Fecundity and Gonadal Maturity of Gongota Loach *Somileptes Gongota* (Hamilton) (Cobitidae) in the Habitat of the Someswari River

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**Abstract**

Fecundity and gonadal maturity of gongota loach, *Somileptes gongota* (=*Cobitis gongota*) (Ham.) were studied from October 2005 to September 2006. The fecundity of *S. gongota* varied from 1540 to 91500. The average fecundity was calculated as 34916.85 ± 25967.51. The maximum and minimum fecundities were determined as 72520± 13423.59 and 2891.44 ± 1084.19 in June and March, respectively. The relationships between fecundity and other variables were calculated and found to be straight, linear and positively significant. The gonadal maturity of *S. gongota* was determined by using five methods viz. Percentage of gravid females against time, Gonado-Somatic Index (GSI), Gonadal-length Index (GLI), Ova Diameter (OD) and Colour of Ovary (CO). The highest percentages of gravid females were recorded as 100 in June and July. The overall percentage of gravid females was determined as 58.15±30.11. The Gonado-Somatic Index level was recorded as 7.76 8.66 with maximum (26.17±3.13) in May. The Gonadal-Length Index level was determined as 35.34 ±10.40 having the highest (50.31± 3.04) in May. The Ova Diameter ranged from 0.1-1.5 mm with a mean value of 0.53± 0.3 mm. The highest ova diameter was found to be 1.40±0.23 mm in June. The colour of ovary was recorded as reddish orange and orange in the months of May to June and July, respectively.

**Key words:** Fecundity, Gonadal maturity Ova diameter

**Introduction**

An important member in the freshwater fish fauna is the loaches (Family Cobitidae) and they are poorly explored in Bangladesh. Loaches in Bangladesh are represented by 6 genera (Rahman 1989). Most of them are of small size inhabiting the hillstreams, a few are also found in the rivers and swamps. The loaches being small in size do not form an important fishery anywhere in Bangladesh. Of these, *Somileptes gongota* (Hamilton), locally known as Pahari gutum, is distributed in the streams and rivers of Mymensingh, Sylhet Division and Rangpur district (Rahman 1989) has failed to draw the attention of the fishery biologists and only brief aspects of its biology are available (Shafi and Quddus 2004, Rahman 1989). The Dahaki river and the Rangapani canal near Jaintiapur in Sylhet, the Someswari river near Shusang Durgapur in Netrakona and the Mahananda river near Tetulia in Panchagarh are largely inhabited by the loaches. Besides Bangladesh, this species is also distributed all over India (Srivastava 1968, and Talwar and Jhingran 1991).

An understanding of the reproductive biology of fish is the basic requirements for the successful management and exploitation of fisheries resources (Lagler et al. 1962). The determination of breeding season is an essential part of biological investigations of fishes (Reddy 1979), which is done through the observation of gonadal maturity. No work has been done on the biology of this rare species, *S. gongota* from Bangladesh water bodies.

The present investigation has been carried out to determine fecundity and gonadal maturity of *S. gongota* inhabiting the Someswari river of Netrakona district. It may help to induce artificial breeding, culture practices and fishing of *S. gongota*.

**Materials and Methods**

The present study describes the data on fecundity, total length, standard length, total weight, gonadal length, gonadal weight, ova diameter and gonadal colour of the cobitid fish of Bangladesh. The fish samples were collected once a month during October 2005 to September 2006 at Shusang Durgapur of the Someswari river of Netrakona. A total number of 220 samples were collected by cast nets and drag nets, and only mature female fishes were selected for the study of gonadal maturity along with measurements of...
total length, total weight, gonadal length and gonadal weight, and estimation of fecundity. After collection, the fishes were preserved in 10% formalin. Measurements of fishes were taken by means of a measuring board fitted with a centimeter scale and their weights were also recorded by means of a sensitive Pan Balance. The fishes were sexed after dissecting out the gonads. After dissecting out the ovaries, the same procedure was applied for length and weight measurements after dehydration with blotting paper. Fifteen to twenty ova were collected at random sampling from anterior, central and posterior parts of each ovary of each fish. Diameters of the collected ova was measured with the help of ocular and stage micrometers and calculated by calibration (Each micrometer division having equivalent to 0.01 mm). Colour of the ovaries was observed throughout the year. Gravimetric method (Lagler 1956) was used to determine fecundity. The values of the regression (b) and correlation (r) coefficients, 95% confidence limits of the regression coefficient, the intercept and the standard deviation were calculated using statistical formulae according to Snedecor (1956) and Simpson et al. (1960) to establish mathematical relationship between fecundity and other variables.

Gonadal maturation of \textit{S. gongota} was determined by using the following five methods: Percentage of gravid females against time, Gonado-somatic index (GSI), Gonadal-length index (GLI), Ova diameter (OD) and Colour of ovary (CO). Gonado-somatic and Gonadal-length indices were calculated after Jhingran (1961) and Kader et al. (1988).

**Results and Discussion**

**Fecundity**

**Estimation of fecundity**

\textit{S. gongota} is highly fertile and the number of eggs varied from 1540 (for a female of total length of 113 mm and total weight of 10.07g) to 91500 (for a female of total length of 122 mm and total weight of 15.85g). The average fecundity was calculated as $34916.85 \pm 25967.51$. (for the females of average total length of 115.74 mm and average total weight of $11.63 \pm 3.198$g). The highest fecundity was $72520 \pm 13423.59$ in June while the lowest fecundity was recorded as $2891.44 \pm 1084.19$ in March. The gonadal weight ranged from 0.11-4.40g showing the fecundity range of 1540-61600 eggs having total length and total weight from 9.8-11.8 mm and 3.57-14.20g, respectively. The gonadal length was found to be varied from 2.6 to 6.6 mm showing the fecundity range of 1625-66220 eggs in a total length and total weight of 10.6-12.4 mm and 6.0-15.95 g, respectively. Usually bigger fishes exhibited higher fecundity. The same sized fishes had different number of eggs in their ovaries. For example, 2 females of total length of 119.0 mm contained 3014 and 4788 eggs each inside their ovaries. Another 2 females of total length of 119.0 mm contained 3014 and 4788 eggs each inside their ovaries. Another 2 females of total length of 124.0 mm contained 4494 and 66220 eggs each. This type of variation is also common in other fishes (Islam and Hossain 1984, Saha et al. 2006 and Saha et al. 2007). According to Rahman (1990), the number of eggs of \textit{L. guntea} varied from 4020 (total length of 62 mm and body weight of 2.2 g) to 15250 (total length of 96 mm and body weight of 8.0g) with a mean value of $9664.92 \pm 13833.07$ eggs (mean total length of 80.01+11.86 mm and mean body weight of 4.57+2.02g) from Rajshahi.

The same weighed female fishes were found to have different fecundities, e.g., 2 females of total weight of 11.53g contained 3014 and 4494 eggs. The females having same weighed ovaries were recorded to bear different fecundities, e.g., 2 females of ovary weight of 2.20g contained 31460 and 36300 eggs.

**Fecundity and total length**

The variations in the fecundity have been shown in scattered diagram (Fig.1) of fecundity and total length expressing a

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Values of regression coefficients (b) with 95% confidence limits</th>
<th>Values of intercepts (a&lt;sub&gt;y&lt;/sub&gt;)</th>
<th>Values of standard deviation of (S&lt;sub&gt;x&lt;/sub&gt;)</th>
<th>Values of correlation coefficients (r)</th>
<th>Significance of ( r ) value at 5% level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fecundity-Total length</td>
<td>11099.85±12239.97</td>
<td>-99555.87</td>
<td>0.8342</td>
<td>0.3498</td>
<td>Significant</td>
</tr>
<tr>
<td>Fecundity-Total weight</td>
<td>5859.84±2372.696</td>
<td>-42346.26</td>
<td>3.2243</td>
<td>0.7131</td>
<td>Highly Significant</td>
</tr>
<tr>
<td>Fecundity-Ovary length</td>
<td>20814.86±6880.48</td>
<td>-75787.35</td>
<td>0.9915</td>
<td>0.7999</td>
<td>Highly Significant</td>
</tr>
<tr>
<td>Fecundity-Ovary weight</td>
<td>16960.07±2629.09</td>
<td>-71.15</td>
<td>1.4602</td>
<td>0.9358</td>
<td>Most highly Significant</td>
</tr>
</tbody>
</table>
linear, positive and significant relationship between them. The results have been presented in Table I.

The regression analysis of fecundity (Y) on total length (X) was evaluated as follows:

\[ Y = -99556 + 11100x \]

Fecundity and total weight

Scattered diagram of fecundity and total weight depicts a linear, positive and significant relationship between them. The values of the regression (b) and correlation (r) coefficients, 95% confidence limits of 'b', the intercept and the standard deviation have been shown in Table I.

The following equation was used to calculate regression values:

\[ Y = 42346 + 5859.8x \]

Shafi and Quddus (1974) obtained the similar result working on *Puntius stigma* from the Buriganga river of Dhaka.

Fecundity and ovary length

Scattered diagram (Fig. 2) of fecundity and ovary length clearly shows a linear positive and highly significant relationship between them. The values of the regression and correlation coefficients, the intercept and standard deviation have been given in Table I.

The equation derived from the regression analysis was as follows:

\[ Y = -75787 + 20815x \]

The present finding is in conformity with the view of Shafi and Quddus (1974) who worked on *Puntius stigma* from the Buriganga river of Dhaka.

Fecundity and ovary weight

Scattered diagram (Fig. 3) of fecundity and ovary weight clearly shows a linear positive and highly significant relationship between them. The values of the regression and correlation coefficients, the intercept and standard deviation have been given in Table I.

The equation derived from the regression analysis was as follows:

\[ Y = -71.152 + 16960x \]
This finding is similar as reported by Shafi and Quddus (1974) in *Puntius stigma* from the Buriganga river of Dhaka.

**Monthwise fecundity**

The maximum and minimum fecundities of pahari gutum were recorded as 72520 ± 13423.59 in June and 2891.44 ± 1084.19 in March, respectively. Fecundity of this species was not recorded in January, February, August, October, November and December, during the study period.

**Gonadal Maturity**

**Percentage of gravid females against time**

The overall percentage of gravid females was 58.15 ± 30.10 (Table II). Out of 140 females, 52 were gravid ones occurring in the months of March to July while no such fish was caught during the months of January, February, August and October-December. The maximum gravid females were found to occur in June (100%) and July (100%) and minimum in March (7.6%) (Table II). From the observation of Rahman (1990), the percentage of gravid females of *L. guntea* is higher in the months of April to July with a peak in June.

**GSI level**

The weight of the ovaries increased gradually during the months of April to July attaining a peak in the month of May. The overall GSI level was calculated as 7.76 ± 8.66 (Fig. 4). The mean GSI level of *L. guntea* ranged from 2.27 in February to 24.13 in July (Rahman 1990).

**GLI level**

The length of the ovaries increased gradually from April to July showing a peak in May. The highest GLI level (50.31 ± 3.03) was recorded in the month of May (Fig. 5). The overall GLI level was calculated as 35.34 ± 10.40. Rahman (1990) calculated the GLI level of *L. guntea* ranging from 18.98 in March to 44.94 in July from Rajshahi.

**Ova diameter (OD)**

The overall ova diameter was calculated as 0.53 ± 0.30 mm (Table II). The minimum and maximum ova diameter were recorded as 0.1mm in November and 1.5 mm in June respectively. The range of ova diameter of *L. guntea* was 0.20 mm in February to 0.47 mm in May according to the record of Rahman (1990). Shafi and Quddus (1974) observed the mean diameter of the eggs of *Puntius stigma* as 0.545 mm which is similar to this finding.

**Colour of ovary (CO)**

The colour of ovaries differed greatly in different months during the study period. Orange colour of ovaries was observed in the months of May - July while cream colour was in January, February, November and December (Table II.)

![Fig. 4: Gonado-somatic index (GSI) level of different months of Pahari gutum (*Somileptes gongota*)](image-url)
This finding resembles the record of Saha et al. (2006) from Netrakona.

**Acknowledgement**

The authors are grateful to Professor Md. Ruhul Amin, Principal, Netrakona Govt. College, Netrakona for his sincere co-operation for providing the necessary facilities during the course of research work.

**Table II: Occurrence of gravid females, OD and colour of ovary of Pahari gutum (*Somileptes gongota*) caught from the Someswari river of Netrakona**

<table>
<thead>
<tr>
<th>Months and year</th>
<th>Percentage of gravid females</th>
<th>OD(mm) Mean±SD</th>
<th>Colour of ovary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct 2005</td>
<td>0</td>
<td>0.226 ± 0.064</td>
<td>Brown</td>
</tr>
<tr>
<td>Nov 2005</td>
<td>0</td>
<td>0.338 ± 0.196</td>
<td>Cream</td>
</tr>
<tr>
<td>Dec 2005</td>
<td>0</td>
<td>0.392 ± 0.174</td>
<td>Cream</td>
</tr>
<tr>
<td>Jan 2006</td>
<td>0</td>
<td>0.43 ± 0.11</td>
<td>Cream</td>
</tr>
<tr>
<td>Feb 2006</td>
<td>0</td>
<td>0.495 ± 0.164</td>
<td>Cream</td>
</tr>
<tr>
<td>Mar 2006</td>
<td>61.54</td>
<td>0.476 ± 0.103</td>
<td>Pink</td>
</tr>
<tr>
<td>Apr 2006</td>
<td>71.43</td>
<td>0.487 ± 0.105</td>
<td>Yellow</td>
</tr>
<tr>
<td>May 2006</td>
<td>83.33</td>
<td>0.771 ± 0.360</td>
<td>Reddish orange</td>
</tr>
<tr>
<td>Jun 2006</td>
<td>100</td>
<td>1.40 ± 0.229</td>
<td>Reddish orange</td>
</tr>
<tr>
<td>Jul 2006</td>
<td>100</td>
<td>0.403 ± 0.066</td>
<td>Orange</td>
</tr>
<tr>
<td>Aug 2006</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sep 2006</td>
<td>66.67</td>
<td>0.422 ± 0.071</td>
<td>Brown</td>
</tr>
<tr>
<td>Overall</td>
<td>58.154 ± 30.107</td>
<td>0.53 ± 0.303</td>
<td>-</td>
</tr>
</tbody>
</table>

**References**


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