

## Chapter 2 Summary

This chapter has explored the effects of environmental change on communities, populations, and individual organisms. Environmental change is both the reason for and the result of the process of succession. A population of organisms can change in both number and characteristics in response to its environment. The process of change within a population allows some organisms to live and others to perish. The survival of certain organisms within a population drives the process of evolution.

Human intervention in ecosystems is the leading cause of environmental change. The disturbances caused by human development make it difficult for organisms to obtain the resources necessary for survival. Making choices about how you use and develop natural resources can have both positive and negative effects on other organisms, ecosystems, and environments.



### Summarize Your Learning

In this chapter you learned a number of new biological terms, processes, and theories. It will be much easier for you to recall and apply the information you have learned if you organize it into patterns.

Since the patterns have to be meaningful to you, there are some options about how you can create this summary. Each of the following options is described in “Summarize Your Learning Activities” on pages 552 and 553. Choose one of these options to create a summary of the key concepts and important terms in Chapter 2.

<b>Option 1:</b> Draw a concept map or a web diagram.	<b>Option 2:</b> Create a point-form summary.	<b>Option 3:</b> Write a story using key terms and concepts.	<b>Option 4:</b> Create a colourful poster.	<b>Option 5:</b> Build a model.	<b>Option 6:</b> Write a script for a skit (a mock news report).
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## Chapter 2 Review Questions

### Knowledge

- Describe the process of primary succession.
- List four examples of disturbances that could cause the process of secondary succession to begin.
- Explain two ways in which the process of secondary succession differs from the process of primary succession.
- Explain the difference between an open population and a closed population.
- Define *carrying capacity*.
- Use a labelled graph to describe the exponential growth of a population.
- Use a labelled graph to describe a population that has reached its carrying capacity.
- An owl is well adapted to a nocturnal hunting lifestyle. Explain how each of the following traits is an adaptation that makes the owl a more successful hunter.
  - the ability to fly
  - a sharp beak and talons
  - huge eyes
  - feathers that muffle the sound of flying

9. What are the three main concepts of Darwin's theory of natural selection?
10. Define *fitness* as it applies to biology and the theory of natural selection.
11. Define *mutation*. Compare how mutations can be beneficial, harmful, or neutral.
12. Many people are reluctant to accept Darwin's theory of natural selection. Suggest a possible reason for this reluctance.
13. Explain how the finches that Darwin studied on the Galapagos Islands provided evidence for his theory of natural selection.
14. List a disadvantage and an advantage of reproducing asexually.

### Applying Concepts

Use the following information to answer questions 15 to 17.

#### The Beavers of Tierra del Fuego



**Figure D2.47:** Beavers were introduced to Tierra del Fuego in 1946.



**Figure D2.48:** Tierra del Fuego is at the tip of South America.

Tierra del Fuego is a large island at the very tip of South America. Its closeness to Antarctica means that the climate is much cooler than most of South America. There were 25 pairs of Canadian beavers introduced to the island in 1946 to create a fur industry for the local people. Unfortunately for the people—but perhaps fortunately for the beaver population—the demand for fur coats dropped. By 1966 there were an estimated 2500 beavers on the island, by 1986 there were 30 000, by 1998 there were about 50 000 beavers, and some biologists currently put the estimated number of beavers at close to 125 000. There are more beavers living on Tierra del Fuego than there are people in its major cities.

The exploding beaver population has started to cause significant environmental damage. Beavers cut down stands of 100-year-old trees in weeks. This reroutes streams to cause an interruption of trout migrations, and it floods forests and roads. As a result, there is significant concern that some members of the Tierra del Fuego beaver population will find their way to the mainland of South America and cause similar problems.

15. Describe what conditions exist on Tierra del Fuego that permitted the exponential growth of the beaver population.
16. Identify similarities between the beaver situation in Tierra del Fuego and Australia's rabbit situation.
17. Describe differences between the rabbit situation in Australia and the beaver situation in Tierra del Fuego.

Use the following information to answer question 18.

### Cold Adaptations

Canada's Arctic region is an example of a habitat where the extreme cold presents a huge survival challenge. The other big challenge is that snow melts in the short spring and summer. This means that white-coloured animals lose the advantage of camouflage.

To cope with these harsh environmental obstacles, Arctic organisms have acquired several adaptations. Some organisms, such as caribou or humpback whales, only spend summers in the Arctic and migrate to warmer winter climates. Most organisms have thick layers of fat, called blubber, fur for insulation, and tiny ears to reduce heat loss. Some animals—such as the Arctic hare, Arctic fox, and a bird called a ptarmigan—are pure white in winter and brown or grey in warmer months to stay camouflaged in their changing surroundings.



**Figure D2.49:** Arctic animals—such as caribou—have developed adaptations.

18. A polar bear is an example of an organism that has adapted well to the cold Arctic. It's a carnivore that eats primarily seals. Polar bears usually hide and wait near breathing holes in the ice to capture the seals when they come up for air. How do the following polar-bear adaptations help them survive in their icy environment? Complete the table.

Adaptation	Reasons For Advantage
slightly webbed toes	
white fur	
a thick layer of fat and black skin underneath fur	
female polar bears hibernating in dens with cubs until spring	
ability to stand up on hind legs	
covers its black nose when stalking a seal	

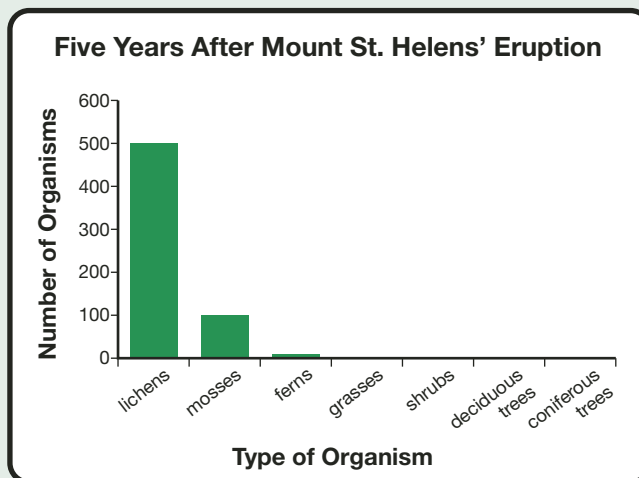


19. The climax community for Alberta's boreal forest is mainly coniferous trees, like spruce and pine. When these evergreens drop their needles and the dead needles decay, they cause the soil to become acidic. Coniferous seedlings grow best in acidic soils, whereas other types of plant organisms—like grasses—have difficulty growing in acidic soil.

- How is this strategy advantageous?
- How might this strategy affect succession in the boreal forest?

Use the following information to answer questions 20 to 22.

The force of Mount St. Helens' explosion in 1980 caused plant and animal communities to be destroyed in much of the area around the volcano. Lava and ash hardened into solid rock over the area's soil. Biologists selected a small sample area and recorded the numbers and types of plant species growing in that area five years after the volcanic eruption. The biologists prepared a bar graph of their results.



- Is this disturbed area around the volcano going through the process of primary succession or secondary succession? Explain your answer.
- Draw three labelled bar graphs that would represent the likely numbers and types of species in the same area if biologists came back to record data 50 years, 100 years, and 200 years after the explosion.
- Why would it be unlikely for you to see an equal number of each type of organism in the sample area?

Use the following information to answer questions 23 to 25.

Kristy is a scientist studying two different species of insects. These insects are considered to be garden pests because they eat cabbage and lettuce. She starts with five male insects and five female insects of each species in two separate terrariums. Kristy labels these Terrarium #1 and Terrarium #2. She places a dish of water and 3 kg of a lettuce and cabbage mixture in each terrarium at the beginning and at the end of week one. Kristy records the number of insects in each terrarium over a period of seven days.

Day of Experiment	Number of Insects in Terrarium #1	Number of Insects in Terrarium #2
1	10	10
2	12	22
3	14	41
4	15	80
5	17	163
6	17	330
7	20	8

- Sketch a graph of the two populations by using Kristy's data.
- Describe and compare the two populations. Use biology terms from Chapter 2.
- How would the results differ if both types of insects were placed in the same terrarium for the study?



Use the following information to answer questions 26 to 28.

Sickle cell anemia is a disease that results from a mutation. This mutation affects the red blood cells that carry oxygen. The mutation can be passed onto offspring. Carriers of sickle cell anemia have difficulty obtaining oxygen—this causes fatigue and blood flow complications. Figure D2.50 compares the red blood cells of an individual afflicted with the disease and a person who does not suffer from the disease.

Malaria is an infectious parasite carried by mosquitoes in warm countries. Untreated malaria causes rapid death. The malaria parasite lives in red blood cells but cannot infect cells that are sickled due to sickle cell anemia.

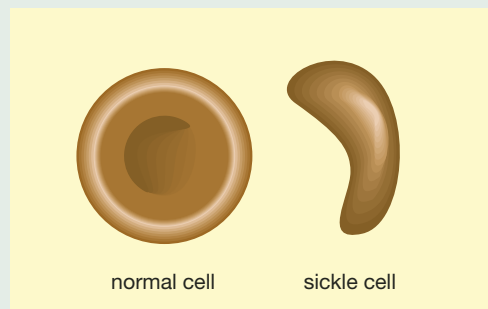


Figure D2.50: A normal cell and a sickle cell are highlighted.

26. After looking at the diagram comparing the sickled red blood cell to the normal red blood cell, explain why sickle cell anemia makes the sufferers so ill.
27. Hypothesize why sickle cell anemia is found in greater numbers in populations where malaria is found.
28. What environmental change would cause a reduction in the number of individuals born with sickle cell anemia?

Use the following information to answer question 29.

Monkeys found in South America and Central America are called New World monkeys. They differ from the Old World monkeys of Africa and Asia because their noses are broad and flat with the nostrils facing outwards. Many New World monkeys have a prehensile tail that can wrap around a branch and support the animal's weight as it hangs—this tail acts like a fifth limb.

29. Use Darwin's theory of natural selection to explain how the New World monkeys developed a prehensile tail.

Use the following information to answer questions 30 and 31.

August Weismann was a German experimental biologist who, in 1893, was investigating Lamarck's ideas of acquired characteristics. Weismann cut off the tails of 22 successive generations of mice and looked for offspring that had shorter tails or no tails at all. Since the offspring did not have shorter tails, the results of his experiment did not support Lamarck's ideas.



30. Explain why the trait of not having a tail is not passed along to the offspring.
31. Why is it still reasonable to study Lamarck's ideas in spite of his incorrect conclusions?

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**Legend:** t = top, m = middle, b = bottom, l = left, r = right

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