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A STUDY OF PINEAL GLAND IN WALKING CATFISH *Clarias batrachus*

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ABSTRACT:

The purpose of this work was to investigate the structure of pineal gland in developing stage of catfish *Clarias batracus*. This also present data from the literature on structure of the pineal gland in catfishes, we studied structure of the photoreceptor cell in the pineal gland structurally and functionally homologus to photoreceptor cell in retina.In the lower vertebrates like fishes the pineal gland contains neurons and photoreceptors and plays a photoreceptive function to perceive light information in animal surrounding, while in mammal it functions exclusively as an endocrine gland.

KEY WORDS: Catfish,*Clariasbatrachus*, Morphology, PinealGland.

INTRODUCTION:

The walking catfish commonly found in fresh water and brackish water of South East Asia, including Malaysia, Myanmar, Indonesia, Singapore. The catfish belongs to the superorder Ostariophysi, which consist of two main series, the Analophysi and Ostaphysi.The catfish consist of 38 families containing approximate 416 genera and 2584 species [1]. The species that are most often referred to in fish aquaculture in India.

Simonneaux and Ribelayga (2003) reviewed the history of the vertebrate's pineal gland focusing on mammals. Descrates was the one of the first to describe the pineal gland as the third eye during the 17th century. At the end of 19th century Ahlborn and Rabl-Ruckhardt described the anatomy, histology, innervations and embryology of the mammalian pineal gland but its function remained unknown.

At the beginning of the 20th century the physiological role of the

pineal gland was studied. In 1943 Bargman suggested that the endocrine function of the pineal gland was regulated by light, via central nervous system, from the 1970s the number of publication on the pineal gland increased. The pineal gland situated above diencephalon in lower vertebrates which is directly sensitive to light. It is a small, white structure, shaped some-what like a pine cone called pineal body. The pineal body is formed by a medio-dorsal protrusion of rudiment during embryonic development [2].

The pineal organ and the lateral eye have several common features with respect to their development and functional aspects. The most notable example of such similarity is the "Third eye" (median eye) in which the dorsal part of the pineal primordium facing the surface epidermis develops as the lens like organ and the other part develops into various photoreceptors and neurons. The pineal complex has two components. They are the pineal gland and parapineal organs. The parapineal organs remain more or less rudimentary, while the pineal organs grow to form a relatively large vesicle located dorsally to the forebrain with the skull roof. The pineal organ is often differentiated into a proximal slender pineal stalk and a distal expanded end vesicle. The wall of the pineal organ is formed by unstraited epithelium, which is strongly folded and may almost obliterate the central lumen of the pineal organs [3].

Fig. No 1 Cat Fish *Clarias batrachus*

The pineal body contains mostly endocrine cells, photoreceptor cells, nerve cells and interstitial cells. The pineal organ of lower vertebrates is a photosensory structure which for comparative anatomical reasons have been termed cone like [4] respond with a graded hyper polarization to light stimulation of all wave lengths [5] so called ganglion cells i.e. the intro pineal neurons that projects into the brain via-the pineal tract are spontaneously active in the dark. The pineal gland translates photoperiodic information into a hormonal signal which would then serves as a messenger to every organ of the body [6]. The pineal gland released its hormone melatonin, into the blood that acts as a neuroendocrine is an internal time keeping molecule that plays a role in

the timing and control of a number of physiological process and behaviors [7].

In fish the entire system (The photo detector, the circadian clock and melatonin synthesizing enzyme) is located in the pineal organ [8].

In the late 1870s, it was first suggested that the pineal gland was a peculiar neuroendocrine organ transforming the signal of the nerve type into the signal hormone. In the 1970-1980s it was believed that only pineal gland was source of melatonin. In catfishes, pineal gland has been suggested to bear some photoneuroendocrine function, like positive or negative photo axis, change in pigmentation in response to back ground colour, circadian rhythemic photoperiodium etc.

MATERIAL AND METHODS:

C. *batrachus*, (body weight range: 420-480 gm) were collected around Mekhari dam Kada Ta. Ashti Dist. Beed (M.S.)during different months, such as April (preparatory period), May and June (Prespawning period), July (spawning period) and September (post-spawning period) of its annual ovarian cycle. They are acclimatized in the laboratory under natural photoperiod and temperature before the commencement of experiments. Water in the aquarium was replenished daily with tap water and procaine penicillin (1: 1000) was added to aquarium water to prevent skin infection. Laboratory made food containing rice bran, oil cake, wheat flour, Soyabean powder (5 mg in 5 g of feed) and chopped goat liver was provided *ad libitum* during acclimation and the tenure of experiments. Catfish is sacrificed and brain is isolated which is present between the two eyes to study the pineal gland.

RESULTS & DISCUSSION:

Fisheries & aquaculture is gaining additional emphasis due to our concern in sustainability, greener solutions, conservation & food security. Detail studies on morphology, physiology, genetics & general biology are therefore in a fish species very much relevant in order to put forward conservation protocols and to propose newer & improved culture practices. Establishment of *Clarias batrachus* in several continents & its popularity as a freshwater culturable fish species among consumers made the species suitable for meticulous reviews with respect to various parameters. According to FAO estimates the demand for catfishes

throughout the world is increasing and *Clarias batrachus* with its several beneficial aspects remain as a hit among the Asians in particular. Besides in order to protect the genetic resources of this species from unwanted hybridization, which the species is very much vulnerable, the fish geneticists and the government bodies should work together. Habitat protection and sustainable consumption of this excellent fish species is the call of the day. Intensive aquaculture of *C.batrachus* in the rural water bodies with very little infrastructure development may bring-about socioeconomic development in many parts of Bengal and Northeast India. Coordination between government bodies with respect to skill up gradation of the workers, market regulation etc together with the scientific community ensuring timely delivery of better quality seed stock will generate success stories in intensive *Clarias batrachus* culture. Since the species is a part of the natural fauna in this region therefore culture practices will be much easier to follow & therefore much more viable in economic point of view. Government bodies & organizations should come forward for training of the rural unemployed youth & women for human resource development & dexterity enhancement related to technical know-how of culture & disease management.

The pineal gland most often hidden under the anterior reflection of the cerebellum. It contains mostly endocrine cells and few (Photosensitive) Sensory ones. The Pituitary Gland & the saccus vasculosus are rather small relative to most teleosts.

Fig No.2 Brain of *Clarias batrachus*

Fig No.3 Pineal Gland of *Clarias batrachus*

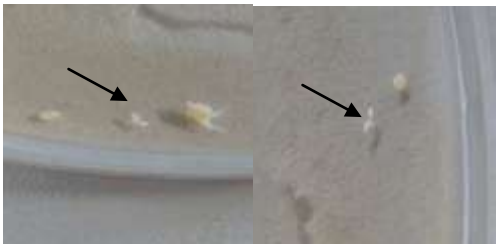

Fig. No.4 Pineal gland of *Clariasbatrachus*

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