

BIOMETRIC STUDIES ON TWO SPECIES OF
FAMILY SERRANIDAE.

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ABSTRACT

Different authors observed that the morphometric characters of any fish species vary according to the ecological conditions dominating in the fish habitat. The present study revealed that *Epinephelus aeneus* and *E. alexandrinus* collected from Alexandria and Salloum regions are separate populations (regions with different ecological conditions). This is due to the big differences in the biometric characters of the two species under study collected from Alexandria and Salloum regions.

The comparison between ratio indices of the present study and those given by other authors in different localities showed that for *E. aeneus* the inter-orbital index in the Egyptian Mediterranean waters is lower than in other areas, however, for *E. alexandrinus*, the inter-orbital and the pre-orbital indices for fishes collected from our waters have lower values than those from other localities.

INTRODUCTION

The study is concerned with *Epinephelus aeneus* and *Epinephelus alexandrinus*, as they constitute the most economic species of Serranid fish caught from the Egyptian Mediterranean waters. This work is considered the first on this family in Egypt, and directed to know the biometric characteristics for fishes collected from different regions in the Mediterranean Sea, and also to know if these fishes belong to one population or different populations.

MATERIAL and METHODS

Monthly samples of the two species were collected from fish market in Alexandria, besides, other samples that were caught from Salloum Bay (Fig. 1) by experimental fishing gears.

Sampling from Alexandria lasted from January 1976 to March 1977.

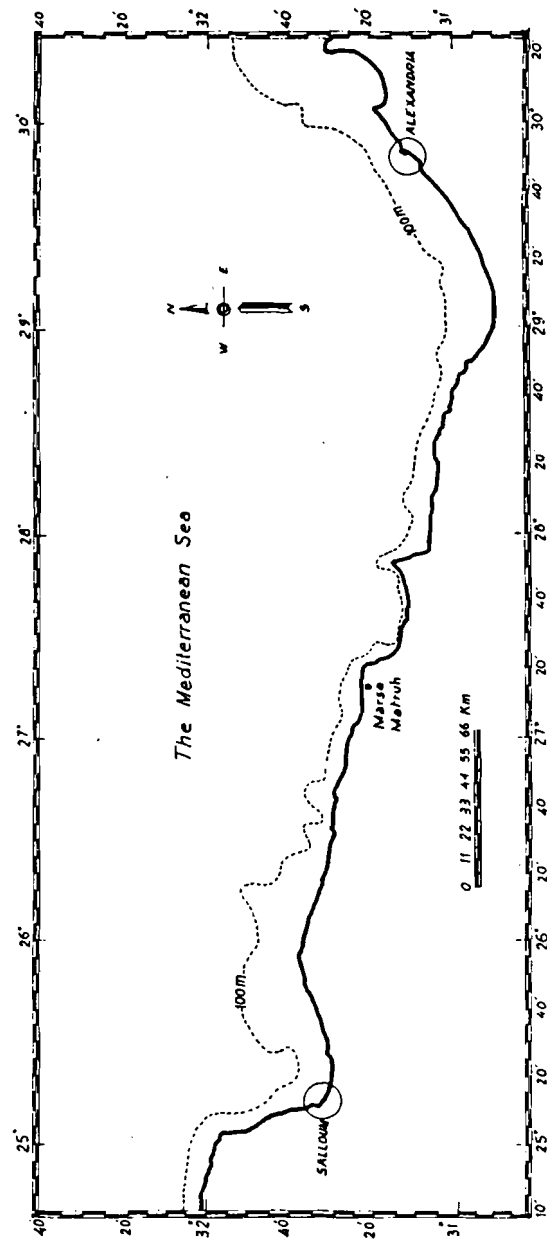


Fig. (1). Area of investigation.

In Salloum Bay region, sampling started in November 1975 and ended by July 1976.

For **Epinephelus aeneus**, a total of 169 fish were studied from Alexandria region ranging in total length between 12.5 and 102 cm; from Salloum Bay region 40 fish were analysed, ranging in total length between 12.5 and 47.5 cm.

While for **Epinephelus alexandrinus**, a total of 161 fish ranging in total length between 14.0 and 64.0 cm were studied in Alexandria region, from Salloum Bay, only 19 fish ranging in total length between 12.0 and 24.0 cm were analysed.

The following measurements were taken, for each fish studied :

- 1- Total length (T.L.): distance in cm from the tip of the snout to the end of the caudal fin.
- 2- Standard length (S.L.): distance in cm from the tip of the snout to the end of hypural bone.
- 3- Pre-dorsal distance (P.D.): distance in cm from the tip of the snout to the anterior origin of the dorsal fin.
- 4- Pre-pectoral distance (P.P.): distance in cm from the tip of the snout to the anterior origin of the pectoral fin.
- 5- Pre-ventral distance (P.V.): distance in cm from the tip of the snout to the ventral fin.
- 6- Pre-anal distance (P.R.A.): distance in cm from the tip of the snout to the forward origin of the anal fin.
- 7- Body depth (B.D.): the vertical distance in cm between the dorsal and ventral profiles of the body measured at the broadest part.
- 8- Head length (H.L.): distance in cm from the tip of the snout to the posterior edge of the operculum.
- 9- Pre-orbital distance (P.R.O.): distance in cm from the tip of the snout to the anterior margin of the eye.
- 10- Inter orbital width (I.N.O.): distance in cm between the two orbits, on the dorsal part of the head.

The following meristic counts were also made:

- (1)- Number of rays and spines in the dorsal fin.
- (2)- Number of rays in the pectoral fin.
- (3)- Number of rays and spines in the ventral fin.
- (4)- Number of rays and spines in the anal fin.
- (5)- Number of rays in the caudal fin.
- (6)- Number of branchiostegal rays.
- (7)- Number of gill rakers in the first left branchial arch.
- (8)- Vertebral count.

OBSERVATIONS

The morphometric index of each measurement was calculated for each fish as a numerical ratio between this measurement and the total length

of the fish was obtained. The mean values of these indices and their standard deviations for different length groups were obtained for both species studied in Alexandria region and Salloum Bay. The head length was taken as a reference for preorbital distance and interorbital width.

Table 1. and Figure 2. show the ratio indices and variations of these indices with length of *Epinephelus aeneus* for both regions. From table 1, it is clear that:

- 1- The standard length index is nearly equal in the two regions, and at lengths more than 50 cm, the index increases with length (Alexandria region). The cephalic index is lower in fish caught from Salloum Bay.
- 2- The pre-anal index is higher for fishes in Salloum Bay than those in Alexandria region for small sizes.
- 3- The body depth index is slightly higher in Alexandria region than in Salloum Bay.

Table 2. and Figure 3. show the ratio indices and variations of these indices with length in *Epinephelus alexandrinus* in Alexandria and Salloum Bay regions. From the table and the figure, we can observe that:

- 1- Standard length index increases with length in Salloum Bay.
- 2- Pre-dorsal index in Salloum Bay, is less than in Alexandria region.
- 3- Pre-pectoral index is higher in fishes more than 50 cm in total length in Alexandria region.
- 4- Pre-pelvic index is higher in Salloum Bay than in Alexandria region. Also, fishes more than 55 cm length for Alexandria region have their index higher than smaller ones from the same region.
- 5- Body depth index is slightly higher in Salloum Bay region.
- 6- For pre-orbital index, it is evident that as fish gets bigger the index increases.

Morphometric Regressions :

The value of the correlation coefficient (r) is calculated between each morphometric distance and total length with the exception of pre-orbital and interorbital. The last two distances are related to head length. A linear relationship between total length and various morphometric measurements is noted for both regions under study. The regression equations were then used to obtain the calculated values of the above mentioned morphometric measurements.

The values of correlation coefficient for various morphometric regressions of *Epinephelus aeneus*- and *Epinephelus alexandrinus* in Alexandria and Salloum Bay regions are shown in Table 3.

The average observed and calculated values for the above mentioned

TABLE (1)

RATIO INDICES PER LENGTH GROUP OF *Epiplatys amicus* IN ALEXANDRIA (1979-1977), and SALTOM BAY (1975-1976) REGIONS.

Total length (cm)	SL/TLx100		HL/TLx100		PrO/TLx100		PrP/TLx100		PrY/TLx100		PrA/TLx100		BD/TLx100		PrO/HLx100		InO/HLx100			
	Alex.	Salt.	Alex.	Salt.	Alex.	Salt.	Alex.	Salt.	Alex.	Salt.	Alex.	Salt.	Alex.	Salt.	Alex.	Salt.	Alex.	Salt.		
12.5	-	-	77.54	-	30.43	-	28.99	-	28.26	-	30.80	-	54.34	-	23.91	-	20.55	-	8.23	10.88
17.5	81.14	82.85	32.00	29.37	28.30	27.43	28.30	27.43	28.25	30.86	29.26	54.86	53.78	24.00	19.89	25.00	20.55	8.23	10.88	
22.5	81.03	80.16	30.46	30.42	26.01	29.44	26.93	27.23	28.97	29.44	52.97	52.63	21.95	20.37	20.25	20.57	11.64	11.37	11.70	
25.5	80.63	81.42	30.53	29.71	28.24	28.13	26.99	27.08	29.29	29.80	53.47	54.56	21.61	21.50	20.26	20.65	10.90	11.70	13.00	
32.5	80.60	80.05	31.26	30.27	29.25	28.18	27.54	26.86	29.26	30.04	55.85	55.29	21.41	22.22	22.90	22.90	12.15	13.00	14.42	
37.5	80.62	81.13	31.01	29.71	29.27	28.29	27.05	26.86	29.26	30.88	54.55	55.71	21.51	23.14	22.24	23.08	12.65	14.42	15.05	
42.5	81.18	79.76	31.07	30.65	29.21	29.35	27.61	27.57	30.04	30.88	53.22	55.62	22.14	21.19	23.42	21.24	13.73	15.05	14.79	
47.5	79.87	81.32	31.12	31.58	29.74	29.98	27.64	28.34	31.00	31.62	55.31	57.58	21.74	23.62	23.07	23.49	13.61	14.79	14.64	
52.5	81.26	-	31.41	-	30.56	-	27.86	-	31.15	-	56.14	-	23.03	-	24.16	-	14.64	-	-	-
57.5	81.47	-	31.75	-	30.88	-	29.14	-	32.67	-	57.27	-	22.54	-	24.55	-	14.68	-	-	-
62.5	82.21	-	31.76	-	30.10	-	28.34	-	32.92	-	56.51	-	22.95	-	23.93	-	14.35	-	-	-
67.5	81.75	-	31.10	-	31.28	-	28.21	-	31.66	-	56.04	-	23.60	-	25.17	-	15.79	-	-	-
72.5	82.49	-	31.59	-	30.68	-	28.65	-	32.60	-	55.86	-	23.40	-	25.11	-	15.99	-	-	-
77.5	83.07	-	32.37	-	31.28	-	30.47	-	34.20	-	56.93	-	23.40	-	26.70	-	15.85	-	-	-
82.5	83.86	-	31.96	-	31.16	-	29.93	-	34.26	-	56.30	-	24.03	-	26.88	-	16.4	-	-	-
87.5	83.58	-	32.28	-	31.05	-	30.26	-	34.48	-	56.94	-	23.49	-	27.38	-	18.86	-	-	-
92.5	83.95	-	31.68	-	30.49	-	30.32	-	34.65	-	56.93	-	24.90	-	27.63	-	17.19	-	-	-
97.5	83.68	-	31.09	-	30.77	-	28.03	-	32.02	-	55.28	-	23.31	-	26.84	-	17.46	-	-	-
102.5	82.50	-	31.50	-	31.50	-	30.00	-	35.00	-	55.00	-	24.00	-	26.67	-	18.41	-	-	-
Index range	79.87	77.54	30.46	29.37	26.01	28.13	26.93	26.86	28.97	28.57	52.97	52.63	21.26	19.89	20.25	20.55	8.93	10.88	-	-
	83.95	82.85	32.37	31.58	31.50	29.98	30.47	28.34	35.00	31.62	57.27	57.58	24.90	23.91	27.63	23.49	18.86	15.06	-	-
Index mean	81.94	80.57	31.45	30.27	29.97	28.83	28.47	27.64	31.95	30.06	55.56	54.94	22.96	21.88	24.53	21.78	14.60	13.03	-	-
Standard deviation	1.2768	1.5811	0.5453	0.6913	1.4381	0.7046	1.2411	0.5799	2.0093	0.9976	1.3109	1.4775	1.0561	1.5032	2.2996	1.3174	2.6657	1.7464	-	-

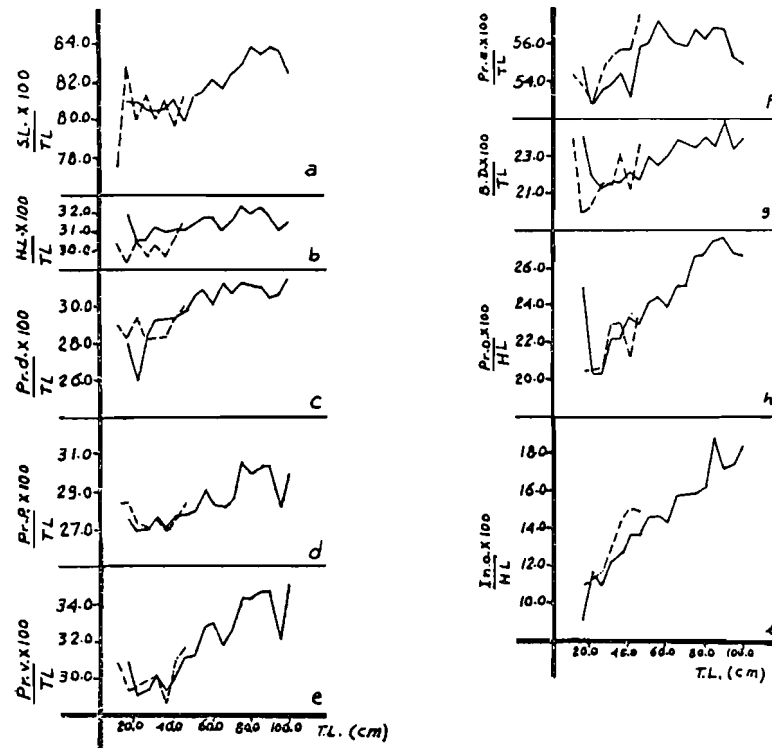


Fig. (2). Variation of ratio indices with length of *Epinephelus aeneus* in Alexandria waters (1976-1977) and Salloum Bay region (1975-1976).

————— Alexandria waters.
 - - - - - Salloum Bay.

morphometric measurements for the two species under study are given in Table 4,5 and 6. From the tables, it is clear that the observed and calculated values coincide well with each other in the two regions. Table 7 shows the regression equations of different morphometric measurements to total length of *Epinephelus aeneus* and *Epinephelus alexandrinus* in Alexandria region.

Meristic Counts

Table 8 shows the mean values of different meristic characters in both

TABLE (2)
Ratio indices per length group of *Epiplatys alexandrinus* in Alexandria (1976-1977) and Salloum Bay (1975-1976) regions.

Total Length (cm.)	No. of fish		SL/TLx100		HL/TLx100		PFD/TLx100		P+P/TLx100		P+V/TLx100		P+A/TLx100		8D/TLx100		PPO/HLx100		IND/HLx100	
	Alex.	Sall.	Alex.	Sall.	Alex.	Sall.	Alex.	Sall.	Alex.	Sall.	Alex.	Sall.	Alex.	Sall.	Alex.	Sall.	Alex.	Sall.	Alex.	Sall.
12.0	-	3	-	81.28	-	29.84	-	27.43	-	33.00	-	39.35	-	59.58	-	24.73	-	23.97	-	9.68
14.0	2	1	82.16	81.76	31.99	31.76	30.30	29.73	29.63	31.08	33.17	34.46	56.57	56.76	23.74	22.97	22.63	21.28	8.94	8.51
16.0	3	3	81.83	81.29	30.59	30.05	29.37	28.99	27.86	29.55	30.28	33.14	55.16	55.10	22.40	22.18	20.79	22.09	10.97	11.40
18.0	1	6	80.21	81.17	29.41	28.87	29.41	27.28	27.54	28.10	29.95	31.09	53.48	54.77	21.39	22.94	20.91	21.50	10.91	12.26
20.0	3	3	81.24	82.86	30.87	29.26	31.05	29.39	29.39	28.04	32.21	30.72	54.45	54.00	21.11	23.95	21.82	22.74	11.25	12.51
22.0	5	2	79.38	84.19	29.33	28.76	29.97	28.76	28.07	28.08	31.52	30.70	54.04	54.59	22.89	23.17	23.26	22.49	12.07	13.98
24.0	13	1	81.28	81.82	30.56	28.85	29.68	27.27	28.28	28.06	31.38	30.43	53.54	54.16	23.01	24.11	23.44	19.18	12.53	10.96
26.0	6	-	80.59	-	29.85	-	28.78	-	28.20	-	31.77	-	53.58	-	23.32	-	22.50	-	13.70	-
28.0	10	-	81.07	-	30.53	-	29.78	-	27.89	-	31.29	-	55.20	-	22.89	-	23.34	-	13.62	-
30.0	9	-	80.44	-	30.31	-	29.51	-	27.76	-	31.38	-	55.62	-	23.49	-	24.54	-	13.72	-
32.0	13	-	80.09	-	29.16	-	28.28	-	27.24	-	30.73	-	55.06	-	23.97	-	23.74	-	14.62	-
34.0	9	-	80.78	-	30.28	-	29.52	-	27.97	-	31.04	-	55.10	-	22.42	-	24.83	-	14.46	-
36.0	10	-	80.57	-	29.94	-	29.05	-	28.17	-	31.66	-	56.52	-	22.69	-	25.29	-	14.84	-
38.0	11	-	80.95	-	30.39	-	29.59	-	28.06	-	31.24	-	57.21	-	22.48	-	25.26	-	15.25	-
40.0	10	-	80.06	-	29.88	-	30.00	-	28.06	-	31.46	-	56.01	-	22.11	-	25.83	-	15.85	-
42.0	9	-	80.69	-	29.84	-	29.10	-	27.92	-	31.06	-	56.71	-	22.74	-	26.14	-	15.84	-
44.0	8	-	80.68	-	30.05	-	29.36	-	28.22	-	32.24	-	57.21	-	22.97	-	26.09	-	15.77	-
46.0	8	-	80.19	-	30.44	-	29.78	-	28.09	-	32.25	-	58.74	-	23.55	-	26.71	-	16.03	-
48.0	8	-	80.76	-	30.37	-	28.83	-	28.13	-	32.71	-	57.47	-	23.29	-	27.52	-	16.51	-
50.0	5	-	80.16	-	30.53	-	29.98	-	28.90	-	33.05	-	57.43	-	24.66	-	25.92	-	17.99	-
52.0	5	-	80.96	-	31.40	-	31.13	-	29.18	-	32.40	-	59.33	-	24.05	-	26.04	-	16.89	-
54.0	3	-	80.85	-	30.83	-	30.75	-	30.75	-	36.42	-	58.39	-	24.21	-	26.50	-	17.62	-
56.0	1	-	80.08	-	29.19	-	29.19	-	27.03	-	30.63	-	55.68	-	24.32	-	22.22	-	16.67	-
58.0	4	-	80.47	-	30.05	-	30.45	-	29.58	-	35.08	-	58.42	-	23.62	-	28.09	-	18.43	-
60.0	4	-	81.70	-	30.09	-	30.20	-	29.21	-	33.98	-	56.06	-	24.86	-	29.41	-	18.81	-
62.0	1	-	81.30	-	30.89	-	30.89	-	28.27	-	33.33	-	56.10	-	22.93	-	27.37	-	18.42	-
64.0	1	-	81.75	-	30.95	-	30.95	-	28.25	-	33.33	-	57.44	-	23.81	-	27.69	-	18.97	-
Index range			79.38	81.17	29.16	28.76	28.28	27.27	27.03	28.04	29.95	30.43	53.48	54.00	21.11	22.94	20.79	19.16	8.94	9.67
			82.16	84.19	31.99	31.76	31.13	29.73	30.75	33.00	36.42	39.35	59.33	59.58	24.86	24.73	29.41	23.97	18.97	13.98
Index mean			80.78	82.05	30.30	29.63	29.80	28.41	28.45	29.42	32.14	32.84	55.18	55.57	23.20	23.58	25.00	21.89	15.03	11.33
Standard deviation			0.648	1.1044	0.659	1.0675	0.7477	1.0566	0.8778	1.9528	1.4737	3.2414	1.6442	1.9904	0.9129	0.6892	2.3908	1.4898	2.7236	1.8301

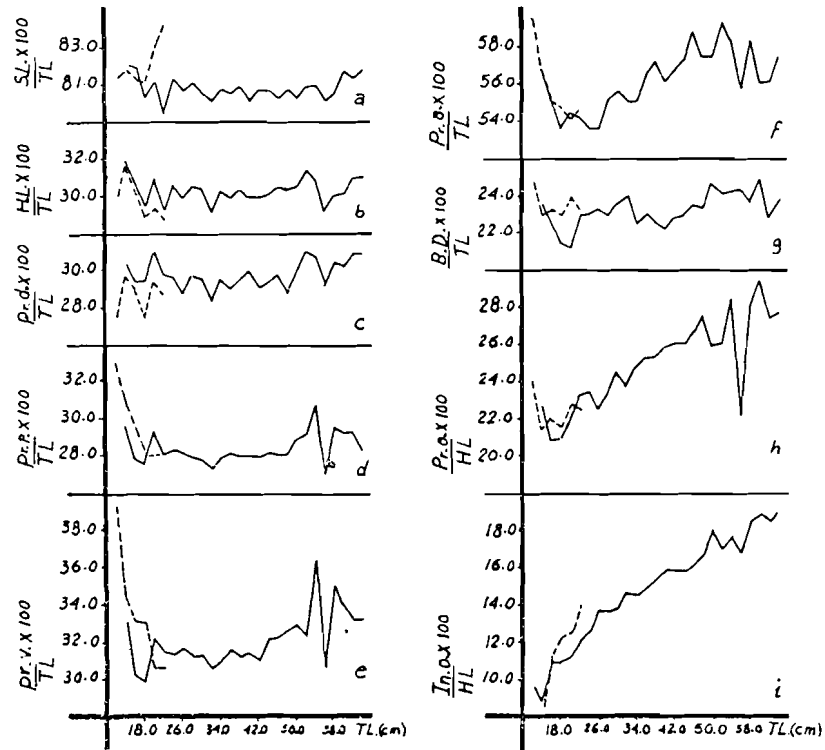


Fig. (3). Variation of ratio indices with length of *E. alexandrinus* in Alexandria waters (1976-1977) and Salloum Bay (1975-1976).

————— Alexandria waters.
 - - - - - Salloum Bay.

Mediterranean and Salloum Bay regions for the two species *E. aeneus* and *E. alexandrinus*.

Table 9 shows the mean values and standard deviation of number of gill rakers on epibranchial and ceratobranchial parts on the first left side gill arch of *E. aeneus* and *E. alexandrinus* in both regions.

Our study also reveals the following facts:

- 1- Pelvic fin (one spine and five rays).

TABLE (3)

The values of correlation coefficient of various morphometric regressions of *Epinephelus aeneus* and *Epinephelus alexandrinus* in Alexandria (1976-1977) and Salloum Bay (1975-1976) regions.

Morphometric distance	Correlation coefficient		
	<i>Epinephelus aeneus</i>		<i>Epinephelus alexandrinus</i>
	Alexandria region	Salloum Bay	Alexandria region
Standard length	0.9992	0.9937	0.9997
Head length	0.9991	0.9891	0.9983
Pre-dorsal	0.9996	0.9887	0.9973
Pre-pectoral	0.9974	0.9880	0.9960
Pre-pelvic	0.9978	0.9830	0.9935
Pre-anal	0.9986	0.9909	0.9983
Body depth	0.9984	0.9819	0.9965
Pre-orbital length	0.9974	0.9924	0.9897
Pre-orbital width	0.9954	0.9989	0.9961

2- Anal fin (three spines and eight rays).

3- Caudal fin ray (constant and equal to 19).

4- Number of rays in the branchiostegal membrane, 7.

5- Vertebral count is 24.

The above mentioned meristic characters are constant for both species in the two regions.

DISCUSSION

Various authors have shown that morphometric characters of fish can vary under the influence of the ecological conditions dominating in the fish habitat (Schmid, 1921; Vadykov, 1934; Taning, 1944; Lindsey, 1954; Fage, 1958 and Barlov, 1961).

The adaptive response to variations in temperature and density of water appears as variation in the number of caudal zone vertebrae. A similar

Table (4). The calculated and observed values of different morphometric measurements per length group of *Epiplatys aeneus* in Alexandria region (1976 - 1977).

Total Length in cm.	No of fishes	MORPHOMETRIC										MEASUREMENTS									
		Standard Length (cm).		Head Length (cm).		Pre-dorsal (cm).		Pre-pectoral (cm).		Pre-pelvic (cm).		Pre-anal (cm).		Body Depth (cm).		Pre-orbital (cm).		Inter-orbital (cm).			
		Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.		
017.5	01	14.20	13.50	05.60	05.36	04.90	04.74	04.80	04.31	05.40	04.37	09.60	09.56	04.20	03.49	1.40	0.94	0.50	0.34		
022.5	10	18.45	17.67	06.94	06.94	06.52	06.32	06.13	05.81	06.60	06.14	12.07	12.35	05.01	04.70	1.41	1.33	0.81	0.60		
027.5	05	21.40	21.85	08.12	08.52	07.50	07.90	07.17	07.33	07.78	07.91	14.20	15.15	05.64	05.92	1.64	1.68	0.88	0.83		
032.5	07	26.06	26.03	10.09	10.09	09.54	09.47	08.90	08.84	09.71	09.68	18.04	17.94	06.98	07.13	2.24	2.25	1.23	1.21		
037.5	11	29.84	30.21	11.48	11.67	10.84	11.05	10.01	10.35	10.83	11.45	20.19	20.73	07.96	08.34	2.55	2.65	1.45	1.48		
042.5	19	34.62	34.38	13.25	13.27	12.47	12.63	11.73	11.86	12.81	13.22	23.80	23.52	09.45	09.56	3.10	3.17	1.82	1.83		
047.5	14	36.94	38.56	14.54	14.83	13.89	14.21	12.91	13.37	14.48	14.99	26.13	26.32	10.16	10.77	3.38	3.54	1.92	2.08		
052.5	13	42.68	42.74	16.50	16.40	16.05	15.79	14.64	14.88	16.36	16.76	29.49	29.11	12.09	11.98	3.98	4.11	2.41	2.45		
057.5	14	46.73	46.92	18.19	17.98	17.71	17.37	16.69	16.39	18.72	18.53	32.83	31.90	12.93	13.93	4.46	4.46	4.60	2.67		
062.5	12	51.07	51.09	19.75	19.56	18.72	18.95	17.62	17.90	20.08	20.30	35.14	34.70	14.27	14.41	4.86	5.05	2.88	3.10		
067.5	10	54.45	55.27	20.71	21.14	20.83	20.53	18.58	19.41	21.02	22.07	37.32	37.49	15.85	15.62	5.21	5.33	3.27	3.28		
072.5	6	59.47	59.45	22.78	22.71	22.12	22.11	20.67	20.92	23.52	23.84	40.27	40.28	17.02	16.84	5.73	5.93	3.62	3.69		
077.5	9	63.67	63.63	24.81	24.29	23.98	23.69	23.02	22.43	26.21	25.61	43.63	43.08	17.93	18.05	6.62	6.52	3.93	4.08		
082.5	12	68.79	67.80	26.25	25.87	25.37	25.26	24.53	23.94	28.09	27.38	46.16	45.87	19.72	19.26	7.04	6.94	4.23	4.36		
087.5	9	72.30	71.98	27.94	27.45	26.89	26.84	26.20	25.45	29.35	29.15	49.41	48.66	20.34	20.48	7.65	7.43	4.71	4.69		
092.5	10	78.06	76.16	29.42	29.02	28.34	28.42	27.89	26.96	32.10	30.92	52.76	51.45	22.39	21.69	8.12	7.86	4.92	4.98		
097.5	4	80.75	80.34	30.00	30.60	29.70	30.00	27.05	28.45	30.90	32.69	53.35	54.25	22.50	22.50	8.05	8.03	5.24	5.09		
102.5	1	82.50	84.51	31.50	32.18	31.50	31.58	30.00	29.98	35.00	34.46	55.00	57.04	24.00	24.12	8.40	8.43	5.80	8.38		

TABLE (5)

The calculated and observed values of different morphometric measurements pre length group of *Epinephelus aeneus* in Silloum Bay region (1975-1976).

Total length (cm)	Number of Fish	Morphometric measurement																	
		S.L. (cm)		H.L. (cm)		Pr.D (cm)		Pr.P. (cm)		Pr.V. (cm)		Pr.A. (cm)		B.D. (cm)		Pr.O. (cm)		I.O. (cm)	
		Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.
12.5	1	10.70	10.38	4.20	3.79	4.00	3.60	3.90	3.56	4.25	3.69	7.50	6.66	3.30	2.61	-	-	-	-
17.5	5	15.22	14.30	5.42	5.31	5.22	5.04	5.22	4.90	5.39	5.22	9.92	9.48	3.66	3.74	1.10	1.07	0.58	0.53
22.5	8	17.41	18.23	6.79	6.83	6.39	6.49	5.93	6.24	6.40	6.74	11.44	12.31	4.44	4.89	1.36	1.41	0.76	0.78
27.5	14	22.81	22.15	8.32	8.35	7.87	7.94	7.59	7.59	8.36	8.27	15.29	15.14	6.03	6.01	1.72	1.79	0.97	1.05
32.5	6	25.03	23.07	9.45	9.45	8.93	9.38	8.60	8.93	9.40	9.97	17.28	17.96	6.66	7.14	2.17	2.07	1.23	1.26
37.5	1	28.50	29.99	10.40	11.38	9.90	10.83	9.40	10.27	10.00	11.31	19.50	20.79	8.10	8.28	2.40	2.30	1.50	1.43
42.5	2	33.70	33.92	12.95	12.90	12.40	12.28	11.65	11.61	13.05	12.84	23.50	23.61	8.95	9.41	2.75	2.93	1.89	1.89
47.5	3	39.50	37.83	15.33	14.42	14.57	13.72	13.77	12.95	15.37	14.36	27.97	26.44	11.47	10.54	3.63	3.52	2.27	2.32

TABLE (4)
The calculated and observed values of different morphometric measurements per length group of *Glyptothorax bleekeri* in Alusar's region (1974-1977).

Total Length (cm)	No. of Fish	MORPHOMETRIC MEASUREMENTS																			
		S.L. (cm)		H.L. (cm)		P-r.0 (cm)		P-r.1 (cm)		P-r.2 (cm)		P-r.3 (cm)		P-r.4 (cm)		I.O. (cm)		P-r.5 (cm)		I-c. (cm)	
		Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.	Obs.	Calc.
14.0	2	12.2	11.49	4.75	4.89	4.3	4.15	4.4	7.80	4.93	4.07	4.40	3.51	3.65	1.06	0.93	0.43	0.37	14.0	14.0	
14.0	2	13.5	13.09	5.05	4.89	5.35	4.75	6.5	4.47	5.00	4.75	5.10	6.75	3.70	3.64	1.05	1.02	0.55	0.43	14.0	14.0
18.0	1	15.0	14.68	5.50	5.49	5.50	5.35	5.15	5.60	5.44	10.00	9.89	4.00	4.02	1.15	1.15	0.60	0.51	18.0	18.0	
21.0	3	18.3	18.89	6.30	6.09	6.23	5.95	5.90	5.62	6.17	6.12	11.03	11.04	4.23	4.50	1.36	0.70	0.84	21.0	21.0	
22.0	5	17.5	17.88	6.46	6.49	5.56	5.55	6.18	6.20	6.54	6.80	11.90	12.10	5.04	4.99	1.50	1.44	0.78	0.74	22.0	22.0
24.0	12	19.6	19.47	7.26	7.28	7.15	7.15	8.01	6.72	7.55	7.49	12.88	13.24	5.94	5.47	1.72	1.71	0.82	0.73	24.0	24.0
26.0	6	20.5	22.07	7.68	7.69	8.09	8.20	8.49	8.49	8.49	8.49	13.79	13.84	6.98	6.55	1.73	1.71	1.05	1.06	26.0	26.0
26.0	10	23.9	24.27	8.00	8.09	8.77	8.95	8.75	9.07	9.32	9.54	16.41	16.79	6.88	6.82	2.21	2.20	1.23	1.29	26.0	26.0
30.0	9	27.3	27.46	10.22	10.29	9.97	10.16	9.34	9.85	10.48	10.90	18.80	19.04	7.57	7.41	2.23	2.32	1.37	1.37	30.0	30.0
34.0	10	29.0	29.06	10.75	10.94	10.49	10.76	10.12	10.22	11.47	11.59	20.20	20.24	8.20	6.37	2.72	2.73	1.48	1.55	34.0	34.0
36.0	12	30.7	30.55	11.51	11.50	11.21	11.28	10.83	10.80	11.63	12.27	21.70	21.29	8.51	6.86	2.91	2.96	1.75	1.83	36.0	36.0
40.0	10	31.9	32.25	11.50	12.10	11.25	11.25	11.27	11.27	11.51	12.25	22.24	22.24	8.50	5.24	3.07	3.06	1.68	1.51	40.0	40.0
40.0	10	34.4	33.84	13.20	13.20	13.20	13.20	13.20	13.20	13.20	13.20	23.54	24.83	10.09	10.31	3.48	3.47	2.10	2.20	40.0	40.0
46.0	8	36.7	37.04	13.91	14.50	13.62	13.76	12.85	13.10	14.75	15.00	26.00	25.98	10.77	10.79	3.72	3.64	2.23	2.29	46.0	46.0
46.0	8	38.7	38.64	14.34	14.50	13.80	14.26	13.46	13.47	15.65	15.69	27.50	27.13	11.15	11.20	4.00	3.87	2.40	2.41	46.0	46.0
50.0	5	40.3	40.24	15.30	15.10	15.00	14.96	14.46	14.25	16.54	16.54	30.44	29.78	11.34	11.75	3.96	4.09	2.75	2.65	50.0	50.0
52.0	5	42.2	41.64	16.42	16.20	16.28	15.56	15.28	14.82	18.94	17.05	30.44	29.43	12.30	12.74	4.26	4.43	2.77	2.89	52.0	52.0
54.0	1	43.2	42.43	16.47	16.20	16.40	16.17	16.40	15.98	19.47	18.74	31.00	30.58	12.83	12.73	4.60	4.45	2.97	2.90	54.0	54.0
56.0	4	46.5	46.53	17.27	17.50	17.57	17.37	17.07	16.56	20.25	19.10	32.22	32.22	13.64	13.71	4.80	4.71	3.10	2.94	56.0	56.0
60.0	4	48.8	48.22	17.95	18.10	18.06	17.97	17.42	17.12	20.27	19.19	33.45	34.03	14.63	14.48	5.27	4.89	3.37	3.22	60.0	60.0
62.0	1	50.0	49.82	19.00	19.20	19.00	18.97	17.70	17.70	20.50	20.47	34.50	35.18	14.10	14.18	5.40	5.11	3.50	3.45	62.0	62.0
64.0	1	51.5	51.42	19.50	19.20	19.58	19.17	17.80	18.27	21.00	21.16	36.80	36.33	15.80	15.18	6.40	5.26	3.70	3.56	64.0	64.0

TABLE (7)

Regression equations of different morphometric measurements to total length of
Epinephelus aeneus and *Epinephelus alexandrinus* in Alexandria region
 (1976 - 1977).

Morphometric measurement	<i>Epinephelus aeneus</i>	<i>Epinephelus alexandrinus</i>
Standard length	SL = - 1.255 + 0.8355 TL	SL = - 0.3080 + 0.7986 TL
Head length	HL = - 0.1606 + 0.3155 TL	HL = - 0.0914 + 0.3001 TL
Pre-dorsal	Pr.D = - 0.7891 + 0.3158 TL	Pr.D = - 0.0620 + 0.3005 TL
Pre-pectoral	Pr.P = - 0.9780 + 0.3020 TL	Pr.P = - 0.1264 + 0.2875 TL
Pre-Ventral	Pr.V = - 1.8238 + 0.3540 TL	Pr.V = - 0.7153 + 0.3417 TL
Pre-anal	Pr.A = - 0.2162 + 0.5586 TL	Pr.V = - 0.4483 + 0.5746 TL
Body depth	B.D. = - 0.7585 + 0.2427 TL	B.D. = - 0.3342 + 0.2419 TL
Pre-orbital length	Pr.O = - 0.6810 + 0.2903 HL	Pr.O = - 0.4972 + 0.3002 HL
Inter-orbital width	In.O = - 0.7514 + 0.1948 HL	In.O = - 0.6611 + 0.2164 HL

TABLE (8)

Shows the mean values of different meristic characters in both Mediterranean
 and Salloum regions for the two species *Epinephelus aeneus* and
Epinephelus alexandrinus.

Meristic character	Species studies	Mediterranean region	Salloum Bay region
Dorsal fin ray count	<i>Epinephelus aeneus</i>	15.05 ± 0.5061	14.66 ± 0.8835
Dorsal fin ray count	<i>Epinephelus alexandrinus</i>	15.93 ± 0.4774	15.74 ± 0.7335
Pectoral fin ray count	<i>Epinephelus aeneus</i>	18.62 ± 0.6364	17.00 ± 0.6558
Pectoral fin ray count	<i>Epinephelus alexandrinus</i>	17.35 ± 0.7698	16.26 ± 0.8057

TABLE (9)

Shows the mean values and standard deviation of number of gill rakers on Epibranchial and Ceratobranchial parts on the first left side gill arch of *Epinephelus aeneus* and *Epinephelus alexandrinus* in the two regions

Meristic		character	<i>Epinephelus aeneus</i>	<i>Epinephelus alexandrinus</i>
Mean and standard deviation	Epibranchial	Filamentous	Alexandria 3.26 ± 0.6394	Alexandria 6.38 ± 0.7274
			Salloum 2.69 ± 0.7662	Salloum 6.00 ± 0.5
		Knob-like	Alexandria 7.15 ± 0.9135	Alexandria 3.01 ± 0.7325
			Salloum 6.90 ± 1.2962	Salloum 2.76 ± 0.7524
	Ceratobranchial	Filamentous	Alexandria 8.34 ± 0.9761	Alexandria 12.94 ± 0.6534
			Salloum 8.16 ± 1.2418	Salloum 12.31 ± 0.6304
Ceratobranchial	Knob-like	Alexandria 6.32 ± 1.2320	Alexandria 3.22 ± 0.7766	
		Salloum 6.11 ± 1.6405	Salloum 3.35 ± 0.9315	

type of variation occurs in several species of fish in the number of rays in the unpaired fins which also is related to an adaptation to movement of water of various density (Hubbs, 1922; Taning, 1944). Variations in body proportions in the same fish species according to hydrographic conditions have been also recorded by various authors (Hubbs, 1922; Gunter, 1950; McHugh, 1954 a and b; Barlov, 1961; Garside, 1966; Bidgood and Berst, 1967; Martin and Sandercock, 1967; Ehrlich and Farris, 1970; Lee and William, 1970; Fayek, 1973; El-Gammal, 1975; Ezzat et al, 1979).

Epinephelus aeneus is a local fish, living among rocks; it is hardly mobile, that is why we can treat those taken from Alexandria region and those from Salloum Bay as separate populations.

From the present study we can mention the following :

- 1- Head length index in Salloum Bay is less than in Alexandria region.
- 2- Pre-anal index is higher in Salloum Bay than in Alexandria region.
- 3- In small sizes, body depth seems to be lower in Salloum Bay than in Alexandria waters.
- 4- Inter-orbital index for small sizes (length range 17.5-47.5 cm) is slightly higher in Salloum Bay than in Alexandria waters.
- 5- Concerning the regression equations, the value of the slope of the standard length and pre-ventral index are different.
- 6- No variations in the meristic counts were observed.

TABLE (10)

The morphometric indices of *Epinephelus aeneus* in Alexandria and Salloum Bay regions as compared with those given by Casenat (1935) in the Western side of Africa.

Authors	Indices	$\frac{BD}{TL} \times 100$	$\frac{HL}{TL} \times 100$	$\frac{Pr.A}{TL} \times 100$	$\frac{Pr.D}{TL} \times 100$	$\frac{Pr.O}{HL} \times 100$	$\frac{In.O}{HL} \times 100$
	Locality						
Cadenat, 1935	Western side of Africa	23.64	33.64	50.91	31.82	24.32	20.27
Present study 1980	Alexandria region	22.96	31.45	55.56	27.97	24.53	14.60
Present study 1980	Salloum Bay	21.88	30.27	54.94	28.83	21.78	13.03

TABLE (11)

THE MORPHOMETRIC INDICES OF *Epinephelus alexandrinus* IN ALEXANDRIA AND SALLIUM BAY REGIONS AS COMPARED WITH THOSE GIVEN BY OTHER AUTHORS (cf. Bini, 1960).

Author	Ratio indices Locality	$\frac{SL}{TL} \times 100$	$\frac{BO}{TL} \times 100$	$\frac{HL}{TL} \times 100$	$\frac{Im.O}{HL} \times 100$	$\frac{Pr.O}{HL} \times 100$
Bini 1960	Circeo 1960	81.20	26.32	30.83	21.95	21.95
Bini 1960	Finike 1956	76.15	19.51	31.71	16.24	17.95
Bini 1960	Finike 1956	81.36	24.58	33.90	17.50	18.75
Bini 1960	Salte 1956	80.73	23.96	32.29	17.74	19.35
Doderlin 1982		26.92	31.69	23.53	17.65	
Doderlin 1982		26.21	22.33	38.13	21.74	
Doderlin 1982		25.52	31.72	28.26	17.39	
Doderlin 1982	Laboratory of Hydrobiologr. Rome	25.17	33.11	28.00	18.00	
Doderlin 1982		26.25	28.75	34.78	17.39	
---	Salte 1956	23.96	32.29	24.19	17.74	
---	Finike 1956	24.58	33.90	23.75	17.50	
Doderlin 1982		27.33	30.00	33.33	14.44	
---	Finike 1956	21.14	31.71	41.03	16.24	
Doderlin 1982		26.32	28.89	29.09	15.45	
---	Circeo 1960	26.32	26.32	30.86	25.71	
Doderlin 1982		23.45	31.03	21.33	13.78	
Doderlin 1982		23.84	31.51	21.74	17.39	
Present study 1980	Alexandria	80.78	23.20	30.30	25.00	15.63
Present study 1980	Sallium Bay	82.05	23.58	29.63	21.89	11.53

For *Epinephelus alexandrinus* (a migratory fish), standard length index is found to be higher in Sallium Bay than in Alexandria region. Pre-dorsal index is less in Sallium Bay than in Alexandria region. Pre-ventral and body depth indices show also some variations. Filamentous branchiospine in the ceratobranchial branch is higher in Alexandria region than in Sallium Bay.

As shown from the previous table (10) and Table 11, for *Epinephelus aeneus*, the ratio indices for different body measurements, lie within the normal range, in different areas, for the same species. We can also state that the interorbital index is lower in Alexandria and Sallium Bay regions than in other areas.

For *Epinephelus alexandrinus*, we can see that, the indices obtained in the present study, lie nearly within the range given by other authors for the same species in different localities. However, the interorbital and pre-orbital indices gave lower values, than given for the same species in other localities.

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