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Sensory Systems

At the end of this lesson you will be able to:

Describe the structure of the eye and the roles of rods and cones in vision.

Discuss how taste and smell are detected.

Compare the detection of touch, temperature, and pain.

Vision

Sclera: This is the tough, white outer layer of your eye that protects its inner parts.

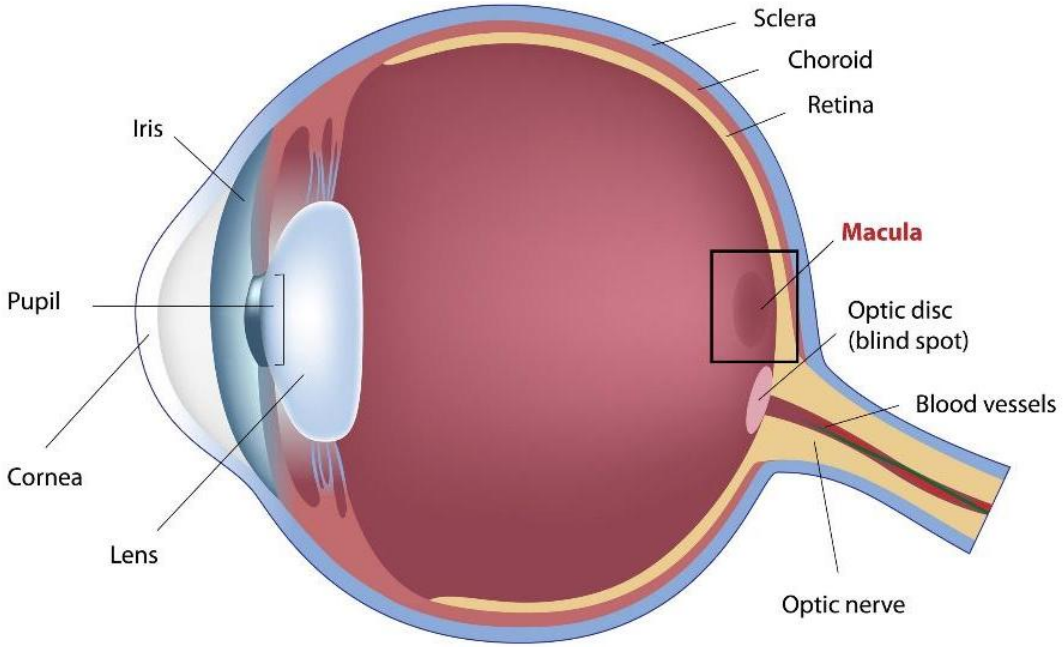
Choroid: This is the middle layer of your eye. It's dark and spongy and contains many blood vessels that bring nourishment to the eye.

Iris: This is the colored part of your eye that you see. It controls the amount of light entering your eye by closing or opening the pupil in the center.

Pupil: This is the black opening in the center of your iris that light travels through.

Retina: This is the light-sensitive layer of tissue in the back of your eye. It converts light rays into electrical signals that are sent to your brain.

Macula: This is a small area near the center of your retina responsible for sharp, central vision.



Vision

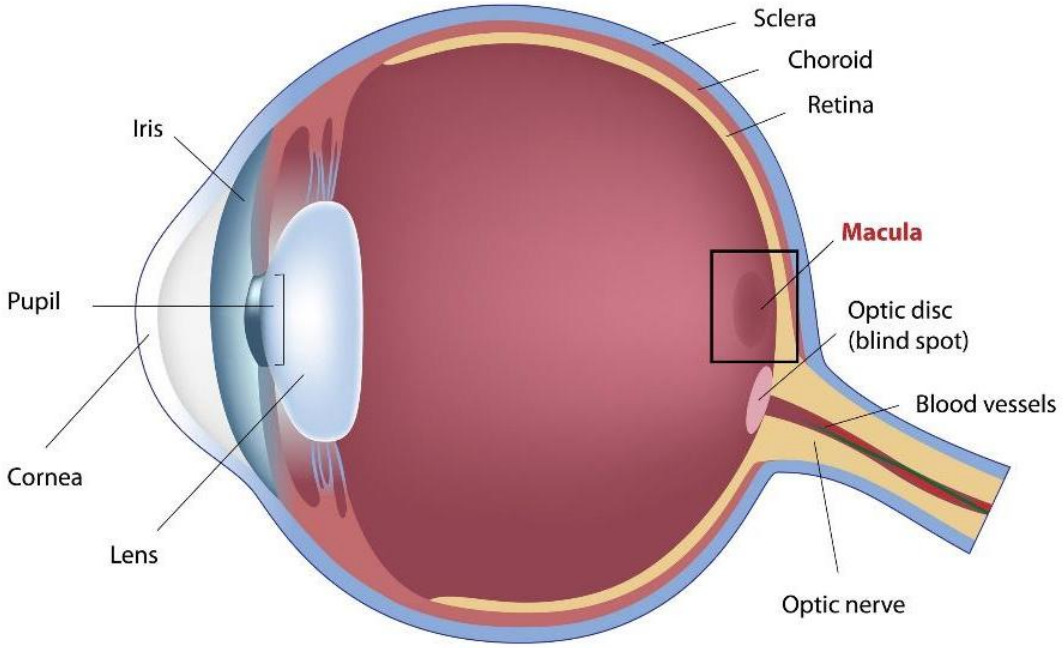
Optic disc (blind spot): This is the area where the optic nerve leaves the eye. There are no light receptors here, so you have a small blind spot in each eye.

Blood vessels: These vessels carry blood throughout the eye, delivering nutrients and oxygen.

Cornea: This is the clear, dome-shaped layer at the front of your eye. It protects your eye and helps focus light coming into your eye.

Lens: This is the clear structure behind the pupil that focuses light rays onto the retina. The lens changes shape to focus light from near and far objects.

Optic nerve: This bundle of nerve fibers carries the electrical signals from the retina to the brain, where they are interpreted as images.



Photoreceptors

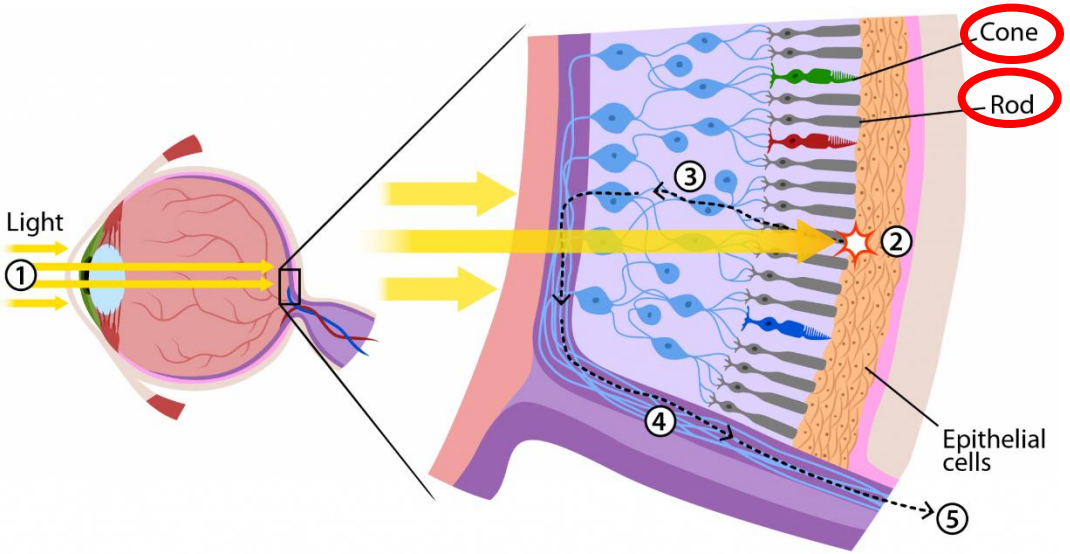
Rods and cones are photoreceptor cells in the retina of the eye.

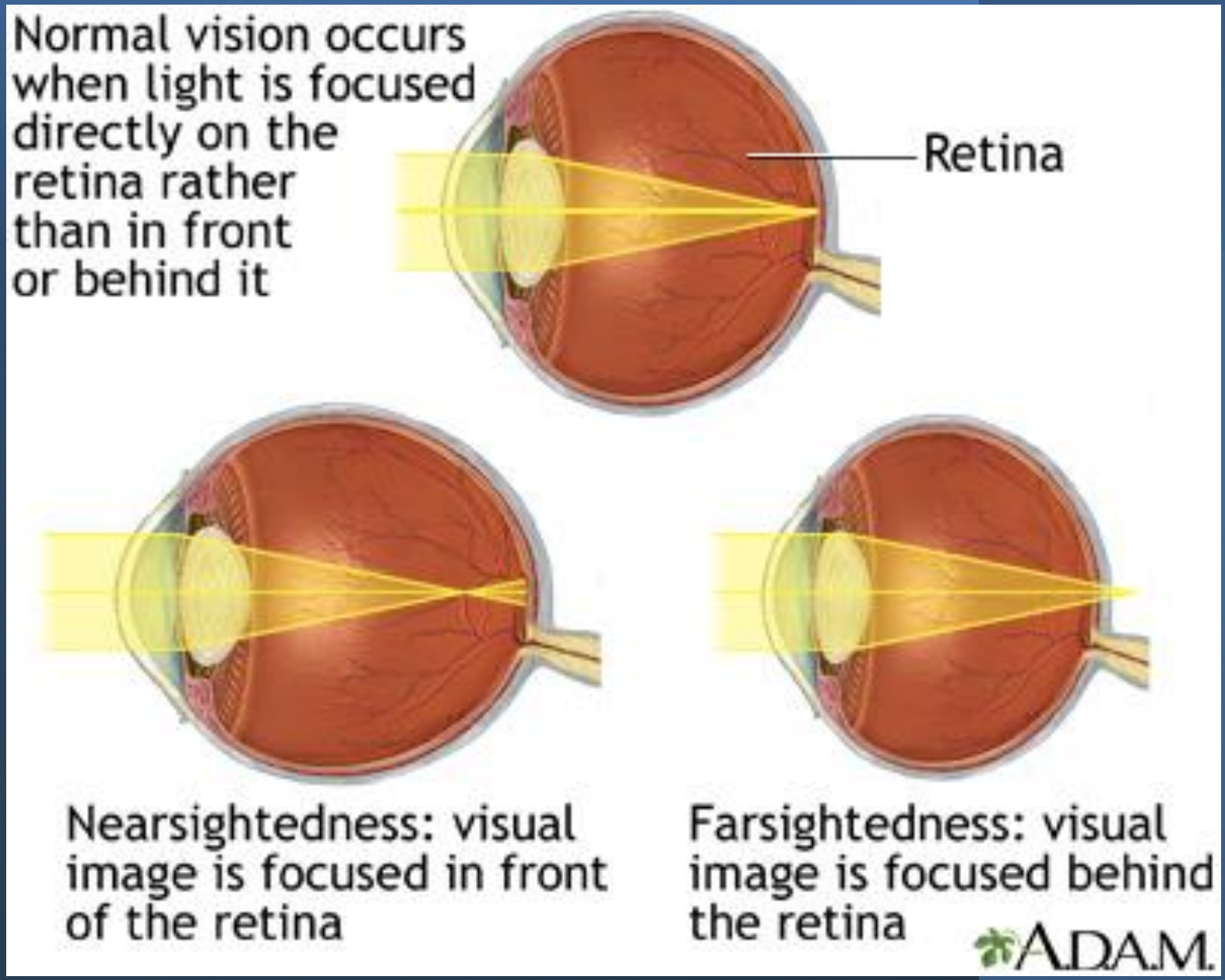
Rods:

- Function well in low light.
- Provide peripheral vision.
- Monochromatic (detect shades of gray). – Black and white.
- Not present in the macula.

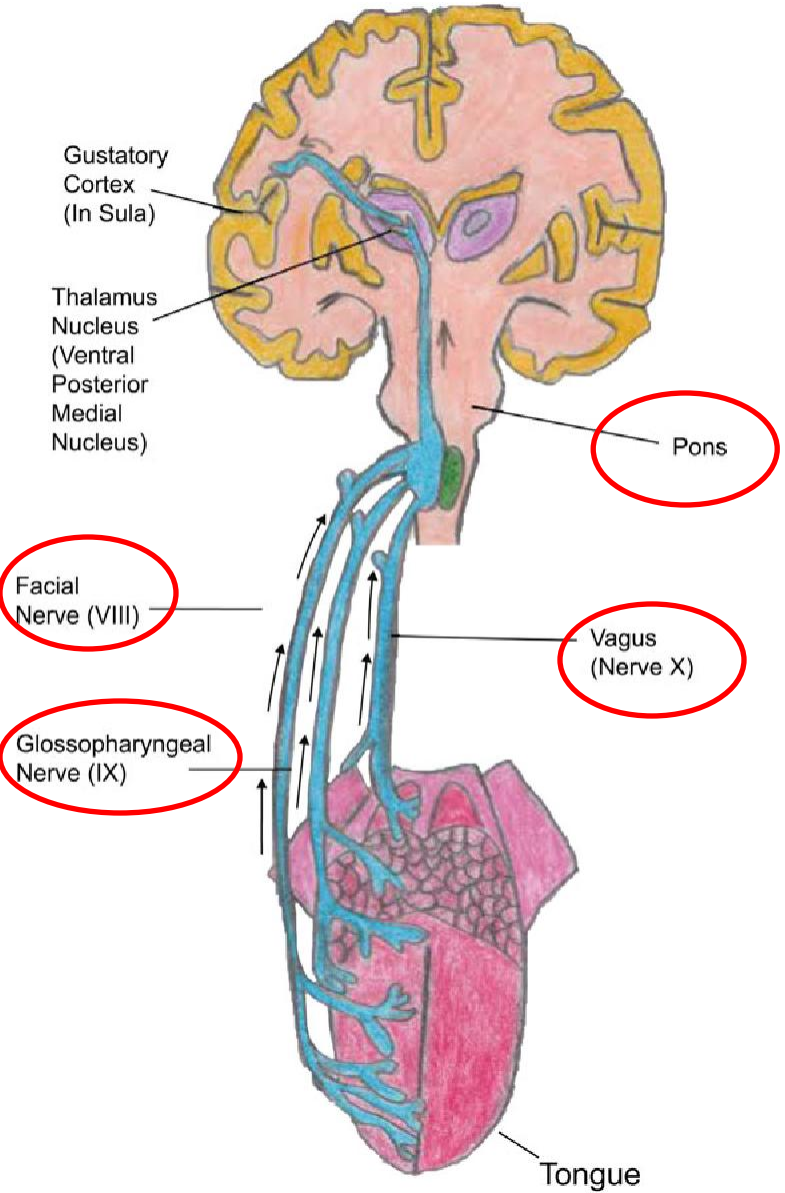
Cones:

- Function in bright light.
- Provide central, detailed vision.
- Trichromatic (detect colors: **red**, **green**, **blue**).
- Concentrated in the macula.




Normal vision occurs when light is focused directly on the retina rather than in front or behind it
Retina
Nearsightedness: visual image is focused in front of the retina
Farsightedness: visual image is focused behind the retina
A.D.A.M.

Taste



Tongue: The muscular organ in your mouth that helps you taste, swallow, and talk.

Facial Nerve (VII): This is one of the cranial nerves that carries information to and from the face, including **taste information from the front part of your tongue**.

Glossopharyngeal Nerve (IX): This is another cranial nerve that carries information to and from the tongue, including **taste information from the back part of your tongue.**

Vagus (Nerve X): This cranial nerve carries information from many parts of the body, including **taste information from a small area at the back of your tongue**.

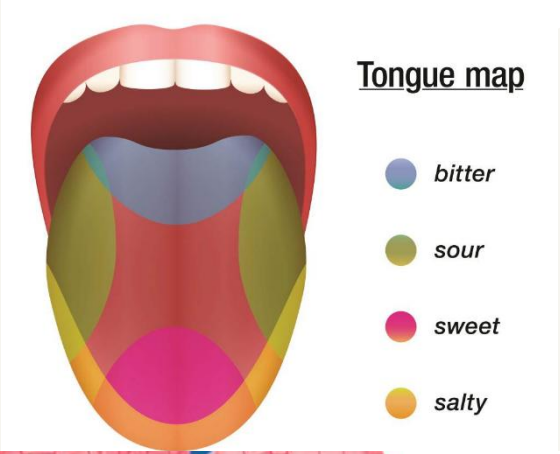
Pons: This is the part of the brainstem that helps coordinate movement and relays signals between the brain and body.

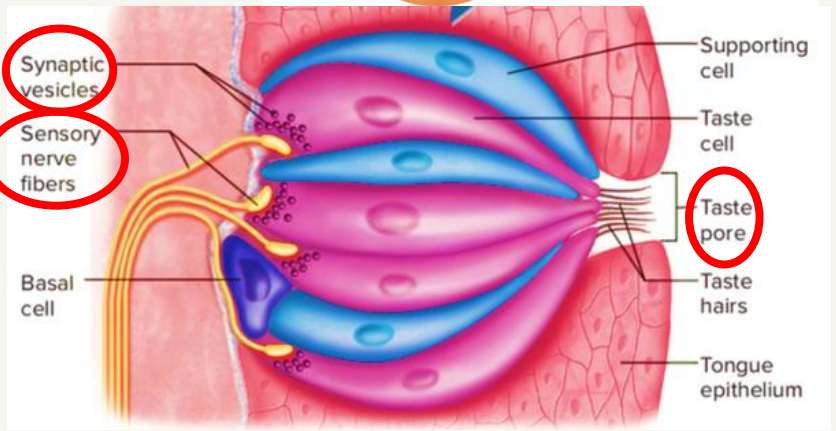
Thalamus: This is the part of the brain that **relays sensory and motor signals.**

Gustatory Cortex (In Sulcus): **This is the part of the cerebral cortex responsible for the sense of taste**. It's located in a fold (sulcus) in the brain.

Taste

Taste pores detect substances like **sugar and salt**, which are then encapsulated in **synaptic vesicles** and conveyed to **sensory nerve fibers**. These neurons, in turn, transmit the **chemical signals** as **electrical impulses** to the brain for interpretation





Smell

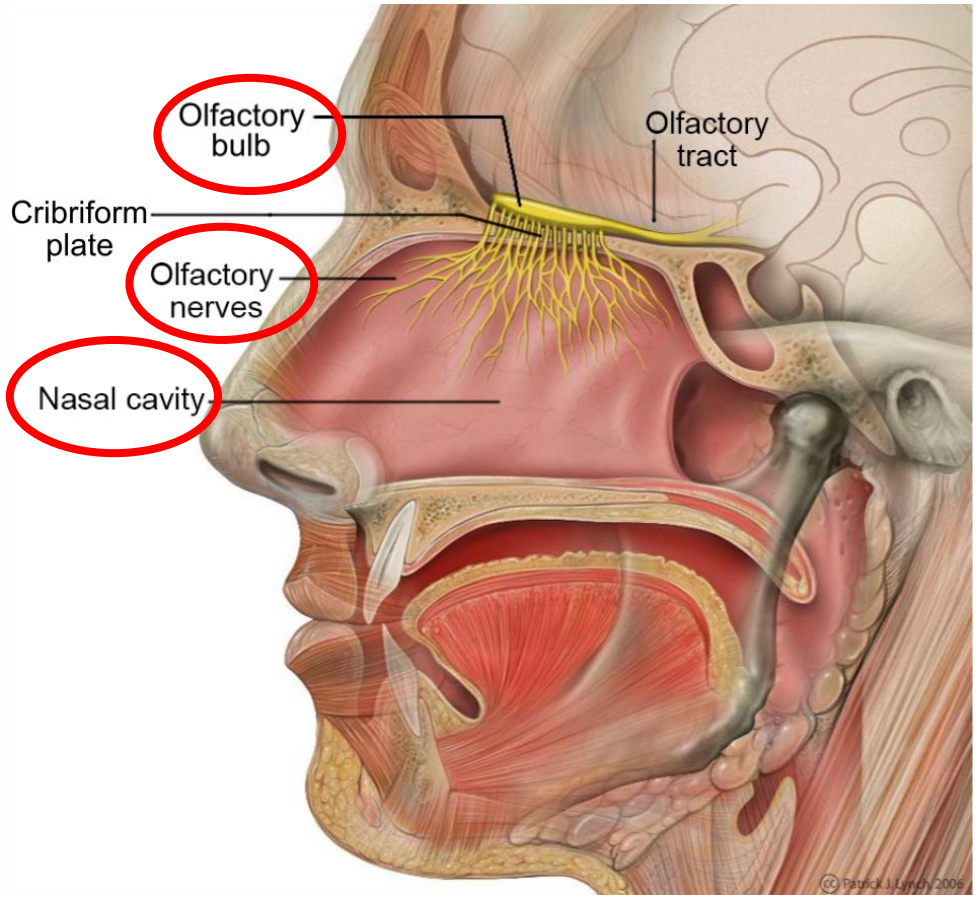
Smell enters your nose: Odor molecules float up into your nasal cavity.

Odor molecules bind to receptors: In the upper part of your nasal cavity, there are millions of **olfactory receptor neurons**. When an odor molecule binds to a receptor that it fits, it triggers a signal in the neuron.

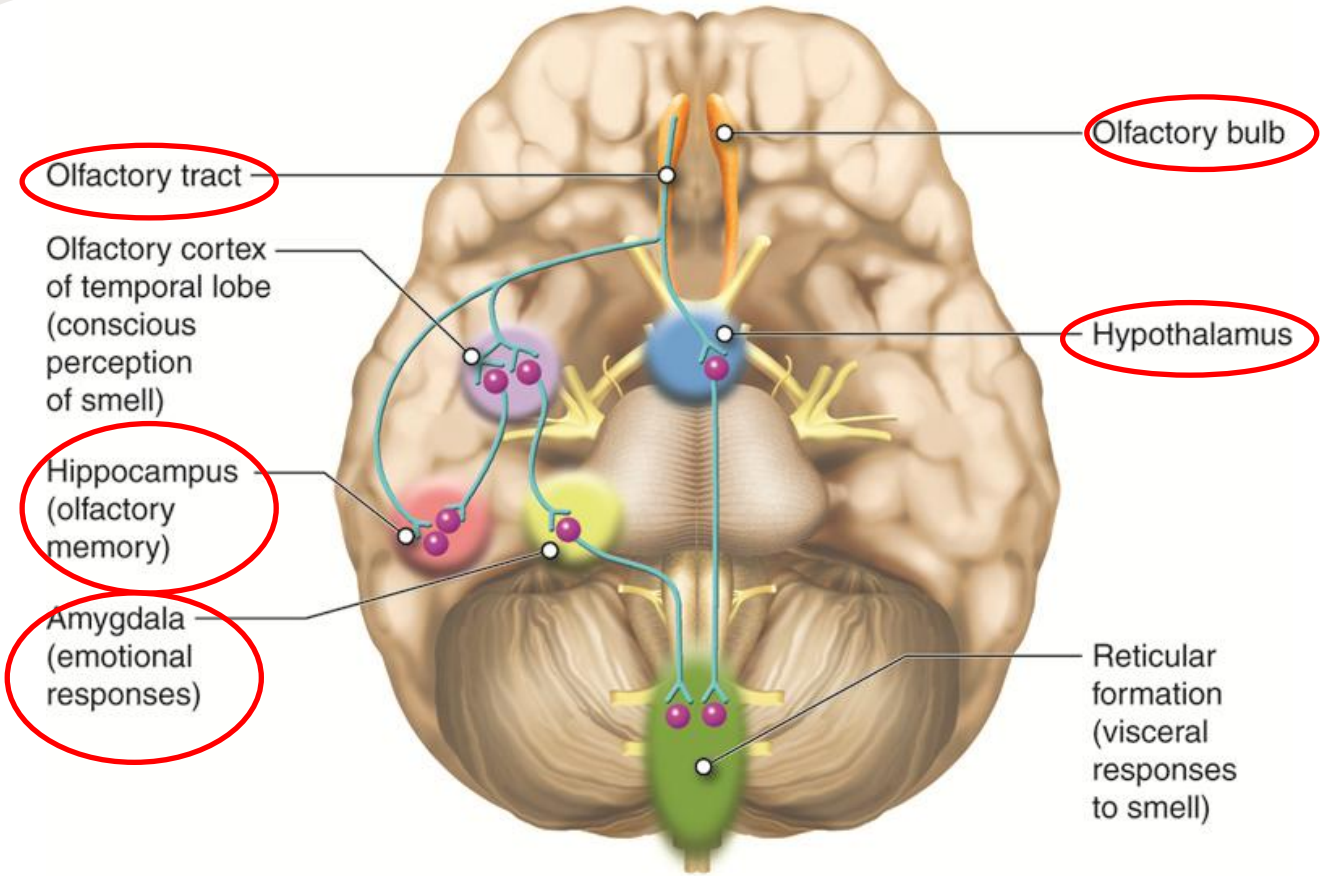
Signal travels to olfactory bulb: The **olfactory bulb** is a small structure at the top of your nasal cavity. The olfactory neurons send their signals here.

Information goes to amygdala and hippocampus: The olfactory bulb sends the odor information to two areas of the limbic system: **the amygdala and the hippocampus**. The amygdala is involved in processing emotions and forming memories. The hippocampus is involved in memory and learning.

Memory is created: **The amygdala and hippocampus may work together to create a memory of the smell. For example, the smell of freshly baked cookies might remind you of happy childhood memories.**



Smell


Olfactory bulb
Olfactory tract
Olfactory cortex of temporal lobe (conscious perception of smell)
Hypothalamus
Hippocampus (olfactory memory)
Amygdala (emotional responses)
Reticular formation (visceral responses to smell)

Pressure and temperature

Pacinian corpuscles: These are deep in the skin and are sensitive to **vibration and pressure**.

Meissner's corpuscles: These are in the upper layers of the skin and are sensitive to **light touch.**

Ruffini endings: These are deep in the skin and are sensitive to **pressure and stretching**.

Krause end bulbs: These are also deep in the skin and are sensitive to **temperature changes.**