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ALLOMETRIC STUDIES IN THE BRAIN OF A TELEOST, *ETROPLUS SURATENSIS* (BLOCH)

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The allometric studies were made for standard length-brain length (SL-BL), standard length-brain weight (SL-BRW) and brain length-brain weight (BRL-BRW) relationships in *Etroplus suratensis*, a teleost, Regression coefficients for SL-BL relationship in males is 0.1197 and 0.0675 in females. While SL-BRW relationship in *E. suratensis*, the regression coefficient for males and females the same and a combined regression line is formed. In BRL-BRW relationship regression coefficient is 0.0276 in males and 0.0502 in females. Thus in the two relationship the males having higher growth rate than females.

Key words : Allometric studies, teleost brain.

INTRODUCTION

Although a lot of work has been done on the morphology of the brain, references are scarcely available on the detailed statistical analysis of brain and its various internal measurements in fishes. Knowledge of the morphometric and allometric analysis is limited to the studies of Ridet *et.al.* (1973), Jafri & Noori (1976), Bauchot *et.al.* (1973, 1979, 1986, 1989 & 1990), Gould (1981), Bhatt & Singh (1982), Ebinger *et.al.* (1983), Chin (1996), Albert (1999), Sherly (2003 & 2004), Healy & Rowe (2007) and Gonzalez *et.al.* (2009). The present paper deals with the statistical analysis of the sex wise comparison of the standard length-brain length (SL-BL), standard length-brain weight (SL-BRW) and brain length -brain weight (BRL-BRW) relationship may be useful in emphasizing sex wise relationship and variations occurring is other fishes and in higher vertebrates also.

MATERIALS AND METHODS

Monthly samples of *E. suratensis* include a total of 118 specimen, 75 females and 43 males for a period of one year. Length weight measurements of the body and brain were recorded in all the specimens. Covariance analysis is used to infer whether the growth pattern is significantly different between the sexes. The regression coefficient (b) and the regression graphs were calculated with the computer by using the formula $y = bx + a$

OBSERVATIONS

Standard Length-brain length (SL-BL) relationship

The results of the covariance analysis is presented in Table I and Fig. 1. A significant Fs clearly indicates a difference in the growth pattern. Here the rate of growth of brain length is greater in males than females. The regression coefficient (b) = 0.1197 in males and 0.0675 in females.

The regression line :

$y = 0.1197 x + 0.3554$ in males and
$y = 0.0675 x + 4.3847$ in females

Standard length brain weight (SL-BRW) relationship

The covariance analysis for this relationship is presented in Table I and Fig. 2. Here the slop (Fs) and the elevations (Fe) not significant hence both sexes share the same growth pattern. Here a combined regression line $y = 1.2973 x + 1.9010$.

Brain length - Brain Weight (BRL-BRW) relationship

The results of the covariance analysis is presented in Table I and Fig. 3. Here the slope is not significant but the elevation is found significant and the rate of growth of brain weight is higher for males as far is the brain length is concerned. Here the regression coefficient (b) = 0.0276 in males and 0.0502 in females. The regression line $y = 0.0276 x + 1.0477$ in males and $y = 0.0276 x + 1.0477$ in males and $y = 0.0502 x + 0.8824$ in females.

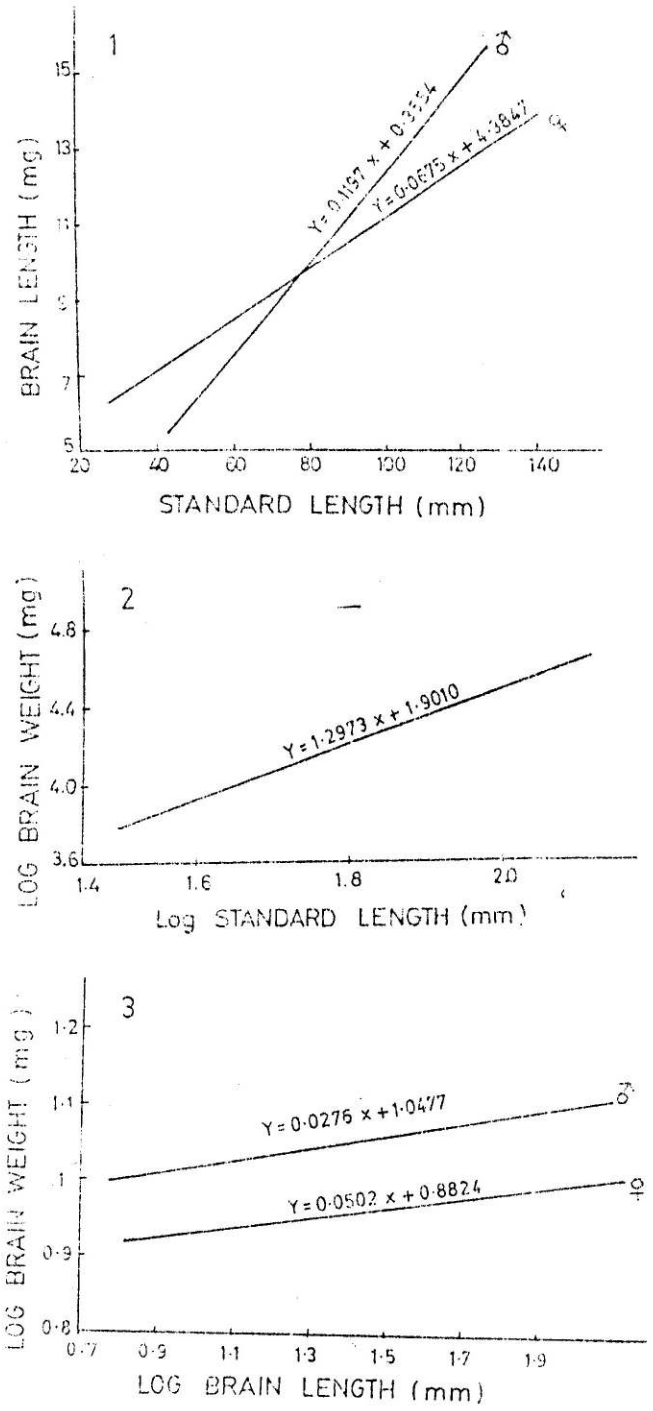
Table I : Results of Covariance analysis for Standard length, brain length and brain weight relationship in *Etroplus suratensis*

	df	SS	MSS	SS	MSS	SS	MSS
Females	75	159.83	2.131	0.6812	0.0090	2.44	0.03
Males	43	65.94	1.533	0.3629	0.0082	5.57	0.12
	118	225.77	1.9131	1.0441	0.0087	8.01	0.06
Pooled	119	239.38	2.0111	1.0455	0.0087	8.01	0.04
Difference between Slopes	1	13.612	13.612	0.00134	0.0013	0.0008	0.0008
FS (Comparing Slopes)		FS=7.1142*		FS=0.1535**		FS=0.0121**	
Fe (Comparing elevation)			Fe=1.4024**		Fe=6.58**		

* : Significant [$p<0.05$]; ** : Not Significant

DISCUSSION

The degree of correlation for various measurements of the brain and body can be calculated by quantitative analysis. Some significant allometric coefficient for intra specific, interspecific and interfamilial variabilities have been determined in a few fish species by Bauchot *et.al.* (1973 & 1979). The relative brain size with phylogenetic position aspects were noticed by Bauchot *et.al.* (1989). According to him the Larger brain size, relates to lower encephalization indices have less fear of predation and no differences in exephalization indices between herbivores and carnivores in the present study. *E. suratensis* being a visual feeder and taste feeder, correspondingly the centres associated in the brain were well developed supports the finding of Bauchot *et.al.* (1989) as fishes which have more than a single sense have highly developed brain size. Bhatt & Singh (1982) have studied the quantitative observations on the length-weight relationship of the brain and body in two cold water teleost. According to them the size of the brain



Figs. 1-3 : *E. suratensis,* regression lines showing relationship between.
1. SL-BL; **2.** Sl-BRW; **3.** BRL-BRW

increases with the growth of the body fully agrees with the findings of Sherly (2004) in *A. chackensis*. But in *Glossogobius giuris* medium sized fishes shown larger brains than juveniles (Sherly, 2003).

Albert *et.al.* (1999) presented the brain weight observation Table of 77 fishes representing 18 new families. Similarly Ebinger (1983) analysed the brain weight-body weight relations in 91 specimens. Riddet (1990) showed different encephalization between sexes.

The regression analysis in *E. suratensis* indicates that in two of the relationship highest growth rate was found in males. Gonzaloz *et.al.* (2009) male brain size was uncorrelated with care type not support the findings. Highest growth rate in males may be due to more complex social interactions associated with diet selection for larger brains.

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