

VISIBLE  BODY®

Special Senses: Taste & Smell

A nervous system lab activity using Visible Body Suite

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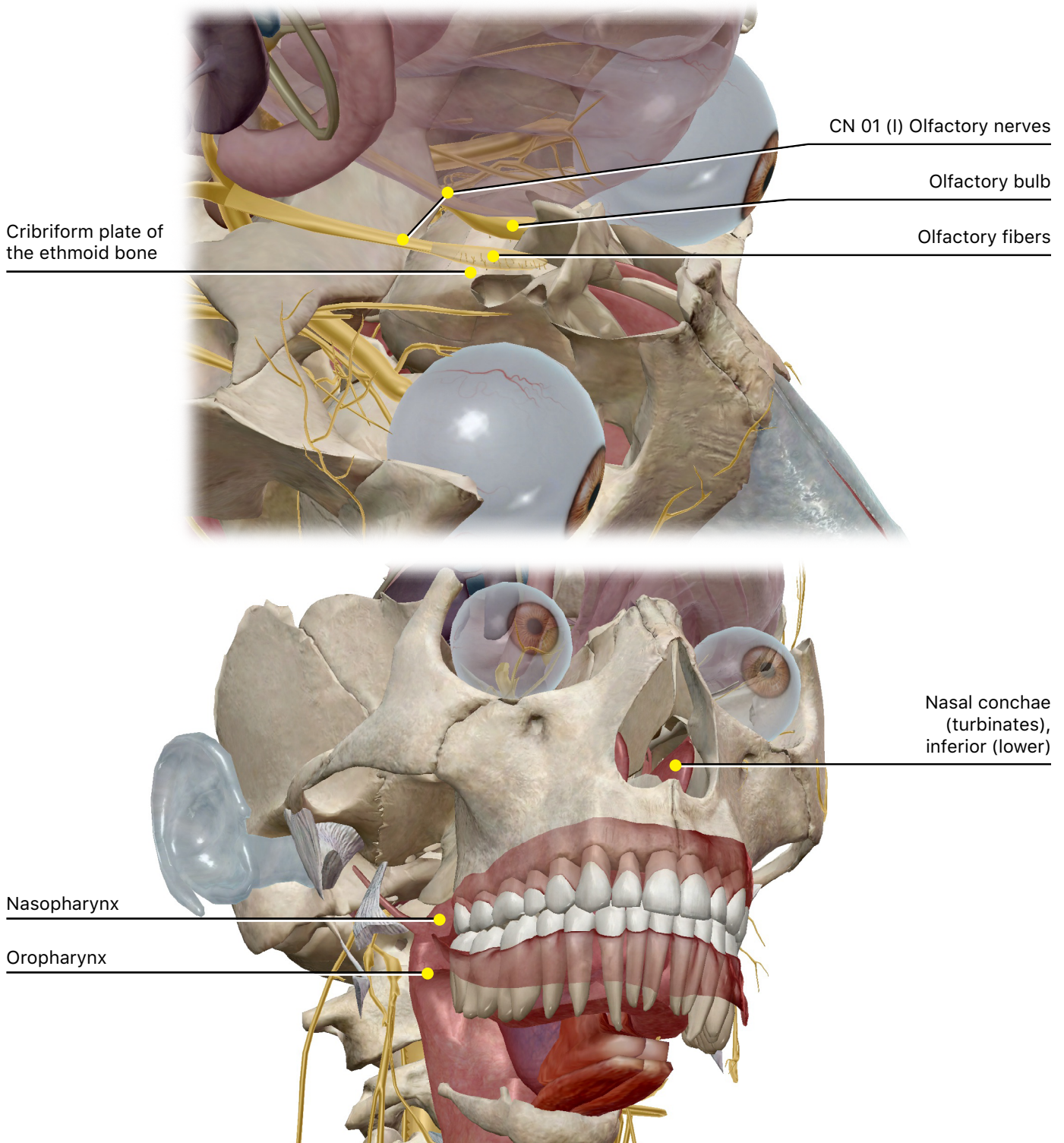
PRE-LAB EXERCISE

Use the modules to guide your exploration of the anatomy and physiology of taste and smell. Be sure to use the book icon to learn more about the structures you are exploring.

You are responsible for the identification of **all bold terms**.

Open Visible Body Suite. From the main menu, choose Anatomy & Physiology and select the 5. Nervous System and Special Senses unit.

A. Select Module 17.6 Special Sensory Organs.



1. Hide the following
 - a. Frontal bone
 - b. Dura mater
 - c. Frontal lobe of the brain
 - d. Falx cerebri
2. As you zoom in you will see two yellow nerves between the eyes. These are the **olfactory nerves** (CN 1).
3. The end of the olfactory nerve is the **olfactory bulb**. Hide an olfactory bulb. What you see now is the **cribriform plate of the ethmoid bone**.
 - a. Note that this plate has small yellow projections going through it. These projections from the olfactory bulb project into the nasal cavity, capturing volatile compounds with receptors on their cilia, and turning them into neural signals.
 - b. What kind of tissue is the olfactory bulb?
 - c. Examine the path that air has to take to reach those receptors. It goes through the **nasal cavity**, flowing past the **nasal conchae**, which mix, moisten, and warm the air. The turbulence created by this movement past the nasal conchae makes it more likely that an **odorant** will reach the **receptors** on the **olfactory epithelium**.
 - d. Note that you have two olfactory bulbs. What function do you think this serves?
 - e. What region of the brain does the olfactory bulb send its signal to?
4. Hide the maxilla, the mandible, and the parotid salivary gland. Now you will see a pinkish tube. This is the pharynx. Note that the **oropharynx** from the mouth and the **nasopharynx** are physically connected. This means that odorants can enter not just from your nose, but also from your mouth, flowing from the oropharynx through the nasopharynx and to the olfactory receptors. In fact, if you plug your nose prior to taking a bite of food you will be able to experience how much of your sense of taste is actually due to your sense of smell.
5. Examine the nose. Note that there is a division or **septum** between the nostrils. What do you think its function is?



IN-LAB EXERCISES

Use the modules to guide your exploration of the anatomy and physiology involved in olfaction (smelling) and gustation (taste). Be sure to use the book icon to learn more about the features you are exploring.

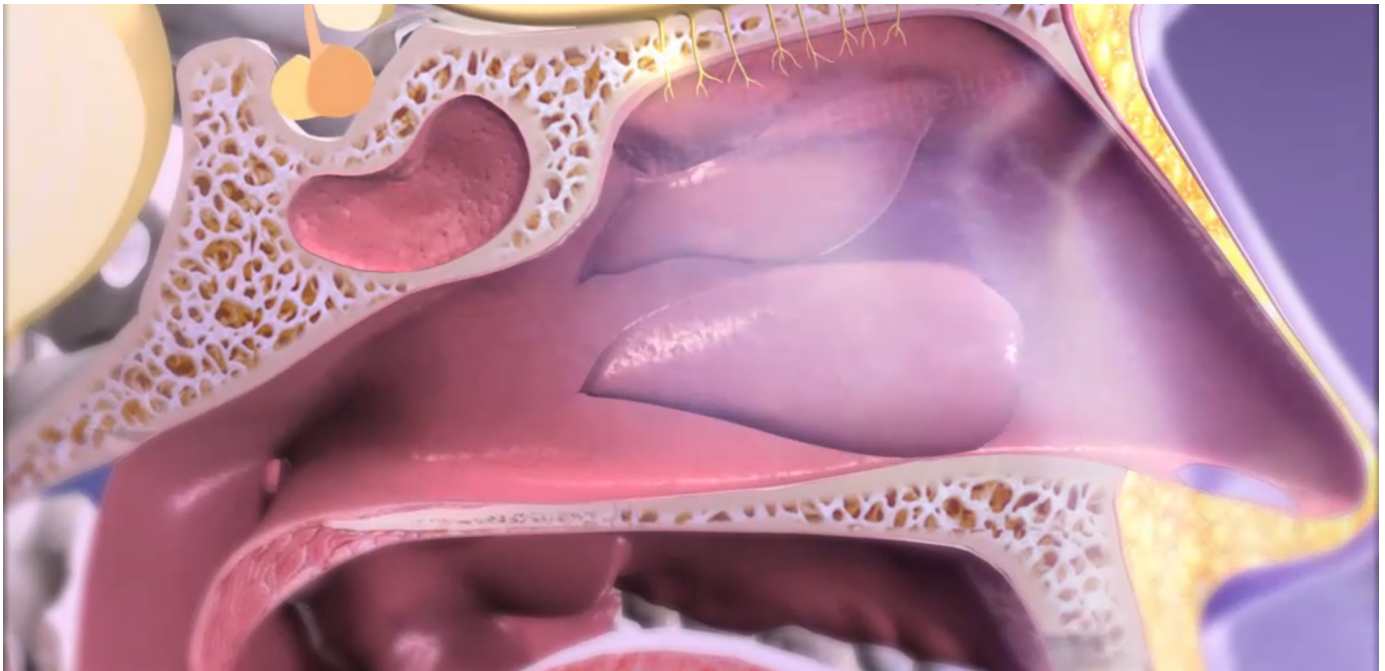
You are responsible for the identification of **all bold terms**.

Open Visible Body Suite. From the main menu, choose Anatomy & Physiology and select the 5. Nervous System and Special Senses unit. Scroll to 21. Cranial Nerves.

PART 1: Olfaction

The goal of your olfactory system is to take chemical information from the air and transduce that information into a neural signal.

A. Watch the video in Module 21.6 Olfaction and make the following observations.

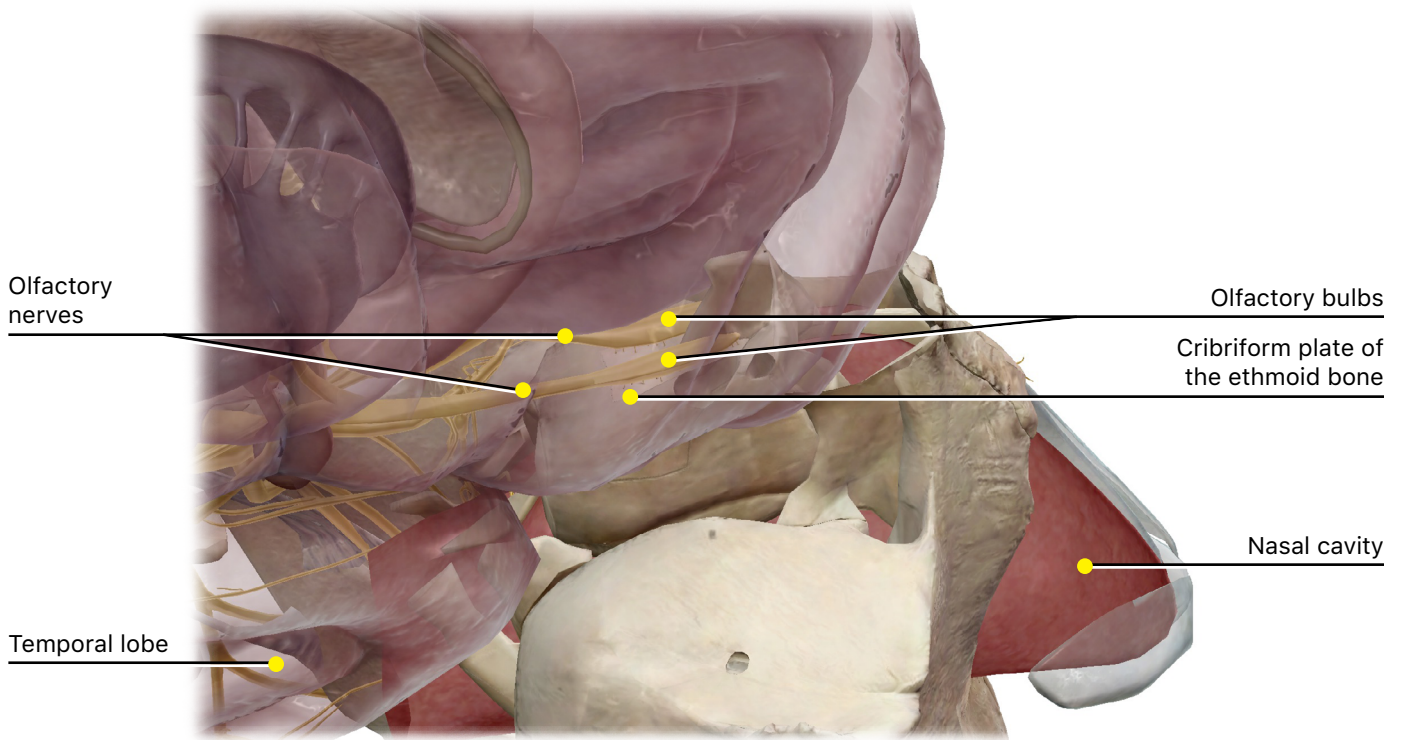


1. Place the following items below in order, with 1 as the first item and 6 as the last.

- _____ signal travels along CN1 to the olfactory area of the **cerebral cortex**
- _____ signal carried by neurons through the **ethmoid bone**
- _____ air enters the **nasal cavity**
- _____ signal transfers to first order neurons connected to **epithelial cells**
- _____ chemicals bind to receptors on the cilia of **olfactory epithelium cells**
- _____ signal reaches the **olfactory bulb** of the brain



B. Explore Module 21.5 Olfactory Nerves.



1. Identify the following structures within the olfactory pathway.

a. **Olfactory nerves**

b. **Nasal cavity**

c. **Cribriform plate**

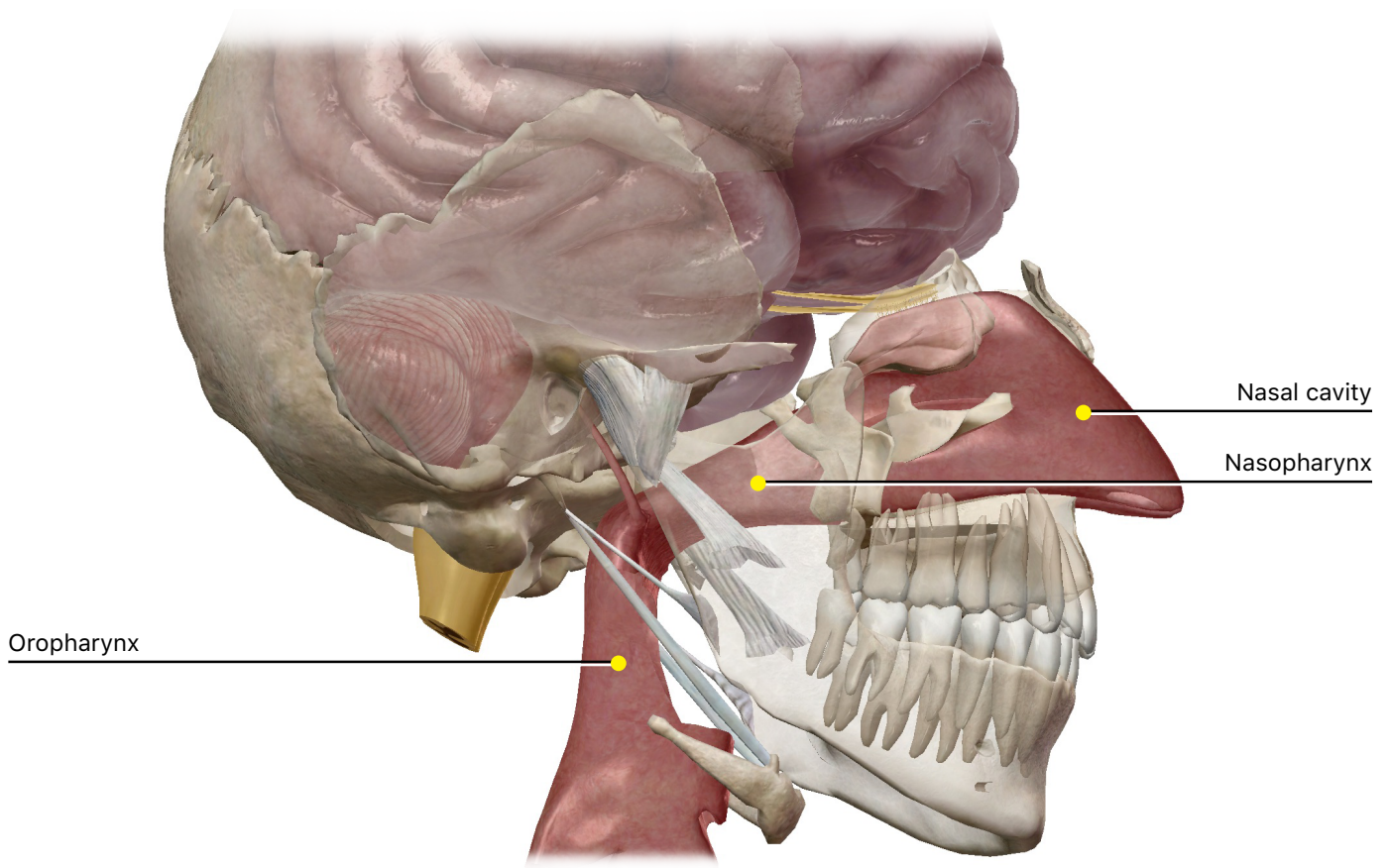
i. Hide the olfactory nerve and notice how there are holes through this part of the skull so that the nerve roots can travel.

d. **Olfactory bulbs**

2. What lobe of the brain does the olfactory nerve project to?



C. Explore Module 23.3 Olfactory Pathway.



1. Trace the pathway of olfaction into the brain.
2. Select the nasal cavity and rotate your image. Note that the nasal cavity connects to the **nasopharynx**, and thus has a connection to the mouth. This connection is important to your sense of taste. Food particles that are chewed become volatile and enter the nasopharynx and nasal cavity, binding to olfactory receptors. When those receptors are covered with a thick layer of mucus, as they are when you have a cold, the odorants cannot reach those receptors and this connection is temporarily lost.

Thought question

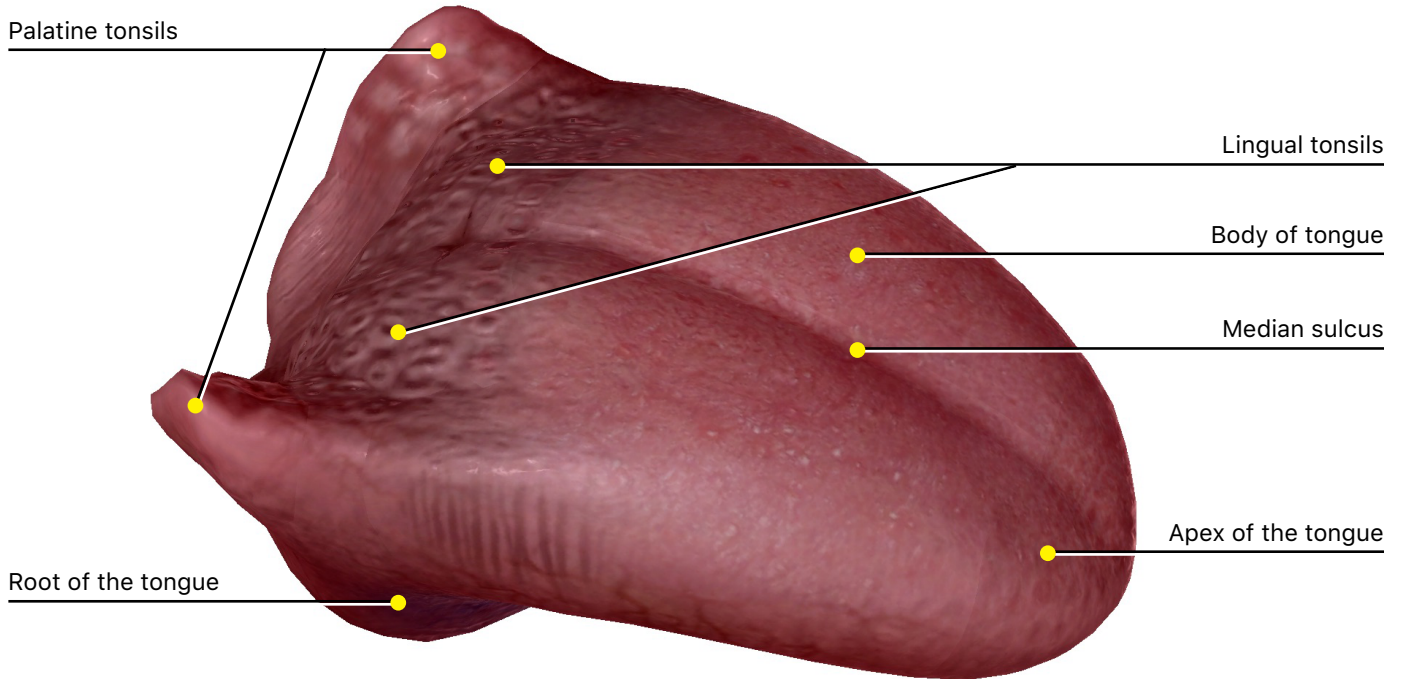
1. Why is your sense of taste affected when you have a cold?



PART 2: Taste

The goal of your tongue is to take chemical information from your food and transduce it into a neural signal.

A. Explore Module 23.4 Tongue

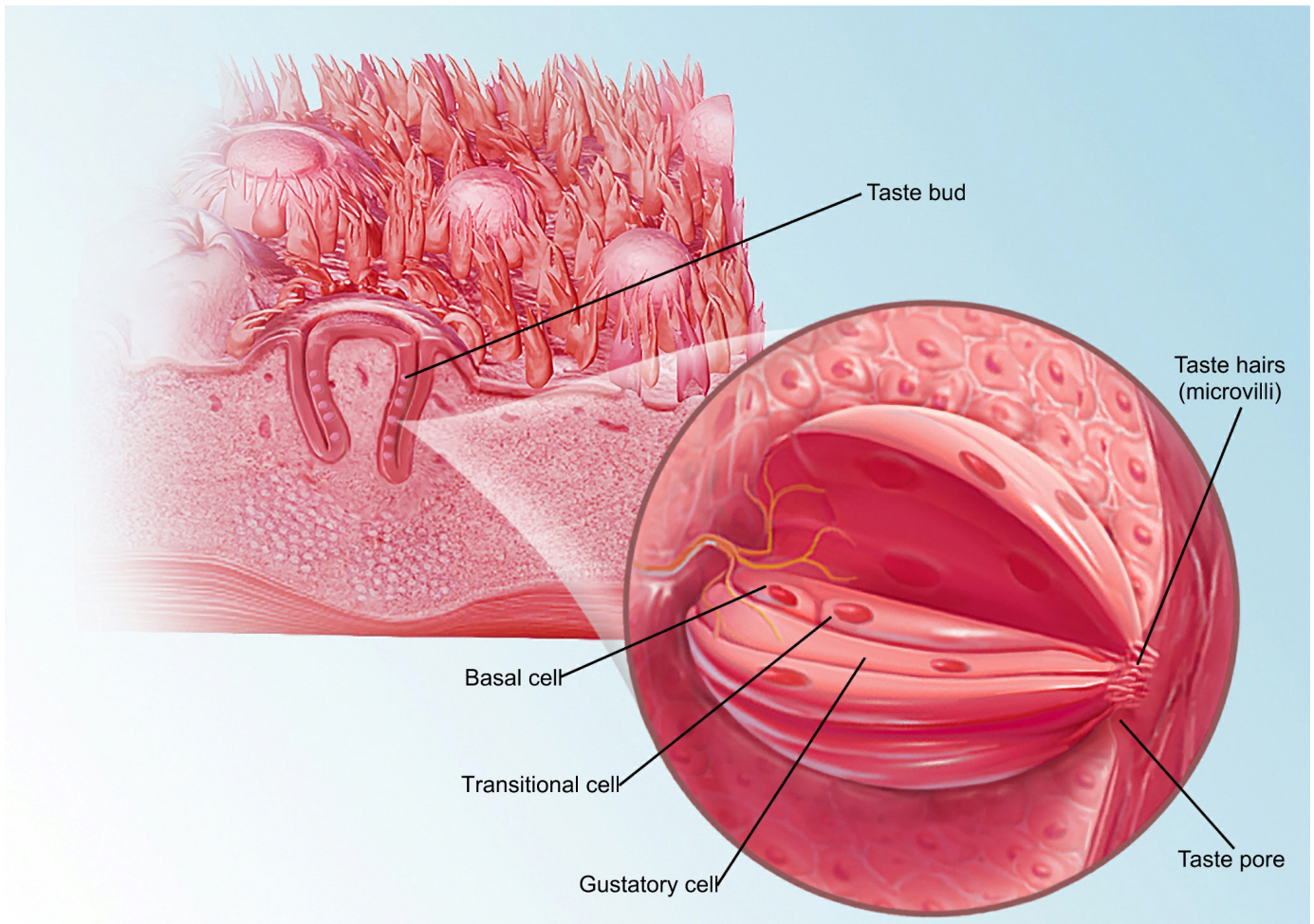


1. Locate the following structures on the tongue

- a. **Body of the tongue**
- b. **Apex of the tongue**
- c. **Root of the tongue**
- d. **Median sulcus**
- e. **Frenulum**
- f. **Lingual tonsils**
- g. **Palatine tonsils**



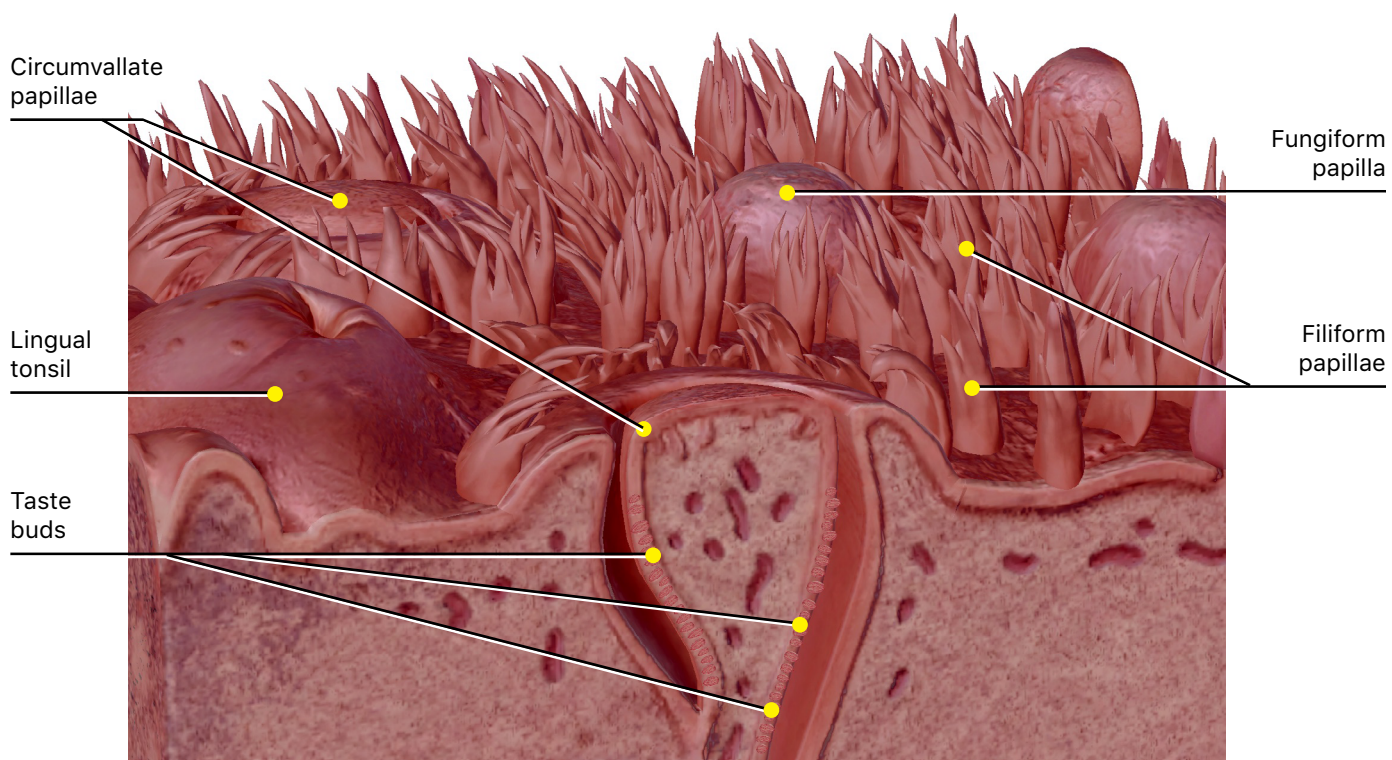
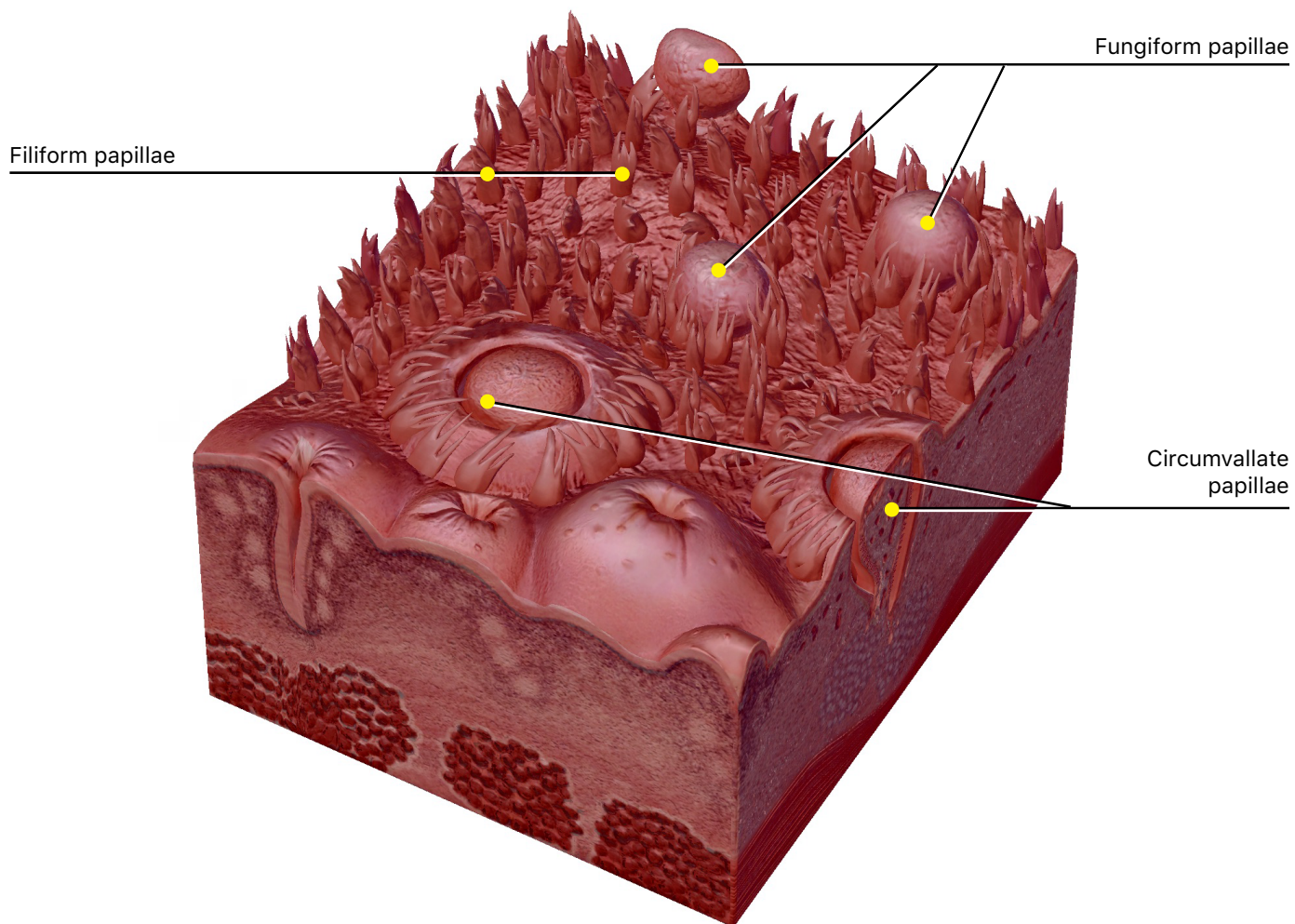
B. Explore Module 23.5 Taste Buds



1. The sense of taste is also known as _____.
2. Chemicals that stimulate receptors in the oral cavity are known as _____.
3. There are 5 major tastes. List them below.
 - a.
 - b.
 - c.
 - d.
 - e.



C. Explore Module 23.6 Papillae



1. Name the three types of **papillae**.

- a.
- b.
- c.

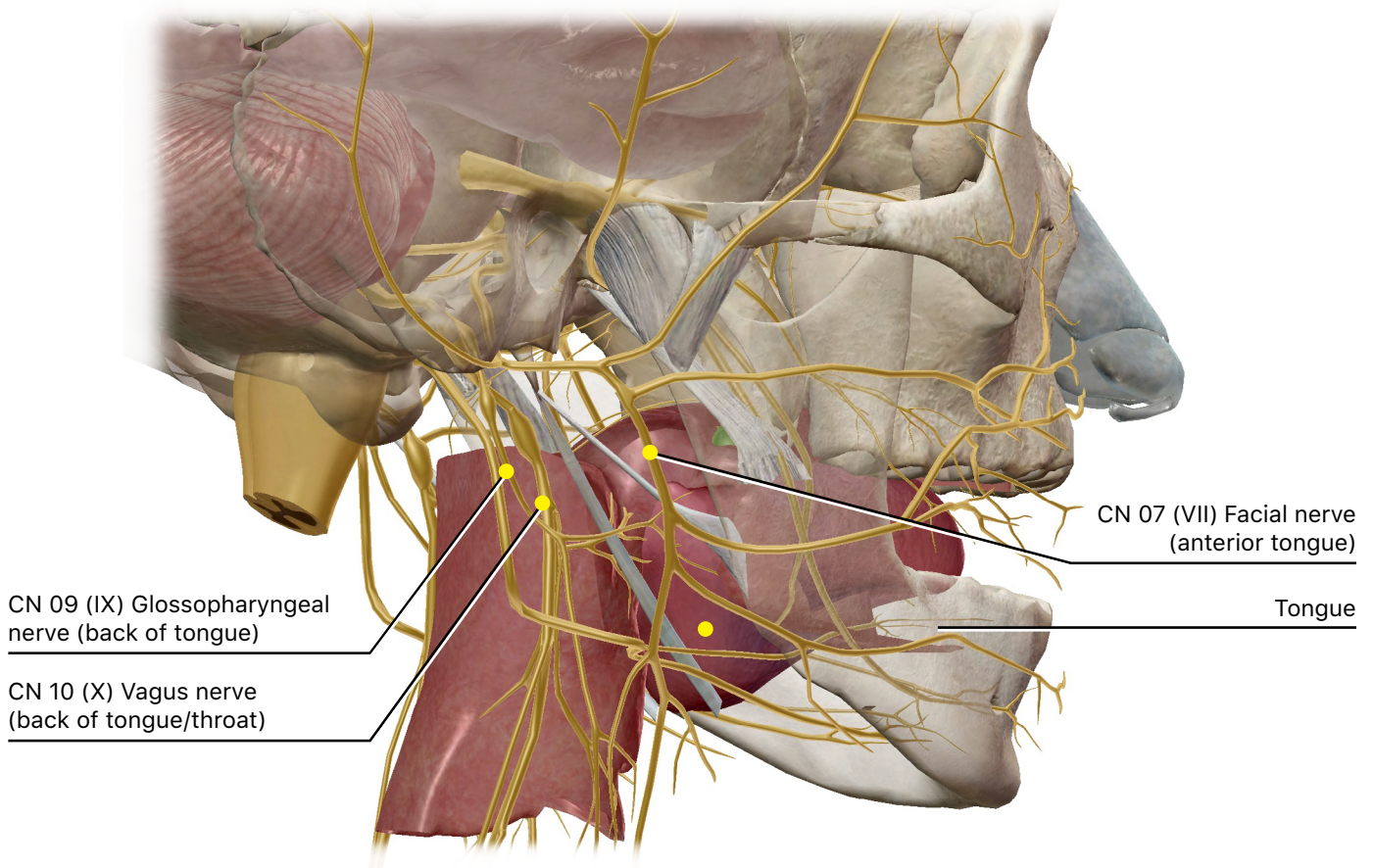
2. Describe the role that each of the papillae types has in the process of eating.

3. Choose "Taste buds" from the list of structures on the left.

- a. What part of the tongue are you looking at?
- b. What kind of papilla are you looking at?
- c. Is there a single taste bud, or are there many per papilla?
- d. Zoom into the taste buds. Is each taste bud made of a single cell, or are there many cells per bud?
- e. What are the types of cells involved?



D. Explore Module 23.7 Taste Pathway



1. Hide the **mandible** and examine the **tongue**. Which nerves receive taste information from the tongue?
2. Do they receive their sensory information from the same parts of the tongue?
3. Draw a diagram below of the taste pathway

Thought question

Some people are regarded as super tasters. These people have a heightened sense of taste. What anatomical differences do you think would be present in these individuals?



PUTTING IT ALL TOGETHER

1. Watch the video for **Module 23.2 Olfaction**.

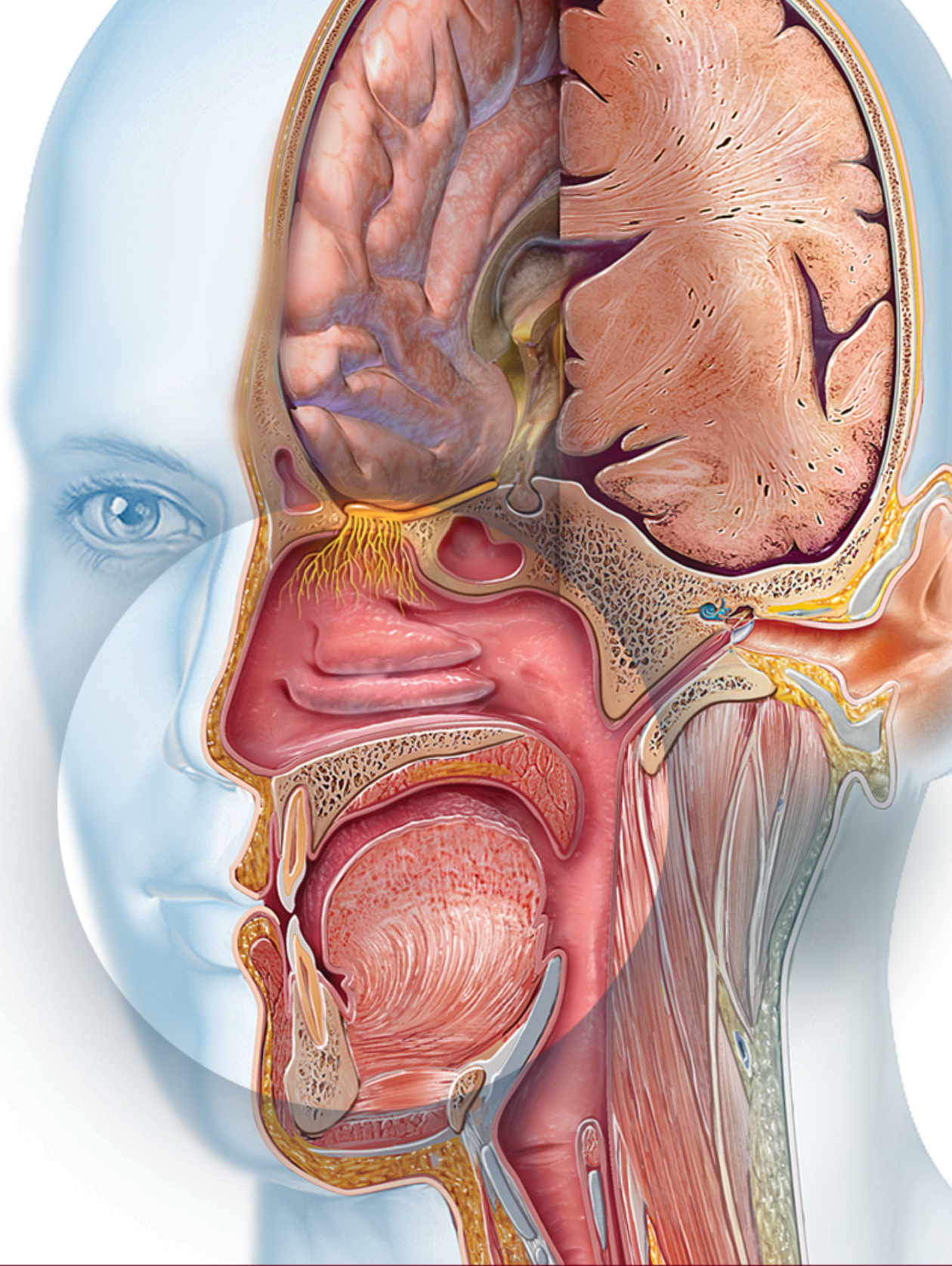
- a. State how olfactory information is transduced into a neural signal.

- b. Describe the path that olfactory information takes to enter the brain.

2. Refer to **Module 23.5 Taste Buds** and **Module 23.7 Taste Pathway**.

- a. State how gustatory information is transduced into a neural signal.

- b. Describe the path that gustatory information takes to enter the brain.



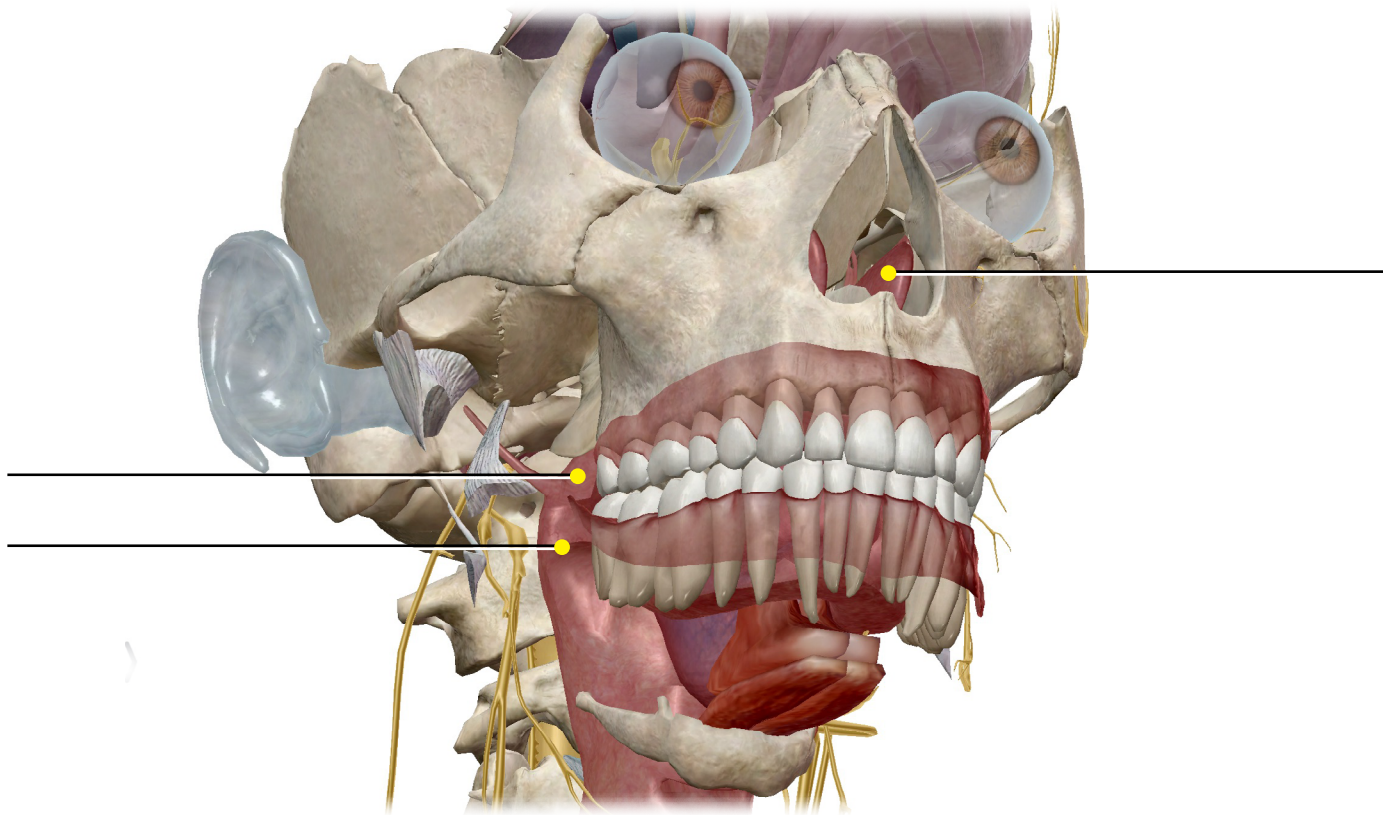
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Student Practice

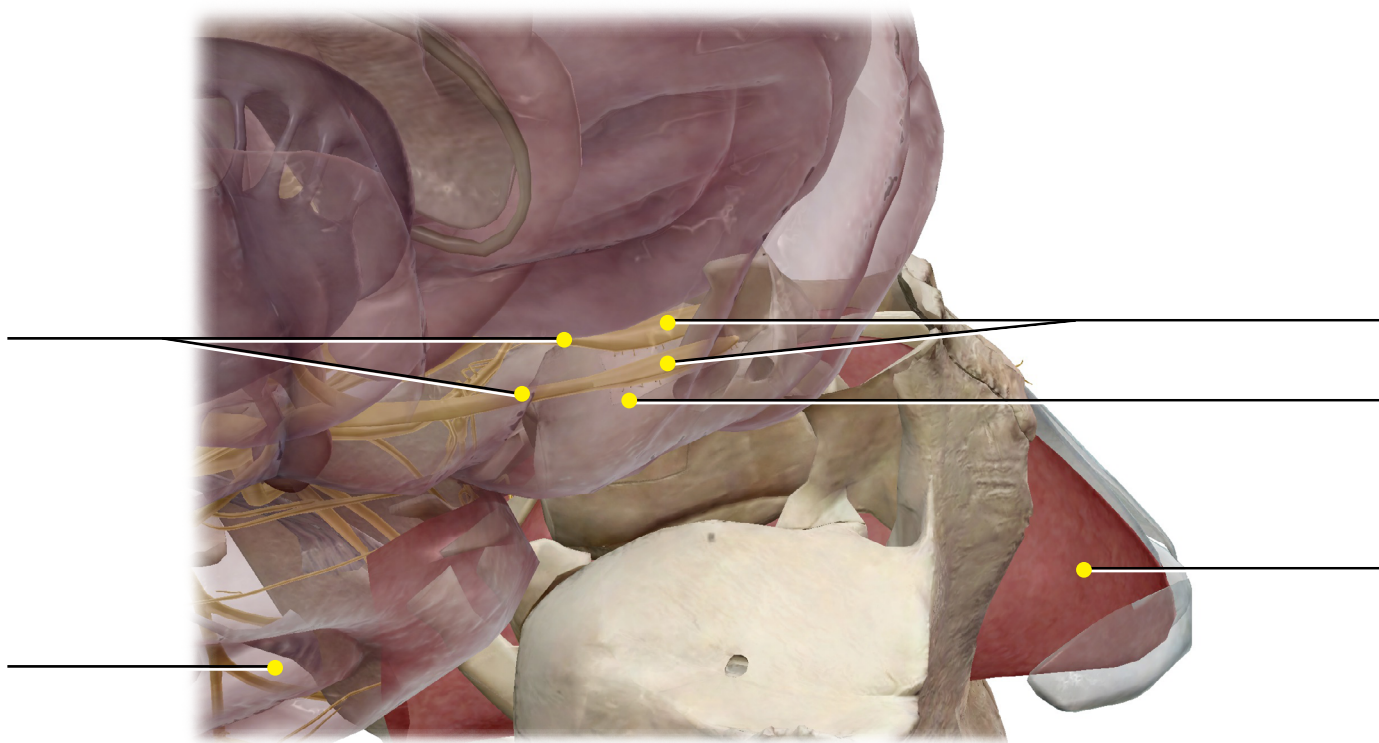
Label the structures in the following figures.



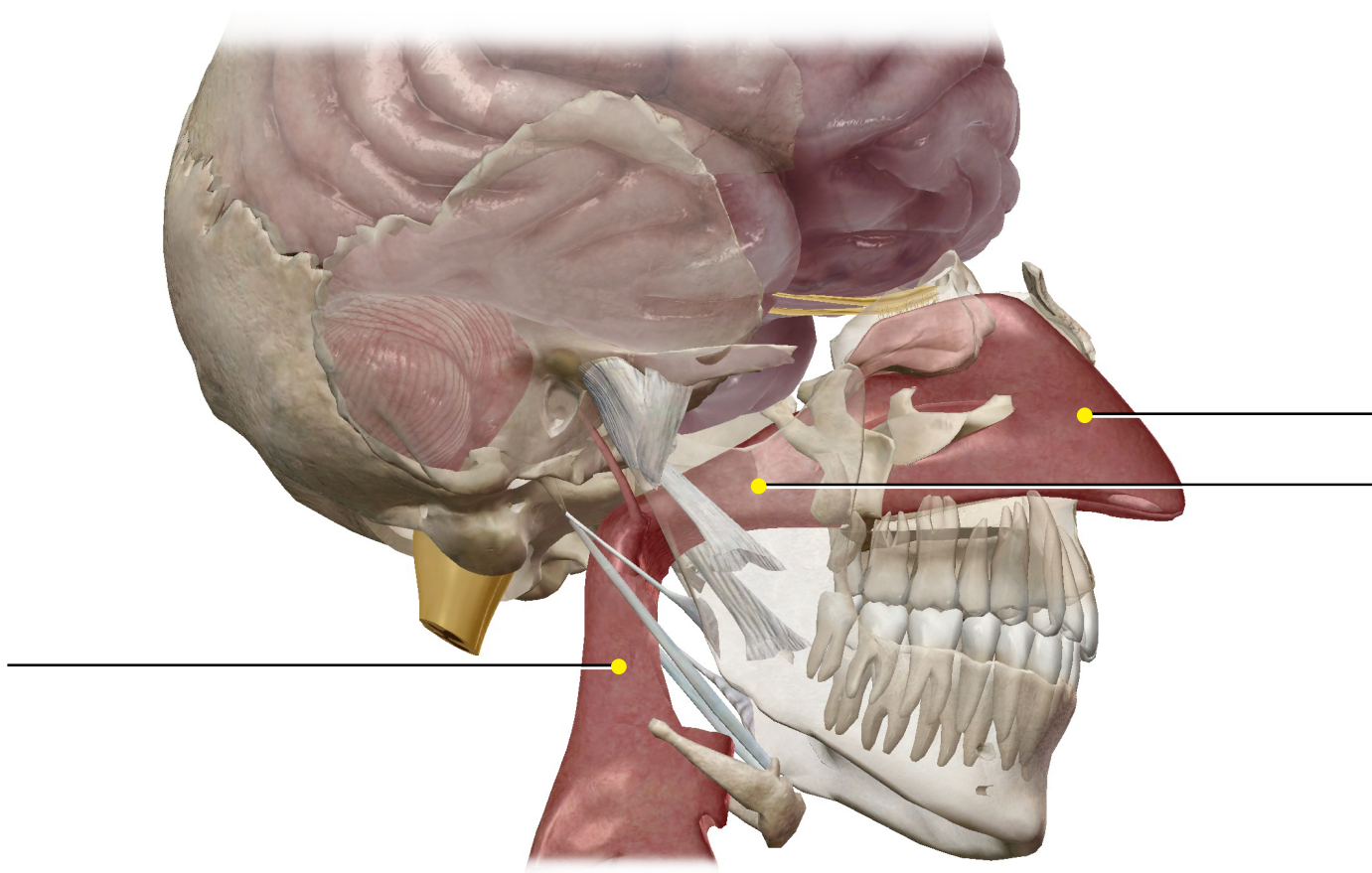
Module 17.6 Special Sensory Organs



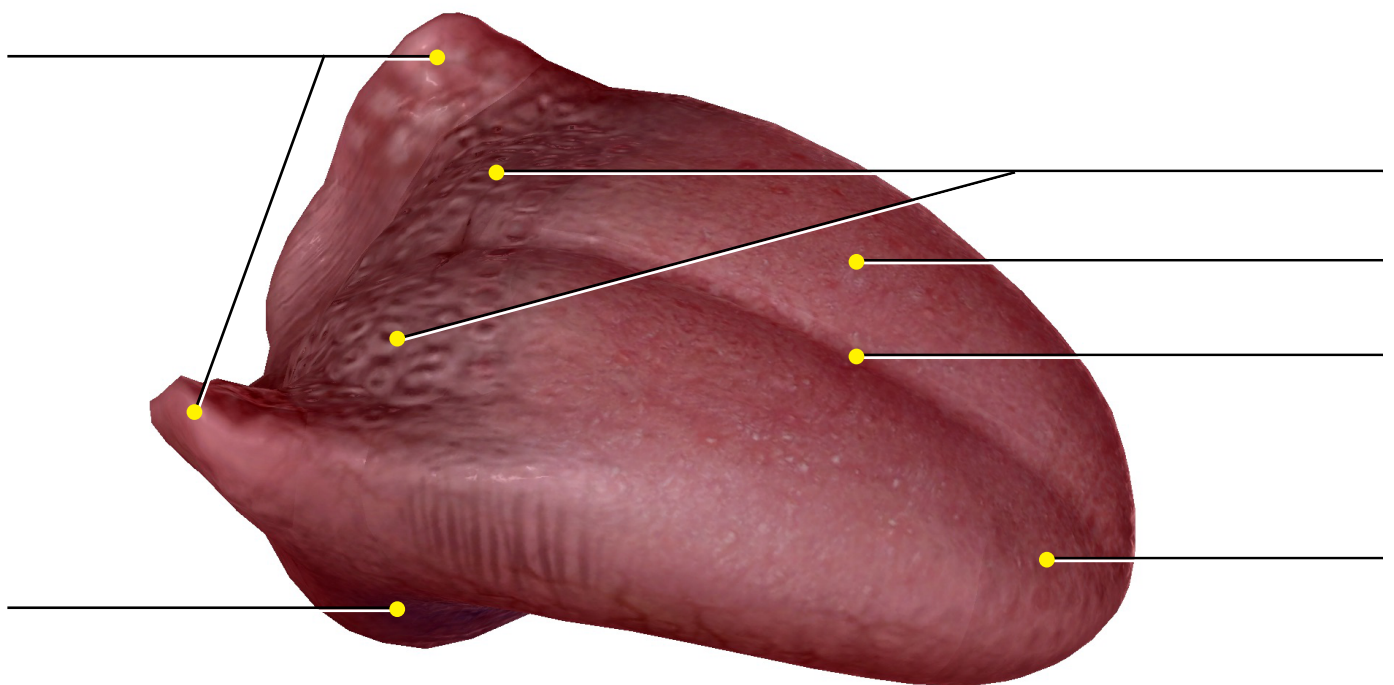
Module 21.5 Olfactory Nerves



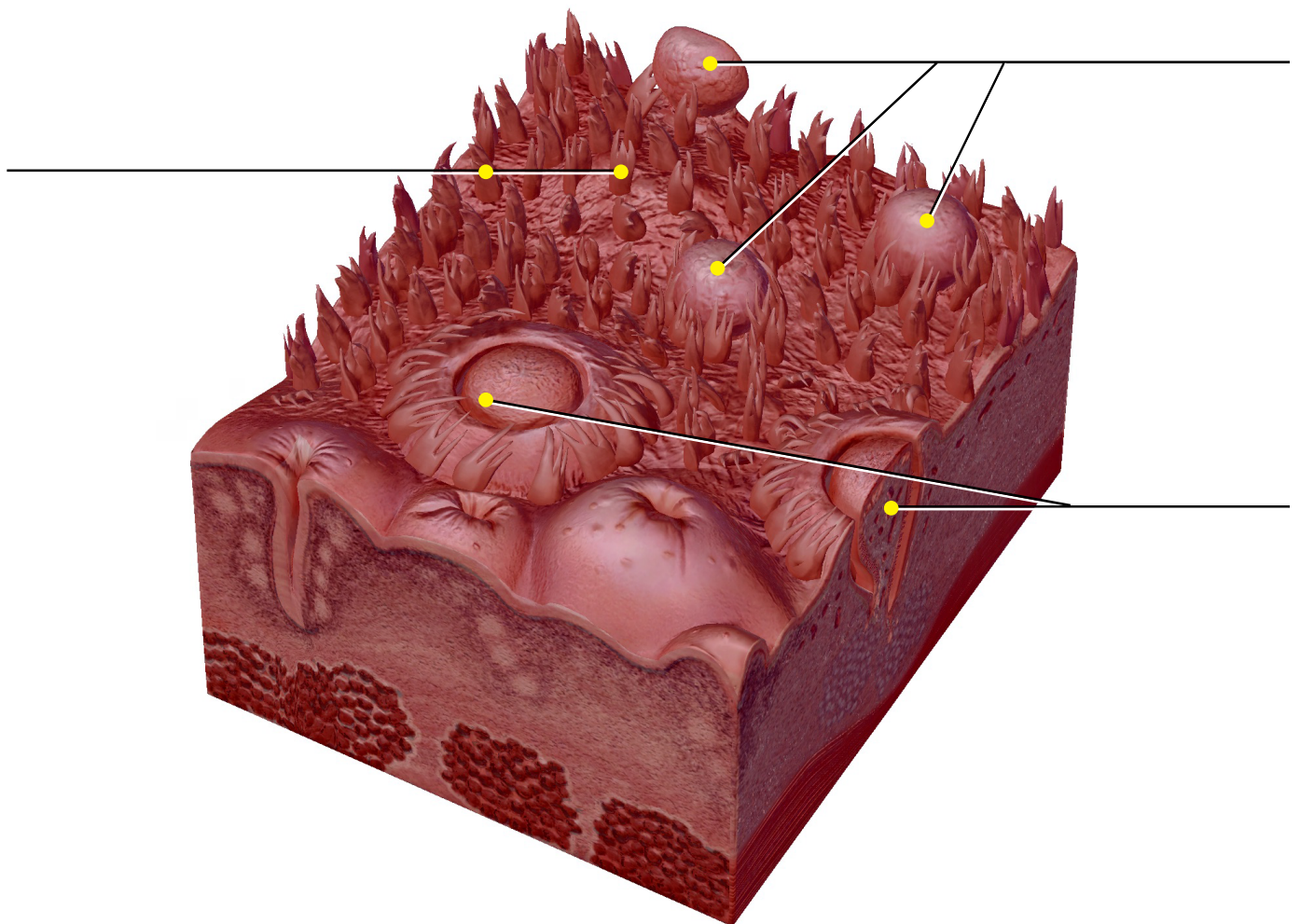
Module 23.3 Olfactory Pathway



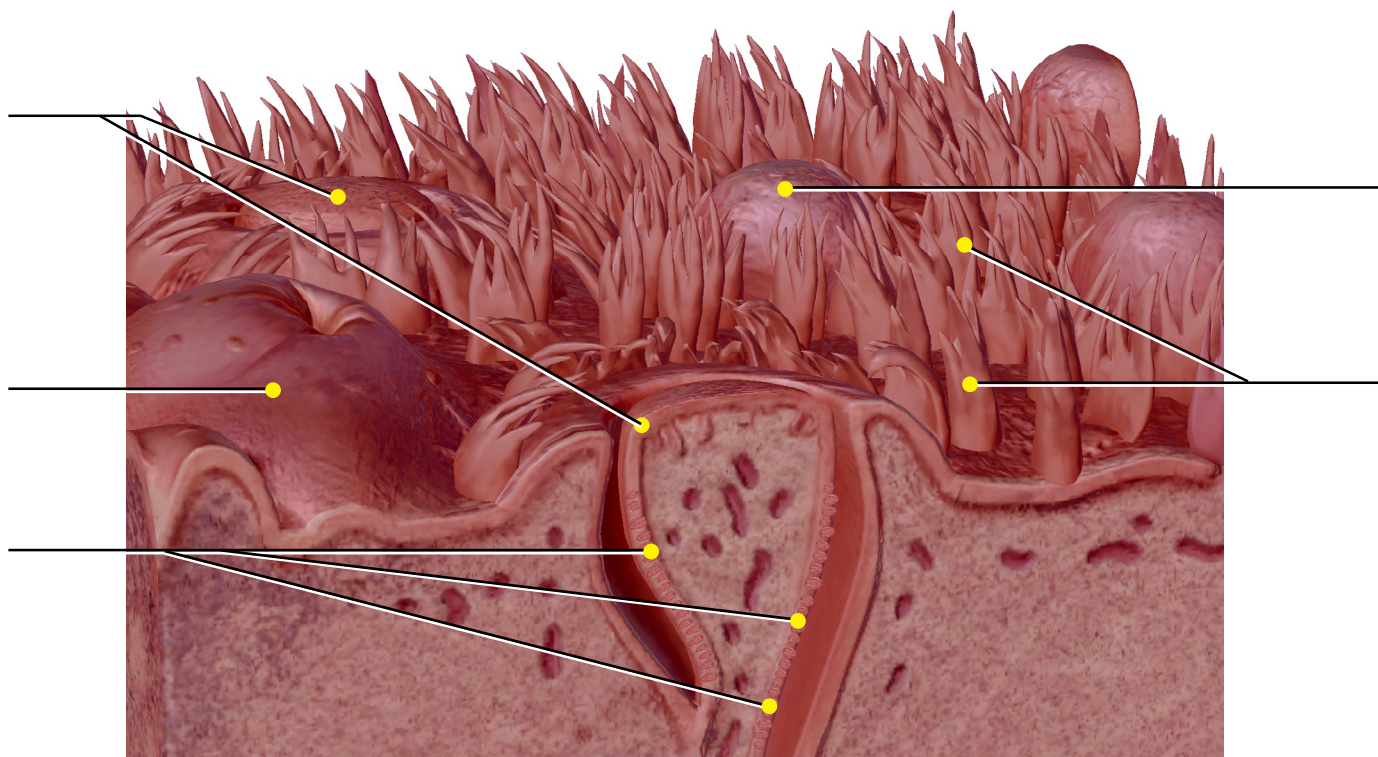
Module 23.4 Tongue



Module 23.6 Papillae (Part 1)



Module 23.6 Papillae (Part 2)



Module 23.7 Taste Pathway

