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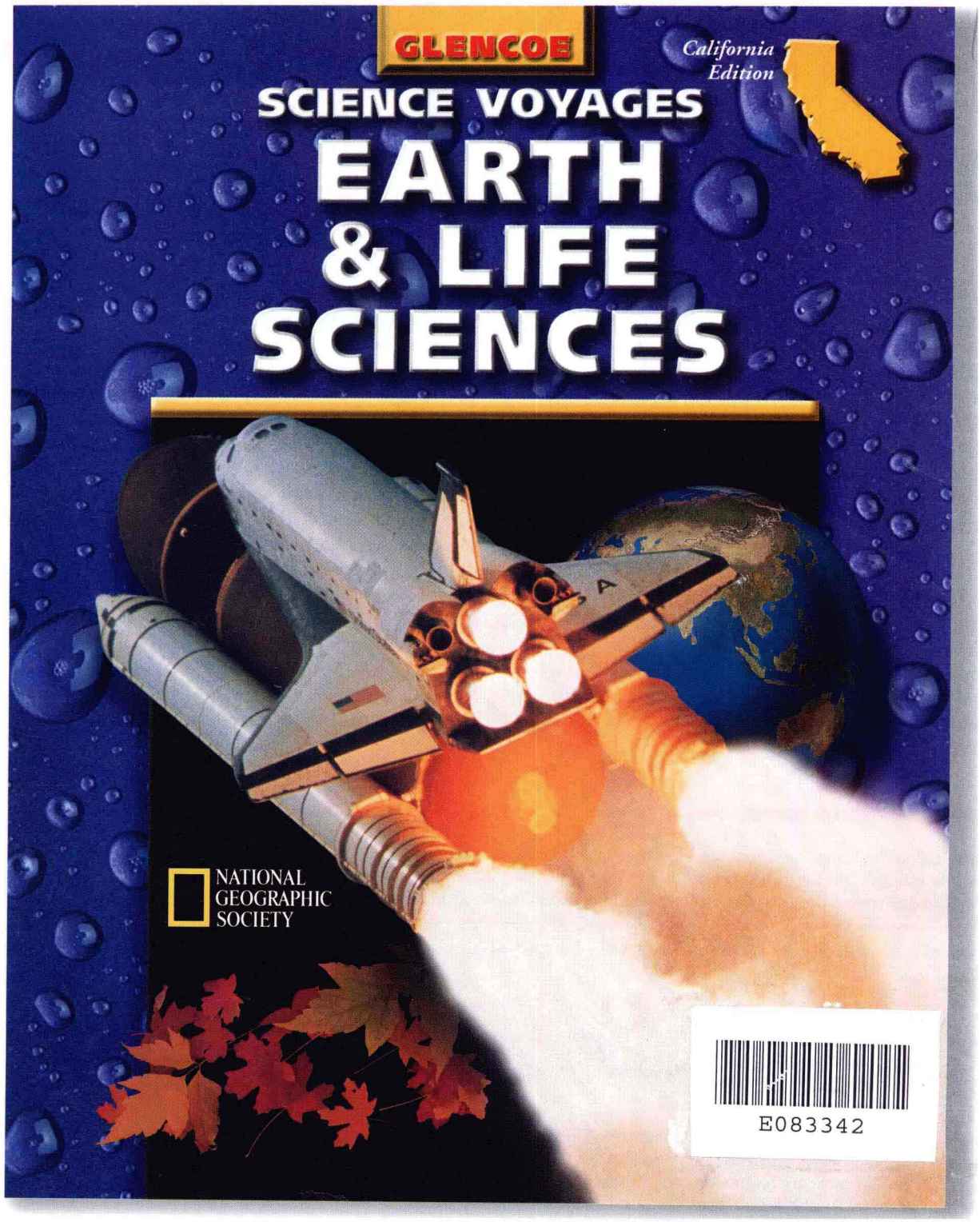

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Series Authors

Alton Biggs
Biology Instructor
Allen High School
Allen, Texas

John Eric Burns
Science Teacher
Ramona Jr. High School
Chino, California

Lucy Daniel, Ph.D.
Teacher, Consultant
Rutherford County Schools
Rutherfordton, North Carolina

Cathy Ezrailson
Science Department Head
Oak Ridge High School
Conroe, Texas

Ralph Feather, Jr., Ph.D.
Science Department Chair
Derry Area School District
Derry, Pennsylvania

Patricia Horton
Math and Science Teacher
Summit Intermediate School
Etiwanda, California

Thomas McCarthy, Ph.D.
Science Department Chair
St. Edwards School
Vero Beach, Florida

Ed Ortleb
Science Consultant
St. Louis Public Schools
St. Louis, Missouri

Susan Leach Snyder
Science Department Chair
Jones Middle School
Upper Arlington, Ohio

Eric Werwa, Ph.D.
Department of Physics and Astronomy
Otterbein College
Westerville, Ohio

National Geographic Society
Educational Division
Washington D.C.

Contributing Authors

Al Janulaw
Science Teacher
Creekside Middle School
Rohnert Park, California

Penny Parsekian
Science Writer for
The National Geographic Society
New London, Connecticut

Gerry Madrazo, Ph.D.
Mathematics and Science Education Network
University of North Carolina, Chapel Hill
Chapel Hill, North Carolina

Series Consultants

Chemistry

Douglas Martin, Ph.D.
Chemistry Department
Sonoma State University
Rohnert Park, California

Cheryl Wistrom, Ph.D.
Associate Professor of Chemistry
Saint Joseph's College
Rensselaer, Indiana

Earth Science

Maureen Allen
Science Resource Specialist
Irvine Unified School District
Laguna Hills, California

Tomasz K. Baumiller, Ph.D.
Museum of Paleontology
University of Michigan
Ann Arbor, Michigan

Connie Sutton, Ph.D.
Department of Geoscience
Indiana University
Indiana, Pennsylvania

Physics

Thomas Barrett, Ph.D.
Department of Physics
The Ohio State University
Columbus, Ohio

David Haase, Ph.D.
Professor of Physics
North Carolina State University
Raleigh, North Carolina

Life Science

William Ausich, Ph.D.
Department of Geological Sciences
The Ohio State University
Columbus, Ohio

Dennis Stockdale
Asheville High School
Asheville, North Carolina

Daniel Zeigler, Ph.D.
Director
Bacillus Genetic Stock Center
The Ohio State University
Columbus, Ohio

Reading

Nancy Farnan, Ph.D.
School of Teacher Education
San Diego State University
San Diego, California

Gary Kroesch
Mount Carmel High School
San Diego, California

Safety

Mark Vinciguerra
Lab Safety Instructor
Department of Physics
The Ohio State University
Columbus, Ohio

Curriculum

Tom Custer, Ph.D.
Maryland State Department of Education
Challenge/Reconstructed Schools
Baltimore, Maryland

Series Reviewers

Jhina Alvarado
Potrero Hill Middle School for the Arts
San Francisco, California

Richard Cheeseman
Bert Lynn Middle School
Torrance, California

Linda Cook
Rider High School
Wichita Falls, Texas

John B. Davis
Niagara-Wheatfield Central School
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H J McDonald Middle School
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Middlebrook School
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Anchorage School District
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Activity Testers

Clayton Millage
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Tonawanda, New York

Contents in Brief

GRADE EIGHT: FOCUS ON PHYSICAL SCIENCE

What are science content standards and why does California have them? Standards are guidelines for schools, students, and parents that describe the essential science concepts and skills for understanding the world in which we live. In 1999, The California State Board of Education established science content standards, and these standards will be the basis for state assessments that measure student achievement in science.

ADDITIONAL CONTENT STANDARDS FOR GRADE 8

- California Science Standards and Case Studies, found at the back of the book
- California Science Content Standards Assessment Practice booklets
- Chapter Assessments at the end of each chapter
- Science Voyages Website at www.glencoe.com/sec/science/ca

Motion

1. The velocity of an object is the rate of change of its position. As a basis for understanding this concept, students know:
   - **a.** position is defined relative to some choice of standard reference point and a set of reference directions.
     Sections 11-1, 17-2, 20-4, page 478
   - **b.** average speed is the total distance traveled divided by the total time elapsed. The speed of an object along the path traveled can vary.
     Sections 11-1, 17-1, 19-1, 19-2, page 478
   - **c.** how to solve problems involving distance, time, and average speed.
     Sections 11-1, 19-1, 19-2, page 479
   - **d.** to describe the velocity of an object, one must specify both direction and speed.
     Section 11-1, page 479
   - **e.** changes in velocity can be changes in speed, direction, or both.
     Sections 11-1, 11-2, page 480
   - **f.** how to interpret graphs of position versus time and speed versus time for motion in a single direction.
     Section 11-1, page 480

Forces

2. Unbalanced forces cause changes in velocity. As a basis for understanding this concept, students know:
   - **a.** a force has both direction and magnitude.
     Sections 5-1, 12-1, 12-2, 12-3, 12-4, 17-2, page 482
   - **b.** when an object is subject to two or more forces at once, the effect is the cumulative effect of all the forces.
     Sections 5-2, 12-1, 12-2, 24-4, 25-3, page 482
   - **c.** when the forces on an object are balanced, the motion of the object does not change.
     Sections 12-1, 12-4, 24-4, pages 482–483
   - **d.** how to identify separately two or more forces acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction.
     Sections 12-1, 25-3, page 483
   - **e.** when the forces on an object are unbalanced, the object will change its motion (that is, it will speed up, slow down, or change direction).
     Sections 7-1, 12-1, 12-2, 12-3, 12-4, 17-2, 24-3, 25-3, page 483
   - **f.** the greater the mass of an object, the more force is needed to achieve the same change in motion.
     Sections 11-2, 12-2, 12-3, 19-2, page 484
   - **g.** the role of gravity in forming and maintaining planets, stars, and the solar system.
     Sections 17-2, 17-3, 18-2, 19-1, 19-2, 19-3, 19-4, 20-3, 20-4, page 484

Structure of Matter

3. Elements have distinct properties and atomic structure. All matter is comprised of one or more of over 100 elements. As a basis for understanding this concept, students know:
   - **a.** the structure of the atom and how it is composed of protons, neutrons, and electrons.
     Sections 5-1, 5-2, 7-1, 7-2, 9-2, 10-1, page 487
   - **b.** compounds are formed by combining two or more different elements. Compounds have properties that are different from the constituent elements.
     Sections 4-1, 4-2, 5-1, 7-2, 8-1, 9-1, 9-2, 10-1, 10-2, 10-3, page 487
   - **c.** atoms and molecules form solids by building up repeating patterns such as the crystal structure of NaCl or long chain polymers.
     Sections 4-1, 7-2, 10-3, pages 487–488
   - **d.** the states (solid, liquid, gas) of matter depend on molecular motion.
     Sections 4-1, 4-2, 4-3, pages 262–263
   - **e.** in solids the atoms are closely locked in position and can only vibrate, in liquids the atoms and molecules are more loosely connected and can collide with and move past one another, while in gases the atoms or molecules are free to move independently, colliding frequently.
     Sections 4-1, 4-2, 4-3, 9-1, pages 262–263
   - **f.** how to use the Periodic Table to identify elements in simple compounds.
     Sections 6-1, 6-2, 6-3, 7-1, 7-1, pages 488–489

Earth in the Solar System (Earth Science)

4. The structure and composition of the universe can be learned from the study of stars and galaxies, and their evolution. As a basis for understanding this concept, students know:
   - **a.** galaxies are clusters of billions of stars, and may have different shapes.
     Section 20-4, page 490
   - **b.** the sun is one of many stars in our own Milky Way galaxy. Stars may differ in size, temperature, and color.
     Sections 19-1, 19-3, 20-1, 20-2, 20-3, 20-4, page 490

c. how to use astronomical units and light years as measures of distance between the sun, stars, and Earth.
Sections 19-2, 19-3, 20-1, 20-4, page 490

d. stars are the source of light for all bright objects in outer space. The moon and planets shine by reflected sunlight, not by their own light.
Sections 17-1, 18-2, 18-3, 19-1, 19-2, 20-3, pages 490–491

e. the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.
Sections 17-2, 17-3, 18-1, 18-2, 18-3, 19-1, 19-2, 19-3, 19-4, page 491

Reactions

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept, students know:

a. reactant atoms and molecules interact to form products with different chemical properties.
Sections 8-1, 8-2, 9-3, 10-1, 10-2, 10-3, 22-2, 23-1, page 494

b. the idea of atoms explains the conservation of matter: in chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.
Section 8-1, page 494

c. chemical reactions usually liberate heat or absorb heat.
Sections 8-1, 9-2, 26-2, page 494

d. physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
Sections 4-1, 4-2, 8-1, 9-1, 9-2, page 495

e. how to determine whether a solution is acidic, basic or neutral.
Sections 9-3, 22-2, 27-1, page 496

Chemistry of Living Systems (Life Science)

6. Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept, students know:

a. carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms.
Sections 6-2, 10-1, 10-2, 10-3, 21-1, 21-2, 22-2, 23-1, 26-2, page 498

b. living organisms are made of molecules largely consisting of carbon, hydrogen,nitrogen, oxygen, phosphorus and sulfur.
Sections 10-1, 10-2, 10-3, 21-2, 23-1, pages 498–499

c. living organisms have many different kinds of molecules including small ones such as water and salt, and very large ones such as carbohydrates, fats, proteins and DNA.
Sections 9-3, 10-1, 10-3, 23-1, 23-3, 24-4, pages 498–499

Periodic Table

7. The organization of the Periodic Table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept, students know:

a. how to identify regions corresponding to metals, nonmetals and inert gases.
Sections 6-1, 6-2, 6-3, 7-2, page 501

b. elements are defined by the number of protons in the nucleus, which is called the atomic number. Different isotopes of an element have a different number of neutrons in the nucleus.
Sections 5-2, 6-1, page 501

c. substances can be classified by their properties, including melting temperature, density, hardness, heat, and electrical conductivity.
Sections 6-1, 6-2, 6-3, 7-1, page 502

Density and Buoyancy

8. All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept, students know:

a. density is mass per unit volume.
Sections 1-2, 4-3, 18-1, pages 504–505

b. how to calculate the density of substances (regular and irregular solids, and liquids) from measurements of mass and volume.
Sections 1-2, 4-3, pages 504–506

c. the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid it has displaced.
Sections 4-3, 25-1, pages 504–505

d. how to predict whether an object will float or sink.
Sections 1-2, 4-3, pages 504–505

Investigation and Experimentation

9. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content of the other three strands, students
should develop their own questions and perform investigations. Students will:

a. plan and conduct a scientific investigation to test a hypothesis.
Sections 1-1, 1-2, 4-2, 4-3, 5-1, 5-2, 6-2, 6-3, 7-1, 7-2, 8-1, 8-2, 9-2, 10-3, 11-1, 20-4, 21-1, 24-3, 25-4, 27-1, pages 127, 482, 483, 484, 486, 487, 489, 494, 495, 496, 507

b. evaluate the accuracy and reproducibility of data.
Sections 1-1, 5-1, 5-2, 6-3, 7-1, 8-1, 17-2, 21-1, 24-3, 25-4, pages 481, 483, 493, 495, 503

c. distinguish between variable and controlled parameters in a test.
Sections 1-1, 1-2, 6-3, 8-1, 8-2, 9-2, 11-2, 12-2, 18-1, 21-1, 21-2, 24-3, 25-4, 27-1, pages 481, 482, 483, 488, 494, 495, 497, 500, 503, 555

d. recognize the slope of the linear graph as the constant in the relationship y=kx and apply this to interpret graphs constructed from data.
Sections 11-1, 26-1, pages 479, 480, 498, 953–954, 978

e. construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
Sections 1-1, 1-2, 4-1, 4-2, 5-2, 6-1, 9-2, 10-1, 25-1, 25-4, 26-1, pages 121, 149, 233, 479, 480, 498, 502, 978

f. apply simple mathematical relationships to determine one quantity given the other two (including speed = distance/time, density = mass/volume, force = pressure x area, volume = area x height).
Sections 1-1, 1-2, 4-1, 4-2, 4-3, 5-2, 7-1, 8-2, 9-2, 10-1, 10-3, 11-1, 11-2, 11-3, 12-4, 17-1, 17-2, 19-2, 21-2, 23-3, 26-1, 27-1, pages 324, 357, 479, 499, 505

g. distinguish between linear and nonlinear relationships on a graph of data.
Sections 1-1, 4-1, 4-2, 5-2, 10-1, 11-1, pages 325, 480, 491, 502, 953–954, 978

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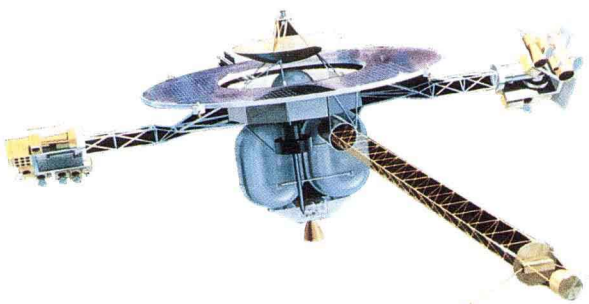

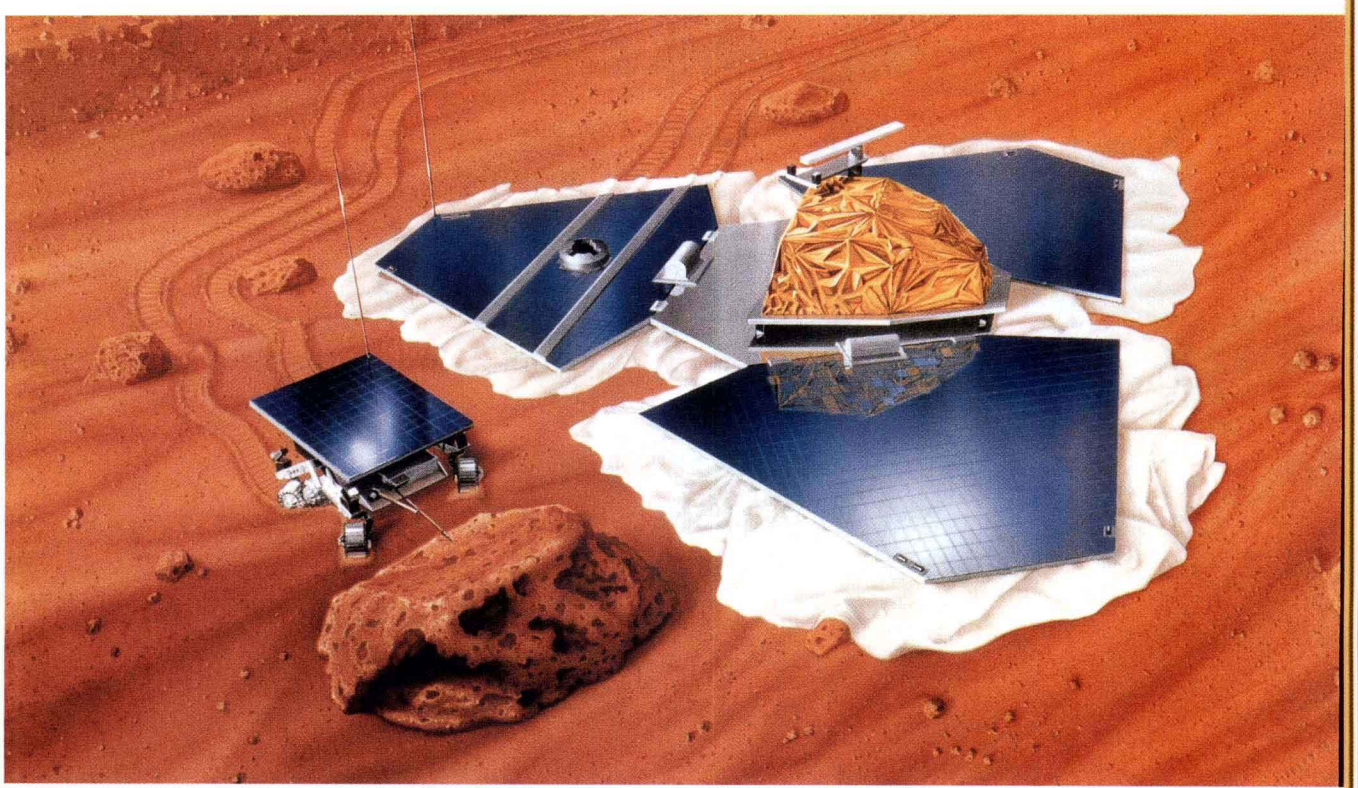

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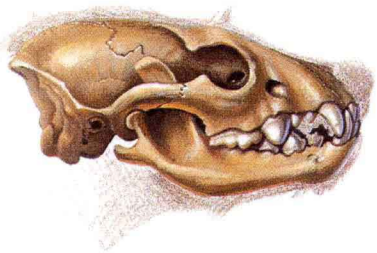

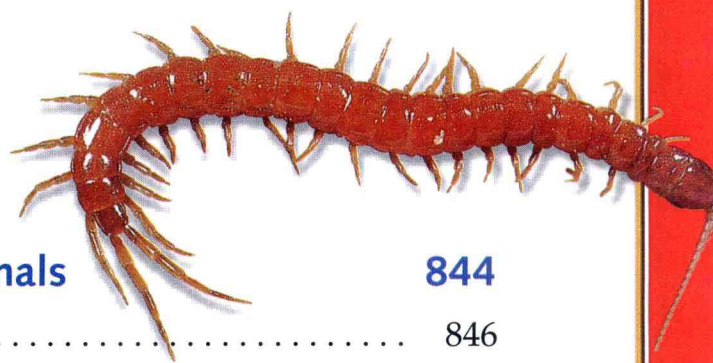

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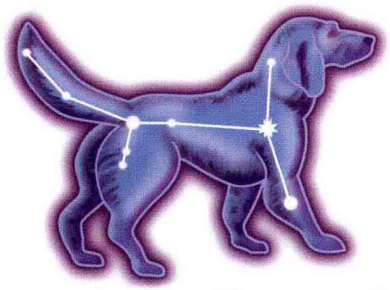

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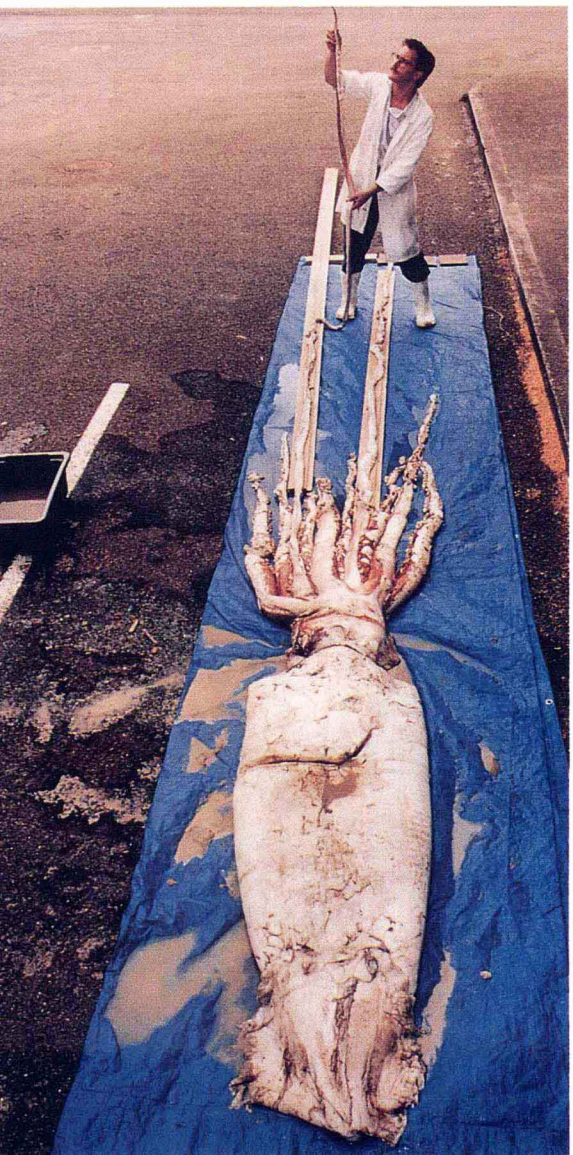
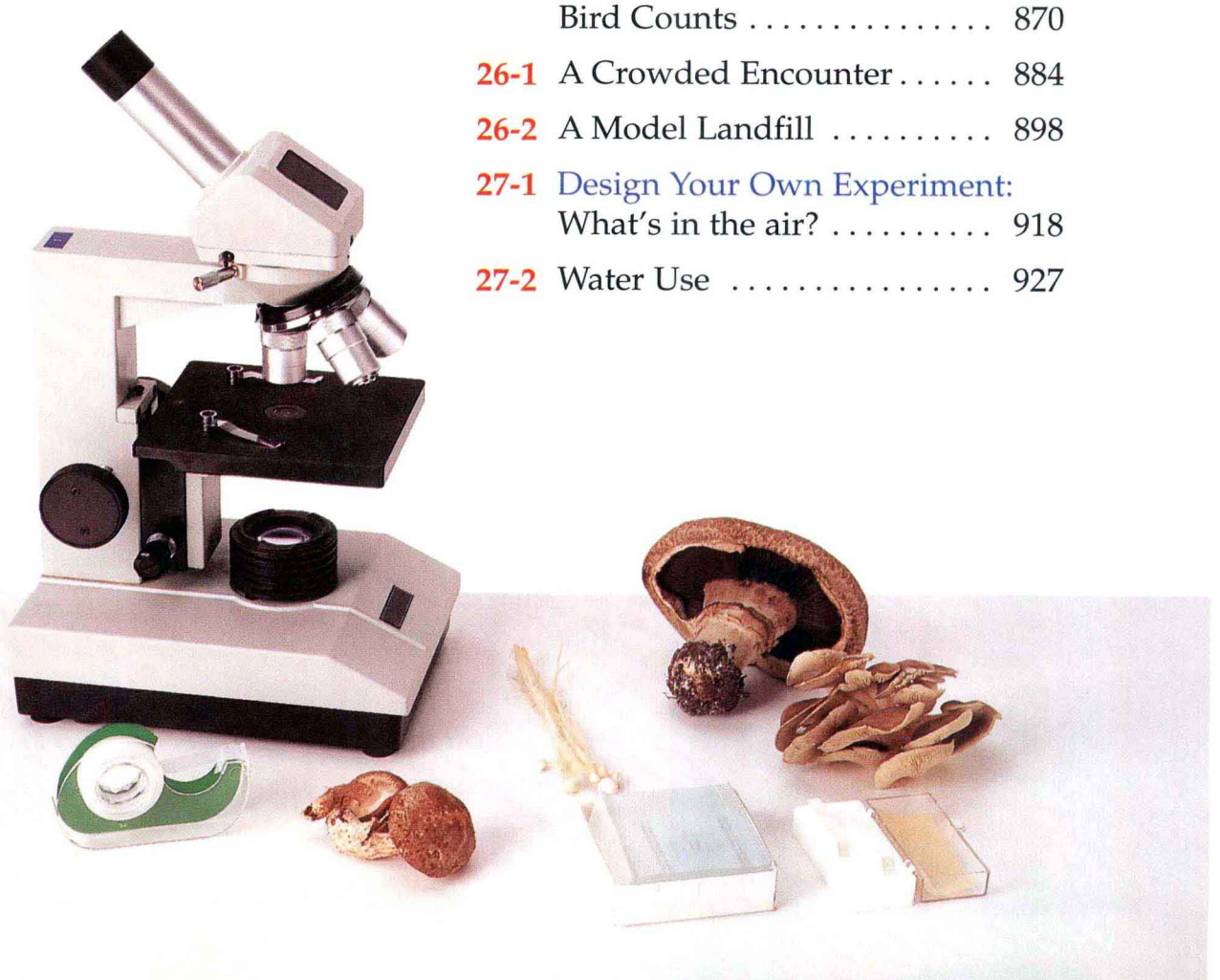


History of Science

How it Works

Activities



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Try at Home Mini Lab

Explore Activities

Problem Solving