Chemoreception is recognized as an oldest sensory system of vertebrates (Hoover, 2010). Despite of the adaptive structural variation of olfactory system in different habitat, the basic anatomy has been conserved across the lineage of vertebrate evolution (Stoddart, 1980; Dahanukar *et al.,* 2005). Two basic types of chemosensory systems *viz.,* olfactory system and vomeronasal system are evident. The principal system involved in olfaction, *i.e*., responsible for detection of chemical odorants and the accessory olfactory system engaged in detecting the chemical cues for communication with other animals. Fishes can detect the water soluble odorant molecules (*viz*., amino acids, bile acids, sex steroids and prostaglandins). Burne (1909) and Yamamoto (1982) mentioned that among the vertebrate classes, fish shows the greatest variety in the fine structure of the sensory organs especially the olfactory organ. In the olfactory apparatus, multilamellar olfactory rosette is the most striking components that help to perform the perfect receiving area of odor chemical substances from the aqueous medium (Cox, 2008). During water ventilation, maximum level of chemical analysis has been performed through receptor cell components of the neuroepithelium and the water retention function is assisted by accessory nasal sac. Water retention technique is achieved through two basic mechanisms *viz.,* either through pumping action of accessory nasal sac or opening and closing of mouth (Pandey and Misra, 1979; Parker, 1910, Pipping, 1926; Nevitt, 1991). Two accessory nasal sacs are noted in most of teleostean groups but in present experimental specimen only one pair accessory nasal sac is evident *i.e.,* lachrymal sac. Ciliary actions of apical ciliated cellular components in the nasal neuroepithelium towards the nasal cavity are involved in water current generation over the olfactory epithelium. The olfactory neuroepithelium of fishes contains olfactory receptor neurons (ORNs) as well as supporting cell. In teleosts the OSRNs bear either cilia or microvilli (Zieske *et al*., 1992). Both cilia and microvilli containing crypt cell components are also found within the neuroepithelium of actinopterygian fishes (Hansen and Finger, 2000). The olfactory cilia of the sensory receptor cell of *M. armatus* are supported by basal body, microtubules. The microtubules are acts as roadway for molecular transport of cargo towards the distal lashes of cilium (Jenkins *et al*., 2009). The subcellular details of ciliary elements show (9+2) arrangements of microtubules with basal body components. Beneath the basal body, the presence of striated rootlets in ciliated supporting cell denotes the motile nature of cilia this characteristics feature is absent in sensory receptor cell due to absence of striated rootlets in their ciliary components and it incorporated into non motile ciliated cell (Menco, 1984). According to Hansen and Finger (2000) crypt cell is an important cell types and not an intermediate between ciliated and microvillous cell types. The structural variations of different sensory receptor components and their functional occurrences may leads to species specific identification of chemical cues from the external chemical environment. Ontogenetically, it has proven that ciliated receptor cell appear first, followed by microvillous receptor cells (Zelinski and Hara, 1998). Breucker *et al*., 1979 suggested the presence of microvillous sensory receptor cell within the neuroepithelium as a separate entity and it not acts as progenitor of ciliated cell. From postnatal developmental study of olfactory apparatus in Indian Major Carp, it reveals that microvillous sensory receptor cell appears later than the ciliated components of the neuroepithelium (Sarkar *et al*., 2014). The perikaryons of sensory receptor components are located at the different depth of the neuroepithelium (Hamdani and Doving, 2001). In *M. armatus* the perikaryons of ciliated sensory receptor cell located at the lower part of the epithelium and involved in general sensing mechanism but the microvillus sensory cell, having long dendrites involves in feeding behaviour of carp (Hamdani and Doving, 2002). Beneath the basal lamina thread like axonal projections are aggregated to form fila olfactoria and this area is associated with collagen fibers, fibroblast cell, macrophases, mast cell, *etc*. The functional occurrences of fibroblast cell and macrophage may involve in first line of defense against ingested pathogen particle (Borders et al., 2007). According to Yamamoto (1982) presence of rodlet cell is the sign of the aging in the ciliated receptor cell and suggested that the cilated receptor cell with a tubercle topped with a single cilium is probably a transitional types from nucleated to rod cells. Bühler, 1930 reported the presence of rodlet cell and they named as mucous or goblet cells when such types of cells are present at the gill region they known as mucous producing cell (Fearnhead and Fabian, 1971). In the olfactory system this type of cells are present mucous cell (Ojha and Kapoor, 1974). But ultrastructural detailing of variable neuroepithelial components of *M. armatus* denotes the separate entity of both rodlet cell and mucous secreting cell and the characteristics features of both types are also different from each other. Rodlet cell are the only type of host inflammatory cells found in the epithelium and have its great role in host parasitic infection (Dezfuli *et al*., 2007). The appearance of rodlet cell in response to stress exposure to the specimen (Iger and Abraham, 1997) and it may acts as biomarker for environmental health monitoring (Mazon *et al*., 2007).

From evolutionary point of view, fishes are the primitive class of animals and they possess ancestral olfactory receptor genes that are responsible for odor recognition. In aquatic environment, where the concentration of light is less but rich in dissolved chemical compounds, fishes are using their highly developed chemical signaling system. Olfactory receptor genes of mammalian olfactory system is first detected by Buck and Axel (1991) and this discovery opened as an avenue for molecular based studies on olfactory system. Fishes retain maximum number of ancestral olfactory receptor gene lineage and are responsible only for detection of waterborne chemical odors. The odorant perception ability of amphibian and its genetic makeup shows an advance mode of adaptation in respect to its both aerial and aquatic mode of adaptation (Niimura, 2005) although they retain maximum gene families common to both fishes and mammals (Freitag *et al*., 1998). Sensory informations about the chemical environment is transmitted to the brain by olfactory receptor neurons through a series of physiological process *viz*., molecular, neural processes *etc*. Odorant molecules are first binds to the receptor proteins of the ciliary plasma membrane and then activate G protein. Activated G protein then activates adenyl cyclase, resulting the increase level of second messenger. This event eventually leads to the generation of impulses and transmit it to the olfactory bulb (Doving *et al.,* 1977). Each olfactory neuron expresses most probably only one of the hundreds of odorant receptor genes in the genome. But regardless of odor, the responses of every olfactory neuron have same type of action potential that ultimately transmits to the brain via the axonal projections. The discriminating sensibility of an individual olfactory neuron is therefore useful only when its axon delivers its neurotransmitter to the specific relay station in the brain, that responsible to sense the particular types of odors. These relay stations are called glomeruli. They are located within olfactory bulbs (one on each side of the brain). Each olfactory receptor neurons expressing the specific odorant receptor that are widely scattered in the olfactory epithelium and their axons are converging on the same glomerulus. When new neurons are generated through neurogenesis, replacing those that die, then new neurons are must in turn send their axons to the specific glomerulus. The odorant receptor proteins thus have been proposed to have a second function helping to guide the growing tips of the new axons along specific paths to the appropriate target glomeruli in the olfactory bulbs. A strong correlation exists between olfactory neuron morphology, type of odorant receptor and G protein expressed and the distribution of sensory cell within the neuroepithelium (Hansen *et al.,* 2003). The expression of specific receptor protein (Gαolf) on the neuroepithelium of the *M. armatus* denotes similarities against structural morphology of ciliated sensory components of neuroepithelium. The ciliated olfactory receptor neuron frequently distributed and helps to sense specific range of odors that are transmitted via olfactory bulb to higher brain areas. The other two types of sensory components *viz*., microvillous sensory receptor cell and crypt cell are responding to social cues and sex pheromones (Hamdani and Doving, 2007).The olfactory neuroepithelium has both degenerating and regenerating abilities (Frabman, 1998). Basal cells are assumed to be acts as progenitors of receptor cell and supporting cells are exists throughout the life of the species (Graziadei and Monti - Graziadei, 1978). The basal layer of the olfactory neuroepitehlium is the principal site for cell proliferation (Byrd and Brunjes, 2001; Oehlmann *et al*., 2004). The developing different stages of basal cell are marked ultrastructurally and their gradual chromatin condensation within neuroepithelium of *M. armatus* may involve in formation of developing sensory receptor cell of the neuroepithelium (Caggiano *et al.,* 1994). The cellular proliferation is therefore acts an important event within neuroepithelium that help to makeup the total interacting surface of the epithelium through gradual systematic way. The changing nuclear chromatin structures under fluorescence microscope denote variation in their nuclear organization that ultimately denotes qualitative maturation level of sensory components (Franziska *et al*., 1994; Sarkar et al, 2016). The sensory receptor cell with fragmented, loosely arranged chromatin fiber with no proper distinction between euchromatin and heterochromatin materials within the nuclear elements denotes their qualitative functional position (Sarkar and De, 2015). The fragmentation of chromatin granules therefore helps to mark the degeneration of cell. Within the olfactory neuroepithelium the sensory components of teleost are undergoes through natural aging events and also faces variable unpleasant environmental pollutants. Copper (Cu) acts as important source of olfactory toxicity in Salmon (Belanger *et al*., 2006; Tierney *et al*., 2007). Authors were reported that elevated manganese (Mn) associated with impairment of iron (Fe) homeostasis (Bowman *et al*., 2011). Alternations in the concentration of different neurotransmitter (*viz*., γ-aminobutyric acid, glutamate, dopamine, *etc*.) and their disruptive effects have been associated with increased Mn level (Takeda *et al*., 2007; Aschner *et al*., 2006). As a transgenic metal cadmium (Cd) has toxic effects on aquatic animals (Chen *et al*., 2014). In vertebrates apoptotic mesangial cell death has been induced by cadmium that leads to reduced level of mitochondrial membrane potential and Cd^{2+} dependent reactive oxygen species (ROS) production (Templeton and Liu, 2010). Presently, quantitative analysis of elements using EDAX attached with TEM reveals the bioaccumulation of heavy metals (*viz*., Cu, Pb, Cd, Ni, *etc*.) in the neuroepihelium of *M. armatus*. Bioaccumulation of Cd in the cytoskeletal (especially in microtubules) structures of sensory components (especially ciliated sensory receptor cell) of *M. armatus* shows morphological changes in different subcellular organelles *viz.*, with dilated rough endoplasmic reticulum (rER), lysosomal diversity, fragmented microtubules as well as neurofilaments with vesicular crowding and docking, *etc.* of sensory cellular elements. The fragmented chromatin structures with frequent granules at the periphery of cell nucleus are distinctive features that signify degenerative sign and it highly correlated with cadmium induced sensory organelle of *M. armatus*. The cadmium accumulation at the microtubular cytoskeletal structures of soybean seedlings leads to differentiated changes in post translational modifications of tubulin protein (Gzyl *et al*., 2015) as well as changed in the microtubules arrangement pattern (Smeartenko *et al*., 1997; Schwarzerova *et al*., 2002; Shoji et al., 2006; Xu *et al*., 2009). The cadmium treated Chinese Hamster Ovary (CHO) cell shows default chromatin condensation (Banfalvi *et al*., 2005). Intracellular damages *viz.*, disrupted cell membrane associated with mitochondrial distortion, defective Golgi cisternae, dialated neurofilaments and microtubules are also evident in cadmium induced change in muntjac fibroblast (Ord *et al*., 1988). Therefore, the excess bioaccumulation of cadmium may cause neural necrosis and inducing neurodegenerations of the sensory components. The variable degenerative features in the subcellular components of sensory neuroepithelium emphasized to correlate functional similarities of different neural dysfunctions (Moberg *et al*., 1997). Within the neuroepithelium the neurodegenerative events itself acts as an instinct stimulator of neurogenesis. Prolonged bioaccumulations of heavy metals may unable to replace new sensory cell population. The entire process leads to olfactory dysfunction in teleost. The olfactory dysfunctions ultimately affecting the basic behavioral requirements of teleost *viz*., food searching, prey detection, avoidance of predators, orientation of migration, *etc*. In general population olfactory dysfunction also affects on millions of people (Marin *et al*., 2018) but in most cases it cannot be diagnosed in proper basis *i.e.,* detection of hyposmia, anosmia, dysosmia, *etc*. or often neglected and it may leads to severe variable neurodegenerative diseases *viz*., Parkinson’s, Alzheimer’s, Huntington’s, familial ataxias, incidental Lewy Body disease, *etc*. Therefore, these data may be a prerequisite to explore the details regarding metallobiology of several neurodegenerative diseases in vertebrates.