SMELL RECEPTORS (Olfactoreceptors)

In the nose's upper part, there's a tiny area called the olfactory epithelium where smell receptors are found. This special area is made up of three types of cells.

Olfactory Receptor Cells

Inside the nose, there are special receptors covered in mucus that help us smell. These receptors are called olfactory receptors, and they do two jobs - they sense smells and also send signals like neurons. These receptors are different because they are shaped like spindles and have a thin part at the top called a dendrite, ending in a knob with non-moving hairs known as olfactory hairs. What's interesting is that these cells are the only ones in the nose that change and renew as we grow older.

Supporting Cells

These are tall cells that sit between the smell-sensing cells to help them. They have a brownish-yellow pigment (like lipofuscin) that gives the smelling part of the nose its yellow color.

Basal Cells

These are small cells that do not reach the surface. They give rise to new olfactory receptor cell to replace the worn out ones. This is an exception to the fact that neurons are not formed in the postnatal (after birth) life. The olfactory receptor cells survive only for about two months.

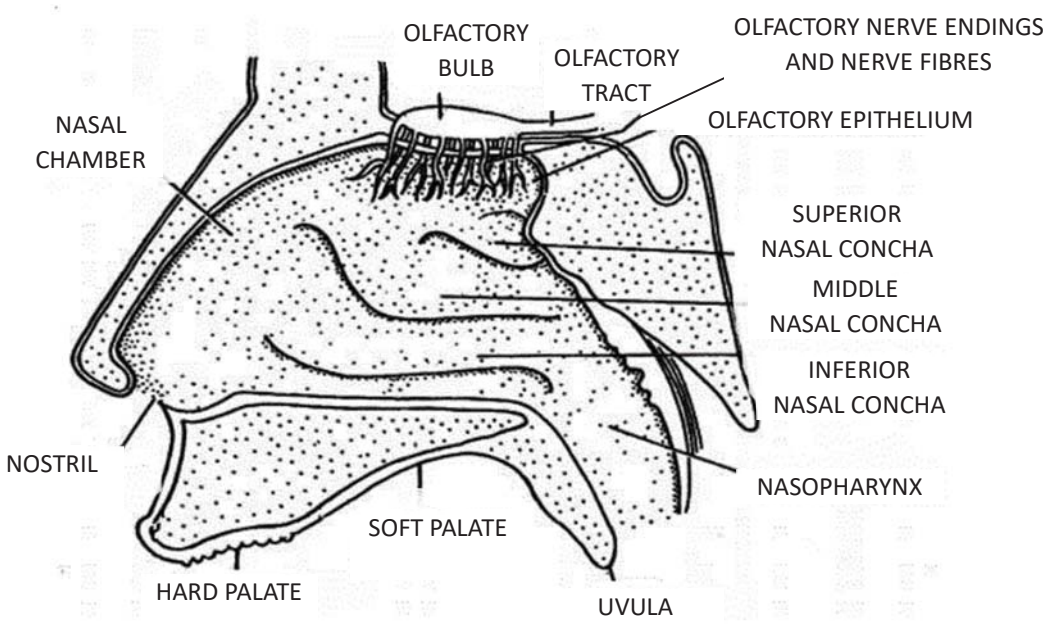

Fig.: Nasal chamber showing location of olfactory epithelium and other associated structures

The smell-sensing neurons in the nose reach into two bean-sized organs known as the olfactory bulbs, which are connected to the brain's limbic system.

Underneath the smelling part of the nose, there are special glands called olfactory glands or Bowman's glands. These glands make mucus that covers the smelling area, keeping it wet. The mucus also shields the cells from dust and bacteria.

Working

When certain substances are dissolved, they excite the smell receptors by attaching to protein receptors in the tiny hairs (cilia) of the nose. This action opens specific channels for sodium (Na^+) and potassium (K^+). As a result, a signal is created and sent to the first relay station in the brain, called the olfactory bulb. The fibers of the smell nerves connect with second-order neurons called mitral cells in structures known as glomeruli,

resembling balls of yarn. When these mitral cells are triggered, signals travel from the olfactory bulb through olfactory tracts to important destinations in the brain, like the temporal lobe of the cerebrum.

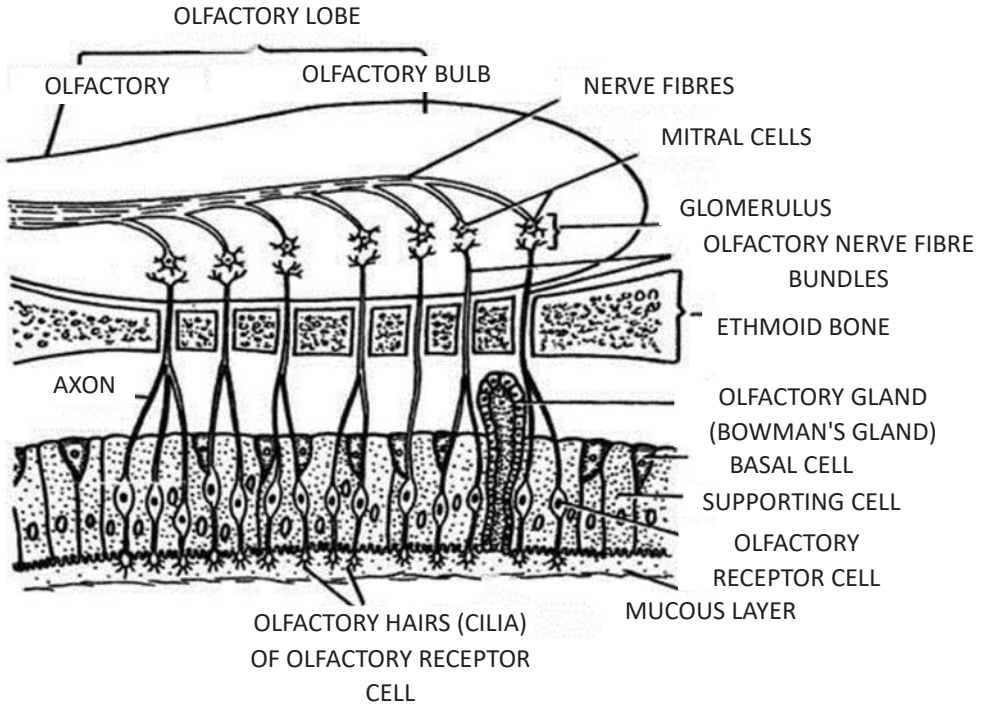

Fig.: Olfactory epithelium, ethmoid bone and olfactory lobe

Ladies usually have a better sense of smell than gentlemen, especially during ovulation. Smoking can harm the smell receptors, and as people get older, their sense of smell tends to weaken. Hyposmia, which means a decreased ability to smell, can happen.

Note:

Apart from the smell receptors in the nose, the mouth and tongue also have nerves forming the trigeminal nerve, often called the dentist's nerve because it senses pain. The brain combines signals from the trigeminal nerve with those from smell to recognize certain smells. When there are irritants like ammonia or vinegar, the trigeminal nerve helps by warning about harmful chemicals in the air. Inside the nose, Bowman's glands release fluids to remove irritating substances and dissolve smelly things.