

Living Systems: Life's Inside Story

by Emily Sohn and Patricia Ohlenroth

Science Objective

Children learn all about what goes on inside humans and plants that allows them to eat, breathe, and live. The cell is the basic form of life, and all cells need food and water and a way to exchange gases. Although there are many differences between the major systems of the human body (circulatory, respiratory, digestive, and excretory) and the vascular system of plants, there are some functions that are necessary in both living systems that are needed to sustain life.

iScience Puzzle: Which System Isn't Working?

This iScience Puzzle requires children to think about whether breathing hard and excreting more waste water than usual means that a human being, Ed, is not feeling well, and also what might be causing plants to droop or get damaged leaves. Children will be able to figure out why Ed is probably fine but his plants are not at the conclusion of this book.

Objectives ► Children will:

- learn that the cell is the basic unit of life.
- understand that all living forms need food, water, and air.
- learn how the respiratory, circulatory, and excretory systems work in the human body.
- describe how each system transports nutrients and wastes.
- learn how plants make food and release oxygen.

Materials

- small plant

Lesson Plan

Before Reading

Investigation

Ask children what they need to live (food, water, air). Ask: *How do you think the body uses the food you eat and the air you breathe?* Tell them that they will learn the answers to these questions as they read this book.

Science Concepts

Accessing prior knowledge gets students thinking about the topic.

Bring in a small plant and have children examine its stems and leaves. Ask: *What happens when plants do not receive water and sunlight?*

Scientific thinking processes help build explanations for scientific observations.

Explain that children will study how different systems in the human body transport nutrients throughout the body and transport wastes out of the body. They will also learn how plants make food and how their special systems carry water and nutrients.

During Reading

Investigation

pp. 6–7: Have children guess what they think is happening to Ed and his plants. Relate Ed's problems to their own experiences. Ask: *Have you ever worked so hard that you sweated? How did you feel? What did you do?*

Science Concepts

Scientific thinking processes help build explanations for scientific observations.

pp. 8–9: Discuss each question posed on these pages one at a time. You may want to write the answers children give on the board and as children continue reading, ask if any need to be changed.

Cells in the respiratory, circulatory, and excretory system have different functions.

pp. 12–14: Begin flowcharts for the different systems.

The respiratory system transports oxygen throughout the human body and carries out carbon dioxide.

pp. 16–18: Refer back to the answers children gave to the Discover Activity and expand on them or correct them.

The circulatory system transports blood filled with oxygen throughout the human body. Arteries carry oxygen-rich blood pumped from the heart, and veins return oxygen-depleted blood back to the heart.

p. 20: Create a flowchart for the circulatory system. Discuss how the respiratory system, which exchanges oxygen and carbon dioxide, works with the circulatory system, which carries gases in blood throughout the body.

Body systems sometimes work together to perform some of their functions.

During Reading (continued)

Investigation

Science Concepts

p. 25: Create a flowchart for the respiratory system. During the reading, pause often to ask children questions about what they have read. For example, *What does the heart do? What is the function of white blood cells? What is the function of red blood cells?*

The respiratory system supplies oxygen to the blood and carries off carbon dioxide waste.

p. 29: Ask: *What happens to your heart rate when you exercise? Do you get out of breath? How do you get more oxygen into your lungs? Why do athletes push out air in short hard breaths while they are exercising?*

Exercise makes a heart beat harder to pump blood, thereby getting more oxygen to the body's cells. Pushing out air releases carbon dioxide waste.

p. 30: Begin a flowchart for the digestive system. Have children explain what happens at each step in the flowchart.

The digestive system breaks down food into tiny pieces that the blood carries throughout the body.

pp. 32–33: Create a flowchart for the excretory system. Recap the major transport systems in the human body before moving on to plants.

The excretory system eliminates liquid and solid wastes.

pp. 34–36: Have children restate the information on these pages in their own words, and answer the questions on page 35.

The vascular system in plants has two transport systems; xylem tubes carry water and minerals from the roots to the leaves and phloem tubes carry sugar from the leaves to the cells.

pp. 37–38: Have children write the key terms related to photosynthesis and their definitions. Have them use their terms and definitions to explain the process of photosynthesis.

Photosynthesis is the process by which plants make food. Chlorophyll absorbs energy from sunlight; this absorbed energy joins together carbon dioxide and water to form the sugar glucose, which is the plant's food. Oxygen, being a waste byproduct, is released into the air.

pp. 40–41: Display the small plant you used in the Before Reading section. Review children's answers about what a plant needs to stay healthy. Have children restate their answers, using terms they have learned.

Learning science vocabulary is crucial to achieving a greater depth of understanding of scientific concepts.

p. 44: Relate the problem of the oil spill to transpiration. Direct children to review pp. 38–41 and use this information to answer the questions in Beyond the Puzzle.

Scientific thinking processes help build explanations for scientific observations.

After Reading

Restate the key ideas in the book. All living things have cells, which is the basic unit of life. The human body has major systems, each of which performs special functions. Blood and oxygen travel throughout the body in the circulatory system. The respiratory system brings oxygen into the body and releases carbon dioxide waste. The digestive system breaks down the food we eat so that it can be carried by the blood as nutrients for the body. The excretory system filters out waste. Plants, too, have specialized cells that allow them to make food in a process called photosynthesis. The vascular system transports water and nutrients.

Investigation

Divide children into small groups. Have each group investigate one of the human systems in more detail. Present each group with a problem, such as: *What would happen if ... lungs were damaged by smoking? arteries were blocked with fatty deposits? food did not contain enough nutrients? kidneys could not filter out wastes?* Have the groups share their findings with the class.

Have children monitor the growth of the small plant you brought in. Have them record how many hours of sunlight the plant gets and how much water it needs. Position the plant so that children can see how it bends toward the light in order to carry out photosynthesis.

Understanding Science

Research skills are tremendously important in science.

Making observations is fundamental to the study of science.