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RESEARCH ARTICLE

Histoanatomy and surface ultrastructure of the olfactory organ of the freshwater tank goby, *Glossogobius giuris* (Hamilton, 1822)

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Abstract. Characteristic features of histology and fine morphology of the olfactory organ in the tank goby, *Glossogobius giuris* (Perciformes, Gobiidae, Gobiinae), were investigated with light and scanning electron microscopy. The olfactory cavity contained single lamellae that were exposed to the aquatic environment by small anterior and posterior nostrils. Typical olfactory rosettes were not observed. Histologically, each lamella consisted of two layers of epithelium; wrapping the central core that was composed of connective tissue stroma with nerve fibers and blood capillaries. The mucosal lining of lamella was merged with sensory and non-sensory olfactory cells, identified on the basis of structural characters, surface specializations, and staining features. The principal sensory elements were ciliated receptor cells that were characterized by apical dendritic processes expanded from cell soma and microvillous receptor cells equipped with multiple tiny dendrons on the mucosal surface. The bead-like appearance of several labyrinth cells, mucous cells with secreted mucin, scattered lymphatic cells, stratified epithelial cells bearing microfolds, and condensed ciliated supporting cells were observed in the non-sensory epithelia. Undifferentiated basal cells were embedded in the deeper zone of the epithelium above the basement membrane. The cellular organization of the olfactory lining was interpreted with chemoreception of the fish concerned.

Keywords: Gobiid fish, olfactory structure, morphoanatomy, histology, olfaction

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Introduction

In fish, the olfactory and gustatory chemosensory pathways are important for the detection and recognition of chemical cues in the aquatic surroundings (Hara and Zielinski 1989). Olfactory responses enable fish species to detect food, escape from predators or enemies, identify sexual partners at breeding sites, and communicate with conspecifics in the aquatic environment (Hansen and Reutter 2004). The chemosensory organs are well developed and play significant roles for nocturnal species or those who live in dark aquatic habitats or inhabit muddy waters. Olfaction is considered as the first range for behavioral adaptations and function as distance sense (Devitsina and Chervova 1994). Diversity exists concerning the shape, morphology, lamellar arrangement, and cellular components of the olfactory organs among teleosts with regard to ecological behavior and mode of life. Sensory receptor cells having either apical cilia or microvilli on the olfactory epithelial surface are usual in fishes (Diaz et al. 2002, Chakrabarti and Guin 2011, Mokhtar and Abd-Elhafeez 2014, Malick et al. 2018, Ghosh 2020), furthermore, a third type, crypt receptor cells, are observed in some teleosts (Hamdani et al. 2008, Camacho et al. 2010, Chakrabarti and Ghosh 2011) with distinct sensitivity to alien stimuli. Only a few