Age and Growth of *Labeo gonius* (Cyprinidae) in Kali River, Uttar Pradesh, India

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Abstract - Studies on the age and growth of *Labeo gonius* (Cyprinidae) collected from the River Kali, Uttar Pradesh, India, were made by analysis of the annuli found on the scales and through analysis of length-frequency data. A straight line relationship was observed between the scales and body length as expressed by the following equation: Y = -1.2127 + 1.0850 X. The fish attained mean lengths of 14.2, 20.6, 23.9, 26.4, 28.5 and 30.0 cm at the ages of I, II, III, IV, V and VI years, respectively. The growth of the species in cm could be expressed by the von Bertalanffy growth equation as: $Lt = 45(1-exp(-0.21 (t-t_0)))$. Some observations on seasonality of growth are presented.

The South Asian cyprinid *Labeo gonius,* commonly known as *khursa bata* in India, contributes to an important capture fishery with other major carps of the River Kali which is a valuable source of fish in western Uttar Pradesh. Despite intensified work on the biology of *L. gonius* during the last decade (Joshi 1981, 1985, 1987; Rana et al. 1982; Sharma et al. 1986), there is no published work available on the age and growth of *L. gonius*.

In the present investigation, regular collections of fishes were made during October 1972-October 1974 from the River Kali by cast net. Studies of age and growth were based on the examination of scales and analysis of length-frequency distribution. Scales were taken uniformly from the region directly below the dorsal fin and above the lateral line and studied following the method of Khan and Siddiqui (1973). Data for total length:scale length relationships were analyzed by regression.

The typical number of cycloid scales along the lateral line was found to vary between 74 and 84. The annuli were in the form of breaks which appeared as a wide clear space between circuli in the basal sector. The annuli were added systematically with the growth

in length of the fish and the distance between the adjacent annuli decreased as the fish grew.

In juveniles, the first growth check on the scales occurred in March-April; in adults, the growth rings appeared in April-July (Fig. 1). New growth rings were usually added in June.
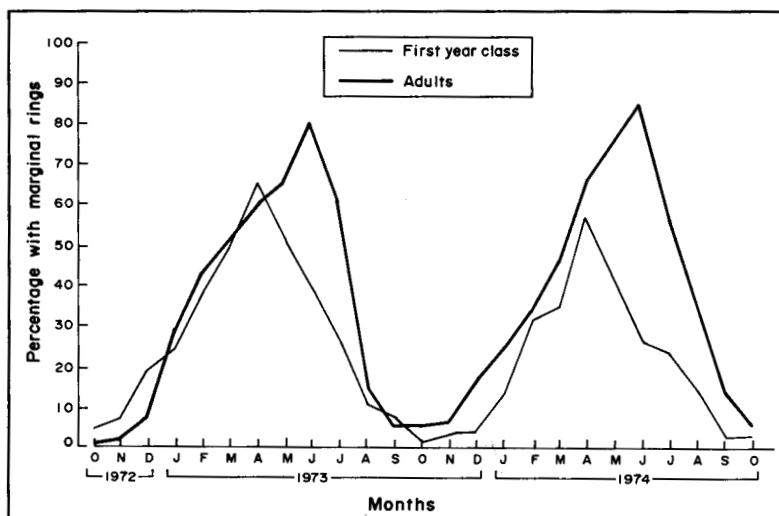

Fig. 1. Percentage of scales of *Labeo gonius* with marginal rings in different months.

A linear relationship was found between fish length and scale length. The regression equation expressing this relationship was calculated to be: $Y = -1.2127 + 1.0850 X$. Specimens ranged from 15.1 to 44.7 cm in length (Table 1).

The back calculated lengths from the fishes of different age groups and the average lengths at each annulus are given in Table 2. *L. gonius* had mean lengths of 14.2, 20.6, 23.9, 26.4, 28.5 and 30.0 cm at ages I, II, III, IV, V and VI, respectively.

The method developed by Ford (1933) and Walford (1946) for linearizing the von Bertalanffy Growth Function (VBGF), i.e., of plotting $L_t + 1$ against L_t is followed here. This led to estimates of asymptotic length $L_\infty = 45$ cm, and $K = 0.21$ years. Thus:

$$L_t = 45(1-exp^{(-0.21(t-to))})$$

where L_t = length at age 't' and where t_o' the arbitrary origin of the growth curve could not be estimated for lack of absolute age data.

Table 1. Length-frequency distribution of age groups of *L. gonius*.

Size groups (cm)	Age groups					
	I	II	III	IV	V	VI
15.0-20.0	4	-	-	-	-	-
20.1-25.0	88	9	3	-	-	-
25.1-30.0	2	66	10	-	-	-
30.1-35.0	-	3	51	6	2	-
35.1-40.0	-	-	3	42	7	1
40.1-45.0	-	-	-	-	6	5
Total number of fish	94	78	64	48	15	6
Per cent of total	30.7	25.8	20.9	15.6	4.9	1.9

Table 2. Calculated length of *L. gonius* at each annulus as determined by back calculation.

Age	Calculated length at different annuli (cm)					
	I	II	III	IV	V	VI
1	18.0	-	-	-	-	-
2	16.4	22.5	-	-	-	-
3	13.7	21.2	25.9	-	-	-
4	13.4	20.1	24.0	27.7	-	-
5	12.4	20.1	23.1	26.5	29.0	-
6	11.8	19.2	22.5	25.2	28.1	30.0
Grand mean	14.2	20.6	23.9	26.4	28.5	30.0

Examination of the outer margin of scales of *L. gonius* revealed that rings on the margin occurred only once in a year. Thus, these rings appear to be true annuli.

In *L. gonius*, the first year ring in juveniles was laid in April whereas, in adults, it formed in May-June which were the spawning months of the fish. In April the intensity of feeding was found to be minimum (Chatterji et al. 1977), so in juveniles, ring formation is correlated with the low intensity of feeding; while in adults, feeding intensity as well as maturation of gonads appear to be responsible for the formation of new growth rings.

Acknowledgements

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