



Chapter 9-19: The Respiratory System

The respiratory system consists of passageways that filter incoming air as it enters the lungs. Here, in microscopic air sacs, gas exchange takes place between the external, atmospheric air and the body environment; the next plate explores these exchanges. Some of the structures we'll see in this plate have already been encountered in previous plates.

Certain structures are designated with lowercase letters because they are associated with other systems. The uppercase letters are reserved for parts of the respiratory system.

On entering the body, air passes through the first structure of the upper system; the **nasal passage (A)**. A light color should be used for this passageway. Within the nasal passage, outcroppings of bone from the lateral wall divide the main passageway into smaller ones. These outcroppings are called **nasal conchae (A₁)**. Air circulates around these ridges and becomes warm and moist before entering the lungs.

The upper respiratory system also contains a number of air-filled spaces between several of the bones of the skull, called sinuses. The diagram shows the **frontal sinus (B₁)** and the **sphenoid sinus (B₂)**; air is warmed and moistened in these spaces. Cilia and mucus along the walls of the sinuses also trap foreign microorganisms and debris in the air.

In this section of the head, we also see features of the digestive system. The **tongue (a)** is the large muscle that fills most of the space of the oral cavity. It assists in the mechanical digestion of food. The oral cavity leads to a major passageway called the **pharynx (C)**, which serves both the respiratory and digestive systems. The **esophagus (b)** leads from the pharynx to the stomach.

As we study the neck area we encounter several passageways that lead to the lungs; notice how these passageways look like an inverted tree. Pale colors should be used for these structures to avoid obscuring their details.

Below the pharynx, we encounter the **larynx (D)**, which is the first portion of the passageway that leads to the lungs. The bracket outlining this structure should be colored boldly, and a pale color should be used for the structure itself. The flap-like epiglottis guards the entry to the larynx, and several plates of cartilage make up the walls of the larynx.

Continuous with the larynx is the windpipe, also known as the **trachea (E)**. The rings of the trachea are made up of cartilage, and you may use a dark color to highlight them.

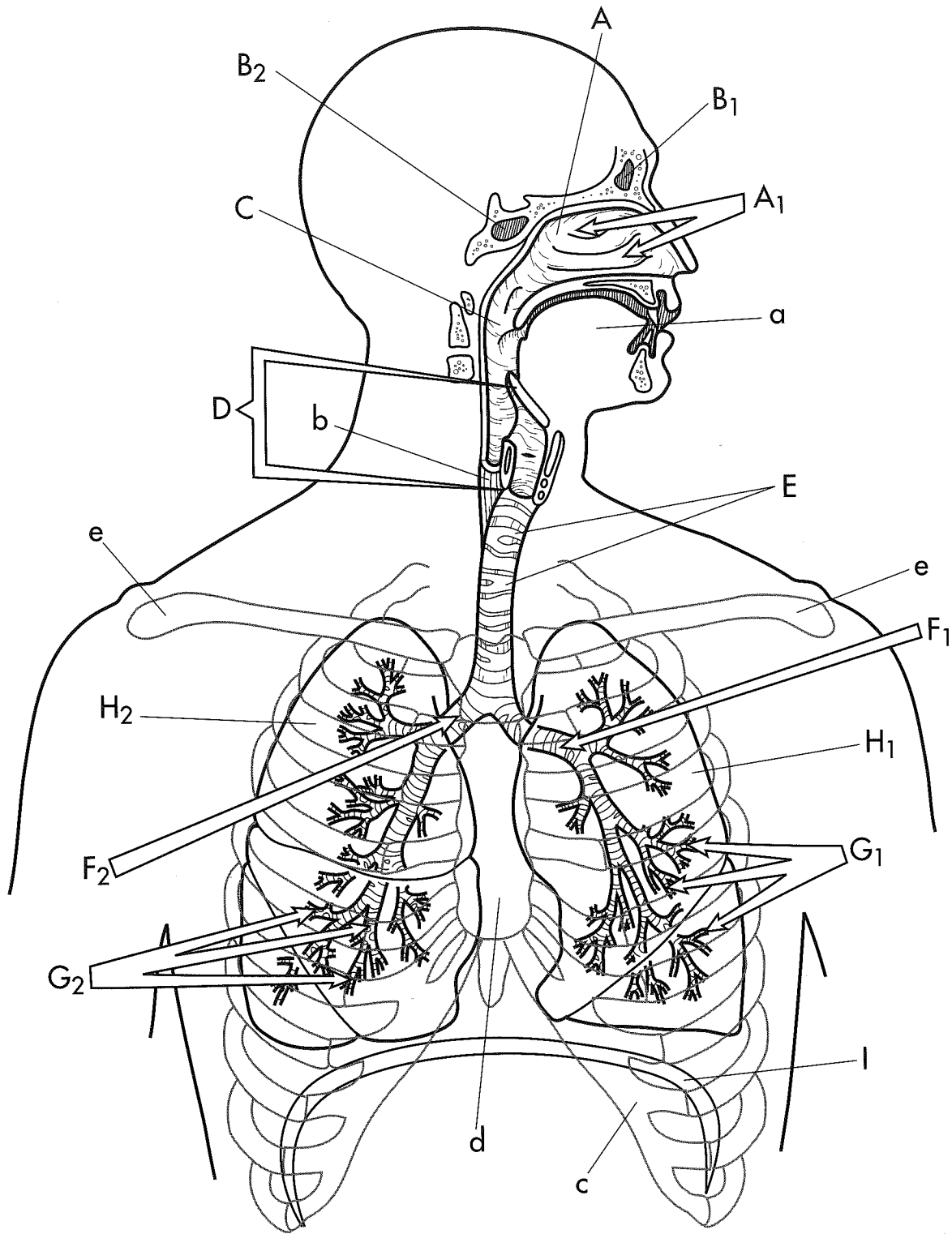
The trachea extends in front of the esophagus into the thoracic cavity, then splits to form two passageways called bronchi. On the visual right (the anatomical left) is the **left bronchus (F₁)**, and at your visual left (the anatomical right) is the **right bronchus (F₂)**. The color that was used for the trachea should be used here to show the continuity of the tube, and the arrows should be colored in a bold color such as a blue or purple.

Each bronchus continues as a bronchial tree. The **left bronchial tree (G₁)** and the **right bronchial tree (G₂)** are designated with arrows that may be colored boldly, but the tubes themselves should be colored with a light color. Cartilage rings hold the tubes open through most of their length, and the tubes themselves are composed of smooth muscle. The right and left bronchial trees lead to the smaller alveolar ducts, then to the air sacs of the lungs.

The main area of gas exchange in the body is the lungs. The lungs should be shaded with a very light color in the plate. We also show some of the bones that surround the lungs, which should be highlighted in light colors.

The **left lung (H₁)** and the **right lung (H₂)** occupy most of the space of the thoracic cavity. The lungs are soft and spongy and cone-shaped. They are separated from each other by the heart and a central area of the thorax called the mediastinum.

The expansion of the lungs depends heavily on the activity of the large dome-shaped muscle known as the **diaphragm (I)**. When this muscle contracts, air enters the lungs, as the next plate explains. Enclosing the lungs are the bones of the thoracic cage; these bones protect the lungs and provide support for the thoracic cavity. These include the **ribs (c)**, the **sternum (d)**, and the **clavicles (e)**. We suggest you outline the margins of these bones to show their proximity to the lungs. The muscles associated with the ribs are an essential factor in breathing, as the next plate demonstrates.



The Respiratory System

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|-------------------------------------|---|---------------------------------|
| ○ Nasal Passage.....A | ○ Left BronchusF ₁ | ○ Right Lung.....H ₂ |
| ○ Nasal ConchaeA ₁ | ○ Right Bronchus.....F ₂ | ○ Diaphragm.....I |
| ○ Frontal SinusB ₁ | ○ Left Bronchial Tree.....G ₁ | ○ Tonguea |
| ○ Sphenoid Sinus.....B ₂ | ○ Right Bronchial Tree.....G ₂ | ○ Esophagus.....b |
| ○ Pharynx.....C | ○ Left LungH ₁ | ○ Ribsc |
| ○ LarynxD | | ○ Sternum.....d |
| ○ Trachea.....E | | ○ Clavicles.....e |