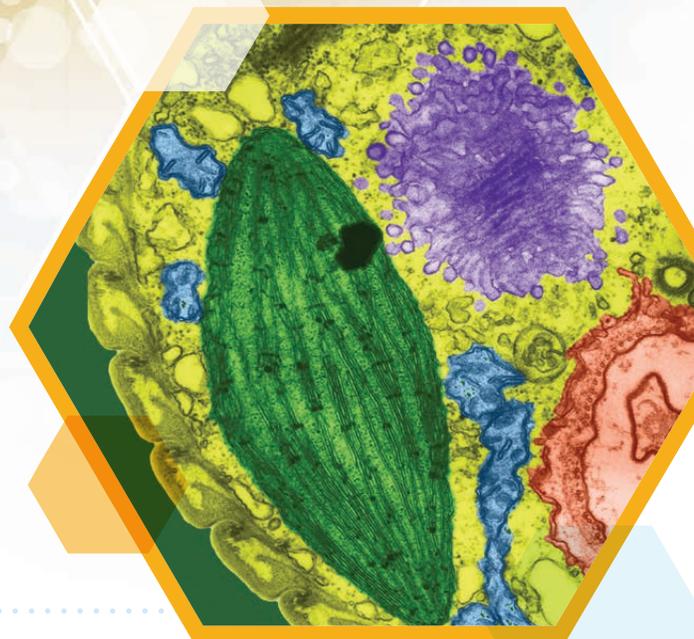




# Miller & Levine Biology

## Making sense of phenomena



Observe it. Explain it. Use evidence. **Miller & Levine Biology** immerses students in phenomena-based lessons. Send students on a journey of discovery with compelling real-world phenomena.

### CASE STUDY

#### What's happening to me?

##### Introduce the Case

Begin by asking students to list ways that people acquire disease or disorders, using examples. (*Sample Answer: microbes that make us sick – flu; genetic abnormalities – color blindness or Down syndrome; exposure to chemicals that change our cell* cancer) Explain that LHON, cause change molecules that cells read the Case Study tify the main points how the case will re

**Ask** How could a p of a cell cause a ma nness? (*Sample answ very important for ti functions.*) Tell stud

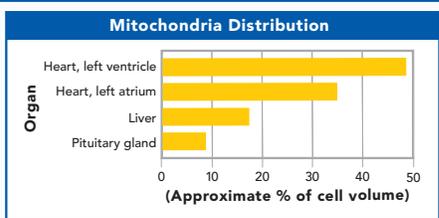
chapter will explain the parts of cell they help cells function in their envi

#### CASE STUDY Analyzing Data

##### Mitochondria in a Mouse

Some cells have more mitochondria than others. Scientists isolated the mitochondria from mouse cells and then calculated the percentage of the cell that mitochondria would fill by volume. The greater the percentage, the more mitochondria in the cell. The bar graph shows the results.

- 1. Interpret Graphs** Compare the distribution of mitochondria in the four organs, or organ parts, shown in the graph.

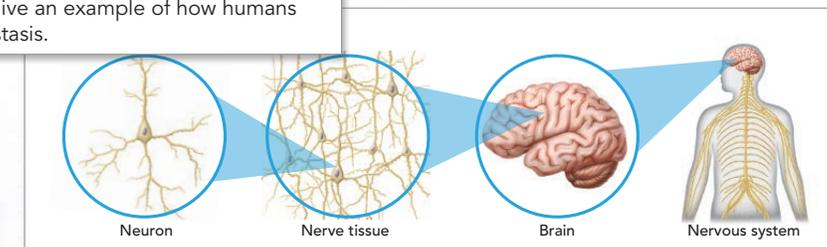


- 2. Draw Conclusions** How is it useful for organisms to have an uneven distribution of mitochondria among their cells?
- 3. Infer** Which of these tissues would be most vulnerable to pain.



#### ASSESS ON THE SPOT

Have students give an example of how humans achieve homeostasis.



Neuron

Nerve tissue

Brain

Nervous system

### Engage and Motivate

Every chapter begins with a case study—an exciting scientific, social, or economic problem that will engage students in analytical thinking, scientific inquiry, and self-directed learning.

### Connect Concepts

Data analysis activities, labs, figures, and assessment questions tie relevant chapter concepts back to the case study, making it easier for students to make sense of science and engineering practices.

## Make Your Case

Mitochondria are organelles in cells throughout the body. LHON is caused by a defect in mitochondrial DNA that affects their function as energy-generating organelles. How might this be linked to the symptoms of LHON? And how might it be possible to prevent this disorder from being passed from parent to child?

### Construct an Explanation

1. **Cite Evidence** Ask students to find evidence throughout the text and heart. Why do you think the first to fail as a result of LHON is from the text to support your claim?
2. **Construct an Explanation** Use the procedure described in the text and evidence to explain the procedure prevent the next.

## Careers on the Case

### Work Toward a Solution

New technologies sometimes raise complex societal issues. Many careers combine both knowledge and understanding of cells and ethics.

#### Bioethicist

As medical technology develops, serious ethical and moral issues often arise. Bioethicists are trained to deal with issues involving biology, philosophy, and moral reasoning. They advise medical institutions and government agencies on questions of ethics.



## Technology on the Case

### Stopping LHON Before It Starts

In vitro fertilization (IVF) is a technique many couples have used to help them have children. Sperm from the father are mixed with an egg cell from the mother in the laboratory. If fertilization is successful, the growing cluster of cells is implanted into the mother's uterus, where it develops into a baby. Scientists have used this technique to develop a way to prevent mitochondrial diseases from being passed from mother to child.

## Explore Technology

Students discover how scientists use new technologies to make an impact. They learn how scientific advances affect society every day.

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## Present Solutions

Students gather data, cite evidence, and apply scientific reasoning to develop argument-driven discussions with their peers.

## Go beyond the Classroom

Students learn about career professionals who work on topics similar to the case study. The careers range from bioethicist to journalist to baker—showing students they don't have to be a biologist for biology to be relevant.

## Facilitate Learning

The instructional materials provide the ideal teaching framework. Be a coach and guide in an inquiry-focused classroom.

### CHAPTER 8

## Cell Structure and Function

8.1 Life Is Cellular 8.2 Cell Structure 8.3 Cell Transport 8.4 Homeostasis and Cells

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- +TEXT
- ANIMATION
- VIRTUAL LAB
- ASSESSMENT

#### Get the Picture

Explain to students that the chapter opener image shows organisms called diatoms. Diatoms are common unicellular organisms that are mostly found in water, but can also be found in soil. There are over 100,000 different species of diatoms. Remind students that unicellular organisms must perform many of the same functions as multicellular organisms in order to survive. Ask students to list some of these functions. (reproduce, acquire energy, get rid of wastes, maintain homeostasis)

#### CASE STUDY

### What's happening to me?

#### Introduce the Case

Begin by asking students to list ways that people acquire disease or disorders, using examples. (Sample Answer: microbes that make us sick – flu, genetic abnormalities – color blindness or Down syndrome, exposure to chemicals that change our cells and make us sick – lung cancer) Explain that genetic disorders, such as LHON, cause changes to cell components or the molecules that cells make. Then, have students read the Case Study. Call on volunteers to identify the main points of the case and to predict how the case will relate to chapter content.

**Ask** How could a problem with just one part of a cell cause a major disorder such as blindness? (Sample answer: The cell part must be very important for the cell to perform its normal functions.) Tell students that the content in this chapter will explain the parts of cells and how they help cells function in their environment.

#### CASE STUDY CONNECTIONS

Students can gather information from these assets to help them solve the case. In the Case Study Wrap-Up, they will practice science skills as they apply what they have discovered.

#### CHAPTER OPENER

**1** CASE STUDY What's happening to me? Students are introduced to the case study and the questions they will need to answer.

#### LESSON 8.2

**DIAGRAM Cellular Powerhouses** Students explore mitochondria and chloroplasts, organelles involved in energy conversion processes in eukaryotic cells.

#### Chapter Storyline

In this chapter, students investigate prokaryotic and eukaryotic cells. They discover how the invention of the microscope led to the exploration of cells and the development of the cell theory. Students compare different types of microscopes, and observe the advances in technology that led to the discovery of the internal structures of cells.

Using analogies and models, students identify the cellular structures that direct and organize cellular processes, store needed materials, rid the cell of wastes, and provide for structure and movement. They also identify cellular structures that capture and release energy, and those involved in producing proteins. After they differentiate structures unique to basic cell types, they explore how cells absorb and release materials through passive and active transport, essential process for maintaining stability (homeostasis) in constantly changing environments.

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