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HISTOLOGICAL STUDY OF OVULAR ATRESTA 'CORPUS LUTEUM' IN THE TELEOST *PUNTIUS MUZAFFARPURENSIS* (CYPRINIFORMES : CYPRINIDAE)

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The atretic condition of ova was common in the spawning stage and not in prespawning and immediately postspawning periods. Oocytes of any shaped and size took part in the formation of corpus luteum. The study of atretic ova of this fish revealed the deflection of oocytic membranes, disorganisation of nucleus and its disapperance, liquefaction of yolk, appearance of vacuoles in cytoplasm, proliferation of follicular cells, invasion of follicle cells into the cytoplasm and uLtimately resorption of whole of the content of ooplasm and appearance of yellow pigment in the follicular cells. Transformation of yolk granules into large yolk globules was also observed. Further, the dissolution of yolk globules and replacement of follicle cells in the yolk globules was also noticed.

INTRODUCTION

The ova which fail to attain maturity or fail to spawn undergo resorption. This condition of oocyte is temed 'ovular atresia or corpus luteum'. The resorption of oocyte appear to be a common occurrenece in the growing ovaries of vertebrates (Hisaw & Albert, 1947). The other worker has observed a number of corpus luteum condition of oocytes in the maturing ovary of *Mystus seenghala* (Sathyanesan, 1962). The resorption process of the abortive oocyte in this fish could not be arranged in a regular series as in the case of *Rhodneus amarus* (Bretschneider & Devit, 1947), *Lebistes reticulatus* (Stock, 1951) and *Carrassius auratus* (Beach, 1959). The corpus luteum condition of follicles at the ripe and spent stages observed which appeared highest in a newly spent ovary (Gokhae, 1957), whereas the continuity of the process of resorption throughout the year and conspicuous during the prespawning and immediately after spawning period observed in *Mystus seeghala* (Sathyanesan, 1962). Two types of atresia in the immatrue oocytes of some fishes also observed (Dixit, 1956).

Since no such finding is yet available in *Puntius muzaffarpurensis*, hence the present intensive study was undertaken to elucidate knowledge about the 'corpus luteum' in *Puntius muzaffarpurensis*.

MATERTALS AND METHODS

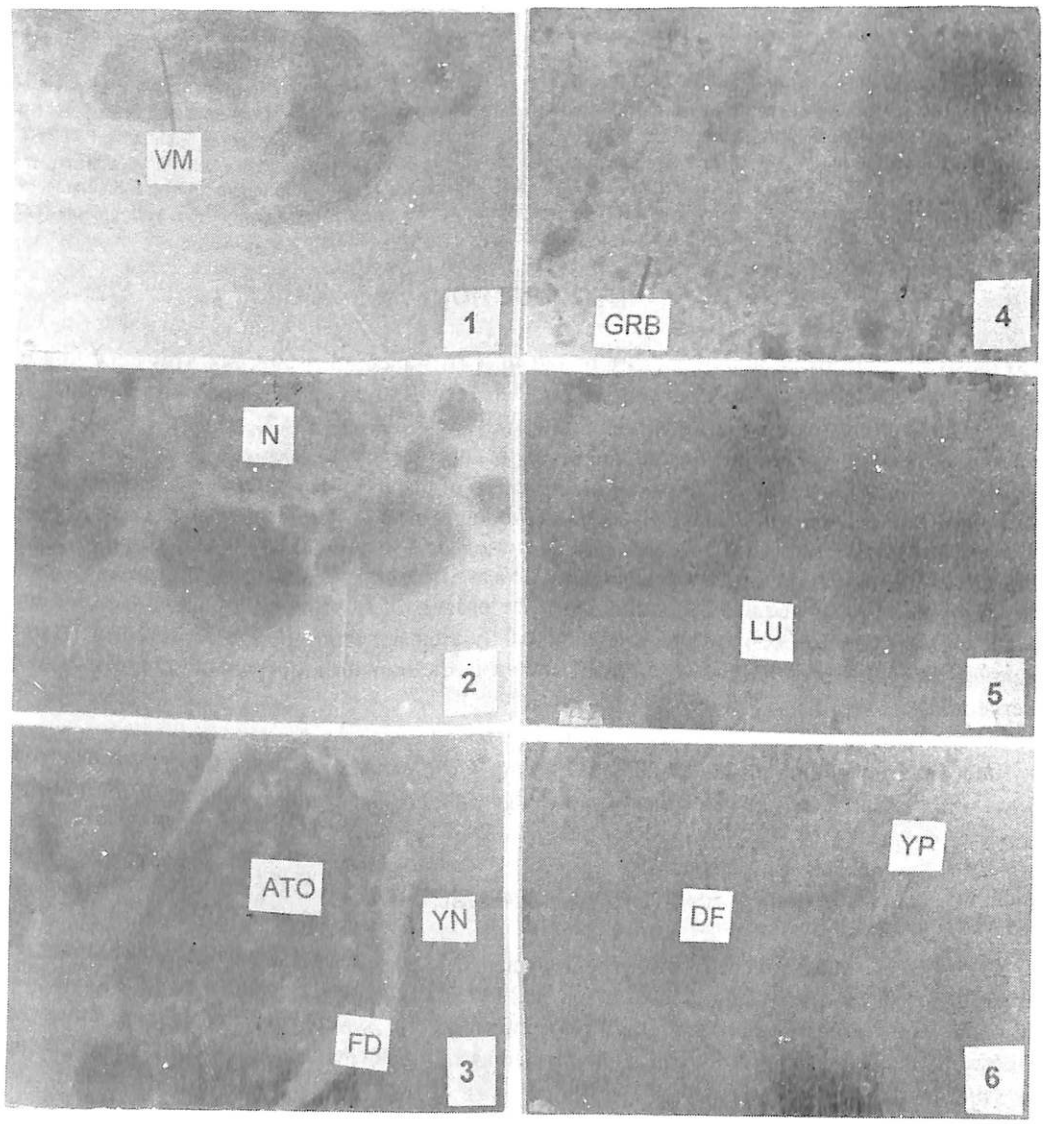
The species were collected from local Donar fish market of Darbhanga and brought to Research Laboratory of Zoology Department of C.M. Science college, Darbhanga for processing. The ovaries of prespawning, spawing and postspawning periods were dissected out and subjected to different fixatives for histological studies whereas the histochemical observations were made using the standard techniques.

OBSERVATIONS

The ovary of *Puntius muzaffarpurensis* was turgid and completely distended in the spawning phase. A number of oocytes abort and were in different stages of resorption. Degeneration of the immature and maturing oocyte were not so common as that of matured ones. The ripe oocyte had a prominent vitelline membrane. The follicular layer which underlined the membrane was made up

of single row of columnar cells.

The first and the most conspicuous change occuring in the atreitc ovum was noticed in the nucleus, which was found to be elongated and some of the contents of ooplasm were liquified. Smal yolk granules were visible to be arranged along the inner border of the vitelline membrane (Fig 1). In the other abortive oocyte the liquifaction of yolk was evident towards the periphery.



Figs. 1-6 : Microphotographs of T.S. of ovary (x 600) showing ovular atresia during the development stages in the teleost *Puntius muzaffarpurensis*.
(VM = Vitelline membrane; N= Nucleus; ATO = Atretic oocytes; FD = Fold; YN = Yolk nucleus; GRB = Granular bodies; LU = Lumen; DF = Discharged follicles; YP = Yellow pigments).

Due to liquifaction the vitelline membrane was deflected at some places from the follicular layer and were thrown in several folds (Fig. 2). During the next phase numerous cytoplasmic granules were found in the follicle cells. On further hypertrophy these cells lost their definition and the entire follicular layer became a syncytium containing vacuoles of varying size and shape (Figs. 2 & 3). Next the gradual hypertrophy of follicular cells were observed as a result of which the original single layered follicular epithelium became two to three layered thick. The division of the follicular cells, seemed to be amitotic since mitotic figures were not visible (Fig. 4). On further division of follicular cells, the cellular organisation was changed due to cytoplasmic strands which were seemed to move deeper and deeper into the yolks of ooplasm. As these strength grew the globular yolks were found to be diminished and subsequently phagocytised by hypertrophying follicular cells. Finally the whole of the yolk was replaced by the follicular cells and formed a web of cytoplasmic strands (Fig. 5). The entire mass of atretic ovum appeared more compact and presented a yollowish hue which might be due to presence of yellow pigment (Fig. 6) which confirmed a natural accompaniment of the real corpus luteum.

DISCUSSION

The structure which develops from atretic follicles in fishes has often been referred to as ' corpus luteum' but it differs greatly from that in mammal and hence the term 'corpus atreticum' is commonly applied. Opinions differ as to the part played by the different components of the follicle in the resorption of the atretic oocyte. Cunninghum (1898) reported that the cells from the connective tissue covering the follicle proliferate and invade the contents of the oocyte to effect resorption. Wallace (1903) has reported that the cells of follicular layer are responsible for the resorption which is more confirmity with the observation of Nair (1963). Contrary to the report of earlier workers (Samuel, 1943; Bretscheider & Duyvene Devit, 1947) the present author did not notice any hypertrophy or proliferation of either the granulosa cells or theca cells in *Puntius muzaffarpurensis*. Nair (1963) has noticed that after the absorption of yolk is completed, the resulting structure disintegrates and disappears but does not leave behind any yellowish hue, a pigment in hypertrophied follicle cells, which is quite contray to the present findings. The role of granulosa cells taking part in the process of resorption of the oocytes (Laheri, 1968), is confirmity with the report of Beach (1959) in *Carassius auratus*; Honma (1961) in *Placoglossus activelis* and Belsare (1962) in *Ophiocephalus punctatus*.

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REFEERENCES

BRETSCHNEIDER, L.H. & DUYVENE DE VIT, J.J. 1947. *Sexual endocrinology of non-mamalian vertebrates*. Amsterdam.

BEACH, A.W. 1959. Seasonal changes in the cytology of the ovary and of the pituitary gland of the gold fish. *Can. J. Zool.* **37** : 615-625.

BELSARE, D.K. 1962. Seasonal changes in the ovary of *Ophiocephalus punctatus*. *Indian J. Fish.* **9** : 140-156.

CUNNIGHUM, J.T. 1898. On the histology of the ovary and of the ovarian ova in certainmarine fishes. *Quart. J. micros. sci.* **40** : 101-163.

DIXIT, R.K. 1956. Atretic oocytes in the ovaries of *Mystus seenghala* (Sykes) and *Wallago attu* (Bloch). J. Zool. Soc. India **8** : 91-94.

GOKHALE, S.V. 1957. Seasonal histological changes in the gonads of the whiting (*Gadus merlangus L.*) and the Norway pout (*Gadus esmarkii* Nilson). *Indian. J. Fish.* **4** : 92 - 115.

HISAW, F.L. & ALBERT, A. 1947. Observation on the reproduction of the spiny dogfish *Squalus acanthias*. *Biol. Bull. Woods. Hole. Mass.* **92** : 187 - 199.

HOMA, Y. 1961. Study on the endocrine glands of the Salmonoid fish, Ayu, *Plecoglossus altevelis* Termick et Schlegel. IV.The fate of the unspawned eggs and the new crop of oocytes in the spent ovary. *Bull. Jap. Soc. Sci. Fish.* **27** : 873 - 880.

LEHRI, G.K. 1968. Cyclical changes in the ovary of the catfish *Clarias batrachus*. *Acta anat.* **69** : 105 - 124.

NAIR, P.V. 1963. Ovular atresia and the formation of so called 'corpus luteum' in the ovary of Indian catfish, *Heteropneustes fossilis*. *Proc. Zool. Soc. Bengal.* **16** : 51 - 65.

SAMUEL, M. 1943. Studies on the corpus luteum in *Rhinobatus granulatus*. Cuv. *Proc. Indian Acad. Sci.* **188** : 133 - 157.

STOCK, A. 1951. Histo-endocrinologische analysis of gestation phenomena in the cyrinodont *Lebistes reticulatus*. II. The corpus luteum cycle during pregnancy. *Proc. Kon. Ned. A kad. V. Wetensch. Amsterdam.* **54** : 558 - 565.

SATHYANESAN, A.G. 1962. The ovarian cycle in the catfish *Mystus seenghala*. *Proc. nat. Inst. Sci. India* (B) **28** : 497 - 506.

WALLACE, W. 1903. Observation on ovarian ova and follicles in teleostean and elasmobranch fishes. *Quart. J. micr. Sci.* **47** : 161.