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Audesirk | Audesirk | Byers

Life on Earth

FOURTH EDITION

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Including Chapters 27-30

University of Wisconsin-LaCrosse

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Taken from:

Life on Earth, Fourth Edition
by Teresa Audesirk, Gerald Audesirk, and Bruce E. Byers



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Preface

Are recent claims about cloned human babies true? Are genetically engineered crops safe? Are people causing climate change? How can we stop the spread of AIDS? Will physicians soon be transplanting pig hearts into people routinely? Why are antibiotic medicines becoming less effective? Many of today's most important and controversial social, medical, environmental, and ethical issues are related to biology. The need for voters, jurors, and citizens in general to understand the basic concepts of biology has never been more urgent.

Many of the students who will use this text are enrolled in a course that will provide both their first and final exposure to biology before they leave formal education. We hope that they will emerge from the course prepared to ask intelligent questions, make informed choices, and scrutinize science articles in the popular press with an educated and critical eye. We also hope that students will better understand and appreciate their own bodies, the other organisms with which we share Earth, the evolutionary forces that mold all life-forms, and how complex interactions within ecosystems sustain us and all other life on our planet. Perhaps most of all, we hope that students will develop a fascination with life that will inspire them to keep learning science. To help instructors achieve these teaching goals, we offer this revision of *Life on Earth*. Now in its fourth edition, *Life on Earth* helps students effectively manage a wealth of scientific information and motivates their learning.

Helping Students Manage Information and Get Motivated

The fourth edition of *Life on Earth*—which is not just a textbook, but rather a complete package of teaching aids for the instructor and learning aids for students—has been revised with three specific goals:

- To help instructors **manage the presentation of the wealth of biological information** with the goal of producing scientifically literate students
- To help students build familiarity with the **process of science** through an engaging storyline
- To help students **relate** this information to their own lives so as to understand its importance and relevance

Life on Earth

... Is Organized Clearly and Uniformly to Maximize Conceptual Understanding

Throughout each chapter, students will find aids that help them navigate through the large amount of information they face in this course. We have organized this text to help students see the forest and the trees, without getting lost in thickets of detail.

- “At a Glance” at the start of each chapter brings together the chapter's major subheadings and now includes the titles of essays

as well. Instructors can easily assign—and students can easily locate—key topics within each chapter.

- Major sections are introduced as questions to which the student will find answers in the section, while minor subheadings are presented as summary statements that reflect content. A crucial outgrowth of this organizational scheme is that it imparts an understanding of biology as a hierarchy of interrelated concepts, rather than a set of isolated, independent subjects. It also reminds students of the importance in science of asking questions.
- The “Summary of Key Concepts” pulls together the important concepts. To be clear and consistent, we use the same major subheadings in both the “At a Glance” and the chapters themselves, allowing instructors and students to move efficiently among the different components within a chapter.
- In cases where animations or online practice may help make a point more clearly, we have added Media Activity tabs within each chapter. These direct the students to OneKey, which contains relevant activities, animations, and practice tests; the Media Activity numbers in the book correspond with OneKey for easy navigation. Detailed descriptions of each Media Activity are found at the end of each chapter.

... Actively Engages and Motivates Students

Scientific literacy cannot be imposed on students; they must actively participate in acquiring both the core facts and the way of thinking like a scientist. This job is a lot easier if students recognize that biology is about their personal lives as well as the life all around them. To help engage and motivate students, this new edition incorporates the following:

- **Openers/Closers.** Each chapter opens with a strikingly illustrated, brief essay. The opener essays are based on recent news items, on situations in which students might find themselves, or on particularly fascinating biological topics. For example, students will investigate blood doping by elite athletes (p. 99); contemplate the use of DNA to solve historical mysteries (p. 113) and crimes (p. 193); see cloned, genetically engineered pigs that are being raised as potential organ donors for humans (p. 379); and follow along as a scientist estimates the number of species on Earth (p. 283). Each opener ends with a cliff-hanger, seducing students to read more. At the end of each chapter, we revisit the story, allowing students to explore the topic a bit further in light of what they have just learned and, often, to find answers to questions raised in the initial piece. The “revisited” essays conclude with a new “Consider This” segment that poses an open-ended question to encourage deeper thinking about the topic. If you want to encourage students to read the openers, you can assign these questions.
- **Links to Life.** A new feature in the fourth edition, “Links to Life” ends each chapter on a relevant note. These short, informally written segments are related to subjects that are both very familiar to the student and relevant to the chapter.

- **Caption Queries.** New in this edition, selected figure captions in each chapter include questions designed to encourage readers to review and extend their new knowledge of the pictured structure or process. These help link the graphics to the content, a helpful exercise for today's more visual learners.
- **Bioethics.** Many topics explored in the text have ethical implications. New in the fourth edition, these topics are now identified by an icon that alerts students and teachers to the possibility of further discussion and exploration.
- **Essays.** We retain our two original essay libraries, including "Earth Watch," environmental essays that explore issues such as the loss of biodiversity, the growing ozone hole, and invasions of exotic species, and our medically related "Health Watch" essays, which investigate topics such as sexually transmitted diseases, the dangers of artificial steroids, and how smoking damages the lungs. New in this edition, "Biotechnology Watch" essays examine the impact of new technologies such as cloning, *in vitro* fertilization, and genetic modification of organisms.

... Emphasizes Scientific Reasoning

In order to make sound decisions at the voting booth or to evaluate assertions made by the media, students need to think critically. To help students develop scientific reasoning skills, we have added the following:

- **Openers and Closers.** In addition to the engaging, relevant biological storyline, the opener essays build students' familiarity with the process of science and demonstrate how scientists use the process to reach conclusions. The opening and the closing essays incorporate many examples of questions posed, hypotheses stated, predictions made, and experiments performed. Our aim is to show by example how scientists gather objective evidence about interesting questions relevant to students' lives. We hope that student readers of *Life on Earth* will begin to think like scientists. Nothing would please us more than a student who, upon hearing an assertion on television or reading a claim on the Internet, instinctively asks, "What is the evidence and how was it gathered?"
- **Is This Science?** We have added new "Is This Science?" questions to the "Applying the Concepts" critical-thinking questions at the end of each chapter. The new questions are designed to help students practice their scientific reasoning and critical-thinking skills.

... Contains Superior Illustrations for Greater Clarity and Consistency and to Inspire Reader Interest

Benefiting from the advice of reviewers, a talented biological illustrator, and careful scrutiny by the authors and developmental editor, we have extensively revised the illustration program. For the fourth edition, we have:

- Expanded the consistent use of color. We have been vigilant in tracking the use of color to provide consistency in illustrating specific atoms, structures, and processes. We have also made the colors more vibrant to better distinguish individual parts of a figure, to help engage the modern readers' interest, and to focus attention on the most important aspects of the illustration.
- Improved overall quality. We have redrawn the more diagrammatic figures for greater interest and accuracy.

- Enhanced label clarity. We have revised the size, placement, and font of figure labels for more consistency and readability.
- Organized content more efficiently. We have modified the placement of parts of multipart figures for easier navigation through the figure.
- Explained figure content more clearly. Through the judicious use of "talking boxes," we have placed more explanatory statements within figures for greater clarity and ease of reading.
- Modified figure captions to enhance function. Our figure titles now summarize the content; we have made the captions more concise and, to stimulate critical thinking, have added thought-provoking questions to several captions within each chapter.

... Provides Print and Media Resources That Aid User Exploration For Instructors

- **OneKey:** OneKey for *Life on Earth, Fourth Edition*, supplies anywhere, anytime access to conveniently organized course materials. OneKey provides instructors and students with a single location for our entire collection of superb teaching and learning resources. OneKey also includes everything instructors need to plan and administer courses. All instructor resources are consolidated in one location to maximize your effectiveness and efficiency.
 - All of the figures from the text, both labeled and unlabeled, specially formatted for large lecture hall presentation.
 - The new Biology Lecture Animations & Simulations library, designed for use in class. This stunning collection of animations and simulations illustrates over 50 key concepts identified for nonmajors as the most difficult to visualize by a panel of biology instructors. Unlike animations built for student tutorials, these are designed specifically for use in the lecture environment and provide you with optimal flexibility and control.
 - All the student Web Tutorials from the Student Accelerator CD.
 - Two prebuilt PowerPoint® shows, one containing all art from each chapter, and another containing all animations, simulations, and videos.
 - Lecture resource outlines, which map all our resources by chapter and section, so you know what we have available as you prepare your class.
 - Lecture activities, which are presentation and assessment ideas for use during class to promote active learning.
 - Clicker questions, which are ready to go in PowerPoint® format and can be used with any Classroom Response System, including those from InterWrite (formerly EduCue) and H-ITT.
 - Test-Gen EQ software provides electronic versions (both Mac and Windows) of the complete test bank for the text, including over 2700 additional questions beyond those already found in the textbook or Student Study Companion. OneKey is available for CourseCompass, BlackBoard, and WebCT.
- **Instructor Resource Center on CD/DVD:** This CD/DVD set contains all the digital resources listed above in an easy-to-use, easy-to-search, portable format. The material can be browsed by chapter or resource type and is easily exported to your local drive.
- **Instructor Resource Guide:** This booklet is the print companion to the Instructor's Resource Center on CD. It includes the Lecture Activities, Lecture Resources, Key Terms, end-of-chapter questions and answers, and figure caption questions and answers.

- **Transparency Pack:** This includes 300 four-color acetates of figures and tables from the text.
- **Biology in the News:** This first volume of 34 two-minute video clips from all areas of biology will enrich your classroom teaching and motivate your students by connecting biology to their everyday lives.

For the Student

- **OneKey:** OneKey for *Life on Earth* offers a single location for anywhere, anytime access to students who want extra practice or to access to the many amazing digital resources that come with this text. New to this edition: a perpetual gradebook for students, tracking the results (and averages) of all the quizzes they have taken over the term. www.prenhall.com/audesirk
- **Accelerator CD:** Each copy of this text includes an Accelerator CD. The CD works with OneKey to provide a faster Internet experience. The Accelerator CD stores some OneKey content, so that even dial-up connections can provide snappy performance.
- **Student Lecture Notebook:** Includes key pieces of art from the textbook, with space to take notes.
- **Student Study Companion:** This printed Companion provides questions and review material to students without access to the Internet.

Acknowledgments

Life on Earth is truly a group effort. To meet the dauntingly complex challenge of putting together a text and supplement package of this magnitude, Prentice Hall has assembled an experienced and skilled development team. The text benefited considerably from the thoughtful suggestions of Developmental Editor Anne Reid. She helped us keep the text clear, consistent, and student friendly. Tim Flem, our Production Editor, coordinated the efforts of the photo researcher, copy editor, art studio, and authors. He skillfully brought the art, photos, and manuscript together into a seamless whole while

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So here we acknowledge, with deep appreciation, our "coach" and all our teammates!

Terry and Gerry Audesirk
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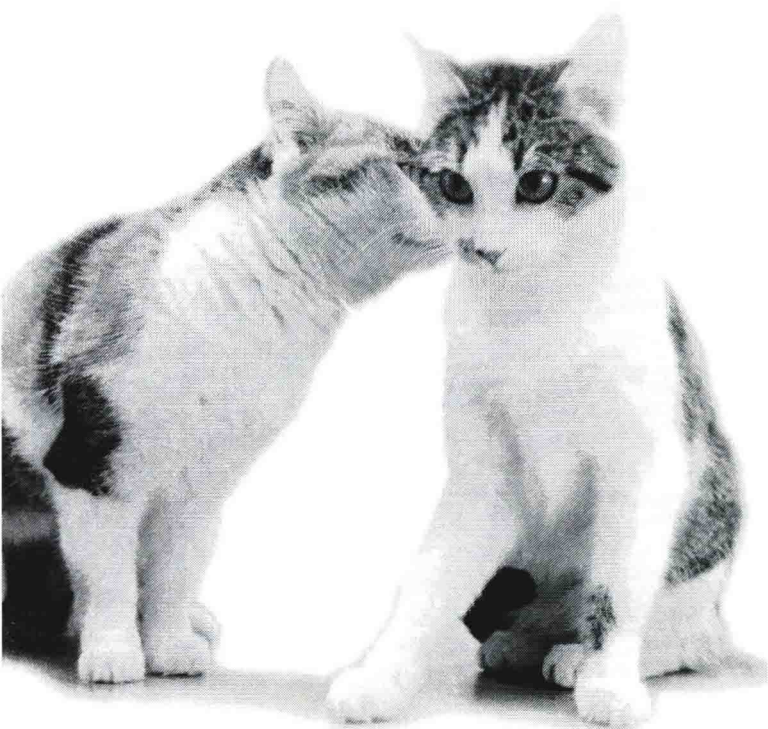
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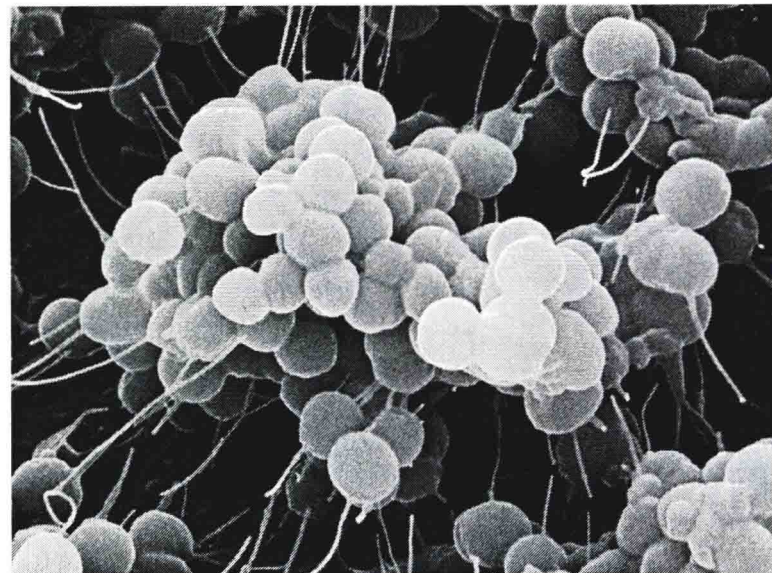
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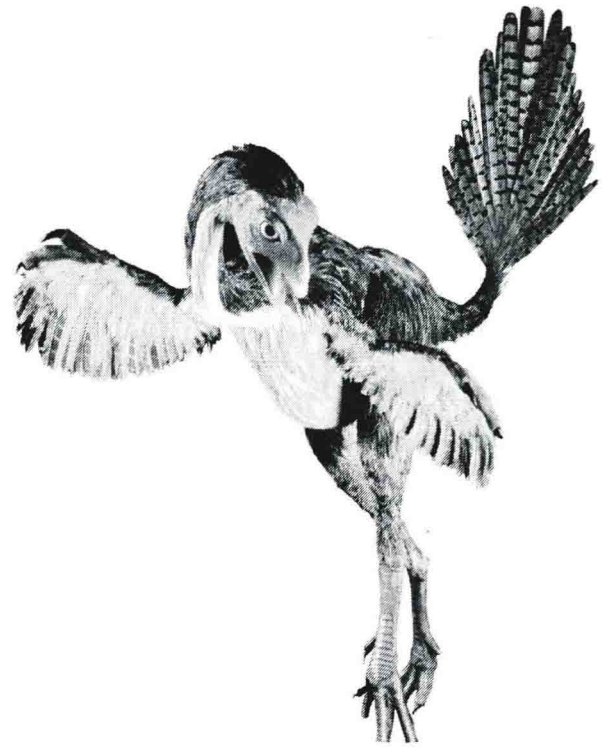
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