LENGTH-WEIGHT RELATIONSHIP AND RELATIVE CONDITION IN *OMPOK BIMACULATUS* (BLOCH) FROM BHAVANISAGAR RESERVOIR (TAMIL NADU)

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ABSTRACT

Length-weight relationship and relative condition in *Ompok bimaculatus* were studied. Analysis of covariance of the regressions for the two sexes showed no significant difference in slopes. The value of the exponent indicated a deviation from the cube law. The point of inflexion in the relative condition plotted on a lengthwise basis gave the size at first maturity, especially in males. Seasonal variations in the condition was found to be influenced by the spawning cycle.

Ompok bimaculatus, as shown by experimental fishing, contributed considerably to the fish population of Bhavanisagar reservoir (Lat. 11°28'N). The fish is omnivorous, feeding mainly on insects, and breed mainly during the N.E. monsoon (Sivakami 1982). The present work is on its length-weight relationship and Relative condition to find out how far the environmental factors influence the general condition of the fish. A general review has been made of the species from riverine habitats by Qayyum and Qasim (1964) and from ponds by Parameswaran et al (1970).

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A total of 314 specimens, comprising 150 males and 164 females, collected from the catches of experimental fishing in Bhavanisagar reservoir during the year 1979, were used for the study. The specimens had a length range of 211-335 mm and weight range of 38-196 g.

The regression of weight on length was determined by grouping the fish into 13 length groups of 10 mm intervals and by fitting the regression of logarithmic value of the average weight of the fish on the logarithmic value of the average length of fish belonging to the same group. Length-weight relationship was then computed based on the formula $W = CL^n$, where W = weight of the fish in g, L = length of the fish in mm, C and n are constants. Relative condition factor was estimated from the formula $W/\hat{W}$, where W = the observed weight and $\hat{W}$ = calculated weight of the fish (Le Cren 1951). From the individual values, the mean 'Kn' was calculated separately for males and females for each 10 mm class sequance and for different months of the year. As no significant difference was noticed between males and females, the common equation derived was used for deriving the Kn factor.

Length-weight relationship: The logarithmic regression equations obtained were

Males : Log W = -4.92311 + 2.83802 Log L. (r=0.98919)
Females : Log W = -4.62657 + 2.72247 Log L. (r=0.99061) [Fig. 1]

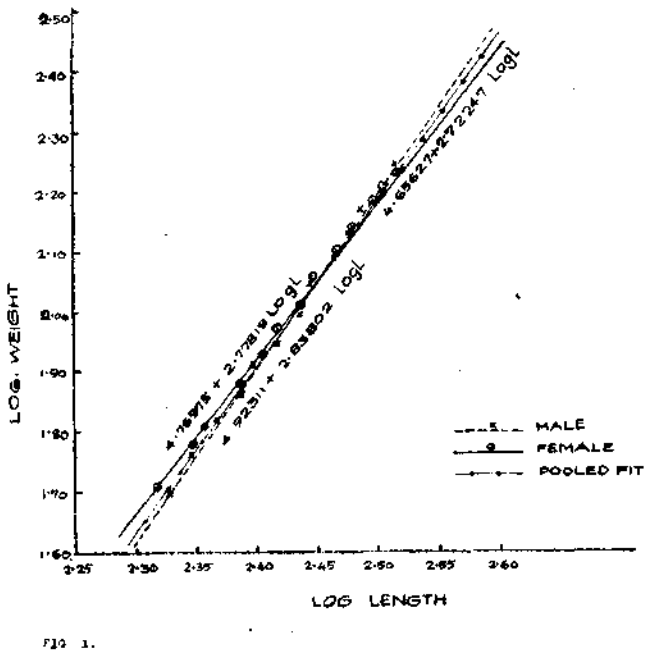

FIG. 1. Logarithmic relationship between length and weight in *Ompok bimaculatus* of either sex along with pooled fit.

The corresponding parabolic equation may be represented as follows:

Males : $W=0.00001193\ L^{2.83802}$
Females ; $W=0.00002362\ L^{2.72247}$

'r' was found to be highly significant in both the sexes. The data subjected to analysis of covariance (Snedecor 1961) indicated that the n values did not differ significantly (calculated F ratio = 0.4627 for 1, 22 df). The test also showed that the 'C' values are also not significantly different (calculated F ratio = 1.0984 for 1, 23 df). Hence a general formula for both sexes was computed as:

Log W = -4.76975 + 2.77819 Log L. The corresponding parabolic equation can be expressed as $W = 0.00001699\ L^{2.77819}$. ($r = 0.98869$).

In order to test whether the regression coefficient (both the sexes together) differs from 3, 't' test was applied. The t value was 2.606 (d.f. = 24, t.05 = 2.064) which is significant at 5% level).

Relative condition: In females, the Kn values remained high in size groups up to 231-240 mm and then gradually declined to 261-270 mm (Fig. 2). In the size groups between 271-340 mm the values showed major fluctuations which may be attributed to the spawning activity of the species.

In males, the Kn values remained comaparatively low in size groups 211-230 mm, but suddenly rose in size group 231-240 mm, indicating attainment of maturity in this size group. In the size groups between 241 mm and 340 mm, the values followed almost the same pattern as those of females.

Monthly variations in the condition factor in both males and females were found to follow almost a similar pattern throughout the year (Fig. 3). Beginning

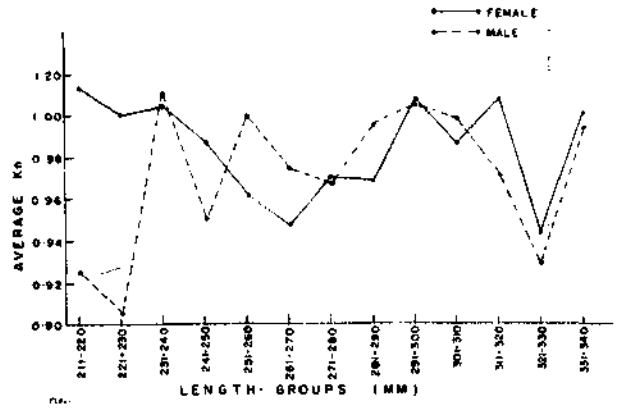

FIG. 2. Average Kn factor in relation to length of *O. bimaculatus* of either sex.

with January, the Kn factor increased gradually, maintaining a high value up to August|September, except for a slight tall in females in June. The values in both males and females started declining in October, reaching the lowest in November. In December, both the sexes showed slightly higher values.

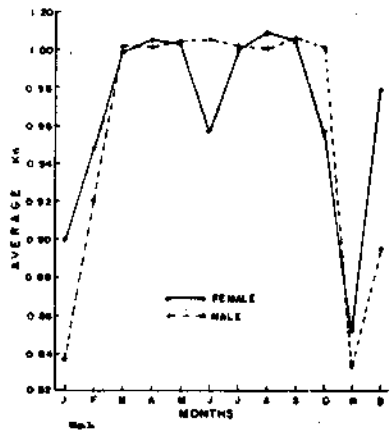

FIG. 3. Monthly variations in the Kn factor of *O. bimaculatus* of either sex.

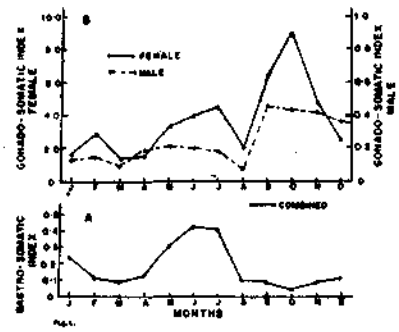

FIG. 4. A Monthly variations in the Gastro-somatic index of *O. bimaculatus* of both the sexes together. B. Monthly variations in the gonadosomatic index of *O. bimaculatus* of either sex.

The monthly variations in the gastro-somatic index and gonadosomatic index n the species are presented in Fig. 4A & 4B. A comparison of A & B in Fig. 4 shows that the fluctuations in the condition factor is more influenced by the spawning cycle than by feeding activity. The ponderal index in *O. bimaculatus* as being related to maturity cycle is discussed by Qayyum and Qasim (1964) and Parameswaran et al (1970).

Though for fishes which maintain the same shape and chemical composition growth is isometric it is not so in fishes which change their shape as growth advances. It is emphasised by Le Cren (1951) in his studies on Wintermere perch population that, in many cases, the cube law fails to apply in a population as a whole, because it includes a range of size classes. In the present case also the regression coefficient 'n' is less than 3, which means that the fish were more slender when they were longer.

That the condition in fishes can be affected by the onset of maturity is established by many workers (Le Cren 1951, Weatherly 1979). According to Hart (1946), the point of inflexion on a curve, showing this dimunition of 'K' with increasing length, is thus a good indication of length at which the sexual

TABLE 1. *Analysis of covariance of male and female* O. bimaculatus

	d.f. (n-1)	ΣY^2	Σx^2	Σxy	Σ b=xy Σx^2	Regression S.S.b Σ xy	deviation from regression S.S. (ΣY^2-bΣxy)	d.f. (n-2)
Males	12	0.36922	0.04486	0.12730	2.83771	0.36124	0.00798	11
Females	12	0.36023	0.04770	0.12985	2.72222	0.35348	0.00675	11
						Individual regression total	0.01473	22
Pooled (within)	24	0.72945	0.09256	0.25715	2.77819	0.71441	0.01504	23
Between	1	0.00045	0.00004	0.00013				
Between & within	25	0.72990	0.09260	0.25702				

maturity is attained. In the present study, a sharp inflexion is noticed in the case of males at a length range of 231-240 mm. This is in corroboration with the earlier observation that the minimum size of male *O. bimaculatus* in Bhavanisagar reservoir to attain maturity was 230 mm (Sivakami 1982). In females, however, such a clear indication is not discernible, though specimens measuring 241 mm and above are found to show less values of condition, probably due to spawning activity.

Hart, as quoted by Jhingran (1973), stated that the ponderal index might indicate a broad outline of the seasonal cycle. This index has been shown to be correlated with gonadal cycle, rate of feeding etc. A close scrutiny of Kn factor in *O. bimaculatus* in relation to different seasons shows that the condition of the species is much affected by the spawning activity. The fall in Kn during the months of October to January corresponds with the main breeding season as has been shown by Sivakami (1982). During the period from February to September Kn values remained high, which may be attributed to the high percentage of maturing and mature fish. The Kn values here cannot be attributed to feeding intensity because of their inverse relationship with gastromatic index during June in females and February to April in both sexes.

TABLE 2. *Test of significance of equality of regression co-efficients*

Source of variation	d.f.	S.S.	M.S.	Calculated F	Inference
Average regression	23	0.01504	0.00065		
Individual regression	22	0.01473	0.00067		
Deviation	1	0.00031	0.00031	0.4627	Not significant
Between adjusted means	1	0.01652	0.01652	1.0984	(at 5% level of significance).

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