

## Effect of copper on gonads and thyroid of *Clarius batrachus*

Manjula Saini, Department of Zoology, Career College, Bhopal

manjulaisaini123 [at] gmail [dot] com

**Abstract** — Matured and acclimatized specimens of *Clarius batrachus* were exposed to 30 ppm of cupric chloride the fishes were sacrificed on 15<sup>th</sup> day gonads and thyroid were excised out. Histological preparations by the method of OFG staining were studied. Histological picture of large ova were observed with cracked and broken yolk due to the treatment with various reagent during paraffin impregnation. The young ova proliferated from stroma appear quite small and without distinction of core. Testicular wall were swollen and intermittently disorganized due to over contraction of testicular substance there was irregular hyperplasia of seminiferous tubule due to rise in concentration of protein. Most thyroid follicle have colloidal mass which is dual in nature some of them were partially neutrophilic some follicles have clear and transparent, dark stained colloid with low epithelium. Some follicle appeared like a glass piece and some have distinct epithelium with smooth colloid where as some have stripes of light and dark bands of colloid.

**Keyword** — Cupric chloride, Ovary, Testis, Thyroid

### 1. INTRODUCTION

A few years back a short collection of reports was published which include reports on pesticides metal and many more toxic agents. It is well known that industrial application and medicinal as well as other chemical over popularities of substance may spread the substance largely among population. So essential trace elements deserve to studied of their toxicological influence because it is not always very certain that in environment even such trace elements would remain as trace only. The chances are fair that a time they may rise beyond their harmless limits and may sometime raise the head of endangerment to really threatening level. Lately the books like Encyclopedia of toxicology [1] running over three volumes have come and this is an example in itself that magnifies the need of studying not only lethal doses but also sub lethal doses. [2] reported slight (<18%) decreases T4 level in post menopausal women exposed to 0.68 mg/zinc/kg/day as zinc glucomate and did not attain statistical significance in free T3 or TSH level [3] observed the effect of 2,4dichlorophenoxyacetic acid (2,4 D) on a ovary of a freshwater catfish, *Heteropneustes fossilis*. [4] showed Physiological responses of African catfish (*Clarias gariepinus*) to water-borne ferric iron: Effects on thyroidal, metabolic and hydro mineral regulations. Influence of coconut husk retting effluent on metabolic, interregal and thyroid functions in the air-breathing perch, *Anabas testudineus* studied by [5].

### 2. MATERIAL AND METHODS

Live and mature specimens of both sexes of the *Clarius batrachus* were obtained from local fish market and put for acclimatization to the laboratory condition in the tap water at the room temperature for four weeks. Glass aquarium contain 20 liters of water were used for maintaining the fish. Tap water used for aquaria was usually kept under storage for more than 40hrs that it could be sufficiently dechlorinized to become suitable for keeping fish. For experiment a batch of 5 fish each of which weighed about 50gms was selected and kept in 20 lit of water. After completion of the experimental exposure to aforesaid concentration of copper the exposed fish were dissected live, after dissection the thyroid and gonads were fixed in 10% neutral formal saline. The lower jaws were fixed in (70% alcohol+HNO<sub>3</sub>) for decalcification and then fixed tissues were thoroughly washed and were put for dehydration. Following the complete dehydration the tissue sample were cleared in toluene/xylene. Alcoholized tissue were processed for paraffin section, cut at 6-8 micron thickness and then were stained in AF,PAS, OFG and HE as specified in [6].

### 3. RESULTS AND DISCUSSION

Copper is widely distributed in nature and is an essential heavy metal [7] worked out that it is very toxic to fish affecting their growth as well as reproductive capacity. Entry of toxicants into receiving water triggers a series of events, which directly or indirectly affect aquatic life. The possible effects may range from impairment of growth, reproduction and metabolic functions in organisms or changes in the physical and chemical properties of the ambient medium that indirectly affect the resident biota in water. The effects of different toxicants on the aquatic fauna, particularly fish have received attention of several investigators [8] [9] [10] ; [11] ; [12] ; [13]. However, histological and biochemical effects of heavy metals on the ovary received little attention [14]. Any anomaly in the normal metabolism or histology of gonads in fishes can affect their progeny.

The gross observations at prima-facie reveals that the excess of copper have degenerative effects on male gonads of *Clarius batrachus*. The testicular walls were not only swollen (fig.1&fig2) but also there was an intermittent disorganization due to over contraction of testicular substances. The cross-section views of most of the seminiferous tubules have been clumped on the left side and have left space on the other side. They were so much degenerated that they could hardly be recognized to be testicular tissue. As there was irregular hyperplasia of the seminiferous tubule .Wherever large ova were

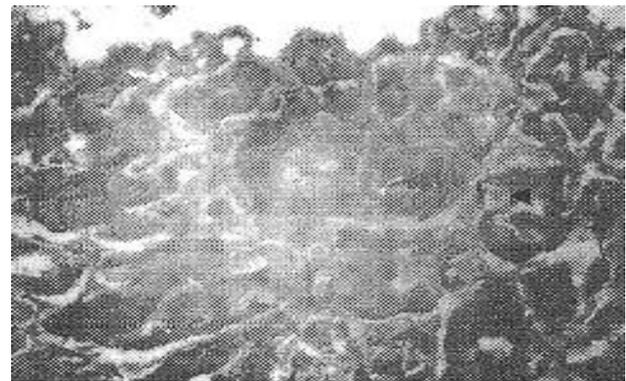
observed there yolk investment appeared cracked and broken places (fig.3&fig.4) but this might be an attribute to be nature of yolk that becomes harder due to the treatment of various reagents during paraffin impregnation and hence such artifacts may not be unnatural.

Exposure to copper did induce little change in histology of thyroid. Most of the follicles have a colloidal mass which is strongly of a dual nature. The size of follicles is another feature observed here that in all cases the follicular epithelium was fairly low (fig.5& fig.6) but yet filled with colloidal mass and the colloid seemed to have undergone thickening (increased viscosity) and that being iodotyrosin protein which become hard due to the treatment with fixative and dehydrating agents due to which it could be observed as flint glass pieces same reason might be held valid to explain alternate strip of light and dark stained colloid in certain follicles. The cuboidal epithelium of thyroid does not suggest any hypo or hyper thyroidal situation. The low cuboidal epithelium of thyroid does not suggest any goitrous or hypo thyroidal or hyper thyroidal situation by yet presence of colloid filled follicle indicate the non depletion of the hormone.

On account of foregoing discussions it is concluded that copper is expected to be more deleterious and toxic to fish. If the present scenario prevails, it may affect the reproductive activity of various fishes which may lead to their extinction in long run.



**Fig: 1** Photomicrograph of cross-section of testis of *Clarius batrachus* exposed to 30 ppm Copper. X100.

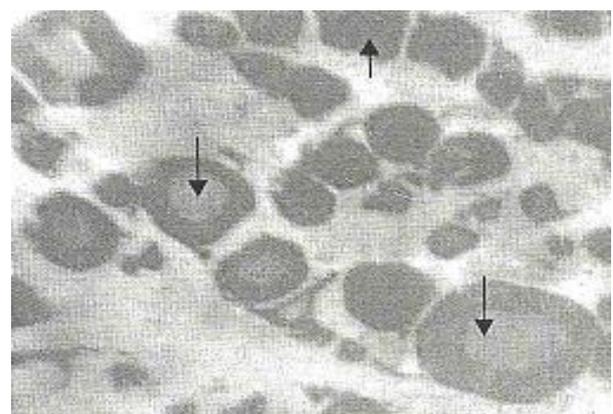


**Fig: 2** Photomicrograph of a part of cross section of a testis of *Clarius batrachus* exposed to copper (reduced interstitial spaces, much thickened wall spermatozoa and dark stained spermatogenic

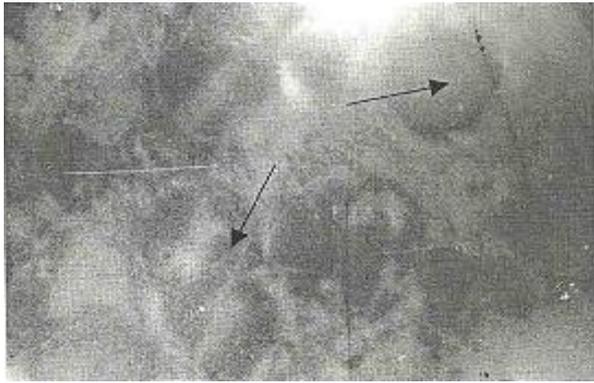


tubule and dark stained spermatogonia). X100

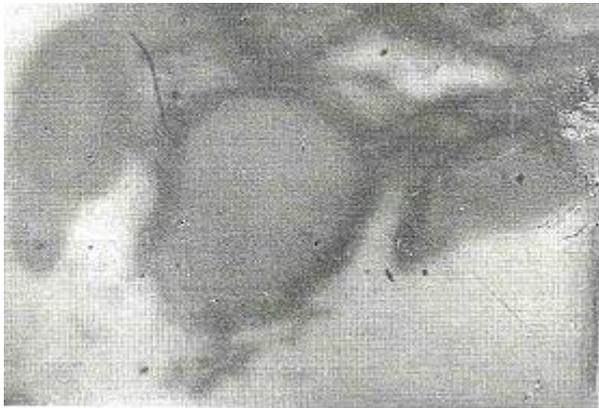
**Fig: 3** Photomicrograph of a part of cross section of ovary of *Clarius batrachus* exposed to Copper. X100.



**Fig: 4** Photomicrograph of a part of cross section of ovary of *Clarius batrachus* exposed to Copper. X100.



**Fig: 5** Photomicrograph of cross section through thyroid of *Clarius batrachus* (arrows indicate the thyroid follicle) exposed to copper. X400



**Fig: 6** Photomicrograph of cross section through thyroid of *Clarius batrachus* exposed to copper. X400

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