HUMAN ANATOMY AND PHYSIOLOGY 1(BP101T)

UNIT: 4 SPECIAL SENSES

CLASS: 7

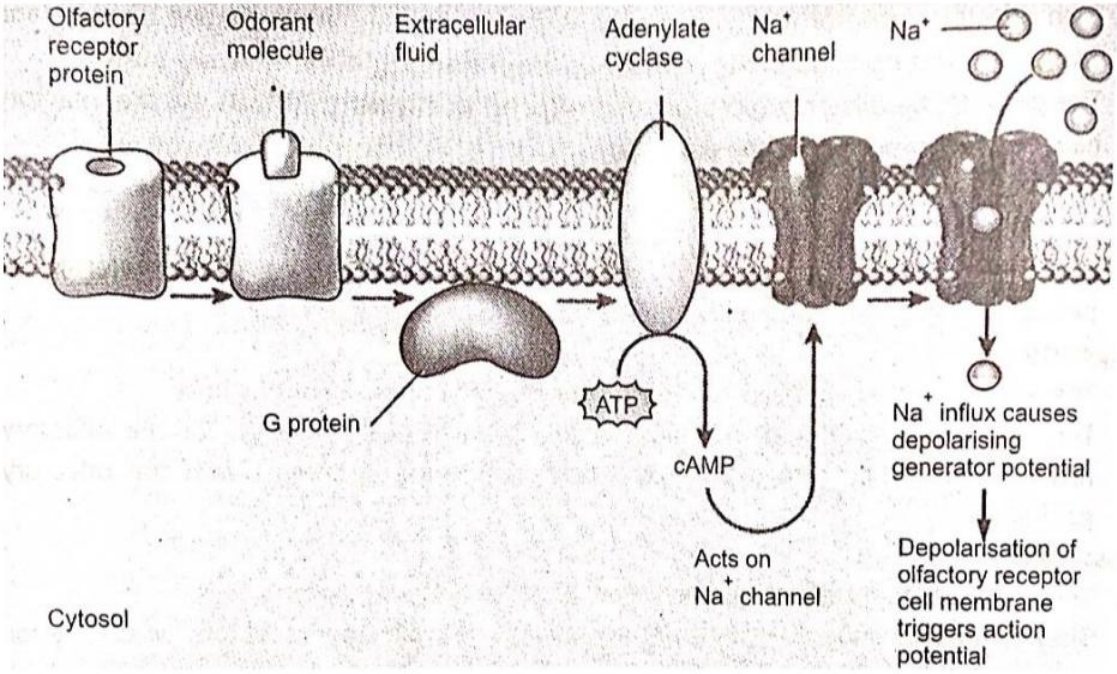
TOPIC: STRUCTURE AND FUNCTIONS OF NOSE AND ITS DISORDERS

- Both **smell and taste are chemical senses**, because the **sensations arise from the interaction of molecules with smell or taste receptors.**
- **ANATOMY OF OLFACTORY RECEPTORS: The nose contains 10-100 million receptors for the sense of smell or olfaction** which are contained **within an area called the olfactory epithelium.**
- The olfactory epithelium consists of three kinds of cells:
- Olfactory receptors
- Supporting cells
- Basal Cells
- **OLFACTORY RECEPTORS:**

  These are the first-order neurons of the olfactory pathway. Each olfactory receptor is a **bipolar neuron** with an exposed **knob-shaped dendrite** and an axon projecting through the **cribriform plate** and **ending in the olfactory bulb**. The parts of the olfactory receptors that respond to inhaled chemicals are the olfactory hair, cilia that project from the dendrite. **Chemicals that have an odour and can stimulate the olfactory hairs are called as odorants.** Olfactory receptors respond to the chemical stimulation of an odorant molecule by producing a generator potential, thus initiating the olfactory response.
- **SUPPORTING CELLS:** These are **columnar epithelial cells** of the **mucous membrane lining the nose**. They provide **physical support,**

nourishment, and **electrical insulation** for the olfactory receptors, and they help **detoxify** chemicals that come in contact with the olfactory epithelium.

- **BASAL CELLS:** These are the **stem cells** located between the **bases of the supporting cells.** They **continually undergo cell division to produce new olfactory receptors,** which live for only a month. Olfactory epithelium produces mucous that is carried to the surface of the epithelium by ducts. The secretion moistens the surface of the olfactory epithelium and dissolves odorants so that transduction can occur.
- **PHYSIOLOGY OF OLFACTION'S:** Human being ability to **recognize about 10,000 different** odours probably depends on patterns of activity in the brain that arise from activation of many different combinations of olfactory receptors. Olfactory receptors react to odorant molecules in the same way that most sensory receptors react to their specific stimuli: A generator potential (depolarization) develops and triggers one or more nerve impulses. In some cases, an **odorant binds to** an **olfactory receptor protein in the plasma membrane** of an **olfactory hair.** The olfactory receptor protein is coupled to a membrane protein called a G protein, which in turn activates the enzyme **adenylate cyclase.**
- The result is the following chain of events: production of cyclic adenosine monophosphate (CAMP): opening of sodium ion (Na) channels →inflow of Na* depolarizing generator potential →generation of nerve impulse and propagation along axon of olfactory receptor.



Physiology of olfaction

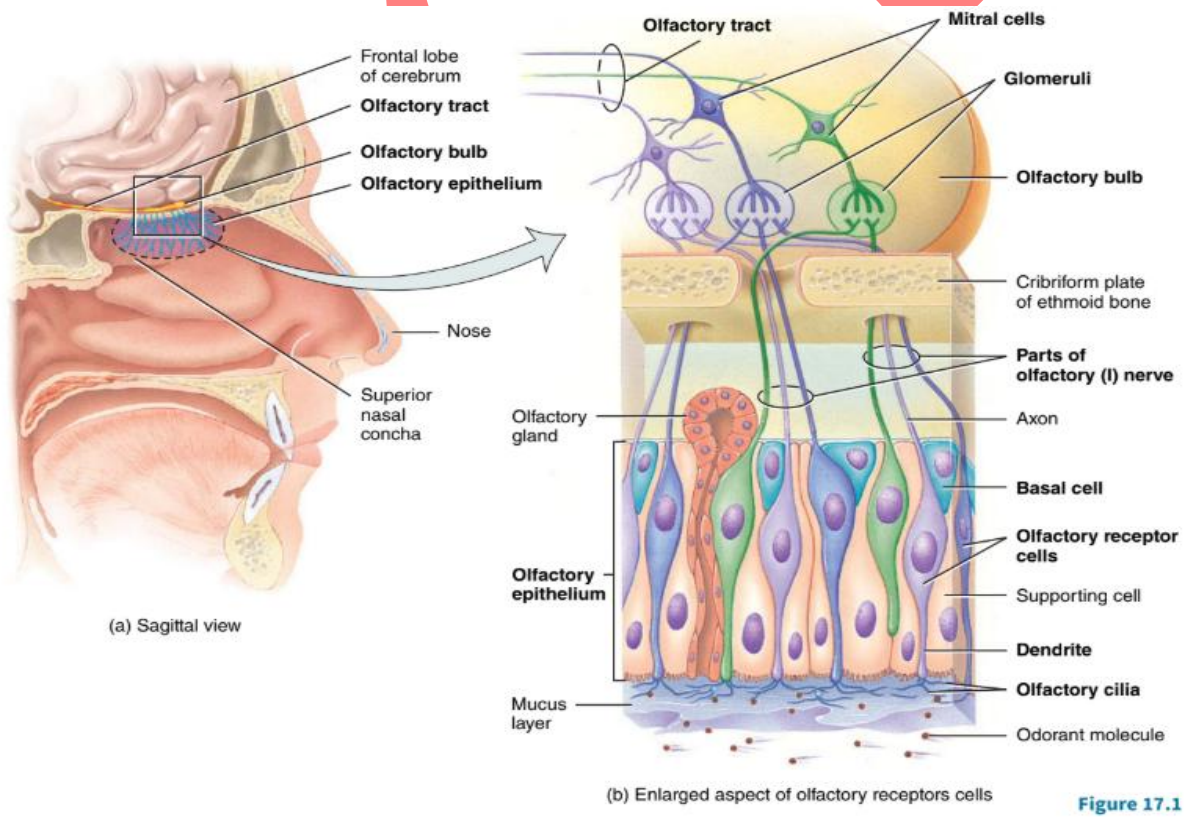


Figure 17.1