

SCIENCE 702

GOD-DESIGNED BODY SYSTEMS

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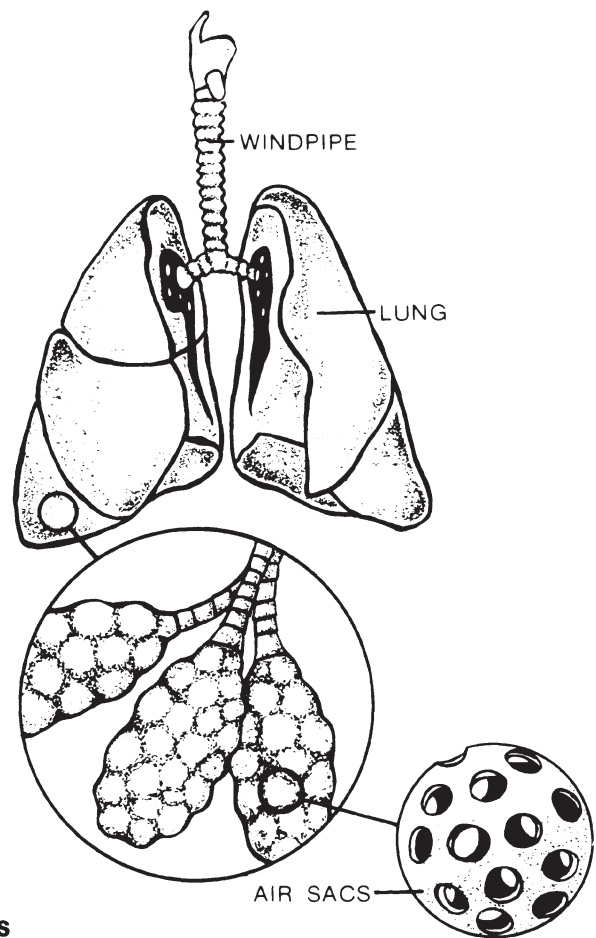
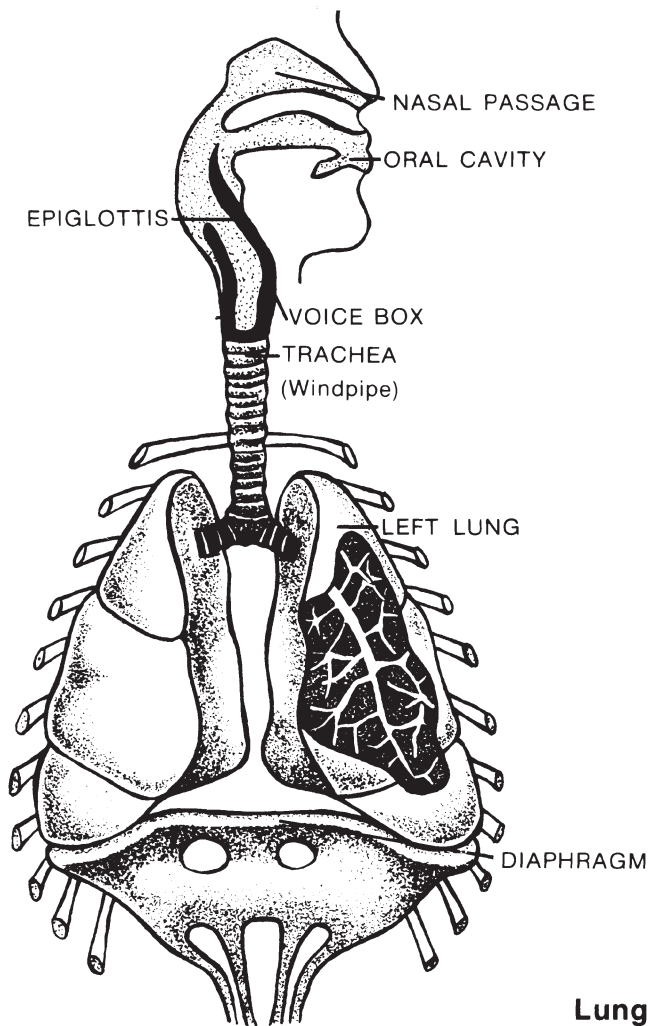
RESPIRATORY SYSTEM

The lungs are the main organs of the respiratory system. They are necessary to purify the blood by ridding it of gases. We will study how the lungs work and some common diseases of the lungs.

Structure and function. Air passes in through the mouth or nose and then down

the throat and into a tube called the trachea (trae' kee uh), or windpipe. The trachea divides into two tubes that connect to the lungs. These tubes continue to branch and to get smaller until the air passes into air sacs. The lungs are very spongy and have many air sacs.

The diaphragm (dy' uh fram) is the breathing muscle. It pushes against the lungs to force air out, or makes room for the lungs to fill with air. When breathing takes place, fresh air is inhaled; and used air is exhaled.



Lung Parts

The blood circulates in the lungs, leaving the cell waste of carbon dioxide and picking up oxygen. The air sacs are the places where this exchange occurs. The thin walls of these sacs allow the gases to move in and out of the blood. Deoxygenated blood comes into the

lungs, and oxygen-rich blood leaves. Hemoglobin is the carrier of the carbon dioxide and oxygen in the blood. Let's investigate this process.



Perform the following investigation.



These materials are needed:

clear limewater (calcium hydroxide)

2 soda straws

hand air pump

2 baby-food jars



Follow these directions. Check the box when each step is completed. This investigation will take about twenty minutes.

- ☐ 1. Fill each baby-food jar 1/4 full with limewater.
- ☐ 2. Using a soda straw, blow through the limewater until you see a change. Record the result in 2.19, indicating the time it took.
- ☐ 3. Fasten a soda straw to the hand pump. Pump air through the second baby-food jar with limewater. Record your results in 2.20, indicating the time it took.
- ☐ 4. Clean up your experiment area and return the supplies to their correct spot.



Record your results.

2.19 Results of blowing through limewater (Step 2) _____

2.20 Results of pumping air through limewater (Step 3) _____



Write your answers to these questions on the lines.

2.21 When carbon dioxide gas bubbles through limewater, limewater turns cloudy. Which of the two experiments turned cloudy more quickly?

a. _____ Which one has the most carbon dioxide?

b. _____ Does breath or air have the most carbon dioxide? c. _____ Where did the added carbon

dioxide in breath come from? d. _____

What uses up the carbon dioxide in air? e. _____

Health and disease. The lungs are very important in the respiratory system. The cleaning of the gases from the bloodstream is important to good health. Many things can cause lungs to operate poorly. Smog and air pollution irritate the tender lining of the lungs. Instead of oxygen, sometimes the poisonous gases in the polluted air are carried by the hemoglobin. This polluted air robs the cells of oxygen and also poisons the cells. Some people with weak lungs die because of the polluted air they breathe. **Deep breathing of fresh air is very necessary for the health of the lungs. Proper breathing helps the body purify the blood and improves blood circulation through the lungs and the body.**

Working at some jobs may cause severe

lung damage. Miners working in coal mines with poor air circulation get “black lung” disease from breathing the coal dust. People working in iron foundries, chemical plants, and fertilizer plants may run a higher risk of lung diseases, particularly emphysema (em fuh see’ muh).

Smoking is a prime cause of lung cancer and other lung disorders. Tuberculosis (tuh ber’ kyu loa’ sis) is caused by bacteria in the lungs. It is spread easily from one person to another by coughing and breathing in air with the bacteria in it. A simple test can be given to a person to determine if he has tuberculosis. This test is commonly called the TB test, or Tine test. You may have had the test already.



Select at least one of the following projects.



Discuss your selection with your teacher before you do it. Place a check before the project(s) you do. Have fun.

1. _____ Go to the meat market and get an animal lung. Carefully dissect it. Use a hand lens to study its cell and air sacs. Draw the cells and parts of the lung. Write a report on your study.
2. _____ Prepare a report on lung diseases and their causes. Read it to the class. It should be about two to five minutes in length.
3. _____ Create a poster that shows why smoking is harmful to our lungs and bodies. Show it to your teacher. Then display it in your home or classroom.



Complete these items.

- 2.22 Trace the path of air from the mouth to the air sacs.
a. _____ c. _____ e. _____
b. _____ d. _____
- 2.23 List three diseases of the lungs.
a. _____ c. _____
b. _____
- 2.24 List three causes of lung disease.
a. _____ c. _____
b. _____
- 2.25 Give the function of the lungs. _____

EXCRETORY SYSTEM

The skin and kidneys are the main part of the excretory system. They purify the dissolved waste products and poisons that get into the blood. Some water which keeps the waste dissolved is also removed.

Structure and function. Let's study the skin first. With a hand lens, look at the skin on your arms. You should see tiny holes in the skin called *pores*. Some are for oil to keep the skin soft. Others are for sweat or perspiration to get out. Perspiring does two things. First, during perspiration the body is cleaned of waste. Sweat contains dissolved salts and other chemicals that the body must lose. Sweating purifies our body; therefore, we must keep our skin bathed

with soap and warm water. If the pores are blocked by the water and oil, they get infected. This infection causes blackheads, whiteheads, pimples, and acne. People of the ages from ten to eighteen are more likely to have this problem than people of other ages. Cleanliness is very important. Fresh air also improves the condition of the skin.

Perspiring also cools the body. When you perspire, the heat of your body causes the liquid sweat droplets to evaporate or change to a gas. As the perspiration evaporates and your body loses this heat, it becomes cooler. The more rapid the evaporation, the cooler will be the surface. Let's see how this works.



Do this investigation.



These materials are needed:

rubbing alcohol
water
two cotton balls

two baby-food jar lids
watch with second hand
blackboard



Follow these directions. Check the box when each step is completed.
This investigation will take about fifteen minutes.

- ☐ ☐ 1. Read every step first. Check the first box as you read the steps for the first time.
- ☐ ☐ 2. Pour a little water into one lid. Dip a cotton ball into the water. Squeeze out the extra water.
- ☐ ☐ 3. Rub the wet cotton ball on the blackboard. Record the time it takes the blackboard to dry. Time = _____
- ☐ ☐ 4. Rub the wet cotton ball on your arm. Record the time it takes your arm to dry off. Time = _____
- ☐ ☐ 5. Repeat Steps 2, 3, and 4 but use the alcohol.
Time = _____ (blackboard)
Time = _____ (arm)
- ☐ ☐ 6. Clean up your supplies.



Answer these questions.

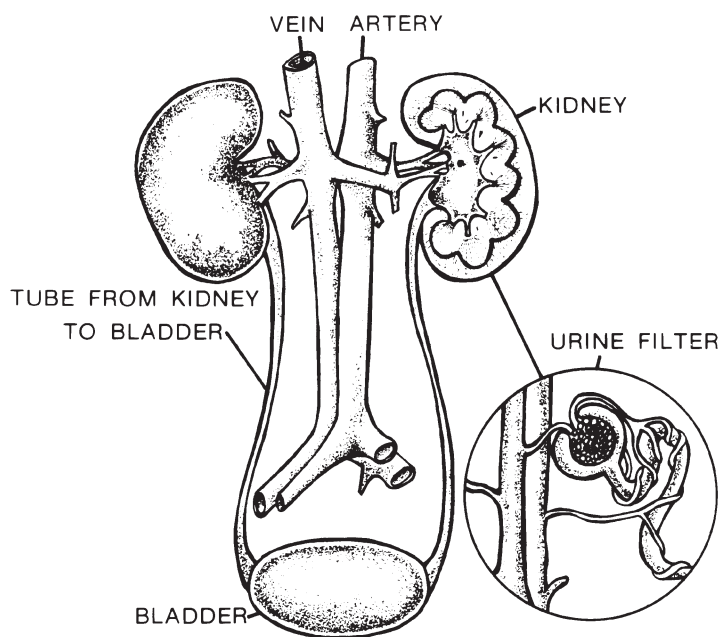
- 2.26 Which dried faster, water or alcohol? _____
- 2.27 Which cooled your arm the most, water or alcohol? _____
- 2.28 How does sweating cool your body? _____
- _____
- _____
- _____

In addition to removing cell waste and cooling the body, the skin forms a protective coat over the body. This coat protects us from germs and dirt. The skin **also contains nerves which help us feel pain, pressure, heat, and cold.**

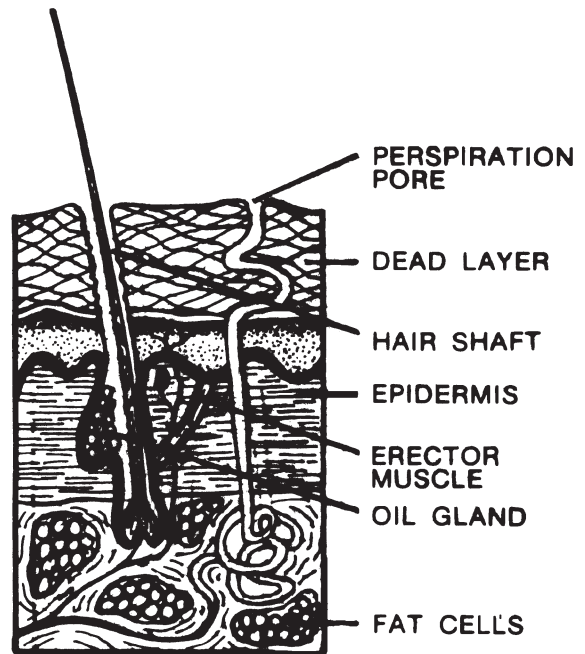
The kidneys are another part of the excretory system that purifies the liquid part of the blood. The kidneys are located at the hip level near the back. Place your hands on your hips with your fingers in front. Your thumbs are over your kidneys. The two organs filter out the poisons and waste in the blood. All blood passes through the **kidneys. They are continuously filtering the blood.** The water and waste that is removed

from the blood is called urine. The urine is stored in the bladder until it is excreted. Look carefully at the picture of the kidney. Notice the urine filter part shown in the drawing. This drawing shows a magnified view of the inside of the kidney. The kidneys have thousands of filters that purify the blood of urea, salt, and water.

Our Creator has provided us with a pair of kidneys. We can, however, manage to live a healthy life with just one. How wonderful that He gave us a spare. Diseased kidneys can be removed and kidney transplants done, but sometimes the body rejects the transplanted kidney.



Kidney



Skin

Health and disease. Skin diseases are mostly related to cleanliness. If germs are washed away and the skin kept clean with soap and hot water, skin problems will be few.

We have already discussed the causes of the major skin problems of people ten to eighteen years old. Other problems include skin cancer and allergies. All of these problems require medical attention by a doctor or skin specialists.

Healthy kidneys are important to the

health of our blood. Overeating of protein, low levels of liquids, and drinking alcohol are extremely damaging to kidneys. If not enough liquids are taken in, the body is not purified; and waste salts build up. This **buildup causes hard rocks to form called *kidney stones***. If they cause problems, they must be removed by an operation. The best prevention for both skin and kidney problems is cleanliness, proper diet, and plenty of fluid.



Do these activities.

2.29 List four important functions of the skin.

- a. _____
- b. _____
- c. _____
- d. _____

2.30 List the seven parts of the skin.

- | | |
|----------|----------|
| a. _____ | e. _____ |
| b. _____ | f. _____ |
| c. _____ | g. _____ |
| d. _____ | |