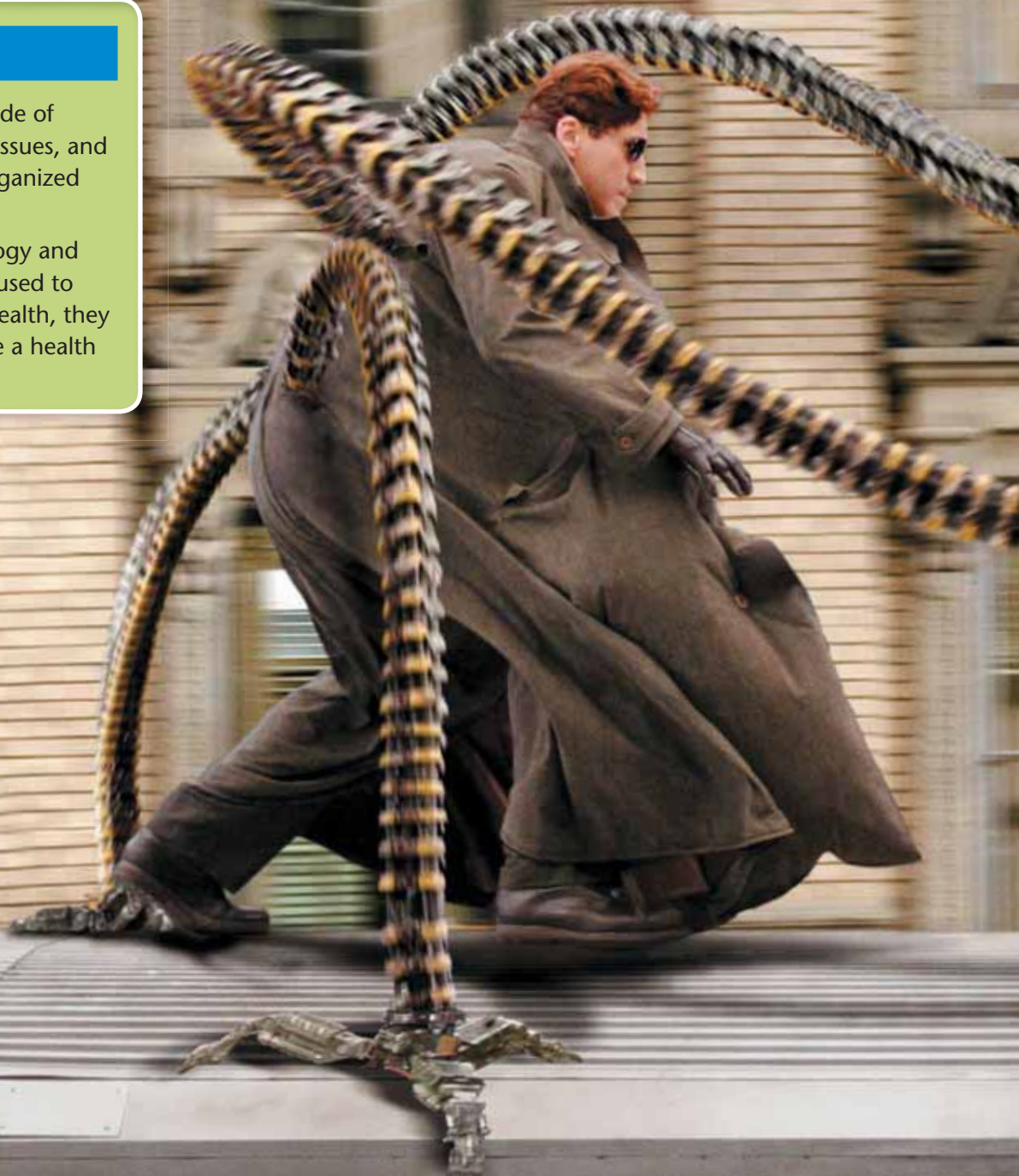


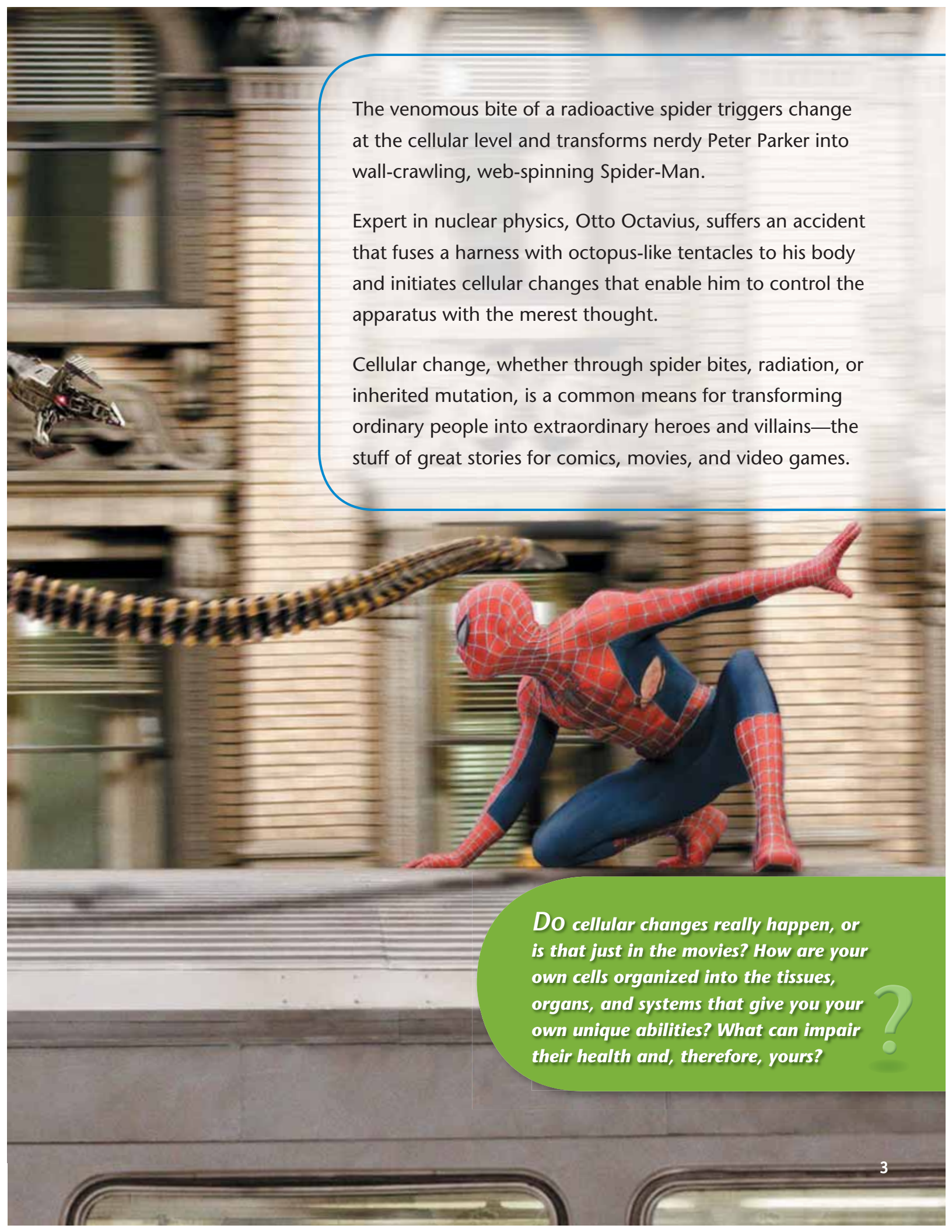
Unit 1

Tissues, Organs, and Systems

Big Ideas

- All animals are made of specialized cells, tissues, and organs that are organized into systems.
- Although technology and chemicals can be used to improve human health, they can also constitute a health hazard.



A background image showing Spider-Man in his red and blue suit crouching on a ledge. A large, black and yellow striped tentacle is reaching towards him from the left. The background is a blurred cityscape.

The venomous bite of a radioactive spider triggers change at the cellular level and transforms nerdy Peter Parker into wall-crawling, web-spinning Spider-Man.

Expert in nuclear physics, Otto Octavius, suffers an accident that fuses a harness with octopus-like tentacles to his body and initiates cellular changes that enable him to control the apparatus with the merest thought.

Cellular change, whether through spider bites, radiation, or inherited mutation, is a common means for transforming ordinary people into extraordinary heroes and villains—the stuff of great stories for comics, movies, and video games.

Do cellular changes really happen, or is that just in the movies? How are your own cells organized into the tissues, organs, and systems that give you your own unique abilities? What can impair their health and, therefore, yours?



Unit 1 At a Glance

In this unit you will learn how tissues, organs, and systems work together in the human body. You will also learn about the function of the basic unit of life, the cell, and how human health is affected by technology and environmental factors.

Think about answers to each question as you work through the topic.

Topic 1.1: Why are cells important?

Key Concepts

- Studying cells helps us understand how organisms function.
- Cellular organelles work together to carry out life functions.
- Cellular processes enable organisms to meet their basic needs.



Topic 1.5: How do technology, substances, and environmental factors affect human health?

Key Concepts

- Medical imaging technologies are used to explore, diagnose, and treat the human body.
- Exposure to various technologies, substances, and environmental factors can impair health.
- Technology will affect human health in new ways in the future.



Tissues, Organs, and Systems

Topic 1.4: How do systems work together in the human body?

Key Concepts

- The respiratory system carries oxygen to and removes carbon dioxide from the blood.
- The circulatory system transports dissolved gases and nutrients through the body.
- The digestive system breaks down food, absorbs nutrients, and eliminates solid waste.
- Organ systems working together carry out important tasks in the body.



Topic 1.2: Why do animal cells divide and what happens when they do?

Key Concepts

- Cells must divide for an organism to survive.
- Hereditary material is passed on during cell division.
- Animal cells have a life cycle that includes both growth and division.
- New animal cells are created during the cell cycle.
- Uncontrolled, rapid division of animal cells can be cancer.



Topic 1.3: How do cells work together in the human body?

Key Concepts

- All cells begin alike and differentiate into specialized cells.
- Specialized cells have different structures that allow them to perform unique functions.
- Groups of cells working together form tissues.
- Groups of tissues working together form organs, which work together in systems.



Looking Ahead to the Unit 1 Projects

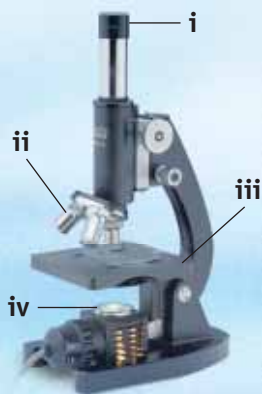
At the end of this unit you **will** have the opportunity to apply what you have **learned**. In your unit projects, you **will** research how one disease affects human tissues, organs, and organ systems, and you will try to define society's responsibility for the health of its citizens.



Get Ready for Unit 1

Concept Check

1. Decide whether each statement about the cell theory is true or false. If a statement is false, explain why.
 - a) The cell is the basic unit of life.
 - b) All cells come from pre-existing cells.
 - c) All living things are made up of many cells.
2.
 - a) Select one of the plants shown in the illustration below, and draw what you think one of its cells looks like.
 - b) Select one of the animals in the diagram, and draw what you think one of its cells looks like.
 - c) Draw what you think a skin cell from your own body looks like.
 - d) Draw what you think a muscle cell from your own body looks like.
3. In your notebook, write the number that matches each part of the microscope listed below.
 - a) light source
 - b) stage
 - c) eyepiece
 - d) objective lens
4. When you start to view a specimen with a microscope, which objective lens do you use first?
 - a) high magnification
 - b) low magnification
 - c) medium magnification
 - d) whichever one is already in place
5. When you are using the high magnification lens, how can you bring the object you are viewing into sharper focus?
 - a) use the coarse adjustment knob
 - b) adjust the eyepiece
 - c) adjust the stage clips
 - d) use the fine adjustment knob
6. The correct way to hold a microscope is
 - a) with one hand on the arm
 - b) with one hand on the arm and the other hand on the base
 - c) with one hand on the arm and the other hand on the stage
 - d) with one hand supporting the base



Inquiry Check

- 7. Brainstorm** In your notebook, use a t-chart to list as many characteristics of single-celled and many-celled organisms as you can. Compare your list with a partner's list.
- 8. Evaluate** The photo below shows a tea bag that has been sitting in boiled water for several minutes. Before the tea bag was placed in the water, the water was clear and colourless. Now the water is dark brown. Your partner says that the process responsible for the change in the appearance of the water is diffusion. Explain why your partner is or is not correct.



Numeracy and Literacy Check

- 9. Graph** Bacterial cells replicate by splitting into two cells. When conditions are favourable (for example, when there is space and a food source), bacteria can divide every 20 min. Draw a graph of the data with time on the horizontal axis and number of bacteria on the vertical axis.

Growth of Bacteria Cells

Time (min)	Number of Bacteria
0	1
20	2
40	4
60	8
80	16

- 10. Write** Use the words below to explain how many-celled organisms are structured.

cells tissues
organs organ systems