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A STUDY OF CYCLIC CHANGES IN THE TESTIS AND ITS CO-RELATION WITH PITUITARY GLAND IN *CHANNA GACHUA*

Ashwini Ghanbahadur

*RNC. Arts, JDB Com., NSC Science, College Nashik Road - 422101.

ABSTRACT
This paper presents cyclic changes in testis of *Channa gachua*, Studied Histologically, through different stages, along with co-relative changes in cells of pituitary gland. Knowledge of the gonadal cycles and their functional mechanisms in fishes is of importance in the successful management of the fisheries. The present study was therefore carried out to provide information on the cyclic changes in the activity of testis of an important food fish *Channa gachua*. Similarly cyclic changes in gonads were co-related with changes in cells of pituitary gland with reference to :- 1) Preparatory phase. 2) Pre – spawning phase. 3) Spawning phase . 4) Post – spawning phase. Histological changes in the testis of *Ophiocephalus punctatus* have been recorded by Belsareand in *Channa gachua* Khanna and Sanwal. Similarly cyclic changes in pituitary gland are reported in *Mystus seenghala* by Prasada Rao[3] and by Sahai in *Puntius ticto*.

KEYWORDS: Breeding, Pituitary, Spawning, Testis.

INTRODUCTION

Fishery resources of India are diversified nature. Indian river contributes a vital role in fishery development and occupy significant position in socio-economic fabrics as a natural source of nutritious food, income and employment opportunities. Presently aquatic ecosystem of India is under considerable stress resulting in depletion of fish population. Proper programme must be undertaken to increase fish population and reproductive ability of fish. To complete the task knowledge of fish reproductive biology and an understanding of endocrine mechanism related to breeding is essential. Hence during presence study cyclic changes in the testis and pituitary gland is studied alongwith co-relation in between them.

MATERIALS AND METHODS

*Channa gachua*were collected from Khultabad lake 25km away from Aurangabad. Fishes were dissected gonads and pituitary gland removed for cellular study. These tissues were fixed in Bouins fluid. The sections were taken at 6µ thickness and pituitary gland was stained in Mallorys triple stain and gonads in Harris Alum Haemotoxylin and eosin.

RESULTS AND DISCUSSION

The Pituitary gland : During present study it was observed that the pituitary gland of *C. gaucha* is of Platy basic type lies closely attach to the floor of infuntibulum without a definite stalk (Plate 5). Similar observations were recorded by Prasada Rao (1969) in *N nandus, M armatus and M pancalus.* Pituitary shows a clear distinction into adenohypophysis and neurohypophysis. Adenohypophysis is further divided into rostral pars distalis (RPD), proximal pars distalis (PPD) and pars intermedia (PI). RPD, PPD are arranged in linear fashion (Plate No-5). Similar observation were recorded in *N notopterus, O bacaila, R daniconous, N botia, clarias batrachus* (Rao 1969). In RPD during presence study two cell types were observed acidophils act as somatotrops and basophils as gonadotrops. Similar observations were recorded in *Tilapia mosambia* by Leatherland *et.al* (1974). In PPD gonadotrops (basophils) are usually located but sometimes migrate to RPD at sexual maturity. Similar observations are recorded in *eel* by Olivereau (1967). In *C gachua* basophils are mainly observed in ventral area of PPD. Similar observations are recorded by Sage and Bromage (1970). The neurohypophysis is spread over the dorsal surface of adenohypophysis and maximum ramification is observed in pars intermedia (Plate no. 1). Pars intermedia in *C gachua*do not show the presence of basophils.

Testis mature through different stages like spermatogonia, primary spermatocyte, secondary spermatocyte, spermatids and spermatozoa. During present study cyclic changes in testis were co-related with cyclic changes in cells of pituitary gland with special reference to gonadotropic cells (GtH) are studied with reference to:

Preparatory Phase: In *Channa* the first preparatory phase extends from December to February. During this stage spermatogenesis remains active. Lobules show germ cells of all stages of maturity. Spermatocytes and spermatids are

visible (Plate No.2). spermatogonia are reduced greatly, primary and secondary spermatocyte first increase in size and number but later on decrease. The spermatids predominate this phase. During this phase the regranulation of basophils is accelerated (Plate No.6).

Pre-spawning phase: It extends from March to May. The testis appear slightly swollen and tubules are uniformly packed with sperms. Active spermatogenesis is noticed in seminiferous tubules. The number of spermatogonia and spermatocytes relatively decrease. The spermatids also show considerable decrease where as spermatozoa (sperms) increase to maximum (Plate No. 3). The basophils of PPD show plenty of granules in the cytoplasm (Plate No. 7).

Spawning phase: In *C.gachua* from June to August. During this period activity of testis is high. The seminiferous tubules are full of sperms (Plate No.3). The basophils show beginning of degranulation (Plate No.8).

Post-spawning phase: it is observed from September to November. With discharge of sperm during spawning phase testis reduces in size and empty seminiferous tubules are seen. The empty lumen of some tubules contain residual unexpelled sperms(Plate No.4). Degranulation of basophils continue due to discharge of hormone in blood stream, few vacuolized basophils are also observed during this period (Plate No.9).

The gonadal cycle during present study is divided into four stages as preparatory, pre-spawning, spawning and post-spawning which is in support to earlier reports of in *Heteropneustus fossilis*. In *C.gachua*atresia have been observed in maturing and mature ova. Similar observations were recorded earlier in *Barbus Luteus*.Pigmentationson the testisduring breeding season has been considered as the sign of ripeness (Swarup 1958) in *Gasterosteus aculatus*.But during the present investigation no such pigmentations were observed in *Channa gachua.*Shrestha and Khanna (1978) in *Garra gotyla* did not find any pigmentation on testes and hence support the above findings. During present study it is observed that spermatogenesis does not takes place simultaneously in all the lobules of the testis and hence it is common to find some of them still in resting phase containing spermatogonia and spermatocytes onlysimilar observations were recorded by Sanwal and Khanna (1972).The spermatogonia are present throughout the year but their number may greatly reduced during the breeding period in *Schizothorax richardsonii* by Bisht (1974)similar observations were recorded during present study.

Swarup (1958) have observed simple smooth surface of testes throughout the year in *Gastrosteus aculeatus*.During present investigation in *C gachua* it is observed that the testis are smooth throughout the year but with the advancement of maturity the testis assumes a lobulated appearance.Such lobulated condition of testis have been reported in *Mystus Seenghala*(Sathyanesan,1959) *Barbus tor* (Rai1965). Histogogically the testis shows distinct seminiferous tubules packed with spermatocytes and spermatids in *Channa gachua* and *Cyprinus carpio*,similar observations were recorded by Belsare (1966) in *Ophiocephalus punctatus.*

Seasonal changes in basophils in relation with testis development were recorded by Scruggs (1951) in *Cyprinus carpio* and *Carassius auratus* (Sunderraj 1959) studied the correlation between pituitary and seasonal changes in gonads of *Heteropneustes fossilis* and further concluded that the testis and pituitary gland undergo correlative changes.

Razida co-related the degranulation and granulation of basophils with reproductive behavior in *Rasbora daniconius*, similar observations were recorded in *C. gachua*. The increase in both number and size of basophilic cells indicates that the secretions of these cells are responsible for gonad development, as also reported for *Channa striatus.* (Karmakar and sircar (1983).

Several investigators have studied gonadotrops in relation to sexual maturity in teleost and have described secretory changes in them Belsare (1962) in *Ophiocephalus punctatus*, Rai (1966) in *Tor tor* and Khanna and pant (1969) in *Glyptothorah pectinopterus*.

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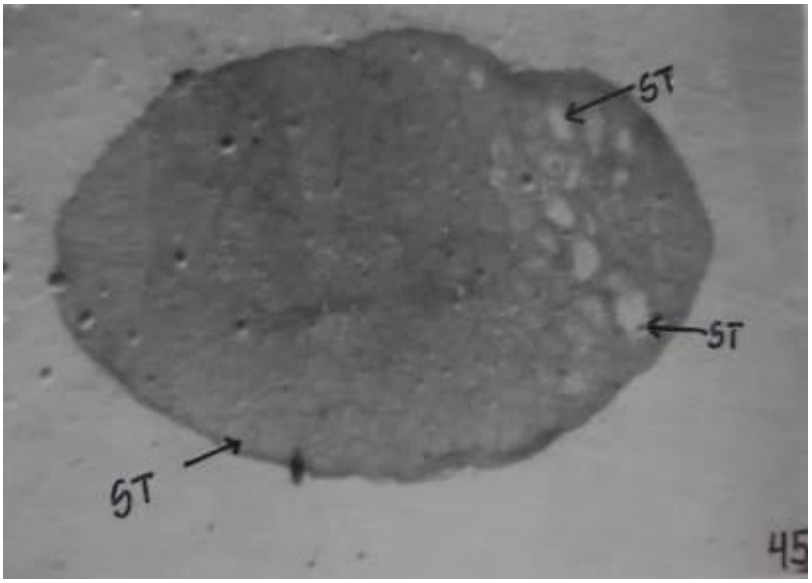

Plate No-1
T.S. of Testis (40x) of *C. gachua* showing
ST- Seminiferous tubules

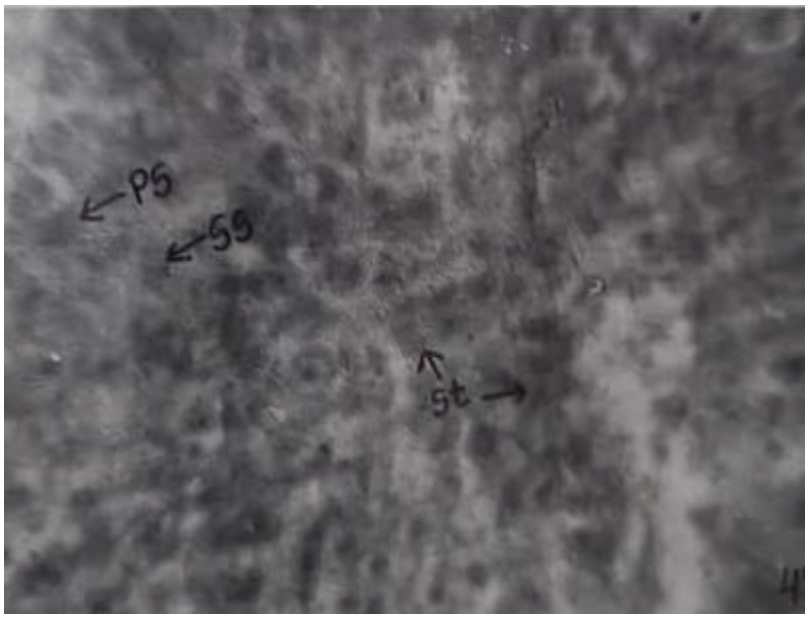

Plate No-2
T.S. of Testis (100x) of *C.gachua* with seminiferous tubules
PS-Primary spermatocytes, SS- Secondary spermatocytes, ST- Spermatids

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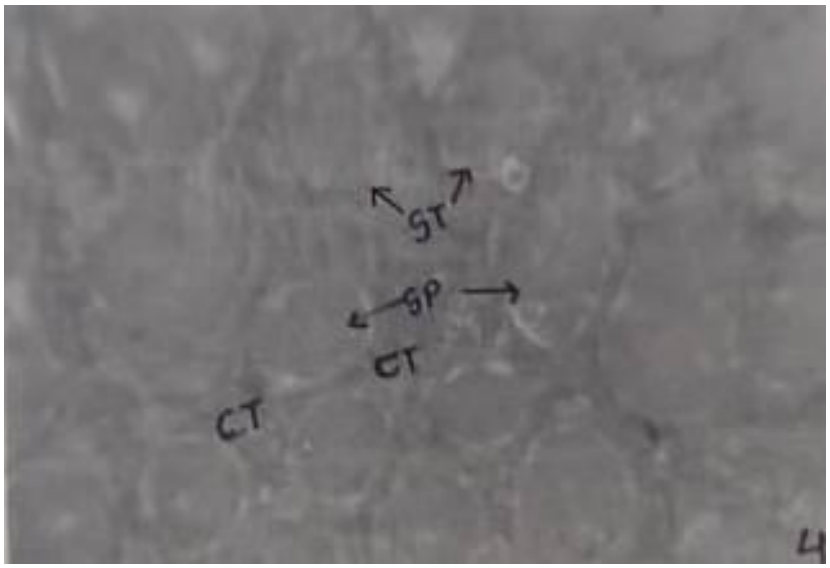

Plate No-3
T.S. of Testis (10x) of *C. gachua* showing
CT- Connective tissue, ST- Seminiferous tubules, SP-Sperms

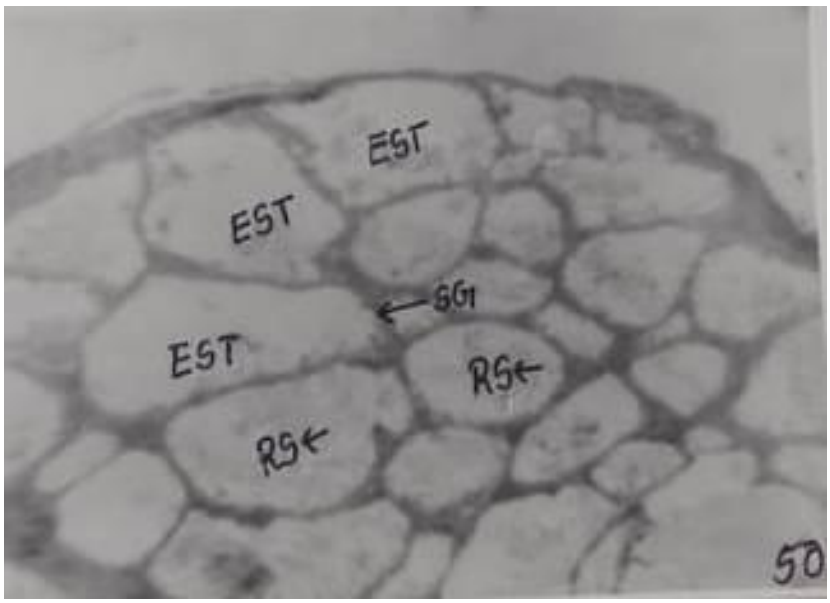

Plate No-4
T.S. of Testis (10x) of *C. gachua* showing
EST- Empty seminiferous tubules, RS-Residual sperms,
SG-Spermatogonia

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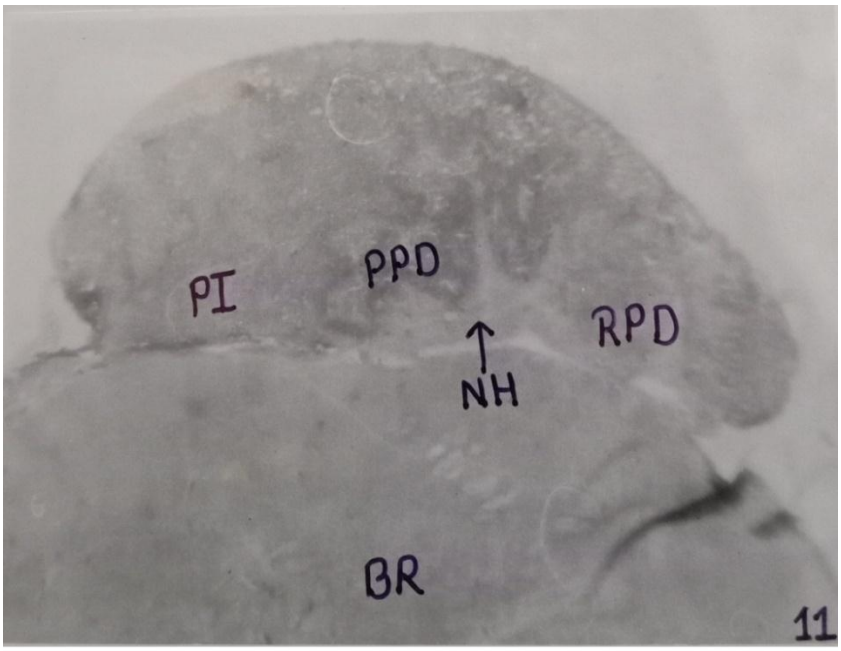

Plate No-5
T.S. of Pituitary gland (10 X) of *C gachua* showing RPD- Rostral pars distalis, PPD-proximal pars distalis, PI-pars intermedia, NH-Nerohypophysis

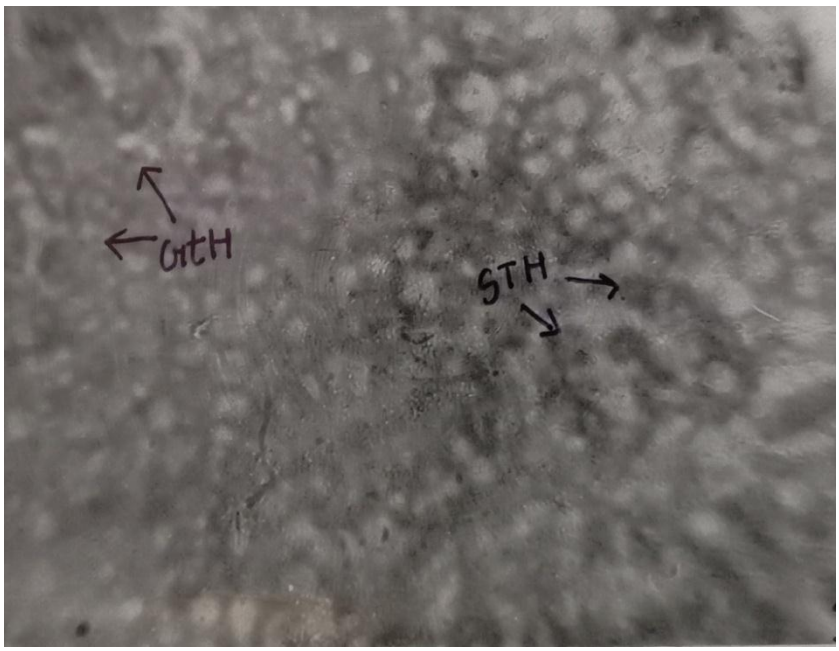

Plate No-6
T.S. of Pituitary gland (100 X) of *C gachua* with proximal pars distalis GtH-Regranulating gonadotrops, STH –Somatotrops

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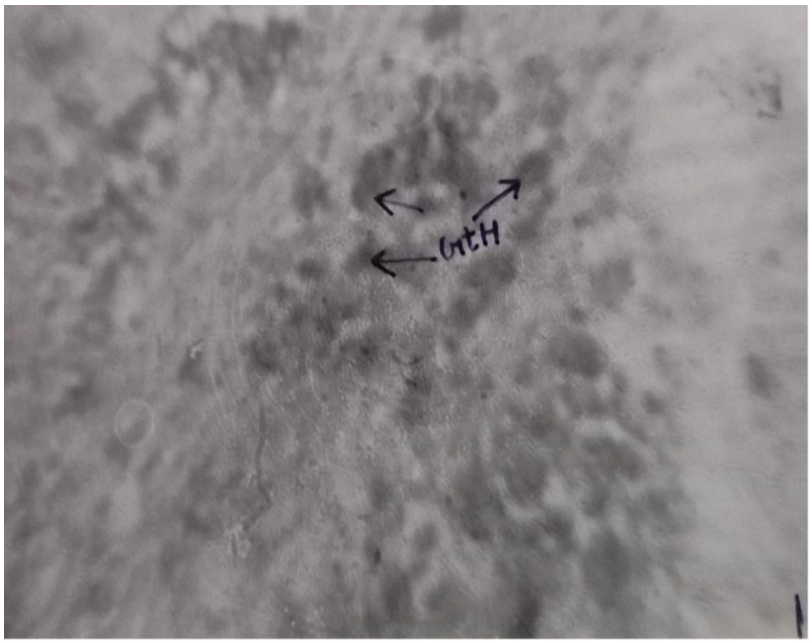

Plate No-7
T.S. of Pituitary gland (100 X) of *C gachua* with proximal pars distalis
GtH-Gonadotrops

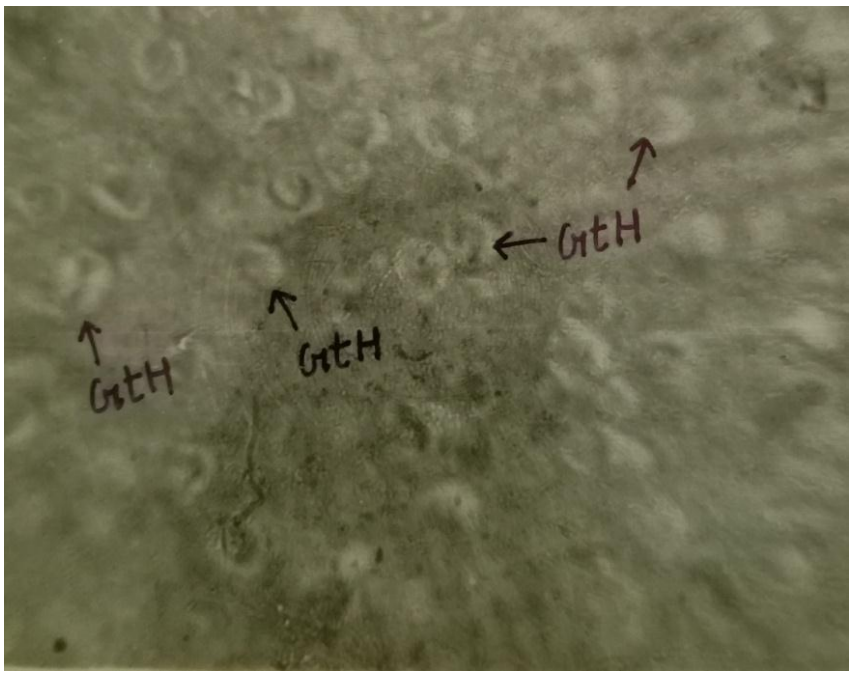

Plate No-8
T.S. of Pituitary gland (100 X) of *C gachua* with proximal pars distalis
GtH-Degranulated Gonadotrops

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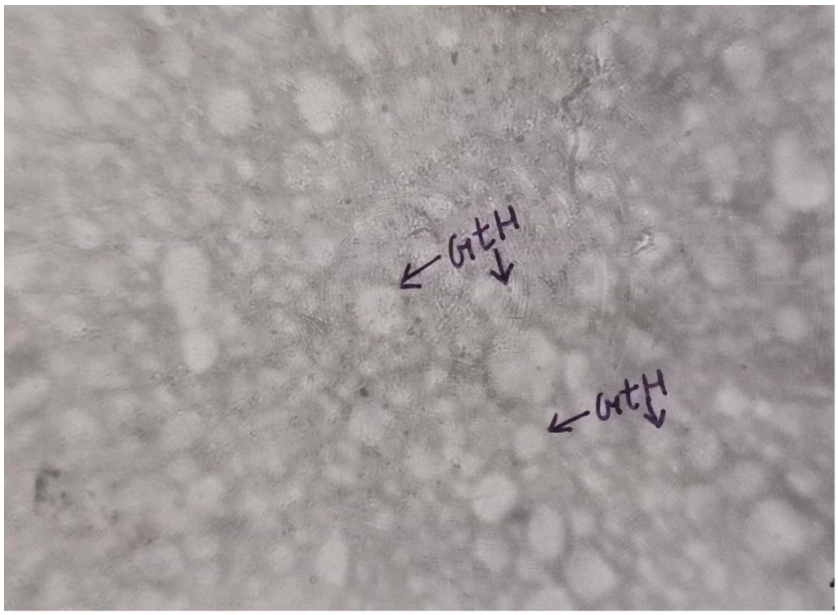

Plate No-9
T.S. of Pituitary gland (100 X) of *C gachua* with proximal pars distalis
GtH-Vacuolized Gonadotrops

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