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ON SOME MORPHOMETRICS OF *EURYGLOSSA ORIENTALIS* FROM KARACHI COAST, PAKISTAN

ABSTRACT

The morphometric and meristic count (character) of *E.orientalis* (Bloch and Schneider) have been analysed. Regression equation of different body measurements on total length and their morphometric indices are compared. Differences for total length, weight, interorbital, body width and mouth opening are statistically significant. Rays of unpaired fins, the vertebrae and lateral line, scales have been counted and calculated (coefficient of variation). Meristic characters show considerable variation and statistical interpretation of morphometric data indicated that there is direct relationship between the head length, depth of body and total length.

EURYGLOSSA ORIENTALIS (Bloch and Schneider) plays a significant role in fisheries throughout the Indo-Pacific region. It is the most commercially important oriental sole in the coastal waters of Pakistan, constituting a significant portion of the food sources for the rapidly growing population of the country.

Several authors have worked on the biology and taxonomy of *E.orientalis* (Bl. and Schn.). Some of the studies on morphometric in different species are the works of Dwivedi and Meneze (1974), Ezzat (1979), Meneze (1980), Hoda (1979, 1988), Hoda and Qureshi (1995) and Habibur Rehman *et al.* (1997). But no such work is available from Pakistan on morphometric and meristic studies. The present paper deals with the morphometric character of *E.orientalis* with the aim of confirming the identity of the local population. This work intended to study the possible variations in the morphometric measurements and meristic counts of *E.orientalis* as a result of its adaptation to the environment and aim at clarifying their identity in the local population along the Karachi coast facing northern Arabian Sea.

We wish to thank the Director, Centre of Excellence in Marine Biology, University of Karachi, Pakistan and Director, Marine Reference Collection and Resource Centre,

University of Karachi, Pakistan for suggesting this research work. We are grateful to Prof. Dr. Jawaid Mustaquim, CEMB for his guidance and valuable suggestions offered on the manuscript.

MATERIAL AND METHODS

The present study is based on random sampling of *E.orientalis*. A total of 359 fish were collected from the commercial landing at Karachi Fish Harbour at West Wharf and Korangi Creek. The samples were frozen. After thawing, the fish were sexed, measured and weighed.

The following measurements were recorded in mm:

1.	Total length (T.L.)	:	distance from the snout to tip of the caudal fin.
2.	Standard length (S.L.)	:	distance from the tip of the snout to end of the hypural bone (urostyle)
3.	Head length (H.L.)	:	distance from the tip of the snout to the posterior edge of operculum.
4.	Interorbital (I.O.)	:	distance between the two orbits.
5.	Body depth (B.D.)	:	vertical distance from the dorsal and ventral profiles of the body measured at the broadest part.
6.	Body width	:	measured as a straight line vertical distance from the belly to the dorsum just in front of the drosal fin or at its deepest part.
7.	Snout length	:	is the straight distance between its tip and the inner anterior angle of the right eye.
8.	Mouth opening	:	distance between upper jaw and lower jaws.
9.	Caudal peduncle	:	measured from the last ray or end of anal fin to the base of the caudal fin.
10.	Eye diameter	:	is taken as that of the larger eye whenever there was a size difference between the two eyes.

The growth of the different body parts with reference to total length was studied by regression equation and body proportion indices.

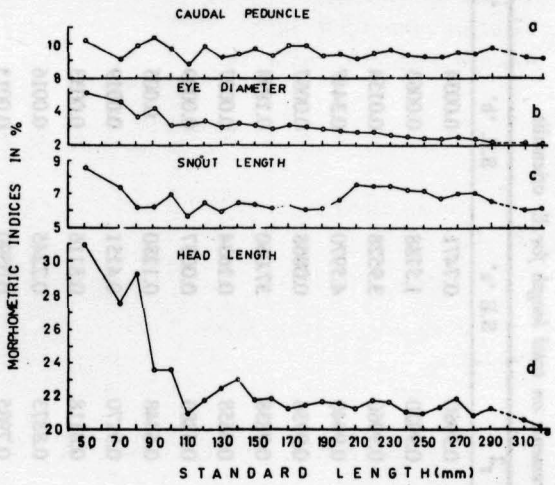

FIG. 1. *Index value for: (a) Caudal peduncle, (b) eye diameter, (c) snout length, (d) head length.*

The following meristic counts were also made:

1. Number of rays in the dorsal fin.
2. Number of rays in the anal fin.
3. Number of rays in caudal fin.
4. Number of lateral line scales.
5. Vertebrae count.

Measurements and counts in all cases were taken from frozen material and then preserved in 5% formaldehyde.

The proportional measurements of body parts were made after Lagler (1973).

RESULTS AND DISCUSSION

The regression equation $Y = a + b X$ has the following values in *E. orientalis* in relation to total length for both sexes and the combine,

TABLE 1. *Regression equations of the various morphometric measurements on total length for* E. orientalis.

Relationship examined			Sex	N	Reg.a	equation b	r^2	S.E 'a'	S.E. 'b'	't' value
1.	X:	Total length	M	202	-26.1135	0.9807	0.9960	0.7471	0.0034	4.1617*
	Y:	Standard length	F	156	-19.7390	0.9524	0.9920	1.5188	0.0063	
			C	358	23.3770	0.9700	0.9960	3.9528	0.0154	
2.	X:	Standard length	M	202	27.3892	1.0145	0.9940	4.5970	0.3447	0.0658
	Y:	Total length	F	156	21.8430	1.0442	0.9936	0.0868	0.0067	
			C	358	25.3608	1.0264	0.9838	37.060	0.1894	
3.	X:	Total length	M	203	2.3206	0.0152	0.6658	0.1634	0.0007	
	Y:	Eye diameter.	F	156	2.8780	1.0128	0.5283	0.0037	0.0009	1.882
			C	359	0.6451	0.0145	0.6448	0.1280	0.005	
4.	X:	Total length	M	190	-1.3260	0.0890	0.9170	0.4151	0.0019	
	Y:	Caudal	F	156	-0.8291	0.0875	0.8118	0.8116	0.0033	0.4045
		peduncle	C	346	1.2700	0.0890	0.8873	0.2245	0.0016	
5.	X:	Total length	M	203	-0.2256	0.0385	0.7985	0.0590	0.0013	0.4045
	Y:	Interorbital	F	156	2.4224	0.0278	0.5372	0.5228	0.0030	5.2195*
			C	359	-0.6590	0.0348	0.7089	0.2654	0.0011	
6.	X:	Total length	M	202	0.3295	0.3609	0.8854	0.3340	0.0015	
	Y:	Mouth	F	156	-1.3199	0.0444	0.8854	0.3367	0.0012	141.2946*
		opening	C	358	0.3541	0.0398	0.8029	0.2350	0.0010	
7.	X:	Total length	M	203	-9.2727	0.1418	0.9082	0.3693	0.0031	
	Y:	Body width	F	156	-6.6359	0.1388	0.6400	12.8667	0.0538	0.0808
			C	359	20.3530	0.0120	0.7903	0.9025	0.0039	
9.	X:	Total length	M	202	-1.3115	0.1915	0.9547	0.6321	0.0029	
	Y:	Head length	F	156	-2.1664	0.1983	0.9370	0.9926	0.0041	1.3600
			C	358	-0.9139	0.1968	0.9522	0.4912	0.0023	
10.	X:	Total length	M	202	-3.7773	0.0735	0.8206	4.5282	0.0004	
	Y:	Snout length	F	156	-4.8579	0.0809	0.7867	0.7249	0.0033	0.2827
			C	258	4.5943	0.0785	0.8206	0.4380	0.0019	

*95% Confidence limit.

X being the total length, Y the morphometric measurement concerned, 'b', the regression coefficient and 'a' the intercept (Table 1). It is observed that the regression coefficient for (all parameter) body width shows the least growth rate followed by eye diameter and S.L shows the greatest growth. Body depth grows faster than head length, thus old specimen look comparatively wider than the younger ones, which is in agreement with observations of Dwivedi and Menezes (1974). However, the value of regression coefficient in the present study is much lower than that cited. Dwividi and Menezes (1974) i.e 'b' = 0.4830 vs 0.85 for body depth 'b' = 0.1968 vs 0.510 for head length. The significant sexual differences in the growth rate of mouth opening and interorbital space have been marked. The linear measurements (head length, snouth length, eye diameter, caudal peduncle) have been expressed as indices (%) with reference to total length (Fig. 1). The linear measurements have been expressed as indices with reference to standard

TABLE: 2. *Variation of meristic characters in* E. orientalis.

Characters	N	Range (mm)	Mode	Mean S.E. 95% C.L.	Coefficient of variation
Dorsal fin rays	253	61-72	68	67.01 ± 0.60	7.133
Anal fin rays	253	49-60	52	53.09 ± 0.51	7.572
Caudal fin rays	253	17-21	19	18.55 ± 0.18	7.762
Lateral line scales	253	85-100	90	89.68 ± 1.99	17.629
Vertebrae	50	35-41	38	36.56 ± 1.54	14.880

TABLE: 3. *Comparison of meristic characters in E. orientalis.*

Authors	N	D.F. Rays	A.F. Rays	C.F. Rays	Vertebrae	Lateral line scale
Day, 1878	-	62-65	47-50	17-21	-	70-85
Munro, 1955	-	62-72	47-57	-	-	63-74
Dwivedi and Menezes, 1974	90	61-70	46-54	-	30-33	78-91
Present study	253	61-72	49-60	17-21	35-41	85-100

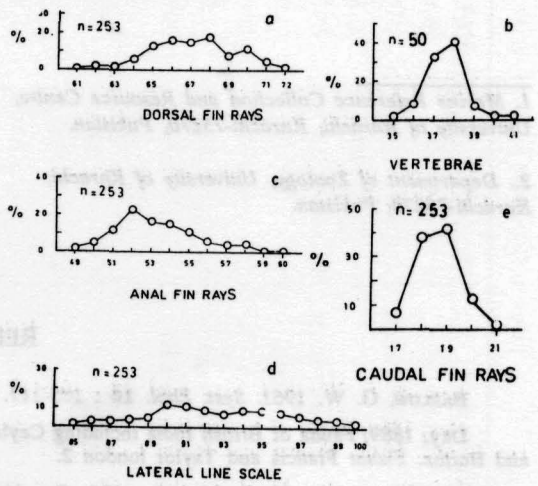

FIG. 2. *Frequency polygons for number of: (a) dorsal finrays., (b) Vertebrae*

length. The indices show high values (mainly in the head length) in fish less than 95 mm S.L. and thereafter the values become almost variable.

Morphometric indices do not exhibit any sexual difference to be used of as taxonomic values. However, significant sexual difference in the relative growth is observed between total length and standard length, and interorbital body width and mouth opening. Such difference in the flatfishes have not been pointed out earlier (Day, 1889; Norman, 1934; Munro, 1955,1958).

Various authors have shown that morphometric character of fish can vary under the influence of environment and in particular the thermal factor during the period of incubation and the beginning of larval life (Schmidt, 1921; Vlandykov, 1934; Tanning, 1944; Fage, 1958; Barlow, 1961; Ezzat, 1979).

MERISTIC CHARACTER

The various meristic characters shown in Table 2 and Figure 2 are based on the examination of 253 fishes for counting of finrays and lateral line scales and 50 individuals for studying the vertebrae. The degree of variation in individual count was assessed by Pearson's coefficient of variation, a measure of variation about the mean which is not obscured by fluctuation in the values of near itself. Table 2 shows that the C.V. 7.133-7.762 for the number of fin ray are more stable than those of vertebrae and lateral line scale (CV. 14.880 and 17.629) respectively, which are the important characters for identifying the species of soles in a local population. The present counts of the characters show higher number than those recorded by earlier workers (Table 3). The dorsal and anal ones exhibit agreeing tendency with those of Munro (1955) i.e 61-72 vs 62-72 and 49-60 vs 47-57 respectively. Counts of vertebrae, lateral line scales and finrays are tabulated and graphed in Fig. 2.

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