

A histological study of the spermatogenesis in *Ompok pabda* (Hamilton-Buchanan 1822)

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Abstract

The present study deals with the histological analysis of testicular development in *Ompok pabda*. For the study, male gonads were collected monthwise from January to September at Freshwater Station, BFRI, Mymensingh. From the analysis, 4 stages of sperm formation, namely, spermatogonia, spermatocytes, spermatids and spermatozoa, were distinguished. The percent distribution of spermatozoa was highest in July (about 92%). Maximum GSI value was 1.129 ± 0.271 found in July. By analysing the histology of spermatogenesis it was established that this species breeds once in a year.

Key words: Histology, Spermatogenesis, *Ompok pabda*

Introduction

Ompok pabda belonging to the family Siluridae of the order Siluriformes is a freshwater catfish, locally known as “madhu pabda”, found in beels, haors, baors, flooded waterbodies, ponds, streams and rivers of Bangladesh. Although many researchers of our country as well as of other countries have worked on other commercially important catfish and other teleost fishes, very little attention has so far been paid to *O. pabda* in Bangladesh. Chaudhury (1962) worked on induced breeding and development of *O. bimaculatus*, Hossain *et al* (1991) studied the food and feeding habits of *O. pabda*, Hossain *et al* (1992) worked on the reproduction and fecundity of *O. pabda*, Khanum (1994) studied the Helminth endoparasites in both *O. pabda* and *O. bimaculatus*, Palmer *et al* (1995) studied the histology of seasonal ovarian development in freshwater drum, and Janseen *et al.* (1995) examined the annual ovarian cycle of a flounder, etc., but no work has been reported on histology of spermatogenesis in *O. pabda*.

Considering the economic as well as biological importance of *O. pabda*, an attempt was made to define the successive maturational stages of male gonads histologically for detecting the spawning season, to classify the gonads by measuring the percent distribution of different developmental stages of spermatogenesis at successive months.

Materials and methods

To complete the experiment, studies were conducted from January to September, 1996, at the Freshwater Station, Bangladesh Fisheries Research Institute (BFRI),

Mymensingh. To study the testicular development histologically, the experimental fish (*O. pabda*) which were more or less of same year-class were collected from the same rearing pond.

Before dissecting the fish sample in every month, total body length and body weight were measured. After dissection, the gonads were carefully removed and were cleaned of all surrounding tissues. Before fixing the gonads in Bouin's fluid the gonad weight and the physical features of testes were also observed and noted.

GSI (Gonado Somatic Index) was determined by using the following formula:

$$\text{GSI} = \frac{\text{Gonad weight of fish}}{\text{Total weight of fish}} \times 100$$

For the histological investigation, permanent microscopic slides of the successively collected gonads were prepared in the laboratory by microtechnique method. The prepared slides were examined and studied by a compound microscope in laboratory and all the successive stages of spermatogenesis were observed. The percentage of different stages of sperm formation was determined and photomicrography was done.

Results and discussion

General morphology of testes: The male gonad consisting of a pair of testes was situated dorso-laterally to the gut, and these were attached to the dorsal body wall by the mesorchium. In immature stage the testes were thin, whitish thread-like structures, very small and translucent, but they became thick, creamy white, highly coiled and opaque at the mature stage. Maximum mean gonad weight was about 0.22g found in June.

GSI: Monthly variation of GSI in male is presented in Fig.1. The GSI values increased slowly from January to April and from May to July increased highly with a peak in July (1.129 ± 0.271). GSI values began to fall steeply from August.

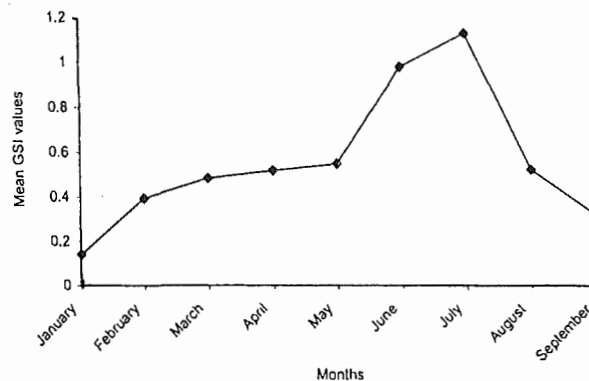


Fig.1. Monthwise changes in mean GSI values of male *O. pabda*.

Histology of gonads

A. Spermatogonia: This is the primary stage of spermatogenesis which is the largest germ-cell in the testis. It was spherical in shape and the cell membrane was clearly seen (Fig. 2A). An oval, slightly basophilic nucleus was present in the centre of the cell. About 65% of this stage was observed in January and only 1-2% in July.

B. Spermatocytes: Spermatogonia transformed into spermatocytes by meiotic division which were also spherical in shape containing a nucleus in the centre. These were smaller in size than the spermatogonia (Fig. 2B). The percent distribution of this stage was 20% in January, but only 1-4% in July.

C. Spermatids: These were spherical shaped in which nucleus was not clearly seen for its dark appearance under the microscope (Fig. 2C). About 15% of this stage was observed in January, but only 3-8% in July.

D. Spermatozoa: These were the functional male gametes which were the smallest cells of all germ cells in testes. They appeared as small black-coloured spots under the microscope. Spermatids transformed into spermatozoa by the process of spermiogenesis (Fig. 2D). This stage was found from February and percent distribution in testes was only 5%, but 75-92% in July.

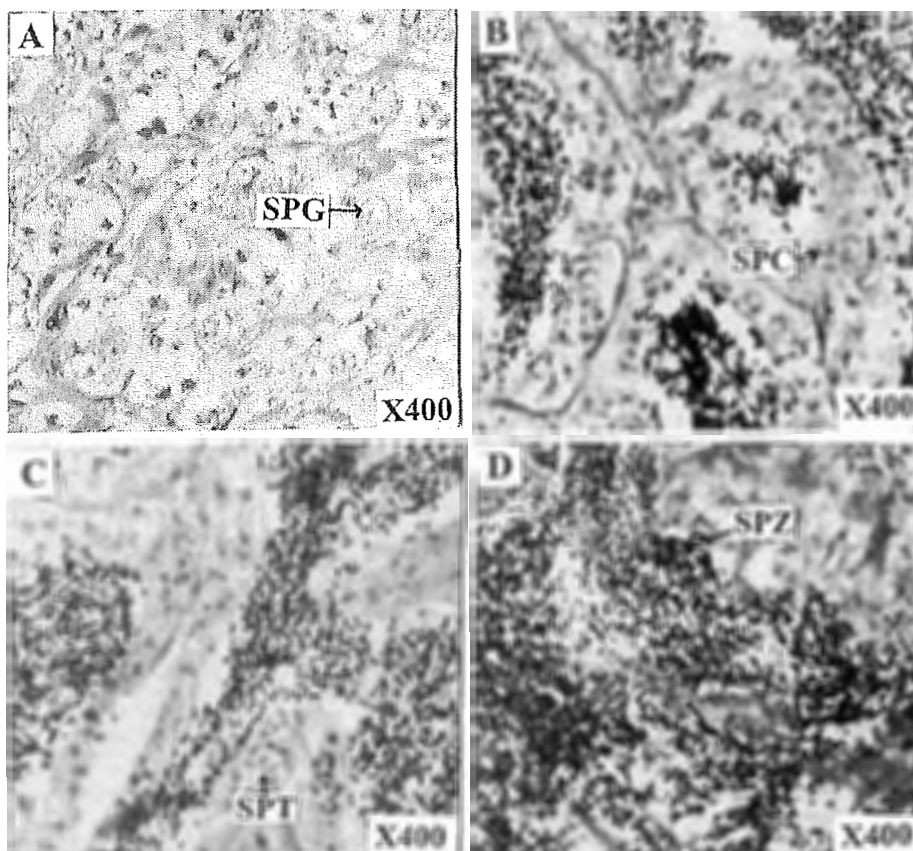


Fig. 2. Different development stages of spermatogenesis: A. Spermatogonia (SPG), B. Spermatocytes (SPC), C. Spermatids (SPT), D. Spermatozoa (SPZ).

Average frequency distribution (%) of different developmental stages of sperm formation in testes is presented in the Fig. 3.

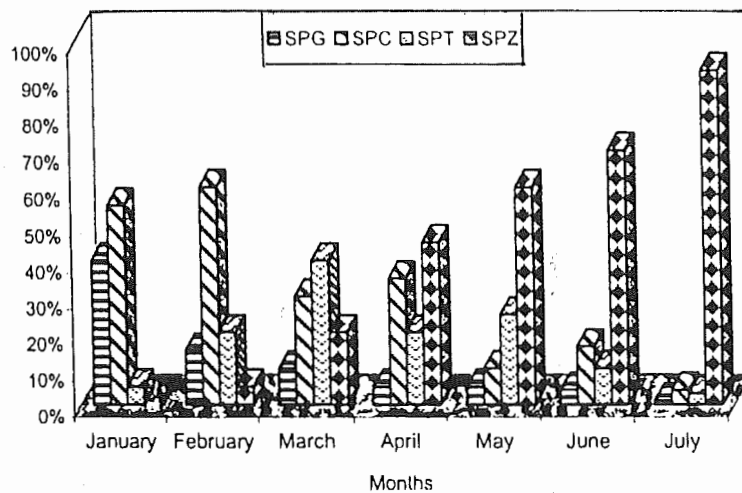


Fig. 3. Average frequency distribution (%) of different development stages of sperm formation in testes of *O. pabda* at successive months.

Testicular development

A. Immature testes: It was very small, whitish, slightly coiled and translucent in which histologically large number of spermatogonia, a few spermatocytes and a very small number of spermatids were present. The mean gonad weight was 0.012g.

B. Maturing testes: It was observed from February to April and histologically it contained 5-45% spermatozoa, 20-40% spermatids, 10-50% spermatocytes approximately. Spermatogonia decreased gradually from 35-5%. It became opaque gradually and creamy white in colour. The mean gonad weight ranged from 0.051g to 0.07g.

C. Mature testes: It was seen from May to July with highest mean gonad weight in June (0.22g). Histologically, it contained 60-92% spermatozoa, and other developmental stages were also seen, but very small in numbers.

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