

MERRILL

BIOLOGY

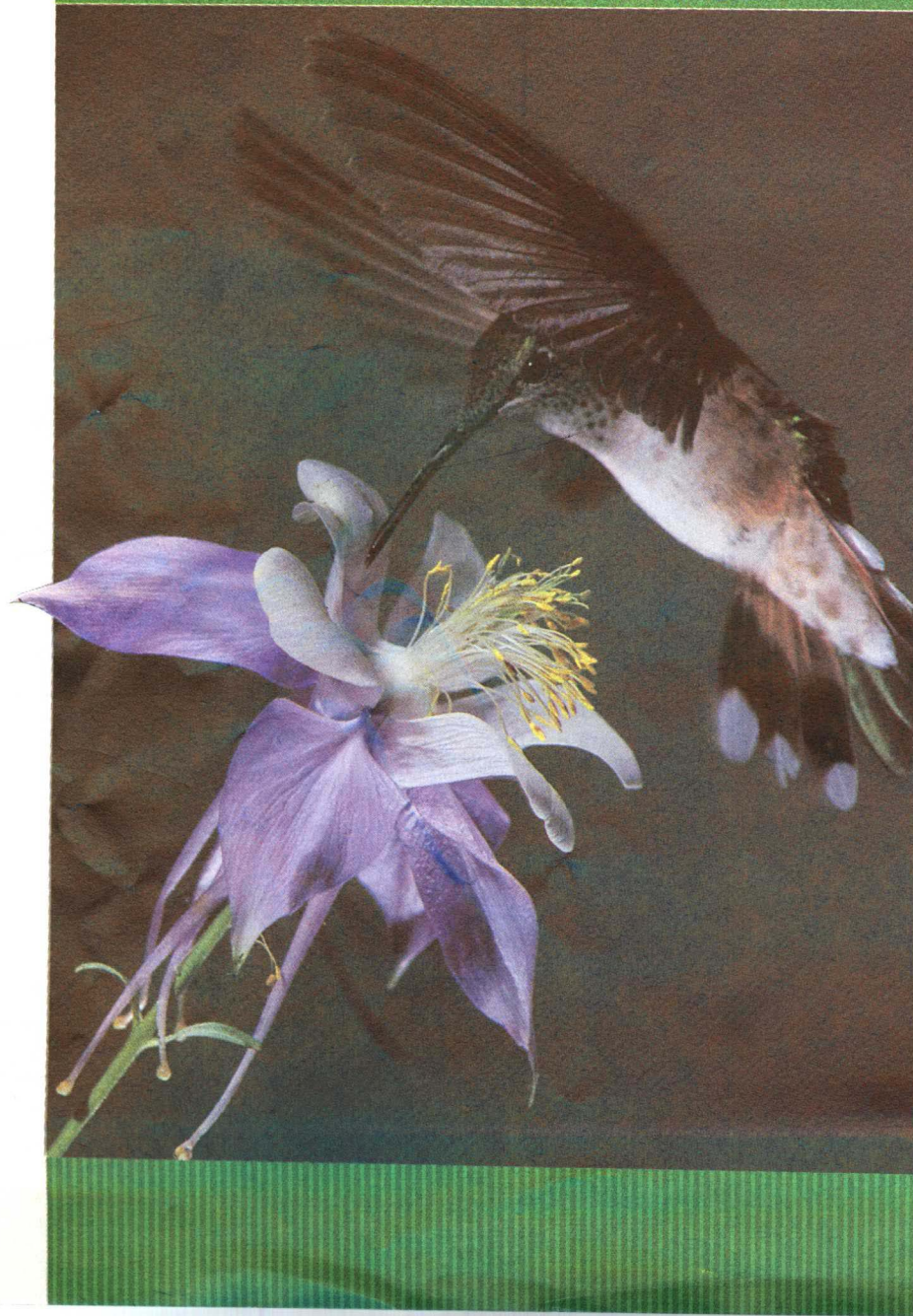
AN EVERYDAY EXPERIENCE



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A MERRILL BIOLOGY PROGRAM

Biology: An Everyday Experience, *Student Edition*

Biology: An Everyday Experience, *Teacher Edition*

Biology: An Everyday Experience, *Teacher Resource Package*

Biology: An Everyday Experience, *Study Guide*

Biology: An Everyday Experience, *Transparency Package*

Biology: An Everyday Experience, *Laboratory Manual, Student Edition*

Biology: An Everyday Experience, *Laboratory Manual, Teacher Edition*

Biology: An Everyday Experience, *Computer Test Bank*

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Biology and You

Biology is an Everyday Experience

This is your life. Biology is not just another science class. It's a subject you already know well, because it's about life.

It's 10:00, do you know where your dinner is? Every day, you eat and drink to stay alive. Where do your food and water come from, and how does your body use them?

Appreciate the environment—it's the only one

you have. Trees don't just stand there, they help supply you with oxygen, prevent soil erosion, and make some of your food.

The wonderful world of technology.

The field of medicine is closely tied to biology. Advances in medical technology may present you with difficult decisions.

Biology happens! Biology is about every living thing in your world and the relationships among them. The more you learn about biology, the more you will realize that biology *is* an everyday experience.



Using *Biology: An Everyday Experience*—a quick tour of your textbook

Biology: An Everyday Experience not only presents information, it asks thought-provoking questions. Labs bring the text to life as you use scientific methods to solve problems. You will see how biology affects you as a consumer and learn about careers in biology. Take time now to see what your textbook offers.

from beginning to end, you'll see how biology connects to the world around you

1 What would happen if... there were no mosquitoes? Have you ever thought about it? Each unit opener begins with a thought-provoking question like this. The unit introduction then shows you how even small differences in the relationships between living things can change your world in dramatic ways. So, what would happen if there were no mosquitoes? Read the opener to Unit 8 to find out.


Unit 8

CONTENTS

Chapter 30
Populations and Communities 630

Chapter 31
Ecosystems and Biomes 652

Chapter 32
Solving Ecological Problems 672



Relationships in the Environment

What would happen if...

there were no mosquitoes? You may have memories of hot, itchy summers when you thought the world would be better off without mosquitoes. But, would it? The fish in the photo depend on mosquito larvae for food. Many birds, in turn, depend on the fish. Without the mosquito, many fish would starve to death. Many birds would then starve. The balance of nature would be upset by the lack of mosquitoes.

What is the effect of spraying chemicals to kill mosquitoes? In many communities, trucks that spray to kill mosquitoes are a regular sight. The spray that kills mosquitoes kills honeybees, too. What would be the effect of killing honeybees? What is the cost to the environment of getting rid of mosquitoes? Is the cost too high?

2 CONNECTIONS

Biology in Your World

The Scientific Method is All Around You

In this unit, you have read how the scientific method is used to solve problems in science. But, did you know people use scientific methods to solve other kinds of problems? Consider the " mysteries " described below and how scientific methods were used to solve them.

LITERATURE

A Scientific Search for Roots

Alex Haley learned from his grandmother that he was part of the Kinte family. His African ancestor, Kunta Kinte, had been kidnapped in Africa and then brought to this country as a slave.

Kunta's family handed down African words for six generations. These words were the names of an African village, a certain tree, and a musical instrument. Haley traced these to the Gambia River in West Africa. There he found a man who could recite the history of the Kinte family. The man's story fit the facts Haley had before his trip. Haley wrote roots to tell the story of his search.

GEOGRAPHY

Shifting Continents

The east coast of South America and the west coast of Africa could almost fit together like the pieces of a jigsaw puzzle. This observation led scientists to form the continental drift theory. The theory says that there was once a single great continent that split and drifted apart. Other evidence indicates that all the land masses of Earth may have been joined at one time. Layers of rock along a coast on one side of the ocean match layers of rock on an opposite coast. Also, different continents have the same kinds of fossils. Thus, observation and evidence support the continental drift theory.

LEISURE

Green Thumbs Up!

Many teens enjoy spending time assembling a terrarium. You can have a miniature garden in your bedroom! Terrariums are fun to arrange, and the materials are easy to find. All you need is a clear container, pebbles, sand, soil, and some plants. Ferns and mosses grow well in terrariums. You can try to grow many other kinds of plants, also. Experiment with various plants to see which are best suited for a terrarium. Set up your experiment using the scientific method.

How would you vary the conditions in or surrounding a terrarium to find the best environment for it?

CONSUMER

Cycling Through Your Choices

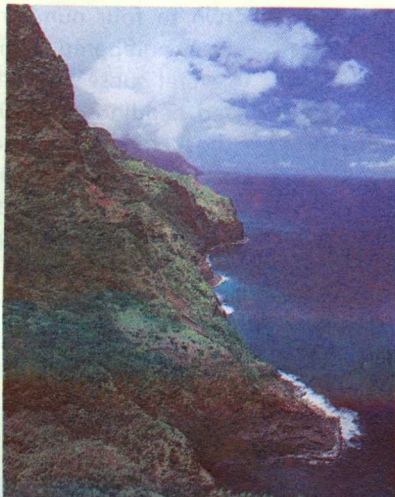
Your old bicycle is just about worn out, and you need to buy a new one. How can you use a scientific method to choose the best bicycle? You can treat your decision like solving a problem.

First, research the types of bicycles. What are the advantages, disadvantages, and purposes of each type? What do you need in a bicycle? Prepare a list of all the features and uses you want in a bicycle. Then rate each feature with a number from 1 to 5. A feature you really need is a 1. A feature that is nice but you could do without would be a 5. Compare your list of needed features with the types of bicycles. Do your features match the purposes and advantages of one or two types of bicycles? If not, you may need to rethink your needs.

Go to a bicycle shop to see and ride bicycles. Narrow your choices to one type and choose your bicycle based on all the data you have gathered about the different bicycles.



2 What do biology and Alex Haley have in common? A lot, as you'll discover when you read the close to Unit 1. Each unit is closed with mini essays that make connections between biology and consumer issues, leisure activities, art, literature, and history.



clearly organized to get you started and keep you going

4 **CHAPTER PREVIEW**

Chapter Content
Review this outline for Chapter 2 before you read the chapter.

2.1 Living Things and Their Parts
Features of Living Things
The Chemistry of Life
Cell Theory

2.2 Cell Parts and Their Jobs
Cell Membrane and Nucleus
Cytoplasm

2.3 Special Cell Processes
Diffusion
Osmosis
Organization

Skills in this Chapter
The skills that you will use in this chapter are listed below:
• In Lab 2-1, you will make and use tables, interpret data, infer, and form hypotheses. In Lab 2-2, you will observe, compare, and use a microscope.
• In the SKB Checks, you will classify, formulate a model, and understand science words.
• In the Mini Labs, you will use a microscope and experiment.

2

Chapter

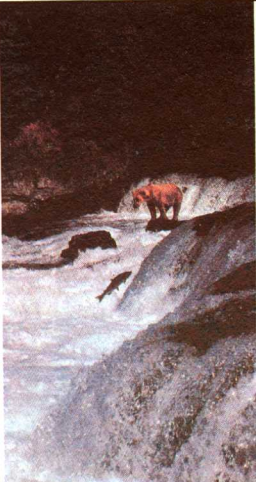
Features of Life and the Cell

In the photo on the left, you can see several kinds of things that are living and several that are not living. If you looked closely at an enlarged part of the rocks, as shown in the small photo, what would you see? Make a guess as to what you would find if you looked at a drop of the water with a microscope.

What does it mean to be living? Maybe you would say that living things need water and food. You might say that living things grow. Some nonliving things seem to grow, too. If you have old windows where you live, you probably have seen icicles that seem to grow on your house. Maybe the ability to grow isn't enough to make something living. How then can you decide if a thing is living or nonliving? Are there features that all living things share?

3 **Try This!**

Each chapter begins with an easy activity to do right at your desk, or at home. It gets you ready for learning.



Rock covered with mosses and lichens

4 Listed for you in the **Chapter Preview** are the chapter contents. They tell what topics are covered and how they are organized. Study this before you dive into the chapter material. Also listed are skills that you will practice. A skill is something you get better at with practice. *Biology: An Everyday Experience* gives you all the practice you need to master skills that are important for success in biology, your other classes, and your everyday life.

5 When was the last time you thought about what it means to be alive? Do small living things have the same life processes as large ones? These are the kinds of ideas you will ponder as you read the chapter openers. Each chapter opener has two photographs that are talked about in the introduction. As you read, think about what the photos mean and how they relate to the chapter.



15:4 Nervous and Endocrine System Problems

Many health problems are caused by diseases of the nervous and endocrine systems. Luckily, some of these diseases can be treated or cured.

Nervous System Problems

The brain has many blood vessels covering its surface, Figure 15-16. The brain receives food and oxygen from these blood vessels. These blood vessels may become weak and break. When this happens, a person is said to have a stroke.

What happens when blood vessels of the brain break? It depends on where the blood vessel is and how much blood is lost. Usually, a person loses the use of a part of the brain because the brain cells die when they no longer receive food or oxygen. Losing the use of part of the brain causes the body part that it controls not to work. Figure 15-16b shows what happens when certain parts of the brain lose their oxygen supply.

Endocrine System Problems

The pancreas is a familiar gland. You studied it in Chapter 10 with the digestive system. Refer back to Figure 15-11 to see the location of the pancreas. This gland is also part of the endocrine system. It makes a hormone called insulin (INS-uh-lin). Insulin is a hormone that lets your body cells take in glucose, a sugar, from your blood.

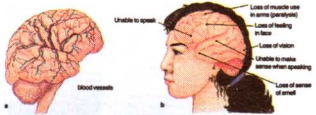
Objectives

A. Identify problems that damage the brain.
B. Explain the importance of insulin.

Key Science Words

insulin
diabetes mellitus

What is a stroke?



15-4 Nervous and Endocrine System Problems 323

6 Chapters are organized into two to four numbered sections. Each numbered section has several subsections that have red headings. The Objectives at the beginning of the numbered section tell you what major topics you'll be covering and what you should expect to learn about them. The Key Science Words are also listed in the order in which they appear in the section.

lots of ways to help you master important ideas and skills

7 Here's a chance to sharpen your skills. The **Skill Checks** and **Mini Labs** are good ways to practice skills. Each skill exercise requires only pencil and paper or simple materials you can find at home or get from your teacher. If you have trouble with the skill exercises in the Skill Checks or Mini Labs, there is a reference to the **Skill Handbook** at the back of the book. Here, you can find complete information about a particular skill.

SKILL HANDBOOK

Skill: Understanding Science Words

There are two ways you can understand science words better. One way is to define the word in context. The way the word is used gives you a clue as to its meaning. A second way is to understand science words by looking at the parts that make up the word. Each word part can give you a clue as to the meaning of the whole word.

Learning the Skill: Defining Words in Context

- First, read to see if the word is defined directly in the sentence.
- If the word is not defined directly, read several sentences beyond the one in which the word first appears. These sentences may provide information about the definition of the word.
- If possible, define the word based on your own past knowledge. You may have learned the word in an earlier chapter, or you may be familiar with it because you hear it day to day.
- Figure out the meaning of the word by how it is used in the sentence and by the sentences around it.

Examples

Find the definitions of the underlined words.

- Biologists is the study of life. The word *biologist* gives you a clue that the word is defined directly in the sentence.
- A cat is a mammal. A mammal is an animal that has body hair, produces its young with milk from mammary glands, and is warm-blooded. The animal sentence contains the definition of mammal.
- All living things are organisms. Reproduction is a similar word to organism. In Chapter 2, it is said one you probably have from day to day.
- Green plants carry out photosynthesis. They are able to make their own food. These sentences tell you that photosynthesis is the ability of a plant to make food.

Learning the Skill: Defining Words by Parts

- Look at the word to see how many word parts you know. The word may have one or more word parts.
- You may recognize parts of the word from previous lessons. Or, you may recognize parts of the word from other familiar words. For example, the word *biology* has the word *bio* in it. You know *bio* means life. The word *logy* means the study of. So, *biology* means the study of life.
- Look for root words and prefixes. A root word is the main part of a word. A prefix is a word part added to the root word to change its meaning. A word part added to the end of a word is a suffix. It changes the meaning.

Example

- What does the word *microorganism* mean? The word *micro* means very small. The word *organism* means a living thing. Therefore, the word *microorganism* means a small living thing.
- Examples of microorganisms are:
 - amoeba—animal without a backbone
 - virus—animal
 - cell—animal
- The prefix *anti* and *in* mean without. *Anti* means against. *In* means inside. *Antibiotic* means a drug that kills bacteria. *Antibiotic* means a drug that kills bacteria without a backbone.
- The suffix *logy* means the study of. What does *biology* mean? *Biology* means the study of life.

Skill Check

Understand science words: photosynthesis. The word part *photo* means light. In your dictionary, find three words with the word part *photo* in them. For more help, refer to the Skill Handbook, pages 706-711.

Chapter 3

Summary

3.1 Why Things Are Grouped

- Many things are classified in everyday life.
- Things are grouped together based on similarities. Two reasons for classifying things are to make them easier to find and to show how they are alike.

3.2 Methods of Classification

- Aristotle was one of the first people to classify living things. He grouped animals according to where they lived. He grouped plants according to size and patterns of growth.
- Linnæus used specific traits to group living things. He also designed a scientific naming system that is still used today.
- There are seven main groups in the modern classification system. They are kingdoms, phylum, class, order, family, genus, and species.

3.3 How Scientists Classify Today

- Classifying is based on how organisms are related, ancestors, similarities in body structure, and body chemistry.
- Scientists use scientific names because no two living things have the same scientific name. They are kingdom, phylum, class, order, family, genus, and species.

Testing Yourself

Using Words

Choose the word from the list of Key Science Words that best fits the definition.

- smallest group of living things
- largest group of living things
- a feature of something
- largest group within a kingdom
- genus and species names together

Key Science Words

animal (p. 62)
class (p. 64)
classify (p. 48)
family (p. 64)
genus (p. 61)
kingdom (p. 62)
moneran (p. 61)
order (p. 64)
phylum (p. 64)
plant (p. 62)
protist (p. 61)
scientific name (p. 68)
species (p. 68)
trait (p. 48)

Review

Testing Yourself

Using Words

Answer the questions by referring to the page number after each question.

- Why did scientists depend less and less on Aristotle's grouping system? (p. 62)
- How would you classify the letters h, e, e, d, l, n, i into two groups? Explain your groups. (p. 48)
- What are three reasons why scientists use scientific names? (p. 68)
- Why do we classify books in a library? (p. 48)
- How do plants and animals differ? (p. 62)
- What are the classification groups for a lion and a deer? (p. 67)
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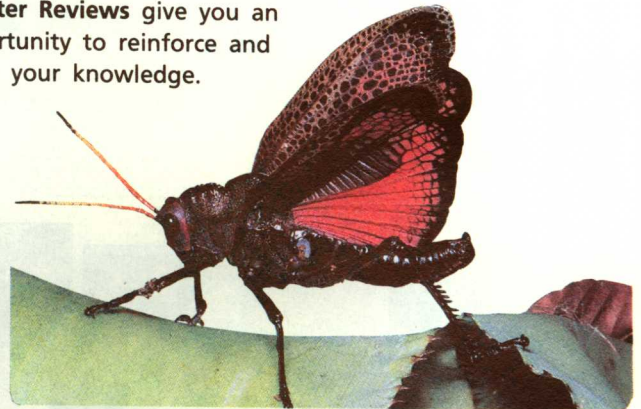
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Using Words

Answer the questions by referring to the page number after each question.

- Why did scientists depend less and less on Aristotle's grouping system? (p. 62)
- How would you classify the letters h, e, e, d, l, n, i into two groups? Explain your groups. (p. 48)
- What are three reasons why scientists use scientific names? (p. 68)
- Why do we classify books in a library? (p. 48)
- How do plants and animals differ? (p. 62)
- What are the classification groups for a lion and a deer? (p. 67)
- What changes did Linnæus make in Aristotle's classification system? (p. 62)

8 Chapter Reviews give you an opportunity to reinforce and apply your knowledge.



10 At the end of each major section are five Check Your Understanding questions. The first three questions reinforce what you have learned in the section. The fourth question challenges you to think critically about what you have read. The fifth question connects biology with reading, writing, or math.

9 If you have trouble remembering and understanding a lesson, help is on the way. Each major concept has an Idea Map that you can use as a study guide. Ideas are summarized in an easy-to-read format. The Idea Maps will help make your study of biology a success.

Modern Classification

Check Your Understanding

- How is similarity in body structure used to classify living things?
- Give two reasons why scientists use scientific names.
- What are five kingdoms recognized today?
- Critical Thinking: You are a chameleon. Are you more like a house cat or an octopus?
- Reading and Writing: What does the word *perfect* mean as it is used in the last paragraph of this section?

*really experience biology by observing,
experimenting, asking questions*



11 Every chapter has two step-by-step labs. Procedures are clear and easy to follow. Sample data tables are given to help you organize the information you collect. At the end of each lab are questions that help to reinforce what you learned in the lab. Doing a lab has never been so easy!

Feathers

Problem: What is the structure of feathers?

Skills
Interpret data, observe, infer



Materials
wing or tail feather
down feather
hand lens
scissors
metric ruler

Procedures

- There are two kinds of feathers. Contour feathers are found on a bird's body, wings, and tail. Down feathers lie under the contour feathers and insulate the body. Look at a contour feather with a hand lens. The hard center tube is the shaft.
- Copy the data table. Cut 2 cm off the end of the contour feather shaft. **CAUTION:** Use care when using scissors. Observe the cut end with the hand lens. Record your observations.

Lab 8-2

11

Data and Observations

- What connects a contour feather's barbs?
- Explain any differences observed when you fanned the air with the two feathers.

Analyze and Apply

- List the parts of a contour feather.
- How does the shaft of the contour feather aid in flight?
- Infer: How does the structure of a down feather help insulate a bird?
- Apply: What structures in reptiles are like feathers? Are their functions similar?

Extension
Observe pictures of a bird wing and a bat wing. How are they similar and how are they different?

FEATHER	PARTS	OBSERVATIONS
Contour	shaft	
	vane	
	barbs	
	barbules	
Down	shaft	
	barbs	
	shaft not hooked together	

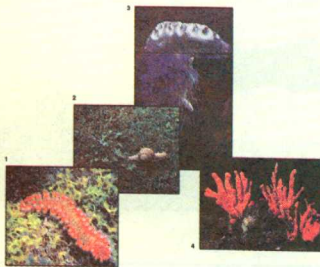
172 Complex Animals 8-2

12 PROBLEM SOLVING

ANIMAL MOVEMENT

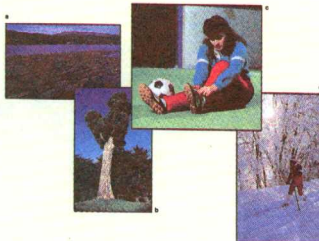
Animals move in different ways. Segmented worms have bristles that grab or dig into the soil. Can you match the way the brittle worm in photo 1 moves to one of the kinds of movement shown in photo a, b, c, or d?

The snail in photo 2 glides along using its muscular foot. Glands at the front of the foot put down a slippery path just ahead of the snail. In which photo does movement match the snail's movement?



The Portuguese man-of-war in photo 3 floats as a group of stinging-cell animals arranged around a gas-filled float. The group floats along with the water currents. In which photo is movement similar to the movement of the Portuguese man-of-war?

Unlike most animals, the sponge does not move. It lives attached to an object under the water. The sponge filters small living things out of the water and uses them for food. This means of getting food allows the sponge to live and grow even though it can't move. Can you match the sponge's way of life with one of the photos?



12 Each unit has a two-page Problem Solving feature. Read the short background paragraph, look at the pictures, and solve the puzzle.



explore how biology impacts technology and news-making issues and offers career choices

13 Science and Society

Ancient Forests: Jobs versus Wildlife

Logging in the ancient forests of the Pacific Northwest

Have any of your neighbors made it well known that they are upset or angry by something in the neighborhood? Maybe a road sign was put up that they didn't like. Maybe someone's yard was full of garbage. You may have said, "It doesn't bother me," and "It's not my problem." In some cases where people disagree, the problem is so important that the government gets involved. One such case involves the cutting of ancient trees in the forests of the Pacific Northwest. The trees are used as a major source of lumber and paper for the United States. They are also important to Earth's atmosphere. Consider the three cases described below and discuss each question with your classmates.

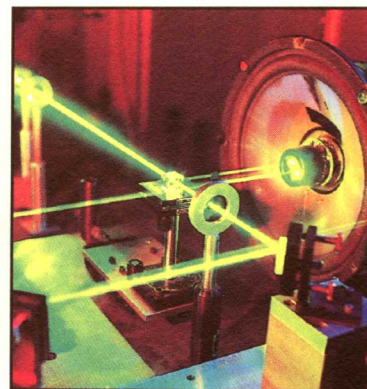
What Do You Think?

- Some small mill owners work in forests owned by the National Forest Service. These loggers harvest only older trees and rely on the growth of young trees to fill in the gaps. Other loggers completely clear the forests of all ages of trees and then replant with young trees. These timber company loggers then harvest the trees as soon as they can. Because of the new law protecting wildlife, the small mill owners may lose their jobs. The larger timber companies will not be affected. What solutions would you suggest to the government to save the life styles of all loggers?
- The northern spotted owl lives only in the forests of old growth in the Pacific Northwest. There are only about 2000 pairs of owls recorded. In July 1990, the United States Fish and Wildlife Service listed this owl as threatened on the federal endangered species list. The owl's environment is also protected by law. Why is it important to save species?
- Certain gases, including carbon dioxide, are found naturally in Earth's atmosphere. They trap heat from the sun in the same way the glass of a greenhouse does. Carbon dioxide has increased over the last fifty years because of the burning of fuels, such as coal, wood, oil, and natural gas. Forests take up carbon dioxide. Without forests, carbon dioxide would build up in the atmosphere. This increase of gases might cause major changes in Earth's climate. What social and political effects might there be if the world's climate changed?

Conclusion: Do we all need to care about forests? Are the needs of humans more important than those of other species?

Northern spotted owl

13 Are animal experiments necessary? Who decides which person in need of an organ transplant gets one? As you read the Science and Society features, you'll find that the answers to these and other questions are not so easy. The Science and Society features bring you closer to current issues and let you see the impact of technology on society. They prepare you for the day when you may need to participate in making decisions that affect your community and your environment.



14 TECHNOLOGY

Eye "Fingerprints"

Good research can be done clearly in the human eye. These vessels run along the back surface of the eye. That is why a doctor sometimes shines a flashlight into your eyes. The condition of these blood vessels gives the doctor clues about your general health. The pattern of blood vessels in the eye is different for every person.

It's like having a "fingerprint" of your eye. Using a computer scanner, scientists can identify people based on blood vessel patterns in their eyes. This technology can be used to screen applicants for driver's licenses. It prevents people who already have licenses from obtaining duplicates. The states of Wisconsin and California are already planning to use this new technology in the issuing of driver's licenses.

A view of the back of your eye

Roles of White Blood Cells

Have you ever had a cut that became infected? An infection is usually caused by an attack on your body cells by bacteria. White blood cells move to an infection and destroy the bacteria causing it. There's a rapid increase in white cells at the time of an infection. The actual numbers of white blood cells help to destroy more bacteria at a faster rate. After an infection is over, the number of white cells returns to normal. Another job of white blood cells is to rid the body of dead cells. Certain white cells can move about the body and "eat" dead cells just as they do bacteria. Figure 13-4. Increased amounts of white blood cells can sometimes cause problems such as leukemia (see X235 case file). Leukemia is a blood cancer in which the number of white blood cells increases at an abnormally fast rate.

Figure 13-4 A white blood cell attacks a bacterium and moves toward this foreign body to destroy it.

130 Blood 13-2

14 "Eyes are the windows to the soul." Did you know that your eyes are also like fingerprints? The patterns made by the vessels in the back of your eye are unique and can be used to identify you. No other person has eyes like you. This and other recent discoveries appear in the Technology features. The Technology features tie together biology and applications of the most recent research in biology. They make biology meaningful to you.

Career Close-Up Wildlife Photographer

John's biology teacher invited a wildlife photographer to visit his class. The photographer brought slides and prints of many living things. Many photographs of flowers and insects were made with a close-up lens or a zoom lens. The photographer showed the students how to use a camera attachment on a light microscope. She told them that her work often took her to outdoor settings. Students wanted to know about the training needed to be a photographer. She told them that she had taken photography and natural science courses in high school. Then she had taken several courses at a community college. She explained that in this field success depends on a person knowing the subject matter well.

Other students wanted to know where her work was used. She showed them magazines and books that contained her photographs.

Photographing wildlife is often a challenging occupation.

15 You may never have thought about a career in biology, but think again. What kinds of interesting careers are there for you in biology? What about wildlife photography? How about being an athletic trainer? Each career feature focuses on one career, telling you the daily ins and outs of the job. Even if you want to work as soon as you graduate from high school, you'll find there are many careers that will let you do just that. Information about career training is given so that if you're interested, you can start planning now.

Biologists classify living things. Doing so puts organisms in order. It also shows how they are alike. There are over one and one-half million known kinds of living organisms. Biologists use keys to find information about an organism.

Learning

Give two examples of traits that are classified as parts of an animal cell based on two other ways to write the traits.

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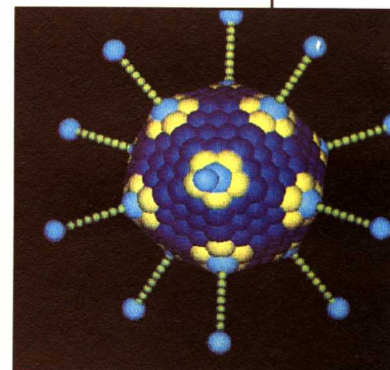
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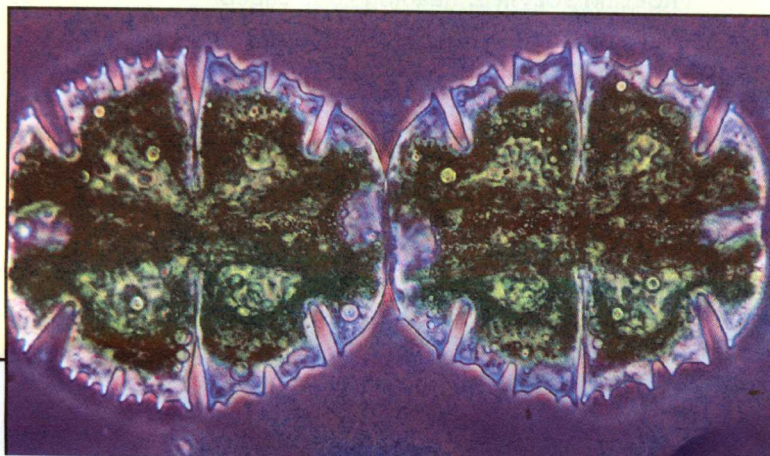
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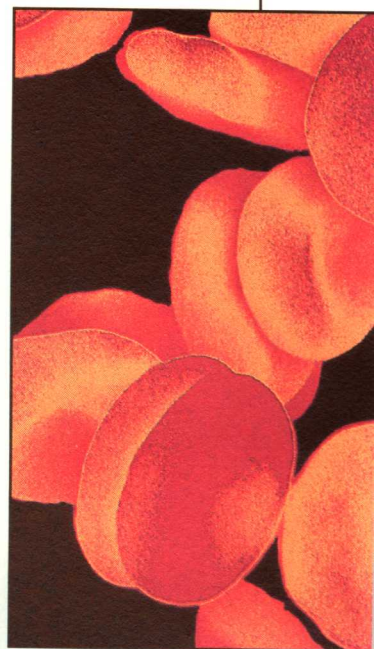
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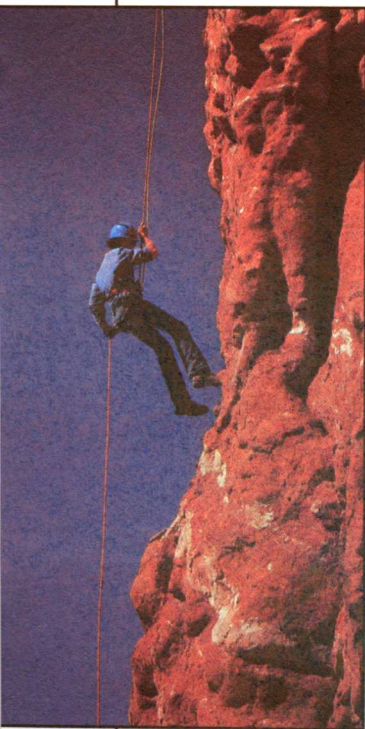
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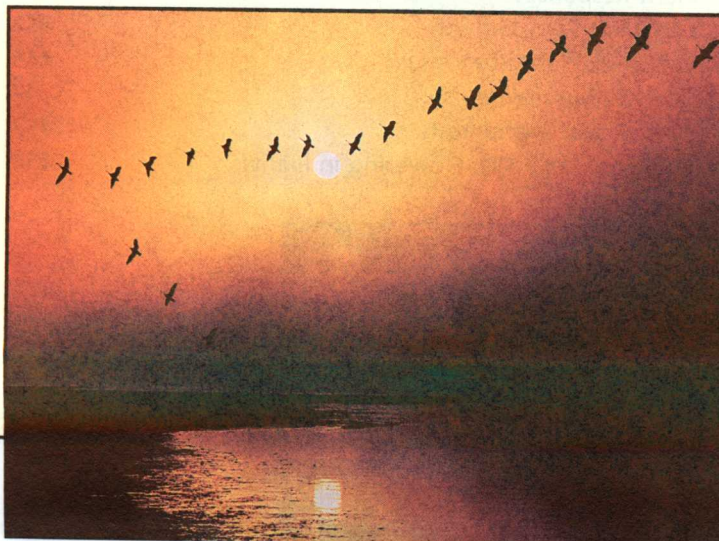
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