LENGTH FREQUENCY AND GROWTH STUDIES ON CYNOGLOSSUS MACROLEPIDOTUS (BLEEKER) OFF BOMBAY COAST

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ABSTRACT

Specimens randomly collected from Sassoon Docks at monthly intervals during 1979 to 1981 were considered for age/growth studies of *Cynoglossus macrolepidotus*. The fish attained a length of 202 mm at 1 year, 250 mm at 1 1/2 year and 272 mm at 21 months respectively and that the maximum length of the fish could be 353 mm and the life span could be 7 years. The scale ring studies showed presence of only 0 to 3+ rings. Majority of the fishes were of 1 and 1+ year class.

INTRODUCTION

Several authors have studied age and growth in many commercial fishes. For determination of age and growth in flat fishes, methods used are check of scales on the snout and length-frequency distribution. Seshappa and Bhimachar (1954) and Kutty (1967) have studied the age and growth of some cynoglossids. Studies on the ecology and biology of *Cynoglossus macrolepidotus* were made by Rao (1985). According to Devaraj (1983) it is diffcult to arrive at reliable age-length key for tropical fishes due to problems arising mainly from protracted spawning and multiple broods comprising individual year classes. However, when familiar method of length-frequency analysis for age determination is appropriately modified it serves the purpose of age determination of tropical fishes (Devaraj, 1982). Hence this method was followed in the present study to determine the age and growth of *C.macrolepidotus*.

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MATERIAL AND METHODS

4646 specimens of *C. macrolepidotus* were collected at monthly intervals from Sassoon Docks from December 1979 to February 1981. Specimens ranging from 70 to 350 mm were measured and grouped into size groups of 10 mm interval.

A single frequency polygon was prepared. The modal lengths for each month were plotted for the scatter diagram technique of modal progression analysis (Devaraj, 1982). The trend in the progression of the modes through time was then indicated by an eye-fitted line. The fitted line was extrapolated freehand with reference to the intermodal slopes, so that it intersected the time axis indicating the time of brood origin, the number of broods per year class, the periodicity of brood release, the growth of the brood since its origin through successive months and approximate longivity of the fish. From data, the mean length at age was estimated. The mean length at age data was used for the estimation of the growth parameters according to Von Bertlanffy growth equation (Bagenal, 1955).

$$Lt = L_\alpha \ (1 - e^{-K(t-t_0)})$$

where Lt = length at age t
L_α = assymptotic length
e = the base of natural logarithm
K = the growth coefficient and
t_0 = the arbitrary origin of growth

The scales on the eyed side from the pectoral region below the mid lateral line were collected by rubbing with wet hand. The scales were mounted on slides and observed under microscope for the number of rings.

RESULTS AND DISCUSSION

The length-frequency graphs were polymodal indicating that *C. macrolepidotus* is a protracted spawner (Fig. 1). Studies on maturation and spawning showed that this fish had spawning activity from June to December. Length frequency distribution showed that the fishes of smaller sizes occurred in higher percentages during January and February 1981, indicating that there was recruitment of the new brood into fishery during this period.

When growth parameters were estimated, the following results were obtained.
K = 0.07054 (on monthly basis)
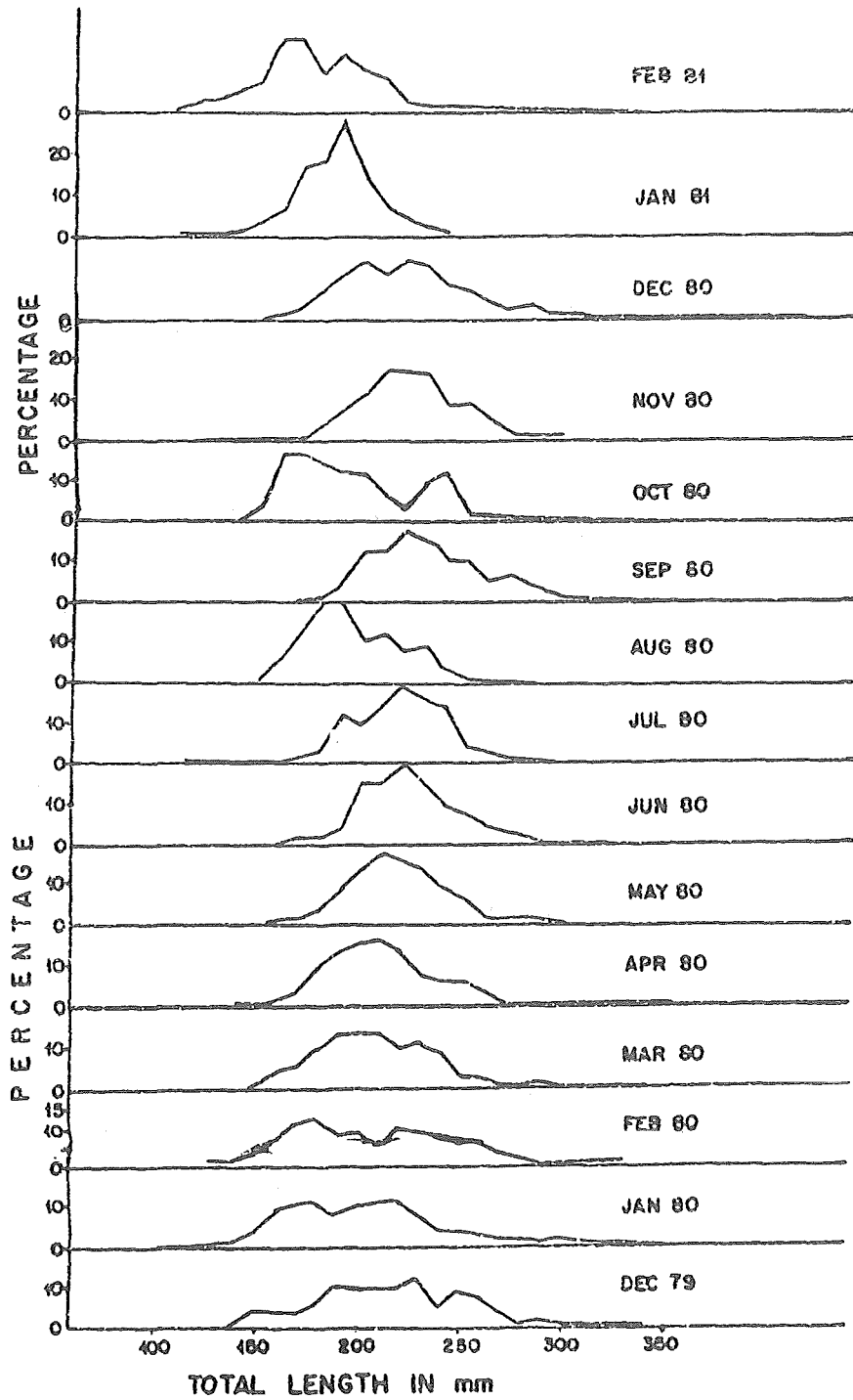L_α = 353 mm
t_0 = -0.0161 (month)

Fig. 1 Length - frequency distribution of *C. macrolepidotus*

From the results as given above it was seen that at t_o, the age of the fish was -0.0161 month, at $T.\alpha$ approximately 7 years and finally attained a maximum length of 353 mm. This data was in confirmation with the only report on *C. macrolepidotus*, indicating that the life span of the fish is 7 years (Kutty, 1967). Thus the Von Bertlanffy growth equation for this fish may be written as

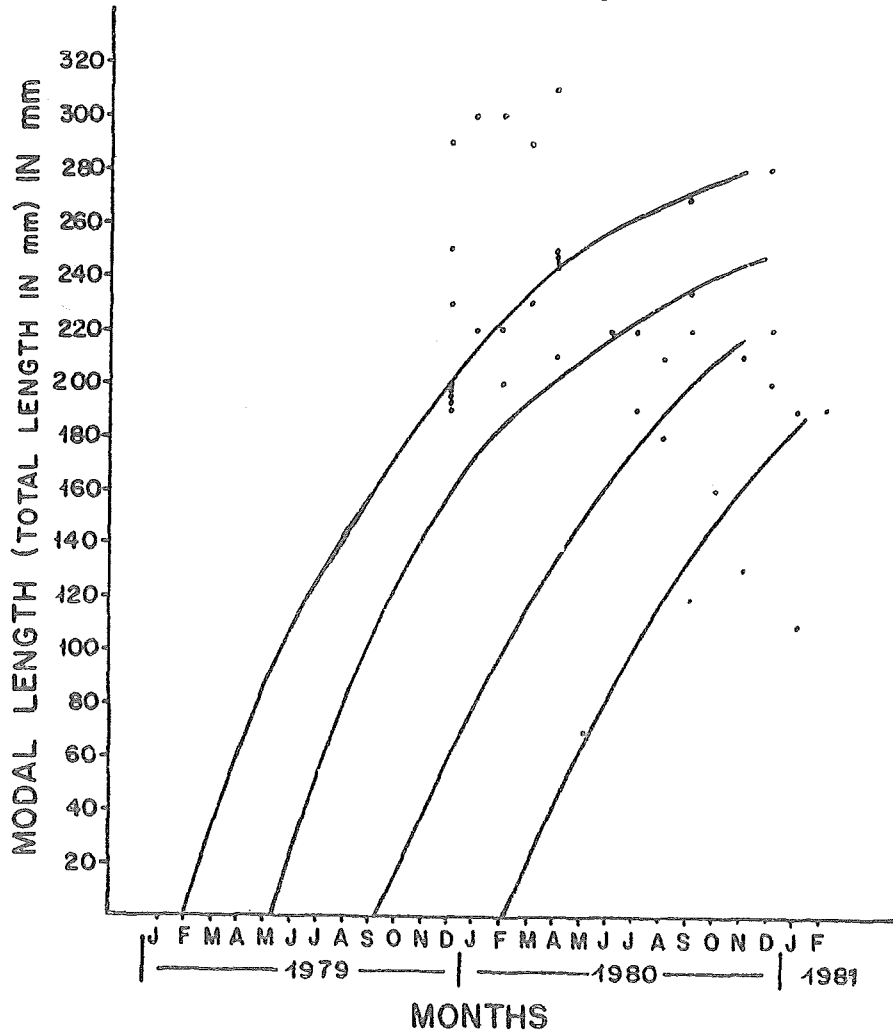$$Lt = 353 \ [1 - e^{-0.07054(t+0.0161)}]$$

Fig.2 . Scatter diagram of modal length-month.

The scatter diagram technique of modal progression analysis (Fig. 2) had shown that the respective length of fish were 70, 124, 168, 202, 250 and 272 mm at 3, 6, 9, 12, 18 and 21 months. (Table I). This was confirmed by the application of Von Bertlanffy growth equation. It was observed that theoretical lengths and observed lengths tallied (Table I). In scale ring study three growth rings

Table I: Estimated growth parameters and mean empirical length and calculated length
(Von Bertlanffy growth equation)

Age in months	Estimated parameters	Length at each month in mm	
		Mean empirical	Von Bertlanffy growth equation
1	L_∞ = 353 mm	28	24.32
2		52	46.84
3	K = 0.07054 per month	70	67.63
4		92	86.98
5	t_o = -0.0161	110	105.12
6		124	122.14
7		140	137.88
8		155	152.43
9		168	162.59
10		180	178.87
11		194	190.69
12		202	201.77
13		214	212.08
14		220	221.61
15		230	230.61
16		237	238.98
17		244	246.71
18		250	253.98
19		258˙	260.69
20		265	267.15
21		272	272.83

were observed and there was growth beyond the third ring in a few fish studied but not a single fish with four rings was found. Fish obtained mostly belonged to 0, 1 and 1+ year groups. Fish with no rings ranged from 115 to 214 mm. The 204-214 mm and 214 to 224 mm length groups had the first ring just being formed although fishes of 1+ ring group ranged from 165-234 mm which according to the length frequency studies were about 9 to 15 months old. Since the median of this range is 12 months it may be assumed that the first ring was laid down at an age of one year. The 2+ ring group fishes, the length ranged from 185-294 mm which according to the length frequency studies were 11 to 25 months. As the median of this range is 18 months, it may be assumed that the second ring was laid down when fish was about 18 months old. The 3+ ring group fishes ranged from 234 to 304 mm which according to the length frequency studies were 15 to 28 months and hence the median of this range, 22 months, may be taken as the age at which the 3rd ring was formed.

The commercial fishery of this fish consists mainly of zero and 1 year classes with a length ranging from 170 to 250 mm. This group consists of 84.38 percent of the total catch of the species. However, this fish is included under miscellaneous category as per the fish landing data for Bombay zone.

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