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MATURATION BIOLOGY OF *GARRA LAMTA* (PISCES: CYPRINIDAE) FROM RIVER KHOH IN GARHWAL HIMALAYA

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ABSTRACT

The paper deals with the maturation biology of *Garra lamta* (Pisces: Cyprinidae) from the river Khoh of Garhwal Himalaya, Uttaranchal. Based on the GSI, Dobriyal index, and occurrence of fish of different stages of maturity round the year, it was concluded that the fish spawns in a single protracted attempt during July- August.

Keywords: *Maturation Biology, Garra Lamta, Khoh river*

INTRODUCTION

Maturation biology is an important aspect to be studied in fisheries as it is useful in its management. Fish exhibit different types of spawning tendencies, which can be studied from development of intra - ovarian eggs. *Garra lamta* is an important hillstream fish, which inhabits torrential coldwater streams. Some important contributions to the maturation biology of fish in India have been made by Desai (1973), Sobhana and Nair(1977), Vasudevappa and James (1980), Thakre and Bapat (1981), Singh *et.al.* (1985), Dobriyal and Singh (1993), Negi and Dobriyal (1997) and Dobriyal (2005).

MATERIAL AND METHODS

The fish were collected monthly from the entire stretch of Khoh stream between Kotdwara and Dogadda. Morphometric measurements were taken in the fresh condition and the fish were then preserved in 5% formalin solution for further examination. The present study is based on the macroscopic and as well as the microscopic examination of gonads in *Garra lamta*. For the macroscopic studies the gonads were removed and sex, physical appearance, length and weight of the gonads were recorded. For microscopic observation, only ovaries were taken in to consideration.

Gonado somatic index (G.S.I.): It was calculated for each fish by the following formula-

GSI = Wt. of gonad / Wt. of fish X 100

Dobriyal Index (Dobriyal *et. al.*; 1999): A newly designed and well in use index was found to be more accurate for the estimation of maturity, month and frequency of spawning. It was calculated as:

Dobriyal Index *(DI)* = $3\sqrt{GW}$

Where, D.I. = Dobriyal Index, G.W = average gonad weight calculated for each month for male and female fish separately.

For the determination of maturity stages, the sample of ova were collected from different regions of ovary and were microscopically studied. The ova diameters were measured by means of an ocular micrometer and at least 100 ova from each ovary were measured. The measurements were taken in omd (ocular micrometer division). On the basis of development pattern of ova round the year, seven stages of the maturity were determined.

Month and the frequency of spawning were determined on the basis percentage occurrence of fish of different maturity stages during different months of the year. Observations of mature, spent stage and occurrence of 1st immature stage are decisive factors of the month and the frequency of spawning. The value of GSI and DI were also used for the determination of month and frequency of spawning. Month with maximum values of these indices showed month of highest maturity, whereas fall is the indicator of first attempt of spawning. Percentage occurrence of mature fishes during pre-spawning and spawning seasons were taken for the study of determination of size at first maturity when arrange size wise (Thakre and Bapat, 1981, Dobriyal and Singh, 1987).

RESULTS AND DISCUSSION

The maturity stages of *Garra lamta* were classified on the basis of microscopic examination of the gonads and are presented in Table- 1. The ova diameter frequency polygons were drawn initially for each month and finally the stages were determined.

Table 1: Classification of maturity stages of *G. lamta* (Ham.)

Maturity Stages		Ocular Micrometer Division (1 omd = 0.016mm)	Peaks
I	Immature Ist	6 – 12 omd	6
II	Immature IInd	6 – 24 omd	12
III	Maturing Ist	7 - 40 omd	21
IV	Maturing IInd	10 - 54 omd	40
V	Mature Ist	10- 85 omd	70
VI	Spent Condition	5 - 25 omd	10

easily record even smallest attempt of spawning.

Table 4 : Percentage occurrence of mature (Females) of *G. lamta* during pre spawning and spawning season in various size groups.

Size groups (mm)	Number of mature fish	Percentage of mature fish	No. of Fish examined
81-90	1	25	4
91 - 100	3	30	10
101-110	3	42.85	7
111-120	4	50.0	8
121-130	7	53.84	13

A majority of teleosts fishes all over the world are seasonal breeder and in the Indian subcontinent a vast majority of freshwater fishes breed during the monsoon months of heavy rainfall. The determination of minimum size at maturity by the tabulation of percentage occurrence of mature fish during spawning season have been made by several workers (Sobhana and Nair, 1974; Vasudevappa and James, 1980; Thakre and Bapat, 1981; Dobriyal and Singh, 1987, 93; Negi and Dobriyal, 1997). The spawning season of a fish can be predicted from (i) the occurrence of mature fish, (ii) the recruitment of juveniles, (iii) the regression coefficient 'b', (iv) observations of the spent fish, (v) anlysis of GSI and DI, etc. On the basis of observations made on occurrence of mature and spent fish and the GSI and DI, it is concluded that the fish spawns during July- August.

REFERENCES

Desai, V.R. 1973. Studies on the fishery and biology of *Tor tor* (Ham) from river Narmada. *Proc. Indian Natn. Sci. Acad. 39* : 228-248.

Dobriyal, A.K. 2005. Diversity of spawning behaviour in the hillstream fishes of Garhwal Himalaya, Uttaranchal. In :M S Johal (Ed.) *Proceedings of National Seminar on New Trends inFishery Development in India, Chandigarh*. Pp. 135-140

Dobriyal, A.K. and Singh, H.R. 1987. The reproductive biology of a hill stream minor carp *Barilius bendelisis* (Ham) from Garhwal Himalaya, *India. Vest cs. Spolec. Zool.* 51 : 1-10

Dobriyal, A.K. and Singh, H.R. 1989a. Ecology of rhithrofauna in the torrential waters of Garhwal

Himalaya. India : fecundity and sex ratio of *Glyptothorax pectinopterus. Vest. Cs. Spole. Zool.* 53 : 17-25.

Dobriyal, A.K. and Singh, H.R. 1993. Reproductive biology of a hill stream catfish *Glyptothrax madraspatanum* (Day). From Garhwal, Central Himalaya, India. *Aquaculture and fisheries management., U.K.*, 24 : 699-706.

Dobriyal, A.K., Rautela, K.K. and Rautela, A.S. 1999. Invention of a new index for the determination of sexual maturity in fishes. *Uttar Pradesh J. Zool*, 19 (1).

Hickling, C.F. and Rutnberb, E. 1936. The ovary as an indicator of spawning period of fishes. *J. Mar. Biol. Ass. U. K.* 21 : 311-317.

Negi, K.S. and Dobriyal, A.K. 1997. Sexual maturity and spawning ecology of a hillstream carp *Crossocheilus latius latius* (Ham) from the glacier fed river Mandakini, Garhwal,Central Himalaya. *J. Inland Fish. Soc. India.* 29 (2): 26-33.

Singh, H.R., Dobriyal, A. K. and Nautiyal, B. P. 1985. Spawning patterns and environmental regulation of spawning in hillstream fishes. In: *The Endocrine System and the Environment* (Ed.) Follett, B.K. *et.al.*. Japan Sci. Soc. Press. Tokyo Springer-Verlag, Berlin. Pp.1- 11.

Sobhana, B. and Nair, Balakrishnan 1974. Observation on the maturation and spawning of *Puntius sarana subanastus* (Val.) *Indian J. Fish.*, 21 : 357-368.

Thakre, V.Y. and Bapat, S.S. 1981. Maturation and spawning of *Rasbora daniconicus* (Ham-Buch.). *J. Bombay Nat. Hist. Soc.*, 78 (1):38-45.

Wood, H. (1930). Scottish herring shoal. Pre spawning and spawning movements. *Scotland fish Bd. S. Invest.*, 1 : 1-71.

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