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Seasonal Histological Changes in the Olfactory Epithelium of Schilbid Catfish, *Clupisoma garua* (Hamilton, 1822)

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**Abstract:** Olfaction in fish is one of the most important chemosensory modalities driving the essential approaches to interact with the encompassing habitat. The olfactory organ of river catfish, *Clupisoma garua* (Siluriformes; Ailiidae) was studied by employing optical microscopy to delineate the cellular composition in harmony with the annual reproductive cycle. The olfactory epithelium was an intimate folded sheet, sandwiched a thin connective tissue layer, the central core, composed of disposed of connective tissue with nerve fibers and blood vessels through it. A sharp distinction has prevailed between the epithelium and central core by a basement membrane. The thickness of olfactory mucosa with diverse cells was counted attention to their architecture, magnitude, compactness, staining intensity, and distribution patterns throughout altered reproductive phases. In view of the texture of the apical part and outward specialization, the olfactosensory epithelium contained morphologically identified ciliated, microvillous, and rod receptor cells. The non-sensory epithelium was typified by labyrinth cells, mucous cells, mast cells, basal cells, ciliated supporting cells, and non-ciliated supporting cells. They were intermingled in the epithelial lining. The functional emphasis of olfactory cells covering the mucosa was argued with the chemoreception of the fish interested.

**Keywords:** Garua bacha, Olfactory organ, Cellular characteristics, Reproductive cycle, Chemosensory information

## 1. INTRODUCTION

In teleosts, the paired olfactory organs are the significant chemosensory parts of the nasal chamber which are specialized in adaptation to the ecological habitat in which they survive. The sense of olfaction mediates many crucial life processes such as feeding, avoid from enemies, parental behaviour, migration, propagation and reproductive approaches (Nikonov *et al.*, 2017). Such behavioral activities are an exposure of variant processes at cellular and physiological levels, esteemed for characteristic receptor neurons on the olfactory mucosa (Singh *et al.*, 1995). In fish, the olfactory receptor neurons are the foremost integral part of sensory epithelium for sending olfactory information to the brain (Satou, 1992). Characterization of olfactory system in a number of teleosts are draw attention by many workers utilizing light and electron microscopy (Hansen *et al.*, 2003; Liu *et al.*, 2005; Arvedlund *et al.*, 2007; Waryani *et al.*, 2013; Masram and Baile, 2014; Pashchenko and Kasumyan, 2015, Ghosh and Chakrabarti, 2016; Kim *et al.*, 2018). Among the fishes, extreme modifications in the morphology of olfactory organs and cellular components of sensory and non-sensory epithelium of olfactory lamella are recorded by the researchers. Receptor cells can be considered as different functional and structural entities with distinct sensitivities to external stimuli (Yamamoto, 1982).

*Clupisoma garua*, commonly known as butter catfish, is an inhabitant of freshwater rivers, streams, canals, and reservoirs; feeds on insects, shrimps, other crustaceans and other small fishes also (Talwar and Jhingran, 1991; Akter *et al.*, 2019). *C. garua* has well developed olfactory organs with important roles in various aspects of life processes (Ghosh, 2018a; 2019). Perhaps very limited attention has been paid to depict the seasonal alterations of sensory neurons and histological organization of olfactory epithelium in association to reproductive cycles of Indian fishes (Hamdani *et al.*, 2008; Ghosh, 2018b). The present study was undertaken to portray the cyclical changes of sensory and non-sensory cells lining the olfactory epithelium in relation to reproductive activity of bottom dweller catfish, *Clupisoma garua* (Hamilton, 1822) by histological approaches. This study would aid to have information about any variation of the olfactory cell types compared with reproductive cycles.

## 2. MATERIALS AND METHODS

### Collection of specimens

Reproductive adult male (ranged from 10.42-19.67 cm in standard length) and female (varied from 12.24-24.56 cm in standard length) specimens of *Clupisoma garua* were collected from Bhagirathi-Hooghly river at Kalyani surrounding areas of West Bengal using