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# REPRODUCTION AND FECUNDITY OF INDIAN SPINY LOACH, *LEPIDOCEPHALUS THERMALIS*

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**ABSTRACT : In this paper, we report for the first time the resultsof histology of the Indian Spiny Loach (*L. thermalis*) gonads and the fecundity of females from South TamilNadu Region during the reproductive season. *L. thermalis* hasanachronistic ovary and are batch spawner. The batches of fish were analyzed under their suitable breeding conditions for 13 months. The behavioral changes during reproduction were observed and the fecundity was also calculated. The fecundity of the Indian Spiny Loach ranged from 1470 – 5194 eggs. The Gonadosomatic Index of *L. thermalis* of South TamilNadu region is 12.15±2.5.**

***Key words :*** Indian spiny loach, histology, gonadosomatic index, fecundity.

## INTRODUCTION

Loaches are hill stream freshwater fishes within the order Cypriniformes. *Lepidocephalus thermalis*, a cobitid fish, inhabiting a wide variety of habitats such as annual and perennial ponds, shallow channels and conduits, paddy fields which are subject to inundation during monsoon, shallow edges of streams, and rivers where the current are not strong, is commonly occurring loach of the Kerala state, lying in the extreme southwest of Peninsular India (Kumari and Nair, 1979). As per the report of Zoological Survey of India, 1999 there are 7 species from this genus *viz*., *Lepidocephalus annandalei, Lepidocephalus berdmorei, Lepidocephalus coromandalensis, Lepidocephalus guntea*, *Lepidocephalus irrorata, Lepidocephalus menoni* and *Lepidocephalus thermalis* (Menon, 1999). The Indian Spiny Loach (*Lepidocephalus thermalis*) has got a very good market value in Tamil Nadu and it is considered to be delicacy. Spined loach during the day remains buried in sand, mud or dense weed growths, being active at night and is mostly solitary (Coad, 2012). Loaches primarily settle in shallow areas of standing or slow-flowing waters where the substrate is fine sediment. However, in the early life stages, the young fish prefer a different microhabitat, as the survival of eggs and young loaches depends on the presence of dense vegetation. It is believed that the selection of loach habitat and their dependence on silty and sandy sediments and sediments rich in organic particles has resulted in their specialized feeding method – the shifting of the substrate. They eat in a very unusual way – using a filtration apparatus with sticky zones in the pharyngeal cavity (Caleta *et al*, 2012). Fecundity is defined as the total number of eggs present in ovary before spawning. The relation between fecundity and various body parameters like body length, body weight and ovary weight was found in this study. It is the indicator of auto recruitment of that species (Bahuguna and Khatri, 2009). Currently very few of the fish farmers are practicing the culture of loaches and most of the farmers are hesitant to take up this culture because there is no commercial culture technology available for this particular species and more over there is no studies about the artificial feeds of loaches. If artificial feeds with required protein level are developed, for the loaches, it will be a boon to fish farmers to take up this culture. The present work was undertaken to collect information on life-history of Indian Spiny Loach population in Southern Tamilnadu where we have no record about this fish (Renuhadevi, 2017).

## MATERIALS AND METHODS

The *L. thermalis* was collected from different places from Southern Tamilnadu from June 2016 toJune2017 (Figure1) In the aggregate fecundity of twenty five females was examined by volumetric method. Both mature testis (Fig. 2) and ovaries (Fig. 3) were used in histological

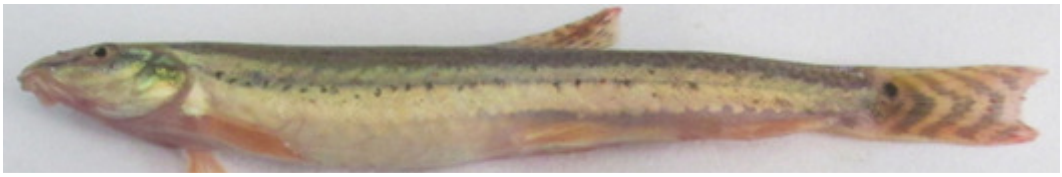

**Fig. 1 :** Indian spiny loach (*Lepidocephalus thermalis*).

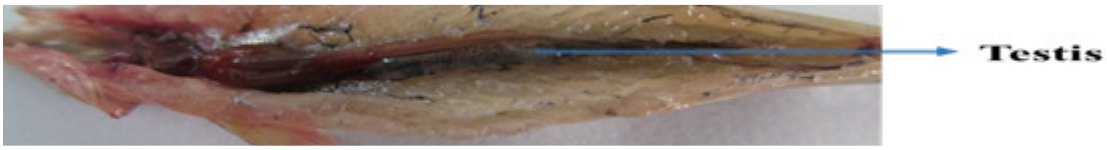


**Fig. 2 :** *Lepidocephalus thermalis* male.

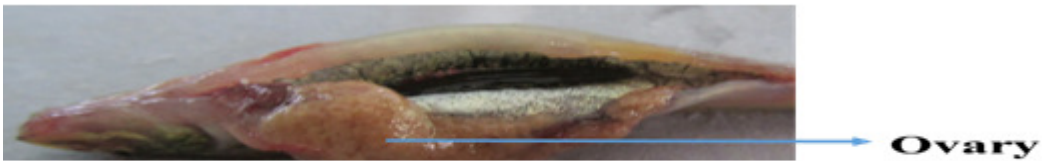


**Fig. 3 :** *Lepidocephalus thermalis* female.

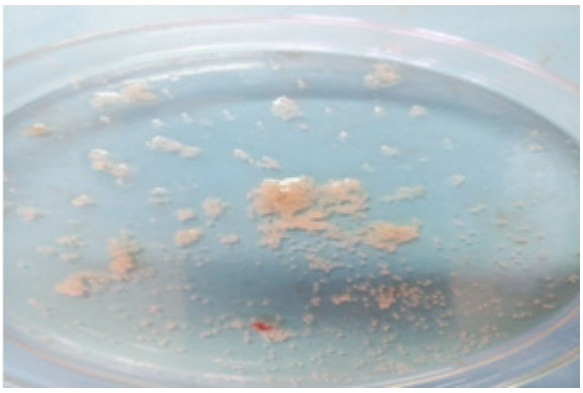

**Fig. 4 :** Collected eggs.


**Fig. 5 :** Length measurement.

analysis. Size of eggs (Fig. 4) can be measured by Reticle reading of twentyfive samples. The fecundity and histology was examined during June, August, November 2016. A total of ten testis were collected in May (n=5), June (n=5) 2017 for histological examination in this study. Water temperature was measured during each loach sample collection. The collected fish were measured for the length (Fig. 5) (L, Standard length) and weight (Fig. 6) (W, Body weight of fish), ovary weight (OW) (Fig. 7) in order to determine the GSI (OW/W × 100). Buffer formaline or Bouine solution was used for fixing the gonads. The male and female gonad tissues were dissected out and fixed in Bouin´s solution. The tissues were finally embedded in paraplast with dehydrated graded alcohol series followed by xylene. Blocks were then prepared and a film of 6µm thickness weremade using a rotatory microtome (Leitz, Wetzlar, Germany). The sections were treated with xylene to remove paraplast followed by rehydrated alcohol series and then stained using hematoxylin and eosin. After staining, the slides were dehydrated using graded alcohol series followed by xylene. Final mounting was done using DPX mountant. Sections were observed under Olympus CX41 bright field light microscope attached with a Micropublisher (Model-MP3.3) cooled CCD camera (Q-imaginanogram,BC, Canada) and photographed.

## RESULTS AND DISCUSSION

*L. thermalis* are very active when we observe their behavior. But, it is difficult to monitor their motion as they keep themselves buried in the sand or stay still in a place if any disturbance occurs. It is rare to identify their natural chasing behavior. During breeding the male sits overlapped on the female. Only with the breath rate of the fishes chasing can be confirmed. The breath rate increases than in normal.Fecundity has been defined as the number of ripening eggs prior to spawning and is a


**Fig. 6 :** Weight Measurement.

**Fig. 7 :** Weight measurement of Ovary

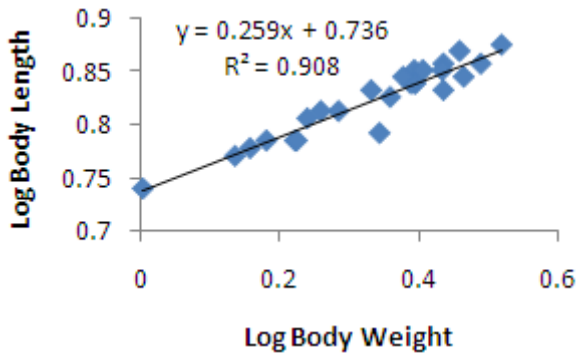


**Fig. 8 :** Logarithmic relationship between Body length and weight.

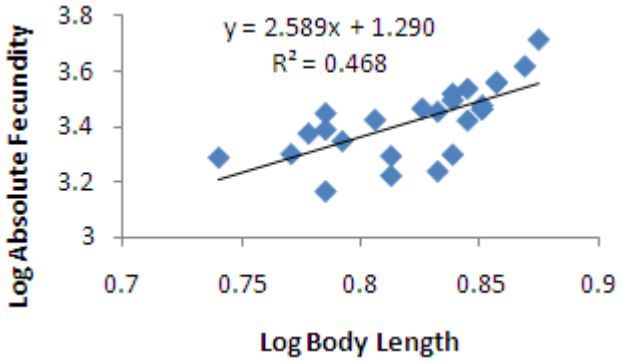


**Fig. 9 :** Logarithmic relationship between body length and absolute fecundity.

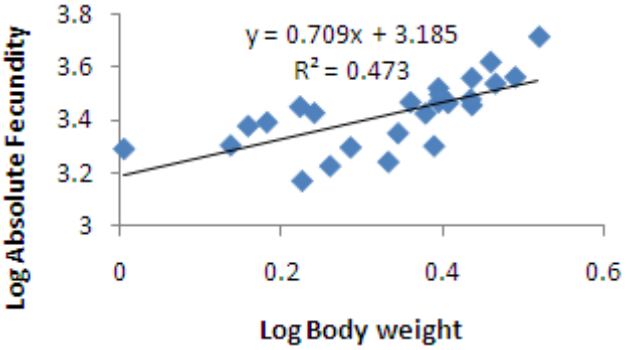


**Fig. 10 :** Logarithmic relationship between body weight and absolute fecundity.

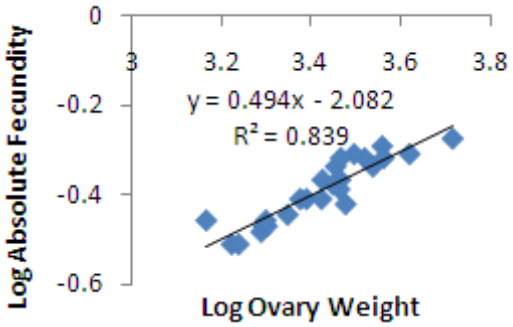


**Fig. 11 :** Logarithmic relationship between ovary weight and absolute fecundity.

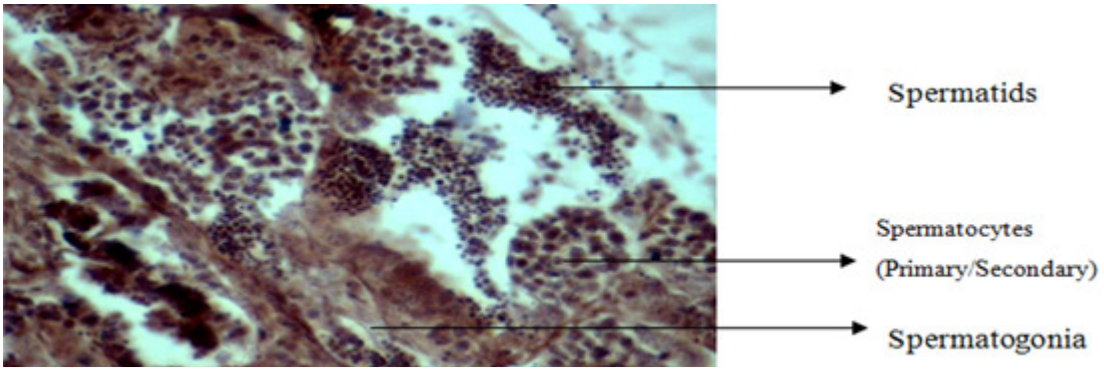


**Fig. 13 :** Mature testis.

**Table 1 :** Regression equations between various parameters.

| Parameter | $R^2$ Value | Regression Equation |
|---|---|---|
| L : W | 0.9081 | y = 0.259 x + 0.7365 |
| AF : L | 0.4687 | y = 2.5899 x + 1.2908 |
| AF : W | 0.4737 | y = 0.7094 x + 3.1858 |
| AF : OW | 0.8391 | y = 0.4945 x – 2.0827 |

main factor governing the size of a class of population (Muneera *et al*, 2014). Fecundity was noted down for each female and a comparison was done to find out fecundity according to weight of the female fish. F = n × (G/g), where F is the fecundity, n is the average number of eggs, G is the weight of the gonads and g g is the weight of the sub-sample. The fecundity was found by sacrificing 25 female fishes of the Indian Spiny Loach where the absolute fecundity (AF) ranged from 1470 - 5194. The average absolute fecundity recorded was 2766 whereas the average relative fecundity was 30.96. In this study, the relationship between absolute fecundity and total length (Fig. 8), body weight (Fig. 9) and ovary weight (Fig. 10) were statistically significant and linear. The length and weight relation was also found to be statistically significant and linear (Table 1, Fig. 11). The highest fecundity was found in the females with body weight above 3.31 g.

The gonadosomatic index values were used as an indicator of degree of Gonadal Development. It was found out by employing the formula,

$$GSI = \frac{\text{Weight of the gonad}}{\text{Total weight of the fish}} \times 100$$

The observed GSI was 12.15±2.5 for *L. thermalis* and it was similar to other loaches like *C. taenia* from the Timonchio River, Italy (Mosavi-Sabet *et al*, 2012), *Sabanejewia baltica* (Golden loach) from Bug river, Poland (Dorota, 2011) showed GSI diverse 12.7±2.9.

Histological section from the gonads of the male mature oocytes granulosa cell and primary follicle were observed. In the male mature testis spermatids, spermatogonia and spermatocytes were observed (Fig. 12) and in the female primary follicle, oocytes and granulose cells were found (Fig. 13).

## ACKNOWLEDGEMENT

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