Chapter 1 Cells and More Cells

Materials

Please see the teaching notes for each activity for a list of the materials required. Please see page TR-31 for a summary of the materials required in this chapter and other chapters.

Advance Preparation

- Ensure microscopes are in working order. Ideally, there will be one microscope per student or group of students as required.
- Order or ensure availability of *Elodea* (or similar) leaf cell and human skin cell prepared microslides (optimally one per microscope) for Inquiry Investigation 1-A.
- Order or ensure availability of onion root tip and whitefish embryo prepared microslides (optimally one per microscope) for Investigation 1-B.
- To prepare for Activity 1-3 Modelling Mitosis, collect coloured paper, poster paper, markers, toothpicks, string, twist-ties, paper clips, pipe cleaners, tongue depressors, yarn, elastic bands, thread, glue, and scissors.

In this chapter, students will develop their understanding of the structure and function of cells and the tools used to investigate them. Students will pick up where they left off in Grade 8 and begin with cell theory. They will have an opportunity to observe cells using microscopes and microviewers, and will explore nuclear division (mitosis) and cell division. They will also learn about cell cycle processes, mutations, and cancer.

Using the Chapter Opener (Student textbook pages 4 and 5)

- DI Engage logical-mathematical learners by asking students to estimate the number of cells a piglet is made of (approximately 1 billion, while an adult human has approximately 10 trillion) or to calculate the percentage of Canadians awaiting transplants (0.012% out of a population of 33 000 000 in 2008).
- DI Engage linguistic learners by asking students to write or orally communicate an alternative caption for the image.
- DI Engage visual learners by asking students to sketch a different image for the caption.
- The image in the Chapter Opener on page 4 may evoke an emotional response from students. Assign students to research one or all of the questions that arise, sharing what they learn with the class. For example, students may ask about the details of xenotransplantation, the age of piglets when they are terminated for organ donation, and how they are raised prior to termination.
- Have students preview **BLM 1-3 Chapter 1 Key Terms,** filling in as many details as they can. You may wish to have students work from prior knowledge, or browse the text features to identify and decode the meaning of each term.

Alternative Context

As a class, view the image of the frog with an extra leg on **BLM 1-5 What Caused This?** Then, have students do a think-pair-share activity to discuss the cause of this mutation. Was the missing leg caused by an error copying in the DNA? Did someone purposely change the DNA? Did a mutagen in the environment change the DNA? Or was it caused by a carcinogen? Have students review and revise their opinions as they complete the chapter.

Activity 1-1 Did You Get the Message? (Student textbook page 5)

Pedagogical Purpose

This activity shows how breakdown in a message chain leads to misunderstanding. It begins the investigation into the role(s) of cells and their need to communicate effectively to sustain an organism's daily function. The activity draws on students' natural curiosity and their desire to interact and play games.

Planning	
Time	10 min

Background

Xenotransplantation (animal to human organ donation) has had limited success because the human immune system rejects the organs. The researchers who cloned the piglets for xenotransplantation in 2002 were able to overcome part of the rejection response by knocking out one copy of the gene for a molecule called alpha (1, 3) galactosyltranserase that is found on the surface of pig organ cells. Normally, human antibodies would attach to this molecule and recognize it as a foreign substance. The antibodies would then initiate cell death of the organ cells. Scientists selectively bred the piglets so that they would lack both copies of the gene. It is expected that the organs of these piglets could be transplanted into people without the problem of tissue rejection.

Activity Notes and Troubleshooting

- Divide the class in two, comparing the accuracy of transmission in each group.
- Have students evaluate the variables involved in message transmission: volume, clarity, speed, outside noise, etc.
- Discuss other methods by which humans communicate. For example, smell (including the subconscious affect of pheromones), touch, expressions, and actions.
- Survey the class for existing ideas of how cells communicate. Because cells do not have sensory organs (e.g., eyes), students may not understand that cells communicate with one another. In fact, communication is crucial for cell and organism survival. Methods include chemicals, electrical impulses, and lock-and-key mechanisms.

Additional Support

- ELL Permit English language learners to watch the first message propagation so they feel comfortable with the process.
- ELL Try initiating a message in a different language and compare it to the English message (use a language familiar to a student).
- ELL Have a message change languages during transmission and discuss the result.
- Have students transmit different types of messages (e.g., musical, gestural).

Answers

1. The final message will likely be different from the original. The difference could be caused by errors on the part of the speaker or the listener.
2. Any message that is simple and has meaning will be propagated more accurately than a message of longer length, more complexity, or nonsense meaning. However, students do become more proficient at this as they practise the game.
3. Students may not be familiar with hormone signalling but may make a connection to communication between brain and nervous system cells, or to immune system cells communicating to launch an attack on invading cells.

Study Toolkit

Strategy	Page Reference	Additional Support
Previewing Text Features	Students can skim or scan the headings and subheadings throughout Chapter 1 in order to predict what each section will be about prior to reading.	Refer students to Study Toolkit 1 on page 562 of the student textbook.
Visualizing	Students can link the visuals and text on page 31. Students can consider what it would look like as they themselves "crossed" the membrane, like crossing a barrier that remains open, such as a door.	Draw analogies to features students may not recognize as being "selectively permeable" (e.g., "gates" used to contain livestock such as a "cattle guard" made of bars across a road, which cattle will not cross).
Word Families	Students can draw a word family web to record the meanings of the Key Terms *prophase*, *metaphase*, *anaphase*, and *telophase* on pages 34 and 35.	Refer students to page 561 of the Study Toolkit Overview; in the student textbook.