

### Short Communication

## Morphometry and length-weight relationship of obtuse barracuda *Sphyraena obtusata* (Cuvier) (Teleostomi/Actinopterygii/Sphyraenidae) from Bombay waters, west coast of India

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The morphometric and meristic studies on obtuse barracuda *Sphyraena obtusata* from Mumbai (Bombay) waters indicated allometric relationship and high degree of homogeneity within the population. Based on the present study, the fin formula can be written as B. vii, D. 5, 1/9, P. 14, V. 1/5, A. 2/9, C 17, Ll. 90-95, two gill rakers on the first gill arch. Variations observed in some of the meristic counts when compared with findings from different locations indicate the presence of different stocks. The length-weight relationship for the species from the Mumbai waters is estimated to be  $W = 0.0000245L^{2.7226}$ . Deviation in the growth rate "b" observed during the present investigation from that of other countries and different region in India itself is result of variations in ecology of these geographical locations.

[**Keywords:** Morphometry, meristic characters, length-weight relationship, barracuda]

Morphometric study is a powerful tool for characterizing strains of the same species, which involves detection of subtle variation of shape, independent of size. Similarly, a mathematical representation of length-weight relationship derived from study of different sexes and sizes from a particular area is very useful tool for study of biology, physiology, ecology, population dynamics, fisheries assessment, and general conditions of the studied population. It also plays very important role in population assessment<sup>1</sup>. Any deviation from the established relationship indicates variation in the ecology of the habitat or physiology of the fish or both.

Obtuse barracuda *Sphyraena obtusata* (Cuvier, 1829) (Teleostomi/Actinopterygii/Perciformes/Sphyraenidae) is one of the most commonly occurring barracudas, contributing 1.33% to the marine fishery of India<sup>2</sup>. There is no report on morphometry and length-weight relationship from Mumbai (Bombay) waters till now. Therefore, the present study on morphometric characteristics was undertaken to provide the population characteristic of the species from Bombay region and length-weight relationship would contribute to some basic parameters of population dynamics apart from growth characteristic.

During the present study a total of 174 specimens of *S. obtusata* ranging from 173 to 435 mm (length) and 31 to 400 g (weight) were collected weekly (10-20 specimens each visit) from two fish landing

centres, New Ferry Wharf and Sassoon Docks in Mumbai (lat. 18° 54' to 19° 09'N and long. 72° 47' to 72° 56'E) during January 2001- January 2002. Fresh fish samples brought to the laboratory measured to the nearest 0.1 mm (total length) and weighed to the nearest of 0.1 g (total weight) after washing in tap water and wiping with blotting paper. Later, various morphometric characters were measured and meristic counts were made following standard procedure<sup>3</sup>. The morphometric characters studied included the relation of total length (TL) with length of predorsal fin I (PDL1) & II (PDL2), prepectoral fin (PPL), preventral fin (PVL), preanal fin (PAL), snout (SL), body depth (BD) and caudal depth (CD). The meristic characters studied are the number of branchiostegal rays, rays on pectoral, dorsal, ventral and anal fins; gill rakers and number of scales on lateral line. Students' *t*-test was applied to verify the significance of difference in morphometric characters of males and females. Meristic characters were subjected to standard statistical analysis including range, mean, mode, standard deviation, standard error, variance, and coefficient of variance. The length-weight relation was estimated by exponential curve fitting as per the formula  $W = aL^b$ . This equation can also be expressed in its logarithmic form  $\log W = \log a + b \log L$ , where, W=total weight (g), L = total length (mm), a = intercept (initial growth coefficient or condition factor), b = slope (growth coefficient, i.e., relative growth of fish). The parameters a and b of weight-

length relationships were estimated by linear regression analysis (least square method) on log transformed data and the association degree between variables (W and L) was calculated by the determination coefficient ( $r^2$ ). Additionally, 95% confidence limits of the parameters a and b and the statistical significance level of  $r^2$  were estimated.

Simple straight line regression of standard length, predorsal length, preventral length, prepectoral length, preanal length, body depth, and caudal depth against total length indicates allometric relationship and high degree of homogeneity within the population as also evident from  $r^2$  values (Table 1).

Number of spine on the dorsal fin I (5), rays on caudal fin (17), ventral fin (5), branchiostegal (7), and gill rakers (2) are constant. Rays on dorsal fin II

ranged from 8-9, pectoral fin from 13-14, anal fin 7-9, and number of scales on lateral line 90-95 (Table 2). The range, mean, mode, standard deviation, standard error, variance and coefficient of variance indicate a high degree of homogeneity within the population.

The fin formula given by Day<sup>4</sup> does not correspond strictly with the other authors and the present study. Day<sup>4</sup> recorded 1 anal spine, while other workers and the present study observed the presence of 2 anal spines. Day<sup>4</sup> recorded 90 scales on the lateral line, while Bal & Rao<sup>5</sup> reported 82-90, Myers<sup>6</sup> 80-90, while 90-95 scales were recorded during the present study. However, the other meristic counts agree with numbers recorded by others as well as by Day<sup>4</sup> (Table 3). The differences found in meristic count may be due to the presence of different stocks of the species in different geographical locations.

Table 1—Values of constants a and b in the linear regression of various characters on the total length or head length together with the respective r and  $r^2$  values

Morphometric characters	a	b	r	$r^2$	Std error of estimate
Pre dorsal length - I	9.613	0.3232	0.989	0.978	3.52
Pre dorsal length - II	5.567	0.5146	0.974	0.949	12.02
Pre ventral length	4.365	0.3210	0.995	0.990	2.40
Pre pectoral length	15.497	0.2134	0.977	0.954	3.47
Pre anal length	1.735	0.6130	0.984	0.967	4.6
Snout length	1.055	0.1133	0.973	0.946	3.21
Body depth	6.602	0.1006	0.955	0.912	3.78
Caudal depth	1.633	0.0578	0.928	0.862	1.74

a = intercept, b = coefficient of regression

Table 2—Details of various meristic characters (n = 176)

Character	Range (no.)	Mean (no.)	Mode	Std. deviation	Std error	Variance	Coefficient of variance
Dorsal finrays-I	5	5	5	0.0	0.0	0.0	0.0
Dorsal finrays-II	8-9	8.78	9	0.7108	0.0311	0.1688	4.67
Pectoral finrays	13-14	13.77	14	0.4233	0.032	0.1792	3.07
Ventral finrays	5	5	5	0.0	0.0	0.0	0.0
Gill rakers	2	2	2	0.0	0.0	0.0	0.0
Branchiostegal rays	7	7	7	0.0	0.0	0.0	0.0
Lateral line scales	90-95	93.73	93	0.848	0.642	0.72	0.907
Anal finrays	7-9	8.73	9	0.4830	0.0366	0.233	5.52
Caudal finray	17	17	17	0	0	0	0

Table 3—Comparison of meristic characters reported for different regions

Meristic characters No.	Present study (Bombay)	Day <sup>4</sup> (India)	Bal & Rao <sup>5</sup> (India)	Myers <sup>6</sup> (Micronesia)
I Dorsal fin rays	5	5	5	6
II Dorsal fin rays	1/9	1/9	1/9	1/9
Pectoral fin rays	14	14	14	13
Ventral fin rays	1/5	1/5	1/5	1/5
Anal fin rays	2/9	1/9	2-3/8-9	2/9
Caudal fin rays	17	17	17	-
Gill rakers	2	2	-	2
Branchiostegal rays	7	7	-	-
Lateral line scales	90-95	90	82-90	80-90

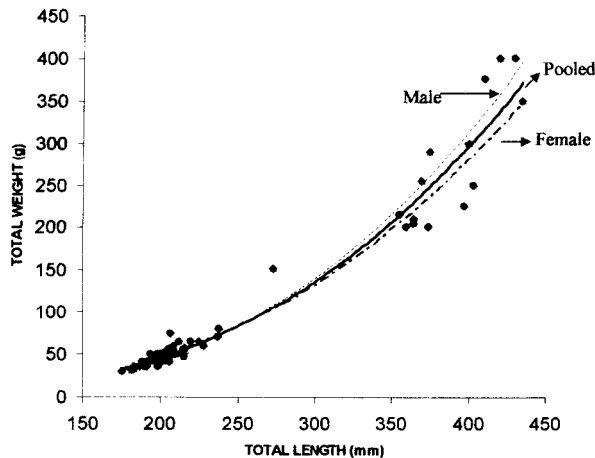


Fig. 1—Length-weight relationship of *Sphyræna obtusata*

Table 4—Length-weight relationship of *S. obtusata* from different countries

Locality/Country/ Reference	Size (mm)	a	b
Lagoon New Caledonia <sup>13</sup>	190-265	0.0370	2.472
Western region Indonesia <sup>14</sup>	120-500	0.0095	2.868
Visayas Philippines <sup>15</sup>	—	0.0070	3.000
Gulf of Mannar India <sup>8</sup>	160-400	0.0041	3.131
Bombay, India (present study)	181-435	0.0000245	2.7226

The length-weight relationships for *S. obtusata* was found to be  $W = 0.0000245L^{2.723}$  for male,  $W=0.0000218L^{2.744}$  for female and  $W=0.0000274L^{2.726}$  when pooled (Fig. 1). The analysis of covariance shows that the length-weight relationship between sexes was not significant at 5% level. However, a difference in growth rate of male and female was seen from south west coast of India, it was worked out as  $W = 0.016512L^{2.6872}$  for male and  $W = 0.011007L^{2.8388}$  for female<sup>7</sup>. Though the length-weight relationship for the species from Mumbai (present study) obtained is  $W = 0.000245L^{2.7226}$ , the same from Gulf of Mannar<sup>8</sup> was reported as  $W = 0.00413L^{3.1318}$ . The present findings on length-weight relationship also differ with findings from other countries (Table 4).

The regression coefficient value  $b=3$  for length-weight relationship indicates that the fish grows symmetrically or isometrically (provided its specific gravity remains constant). Values other than three indicate allometric growth. Fishes having  $b$  value as 3 maintain their specific body shape throughout their life<sup>4,5</sup>. Variation in the relative growth  $b$  reported for different places suggests interregional difference in

length-weight relationship of the fish. Geographical variation has already been documented by various workers for many fishes<sup>9,10</sup>. Some investigators correlated this fact with the variations in ecological conditions of two habitats or variation in the physiology of the animals, or both<sup>10,11</sup>. Thus, the variation in the length-weight relationship of *Sphyræna obtusata* at different places may be due to geographical and ecological differences which lead to difference in water quality parameters and food availability that are responsible for growth of the fish<sup>12</sup>.

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