Preface

The eye of the iguana (*Iguana iguana*) has a suite of evolutionary adaptations that give it excellent color vision and long-distance vision, helping the iguana find food and avoid predators. The iguana's remarkable eye is an apt metaphor for our goal in writing this text: to focus with high intensity on the core concepts that introductory biology students need to master to build a solid foundation in biology.

The current explosion of biological information, while exhilarating in its scope, poses a significant challenge—how best to teach a subject that is constantly expanding. In particular, instructors have become increasingly concerned that their students are overwhelmed by an excessive volume of detail and are losing sight of the big ideas in biology. In response to this challenge, various groups of biologists have initiated efforts to refine and, in some cases, redesign the introductory biology course. In particular, the report *Vision and Change in Undergraduate Biology Education: A Call to Action** advocates focusing course material and instruction on key ideas while transforming the classroom through active learning and scientific inquiry. Many instructors have embraced such approaches and have changed how they teach. Cutting back on the amount of detail they present, they focus on core biological concepts, explore select examples, and engage in a rich variety of active learning exercises.

We were inspired by these ongoing changes in biology education to write *Campbell Biology in Focus*, a shorter textbook that has been received with widespread excitement by instructors. Guided by their feedback, we have honed the Third Edition so that it does an even better job of helping students explore the key questions, approaches, and ideas of modern biology.

* Copyright 2011 American Association for the Advancement of Science. See also *Vision and Change in Undergraduate Biology Education: Chronicling Change, Inspiring the Future* (copyright 2015 American Association for the Advancement of Science) and *Vision and Change in Undergraduate Biology Education: Unpacking a Movement and Sharing Lessons Learned* (copyright 2018 American Association for the Advancement of Science).
For more information, see www.visionandchange.org.

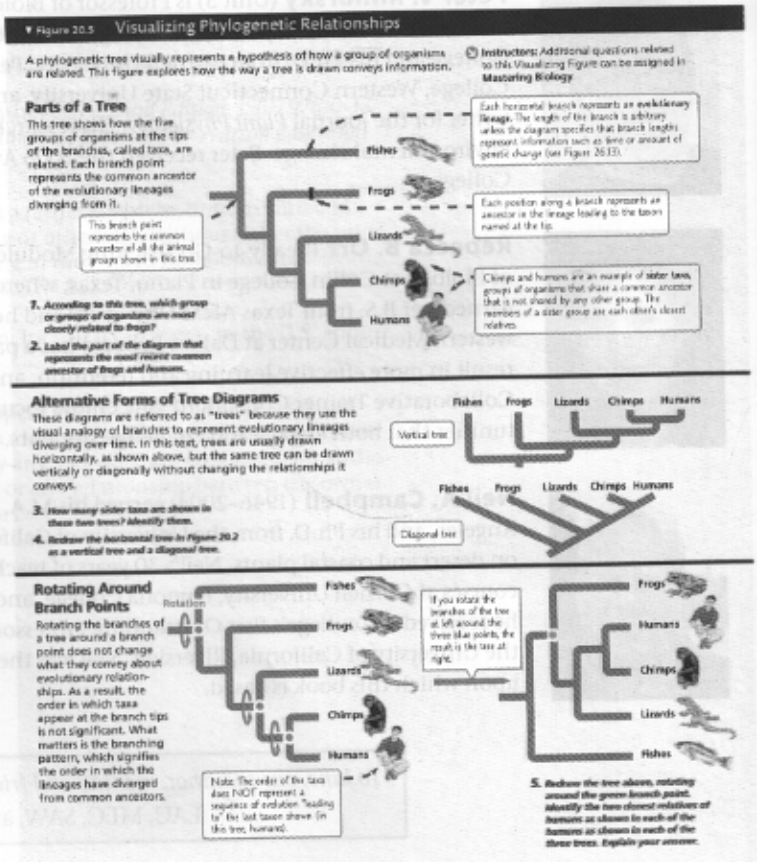
New to This Edition

Our goals for the Third Edition include:

- **increasing visual literacy** through new figures, questions, and exercises that build students' skills in understanding and creating visual representations of biological structures and processes
- giving students the opportunity to **practice scientific skills** by applying scientific skills to **real-world problems**
- **integrating text and media** to engage, guide, and inform students in an active process of inquiry and learning
- **supporting instructors** by providing teaching modules with tools and materials for introducing, teaching, and assessing important and often challenging topics

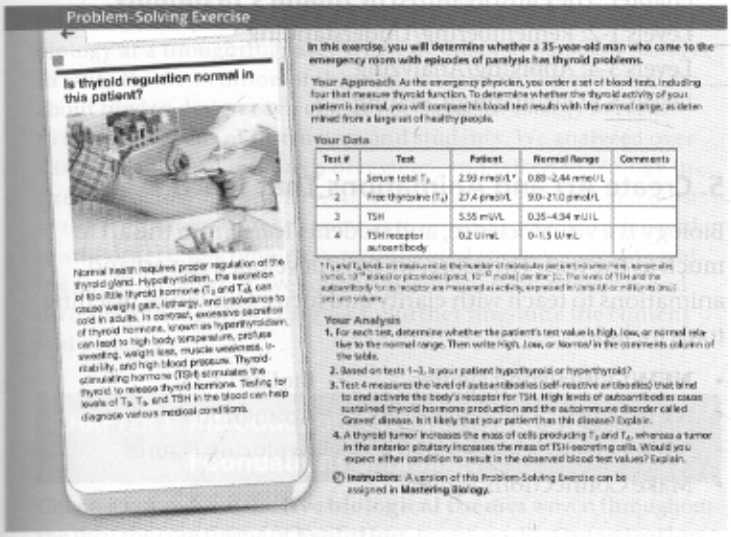
Our starting point, as always, was our commitment to crafting text and visuals that are accurate, are current, and reflect our passion for teaching biology. Here we provide an overview of the new features that we have developed for the Third Edition. We invite you to explore pages 11–12 for more information and examples.

- **NEW! Visualizing Figures** and **Visual Skills Questions** help students practice interpreting and creating visual representations in biology. The Visualizing Figures have embedded questions that guide students in exploring how



diagrams, photographs, and models represent and reflect biological systems and processes. Assignable questions are also available in **Mastering Biology** that allow students to practice the visual skills addressed in these figures.

- **NEW! Problem-Solving Exercises** challenge students to apply scientific skills and interpret data in solving engaging real-world problems:

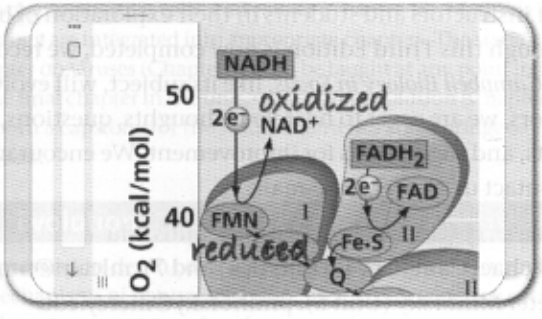


Problem-Solving Exercises can also be assigned and automatically graded in **Mastering Biology**.

- **NEW! Integrated text and media**: Media references in the printed book direct students to a wealth of online self-study resources available to them in the **Mastering Biology eText** or **Study Area**. For example:

Mastering Biology
BioFlix® Animation: Protein Synthesis

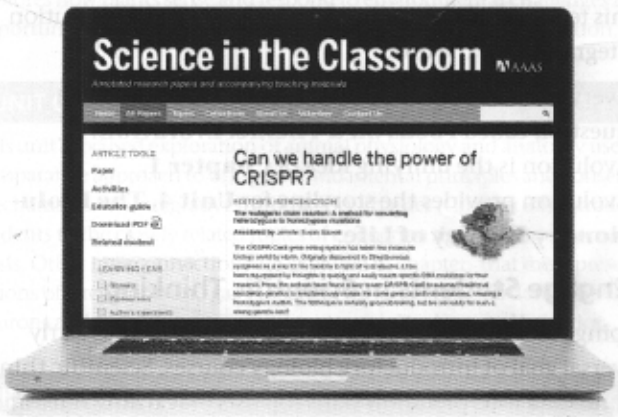
- **NEW! Get Ready for This Chapter** online questions provide a quick check of student understanding of the background information needed to learn a new chapter's content, with feedback to bolster their preparation.
- **NEW! Figure Walkthroughs** guide students through key figures with narrated explanations and figure markups that reinforce important points:



Check students' understanding of Figure Walkthroughs with assignable questions in **Mastering Biology**.

- **EXPANDED!** Bring biology to life with **400 animations** and **videos** in the Mastering Biology eText, Study Area, Instructor Resources, and Item Library. These include **BioFlix® 3-D Animations** and resources from **HHMI BioInteractive**:

- **NEW! Mastering Biology** includes automatically graded assignments with links to annotated research papers from *Science* on the **AAAS Science in the Classroom** website:



- **FIVE NEW! Ready-to-Go Teaching Modules** provide instructors with active learning exercises and assessment questions to use in class, plus **Mastering Biology** assignments that can be assigned before and after class. The Third Edition includes five new modules for a total of 15 modules.
- **EXPANDED!** The impact of **climate change** at all levels of the biological hierarchy has been expanded throughout the text, starting with a new chapter opener and Figure 2.21 in Chapter 2 and continuing with new figures and increased coverage of climate change in Chapters 22, 40, and 42.
- As in each new edition of *Campbell Biology in Focus*, the Third Edition incorporates **new content**, which is summarized on pages 7–10. Content updates reflect rapid, current changes in technology and knowledge in the fields of genomics, gene-editing technology (CRISPR), evolutionary biology, microbiology, and more.

Our Guiding Principles

Our key objective in creating *Campbell Biology in Focus* was to produce a shorter text by streamlining selected material, while emphasizing conceptual understanding and maintaining clarity, proper pacing, and rigor.

Here are the five guiding principles of our approach:

1. Focus on Core Concepts

We developed this text to help students master the fundamental content and scientific skills they need as college biology majors. In deciding what to include in this text, we were guided by discussions with biology professors across the country, analysis of over 1,000 syllabi, study of the debates in the literature of scientific pedagogy, and our experience as instructors at a range of institutions. The result is a **briefer book for biology majors** that informs, engages, and inspires. Page 7 provides more information on the book's organization.

2. Establish Evolution as the Foundation of Biology

Evolution is the central theme of biology and the core theme of this text, as exemplified by the various ways that evolution is integrated into the text:

- Every chapter includes an **Evolution section** and a question called **Focus on a Theme: Evolution**.
- Evolution is the unifying idea of **Chapter 1**.
- Evolution provides the storyline for **Unit 4, The Evolutionary History of Life**.

3. Engage Students in Scientific Thinking

Helping students learn to "think like a scientist" is a nearly universal goal of introductory biology courses. Scientific thinking and data interpretation skills top lists of learning outcomes and foundational skills desired for students entering higher-level courses. Students need to understand how to formulate and test hypotheses, design experiments, and interpret data. *Campbell Biology in Focus* meets this need in several ways:

- **NEW!** Problem-Solving Exercises
- **NEW!** Links to annotated research papers in the AAAS Science in the Classroom website
- Scientific Skills Exercises
- Interpret the Data Questions
- Scientific Inquiry Questions
- Inquiry Figures
- Research Method Figures

4. Use Outstanding Pedagogy to Help Students Learn

Campbell Biology in Focus, Third Edition, builds on our hallmarks of clear and engaging text and superior pedagogy:

- **NEW! Get Ready for This Chapter** online questions help prepare students for the chapter ahead.
- Each chapter is organized around a framework of carefully selected **Key Concepts** so students don't lose sight of the "forest" for the "trees."
- **Questions throughout the text** catalyze learning by encouraging students to actively engage with the material.
- **Test Your Understanding Questions** at the end of each chapter help students assess their understanding of the chapter. They are organized by **Bloom's Taxonomy**:
  Levels 1-2: Remembering/Understanding
  Levels 3-4: Applying/Analyzing
  Levels 5-6: Evaluating/Creating

5. Create Art and Animations That Teach

Biology is a visual science, and students learn from the art as much as the text. Therefore, we have developed our art and animations to teach with clarity and focus. Our visual teaching tools include:

- **NEW!** Visualizing Figures
- **NEW!** Visual Skills Questions
- **NEW!** Figure Walkthroughs
- Make Connections Figures
- BioFlix® 3-D Animations
- Exploring Figures

Mastering Biology

Mastering Biology is the most widely used online assessment and tutorial program for biology, providing an extensive library of homework assignments that are graded automatically. Self-paced **tutorials** provide individualized coaching with specific **hints and feedback** on the most difficult topics in the course. Optional **Adaptive Follow-up Assignments** provide additional questions tailored to each student's needs.

Mastering Biology also includes the **Instructor Resources**, **Ready-to-Go Teaching Modules**, **eText**, and **Study Area**. For more information about Mastering Biology, see pages 18–23.

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Our overall goal in developing and revising this text was to assist instructors and students in their exploration of biology. Although this Third Edition is now completed, we recognize that *Campbell Biology in Focus*, like its subject, will evolve. As its authors, we are eager to hear your thoughts, questions, comments, and suggestions for improvement. We encourage you to contact us directly by e-mail:

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