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The Respiratory System

A respiratory system lab activity using Visible Body Suite

Andrew Criss, Doctoral Lecturer at York College

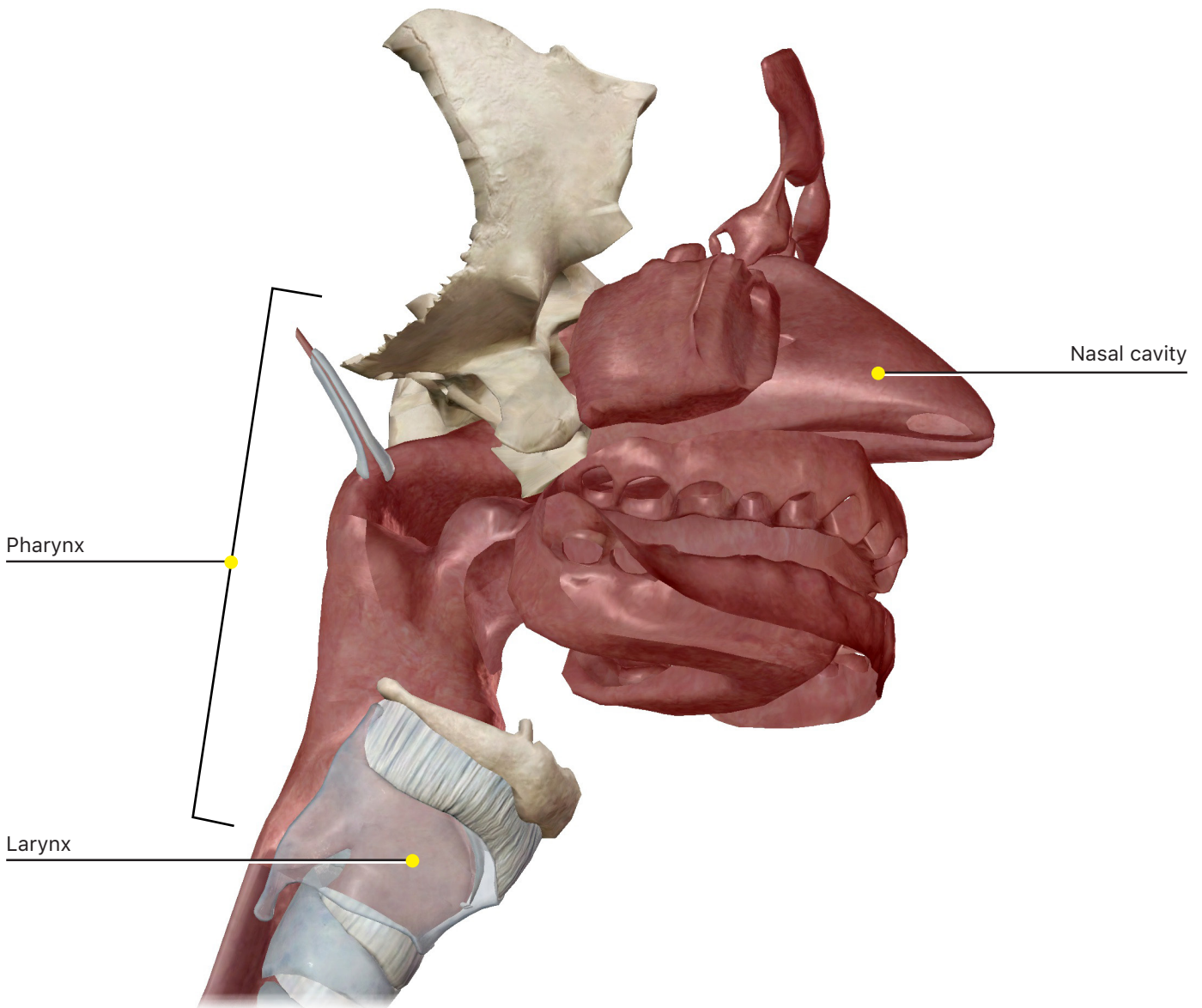
PRE-LAB EXERCISES

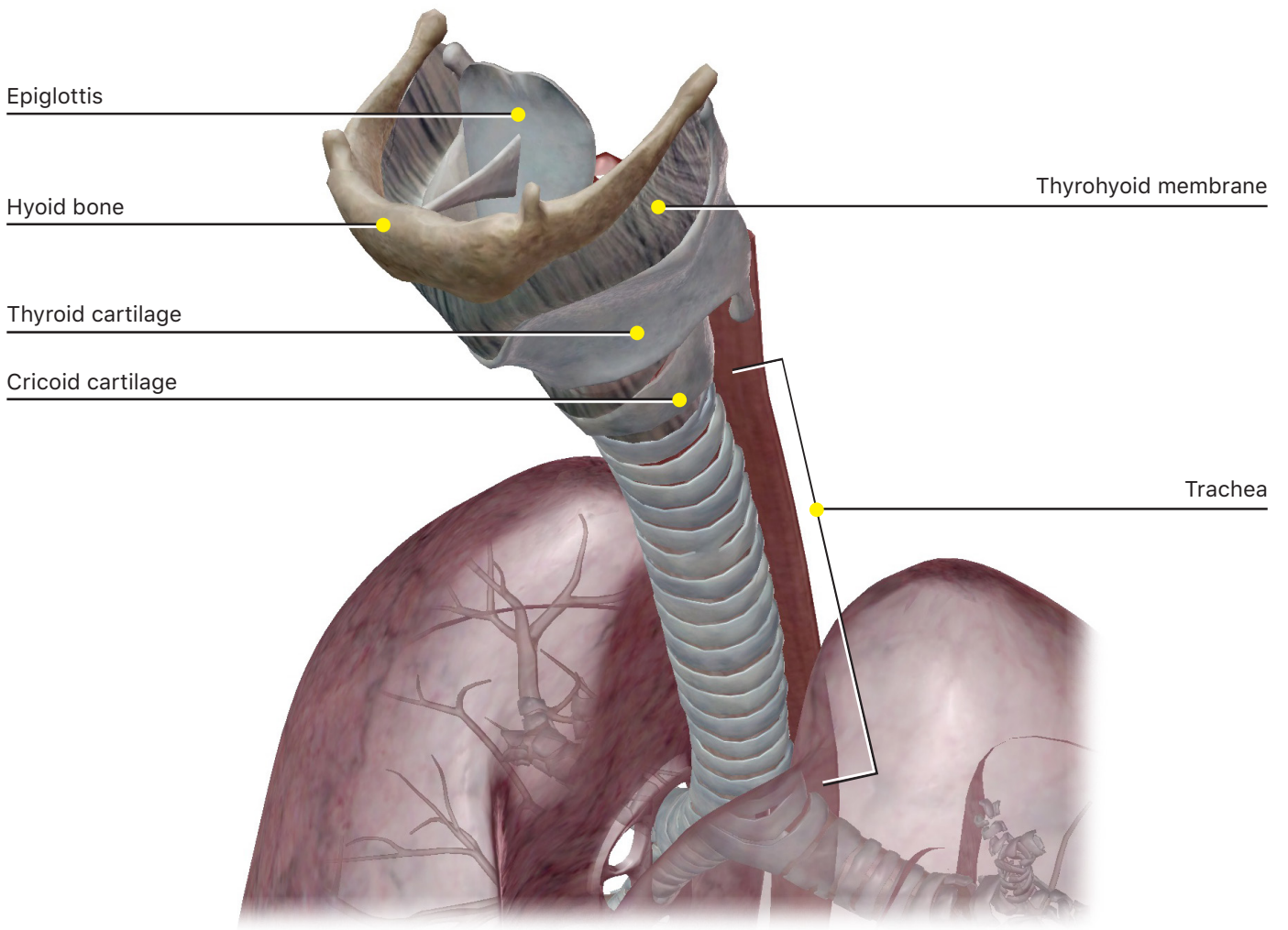
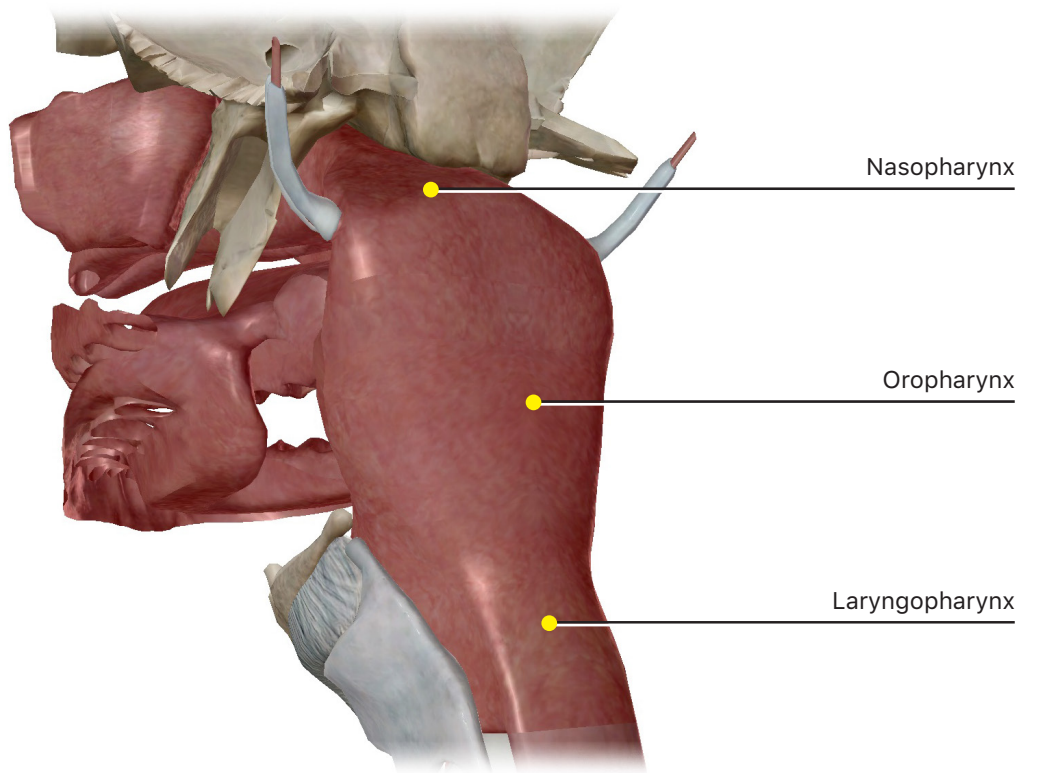
Open Visible Body Suite. Search for and select each of the Respiratory System Views noted in the exercises below.

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

A. Open the Respiratory System View "Upper Respiratory System."

In the system tray on the left side of the screen, deselect the integumentary system icon to remove the skin and hair from the view. Rotate the view as needed to examine the upper respiratory system structures and note where they are located.





1. What structures comprise the upper respiratory system, from superior to inferior?

2. Select the **nasal cavity** and use the book icon to read about it. What are the structures and functions of the nasal cavity?

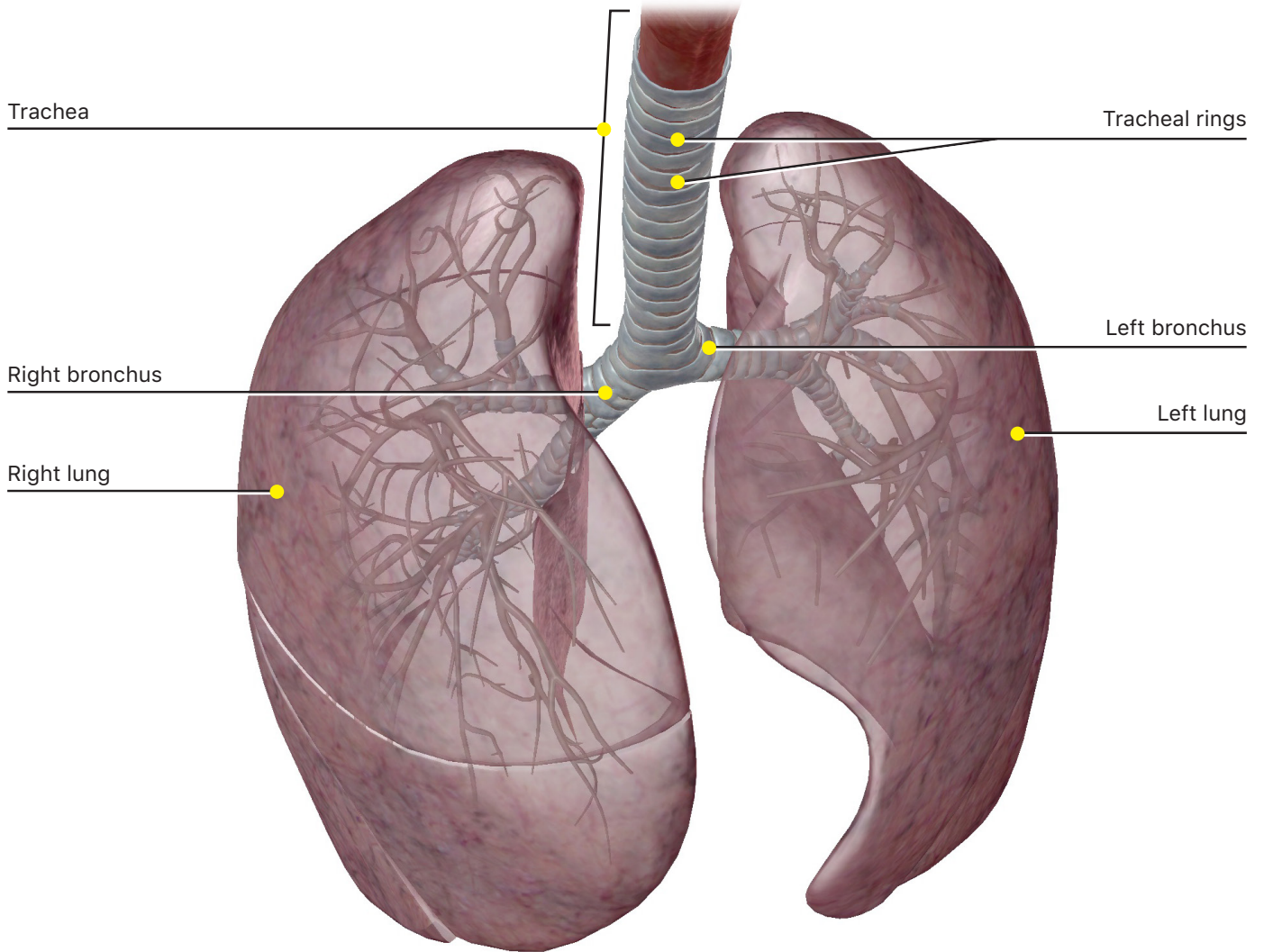
3. Examine the structure of the **pharynx**. What are the 3 parts of the pharynx, from superior to inferior?

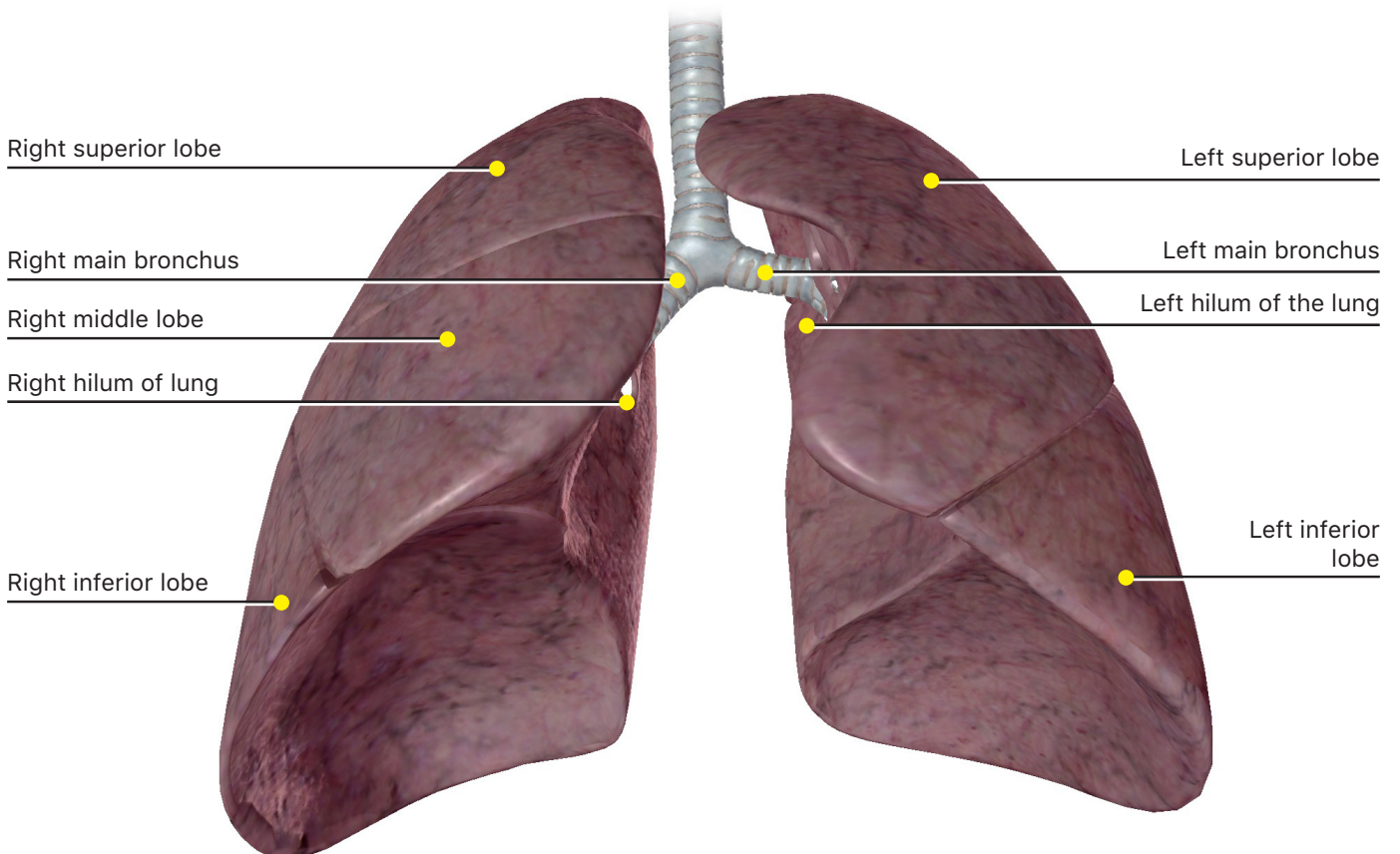
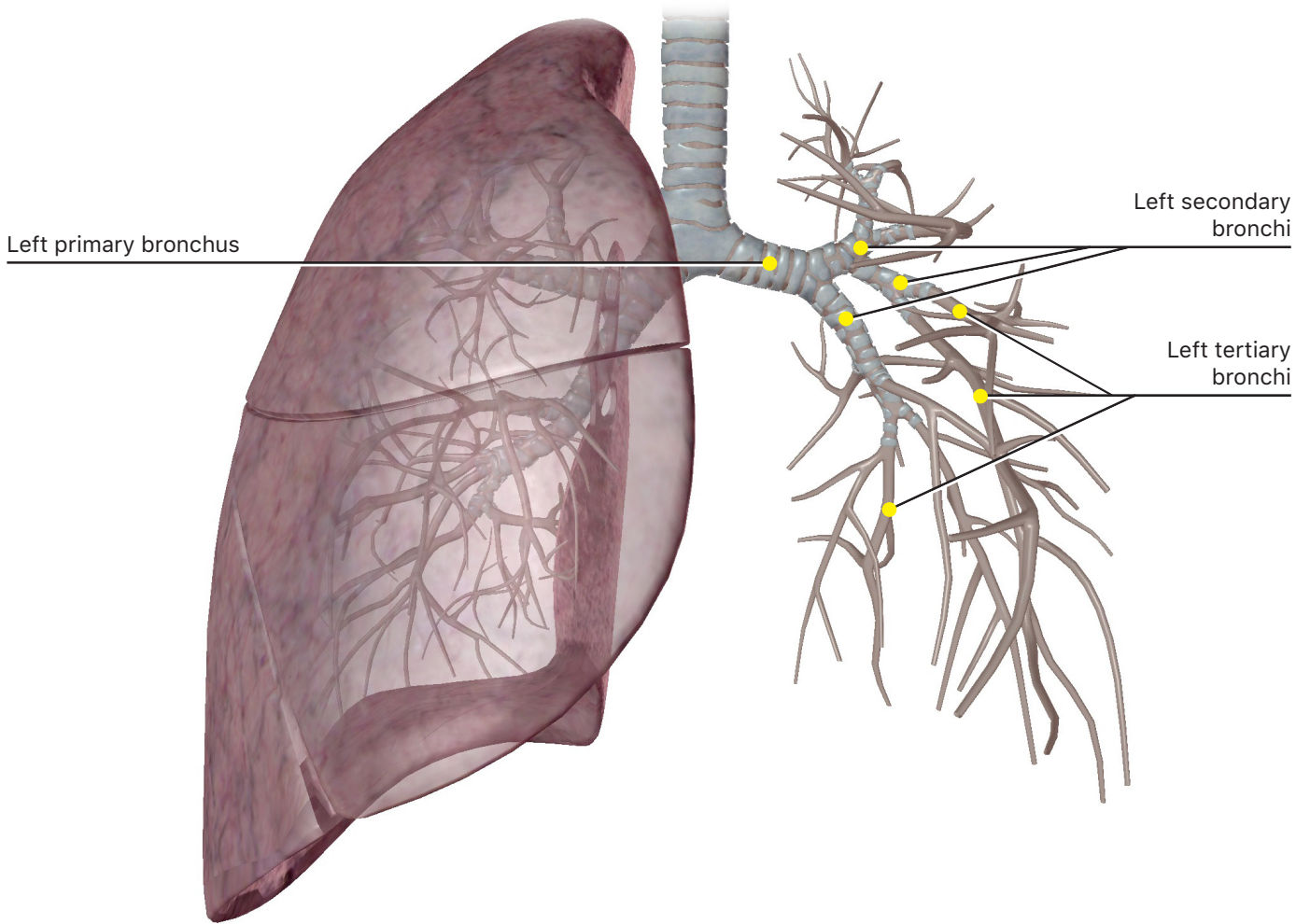
4. Examine the structure of the **larynx**.
 - a. Select the **thyroid cartilage** and use the book icon to read about it. What is the function of this cartilage and the other laryngeal cartilages?

 - b. To examine the **epiglottis**, you must first individually select and hide the thyroid cartilage and the **thyrohyoid membrane**. Then, select the epiglottis and use the book icon to read about it. What is the composition and function of the epiglottis?

B. Open the Respiratory System View "Location of Lungs."

In the system tray on the left side of the screen, deselect the skeletal system icon to remove the thoracic cage and other skeletal structures from the view. Rotate the view as needed to examine the lower respiratory system structures and note where they are located.





1. What structures comprise the lower respiratory system, from superior to inferior?

2. Select the **trachea** and use the book icon to read about it. What is the structure and function of the trachea and the **tracheal rings**?

3. In the system tray on the left side of the screen, deselect all the blue system icons except respiratory. Then, select and hide one of the **lungs**. Examine the **bronchi**.
 - a. In terms of size and structure, what is the difference between **primary, secondary,** and **tertiary bronchi**?

 - b. What are the tiny structures that appear at the ends of the tertiary bronchi, and what is their function?

4. In the system tray on the left side of the screen, deselect and select the respiratory system icon to refresh the respiratory structures in the view, and examine the lungs.
 - a. What differences do you notice between the left and right lungs?

 - b. What are the lines on the surface of the lungs called?

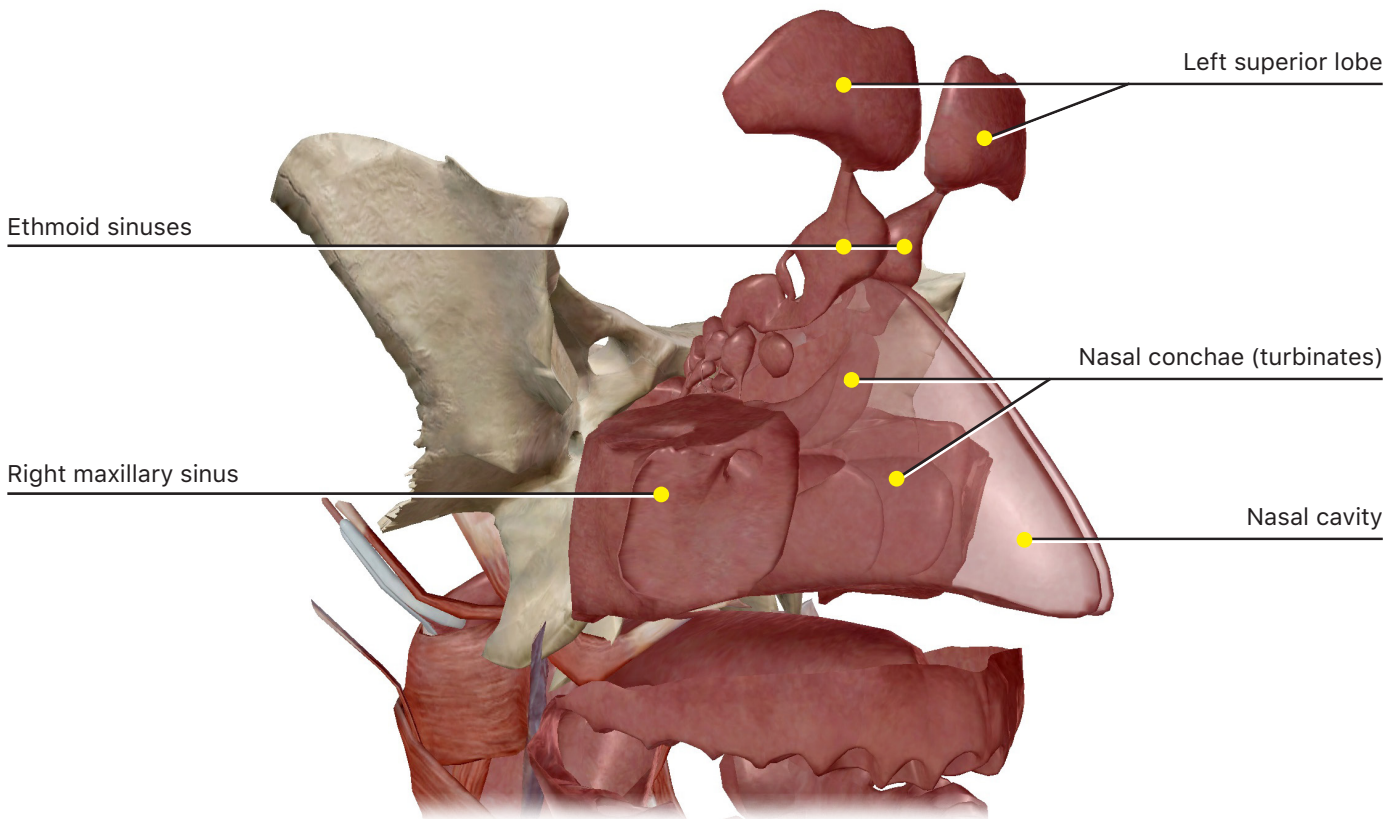
 - c. On the medial aspect of the lungs, what is the name of the region where the bronchi enter the lung? What else enters the lung via this region?

IN-LAB EXERCISES

Open Visible Body Suite. Search for and select each of the Respiratory System Views noted in the exercises below.

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

A. Open the Respiratory System View "Upper Respiratory System."



1. Select the **nasal cavity** and use the book icon to read about it. Besides serving as a passageway for air to enter the body, what are 3 functions of the nasal cavity?

2. With the nasal cavity selected, use the Fade button. Notice the folds of tissue protruding from the internal lateral walls of the nasal cavity.

a. What are these folds of bone covered with mucous membranes called?

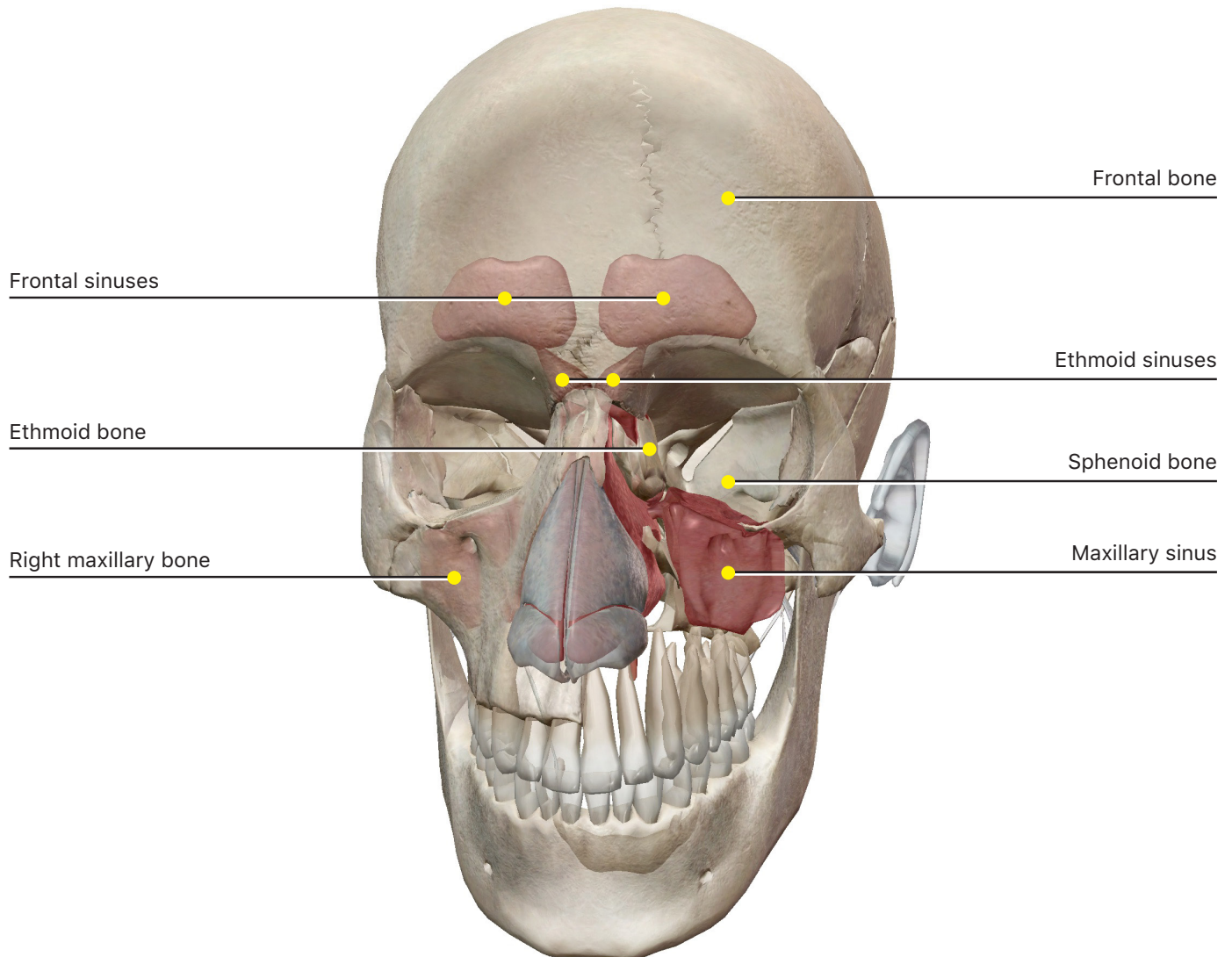
b. What is their function?

3. In the pictures below, compare the **nasal conchae** (turbinates) of a dog (top) versus those of a human (bottom).



Why do you suppose the nasal conchae of the dog are much larger and more extensive than those of the human?

4. Select the large cubic-shaped chambers located on either side of the nasal cavity.

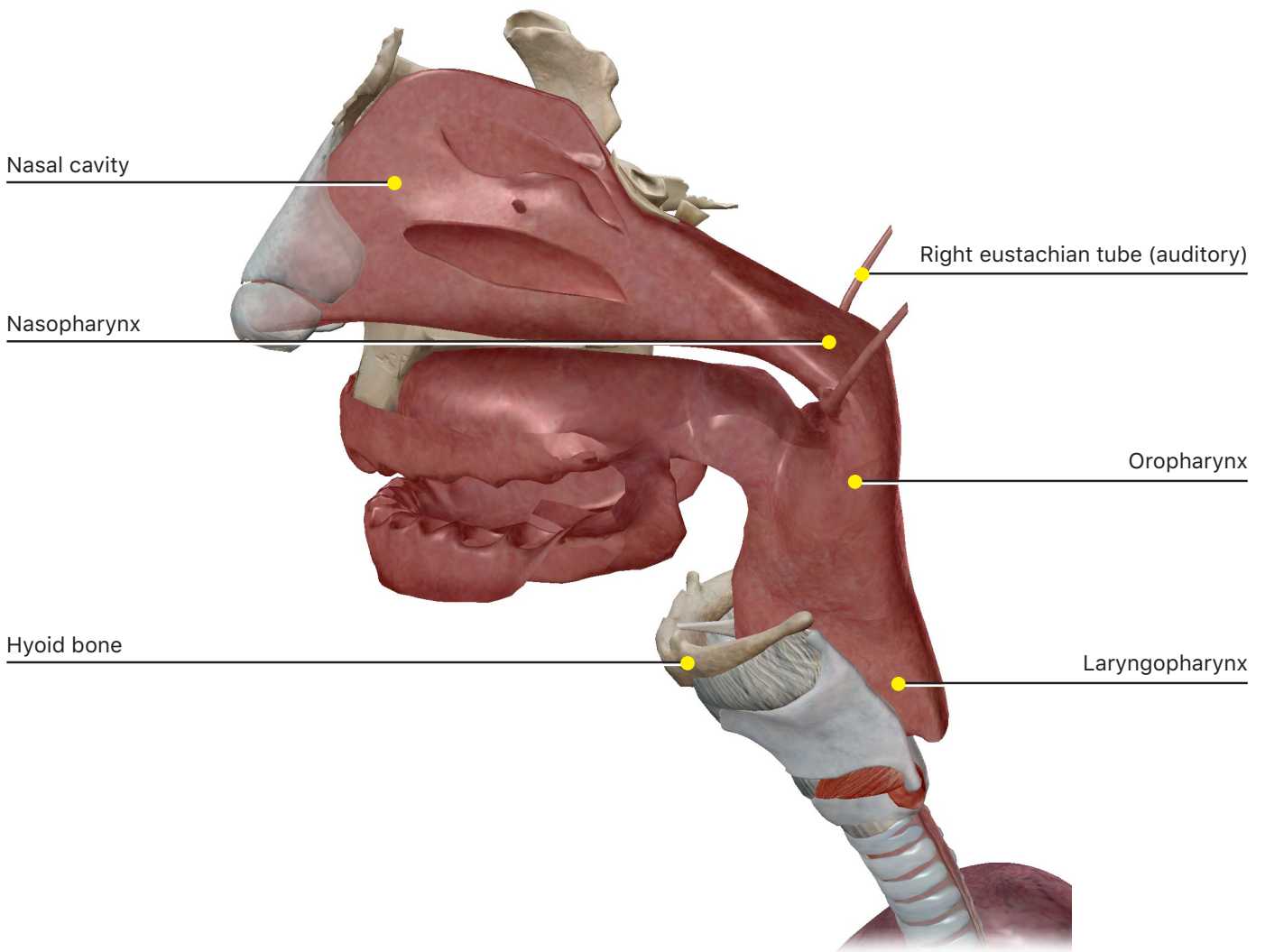


a. What are these chambers called?

b. Select the book icon. What 4 bones contain paranasal sinuses?

c. What are the functions of these sinuses?

B. Open the Respiratory System View "Nasal Cavity."



Rotate the view as needed to observe the nasal cavity and nasal conchae.

1. Rotate to a lateral or posterior view.

a. Identify and select the **nasopharynx**. Find and select the 2 other sections of the **pharynx**. What are they called?

b. What is the name of the tube that exits superolaterally from the nasopharynx?

c. What is the function of this tube?

2. Rotate back to the anterior view.

a. What is the name of the bone located anterior to the **laryngopharynx**?

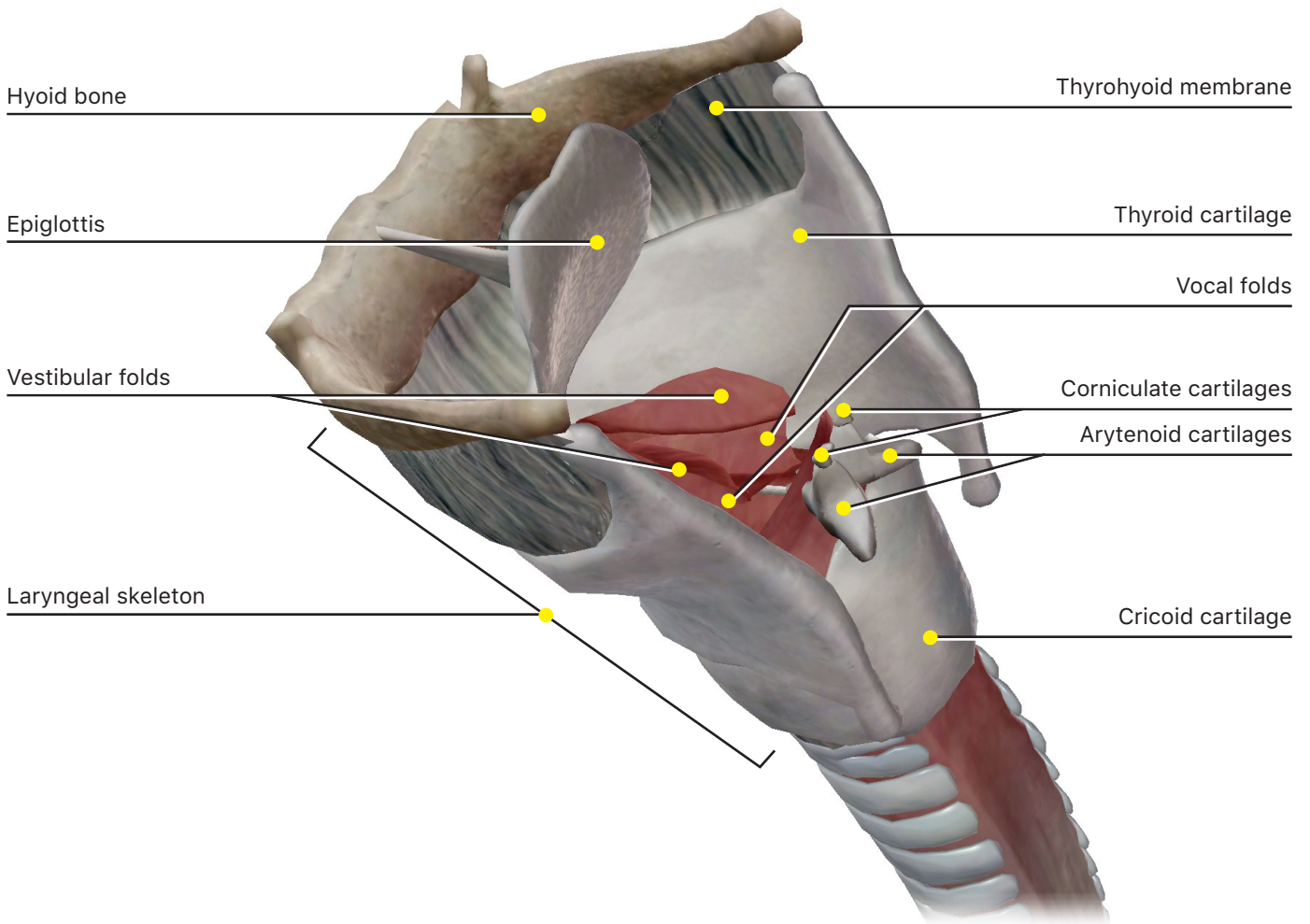
b. What is the function of this bone and what makes it unique and different from all the other bones in the body?

TIME TO PRACTICE!

SEARCH FOR AND TAKE THE FOLLOWING RESPIRATORY SYSTEM QUIZZES:

UPPER RESPIRATORY AND NASAL CAVITY

C. Open the Respiratory System View "Laryngeal Muscles."



Observe the various cartilages and membranes located below the hyoid bone.

1. Select the largest cartilage structure of the **larynx** and use the book icon to read about it and the other laryngeal cartilages.

a. What is the group of cartilages and membranes known as?

b. What is the largest cartilage of the larynx called?

c. What is it more colloquially (commonly) known as?

d. What is the name of the membrane between the **hyoid** bone and the **thyroid cartilage**?

e. What is the name of the only laryngeal or tracheal cartilage that extends all the way around the larynx?

f. What is the function of the laryngeal skeleton?

g. Select the large, flap-like piece of cartilage behind the hyoid bone. What is this structure called, and what is its function?

2. In the system tray on the left side of the screen, deselect the muscular system icon to remove the muscles from the view. Rotate the view to a posterior view of the larynx. Locate and select the **vocal folds** and use the Radius Blast button.

a. Compare the location of the vocal folds and **vestibular folds**. What is an alternate name for each of these structures, and what are their functions?

b. What is the name of the pyramid-shaped cartilages that sit on top of the **cricoid cartilage** and attach posteriorly to the **vocal ligaments**?

c. What are the names of the small cartilages that are located on top of the cartilages from question b?

d. Select the **trachea** (windpipe). Notice the cartilaginous rings located along its anterior and lateral surfaces. What is the function of these rings?

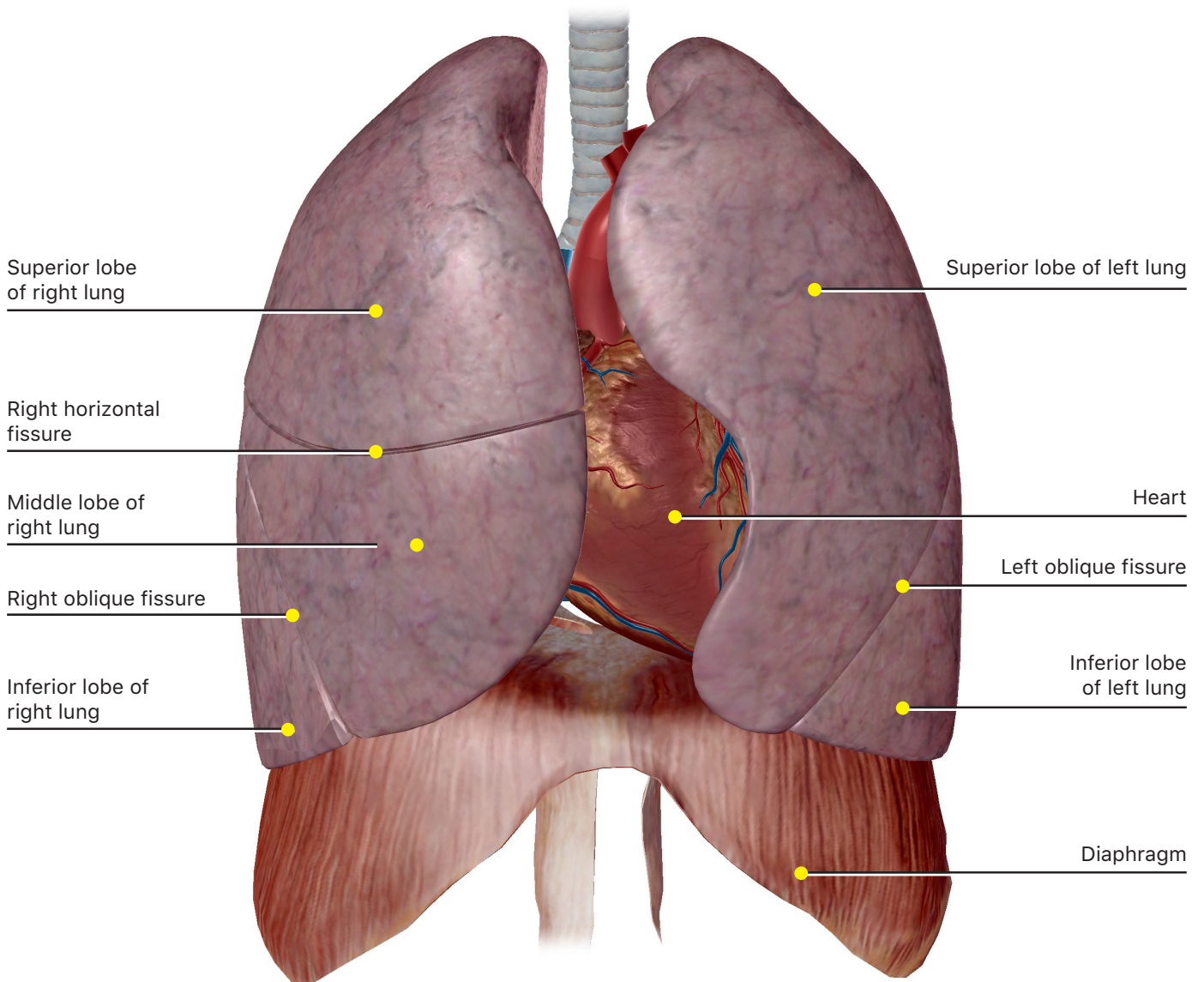
e. In the system tray on the left side of the screen, select the digestive system icon to add the digestive structures to the view. What is the name of the tube that is located just dorsal to the trachea? Why do you think this tube does not have cartilage rings like the trachea?

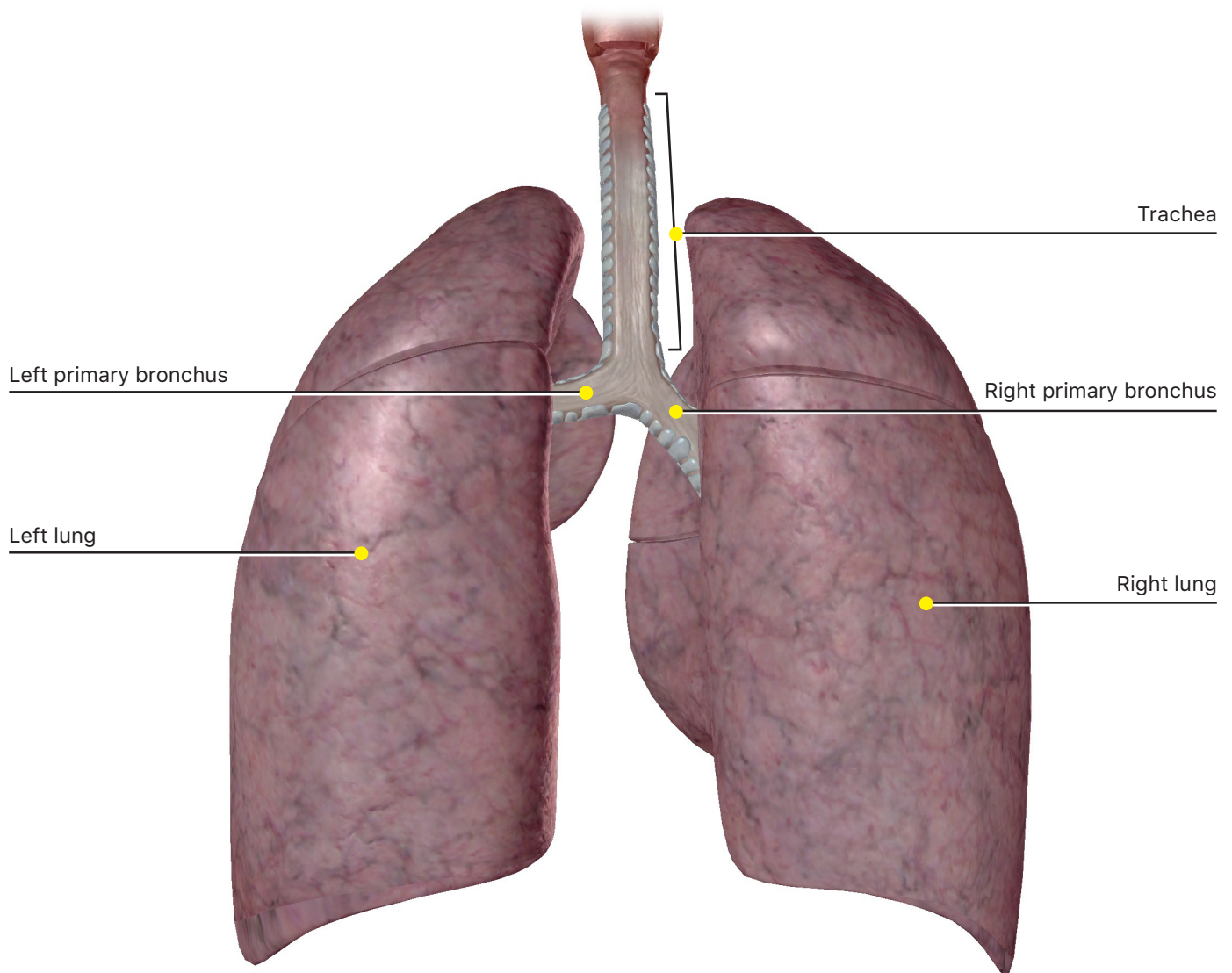
TIME TO PRACTICE!

SEARCH FOR AND TAKE THE FOLLOWING RESPIRATORY SYSTEM QUIZ:

LARYNX

D. Open the Respiratory System View "Location of Lungs."





Observe the location of the lungs in the thoracic cavity. In the system tray on the left side of the screen, deselect the skeletal system icon to remove the thoracic cage and other skeletal structures from the view. Notice the location of the heart in relation to the lungs.

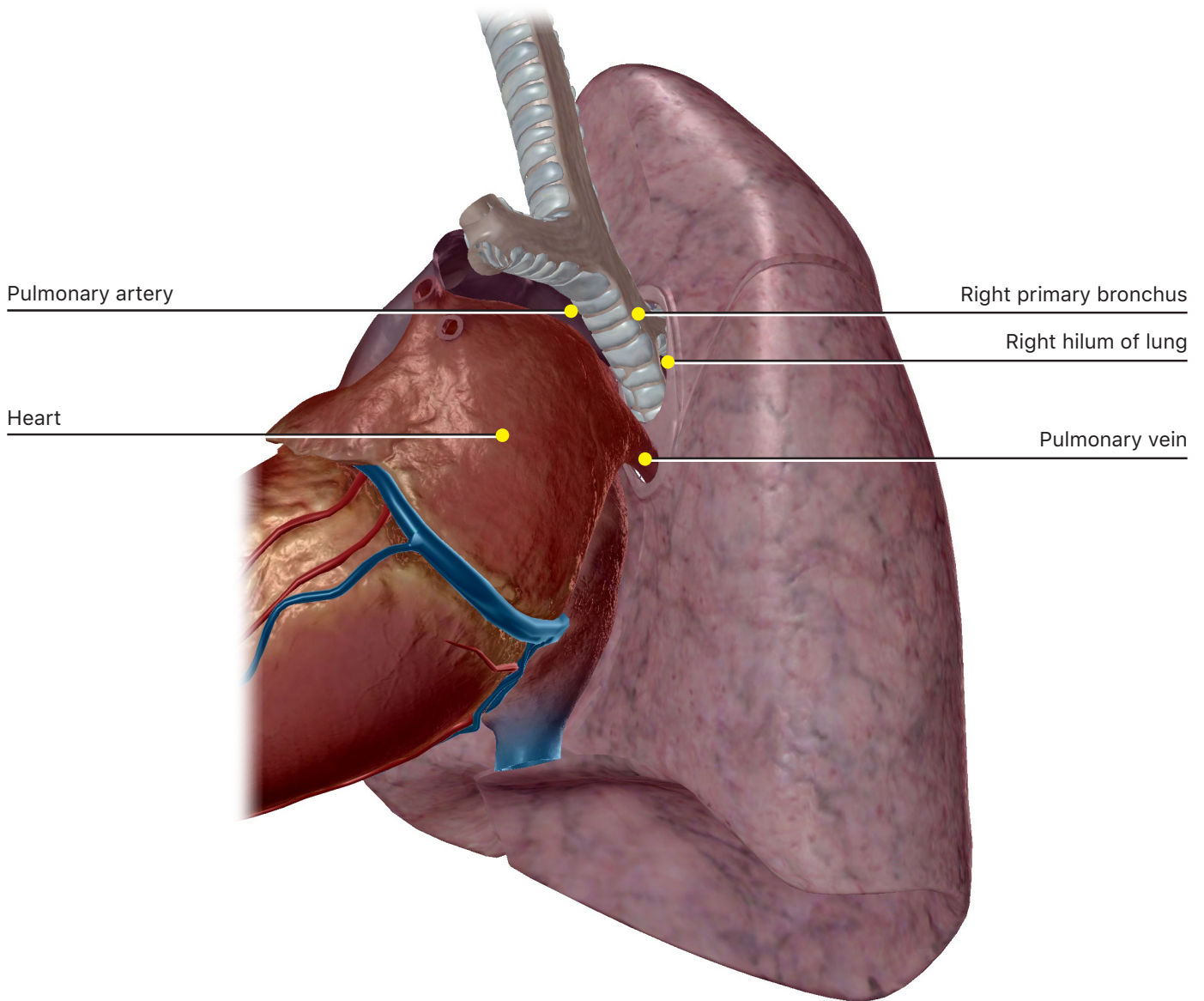
1. Describe two anatomical differences between the left and right **lungs**.
2. In the system tray on the left side of the screen, deselect the cardiovascular system icon to remove the heart and blood vessels from the view. Select the left lung. What is the name of the indentation in the left lung for the heart?

3. What are the lines you see on the surface of the lungs? Name them and the lobes they separate.

4. Rotate to a posterior view of the lungs. Look at the trachea and where it bifurcates into 2 branches. What are these branches called?

5. Looking at the left and right branches, consider this question. If you accidentally aspirated (inhaled) a foreign object, which lung do you think the object would be most likely to enter and why?

E. Open the Respiratory System View "Hilum."



1. Rotate the view as needed to find and select the **hilum**.

a. What are the 3 main structures that penetrate the hilum?

b. What other structures do you think pass through the hilum and into the lungs?

2. Click on any part of the lung and use the book icon to read about the lungs. Complete the following paragraph.

The _____ is a double layered, serous membrane surrounding the lungs. The space between the layers is filled with _____, which serves to reduce _____ against the chest wall.

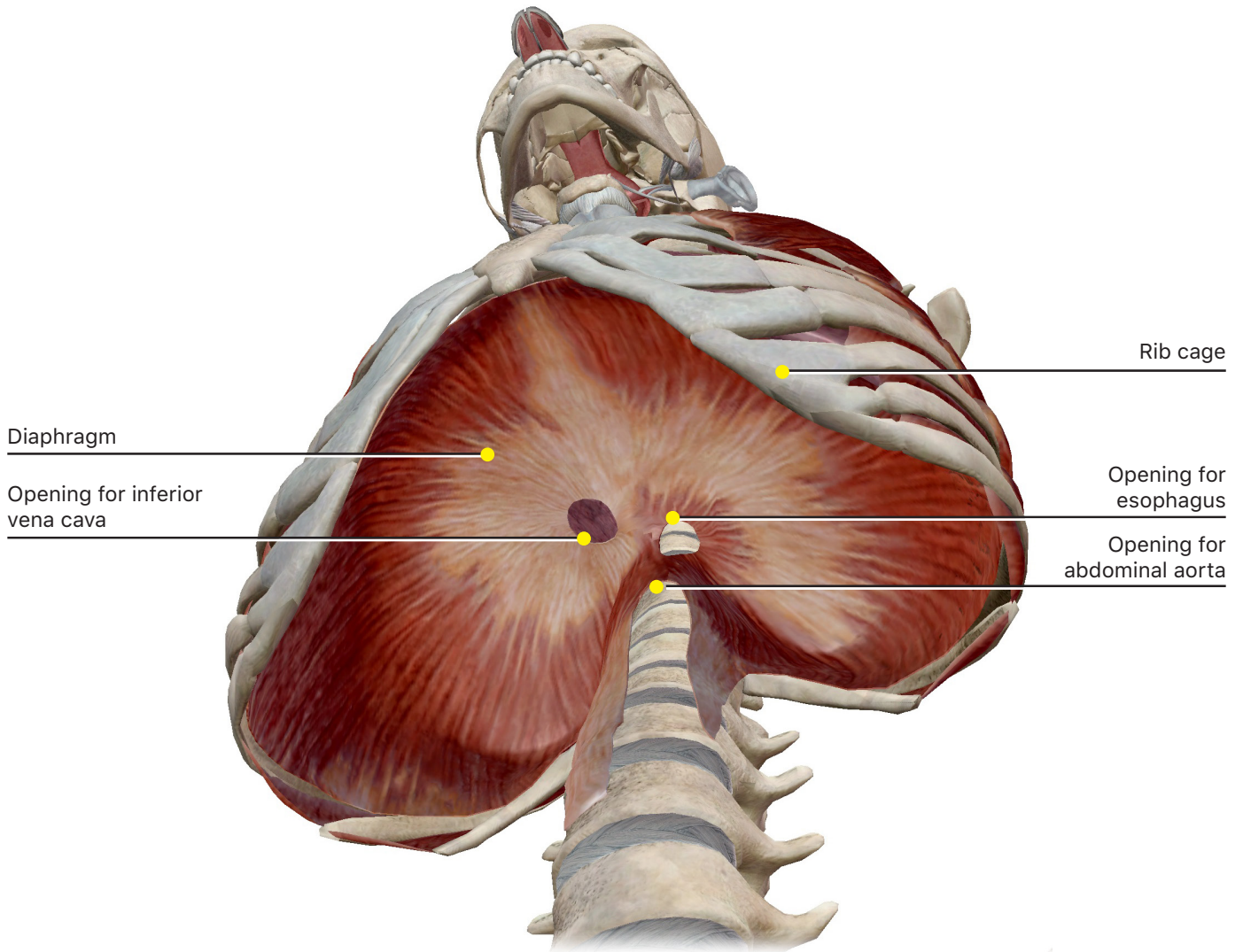
3. In the system tray on the left side of the screen, deselect the circulatory system icon to hide the heart and blood vessels from the view. Select and hide the right lung. Observe the bronchial tree. What differences do you notice between the **secondary (lobar)** and **tertiary (segmental) bronchi**?

TIME TO PRACTICE!

SEARCH FOR AND TAKE THE FOLLOWING RESPIRATORY SYSTEM QUIZZES:

TRACHEA AND BRONCHI AND LUNGS, EXTERIOR

F. Open the Respiratory System View "Inhalation Muscles."



1. Rotate to the inferior view and select the **diaphragm**. Observe its location and shape.

a. How many apertures (openings) do you see in the diaphragm?

b. What major structures pass through these openings?

2. With the diaphragm selected, use the book icon to read about it. Search for and select the Muscle Action "Ribs elevation." Observe the motion of the diaphragm.

- a. What happens to the dome-shaped diaphragm as it contracts? What happens to the rib cage?

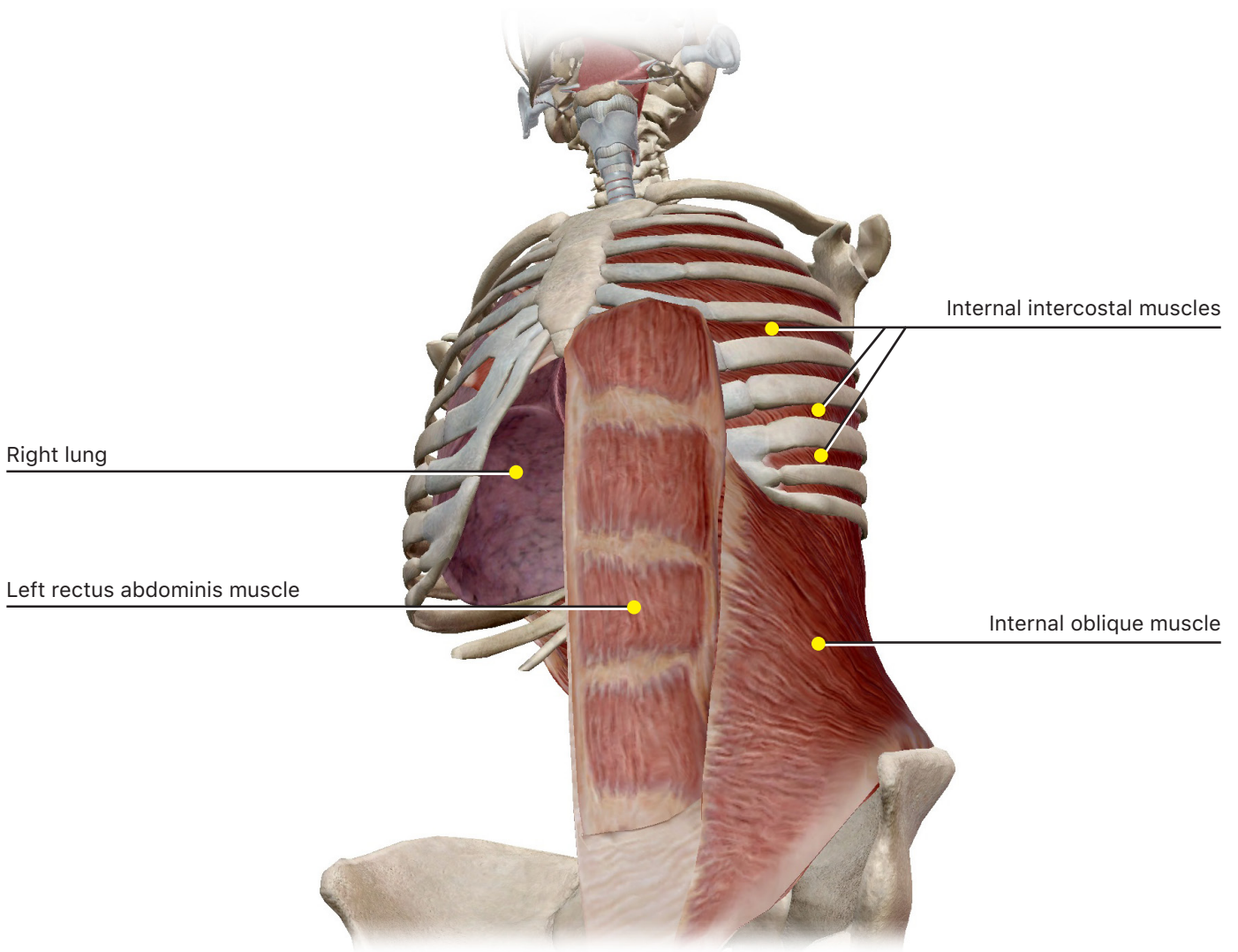
- b. What effect does diaphragm contraction have on the volume of the **thoracic cavity** and lungs?

- c. What do you think happens to the pressure inside the lungs due to this volume change?

- d. Do you think this will cause air to move into or out of the lungs?

- e. Name 5 other muscles that may contribute to elevation of the rib cage for inhalation.

G. Open the Respiratory System View "Exhalation Muscles."



1. Select the muscles located between the ribs. What are these muscles called?

2. Use the book icon to read about these muscles. Search for and select the Muscle Action "Ribs depression." Observe the motion of the muscles in this Muscle Action.

a. What effect does contraction of these muscles have on the rib cage?

b. What effect does contraction of these muscles have on the volume of the thoracic cavity and lungs?

c. What do you think happens to the pressure inside the lungs due to this volume change?

d. Do you think this will cause air to move into or out of the lungs?

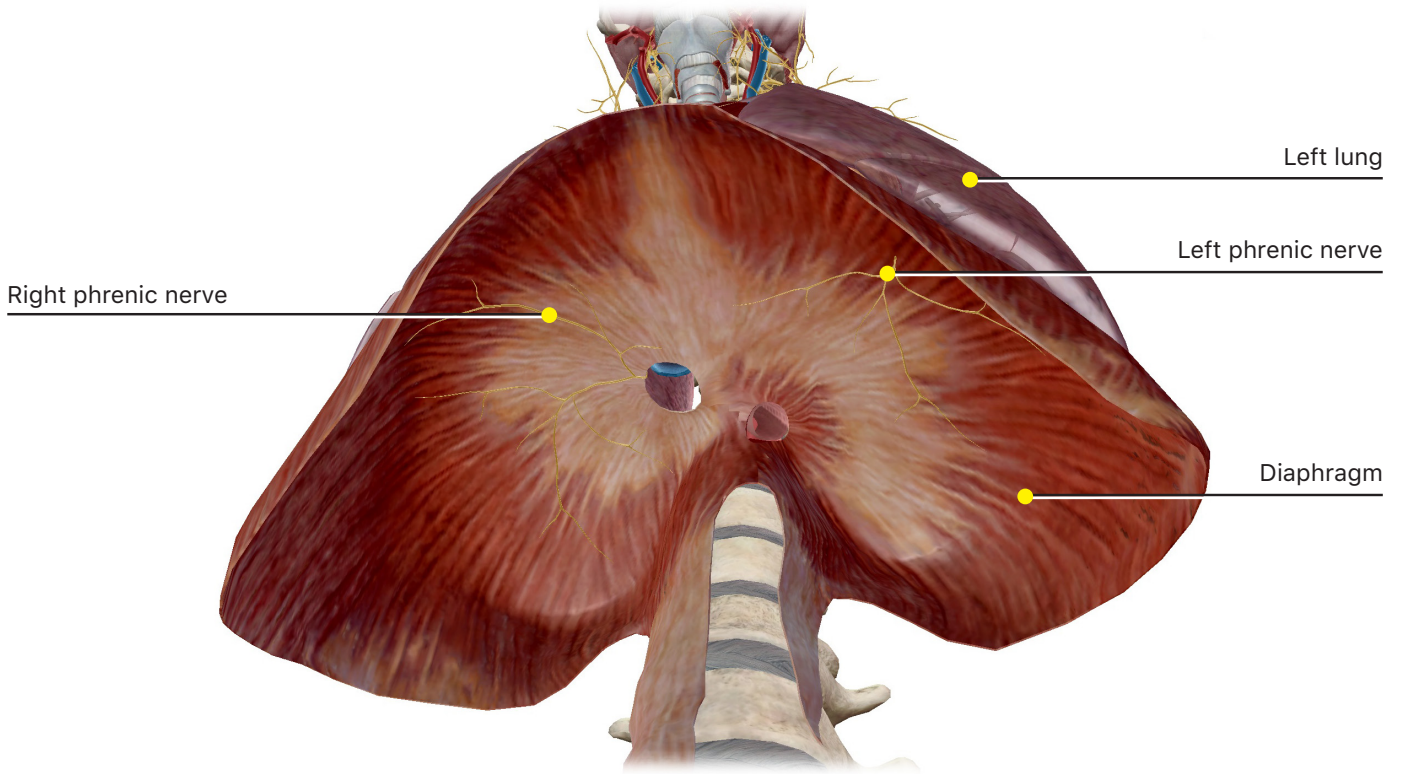
e. What other muscles do you see contributing to depression of the rib cage?

3. Open the Respiratory System View "Exhalation Muscles." Select the **internal oblique** muscle and use the book icon to read about it.

a. What effect does contraction of the abdominal muscles have on the abdominal viscera?

b. Do you think contraction of these muscles would aid in inhalation or exhalation? Explain your answer.

H. Open the Respiratory System View "Respiratory Innervation."

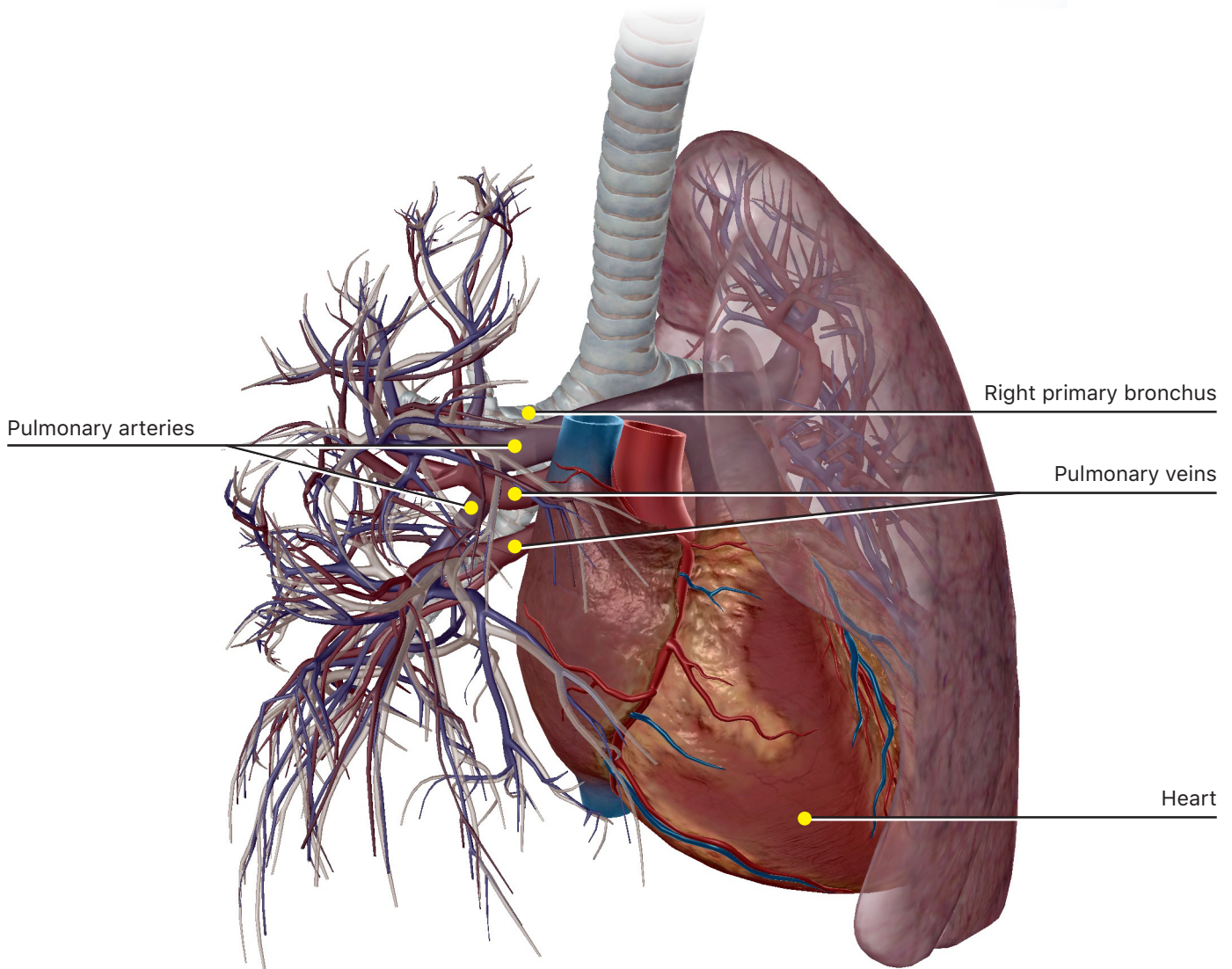


Rotate to the inferior view. Zoom in on the diaphragm and select the nerve branches visible on the inferior surface.

1. What is the name of this nerve?
2. With the nerve still selected, rotate and zoom the view to follow the nerve back to the spinal cord. What level(s) of the spinal cord is the origin of this nerve?
3. Explain how an injury to the neck might cause someone to require an artificial respirator to breathe?

TIME TO PRACTICE!
SEARCH FOR AND TAKE THE FOLLOWING RESPIRATORY SYSTEM QUIZZES:
OVERVIEW, RESPIRATORY AND LOWER RESPIRATORY

I. Open the Respiratory System View "Pulmonary Circulation."



Observe and explore the blood vessels of the pulmonary tree. Fill in the blanks in the following paragraph.

Normally, arteries are depicted in red and veins are depicted in blue. The pulmonary arteries are colored _____ because they contain _____ blood that flows to the lungs to pick up _____ and unload _____. The pulmonary arteries exit the heart from the _____ (chamber). The pulmonary veins are colored _____ because they carry freshly _____ blood back to the _____ (chamber) of the heart.

TIME TO PRACTICE!

**SEARCH FOR AND TAKE THE FOLLOWING RESPIRATORY SYSTEM QUIZZES:
OVERVIEW, RESPIRATORY AND LOWER RESPIRATORY**

PUTTING IT ALL TOGETHER

Open Visible Body Suite. Open the Respiratory System Views "Upper Respiratory" and "Location of Lungs." Use these views and the answers to the questions throughout this lab manual to summarize the flow of air through the respiratory system structures.

1. Air enters the upper respiratory system through the _____, which are the openings that lead into the nasal cavity. The air moves through passageways that are formed by the _____, which protrude into the cavity.
2. From the nasal cavity, air flows into the first part of the pharynx, which is the _____. Then, it flows through the other 2 parts of the pharynx, which are called the _____ and _____.
3. Air then makes its way into the _____. This structure includes 9 laryngeal cartilages that _____. The largest of these cartilages is the _____. Another significant part of the larynx, the _____, covers the opening to the trachea during swallowing to prevent food from accidentally entering the respiratory tract. This structure is composed of _____.
4. Then air moves into the first part of the lower respiratory system, the _____, which has rings composed of _____. This structure branches into 2 _____, 1 for each lung.
5. Air flows through the bronchi, which get _____ as you move from primary to secondary to tertiary, eventually terminating in _____, which are tiny air sacs where gas exchange occurs.
6. Air flows from the bronchi into the lungs medially through the _____. The _____ lung has 3 lobes, whereas the _____ lung has 2. There are grooves on the surface of the lungs, called _____, which separate the lungs into lobes. The _____ lung is slightly larger than the _____ lung due to its position in relation to the heart.

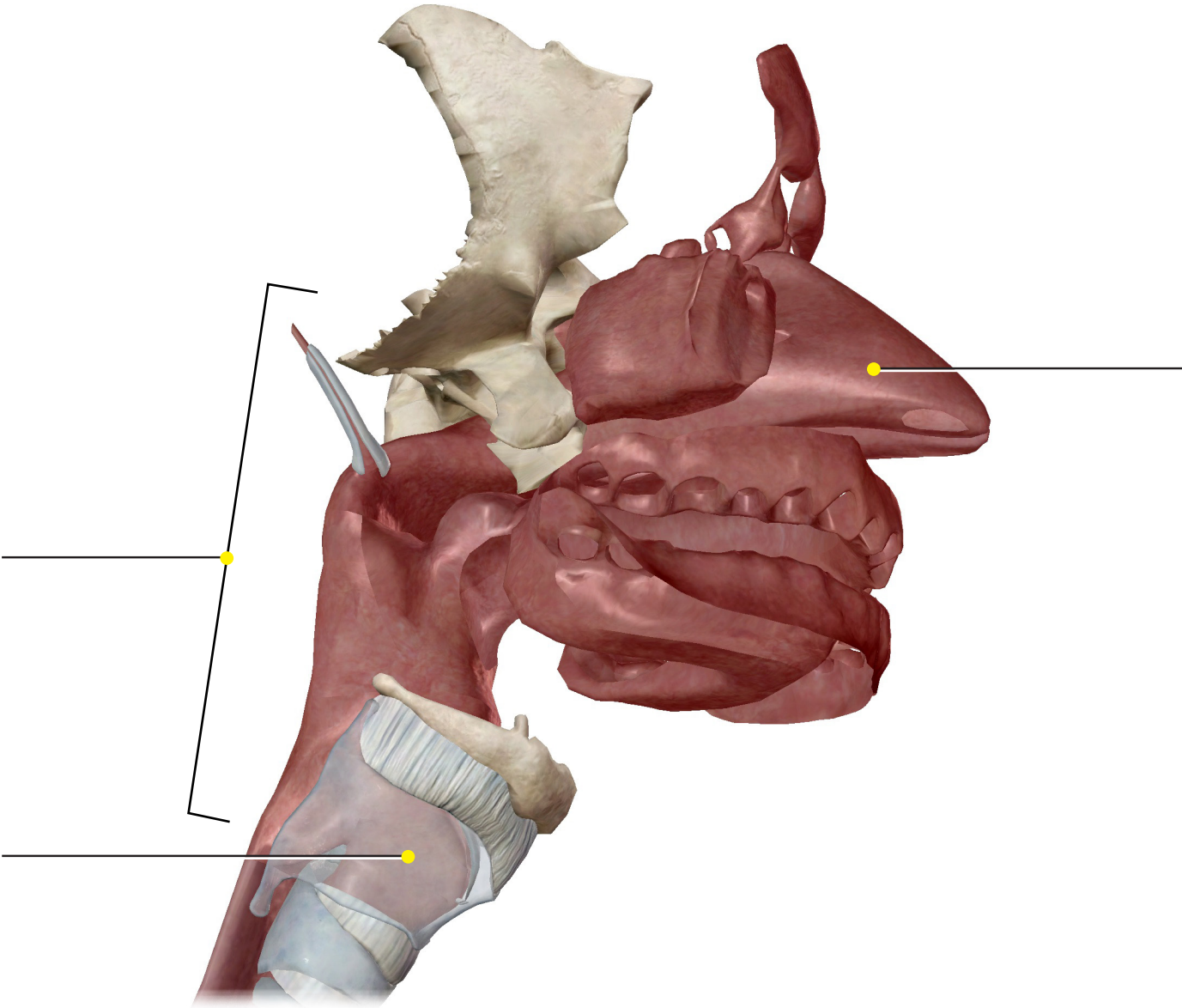


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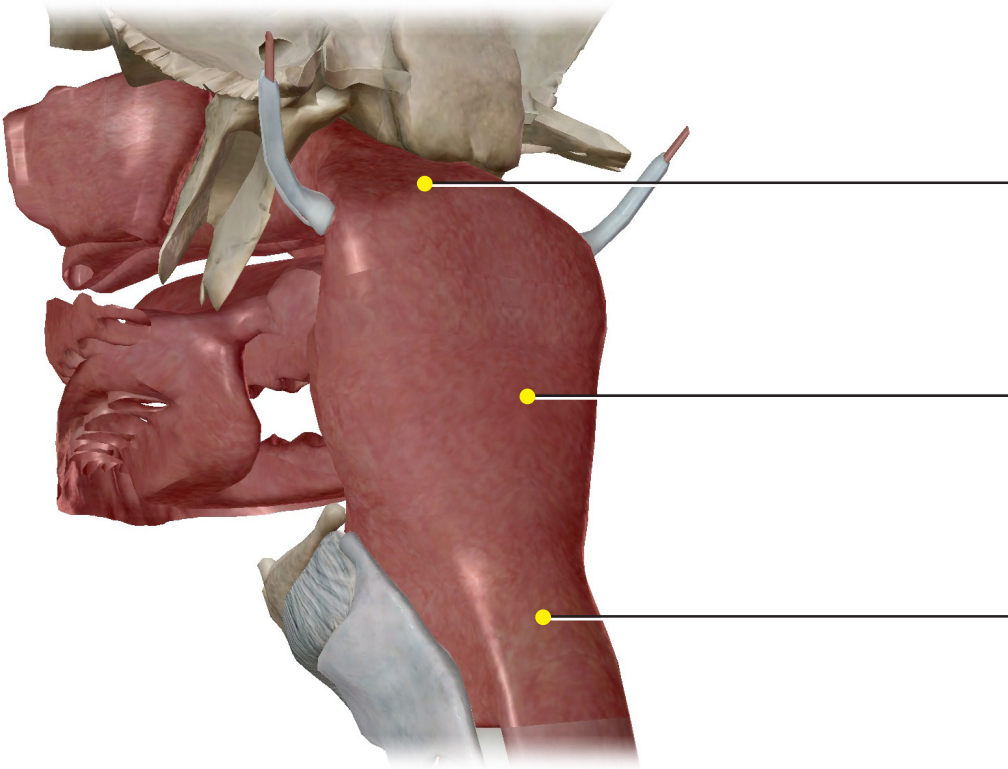
Student Practice

Label the structures in the following figures.

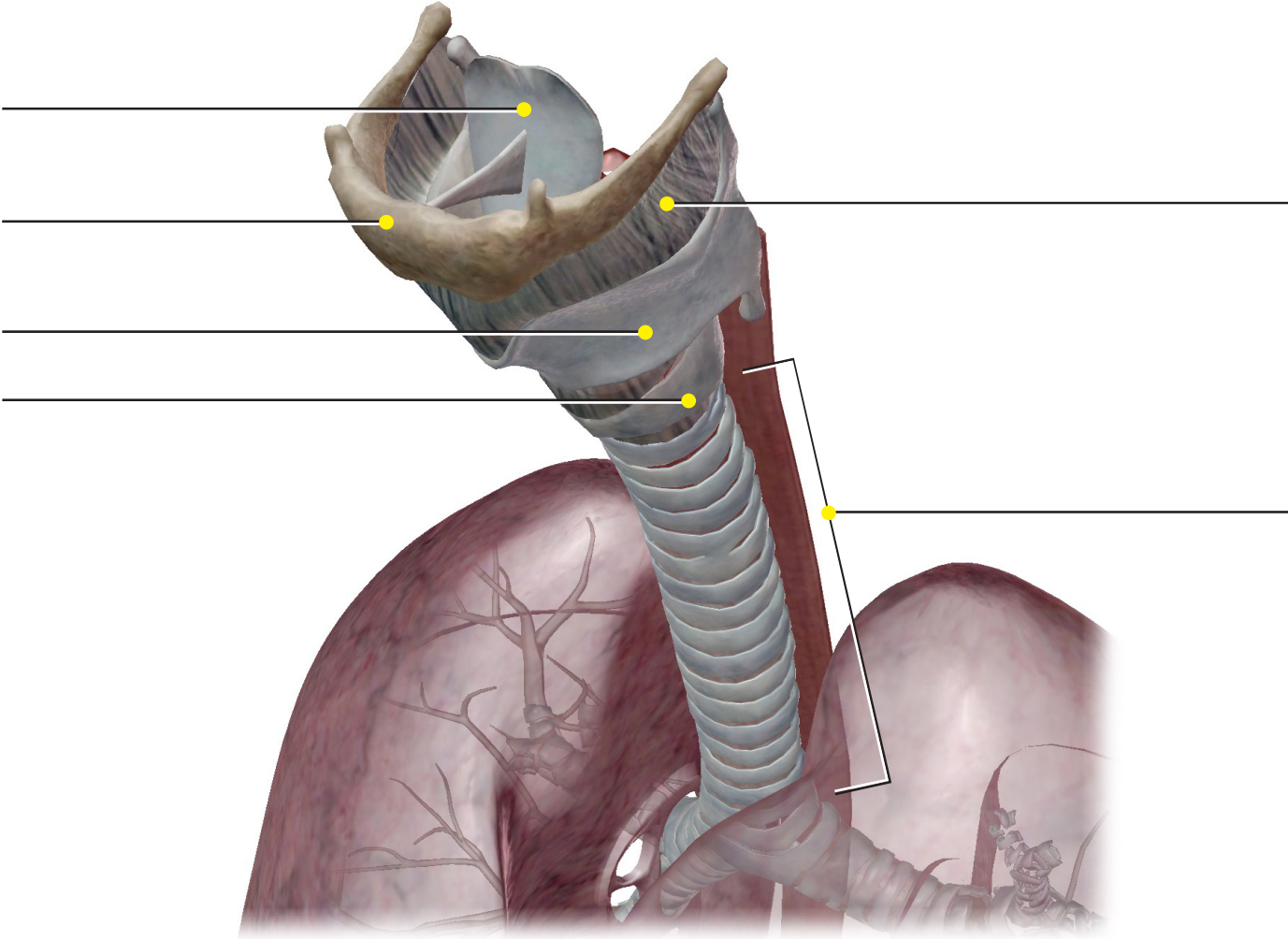
Source: Respiratory System View "Upper Respiratory System" (I)



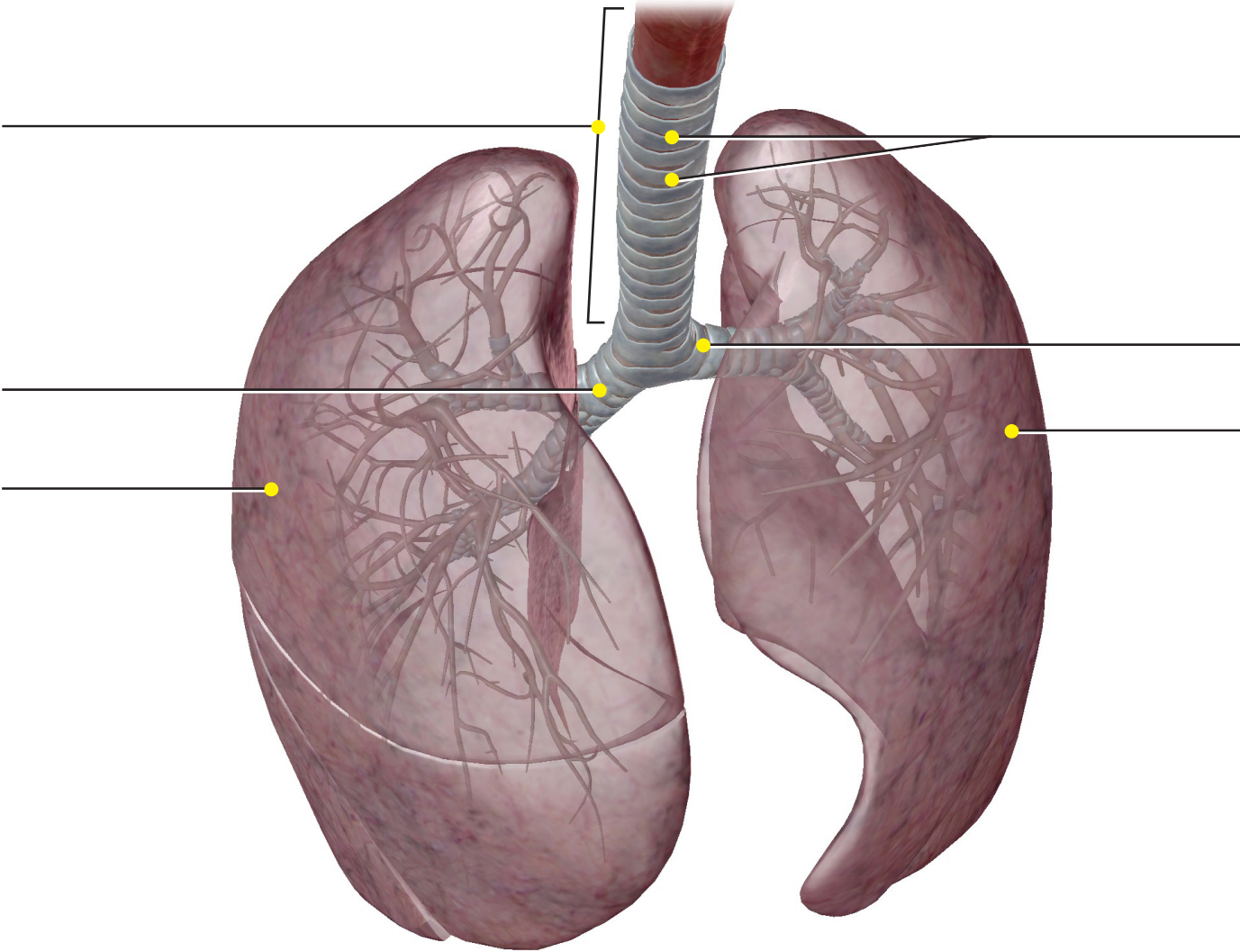
Source: Respiratory System View "Upper Respiratory System" (II)



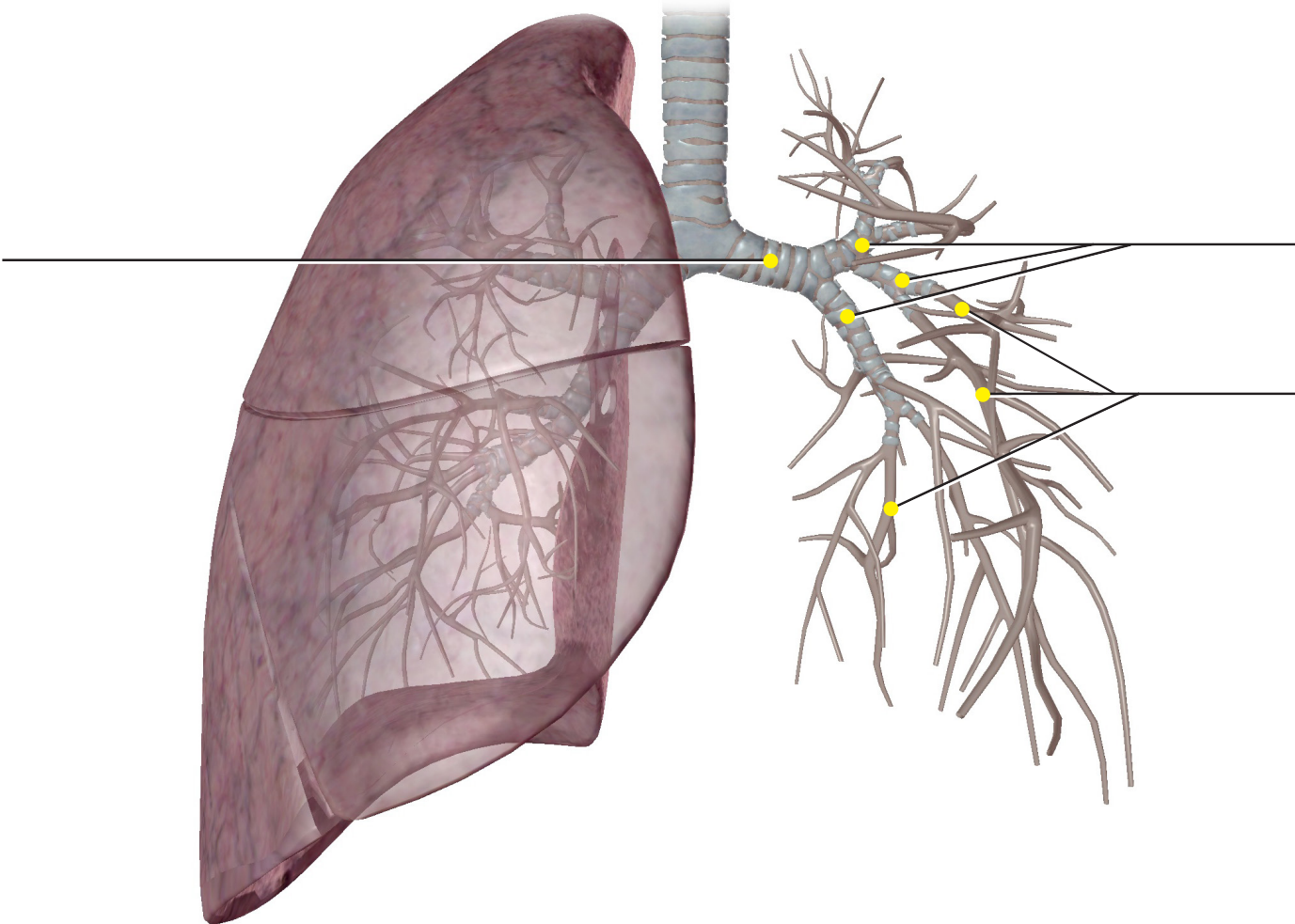
Source: Respiratory System View "Upper Respiratory System" (III)



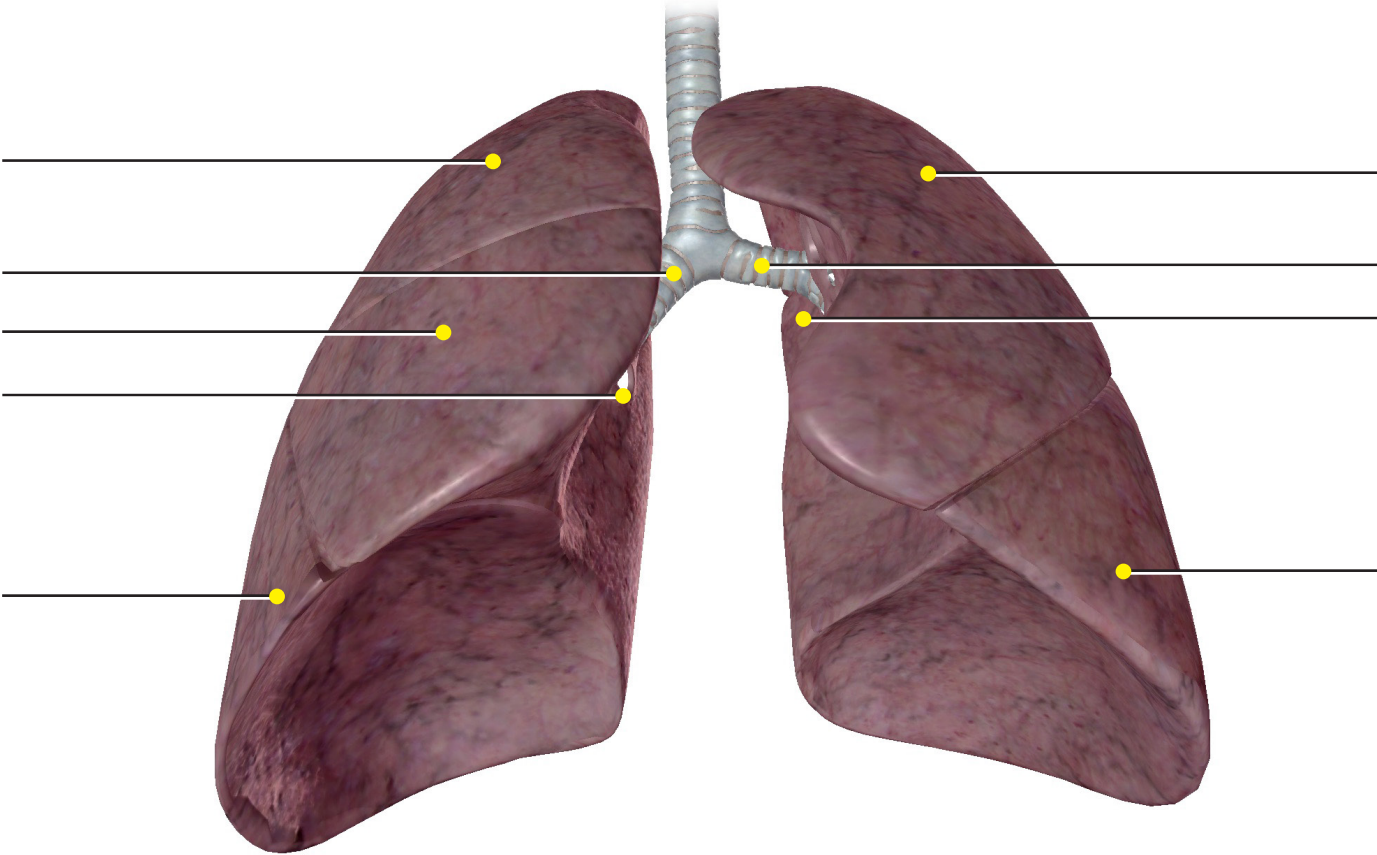
Source: Respiratory System View "Location of Lungs" (I)



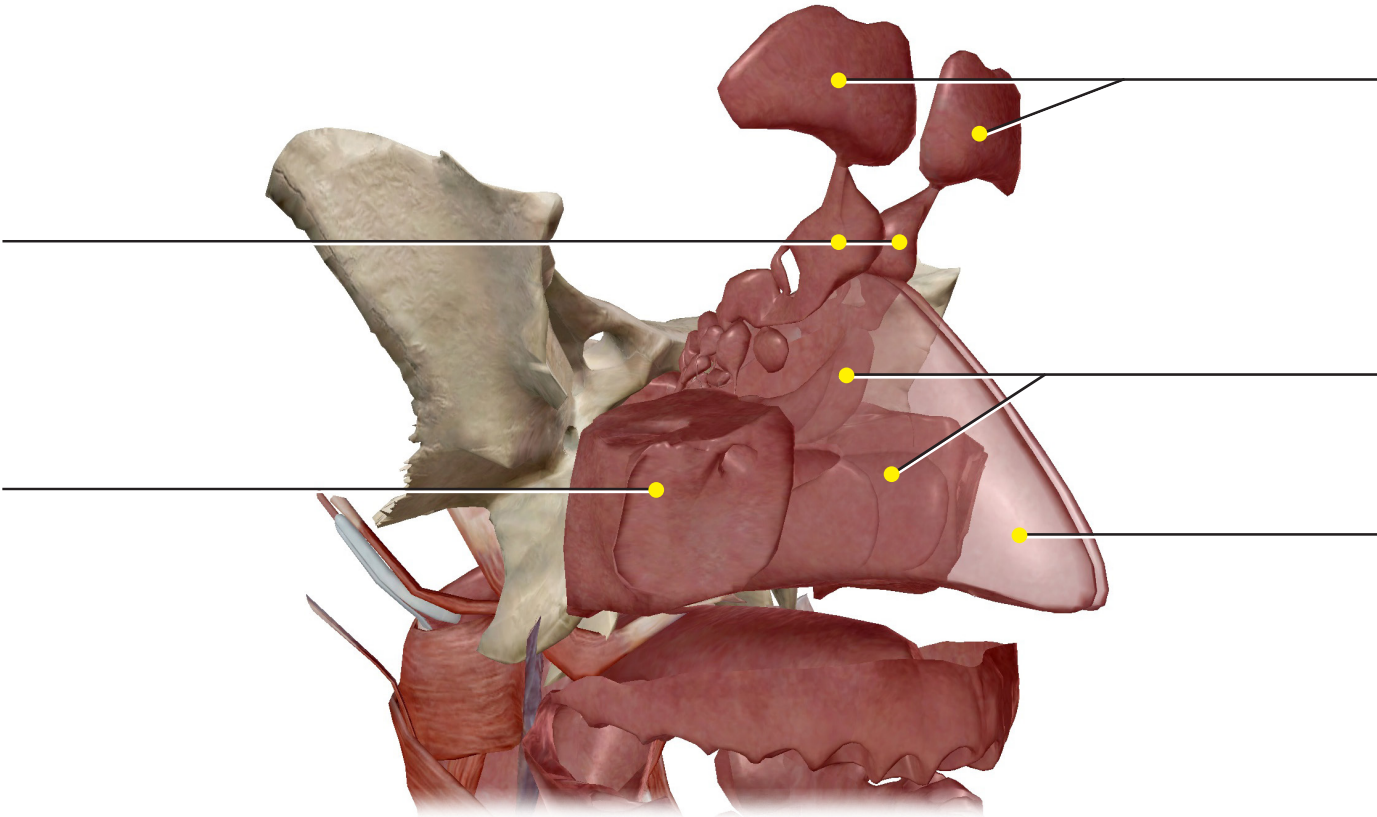
Source: Respiratory System View "Location of Lungs" (II)



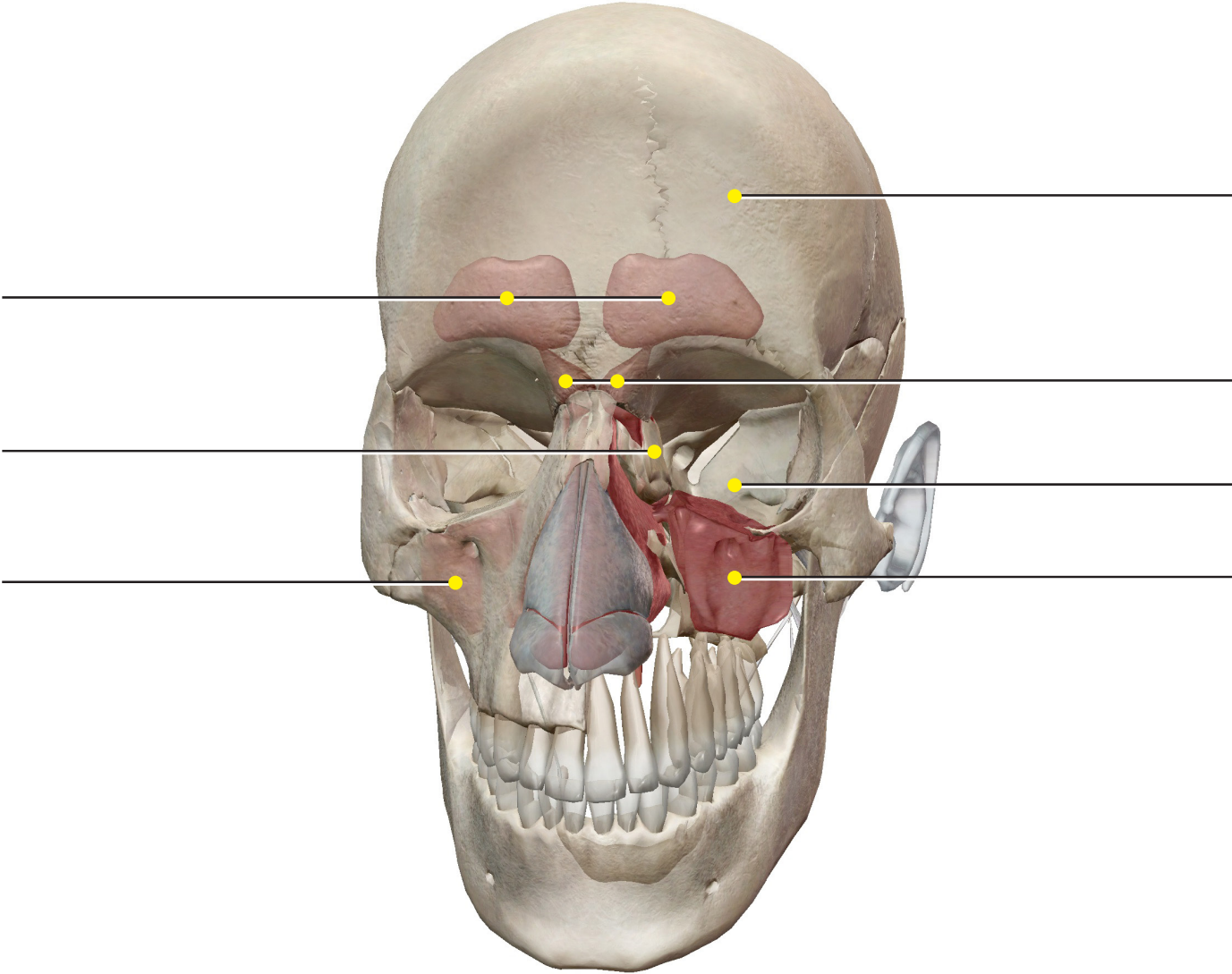
Source: Respiratory System View "Location of Lungs" (III)



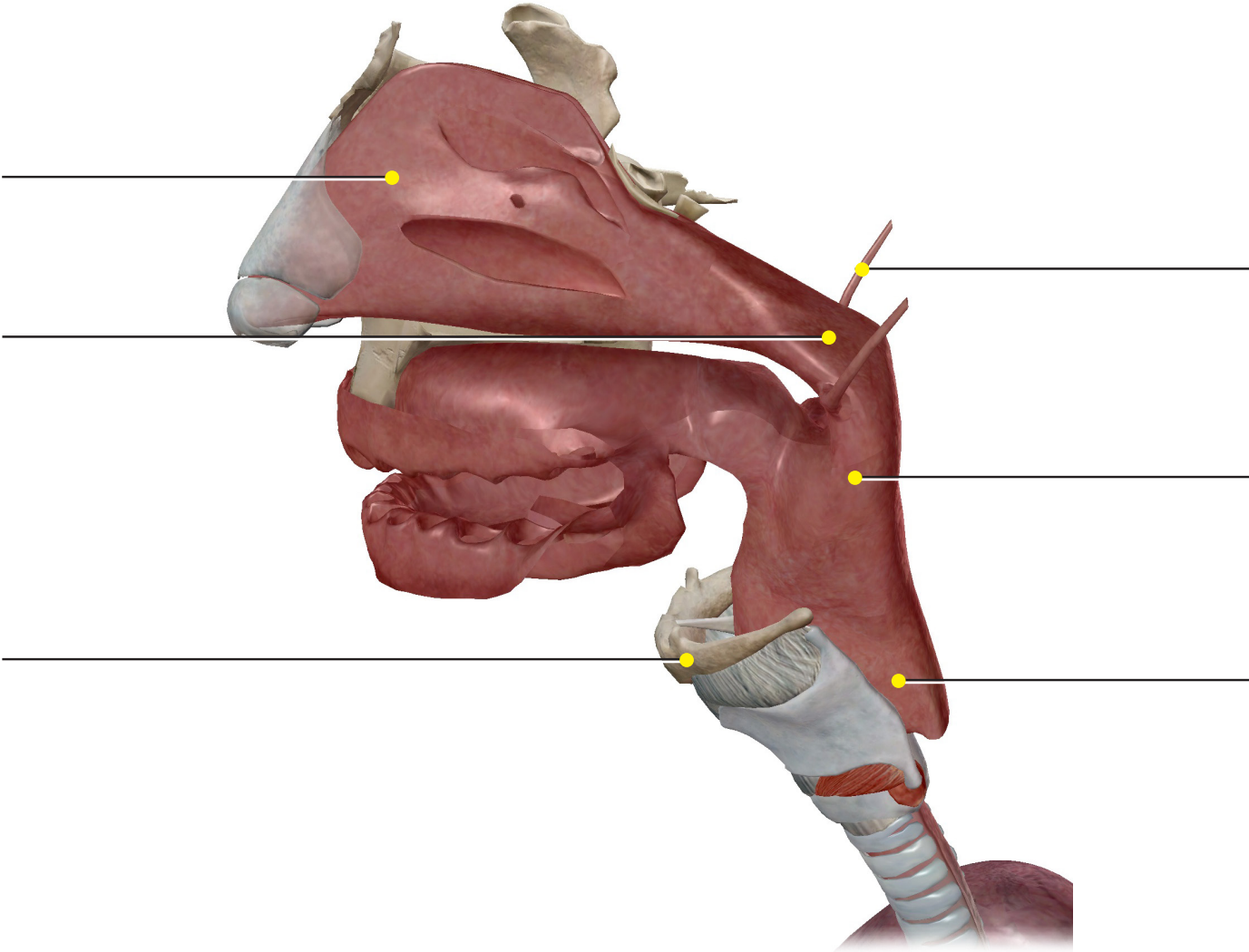
Source: Respiratory System View "Upper Respiratory System"



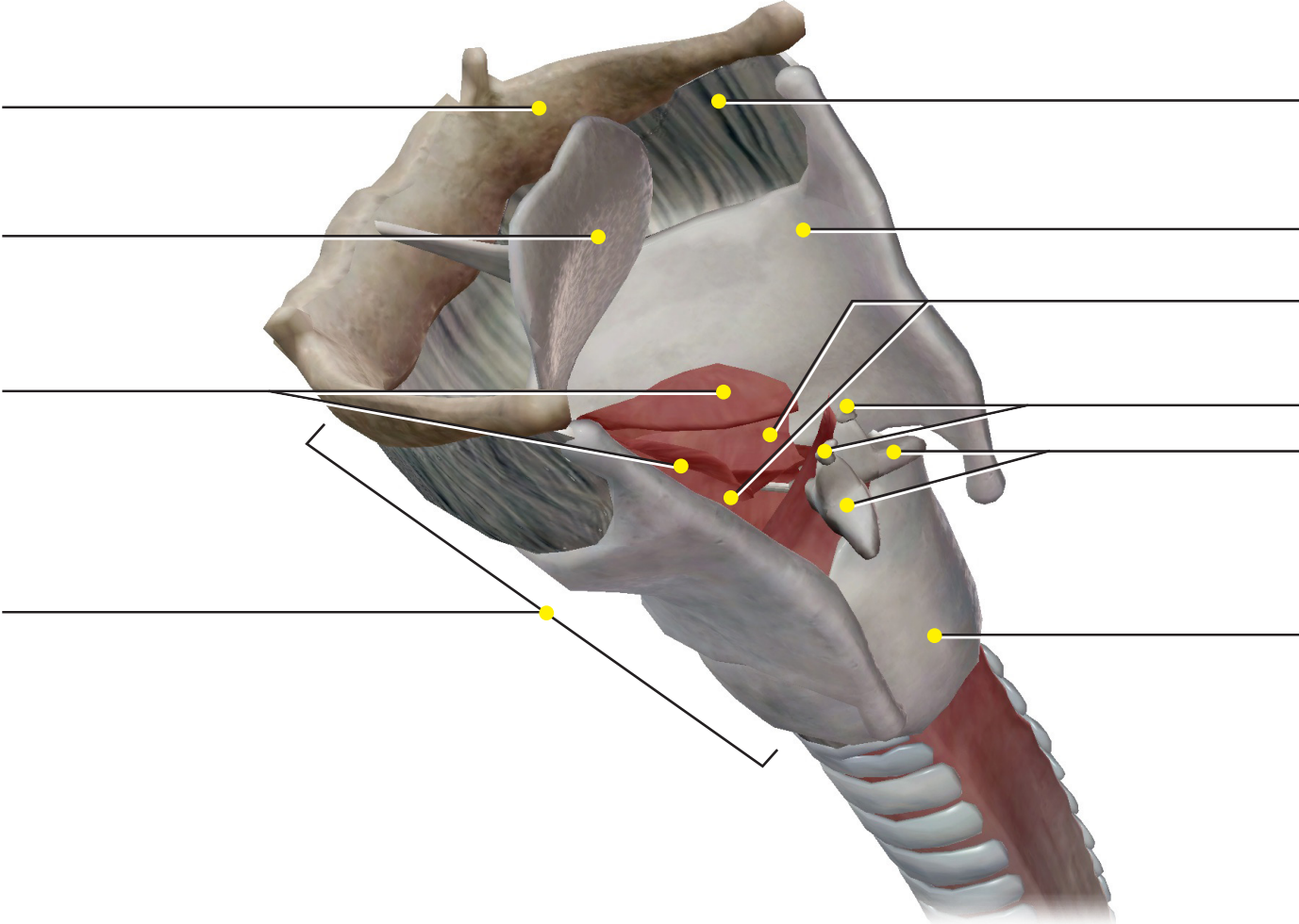
Source: Respiratory System View "Upper Respiratory System"



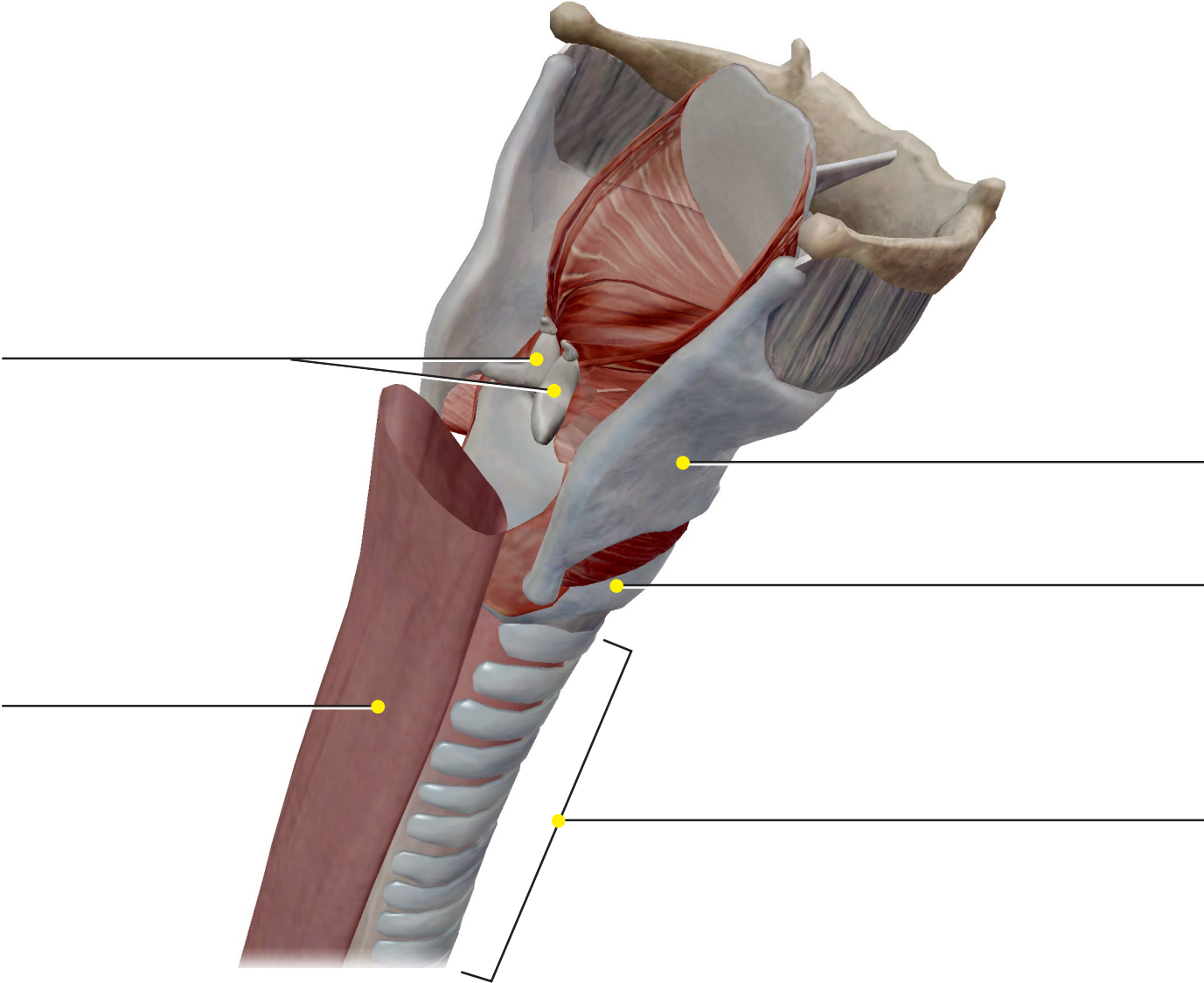
Source: Respiratory System View "Nasal Cavity"



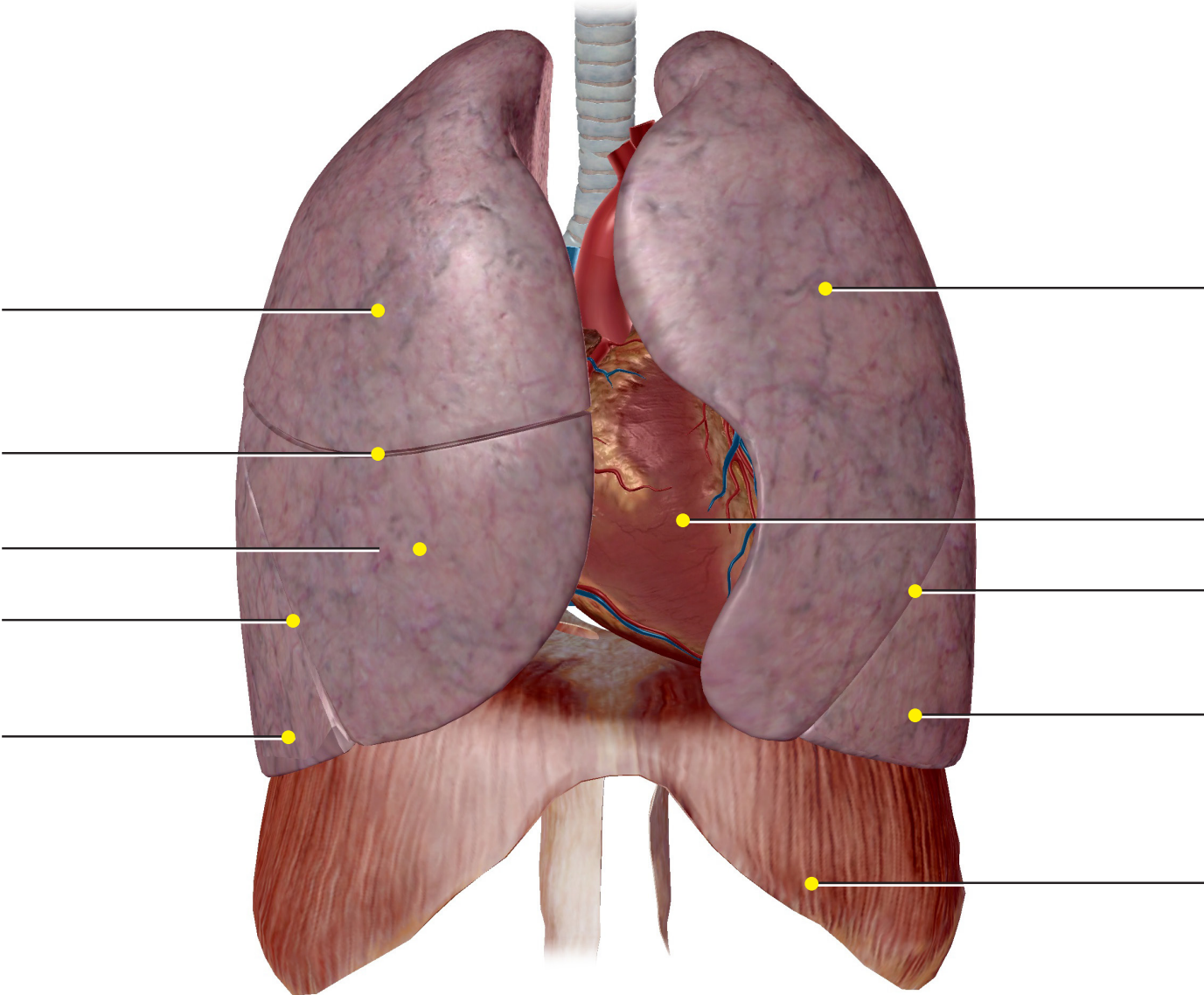
Source: Respiratory System View "Laryngeal Muscles"



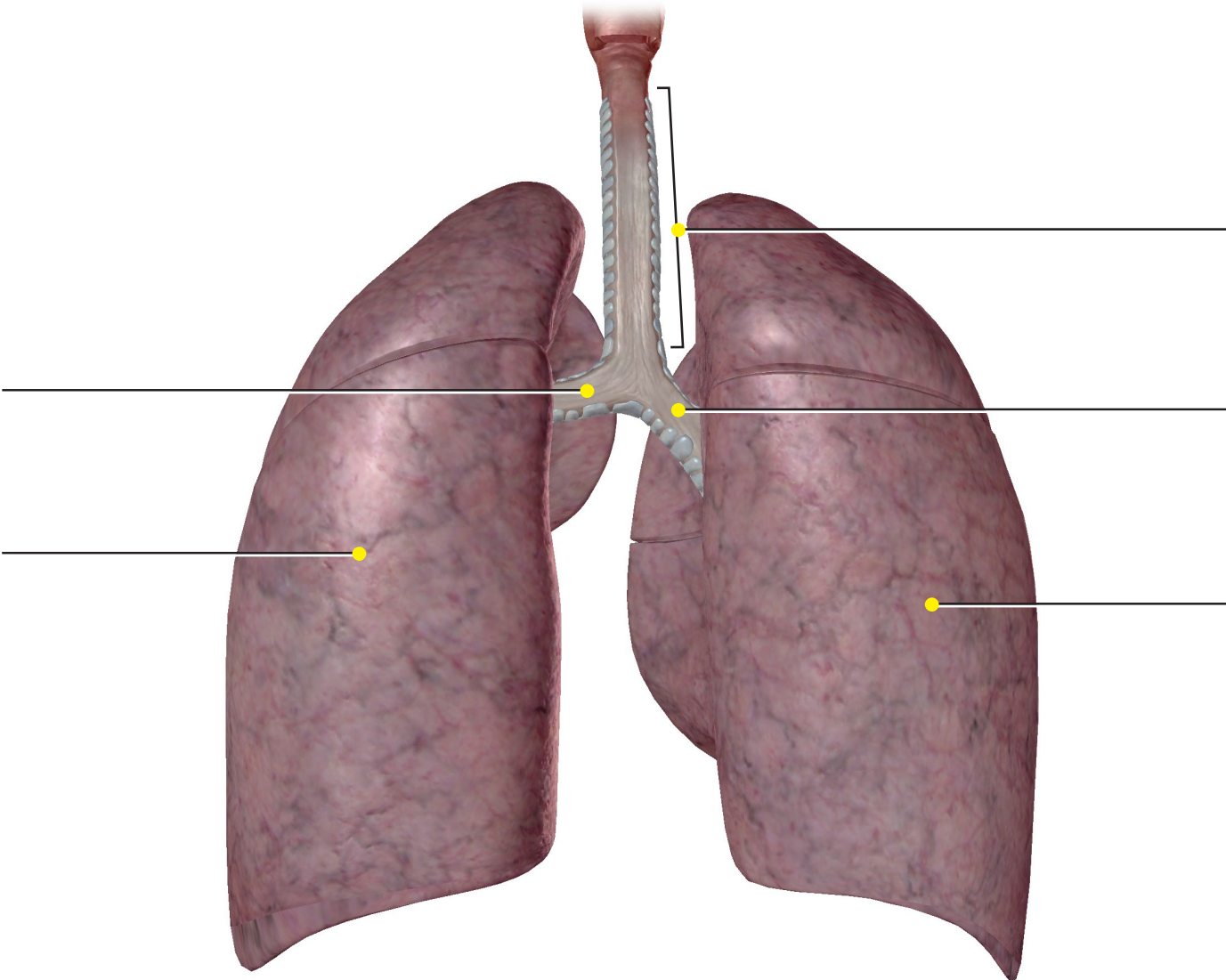
Source: Respiratory System View "Laryngeal Muscles"



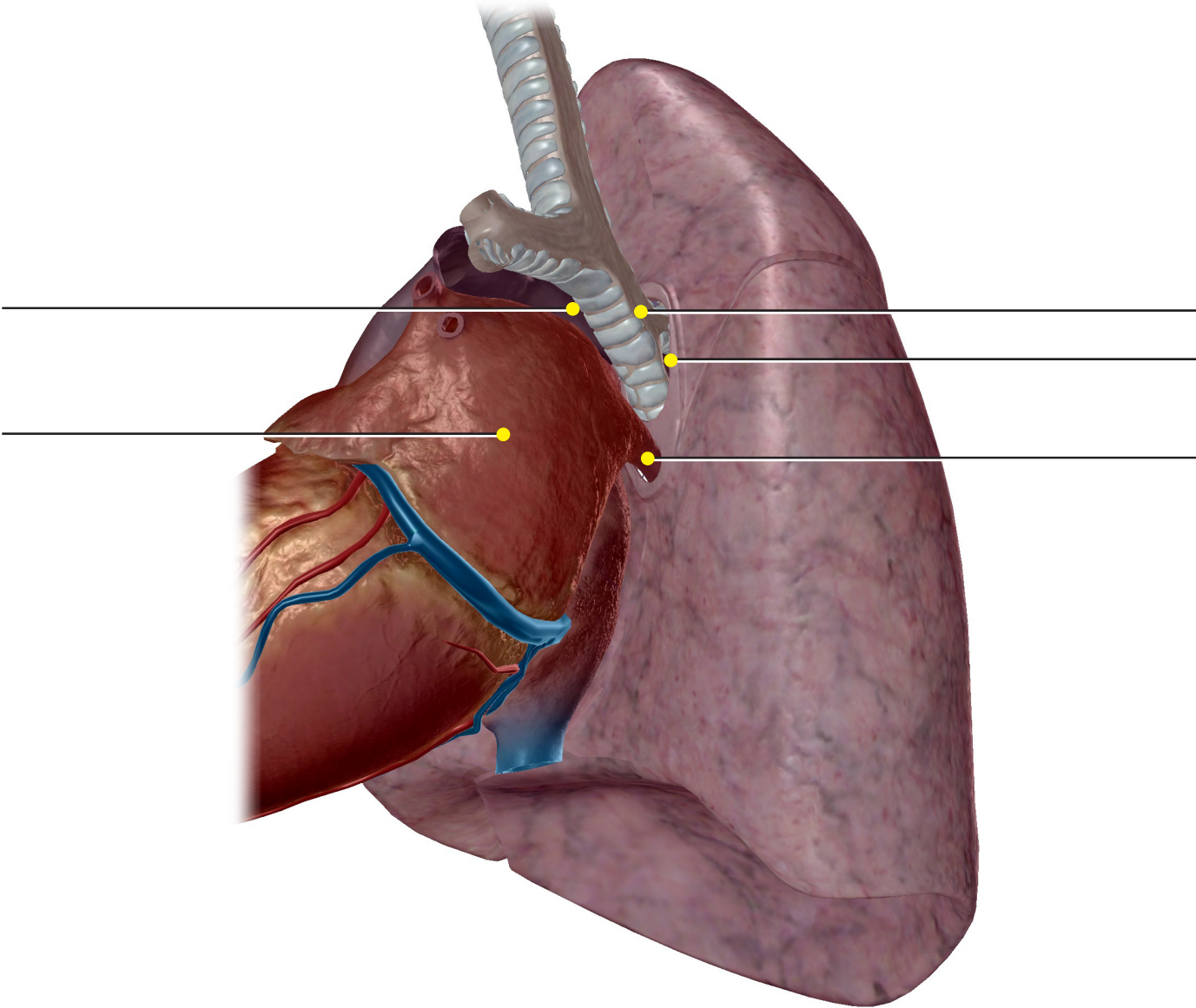
Source: Respiratory System View "Location of Lungs" (I)



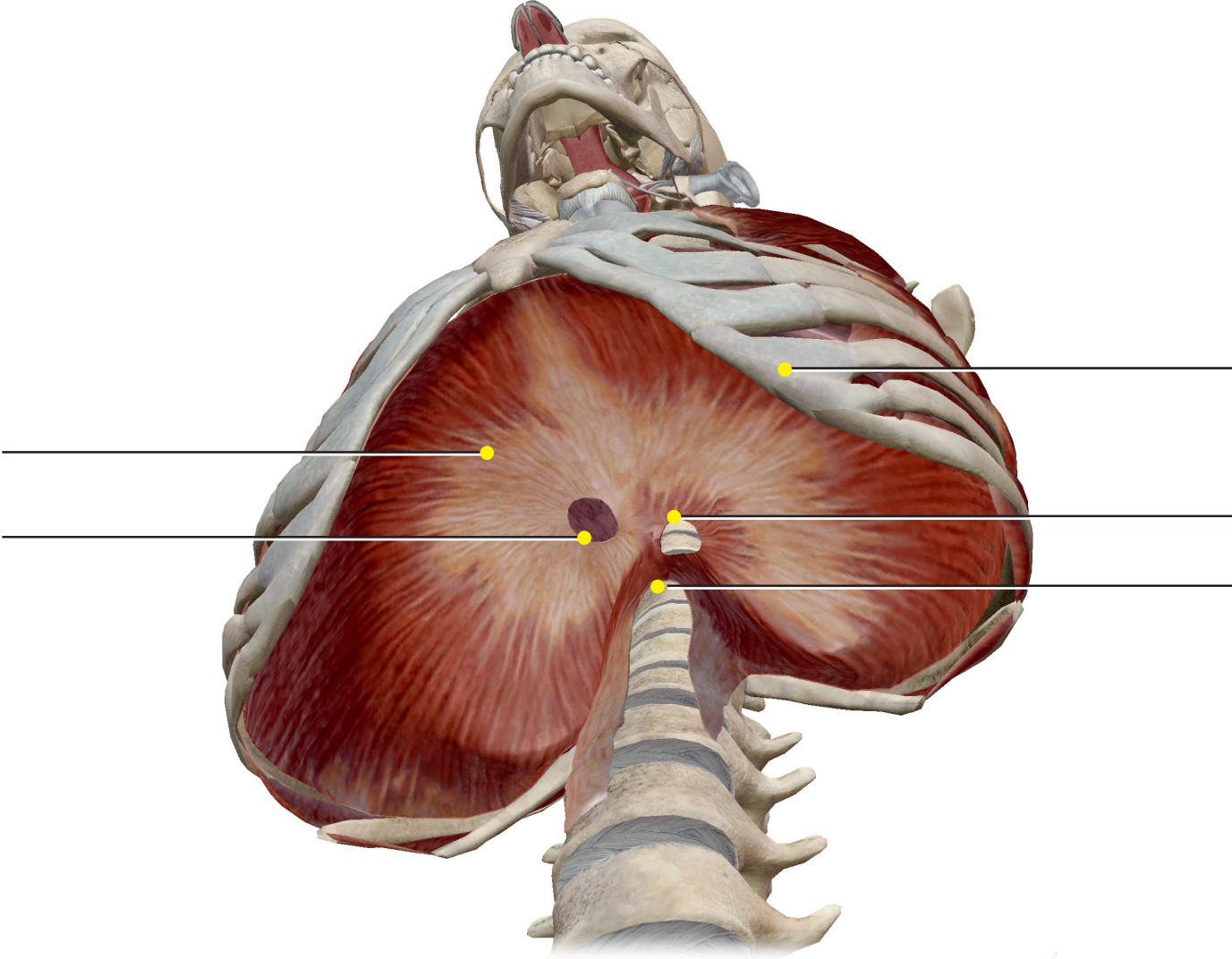
Source: Respiratory System View "Location of Lungs" (II)



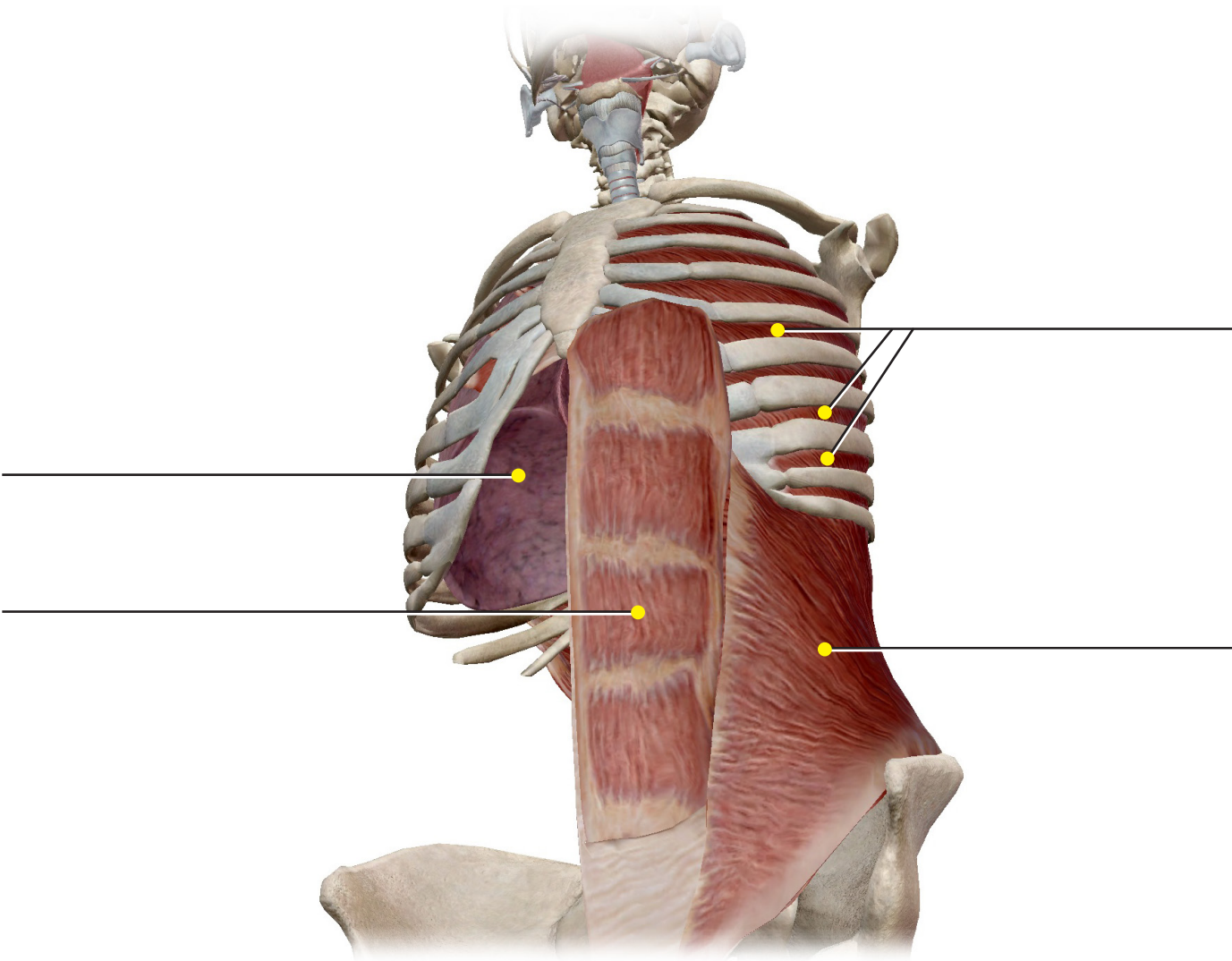
Source: Respiratory System View "Hilum"



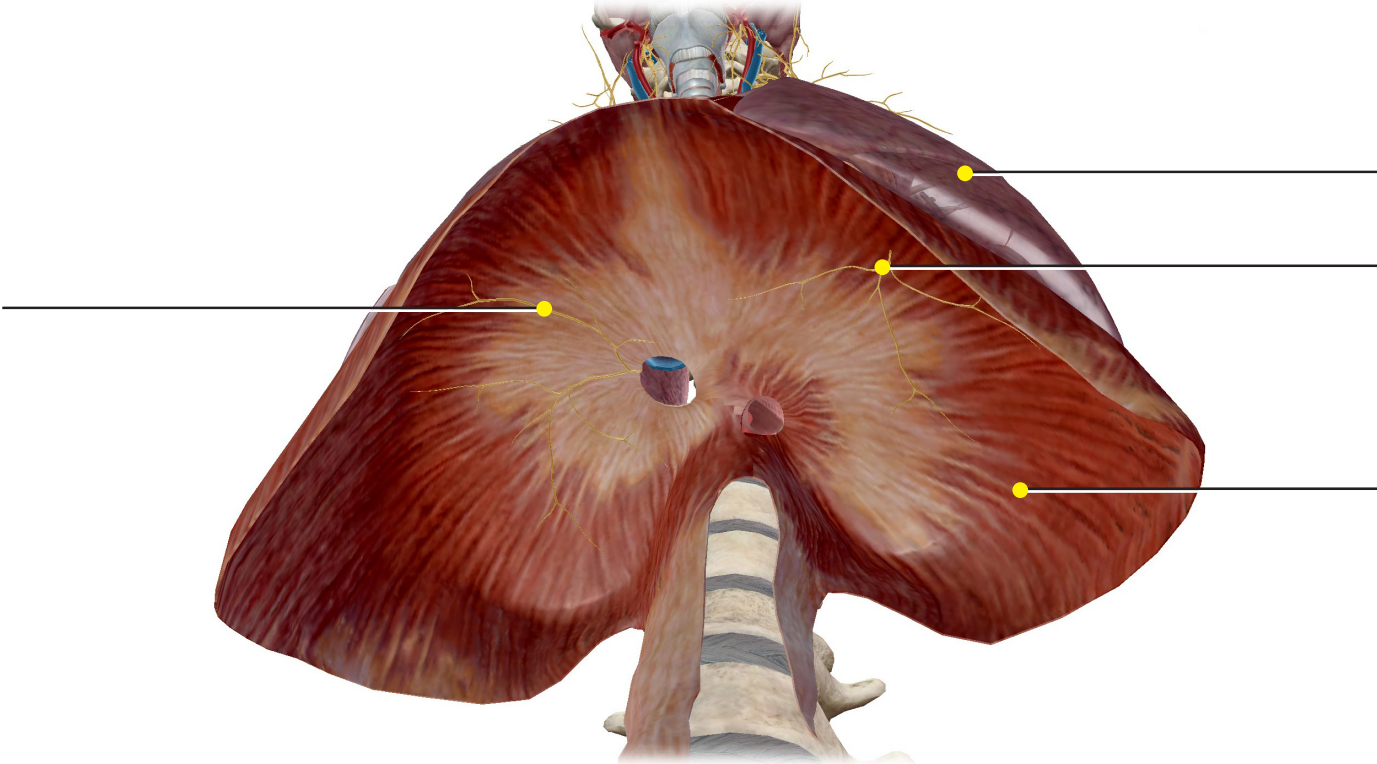
Source: Respiratory System View "Inhalation Muscles"



Source: Respiratory System View "Exhalation Muscles"



Source: Respiratory System View "Respiratory Innervation"



Source: Respiratory System View "Pulmonary Circulation"

