The Senses

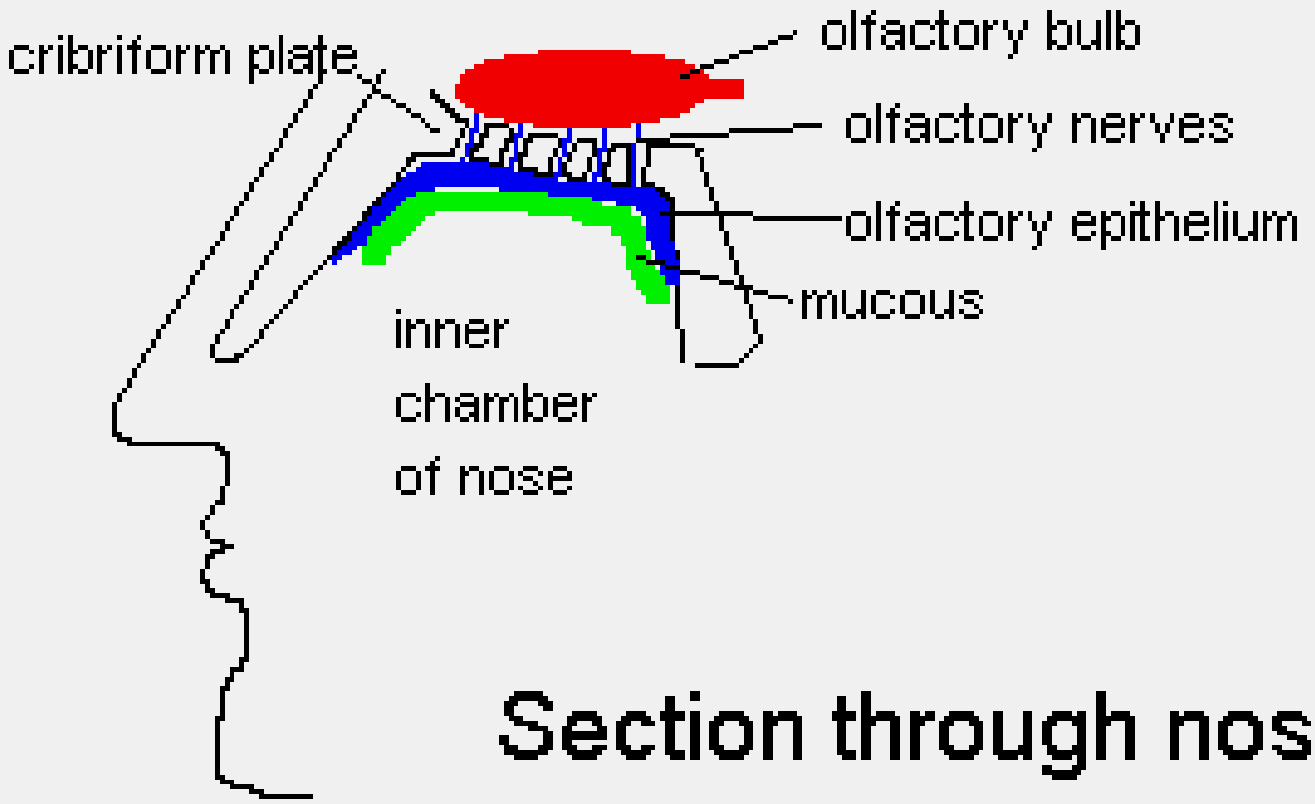
Smell & Taste

The Sense of Smell

- Receptors for smell, called olfaction, are located in the nasal cavity.
- These receptors are **chemoreceptors**.
- Remember that chemoreceptors detect dissolved chemicals.
- The receptors for olfaction are called **olfactory cells**.

The Sense of Smell (2)

- There are about 100 million of these cells located in the **olfactory membrane.**
- It is located in the superior part of the nasal cavity in the area of the cribriform plate.



Section through nose

Anatomy of an Olfaction Cell

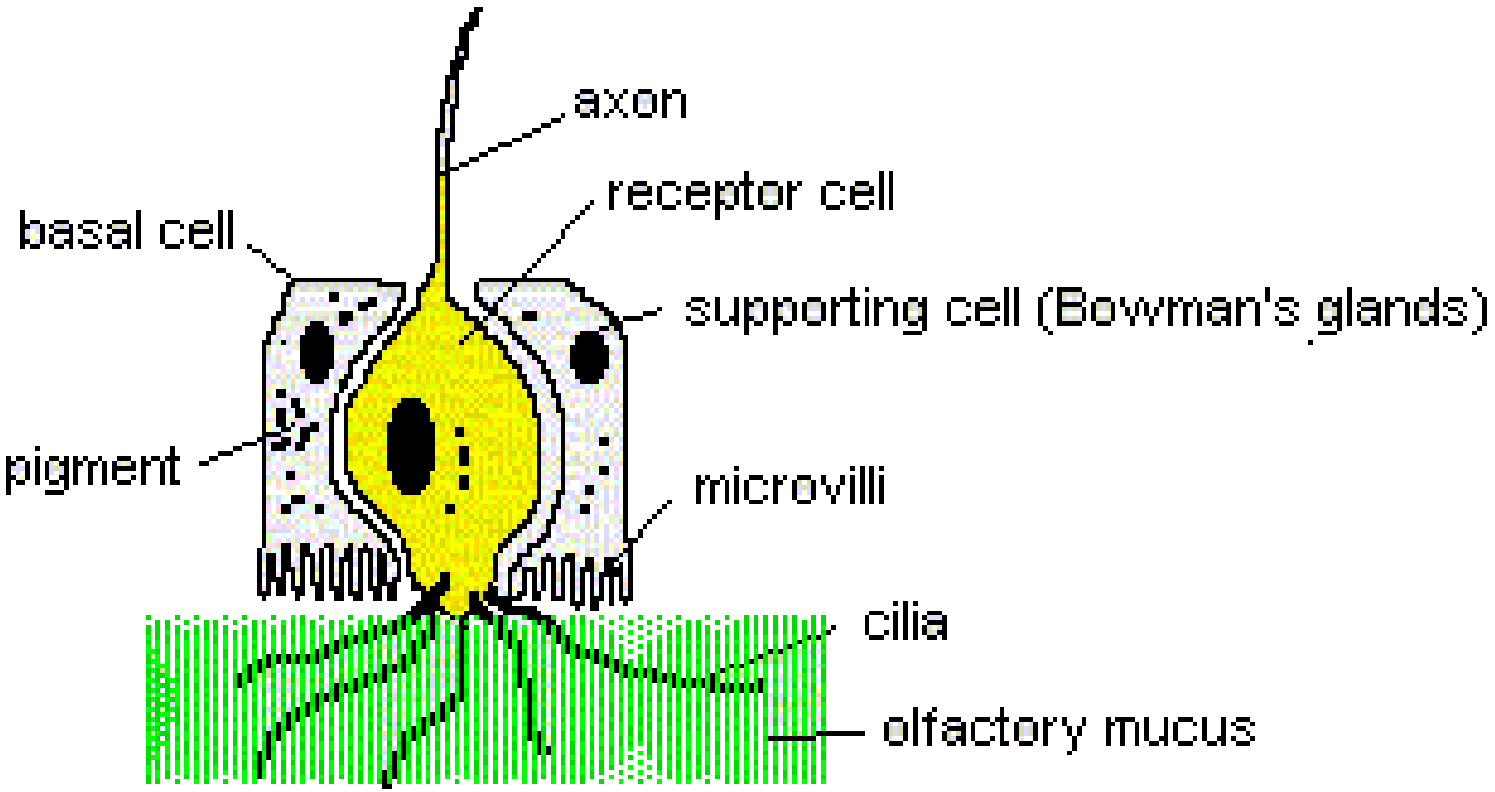
- Each cell ends in a swelling called the **olfactory vesicle**.
- Each vesicle has several cilia that are called **olfactory hairs**.

Anatomy of an Olfaction Cell

- There are other cells associated with the olfactory cells, they are …

1. Olfactory or Bowman's glands
2. Supporting cells
3. Basal cells

- The Bowman's glands secrete mucus to keep this surface moist.



Nasal epithelium

Olfaction Involves Chemoreception

- To smell the odor must be carried to the nasal cavity by air.
- The odor should mostly dissolve in water and be lipid – soluble, since the hairs have a fatty membrane.
- When odor molecules hit the hair cells they combine w/ **specific protein receptors** on the hair cell membrane.

How You Smell

Odor in upper nasal cavity

↓

Odor combines w/ receptor protein

↓

Action Potential (AP) produced in cell

↓

AP sent up olfactory axon

Stereochemical Theory

- There are **50** specific protein receptors on the olfactory hairs.
- Each hair may have many combinatins of the 50 protein receptors.
- This system can distinguish thousands of different odors.

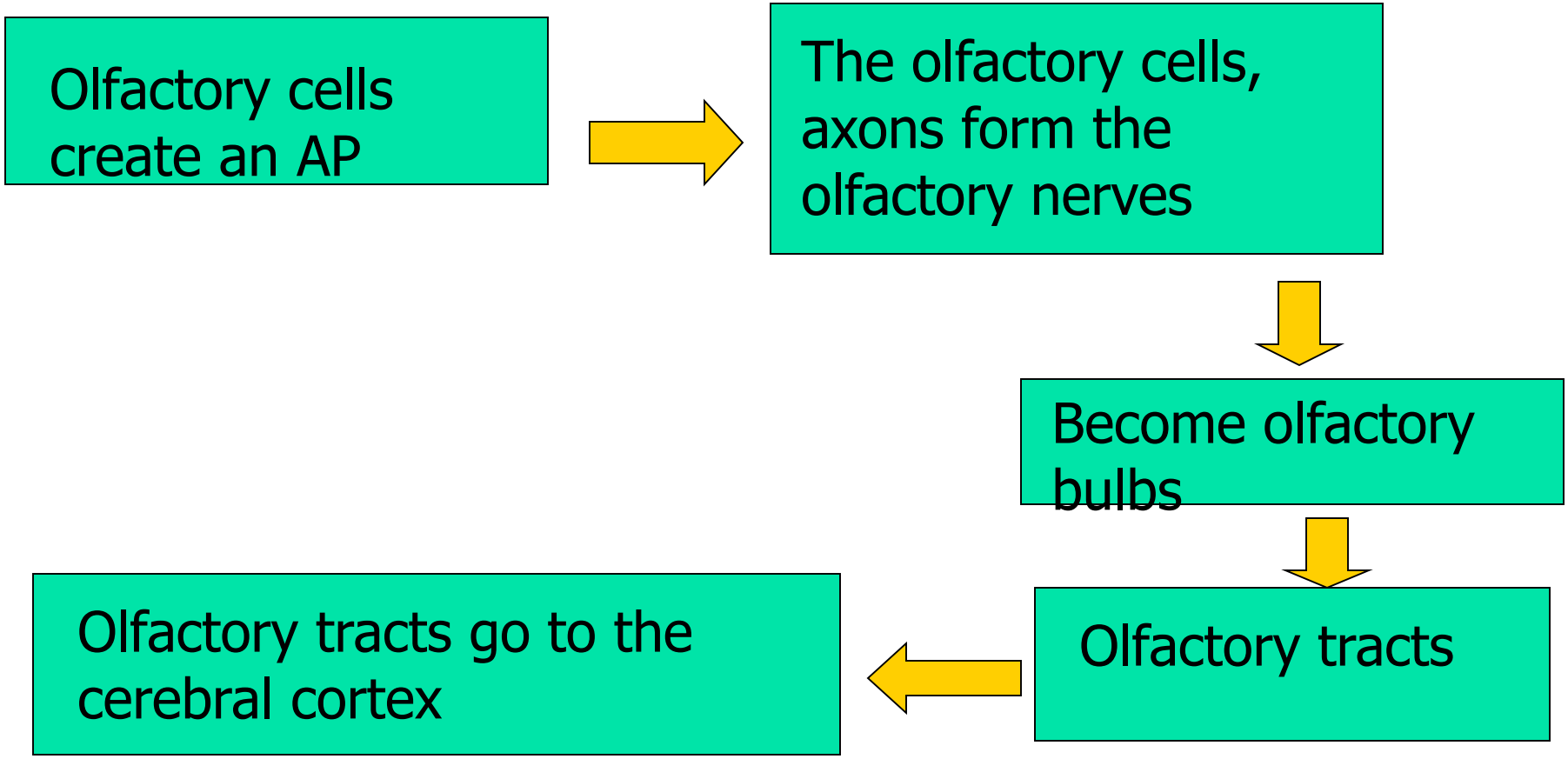
Classes of Odors

- There are 7 primary classes of odors but there may actually be more than 50.
- The 7 classes are: camphoraceous, musky, floral, peppermint, ethereal, pungent, and putrid.

Clinical Highlight

- A lack of zinc in your diet could lead to **anosmias**, which is a disorder that keeps you from smelling.

How Smells Reach the Brain



The Sense of Taste

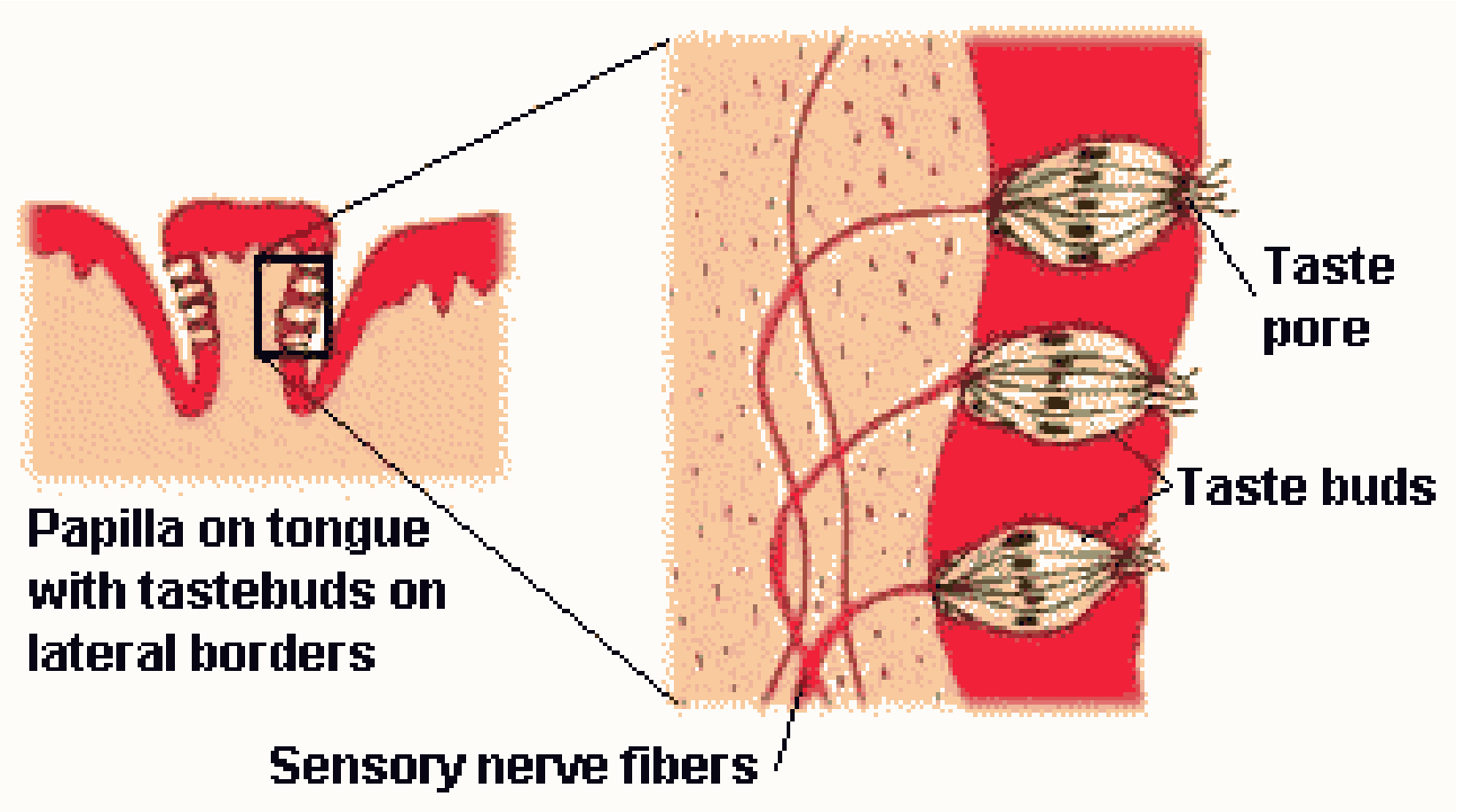
- Our sense of taste is located in the **taste buds**.
- Taste buds are found on small rises on the tongue called **papillae.**
- They are located on the tongue, the roof of the mouth, and the back of the throat (pharynx.)

The Sense of Taste

- Adults have about 10,000 taste buds but small children have more.
- Taste buds contain about 40 modified epi cells. Some of these cells are called **gustatory (taste) cells**, others are supporting cells & basal cells.

Anatomy of a Gustatory Cell

- The gustatory cells are arranged around a small taste pore.
- Each cell has several **gustatory hairs** extending into the taste pore.


Taste pore
Taste buds
Papilla on tongue with tastebuds on lateral borders
Sensory nerve fibers

Anatomy of a Taste Bud

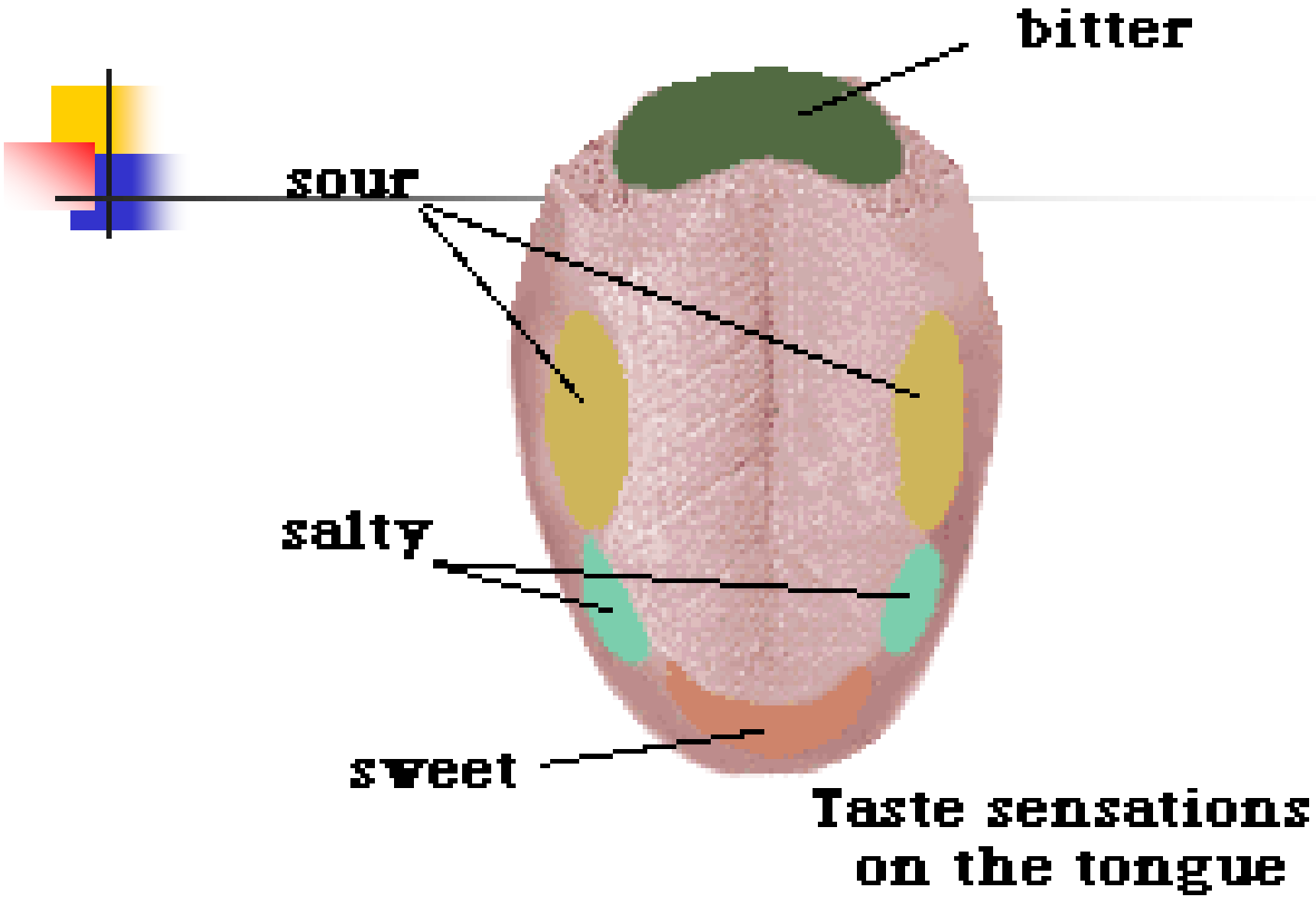
- Taste buds are located on **papillae**
- There are four types of papillae

1. Circumvallate (half the buds, back of tongue)
2. Fungiform (front 2/3 of tongue)
3. Foliate (lateral surface of tongue)
4. Filiform (no taste buds on these)

The Primary Taste Sensations

- There are four

1. Sweet
2. Salty
3. Sour
4. Bitter


bitter
sour
salty
sweet
Taste sensations
on the tongue

Taste Sensations

- Sour tastes come from sensing acid.
- Salty tastes come from salts.
- Sweetness is caused by sugars, alcohols, glycols, ketones, esters, and amino acids.
- Bitter tastes come from nitrogen containing compounds and alkaloids.

Taste Sensations (2)

- To taste something, that something needs to be dissolved in saliva.
- Saliva is important also because it moves substances around and off the tongue.

Taste Involves Other Receptors

- Tactile (touch)
- Thermoreceptors (hot, cold)
- Pain
- Smell is at least 80% of our sense of taste. A bad cold can block our sense of taste.