

# On the Eye Diameter - Total Length Relationship of the Indian Mackerel *Rastrelliger kanagurta* (Cuvier)\*

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791 mackerel along the coast Karnataka during 1979-80 season was studied for total length-eye diameter relationship. It was found that mackerel having the eye diameter range 0.5 to 0.9 cm belong to 1 year old group, 1.0 to 1.2 cm to 2 year old group and 1.3 to 1.5 cm to 3 year old group.

Among the many morphometric characters, eye diameter of fish has attracted little attention in the field of fishery research. When compared to other morphometric characters, eye diameter seems to have no significant role to play in taxonomical work. The present note aims in correlating the eye diameter of the Indian mackerel *R. kanagurta* to total length and hence to age of the fish.

This study forms part of an investigation on the biometry of mackerel populations along the coast of Karnataka. For this purpose monthly samples of mackerel were collected from purse seine boats of Mangalore. Eye diameter was one of the selected morphometric characters along with others like total length and standard length. 791 mackerels were observed and bivariate frequency table of eye diameter and total length is shown in Table 1.

A perusal of Table 1 will show that the distribution of both total length and eye diameter is a multimodal one, when viewed separately. Hence each can be split up into independent normal components for total length and eye diameter. The split normal components are shown by thick lines in Table 1. The cell frequencies for each combination of eye diameter and total length are pooled and represented in Table 2. This bivariate frequency table clearly brings out the close relation between total length and eye diameter in *R. kanagurta*.

For the same group of 791 mackerels, Udupa & Bhat (1984) have indicated that mackerel whose average lengths are 19.4 cm, 23.45 cm and 25.2 cm belong to 1, 2 and 3 year old group respectively with length ranges of 14-20 cm, 20-24 cm and 24-26 cm. The eye diameter studies also have brought out identical results. From Table 2, it is seen that out of 791 mackerels, 103 belong to 14.0-19.4 cm group with eye diameter range 0.5 to 0.9 cm, 577 mackerels in the length range of 19.5 to 23.4 cm with eye diameter range 1.0 to 1.5 cm and 59 more mackerel in the same eye diameter range, but with different length range 23.5 - 26.4 cm, which means overlapping of the frequency distribution of total length with eye diameter of *R. kanagurta*. But, in Table 1 it is seen that the frequency distribution of mackerel with the eye diameter range 1.0 to 1.5 cm is positively skewed. Hence as an approximation to missed observations 1.3 - 1.5 cm group is separated from that of 1.0 - 1.5 cm group, and 0.5 to 0.6 cm group is pooled with 0.7 - 0.9 cm group since 0.5 - 0.6 cm group is not well represented. Thus, the total length - eye diameter relationship with age of mackerel is described in Table 3. Following the diagonal cell frequencies in this bivariate frequency table, it can be concluded that mackerel with eye diameter 0.5 - 0.9 cm belong to 1 year old group, 1.0 - 1.2

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Table 1. Bivariate frequency distribution of total length-eye diameter of *R. kanagurta*

Size in cm	eye diameter in cm (x)											Total
	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	
14.0-14.4		1										1
14.5-14.9		4										4
15.0-15.9	1	9										10
15.5-15.9	1	5										6
16.0-16.4	1	1	1		1	1						5
16.5-16.9				1								1
17.0-17.4		3			1							4
17.5-17.9	1	3	3	10		2						19
18.0-18.4		5	1	25		9						40
18.5-18.9		1	2	16		13	2					34
19.0-19.4				4	2	20	3					29
19.5-19.9				1		21	9					31
20.0-20.4					1	12	23					36
20.5-20.9						13	58	3				74
21.0-21.4						21	176	23	1			221
21.5-21.9						7	95	32				134
22.0-22.4						4	44	23				71
22.5-22.9							3	5				8
23.0-23.4								2	2			4
23.5-23.9								1	1			2
24.0-24.4								3	5	1		9
24.5-24.9								1	11	3	1	16
25.0-25.4								1	7	4	2	14
25.5-25.9									2	7	3	12
26.0-26.4									1	5		6
Total	4	32	7	57	5	123	413	94	30	20	6	791

Table 2. Total length-eye diameter relationship in *R. kanagurta*

Size range cm	Eye - diameter (cm)			Total
	0.5-0.6	0.7-0.9	1.0-1.5	
14.00-16.90	23	3	1	27
17.00-19.40	13	64	49	126
19.50-23.40	—	2	577	579
23.50-26.40	—	—	59	59
Total	36	69	686	791

Table 3. Age-eye diameter relationship of *R. kanagurta* with size range

Age (Year)	Size range cm	eye-diameter (cm)			Total
		0.5-0.9	1.0-1.2	1.3-1.5	
1	14.0-19.40	103	50	—	153
2	19.5-23.40	2	574	3	579
3	23.5-26.40	—	6	53	59
Total		105	630	56	791

cm belong to 2 year old group and 1.3 - 1.5 cm belong to 3 year old group. From Table 1, the total length - eye diameter relationship is found to be  $r^2 = 0.8989$ , in which case, the regression of total length on eye diameter is given by  $y = 9.6533 + 10.612x$ . The regression equation can be used as prediction equation, for estimating total length and hence the age of fish using eye diameter of mackerel alone.

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#### Reference

Udupa, K.S. & Krishna Bhat, C.H. (1984)  
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