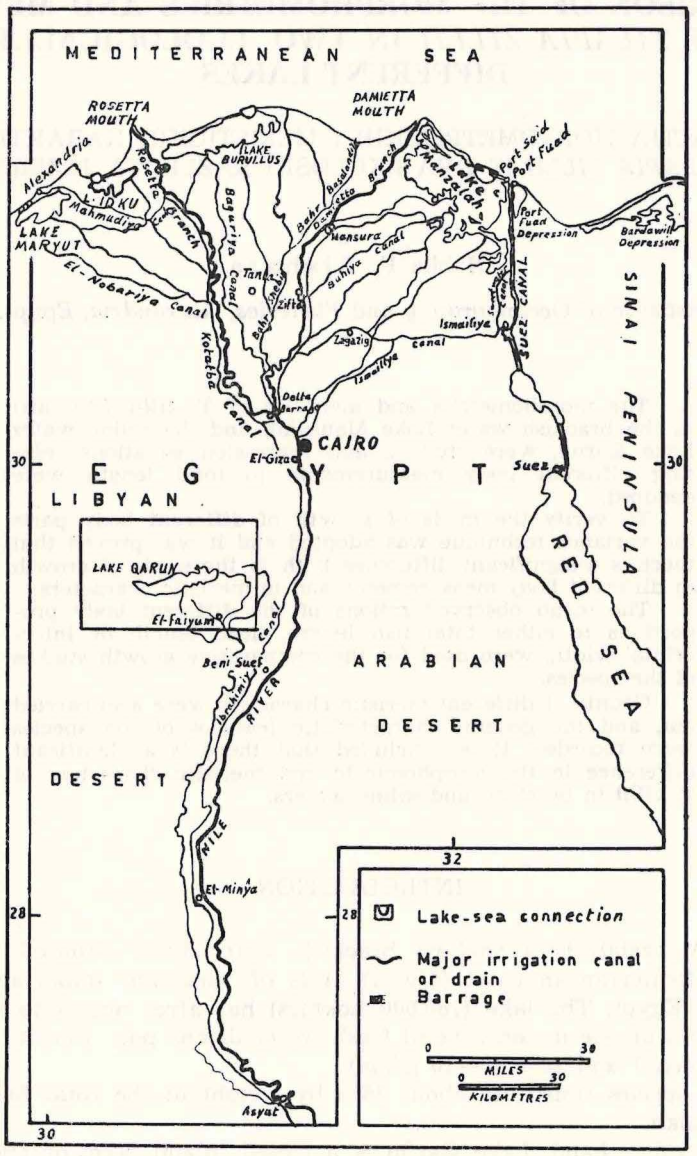

Fig. 1. Map to show relative Positions of Lakes

MATERIAL AND METHODS

Fishes used for biometric studies were exemined irrespective of their age and sex. 97 *T. zillii* were studied from Lake Manzalah and 56 from Lake Qarûn. Measurements were made on the left side of fish by the use of a divider and ruler graduated in millimeters. Results were recorded to the nearest 0.25 mm. Measurements were taken from fresh specimens according to the criteria of Boulva (1972).

In the present study, 13 measurements were made. The fish measured were selected to provide as even a size distribution as possible. The body proportions measured are the following:

1 — Snout length (Sn. L.).
2 — Posterior eye length (P. E.).
3 — Diameter of the eye (Di. E.) = P. E. — Sn. L.).
4 — Diameter of the eye iris (I.).
5 — Head Length (H. L.).
6 — Prepelvic Length (Pv. L.).
7 — Predorsal Length (Pd. L.).
8 — Preanal length (Pa. L.).
9 — Standard Length (S. L.).
10 — Total Length (T. L.).
11 — Bony interorbital (I. O.).
12 — Depth of Head (D. H.).
13 — Depth of the body under the beginning of the dorsal fin (D. B.). During the morphometric study, it was advisable.

During the morphometric study, it was advisable to select individuals of the same size whenever possible. To meet this requirement the fish were grouped in 10 mm length intervals, and the mean value for each measurement in each length gruop calculated.

RESULTS

Morphometrics and meristics of *T. zillii* in Lake Manzalah

A. Morphometrics

I — Calculations of the linear regression equations of different morphometric body proportions on total fish length:

Linear equations expressing the regression of different body proportions on the total fish length, were computed and given in table 1 a.

It was noticed that the standard length measurement has the highest regression coefficient while the eye iris has the lowest.

II — Biometric study based on determining the mode of growth:

Two morphometric characters were selected:

— Depth of head measurements (D. H.). and
— Interorbital measurement (I. O.).

1 — *Depth of head:*

The variance analysis of this character in *T. zillii* gave $S_1^2 = 13.041$, with the variance of the mean values about the line (S_2^2) equal to 25.89. Accordingly the common variance for this character in *T. zillii* (V^2) for degrees of freedom f_1 and f_2 (79 and 16) respectively was found to be equal to 1.985, the tabulated value is about 1.77, so we conclude that the depth of the head character in *T. zillii* bears allometric growth.

2 — *Interorbital width:*

Bartlett's test gave $x^2 = 28.6816$ for degrees of freeson equal to 67 · $S_1^2 =$ $= 1.1012$ and $S_2^2 = 3.376$. Accordingly $V^2 = 3.066$ for degrees of freedom 67, 17 respectively.

Table 1-a. Regression equations of the morphometric measurements to *Tilapia zillii* in Lake Qarûn and Lake Manzalah.

Morphometric measurements	Lake Qarûn	Lake Manzalah
Sn. L.	Y = 0.1188 L —1.128	Y = 0.1318 L —1.308
I.	Y = 0.0176 L +1.952	Y = 0.0188 L +1.6708
P. E.	Y = 0.150 L +1.000	Y = 0.28 L —6.40
I. O.	Y = 0.100 L —2.000	Y = 0.0994 L —0.364
H. L.	Y = 0.263 L —0.750	Y = 0.2541 L +1.554
Pd. L.	Y = 0.278 L +1.320	Y = 0.2935 L +0.990
Pv. L.	Y = 0.300 L +1.000	Y = 0.2847 L +3.518
Pa. L.	Y = 0.567 L +6.004	Y = 0.5253 L +5.782
S. L.	Y = 0.744 L +11.336	Y = 0.773 L +0.220
D. H.	Y = 0.311 L —4.666	Y = 0.4124 L —7.844
D. B.	Y = 0.350 L —7.000	Y = 0.3753 L —3.818

Since the value of V^2 is significantly higher than its corresponding tabluated value (1.78) so we can conclude that the mode of growth of this morphometric character in *T. zillii* is allometric.

In order to investigate whether there is a difference in the mode of growth of *T. zillii* in the two completely different natural environments, it was found necessary to proceed in the analysis of variance for other morphometric characters, namely:

1 — Snout length, 2 — Head length, 3 — depth of body uder the beginning of the dorsal fin as shown in Table 1-b.

Table 1-b. Analysis of variance for the snout length, head length, depth of body under beginning of dorsal fin of *T. zillii* in Lake Manzalah.

Measurements	S_1^2	S_2^2	$f_1 f^2$	V^2 (calculated)	V^2 (Table value)	
3- Sn. L.	1.491	1.551	79,17	1,0402	1.75	Straight line relation, i. e. Linear growth
4- H. L.	2.284	4.3588	79,17	1.900	1.75	Curvilinear relation; allometric growth
5- D. B.	6.105	30.08	79,17	4.93	1.75	Curvilinear relation, allometric growth.

B. Meristics

1 — *Analysis of variance of the number of gill rakers:*

Estimation of the common variance for the gill rakers of *T. zillii* in Lake Manzalah showed that:

$S_1^2 = 1.463$ $f_1 = 74$

$S_2^2 = 2.488$ $f_2 = 17$

$V^2 = 1.7$

The calculated V^2 (1.7) is slightly lower than the tabulated value (1.76). It is concluded that the relation between the number of gill rakers and total fish length is linear.

Analysis for the "t" test gave t = 3.85 for degrees of freedom 91. The tabulated t = 3.4, so we conclude that the number of gill raker increase with increase in fish length.

2 — *Number of vertebrae:*

Examination of 64 individuals of *T. zillii* in Lake Manzalah showed a restricted variation in the number of vertebrae. Fish with 28 vertebrae constituted 53.1% of all fish examined while those having 29 vertebrae constituted 40.6%. However there was a low percentage (6.3) of *T. zillii* with 27 vertebrae.

Te analysis of variance for this character gave $V^2 = 0.3562$, indicating that the fish examined showed a smaller variation in the number of vertebrae than any other *Tilapia* species in the lake.

3 — *Comparison based on the percentage of occurrence of fin rays and spines:*

a — Dorsal fin:

Examination of 98 *T. zillii* in Lake Manzalah showed that the range of variation in the number of dorsal fin spines and rays is more restricted than

in any other *Tilapia* species in the lake. Concerning the number of dorsal spines, 73.4% of fish examined had 15 while 23.5% had 17 and 3.1% had 14.

Regarding the number of dorsal rays the mode was found to between 11—12 in 91.9% of the fish studied, so it is clear that the most common dorsal fin formula is XV + 12, followed by XV + 11 and XVI + 11.

b — Pectoral fin:

Examination of 87 *T. zillii* showed that 68.9% of all fish examined had 13 rays, 27.6% had 14 rays and 2.4% and 1.2% had 12 and 15 rays respectively.

c — Anal fin:

87 fish were examined for this character of which 89.5% had the anal fin formula III + 9 while 10.5% had III + 8.

d — Pelvic fin:

The formula in all specimens examined (515 fish) was I + 5.

e — Leteral line scales:

The range was 28—29 with a mode at 29, 4 scales between origin of the dorsal and lateral line, and 5—6 between bases of pectoral and pelvic fins.

Morphometrics and meristics of *T. zillii* in Lake Qarun

A. Morphometrics

I — Calculating the linear regression equations of different morphometric body proportions:

Table 1 shows the corresponding regression equations. As in Lake Manzalah, the slope of the line representing the snout length measurement has the lowest value while that representing the standard length measurements has the highest one.

II — Biometric study based on determining the mode of growth:

1 — *Depth of Head:* D. H.

The data were analysed to determine the variance between the individuals of each length group. S_1^2 for this character was found to be equal to 3.895 for the degree of freedom 36. The variance of the different length groups along the line i. e. S_2^2 was found to be = 5.54 for degrees of freedom = 18. The common variance V^2 therefore was calculated to be = 1.42 while the tabulated value was (1.9), accordingly it is concluded that the mode growth is linear.

2 — *Interorbital width:* I. O.

In the same way the data representing this biometric measurements with different body length were treated and the following are the results:

$S_1^2 = 0.621$ $f_1 = 36$

$S_2^2 = 0.7372$ $f_2 = 18$

$V^2 = 1.187$

3 — The mode of growth of the snout length proved to be allometric in Lake Qarûn and linear in lake Manzalah.

4 — The mode of growth of the head length in Lake Qarûn is a linear one while that in Lake Manzalah is allometric.

5 — The depth of the body under the beginning of the dorsal fin showed a linear mode of growth in Lake Qarûn and allometric in Lake Manzalah.

Table 2. Average values of different body proportions as percentage of total fish length, head length and interorbital with of *Tilapia zillii* in both Lake Manzalah and Lake Qarûn.

Lakes		Sn. L	R	Di. E	I. O	H. L	PD. L	PV. L	PA. L	T. P	D. B	D. H
Manzalah	Ratio	0.110	0.035	0.058	0.092	0.258	0.304	0.316	0.578	0.211	0.331	0.279
	% total fish length	11.00	3.450	5.760	9.200	25.78	30.40	31.60	57.80	21.10	33.14	27.90
Qarûn	Ratio	0.110	0.355	0.051	0.079	0.243	0.280	0.302	0.586	0.197	0.290	0.262
	% total fish length	11.07	3.55	5.06	7.88	24.33	27.98	30.22	58.57	19.66	28.98	26.24
Manzalah	Ratio	0.428		0.233	0.358						1.289	1.083
	% Head length	42.80		22.30	35.00						128.9	108.3
Qarûn	Ratio	0.436		0.209	0.323						1.189	1.077
	% Head length	43.62		20.91	32.27						118.30	107.7
Manzalah	Ratio	1.201										
	% Interorbital	120.1										
Qarûn	Ratio	1.366										
	% Interorbital	136,6										

Table 3. Comparison of the mode of growth of different morphometric characters of *Tilapia zillii* in Lake Manzahal and Lake Qarûn.

	Tilapia zillii in Lake Manzalah						*Tilapia zillii* in Lake Qarûn					
	S_1^2	S_2^2	f_1, f_2	V^2	V^2 table value	Mode of growth	S_1^2	S_2^2	f_1, f_2	V^2	V^2 table value	Mode of growth
D. H.	13.041	25.89	79,16	1.985	1.75	Allometric	3.895	5.54	26.18	1.4	1.9	Linear
I. O	1.101	3.376	67,17	3.066	1.77	Allometric	0.621	0.737	36,18	1.187	1.9	Linear
Sn. L	1.491	1.551	79,17	1.040	1.73	Linear	0.693	1.528	36,18	2.205	1.9	Allometric
H. L	2.294	4.358	79,17	1.900	1.75	Allometric	3.368	2.523	36,18	0.749	1.9	Linear
D. B	6.105	30.08	79,16	4.930	1.75	Allometric	6.056	5.486	36,18	0.906	1.9	Linear

The tabulated value = 1.90, and accordingly the mode of growth of this character in Lake Qarûn is linear.

3 — *Snout length measurement:* Sn. L.

The treatment of the data gave the following estimates of the different analyses considered:

$S_1^2 = 0.6933$ $f_1 = 36$
$S_2^2 = 2.2049$ $f_2 = 18$
$V^2 = 2.2049$

The calculated V^2 value is 2.2049 and the tabulated one is (1.90), the relationship between snout length and total body length of *T. zillii* in Lake Qarûn is curvilinear i. e. this character bears allometric growth.

4 — *Length of head:* H. L.

The fourth character to be treated is the head length measurments with the total body length, the following are the resutls:

$S_1^2 = 3.368$ $f_1 = 36$
$S_2^2 = 2.523$ $f_2 = 18$
$V^2 = 0.749$

As V^2 value in the table = 1.9 therefore we conclude that this relationship is a straight line.

5 — *Depth of body under the beginning of the dorsal fin:* D. B.

This biometric measurement is the last character chosen to be treated. The results of the statistical estimations show that:

$S_1^2 = 6.056$ $f_1 = 36$
$S_2^2 = 5.486$ $f_2 = 18$
$V^2 = 0.906$

As the value of the calculated V^2 is lower than the corresponding tabulated value so we conclude that the relation is a straight line.

When comparing the results of the above statistical treatments in the saline Lake Qurûn, with the corresponding mode of growth for the same species in the brackish water Lake Manzalah which are recorded in Table 3, the following are the results:

1 — The mode of growth for the depth of head with respect to the total fish length is linear for *T. zillii* in Lake Qarûn and allometric in Lake Manzalah.

2 — The interorbital distance showed a linear mode of growth in Lake Qarûn and-curvilinear-allometric one in Lake Manzalah.

B. Meristics

1 — *Number of gill rakers:* The number of rakers was counted in 57 fish and all were found to have 12 gill rakers, i. e. the fish had a constant number of gill rakers in Lake Qarûn while in Lake Manzalah it showed a linear relationship between the number of gill rakers and total length within the length range studied.

2 — *Number of vertebrae:* The variation in the number of vertebrae was based on the study of 62 fish. The analysis of variance of this character was found to be $V^2 = 0.1957$. Comparing this value with that of *T. zillii* in Lake Manzalah, $V^2 = 0.3562$, it is clearly shown that the variation in the number of vartebrae between individual fish of *T. zillii* in Lake Qarûn is considerably smallor than those in Lake Manzalah.

3 — *Comparison based on the percentage of occurrence of fin spines and rays:*

a) *Dorsal fin:* 56 specimens were examined. The number of dorsal spines was found to be XV in 67.9% of the total fish examined and XVI in 32.1%. Similar to *T. zillii* in Lake Manzalah the highest percentage of fish in Lake Qarûn have XV spines.

Dealing with the range of variation in the number dorsal fin rays, it was found to be 11—13 in 98.2% of specimens. The results show that the percentage occurrence of 11, 12 & 13 soft fin rays of this species in Lake Garûn in nearly the same. In Lake Manzalah fish which have 12 soft rays dominate and constitute 62.8% of all fish examined.

It is concluded that the dorsal fin formulae for *Tilapia zillii* in Lake Qarûn is XVI + 13 and occurs in 30.4% of the total fish examined, and XV + 12 in 23.2%, and XVI + 11 and XVI + 12 in 17.8 and 10.7% of all fish examined.

b) — *Pectoral:* Examination of 57 fish showed that 73.6% of all fish examined have 14 fin rays, 24.6% have 13 fin rays and 1.8% have 15 rays.

In Lake Manzalah however the highest percentage of *T. zillii* examined (16.9%) have 13 soft rays, while those which had 14 fin rays were only 27.6%. It is concluded that the dominant number of soft rays in the dorsal fin *T. zillii* in both the two lakes varies within the limit of one fin ray.

c) — *Anal fin:* 84 fish were examined, as in *T. zillii* in Lake Manzalah the anal fin formula III + 9 dominates and constitutes 94.0% of the total fish examined.

d) — *Pelvic fin:* The formula in all specimens examined (84 fish) is (I + 5), it is similar to that for *T. zillii* in Lake Manzalah.

e) — Lateral line scales (82—29) with mode at 29, 4 between origin of dorsal and lateral lines, 5—6 between bases of the pectoral and pelvic fins.

f) — *Proportions as percent total length:* The average values are shown in Table 2 as snout length 11.07, eye diameter 5.06, eye iris 3.35, interorbital width 7.88, head length 24.33, predorsal length 27.98, prepelvic length 30.22, preanal length 58.57, tail fan length 19.66, depth of head 26.24. depth under the beginning of dorsal fin 28.98.

g) — *Proportion as % length of head:* The average values are given in Table 2 as snout length 43.62, diameter of eye 20.91, interorbital width 32.27, depth of head 107.67, depth of body under the beginning of dorsal fin 118.90.

h) — It was found that the proportions of snout length as percent of interorbital width = 136.62.

Comparative study of the rations of different body propations of *T. zillii* in both lake Manalah and lake Qarûn with respect to either total fish length, head length or interorbital width:

This study can be classified and summarised into:

A — *The consistent retions:* they are given in the order of consistency as follows:

1. $\frac{\text{D. B.}}{\text{T. L.}}$ greater in Lake Manzalah, tends to increase with fish length in both lakes — Fig. 2.

2. $\frac{\text{PD. L.}}{\text{T. L.}}$ moreor less unchanged with increase in fish length with greater values in Lake Manzalah. Fig. 2.

3. $\frac{\text{H. L.}}{\text{T. L.}}$ Quite consistent between fish in both lakes. In Manzalah the rates decreases in fish up to 11 cm, then became constant. In Qarûn it increases in fish up to 12 cm then became constant. Values greater in Lake manzalah. Fig. 2.

4. $\frac{\text{D. B.}}{\text{H. L.}}$ Greater in Lake Manzalah than Qarûn-increasing in length in both lakes — Fig. 3.

5. $\frac{\text{I. O.}}{\text{H. L.}}$ Higher in Lake Manzalah than Qarûn, Fig. 3.

6. $\frac{\text{Sn. L.}}{\text{I. O.}}$ Greater in Lake Qarûn than Manzalah Fig. 4.

7. $\frac{\text{I. O.}}{\text{T. L.}}$ Greater in Lake Manzalah than Qarûn, in the latter lake the ratio increases in fish up to 12 cm then becomes constant. This is not observed in Lake Manzalah. Fig. 5.

8. $\frac{\text{Sn. L.}}{\text{T. L.}}$ The least consistent ratio. Difference being greater for fish in Lake Manzalah than Qarûn.

B — *Partially consistent ratios:*

These are only constistentin certain lengh ranges:

1. $\frac{\text{P. V. L.}}{\text{T. L.}}$: Only consistent till 13 cm long being greater in fish for Lake Manzalah. In fishes larger than 14 cm the ratio is nonconsistent. Fig. 6.

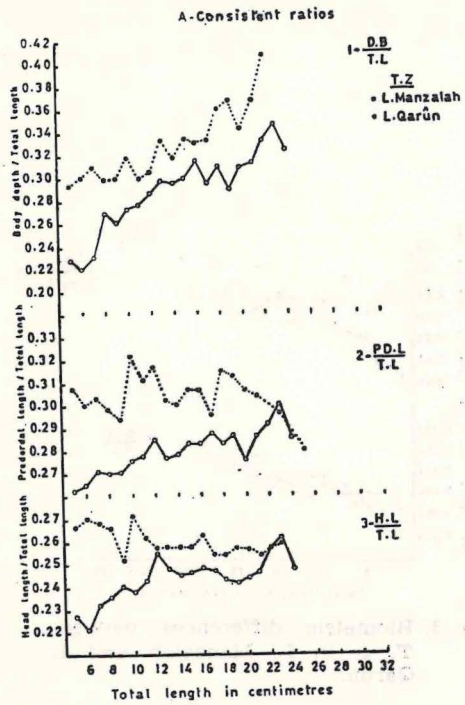

Fig. 2. Biometric differences between *T. z.* in L. Manzalah and L. Qarûn.

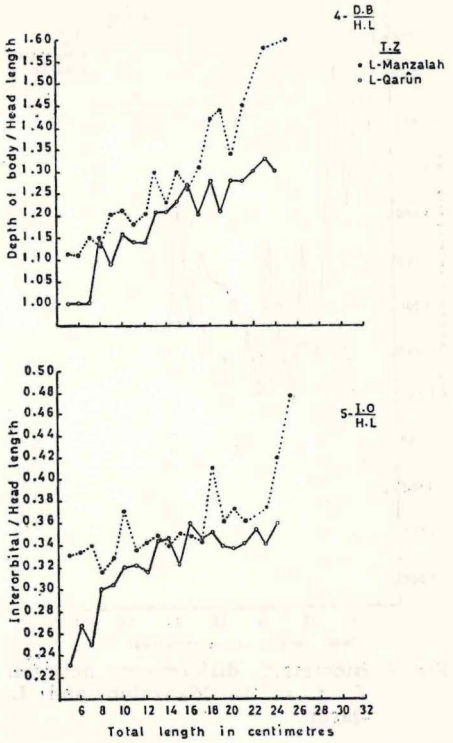

Fig. 3. Biometric differences between *T. z.* in L. Manzalah and L. Qarûn.

2. $\frac{\text{T. F.}}{\text{T. L.}}$: Consistent for fish 5—10 cm, being greater in Lake Manzalah, in fishes longer than 10 cm, the ratio is non consistent. Fig. 6.

3. $\frac{\text{D. H.}}{\text{T. L.}}$: Consistent for 5—8 and 18—24 cm being greater in Lake Manzalah. From 9—17 cm the ratio is conconsistent. Fig. 7.

4. $\frac{\text{DI—I.}}{\text{T. L.}}$: Higher in Lake manzalah. Only consistent in length ranges 10—16 and 20—23. Fig. 7.

Non coisistent ratios: these are given in Figs. 8. and 9.

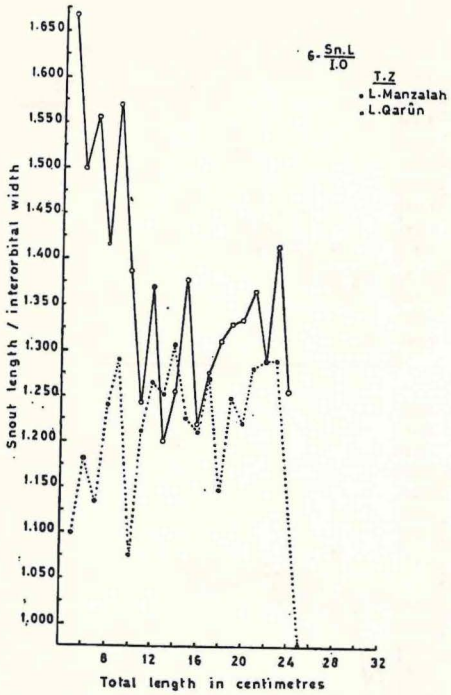

Fig. 4. Biometric differences between *T. z.* in L. Manzalah and L. Qarûn.

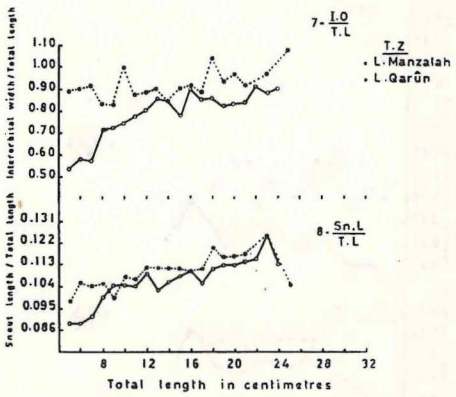

Fig. 5. Biometric differences between *T. z.* in L. Manzalah and L. Qarûn.

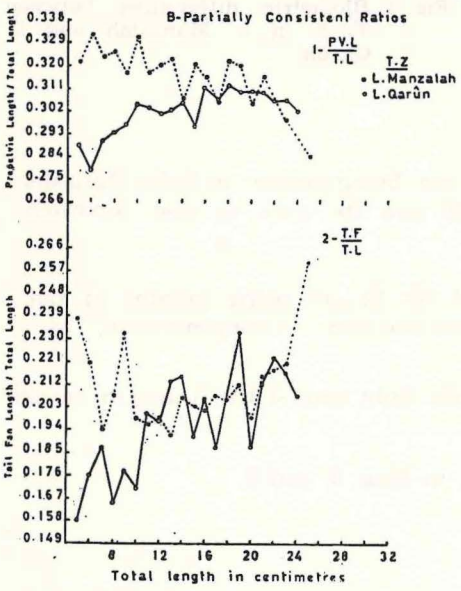

Fig. 6. Biometric differences between *T. z.* in L. Manzalah and L. Qarûn.

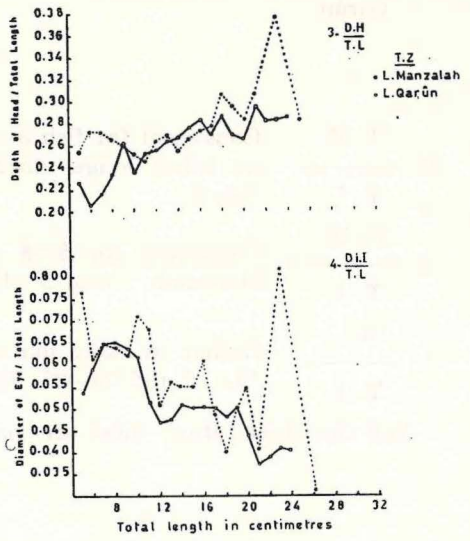

Fig. 7. Biometric differences between *T. z.* in L. Manzalah and L. Qarûn.

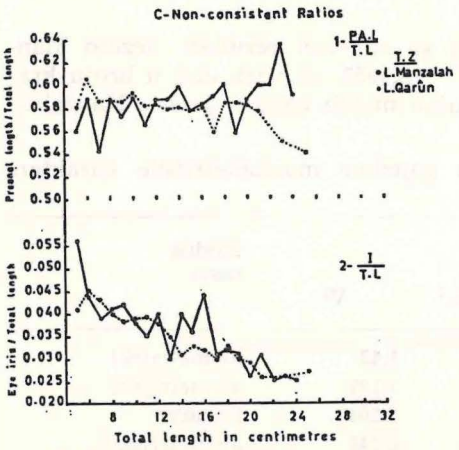

Fig. 8. Biometric differences between *T. z.* in L. Manzalah and L. Qarûn.

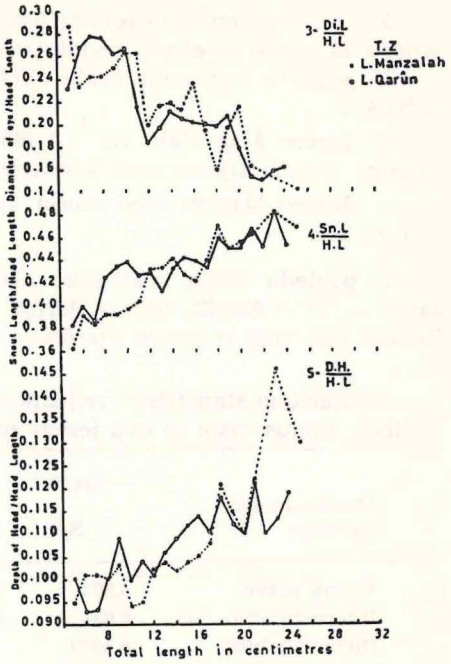

Fig. 9. Biometric differences between *T. z.* in L. Manzalah and L. Qarûn.

REFERENCES

Boulva, J. 1972. Morphometrics of three sympatric arctic of the genera Arctogadus and Gadus. J. Fish. Res. Bd. Canada, 29: 243—249.

KOMPARACIJA MORFOMETRIJSKIH I MERISTIČKIH KARAKTERISTIKA *TILAPIA ZILLII* IZ DVA EKOLOŠKI RAZLIČITA JEZERA

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KRATKI SADRŽAJ

U radu se iznosi komparativni pregled morfometrijskih i merističkih karakteristika ribe *Tilapia zillii* iz jezera Manzalah i Qarûn (Egipat).

Jezero Manzalah je brakično. Smješteno je uz sjeverno-mediteransku obalu Egipta. Slanost jezera varira između 1 i 10 g/kg. S druge strane jezero Qarûn je potpuno kopneno i relativno plitko. Zbog prekomjerne evaporacije slanost ovog jezera postepeno raste i sada iznosi 30 g/kg.

Za sve mjerene morfometrijske karaktere izračunavana je regresija odvojeno za svako jezero, a rezultati su interpretirani u smislu modaliteta rasta.

U pogledu variranja broja škržnih nastavaka dobivene su slijedeće vrijednosti:

— Jezero Manzalah: $S_1^2 = 1{,}463$; $S_2^2 = 2{,}488$; $V^2 = 1{,}7$. S obzirom na LT (totalna dužina tijela) ovaj karakter pokazuje linearni odnos.

— Jezero Qarûn: ribe imaju konstantan broj škržnih nastavaka s obzirom na LT.

U pogledu broja kralješaka dobiveni su slijedeći rezultati: jezero Manzalah — $V^2 = 0{,}3562$; jezero Qarûn — $V^2 = 0{,}1957$, tj. variranje u broju kralješaka kod riba u jezeru Qarûn je značajno manje nego u jezeru Manzalah.

Varijaciono-statističke vrijednosti za pojedine morfometrijske karaktere i njihov modus rasta za ova jezera su:

Qarûn				
Morfometrijski karakter	S_1^2	S_2^2	V^2	modus rasta
Visina glave	3.895	5.54	1.42	alometrijski
Interorbitalno rast.	0.621	0.737	1.187	alometrijski
Dužina gubice	0.6933	2.204	2.2049	linearan
Dužina glave	3.368	2.523	0.749	alometrijski
Visina tijela ispod dorzalne peraje	6.056	5.486	0.906	alometrijski

Manzalah				
Morfometrijski karakter	S_1^2	S_2^2	V^2	modus rasta
Visina glave	13.041	25.89	1.985	linearan
Interorbitalno rast.	1.1012	3.376	3.066	linearan
Dužina gubice	1.491	1.551	1.0402	alometrijski
Dužina glave	2.284	4.358	1.900	linearan
Visina tijela ispod dorzalne peraje	6.105	30.08	4.93	linearan

Formule peraja su:

— Jezero Manzalah — D: XV+12/XV+11; P: 13/14; A: III+9; V: 1+5.

— Jezero Qarûn — D: XVI+13/XV+12; P; 14/13; A: III+9; V: 1+5.

Komparativni odnosi različitih tjelesnih dimenzija *T. zillii* s obzirom na totalnu dužinu tijela (LT), dužinu glave ili interorbitalno rastojanje su:

— Preorbitalno rastojanje/LT — odnos nepromijenjen s obzirom na dužinu ribe, veće vrijednosti u jezeru Manzalah.

— Dužina glave/LT — odnos potpuno skladan u oba jezera, vrijednosti veće u jezeru Manzalah.

— Visina tijela/dužina glave, visina tijela/LT, interorbitalno rastojanje/dužine glave, interorbitalno rast./LT i dužina glave/LT — sve veće u jezeru Manzalah.

— Dužina gubice/interorbitalno rast. — veće vrijednosti u jezeru Qarûn.

— Dužina V/LT — skladan samo do 13 cm dužine, veće vrijednosti u jezeru Manzalah.

— Dužina repne p./LT — skladan samo kod riba od 5—10 cm, veći u jezeru Manzalah.

— Dijametar oka/LT — skladan samo kod dužinskih razreda 10—16 i 20—30 cm, vrijednosti veće u jezeru Manzalah.