

MORPHOMETRY, LENGTH-WEIGHT RELATIONSHIP AND FOOD
AND FEEDING HABITS OF *OTOLITHOIDES BIAURITUS*
(CANTOR, 1850) OF BOMBAY WATERS

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ABSTRACT

Thirteen morphometric and seven meristic characters, length-weight relationship and food & feeding habits of *Otolithoides biauritus* of Bombay coast were studied. Compared morphometric characters revealed positive allometric growth and high correlation ('r' ranging 0.898 - 0.996) between each other. Meristic characters were observed to be B_{VII} , D_1 8-10, D_2 27-31, P 17-20, V 5-7 and A 7-10. Number of gill rakers on the first left gill arch ranged from 15 to 19. Length-weight relationship for both sexes together worked out to be $W = 0.026L^{2.646}$. The species is a predator, feeding mainly on motile *Acetes*, small fish and *Loligo* in order of preference.

INTRODUCTION

Sciaenids form an important fishery along the Gujarat and Maharashtra coast of India contributing considerably to the marine fish landings. Gujarat contributed 33.4% and Maharashtra 16.6% to India's total landings of 1,09,000 tonnes of sciaenids during 1984-85. Of the 64 species of sciaenids *Otolithoides biauritus* and *Protonibea diacanthus* known as 'Koth' and 'Ghol' respectively in Maharashtra, grow larger in sizes, esteemed more as table fish and therefore fetch higher price than the other sciaenids. Although *O. biauritus* forms an important fishery of commercial value along the coast of Gujarat and Maharashtra, studies on morphometry, biology and population dynamics of this fish are meagre. Keeping this in view an attempt was made to study the above aspects of this fish from Bombay. The present paper deals with its morphometry, length-weight relationship and food & feeding habits.

MATERIAL AND METHODS

100 specimens of *O. biauritus* ranging 305-608 mm in length collected at random, during 1987 from New Ferry Wharf, Sassoon dock and Versova landing centres of Bombay formed the material for this study.

Morphometry and meristic characters were studied by adopting standard methods of Schneider (1956), Dwivedi & Menezes (1974) Acharya & Dwivedi (1985). In this study the total length or head length of the fish was taken as an independent variable (X) and the other characteristics according to suitability as a dependent variable (Y), for fitting regression $y=a+bx$ worked out by Least square method.

The length-weight relationship of the fish was established by using the formula $W=aL^b$, where W and L denote total weight in g and total length in mm respectively, 'a' is a constant and 'b' is an exponent, (LeCren, 1951).

Food and feeding habits was determined by analysis of gut contents of specimens allotting points (volumetric) based on eye estimation (Pillay, 1954; Acharya, 1980). 20, 15, 10 and 5 points were allotted for each of full, 3/4 full, 1/2 full and 1/4 full stomachs. In case of gorged and trace of food materials in stomachs, according to condition more than 20 and 2 points respectively were allotted for individual stomach.

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RESULTS AND DISCUSSION

Statistical analysis of morphometric characters of large number of specimens helps in fixing the identification characters of the species of a particular area more accurately than fixing identification characteristics by observing and studying a few specimens. Recent reports on this aspect by Dwivedi and Menezes (1974) on *Brachirus orientalis*, Dwivedi et al. (1976) on *Pampus argenteus* and *Parastromateus niger*, Chonder (1974, 1976) on *Gudusia chapra*, Alex (1979) on *Lycodapus mandibularis*, Acharya (1980) on *Nemipterus japonicus*, Acharya and Dwivedi (1984) on *Upeneus sulphureus* and Acharya and Dwivedi (1985) on *Trypauchen vagina* may be cited as examples. Very less work has been done on this aspect on sciaenids. A review of literature shows that Dwivedi and Roy (1975), studied the morphology of *Otolithus argenteus*.

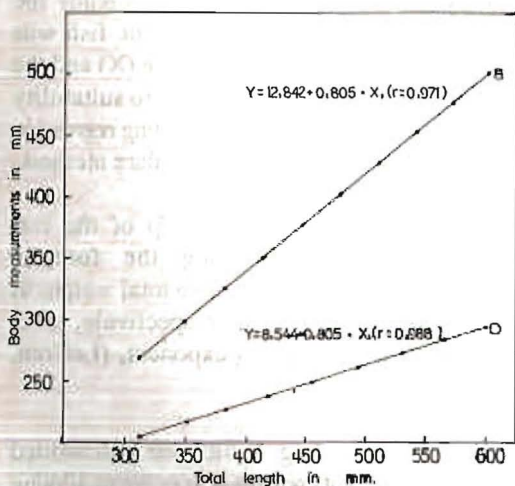


Fig. 1. Regression of different body measurements on total length (B = standard length; D = dorsal length) of *O. biauritus*.

Figs. 1-3 depict the regression of morphometric characters of *O. biauritus* studied. Characters compared against the total length were standard length (B), head length (C), dorsal length (D), ventral length (E), pectoral length (F), maximum body depth (G), minimum body depth (O), caudal length (I), and anal length (J), snout length (K), orbital

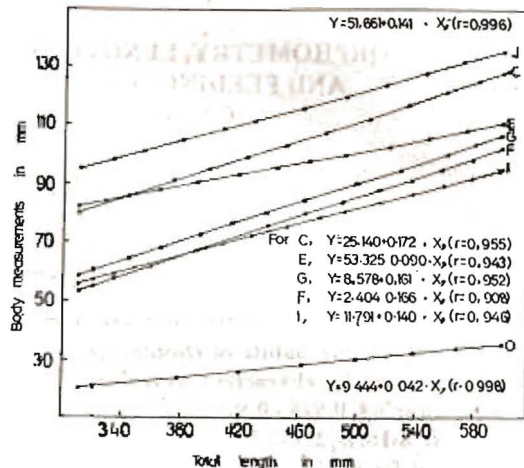


Fig. 2. Regression of different body measurements on the total length (C=Head length; E=ventral length; F=pectoral length; G=maximum body depth; I=caudal length; J=anal length; O=minimum body depth) of *O. biauritus*

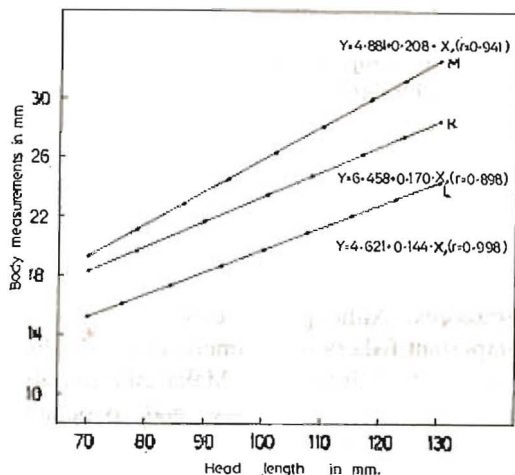


Fig. 3. Regression of different body measurements on the head length (K=snout length; M=interorbital width; L=orbital width) of *O. biauritus*.

width (L) and inter orbital width (M) were compared against the head length. The regression of these characteristics obtained by least square method indicated that the characters have positive allometric growth. High 'r' value ranging from 0.898 to 0.996 indicated that the compared characteristics were highly correlated to each other. Of the characters compared against total length, anal length showed the maximum ($r = 0.996$)

and pectoral length the minimum ($r = 0.908$) correlation, orbital width and snout length held highest and lowest ($r = 0.998$ and 0.898) correlation respectively with head length.

Study of meristic characters examined revealed that the specimens possessed 7 (constant) branchiostegal rays and 27-31 gill rakers on the left first gill arch. Number of spines and rays together of first dorsal, second dorsal, pectoral, ventral and anal fins ranged 8-10, 27-31, 17-20, 5-7 and 7-10 respectively. Accordingly the fin formula of *O. biauritus* of Bombay water could be fixed as B_{VII}, D_1 8-10, D_2 27-31, (P_{17-20}, V_{5-7} and A_{7-10}). Range, standard error, coefficient of variation, mean and mode of each of the meristic characteristics studied are depicted in Table I.

In the present study the linear regression of the length-weight relationship of *O. biauritus* from Bombay waters was

length becomes slower than rate of increase in weight.

Food and feeding habits is one of the basic aspects of biology of a fish on which its behaviour, habit, morphology (body

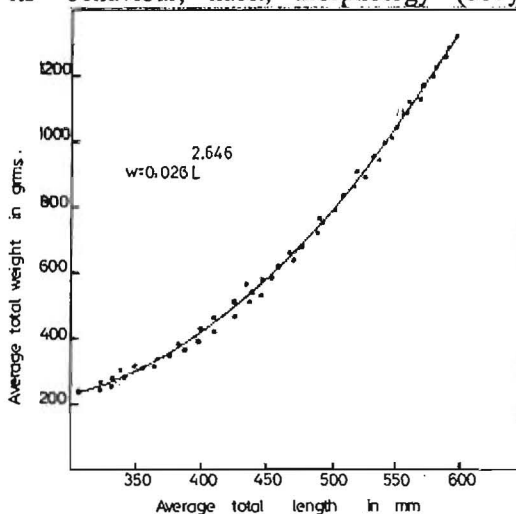


Fig. 4 : Length-weight relationship of *O. biauritus*.

Table I : Values of range, standard error, co-efficient of variation, mean mode of the meristic characters studied

Characters	N	Range	Standard error	Co-efficient of variation	Mean	Mode
1st Dorsal rays	100	8-10	0.0271	2.9779%	9.1205	9
2nd Dorsal rays	100	27-31	0.0951	3.2726%	29.0701	29
Pectoral fin rays	100	17-20	0.0938	5.0849%	18.4489	18
Ventral fin rays	100	6-7	0.0440	7.5790%	6.8101	6
Anal fin rays	100	7-10	0.0856	9.3780%	9.1301	10
Gill rakers	100	15-19	0.0980	5.6148%	17.5910	18
Branchiostegal rays	100	constant	—	—	7.0000	7

calculated as $W = 0.026 L^{2.646}$ or $\log W = 1.583 + 2.646 \log L$. Value of 'b' (2.646) suggests that the growth of the fish was not isometric. The fish grew a little slower than the cube of its length and retained its specific body shape throughout its life. High 'r' values ($r = 0.991$) indicated that the length and weight of *O. biauritus* from Bombay waters were highly correlated. Fig. 4 shows the general curvilinear relationship obtained by plotting average weight of the fishes of different length groups against average lengths indicating that with lapse of time, rate of increase in

shape), even life cycle depends on and hence needs to be understood fully not only for commercial purposes but also for formulation of policy for management of its fishery. Works on this aspect on some sciaenids have been done by Savant (1963) on *J. dussumieri*; Vaidya (1966) on *O. ruber*; Rao (1963) on *P. diacanthus*; Basu (1975) on *O. argenteus*, Bhusari (1977) on 4 important sciaenids of Ratnagiri and Gulati (1986) on *O. cuvieri*. However, there is no published work on *O. biauritus*.

The present study, on analysis of gut contents of 100 specimens collected at random during the year 1987, revealed that the guts of almost all specimens had a good amount of digested jelly like matrix which itself did not constitute any particular food item but was a product of all types of food items (unrecognisable) ingested by the fish besides only a few identifiable items in semi-digested and broken form. These were *Acetes* spp. fry of other fishes and *Loligo*. To find out if any differences, existed in the feeding habits in different length groups of the collected specimens ranging 305-608 mm, these were classified into three length groups viz. 305-400 mm, 400-500 mm and 500-608 mm. Percentage composition of the food items pooled together and separately for three different length groups are given in Table II.

Acetes: Percentage composition of *Acetes* spp; in the gut contents was the highest (64.55%) in the length group 305-400 mm and in the next largest length group of 400-500 mm. Percentage of *Acetes* was also highest (51.25%) when data for all specimens were pooled together. However, in the length group constituted by the largest specimens (500-608 mm) percentage composition of *Acetes* was shifted to second position (45.0%) by a small margin (2.5%) from fish fry. This indicated that *O. biauritus* in general preferred *Acetes* over the other food items. But larger specimens preferred to feed on fish fry than *Acetes*.

Fry of fish: Small fishes, whole, broken or in communitated form were encountered at highest percentage (47.5%) by volume in the guts of specimens belonging to the

Table II : Total points gained by each length group of fishes and percentage composition (in parenthesis) of the three most important items of food of *O. biauritus*

Class interval	Fish	<i>Acetes</i> spp.	<i>Loligo</i>	Total
Groups - I				
300-320	--	15	--	15
320-340	19	15	--	34
340-360	--	--	--	--
360-380	4	11	--	15
380-400	5	10	--	15
Total	28 (35.44%)	51 (64.55%)	0 (0.00)	79
Groups - II				
400-420	16	27	1	44
420-440	29	48	1	78
440-460	44	38	3	85
460-480	52	36	8	96
480-500	38	56	4	98
Total	179 (44.63%)	205 (57.25%)	17 (4.23%)	401
Groups - III				
500-520	22	23	7	52
520-540	43	24	1	68
540-560	1	9	--	10
560-580	5	5	--	10
580-600	--	--	--	--
600-620	5	11	4	20
Total	76 (47.5%)	72 (45.00%)	12 (7.5%)	160
Grand Total	283 (44.21%)	328 (51.25%)	29 (4.53%)	640

largest length group 500-608 mm. In other two length groups viz. 305-400 mm and 400-500 mm and also when data for all fishes were pooled together the preference of fish fry in the diet of *O. biauritus* was observed to lie in second position. In these length groups fish fry was observed to occupy 35.44% and 44.63% respectively by volume.

Loligo : This occupied third position by occupying 4.23% and 7.5% in the length groups 400-500 mm and 500-608 mm respectively. Pooled data for all fishes together indicated the same preference i.e. third preference for this item of food (4.53%). In the diet of smallest group of fishes ranging from 305-400 mm *Loligo* was absent indicating that *Loligo* enters in the food spectrum of *O. biauritus* when it grows more than 400 mm by length.

No vegetative matter was encountered in any of the 100 guts examined.

Thus the analysis of gut contents of *O. biauritus* revealed that *O. biauritus* of Bombay coast prefer a very narrow spectrum of food as diet. The fish is a predator, feeding mainly on *Acetes spp*; small fish fry and *Loligo* by hunting, larger fishes prefer fish fry more. Absence of polychaeta, or other bottom living organisms and detritus in the guts indicates that the fish is not a bottom feeder. Total absence of vegetative matter and small planktonic forms in gut, presence of sharp teeth, strong gill rakers in small numbers and larger motile food items in the stomach supported the assumption that it is not a herbivore.

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