

TWELFTH EDITION

CAMPBELL  
**BIOLOGY**

URRY • CAIN • WASSERMAN  
MINORSKY • ORR



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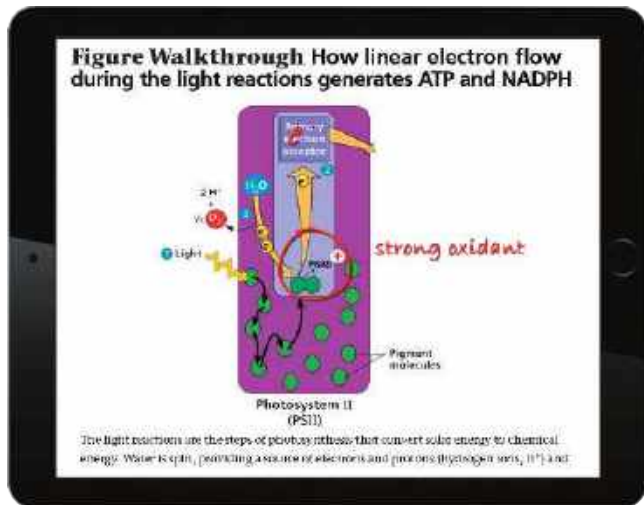
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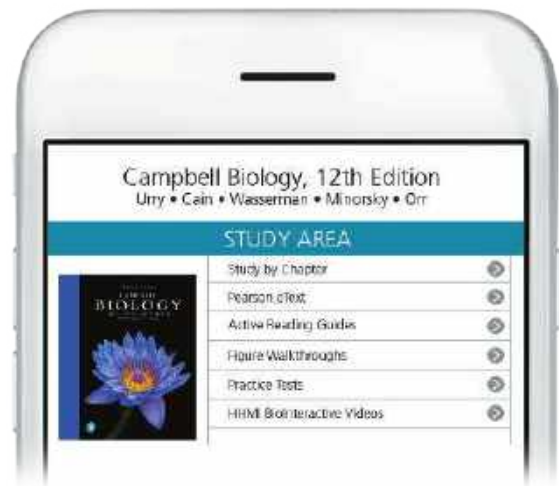
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# Students: Campbell offers many tools to help you succeed

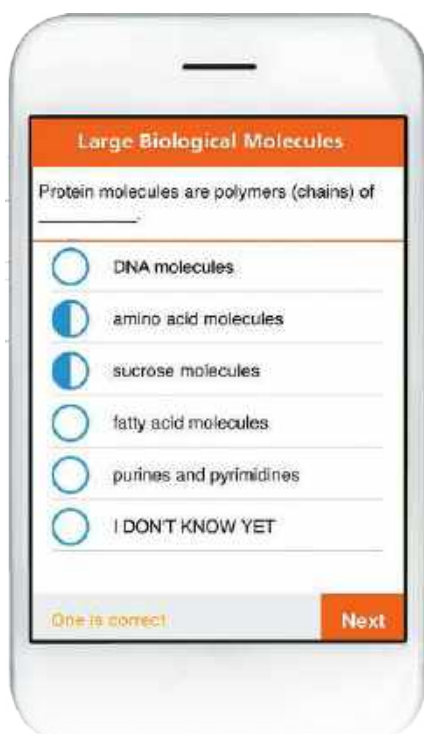
- ✓ Access your text anywhere with the **Pearson eText**



- ✓ Strengthen your knowledge in the **Mastering Biology Study Area**



- ✓ Prepare for your exams with the **Dynamic Study Modules**



- ✓ Use the tools in *Campbell Biology* and **Mastering Biology** to create a **Study Plan**. Your Study Plan might include:

Bio Study Plan	
<input type="checkbox"/>	Review the syllabus, assignments, and notes from my instructor
<input type="checkbox"/>	Read the chapter and...
<input type="checkbox"/>	Use the Study Tip
<input type="checkbox"/>	Fill out the Active Reading Guide (download from the Study Area)
<input type="checkbox"/>	Watch the Figure Walkthroughs, Videos, and Animations (in the eText or Study Area)
<input type="checkbox"/>	Answer the questions in the chapter
<input type="checkbox"/>	Do the assignments
<input type="checkbox"/>	Study for the test!
<input type="checkbox"/>	Review lecture notes and assignments
<input type="checkbox"/>	Read the Summary
<input type="checkbox"/>	Answer the questions at the end of the chapter
<input type="checkbox"/>	Use the Dynamic Study Modules (in Mastering Biology)
<input type="checkbox"/>	Take the Practice Test (in the eText or Study Area)

# CAMPBELL BIOLOGY

TWELFTH EDITION



**Lisa A. Urry**

MILLS COLLEGE, OAKLAND,  
CALIFORNIA

**Michael L. Cain**

NEW MEXICO STATE UNIVERSITY

**Steven A. Wasserman**

UNIVERSITY OF CALIFORNIA,  
SAN DIEGO

**Peter V. Minorsky**

MERCY COLLEGE, DOBBS FERRY,  
NEW YORK

**Rebecca B. Orr**

COLLIN COLLEGE, PLANO, TEXAS



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Director, Global Higher Ed Content Management and Strategy, Science & Health Sciences: *Jeanne Zalesky*  
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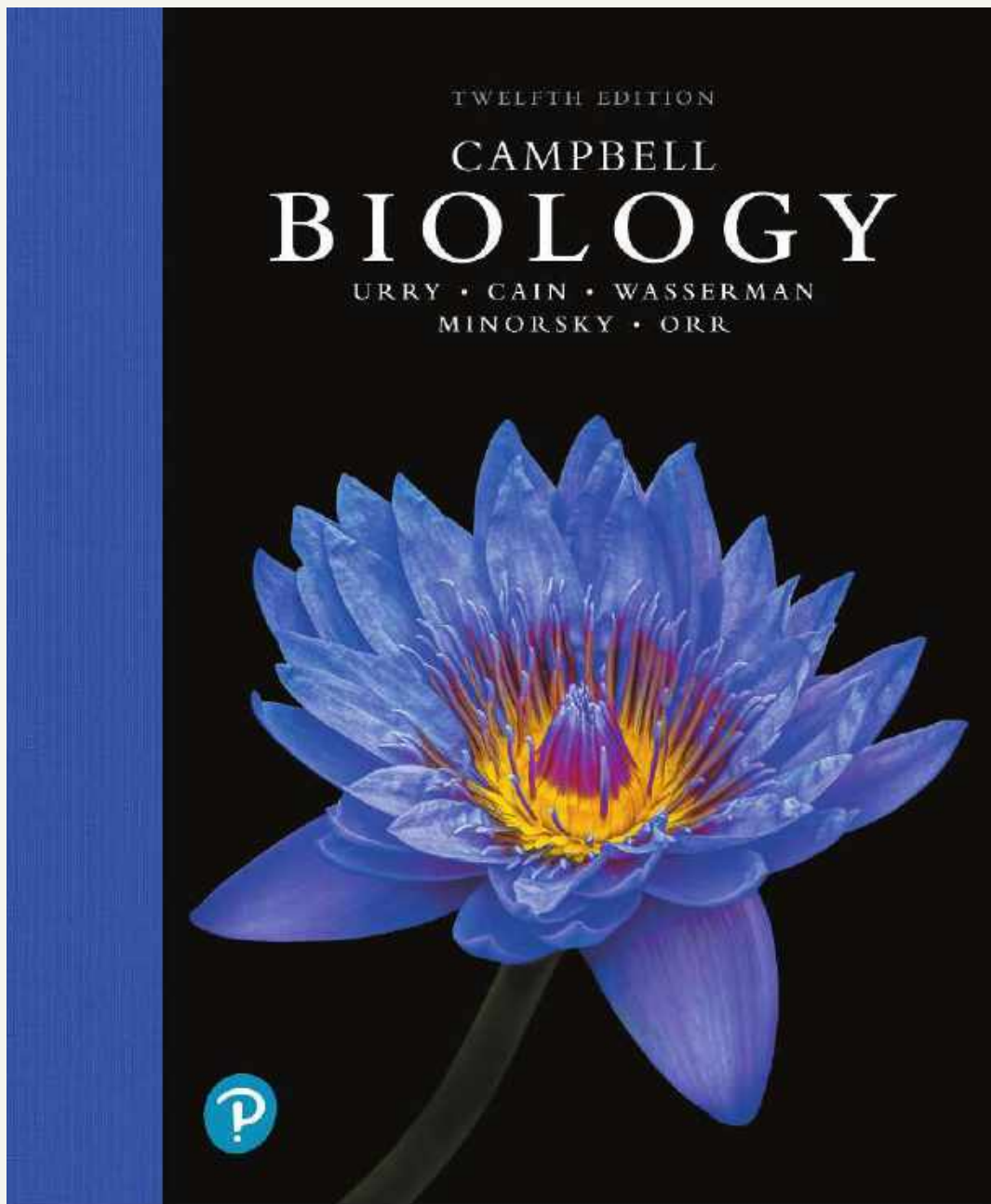


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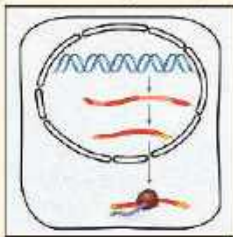
## 17 Gene Expression: From Gene to Protein

### KEY CONCEPTS

- 17.1** Genes specify proteins via transcription and translation p. 336
- 17.2** Transcription is the DNA-directed synthesis of RNA: A Closer Look p. 342
- 17.3** Eukaryotic cells modify RNA after transcription p. 345
- 17.4** Translation is the RNA-directed synthesis of a polypeptide: A Closer Look p. 347
- 17.5** Mutations of one or a few nucleotides can affect protein structure and function p. 357

### Study Tip

**Make a visual study guide:** Sketch the process shown below, and add labels and details as you read the chapter. (In this exercise, assume all processes take place in a eukaryotic cell.)



### Go to Mastering Biology

**For Students** (in eText and Study Area)

- Get Ready for Chapter 17
- BioFlix® Animation: Protein Synthesis
- Figure 17.27 Walkthrough: Types of Small-Scale Mutations that Affect mRNA Sequence

**For Instructors to Assign** (in Item Library)

- BioFlix® Tutorial: Protein Synthesis (1 of 3): Overview
- Tutorial: CRISPR: A Revolution in Genome Editing

**Ready-to-Go Teaching Module**

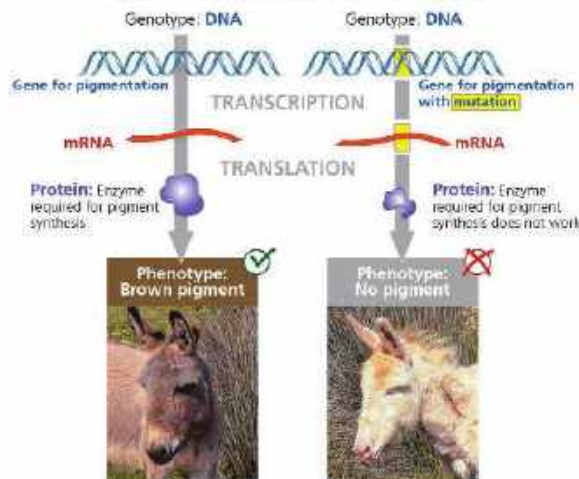
- (in Instructor Resources)
- Gene Expression: Mutations (Concept 17.5)



**Figure 17.1** A population of albino donkeys grazes on vegetation on the hillsides of Asinara, an Italian island. Several centuries ago, a recessive mutation that disables pigment synthesis arose in the DNA of one donkey and was passed down through the generations. Inbreeding has resulted in a large number of homozygous albino donkeys living on the island today.

### How can one change in DNA result in such a dramatic change in appearance?

Proteins are the link between genotype and phenotype. Gene expression is the process by which DNA directs the synthesis of proteins.



**NEW! A Visual Overview** helps students start with the big picture.

# 39 Plant Responses to Internal and External Signals

## KEY CONCEPTS

- 39.1** Signal transduction pathways link signal reception to response p. 843
- 39.2** Plants use chemicals to communicate p. 845
- 39.3** Responses to light are critical for plant success p. 855
- 39.4** Plants respond to a wide variety of stimuli other than light p. 867
- 39.5** Plants respond to attacks by pathogens and herbivores p. 866

## Study Tip

**Make a table:** As you read the chapter, add specific examples for each of the general categories of responses shown in the diagram.

Factor	Example of plant response
Light	Seed germination in response to red light

## Go to Mastering Biology

**For Students** (in eText and Study Area)

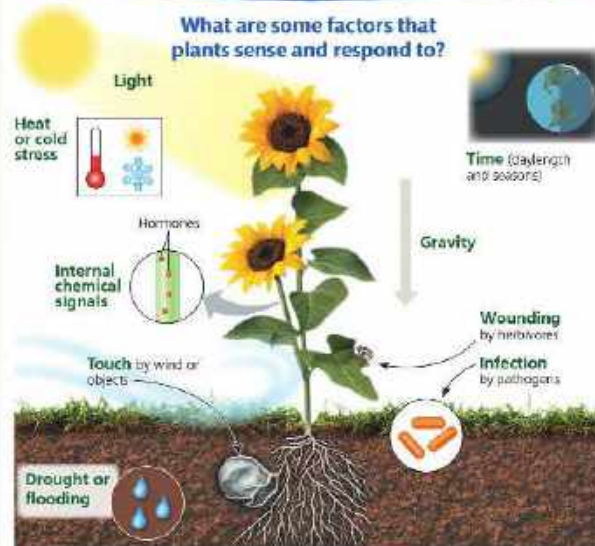
- Get Ready for Chapter 39
- Video: Gravitropism
- Video: Mimosa leaves

**For Instructors to Assign** (in Item Library)

- Activity: Leaf Abscission
- Activity: Plant Hormones



**Figure 39.1** Sunflowers track the sun from east to west each day. After sunset, they reverse direction, facing the direction of the next sunrise. By facing the hot sun during the day, the floral heads become warmer and release greater amounts of chemicals that attract pollinators. Light is just one of the many factors to which a plant responds.



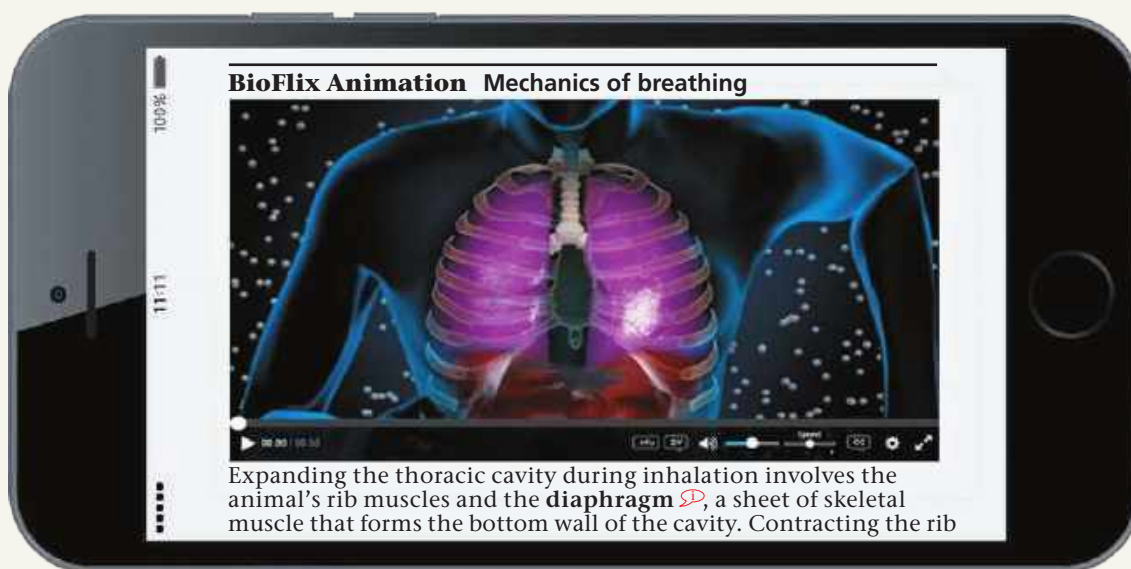
**NEW! A Study Tip** provides an activity for students to help them organize and learn the information in the chapter.

**NEW! Key Mastering Biology resources** are highlighted for students and instructors.



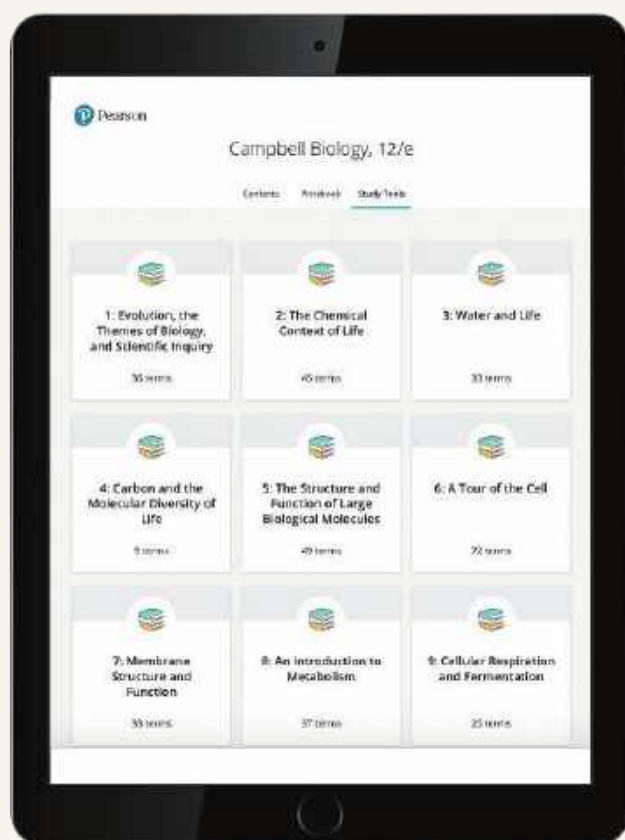
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