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Biology
Miller
Levine

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Print Components

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Laboratory Manual A, Annotated Teacher's Edition
Laboratory Manual B
Laboratory Manual B, Annotated Teacher's Edition
Teaching Resources
Reading and Study Workbook A
Reading and Study Workbook A, Annotated Teacher's Edition
Adapted Reading and Study Workbook B
Adapted Reading and Study Workbook B, Annotated Teacher's Edition
Chapter Tests: Levels A and B
Includes Unit Tests and Final Exams
Computer Test Bank
Biotechnology Manual
Laboratory Assessment With Scoring Guide
Issues and Decision Making
BioDetectives: Investigations in Forensics
Probeware Lab Manual
Teacher's ELL Handbook
Lesson Plans

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Transparencies
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BioDetectives Videotapes
Prentice Hall *Biology* Web Site
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Animated Biological Concepts Videotapes
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Spanish Components

Student Edition
Teacher's Guide
Chapter Tests: Levels A and B
Section Summaries with Vocabulary Review
Section Summaries Audio CD-ROM
Animated Biological Concepts Videotape Library

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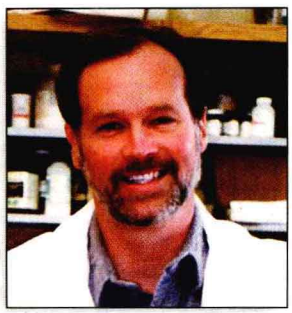
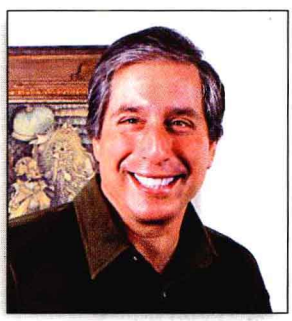
About the Authors



Kenneth R. Miller grew up in Rahway, New Jersey, attended the local public schools, and graduated from Rahway High School in 1966. Miller attended Brown University on a scholarship and graduated with honors. He was awarded a National Defense Education Act fellowship for graduate study, and earned his Ph.D. in Biology at the University of Colorado. Miller is Professor of Biology at Brown University in Providence, Rhode Island, where he teaches courses in general biology and cell biology.

Miller's research specialty is the structure of biological membranes. He has published more than 70 research papers in journals such as *CELL, Nature,* and *Scientific American.* In 1999, he wrote the popular trade book *Finding Darwin's God.*

Miller lives with his wife, Jody, on a small farm in Rehoboth, Massachusetts. He is the father of two daughters, one of whom is a wildlife biologist. He swims competitively in the masters' swimming program and umpires high school and collegiate softball.



Joseph S. Levine was born in Mount Vernon, New York, where he attended public schools. He earned a B.S. in Biology at Tufts University, a master's degree from the Boston University Marine Program, and a Ph.D. at Harvard University. His research has been published in scientific journals ranging from *Science* to *Scientific American,* and in several academic books. He taught introductory biology, marine ecology, and neurobiology for six years at Boston College.

After receiving a Macy Fellowship in Science Broadcast Journalism at WGBH-TV, Levine dedicated himself to improving public understanding of science. His popular scientific writing has appeared in five trade books and in magazines such as *Smithsonian, GEO,* and *Natural History.* He has produced science features for National Public Radio and has designed exhibit programs for state aquarium projects in Texas, New Jersey, and Florida.

Since 1987, Levine has served as scientific advisor at WGBH, where he worked on *NOVA* programs and on projects including the film *Cocos: Island of Sharks* and the series *The Secret of Life.* Most recently, he served as Science Editor for *The Evolution Project.*

Levine and his family live in Concord, Massachusetts, a short distance from Thoreau's Walden Pond.

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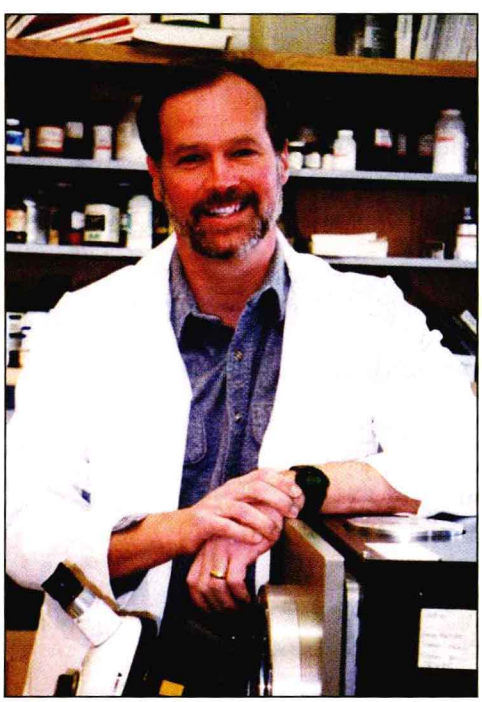
Dear Student

Joe Levine and I wrote this book for a very simple reason: We wanted to let you in on a secret. Biology isn't just a "subject" in school. Biology is the science of life itself. Biology is the study of what makes an eagle fly, a flower bloom, or a caterpillar turn into a butterfly. It's the study of ourselves—of how our bodies grow and change and respond to the outside world, and it's the study of our planet, a world transformed by the actions of living things. Of course, you might have known some of this already. So, what's the secret?

The secret is that you've come along at just the right time. In all of human history, there has never been a moment like the present, a time when we stood so close to the threshold of answering the most fundamental questions about the nature of life. You belong to the first generation of students who can read the human genome almost as your parents might have read a book or a newspaper. You are the first students who will grow up in a world that has a chance to use that information for the benefit of humanity, and you are the very first to bear the burden of using that knowledge wisely.

If all of this seems like heavy stuff, it is. But there is another reason we wrote this book, and we hope that is not a secret at all. Science is fun! Biologists aren't a bunch of serious, grim-faced, middle-aged folks in lab coats who think of nothing but work. In fact, most of the people we know in science would tell you honestly, with broad grins on their faces, that they have the best jobs in the world. They would say there's nothing that compares to the excitement of doing scientific work, and that the beauty and variety of life make every day a new adventure.



We agree, and we hope that you'll keep something in mind as you begin the study of biology. You don't need a lab coat or a degree or a laboratory to be a scientist. What you do need is an inquiring mind, the patience to look at nature carefully, and the willingness to figure things out. We've filled this book with some of the latest and most important discoveries about living things, but we hope we've also filled it with something else: our wonder, our amazement, and our sheer delight in the variety of life itself. Come on in, and enjoy the journey!

Sincerely,

Ken Miller

Dear Student

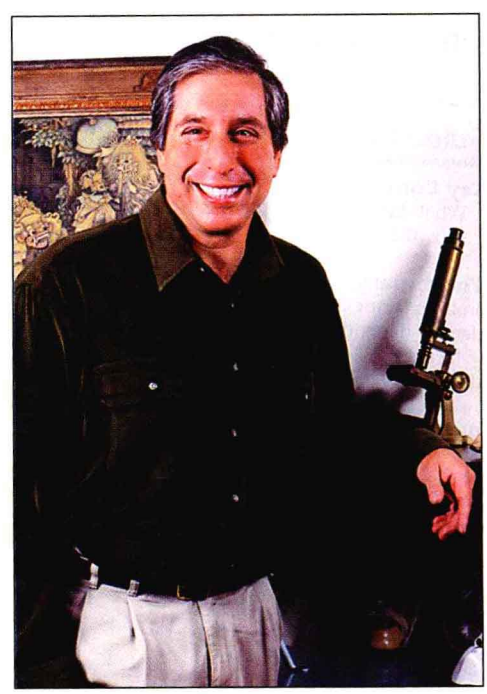
What do you think about biology? Are you interested in the natural world and the workings of your body? Or could you care less, and do you find yourself wondering "What's in it for me?" However you think, Ken and I wrote this book to convince you that biology is exciting, fascinating—and important to you. In fact, biology is more important to the daily lives of all humans today than it has ever been.

Why? You could answer in three words: "We are one." Now, this is a science text, so this statement isn't meant in any kind of "touchy-feely" or "New Age" way. "We" means all living things on earth. And "are one" means that all of us are tied together more tightly, in more different ways, than anyone ever dreamed of until recently. That's what biology tells us.

All forms of life—from bacteria to palm trees to humans are based on information written in a single, universal code carried in our genes. As biologists "read" those genes, they find nearly identical instructions directing life's processes in all of us. That's why medical researchers can learn about human diseases—diseases that may strike you or your family—by studying yeast. We are one on the molecular level.

All organisms interact with one another and with the environment in ways that create our planet's web of life. Organisms make tropical rain forests and coral reefs, prairies and swamps—and farms and cities. Our interactions involve not only each other—but also the winds and ocean currents that tie our planet together. Human activity can change, and is changing, local and global environments in ways that alter our ability to produce food and protect ourselves from diseases. We are one on the global ecological level.

All organisms change over time as they adapt to their surroundings. If humans alter the environment, we encourage other organisms to change. When we deploy antibiotics against bacteria, they develop resistance to our drugs. If we use pesticides against insects, they become immune to our poisons. We are one in our ability to evolve over time.



Those are the kinds of connections you will find in this book. Microscopic. Enormous. Amusing. Threatening. But always fascinating. That's why—no matter where you start off in your attitude about biology—we think you are in for some surprises!

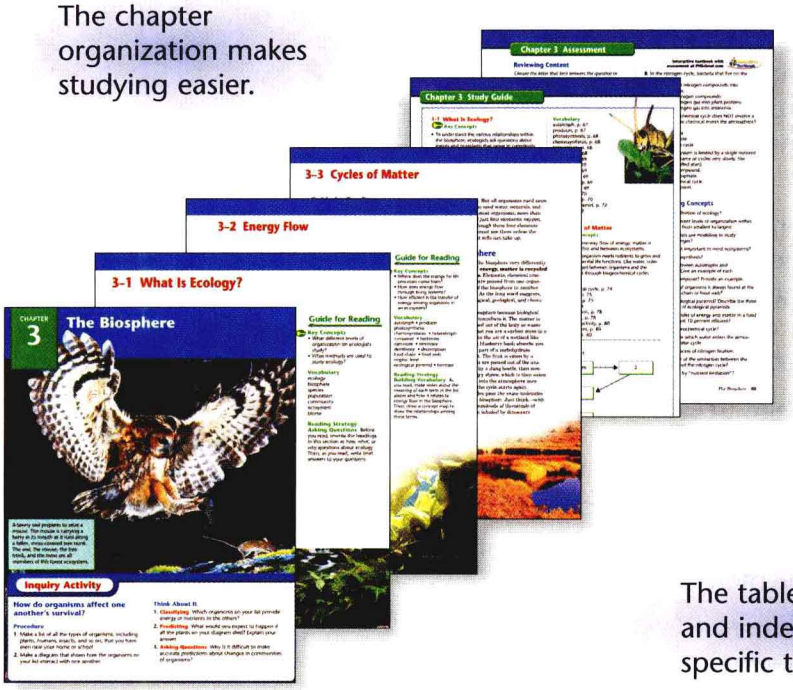
Sincerely,

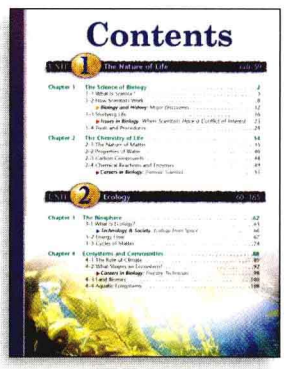
Joe Levine

Use This Book for Success

See the book as a whole.

The chapter organization makes studying easier.





The table of contents, glossary, and index help you find specific topics.

Read for mastery.

Key Concepts are clearly identified.

Guide for Reading

Key Concept
- What factors limit population growth?

Vocabulary
limiting factor
density-dependent limiting factor
density-independent limiting factor
predator-prey relationship

Reading Strategy: Predicting Before you read, preview the diagram in **Figure 5–5.** Predict how each factor might limit the growth of a population. As you read, note whether your predictions were correct or incorrect.

level. These factors operate most strongly when a population is large and dense, and do not usually affect small, scattered populations. **Density-dependent limiting factors include competition, predation, parasitism, and disease.**

CHECKPOINT *What is a density-dependent limiting factor?*

5–2 Section Assessment

1. **Key Concept** List three density-dependent factors and three density-independent factors that can limit the growth of a population.
2. What is the relationship between competition and population size?
3. If an entire lynx population disappears, what is likely to happen to the hare population on which it preys?
4. **Critical Thinking Applying Concepts** Give an example of a density-independent limiting factor that has affected a human population. Describe how this factor changed the human population.
5. Identify how a limited resource can affect the size of a population. Give an example that illustrates this situation.

Connecting Concepts

Biotic and Abiotic Factors Study the factors that limit population growth as shown in **Figure 5–5.** Classify each factor as either biotic or abiotic. Refer to the information on biotic and abiotic factors in Section 4–2.

Monitor your progress.

Use concrete strategies for active learning.

Visualize the content.

Photographs

Photographs of real-world examples make topics memorable.

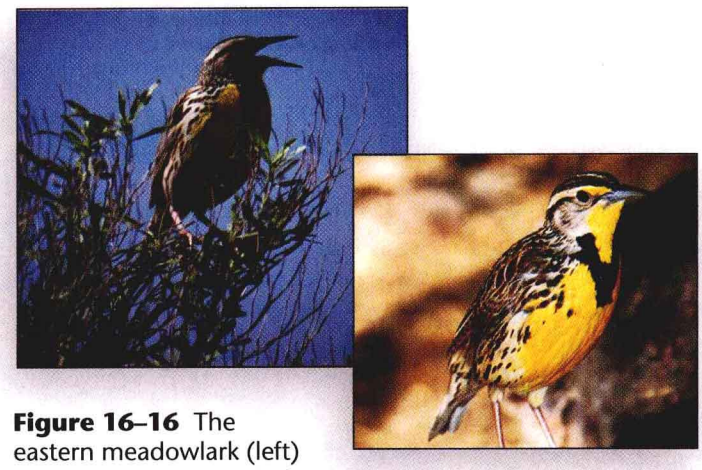
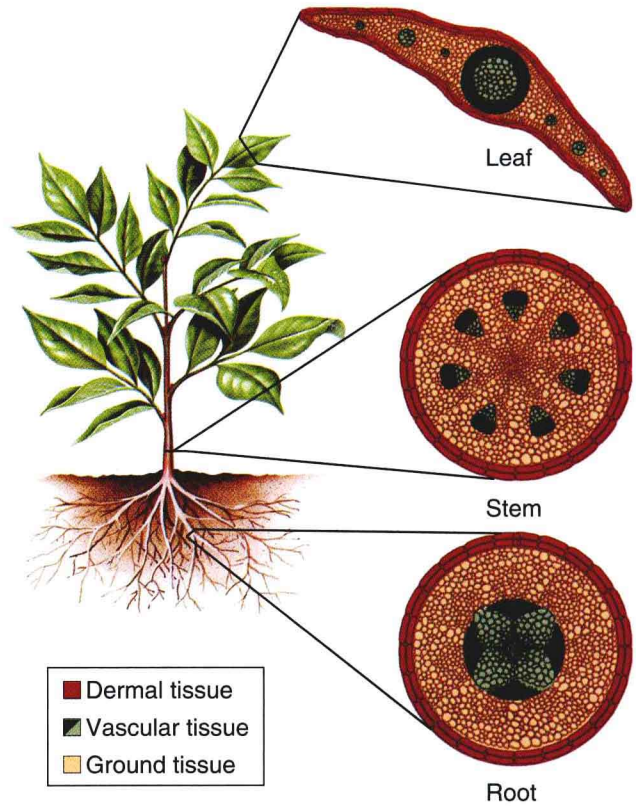


Figure 16–16 The eastern meadowlark (left) and western meadowlark (right) have overlapping ranges. They do not interbreed, however, because they have different mating songs.
Applying Concepts ***What type of reproductive isolation does this situation illustrate?***

Caption questions reinforce knowledge and deepen understanding.

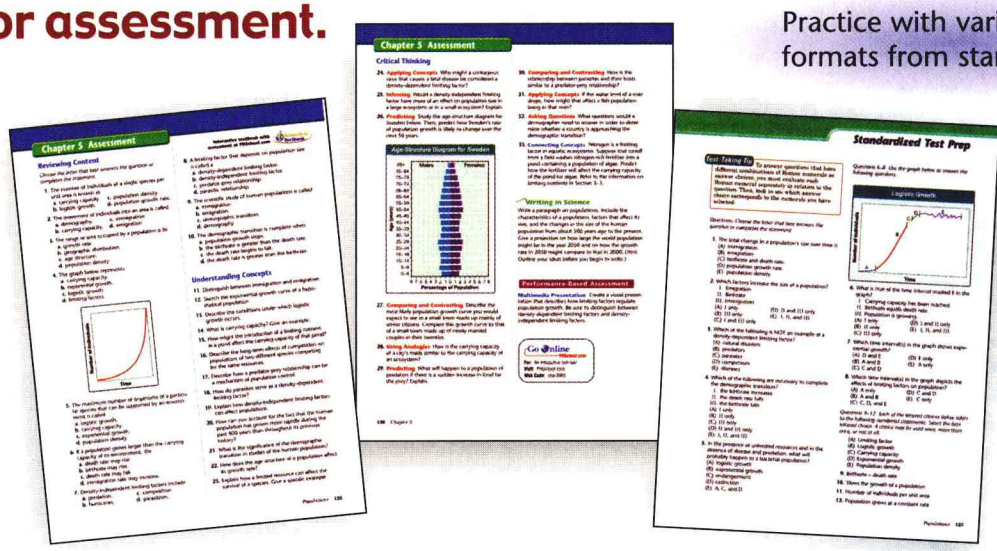


Diagrams

Diagrams break down complex ideas and demonstrate abstract processes.

Prepare for assessment.

Practice with varied question formats from standardized tests.



Review each chapter with a variety of question formats.

Interactive Textbook

Measure your knowledge with self-administered tests.

UNIT 1

The Nature of Life

Chapters

▶ The ocean floor off the coast of New Guinea is home to many forms of life. Small fish called basslets swim gracefully among the rocks and coral, while yellow feather star crinoids grow out of plate corals.

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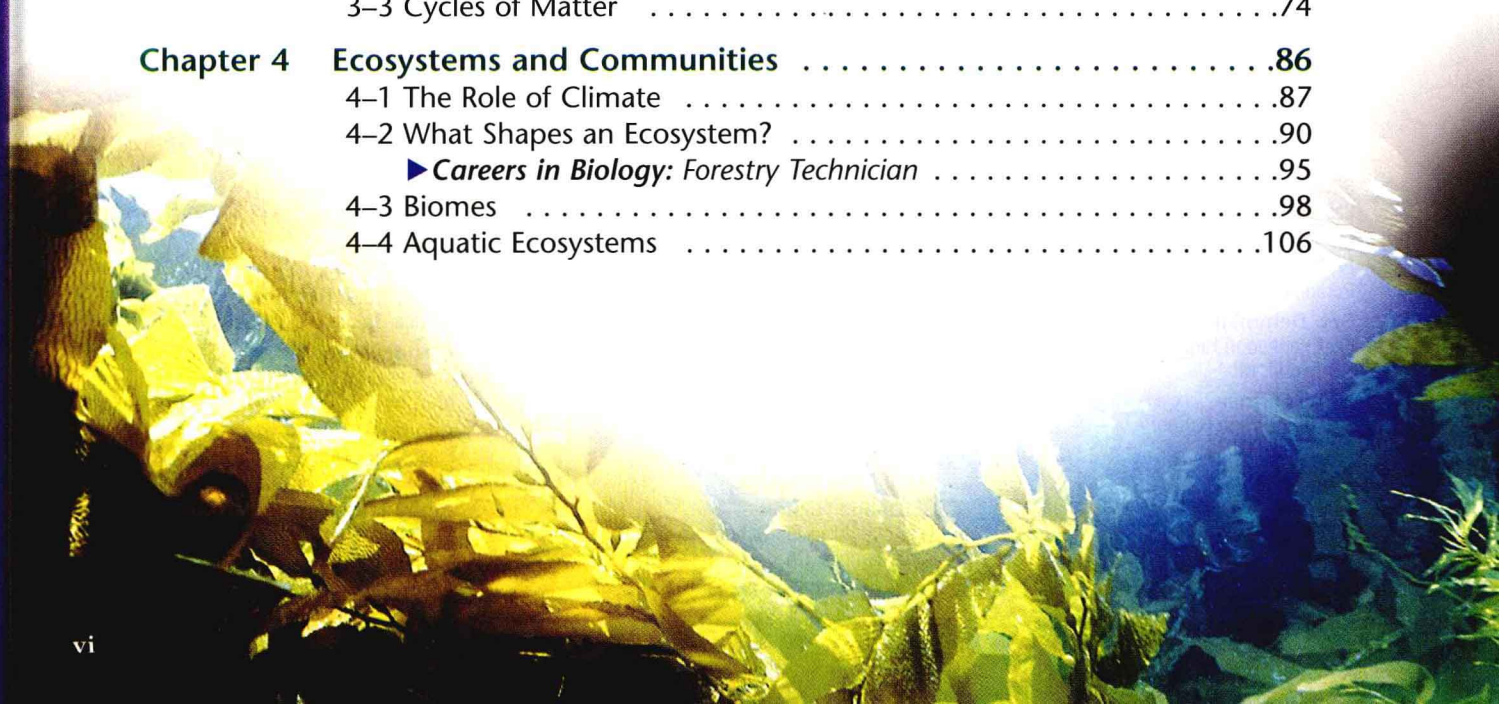

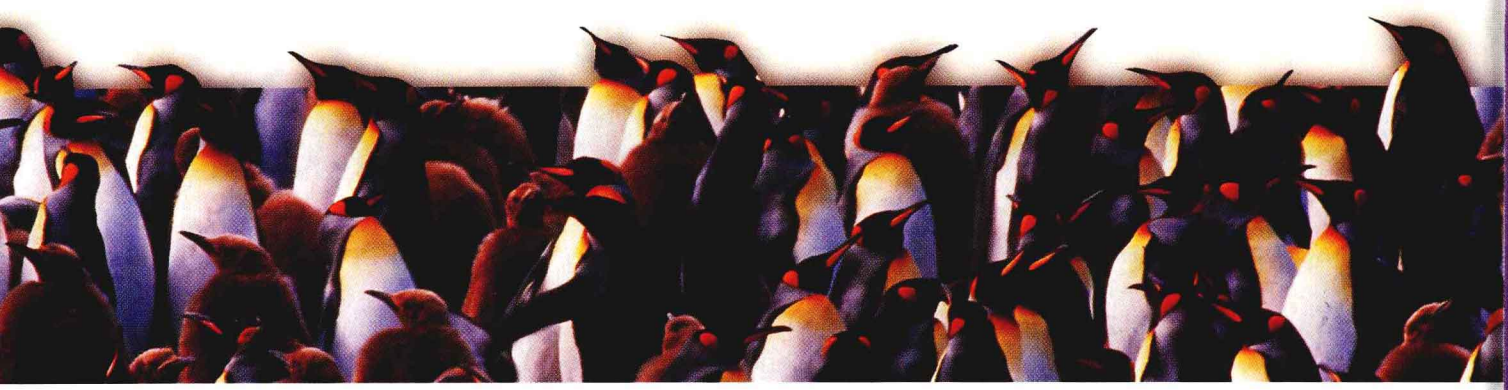

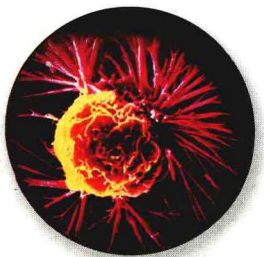

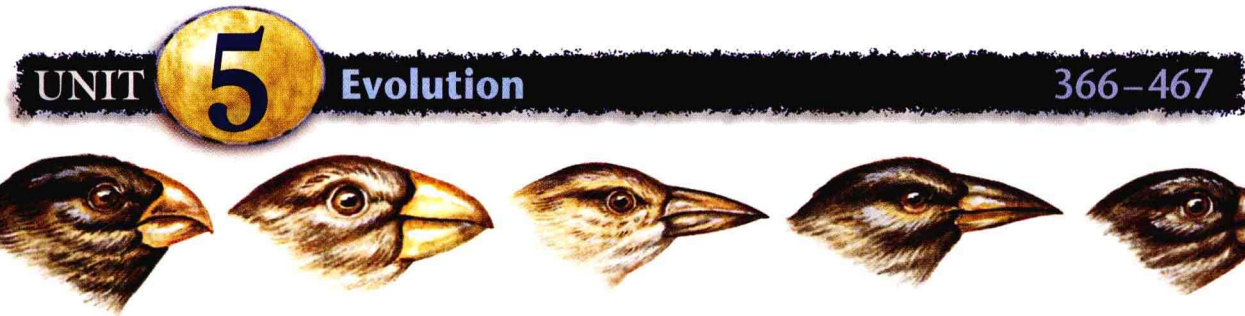

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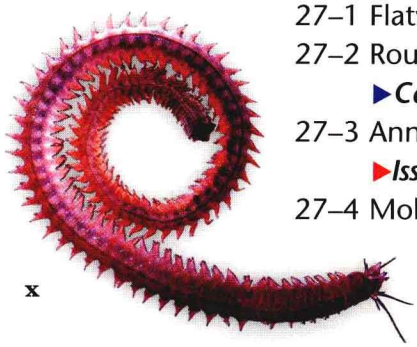

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