# Surface ultrastructure of the olfactory lamellae of a murrel, *Channa punctata* (Bloch) (Channidae, Channiformes)

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**In fishes, unlike terrestrial animals, olfaction takes place entirely in the aquatic environment. Here the carrier of stimulant chemical molecule is not air but water. Thus chemicals that are to be detected olfactorily by fishes need not be volatile, but must be soluble in water. Thus, chemicals that are to be detected olfactorily epithelium detect the stimulant chemical molecules present in the ventilating water[1,2]. Paucity of information on micromorphology of the olfactory lamellae of Indian fish species forms the basis of the present paper on the surface ultrastructure of the olfactory lamellar epithelium of an air-breathing murrel, *C. punctata*.**

LIVE specimens of *C. punctata* were cold-anaesthetized[3] by lowering the ambient temperature and their olfactory lamellae were fixed in chilled (4 °C) 0.1 M phosphate buffered (pH 7.4) 3.25% glutaraldehyde for 24 h. The lamellae were rinsed thoroughly in chilled (4 °C) phosphate buffer (pH 7.4), dehydrated in ascending concentration of ethanol, subjected to critical point drying, gold sputtered and examined under a scanning electron microscope (SEM, Hitachi).

In fishes the olfactory epithelium is the site for aquatic olfaction. It is differentiated into sensory and non-sensory zones. The former is dominated by receptor cells and its surface is characterized by the presence of tufts of sensory hairs (Figures 1 and 2). It is interesting to note that the walls of the interlamellar channels contain numerous hair-like processes. However, the leading and trailing zones (entry and exit points of the lamellar water flow respectively) of the olfactory lamellar channels also contain non-sensory epithelial cellular zones (Figures 1 and 2). The plasma membrane of such epithelial cells are folded to form microridges (Figure 2). Such cells are designated as microridged epithelial cells (MREC). Narrow (0.263 μm) intercellular spaces are also discernible (Figure 2). The microlanes of MREC may be associated with holding mucus produced by the epithelial mucous glands (Figure 2). The mucus is used to remove the sediments from the olfactory epithelium for its effective functioning to detect the odorant present in ambient water. A layer of mucus lodged in the microlanes of MREC is also effective in protecting the infection-prone delicate olfactory epithelium from fungal and bacterial colonies prevalent in the unhygienic aquatic environment of the swamps. The mucus layer can also be used to minimize the harmful effects of the agrochemicals drained into swamps through the rain water. Modification in the surface ultrastructure of the olfactory epithelium due to harmful chemicals in the ambient water can be evaluated by scanning electron microscopy. This methodology can also be used to determine the ecodegradation of the aquatic status of the swamps.


**Figures 1 and 2.** **1,** Scanning electron micrograph of some parts of the three olfactory lamellae showing sensory (arrows) and non-sensory (arrowhead) zones. Interlamellar spaces are also discernible (curved arrows). **2,** SEM of a part of olfactory epithelium showing microridged epithelial cells (arrows) and their intercellular spaces (small arrows), sensory hairs of receptor cells (arrowheads) and mucous gland opening (white arrowhead).

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