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HISTOLOGICAL STUDY ON THE PRE AND POST-SPAWNING CHANGES IN THE OVARY OF *BARILIUS BARNA* (HAM.)

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ABSTRACT

***Paper deals with the histological studies on the pre and post spawning changes in the ovar of Barilius barna,* a hillstream minor carp from Garhwal Himalaya, Uttaranchal. The fish is a protracted spawner that breeds during July- August. On the basis of detailed morpho-histological features of the ovary, the ovarian cycle of *Barilius barna* can be divided in to preparatory period (December to January), early pre-spawning period, (February to First Fortnight of March), late pre-spawning period (second fortnight of March to April), Spawning and Partly spent period (Late may to early August), Completely spent period (Late August to September), and resting Period (October to November).**

Key words: Histology, Ovary, *Barilius bama.*

INTRODUCTION

Sound knowledge of the natural reproductive cycle of a species is essential for designing experimental investigations on the endocrine control of its reproduction. Although, various workers have attempted studies on the teleostean gonads since the middle of the 19th century, information on reproductive cycle on female fish from the tropical and temperate regions are available from the work of Yamamoto (1956), Chopra (1956), Khanna and Pant (1967), Literature on the ovarian activities during the reproductive cycle in the hillstream fishes of Garhwal Himalaya is rather scanty (Nauriyal, 1983, Agarwal,1989; Bahuguna,1990).

STUDY SITE AND METHODOLOGY

Samples of female *Barilius barna* were regularly collected from Khandagad, a tributary of river Alaknanda, during the year 1999-2000. The body weight, length and their ovary of each collected fish were recorded. Fresh pieces from anterior, middle and posterior region of the ovary were drawn and fixed separately in bouins fluid. Serial sections were cut at 5μ and stained in hematoxylin-using eosin as counter stain.

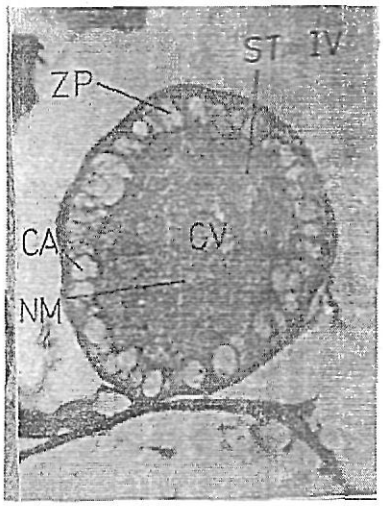
RESULTS

The ovaries of *Barilius bama* are paired, elongated structures, lying ventral to air bladder and attached to the body cavity by a thin mesovarium. Generally the ovaries of both the sides are equal but occasionally one may be larger than other. Ovaries exhibit remarkable seasonal variation in shape, size, colour, texture and vascularily, but length remains nearly constant throughout the year. Pigmentation is absent but the general colour changes from light whitish black to mixed yellowish dirty in the breeding season. As maturity advances ovaries become highly vascular and gravid due to mature ova laying out. The weight of ovaries increases gradually as the maturity advances and reaches its maximum at late May to early August (spawning period).

Histologically, the ovaries of *B. bama* are covered by peritoneal membrane. The ovary wall can be differentiated in to an outer tunica albugenia and inner germinal epithelium Fig (1). Tunica albugenia consists of connective tissue, muscle fibers and blood capillaries. Many large and small blood capillaries run longitudinally along tunica albugenia thus giving it a varying vascularily in breeding and non-breeding season. During breeding season the tunica albugenia is a thin and vascular layer while during non-breeding season it is thick. The germinal epithelium is the innermost layer of cuboidal cells and has the scanty cytoplasm and deeply stained muscles with several nucleoli. The germinal epithelium losses its contact with the inner surface of tunica albugenia at many places and projects into the ovocoel in the form of ovigirous lamellae. These lamellae are usually thin in young and spent ovaries, but in the mature ones they are highly swollen due to the presence of ripe oocytes. The oogonia in early stages of development lie in clusters and are attached to ovigirous folds, whereas in advances stages follicular cells surround them. The earliest stages of female germ cells is oogonium and primary oogonium arise from the cell of germinal epithelium. These cells divided mitotically and give rise to new crop of oogonia. As oogonia increases in size and number they get pushed into ovocoel and come to lie in oogonial nest.

The developing oocytes of *B. barna* have different stages. In chromatin nuclear stage oogonium contains severally deeply stained nucleoli resting on the meshwork of the chromatin reticulum. The oogonia at this stage are rounded or oval shaped and measures 0.09 to 0.36mm in size (Fig 1). The oogonia increase in size gradually with the absorption of cytoplasm and are recognized as oocytes in early pre-nucleolus stages

Fig1 & 2



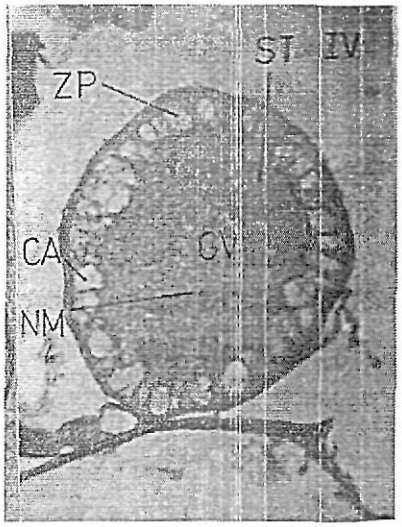
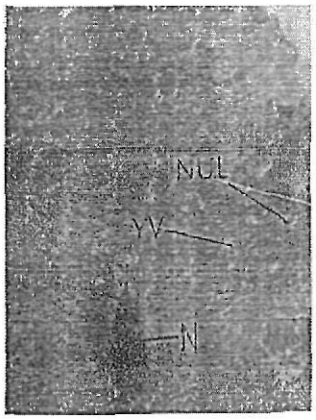


Fig3 & 4



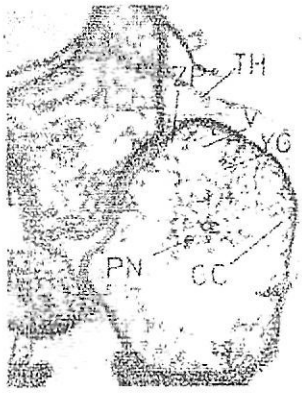


Fig 5, 6 & 7

1978). In some fishes such as the Rainbow trout after ovulation, the granulosa, special thecal and interstitial cells can synthesize steroids that may have a function in the maintenance of ovulated eggs. Often many of the developing follicles, or the ovulated yolky oocytes that remain in the follicles become atretica. The granulosa cell layer in such cases hypertrophies and phagocytoses the yolk. Such follicles, called the corpora atretica, do not have endocrine functions.

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Legends of Figures :

Fig.I: Portion of the ovarian wall of the maturing period showing the potential covering, connective tissue layer and ovarian epithelium in stage II (100X).

Fig.2: A number of nuclei are seen as a result of division of nucleolus in tha stage II oocyte. Note the appearance of minute cortical alveoli in the peripheral region of the oocyte of stage IV (400X).

Fig.3: Development of oocyte of stage III with prominent nucleoli around the inner side of the nuclear membrane, yplk nucleus and some extruded nucleoli in the cortical ooplasm. (100X).

Fig. 4: Late yolk vesicle stage V oocyte showing oocytes full of yolk vesicle (100 X)

Fig. 5: Vitellogenic follicle corresponding to the stage VI oocyte. Note the presence of nucleoli in the cytoplasm (380 X).

Fig. 6: Spent ovary showing remnants of degenerating residual follicles and immature oocytes (100 X).

Fig. 7: Formation of cell pearl due to hypertrophy of the follicular cells. (100X). Abbreviations :

CA = Cortical alveoli, CT = Connective tissue, EN = Extruded nucleoli, FE = Follicular epithelium, GE = Germinal epithelium, GV = Germinal vesicle, 1C = Interstitial cells, IM= Immature oocyte, NM + Nuclear membrane, NU = Nucleus, NUL = Nucleoli, OL = vigerous lamellae, PE = Peritonium, PY = Proteid yolk, RF = Remnants *of* degenerating residual follicles, ST I – ST VIII = Stage I to Stage VIII, YG = Yolk granule, YN = Yolk nucleus, YV = Yolk vesicle, ZP = Zona pellucida.