14-3 What happens to air before it reaches the lungs?

Objective ▶ Explain how air is cleaned, warmed, and moistened as it moves through the respiratory system.

TechTerms

- **cilia** (SIL-ee-uh): microscopic hairs
- **mucus** (MYOO-kus): sticky liquid

Filtering Air You normally breathe through your nose. The air that you breathe in contains dirt and dust particles. These particles may be harmful to the lungs. Inside your nose, there are many hairs. These hairs filter out and trap many dust and dirt particles.

Infer: Why do you think that it is better to breathe through your nose than through your mouth?

Mucus The cells inside the nose and windpipe form a sticky liquid called **mucus** (MYOO-kus). Mucus covers the inside of the nose and windpipe. Dust, dirt, bacteria, and other harmful particles stick to the mucus. Mucus stops many particles from reaching the lungs. Mucus also keeps the tissues of the respiratory system from drying out.

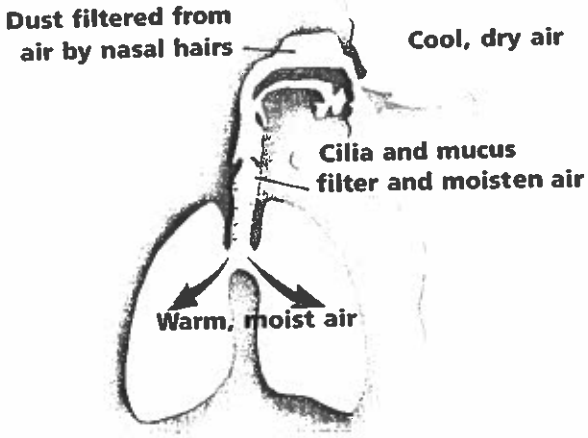
Explain: What are the two jobs of mucus?

Cilia Many single-celled living things have **cilia** (SIL-ee-uh). Cilia are microscopic hairs on cells. Your windpipe is lined with millions of cilia. The cilia move back and forth, pushing mucus toward the throat. Trapped particles are pushed into the throat with the mucus. Some mucus with its trapped particles is swallowed.

Sometimes mucus can irritate your nose. When this happens, you respond by sneezing. A sneeze is a burst of air. Sneezing blows harmful particles out of the nose.

Name: Where are cilia located in the respiratory system?

Warm, Moist Air Sometimes the air you inhale is cold and dry. When the air enters your body, it is warmed by heat from the body. Remember you are warmblooded. Your body works to keep your body temperature at about 37 °C, except when you have a fever. Air that enters the lungs has been warmed in your nose and throat. The body also



adds water vapor to the air you inhale. The air is made moist as it moves through the nose and windpipe. Air reaching the lungs is warm and moist. Warm, moist air prevents damage to the lungs.

Infer: What happens to dry, warm air before it reaches the lungs?

LESSON SUMMARY

- Hairs in the nose filter dust particles from the air.
- Mucus in the nose and windpipe helps trap harmful particles contained in air.
- Cilia in the windpipe push mucus and trapped particles toward the nose.
- A sneeze is a burst of air that blows harmful particles out of the nose.
- Air that enters the body is warmed and moistened before it reaches the lungs.

CHECK *Complete the following.*

1. A burst of air that blows harmful particles out of the nose is a _____ .
2. The windpipe is lined with tiny hairs called _____ .
3. Air that enters the lungs is warm and _____ .
4. The sticky liquid that traps harmful particles in the respiratory tubes is _____ .
5. You normally breathe through your _____ .

APPLY *Complete the following.*

6. How is the air you breathe in changed before it reaches the lungs?
7. Which of the following have cilia?
   a. the human windpipe **b.** *Paramecium* **c.** sponges **d.** *Amoeba*
8. **Diagram:** Develop a flowchart that traces the pathway of air from the nose to the lungs. List each organ the air passes through. Beneath each organ, identify how air passing through the organ is changed.

Health & Safety Tip

Smoking is harmful to the lungs. Smoking can cause the cilia in the windpipe to stop moving. When this happens, dust, dirt, and germs are not removed. These substances are now able to get into the lungs. They may cause disease. Some diseases of the lungs can cause death. The choice you make about smoking can affect your health for years to come. Cigarette packages have warnings about the dangers of smoking. Make a list of the different warnings written on cigarette packs or in cigarette advertisements.

SCIENCE CONNECTION

RESPIRATORY DISEASES

Air taken into the body contains the oxygen needed for life. Air also can contain substances that may be harmful. Sometimes these substances cause respiratory diseases.

Asbestos (eh-SPEH-stahs) is a material that was used in the past to insulate buildings. Inhaling asbestos fibers can cause lung disease. Today, asbestos is being removed from buildings to eliminate the danger.

Tobacco smoking releases chemicals that can cause respiratory problems, too. You do not need to smoke the tobacco yourself. Just inhaling secondhand smoke—the smoke from another person's cigarette—can cause serious respiratory problems.

A study in 1992 by the Environmental Protection Agency showed that secondhand smoke causes asthma, especially in children. The study also showed that secondhand smoke causes lung cancer deaths in nonsmokers. Secondhand smoke has been linked to other health problems as well. These include brain tumors, birth defects, and sudden infant death syndrome. To protect nonsmokers, some states and many communities have passed laws to restrict smoking in public places.