




BIOLOGY!

BRINGING SCIENCE TO LIFE

JOHN H. POSTLETHWAIT
JANET L. HOPSON
RUTH C. VERES



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JOHN H. POSTLETHWAIT
University of Oregon

JANET L. HOPSON
University of California, Santa Cruz

RUTH C. VERES

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Steven Hopson.—J.L.H.
For Peter, Maia, Michael, Kati, Bernard, and in memory of
Anne.—R.C.V.

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BRINGING SCIENCE TO LIFE

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Senior Associate Editor: Mary Eshelman

Editing Supervisors: Phyllis Niklas, Alice Mace Nakanishi

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Designer: Janet Bollow

Developmental Art Consultants: Peter Veres, Cherie Wetzel

Illustrators: Martha Blake, Wayne Clark, Cindy Clark-Huegel,

Cecile Duray-Bito, Paula McKenzie, Linda McVay, Elizabeth

Morales-Denney, Victor Royer, Carla Simmons, John Waller,

Judith Waller

Box Logo Illustrator: Steve Madson

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Copyeditor: Janet Greenblatt

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PREFACE

In recent years, several groups have tested the scientific literacy of American adults, and the results have been startling.

- Nearly a quarter of Americans think the sun revolves around the earth.
- Forty percent can't place the Pacific Ocean on an unlabeled map.
- One third couldn't say what a molecule is.
- Five out of six don't know the basics of genetic engineering.
- More than half failed a Kinsey Institute quiz on sex and reproduction.
- Even our best high school biology students (those in advanced placement courses) scored lowest, on average, among their peers from thirteen other industrialized nations in a recent exam.

While there are several, often conflicting, explanations for our national illiteracy in biology and other sciences, surveys reveal unambiguously negative attitudes among the very people who have the most to learn. The public, to put it simply, doesn't like science very much. Most students think the subjects are difficult, only for top scholars, and all-around just plain boring.

Required to memorize biological details such as the life cycles of the slime molds, the molecular structure of a ribosome, or the anatomy of a worm, students will quite logically wonder: What's this got to do with me and my life? Texts and courses have frequently overlooked the need for a clear framework showing how details like these can fit into the broader themes of biology and everyday life, not to mention underemphasizing health, fitness, food, sex, the environment, and other topics of intrinsic interest to students.

Somehow, despite our nation's superiority in science and technology, students have missed out on the excitement of scientific discovery and the pleasure of exploring and understanding the physical world. Their natural curiosity about nature has all too often been stifled by the time they reach college, and thus they are unaware of the vital role that biology and other sciences play in our survival, now and in the future. People today are faced with dozens of important choices about what to eat or avoid; what to buy or not buy; what to support politically or vote down; how to protect themselves against AIDS, heart disease, obesity, and other conditions; and what they can do personally to prevent the global environment from being further denuded, planted, paved, and polluted. Quite clearly, we face a dilemma of serious proportions: an entire generation of unprepared students who nevertheless need to understand biological science as never before.

It was against this challenging backdrop that we planned and produced *Biology! Bringing Science to Life*. We wanted to create a learning tool that was not simply a shortened version of our well-received book *The Nature of Life*. Instead, we designed a book that could provide any beginning college student, regardless of previous biology courses or attitudes toward science, with the information he or she needs to make informed personal and societal choices as a citizen of the late twentieth century. To do this, the book would have to selectively present those supporting facts and concepts needed for clear understanding, place them in a broad context, and deliver them in a way that would interest, entertain, and provoke the reader. While the student was acquiring the basic knowledge to make informed life choices, he or she could also pick up a heightened appreciation along the way for the natural world, and for the ways biologists think, work, and discover. Beginning students and their professors have repeatedly called for such a book, and we hope *Biology!* does the job.

Each chapter begins with a story—a dilemma, really.

- How can people, all of whom are 65 percent water, live and thrive in the desert?
- How does solar energy (indirectly, of course) power a hiker up a mountain trail?
- Why do some diseases resist treatment with antibiotics?
- Why can't some people drink diet sodas?
- How can a climber reach the top of Mt. Everest without an oxygen tank?
- How does cocaine damage the nerves and brain of an unborn baby?
- Is our environment heating up, and how will that affect us?

Each chapter then provides the necessary background facts and concepts to answer the question, as well as raising and addressing related ones, many of direct relevance to the students.

- Should you catch some rays?
- Should you undergo genetic screening?
- What can you do to help prevent global warming and ozone depletion?

We pose many of these questions in the boxes called Health Choices, Societal Choices, and Environmental Choices. These essays always provide evidence about various sides of the issues, and encourage students to formulate their own opinions and plans of action. The essays end with lists of additional sources of information, and the lists represent our response to an interesting point raised by surveys of science literacy. The vast majority of respondents

consider it far more important for a citizen to be able to locate, read, and apply scientific information than to memorize science facts and concepts and spout them at will. The much sought-after educational commodity called “critical thinking” depends on this information gathering and processing. The boxed essays called Personal Impact are also designed to stimulate critical thinking by applying basic material from the surrounding chapter to topics of student interest.

The book further encourages critical thinking through another series of boxes called Discovery. These boxes are models of the scientific process that show how biologists study the world—how they make observations, pose specific questions, and test possible answers. The boxes are designed to be more than a recitation of the scientific method. They are intended to show how scientists think and what processes they use—processes which we all employ every day—in solving problems.

The contemporary graphic and art styles we have chosen for *Biology!* are intended to invite and appeal to readers, as well as to illustrate the material in a simple, clear way. An innovative feature called At a Glance provides an illustrated summary at the end of each chapter. Other study tools in each chapter include underlined take-home messages, a Connections section to review and interrelate concepts, a New Terms list, Study Questions, and a For Further Reading list. Our approach is deliberately visual and oriented toward high student interest and easy review. We hope it accomplishes our goals and will help in some small way to close the worrisome gap between society’s science illiteracy and its desperate need to understand and apply science facts and ideas to daily life and global directions.

≡ SUPPLEMENTARY MATERIALS

A comprehensive and completely integrated package of supplementary materials accompanies *Biology! Bringing Science to Life*.

- **Instructor’s Manual and Resource Guide**
Dennis Todd, University of Oregon
- **LecturePak** (transparency masters of lecture outlines)
Dennis Todd, University of Oregon
- **Study Guide**
Deborah M. Brosnan, Oregon State University
- **Test Bank**
Dennis Todd, University of Oregon
- **Laboratory Manual**
Eileen Jokinen, University of Connecticut, Storrs
Theodore Taigen, University of Connecticut, Storrs
Thomas Terry, University of Connecticut, Storrs
David Wagner, University of Connecticut, Storrs
- **Laboratory Preparator’s Guide**
Eileen Jokinen, University of Connecticut, Storrs
Theodore Taigen, University of Connecticut, Storrs

- Thomas Terry, University of Connecticut, Storrs
- David Wagner, University of Connecticut, Storrs
- **Computerized Instructor’s Manual** (available in IBM, Macintosh, Apple)
- **Computerized Test Bank** (available in IBM, Macintosh, Apple)
- **BioPartner** (Computerized Study Guide; available in IBM, Macintosh)
- **Videos**
- **Biology Slides and Acetate Package**
- **Videodisk**
- **HyperMedia Software** (Macintosh):
Lecture Planner (to accompany the Videodisk)
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Biological Diversity (interactive software)
Daniel Udovic, University of Oregon

For further information regarding the supplements available, please contact your local McGraw-Hill representative.

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John Postlethwait
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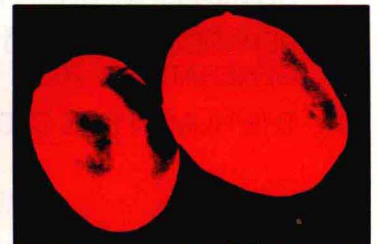
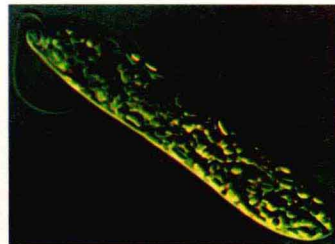
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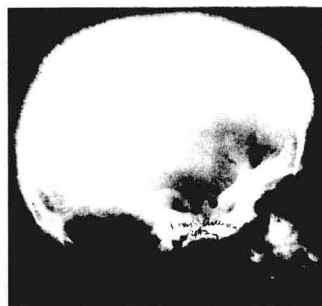
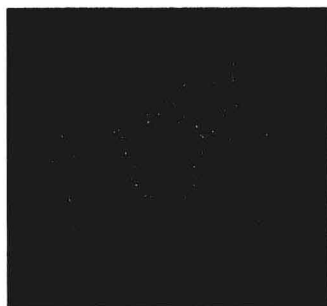
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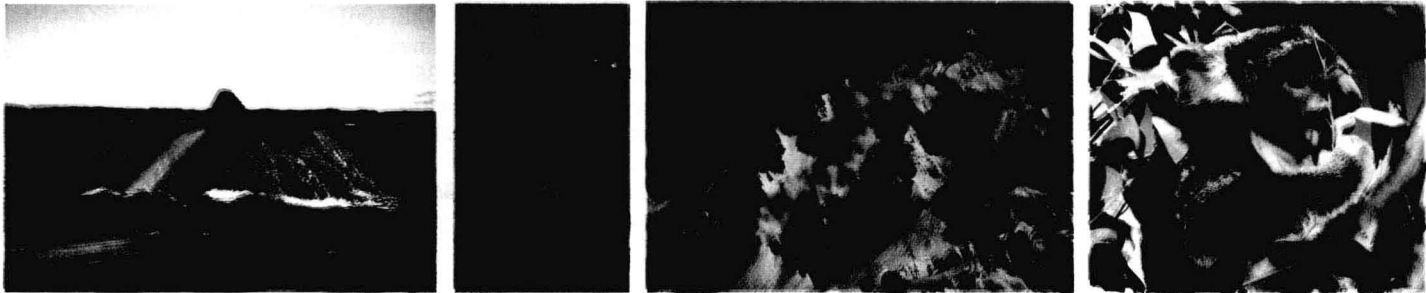
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