

VISIBLE  BODY®

Special Senses: Taste & Smell

A nervous system lab activity using Visible Body Suite

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PRE-LAB EXERCISES

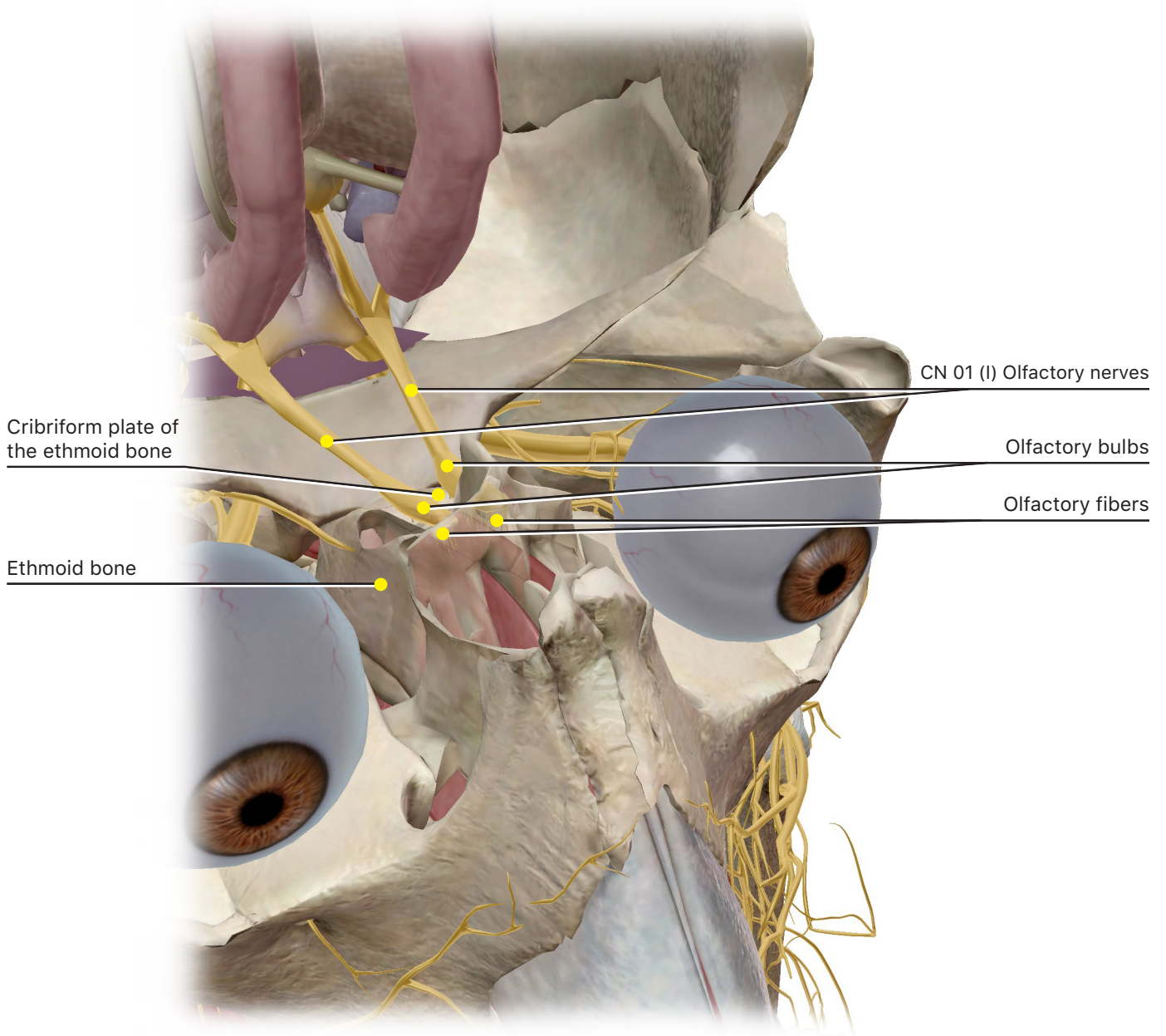
1. What do you do when you smell?
2. What do you think creates odors?
3. The goal of your senses of smell and taste is to take sensory information from the environment and convert that information into a neural signal. This involves the stimulation of receptors that encode that information. What do you think is stimulating the receptors in this case?
4. Do your senses of smell and taste work together? Plug your nose. Does food taste the same when your nose is plugged as it did when it was not plugged?

IN-LAB EXERCISES

A. Olfaction

Search for and select the Region View "Head and Neck."

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



1. Hide the following structures:

- a. Muscles
- b. Vessels
- c. Lymphatic system
- d. Frontal bone
- e. Dura mater
- f. Frontal lobe of the brain
- g. Falx cerebri

2. As you zoom in, you will see two yellow nerves between the eyes. These are the **olfactory nerves** (CN I).

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 coming through it. These are projections from the olfactory bulb that project into the nasal cavity, capturing volatile compounds with receptors on their cilia and turning those compounds into neural signals.

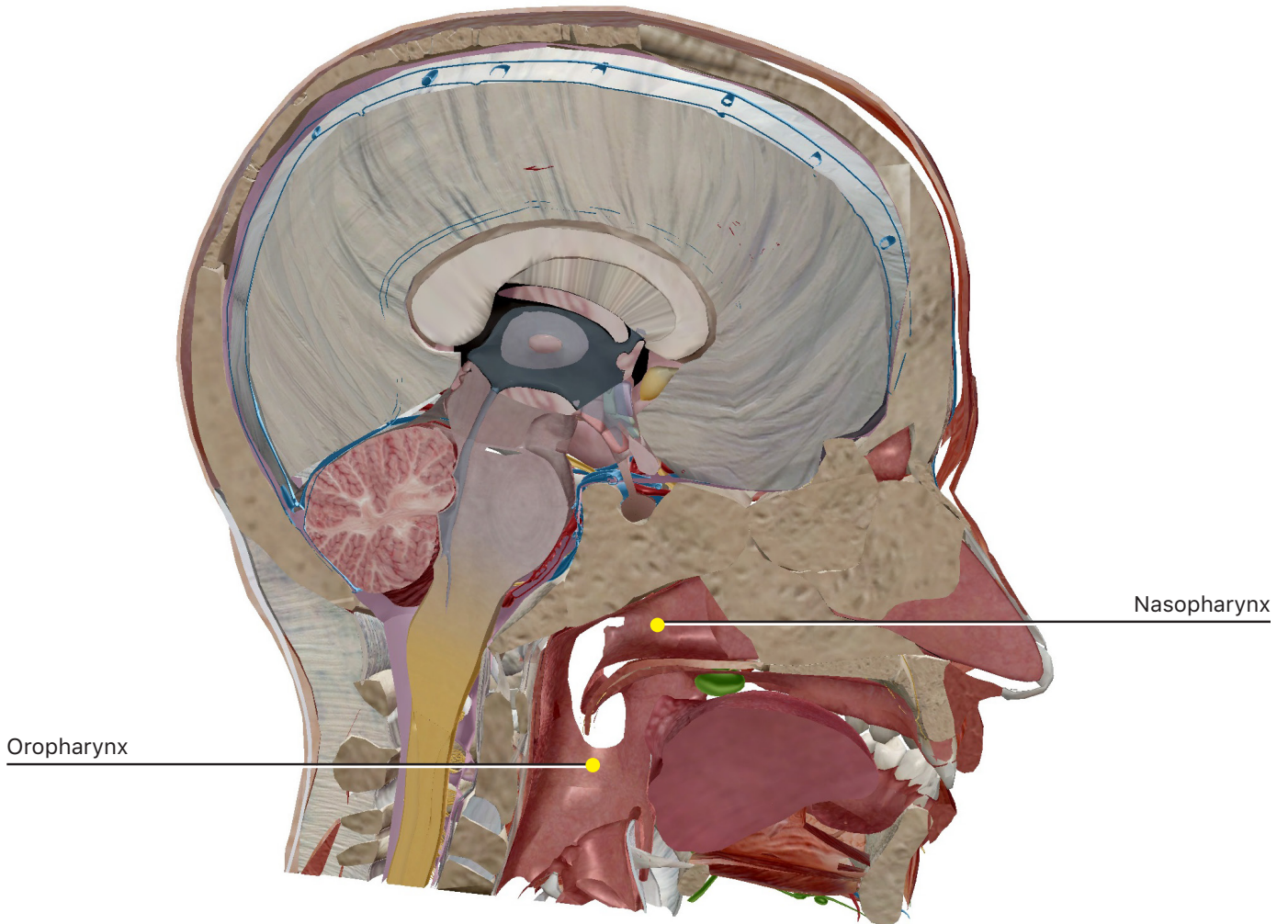
b. What kind of tissue is the olfactory bulb?

c. Examine the path that air must 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 makes it more likely that an **odorant** will reach the receptors on the **olfactory epithelium**.

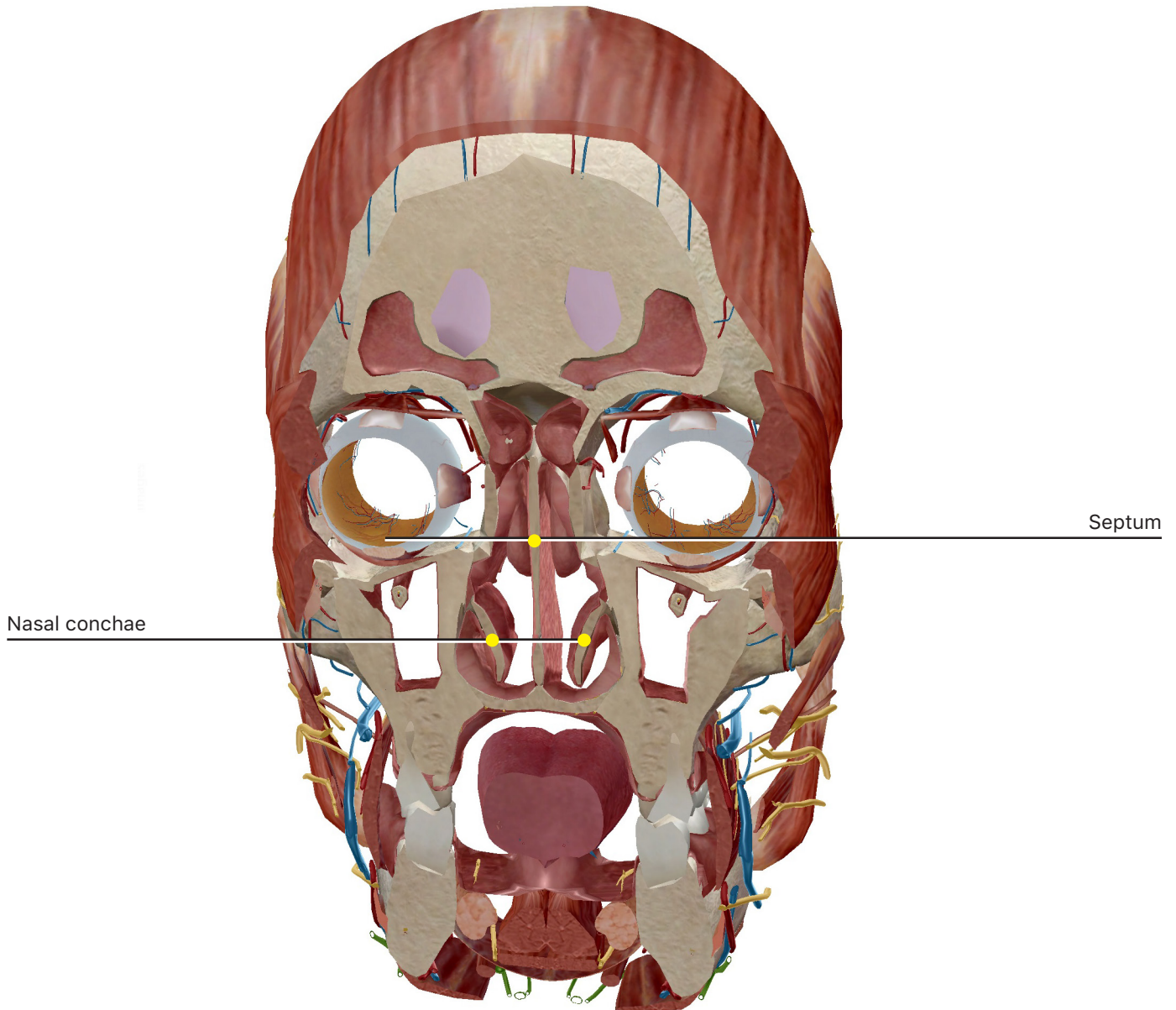
d. Note that you have two olfactory bulbs. What function do you think this serves?

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** and the **nasopharynx** are physically connected. This means that odorants do not have to enter only from your nose; they can also flow 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.



A. Search for "coronal" and select the Cross Section "Head (Orbit)."



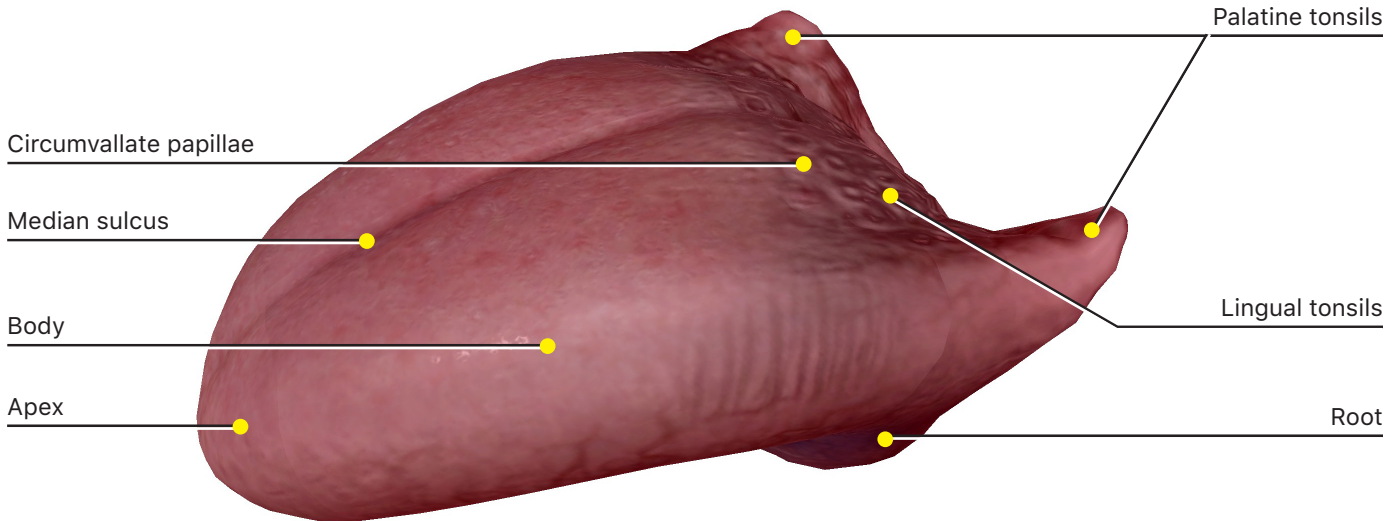
1. Note that there is a division or **septum** between the nostrils. Why do you think the septum is important?

2. Note that the nasal cavity contains bony projections called the **nasal conchae**; these serve to make the air entering the nose swirl, so it is warmed and mixed. They also allow for the movement of odorants, making them more likely to contact a receptor.

PART 2: TASTE

A. Open the Nervous System View "Tongue Regions."

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



1. Note that there are no bones or joints in the tongue. What do you think the muscle of the tongue moves against to create the movements needed for talking and eating?

2. Find the following regions.

a. **Root**

i. What is the root of the tongue connected to?

b. **Palatine tonsils**

i. What function do the palatine tonsils serve? Discuss how their location influences their function.

ii. Why would they be larger in children than in adults?

c. Lingual tonsils

d. Median sulcus

- i. This divides the tongue into two lateral halves.

e. Apex

f. Frenulum

- i. What is the function of this part of the tongue?

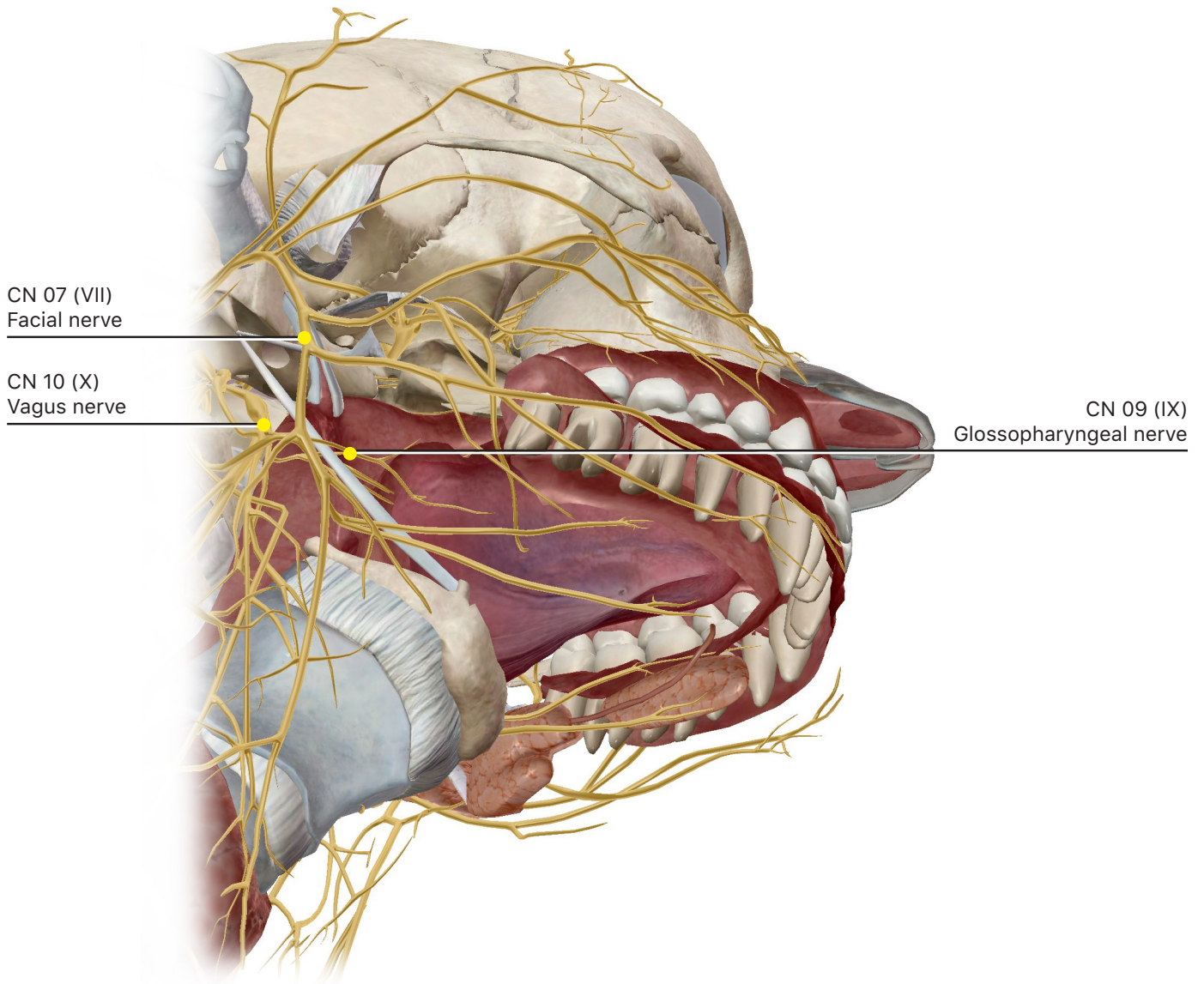
- ii. What happens when the frenulum projects to the apex of a tongue (also known as being tongue tied)?

g. Circumvallate (vallate papillae)

- i. Note that the circumvallate papillae form a somewhat V shape, when you are looking at the tongue. As there are many types of papillae, this is a good way to remember which ones are the vallate.

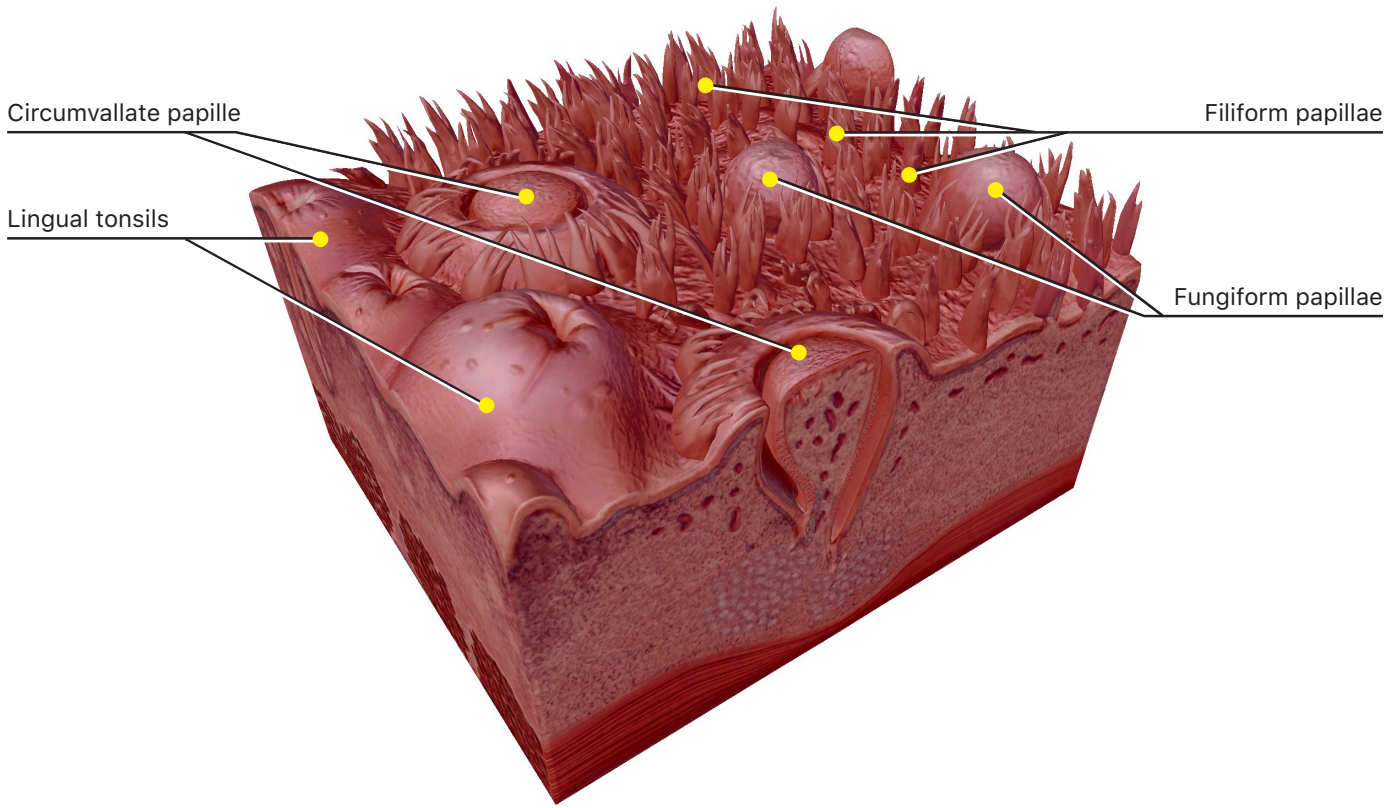
- ii. What is the function of these papillae?

B. Open the Region View "Head and Neck."



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 of the taste pathway below.

C. Open the Nervous System View "Tongue Section."



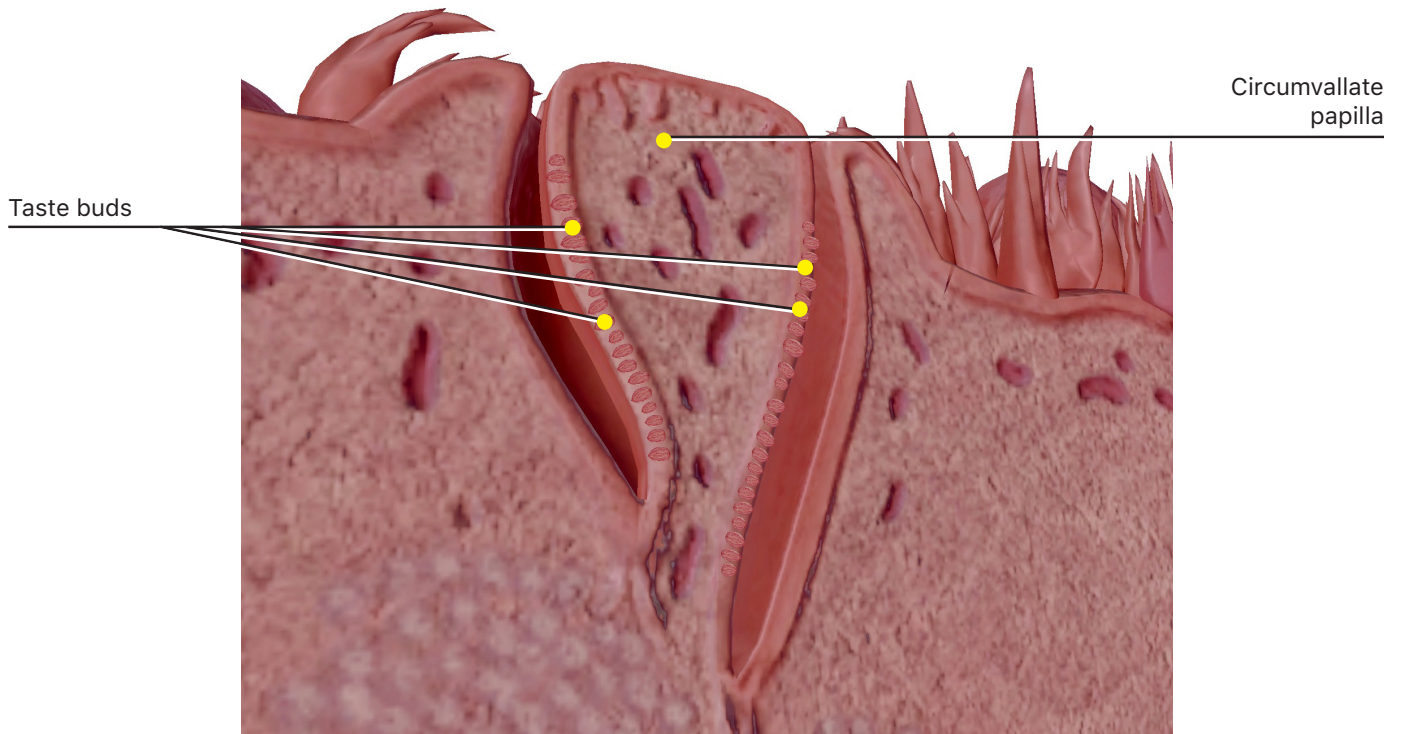
1. Locate the **lingual tonsils**.
2. Locate the **circumvallate papillae**.
3. Having located these items, what part of the tongue is this section from? Justify your answer.

4. Select the **filiform papillae**. Note their jagged appearance. How does this appearance influence their function?

5. Select a **fungiform papilla**. These are named because of their mushroom-like appearance.
 - a. Where are they typically found?

 - b. What is their primary function?

6. Rotate the tongue section, so you have a side view of a **circumvallate papilla**. Select the papilla. Zoom in to examine the **taste buds**.



- a. Note that each taste bud is made of multiple cells
 - i. What are the two cell types present in a taste bud?

- b. How do these taste buds come into contact with **tastants**?

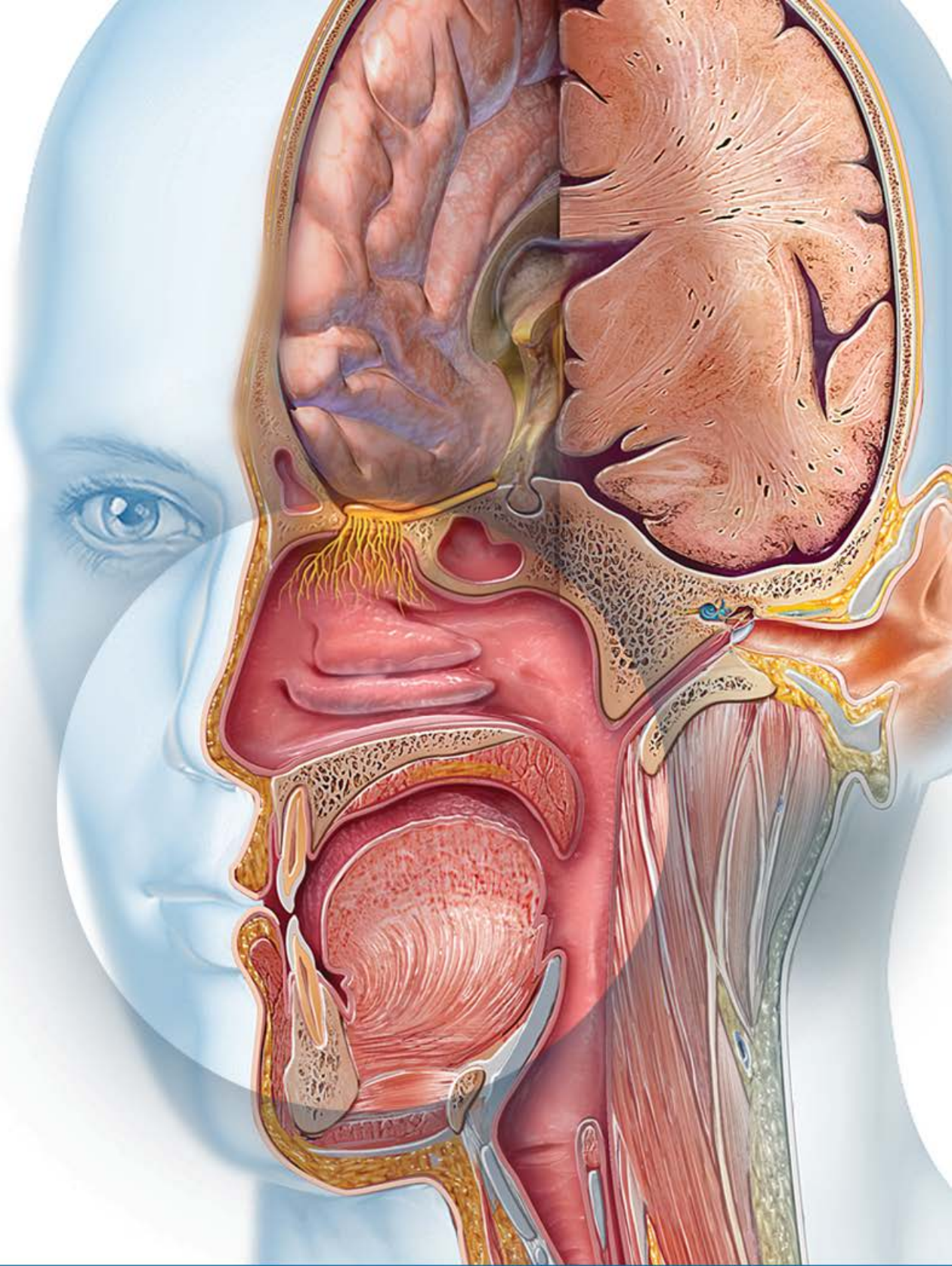
PUTTING IT ALL TOGETHER

1. When an odorant enters the nose, what are all the structures it passes on its way to becoming a fully processed conscious neural signal (in the cortex). Fill in the blanks below.

The odorant enters the _____ cavity and passes along the _____, which divides the nose into two nostrils, on its way past the _____, which make the air more turbulent. Then, it reaches the cilia on the receptors of the _____, where it binds, creating a neural signal. That signal travels through the _____ of the ethmoid, on its way to the _____. The signal is then transferred to the _____, which takes it to the olfactory area in the _____ of the cerebral cortex.

2. When a tastant enters the mouth, what are all the structures it passes on its way to becoming a fully processed neural signal? Fill in the blanks below.

The food enters the mouth, passing the _____ (tip) of the tongue. It is moved around by the motion of the tongue and teeth as the food is chewed. Its movement is facilitated by _____ on the tongue, which are jagged, aiding them in their ability to move food. _____, on the _____ of the tongue, and _____, located _____, come in contact with the _____. Both types of papillae have _____ that have receptors for the individual tastes—sweet, sour, salty, umami (savory), and bitter. Once a tastant is bound to the receptor, it creates a signal that travels through one of three cranial nerves, depending on the location of the taste bud. For a taste bud located on the front of the tongue, the signal travels through the _____. For a taste bud located on the back of the tongue, the signal travels through the _____. For a taste bud located on the middle and back of the tongue, the signal travels through the _____. These signals travel to the _____ of the brainstem, where they are relayed to the _____ for higher processing.

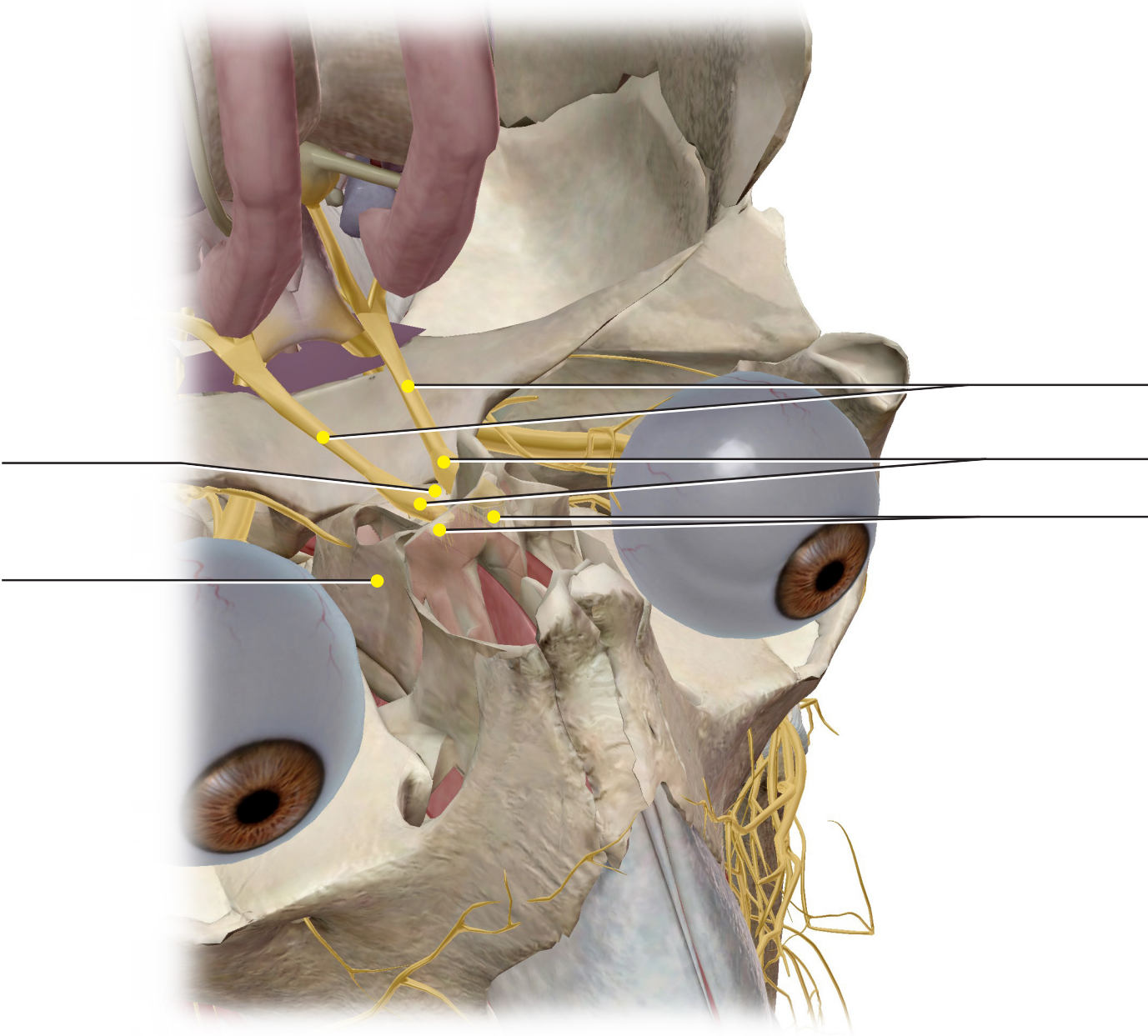


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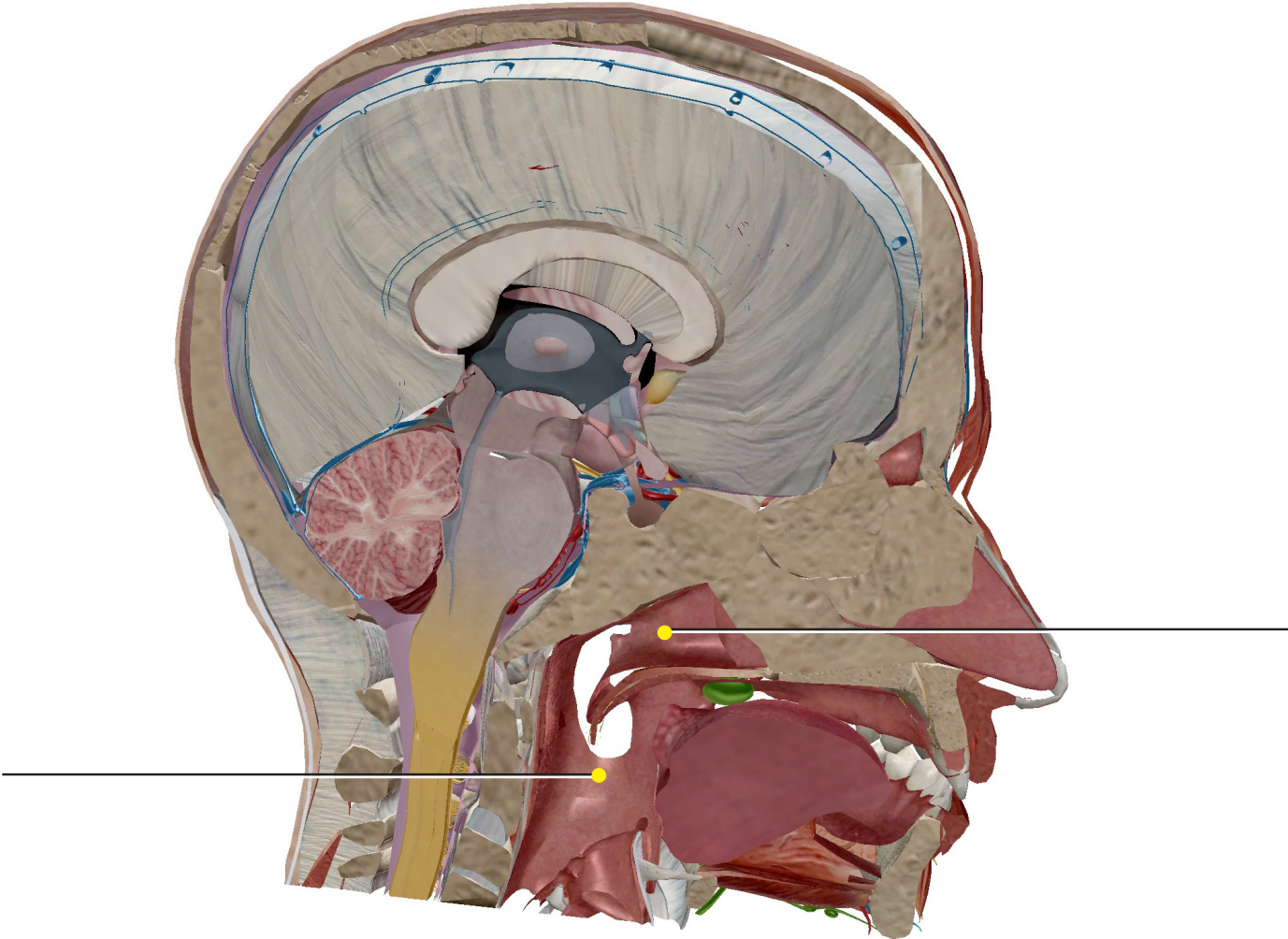
Student Practice

Label the structures in the following figures.

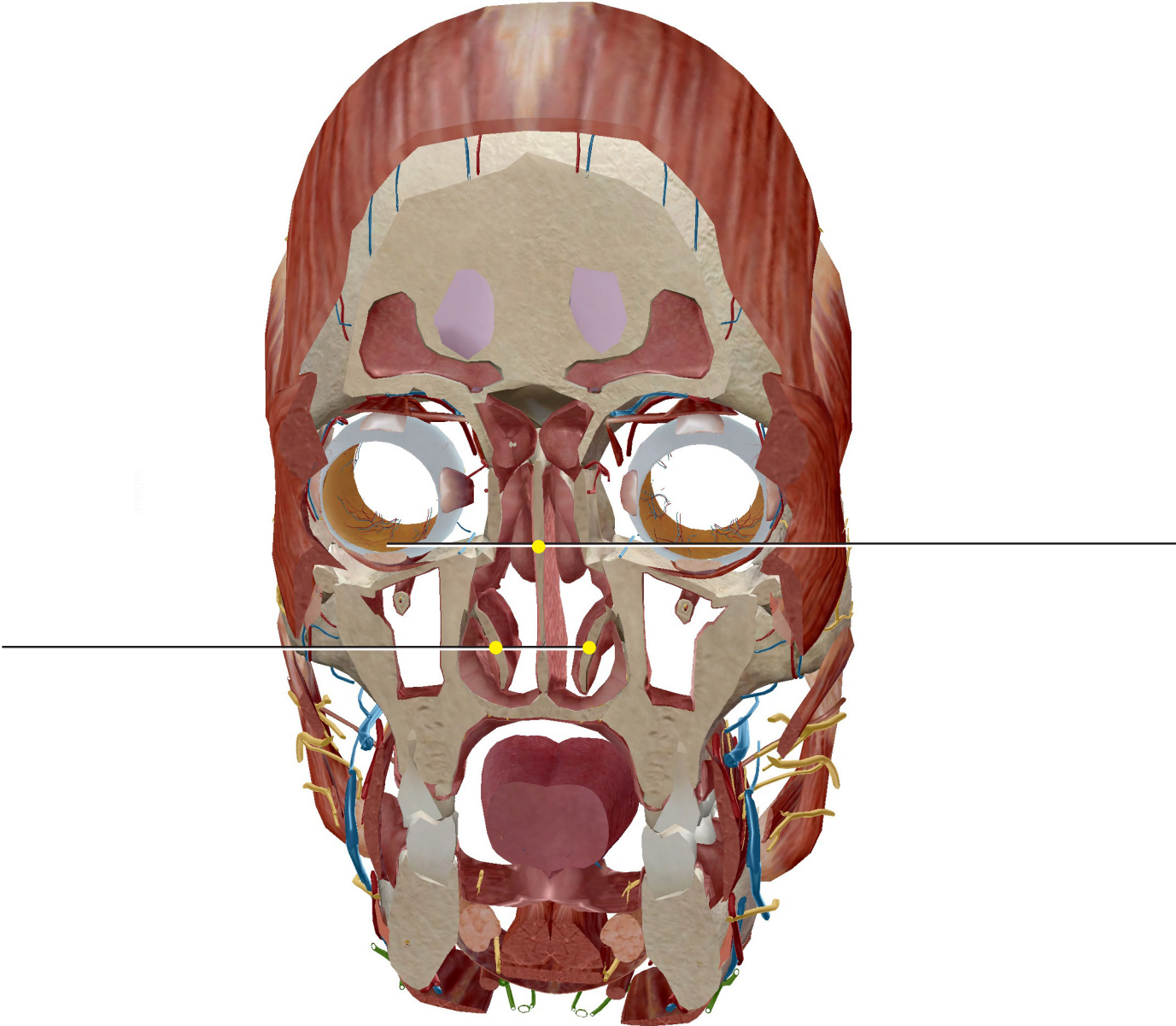
Source: Region View "Head and Neck"



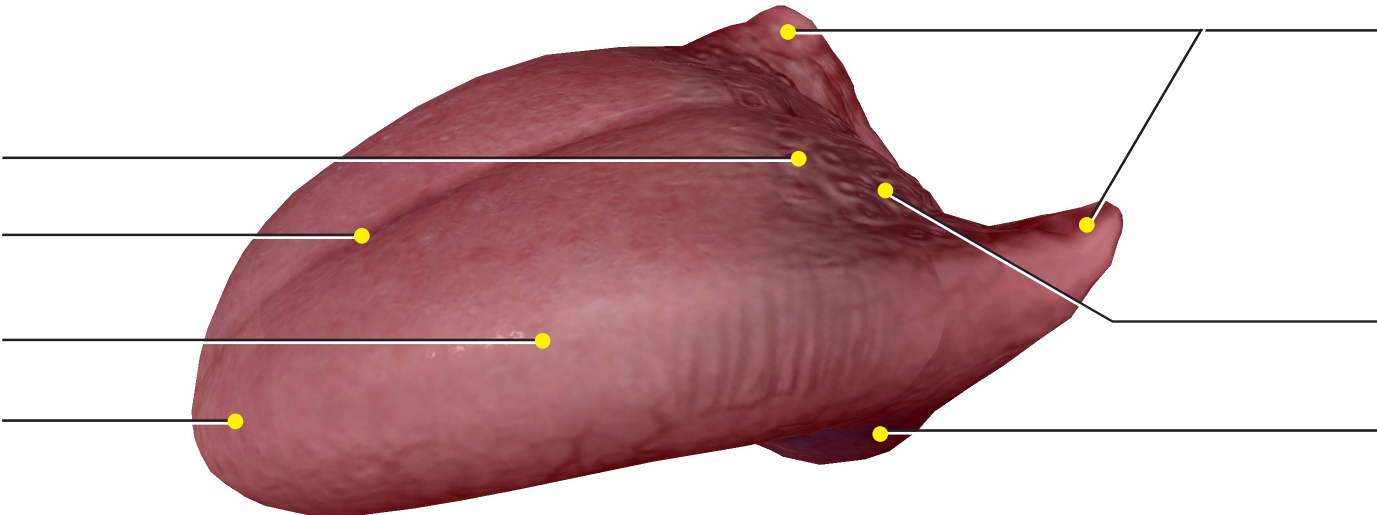
Source: Cross Section "Head (Midsagittal)"



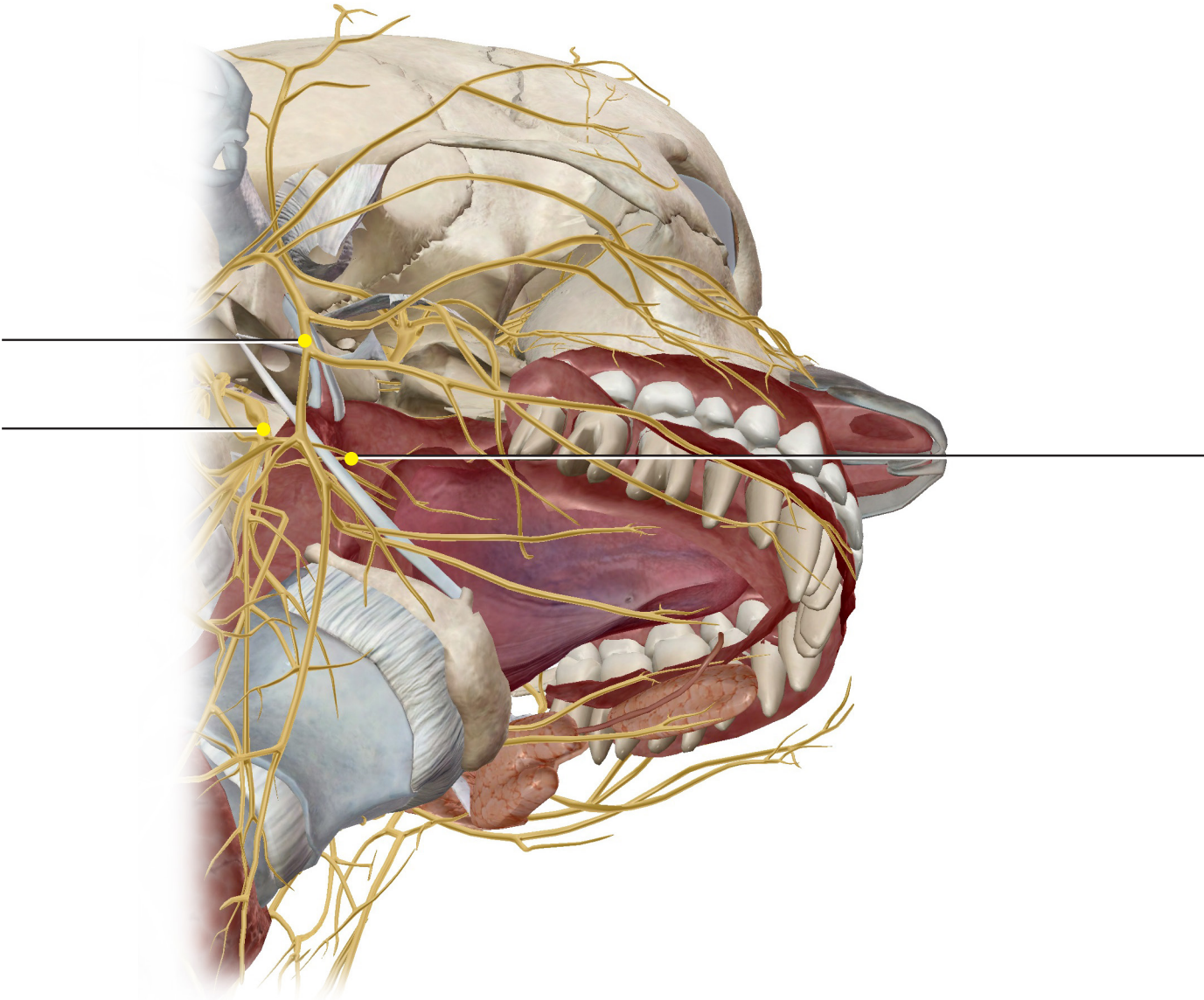
Source: Cross Section "Head (Orbit)"



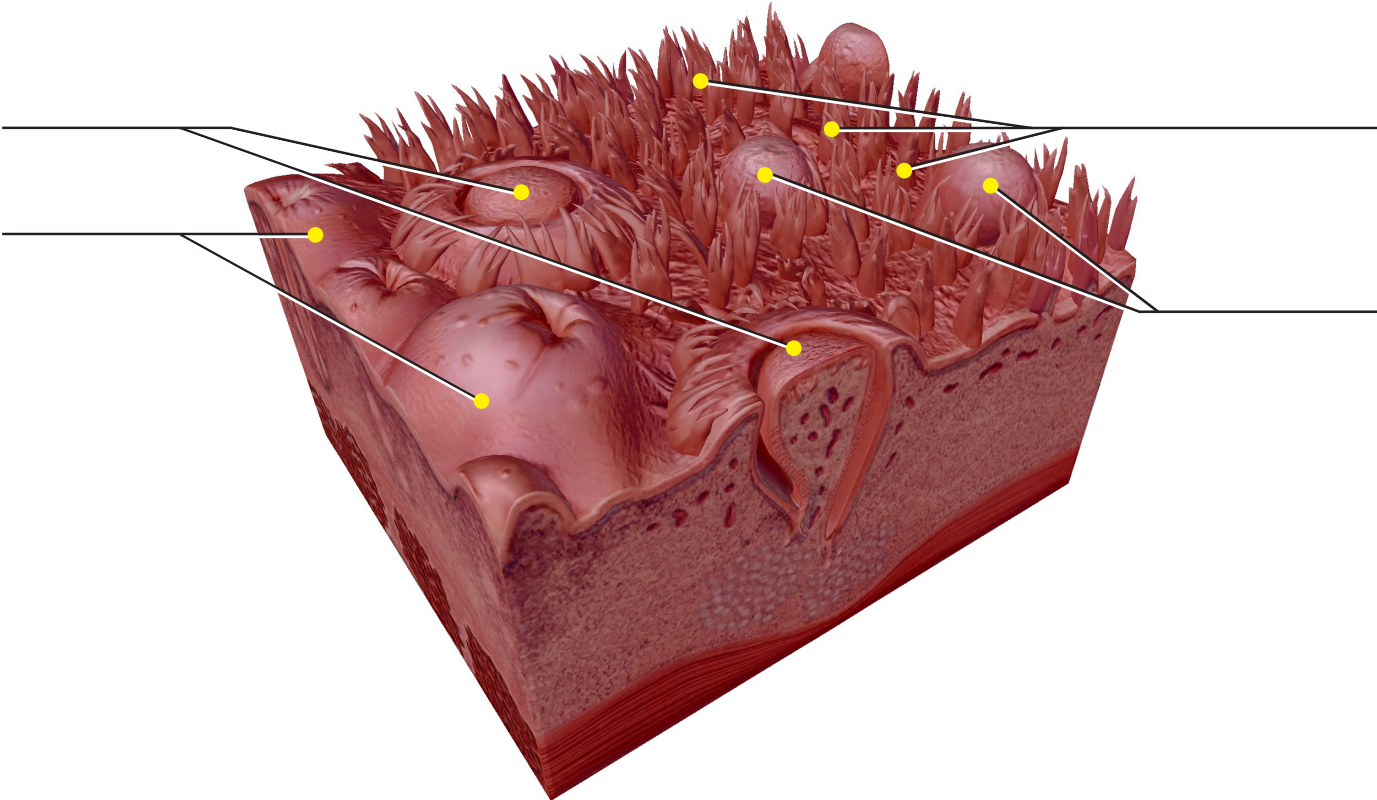
Source: Nervous System View "Tongue Regions"



Source: Region View "Head and Neck"



Source: Nervous System View "Tongue Section"



Source: Nervous System View "Tongue Section"

