

Committed To Excellence

This edition continues the evolution of the new Raven & Johnson's *Biology*. The author team is committed to continually improving the text, keeping the student and learning foremost. We have an improved design and updated pedagogical features to complement the new art program and completely revised content of the transformative eighth edition of *Biology*. This latest edition of the text maintains the clear, accessible, and engaging writing style of past editions while maintaining the clear emphasis on evolution and scientific inquiry that made this a leading textbook for students majoring in biology. This emphasis on the organizing power of evolution is combined with a modern integration of the importance of cellular and molecular biology and genomics to offer our readers a text that is student-friendly while containing current content discussed from the most modern perspective.

We are committed to producing the best possible text for both student and faculty. Lead author, Kenneth Mason (University of Iowa) has taught majors biology at three different major public universities for more than 15 years. Jonathan Losos (Harvard University) is at the cutting edge of evolutionary biology research and has taught evolutionary biology to both biology majors and nonmajors students. Susan Rundell Singer (Carleton College) has been deeply involved in science education policy issues on a national level.

The extensive nature of the revision for the eighth edition allowed the incorporation of the most current possible content throughout. This has been continued in the ninth edition. Here we provide a more consistent approach to concepts so that the reader is not buried in detail in one chapter and left wondering how something works in another. In all chapters, we provide a modern perspective emphasizing the structure and function of macromolecules and the evolutionary process that has led to this structure and function.

This modern approach is illustrated with two examples. First, genomics are not given one chapter and otherwise ignored. Instead, results from the analysis of genomes are presented in context across the text. It is important that these results are provided in the context of our traditional approaches and not just lumped into a single chapter. We do not ignore the unique features of this approach and therefore provide two chapters devoted to genomics and to genome evolution.

A second example is expanded coverage of noncoding RNA. It is hard to believe how rapidly miRNA have moved from a mere curiosity to a major topic in gene expression. We have included both new text and graphics on this important topic. The results from complete genome sequencing have highlighted this important category of RNA that was largely ignored in past texts.

The revised physiology unit has been further updated to strengthen the evolutionary basis for understanding this section. The single chapter on circulation and respiration has been broken into two to provide a more reasonable amount of material for the student in each chapter. The coverage of temperature regulation has also been moved to the introductory chapter 43: The Animal Body and Principles of Regulation to provide a concrete example of regulation. All of this should enhance readability for the student as well as integrate this material even closer with the rest of the text.

The entire approach throughout the text is to emphasize important biological concepts. This conceptual approach is supported by an evolutionary perspective and an emphasis on scientific inquiry. Rather than present only dry facts, our conceptual view combines an emphasis on scientific inquiry.

Our Consistent Themes

It is important to have consistent themes that organize and unify a text. A number of themes are used throughout the book to unify the broad-ranging material that makes up modern biology. This begins with the primary goal of this textbook to provide a comprehensive understanding of evolutionary theory and the scientific basis for this view. We use an experimental framework combining both historical and contemporary research examples to help students appreciate the progressive and integrated nature of science.

Biology Is Based on an Understanding of Evolution

When Peter Raven and George Johnson began work on *Biology* in 1982 they set out to write a text that presented biology the way they taught in their classrooms—as the product of evolution. We bear in mind always that all biology “only makes sense in the light of evolution;” so this text is enhanced by a consistent evolutionary theme that is woven throughout the text, and we have enhanced this theme in the ninth edition.

The enhanced evolutionary thread can be found in obvious examples such as the two chapters on molecular evolution, but can also be seen throughout the text. As each section considers the current state of knowledge, the “what” of biological phenomenon, they also consider how each system may have arisen by evolution, the “where it came from” of biological phenomenon.

We added an explicit phylogenetic perspective to the understanding of animal form and function. This is most obvious in the numerous figures containing phylogenies in the form and function chapters. The diversity material is supported by the most up-to-date approach to phylogenies of both

animals and plants. Together these current approaches add even more evolutionary support to a text that set the standard for the integration of evolution in biology.

Our approach allows evolution to be dealt with in the context in which it is relevant. The material throughout this book is considered not only in terms of present structure and function, but how that structure and function may have arisen via evolution by natural selection.

Biology Uses the Methods of Scientific Inquiry

Another unifying theme within the text is that knowledge arises from experimental work that moves us progressively forward. The use of historical and experimental approaches throughout allow the student not only to see where the field is now, but more importantly, how we arrived here. The incredible expansion of knowledge in biology has created challenges for authors in deciding what content to keep, and to what level an introductory text should strive. We have tried to keep as much historical context as possible and to provide this within an experimental framework consistently throughout the text.

We use a variety of approaches to expose the student to scientific inquiry. We use our new Scientific Thinking figures to walk through an experiment and its implications. These figures always use material that is relevant to the story being told. Data are also provided throughout the text, and other figures illustrate how we arrived at our current view of the topics that make up the different sections. Students are provided with Inquiry Questions to stimulate thinking about the material throughout the book. The questions often involve data that are presented in figures, but are not limited to this approach, also leading the student to question the material in the text as well.

Biology Is an Integrative Science

The explosion of molecular information has reverberated throughout all areas of biological study. Scientists are increasingly able to describe complicated processes in terms of the

interaction of specific molecules, and this knowledge of life at the molecular level has illuminated relationships that were previously unknown. Using this cutting-edge information, we more strongly connect the different areas of biology in this edition.

One example of this integration concerns the structure and function of biological molecules—an emphasis of modern biology. This edition brings that focus to the entire book, using this as a theme to weave together the different aspects of content material with a modern perspective. Given the enormous amount of information that has accumulated in recent years, this emphasis on structure and function provides a necessary thread integrating these new perspectives into the fabric of the traditional biology text.

Although all current biology texts have added a genomics chapter, our text was one of the first to do so. This chapter has been updated, and we have added a chapter on the evolution of genomes. More importantly, the results from the analysis of genomes and the proteomes they encode have been added throughout the book wherever this information is relevant. This allows a more modern perspective throughout the book rather than limiting it to a few chapters. Examples, for instance, can be found in the diversity chapters, where classification of some organisms were updated based on new findings revealed by molecular techniques.

This systems approach to biology also shows up at the level of chapter organization. We introduce genomes in the genetics section in the context of learning about DNA and genomics. We then come back to this topic with an entire chapter at the end of the evolution unit where we look at the evolution of genomes, followed by a chapter on the evolution of development, which leads into our unit on the diversity of organisms.

Similarly, we introduce the topic of development with a chapter in the genetics section, return to it in the evolution unit, and dedicate chapters to it in both the plant and animal units. This layering of concepts is important because we believe that students best understand evolution, development, physiology, and ecology when they can reflect on the connections between the microscopic and macroscopic levels of organization.

We're excited about how we moved the previous high-quality textbook forward in a significant way for a new generation of students. All of us have extensive experience teaching undergraduate biology, and we've used this knowledge as a guide in producing a text that is up to date, beautifully illustrated, and pedagogically sound for the student. We've also worked to provide clear explicit learning objectives, and more closely integrate the text with its media support materials to provide instructors with an excellent complement to their teaching.

Ken Mason, Jonathan Losos, Susan Rundell Singer

This chapter covers one of the fastest-progressing fields in biology. It must cover fundamental topics as well as a wide variety of real and potential applications of the technology. The chapter does all of this well. There is good continuity from one section to the next, which I find important to make the text "readable."

Michael Lentz
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