

# Chapter 3: Changing Climates

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1. It was these collisions that caused the final upthrusts of the rock formations that would become the Rocky Mountains and their foothills. As this rock and the plate around it were pushed higher, the Bears paw Sea would have started to drain.
2. The ammonite fossils are indicators of the fact that Alberta spent much of its ancient past under tropical seas. The source of ammonite is the Bears paw Sea. The fine sediment at the bottom of that sea formed the sedimentary rock that encases these fossils.

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3. Mowing a lawn does not kill the grass because grass grows from the base, not from the tips. Other plants, including most house plants, grow from the tips. Removing too many leaves from the stem could kill a plant because it may not be able to generate new growth from the base.
4. The African savanna is a current landscape that meets this same description.

## 3.1 Questions, page 374

### Knowledge

1. The largest rock moved a great distance by a glacier in Alberta is located near Okotoks. This rock—which originated in the Rocky Mountains—must have hitched a ride on a flowing glacier during the last glaciation. The very cold climate that would have allowed a glacier to move this rock is different from the climate that exists there now.
2. This chart shows similarities and differences between the traditional Blackfoot explanation for Big Rock and the scientific explanation for Big Rock.

	Traditional Blackfoot Explanation	Scientific Explanation
Similarities	Big Rock is not of local origin. It travelled a long distance before it came to rest at its present location.	
Differences	The rock's origin is from what is now Waterton Lakes National Park. It moved under its own power.	The rock's origin is close to where Jasper is now. Big Rock was carried to Okotoks by advancing glaciers.

3. Ice flows like water, only much more slowly. In both cases, surface rock can be transported great distances by that flow. One difference is that flowing water typically moves the rock in smaller pieces than a glacier does.
4. The Cretaceous Extinction marked the beginning of the Cenozoic Era. A dramatic cooling of the global climate is believed to have caused this extinction. Several large meteorite impacts near the end of the Cretaceous Period may have added to the cooling trend.

5. Cypress Hills has an undisturbed rock column that serves as a record of the last 65 million years. The sedimentary rock strata that make up the column contains many fossils from the Cenozoic Era.
6. The Tertiary Period and the Quaternary Period make up the Cenozoic Era.
7. More than 97% of the Cenozoic Era is made up of the Tertiary Period.
8. The mountain-building was caused by a collision between the North American Crustal Plate and another tectonic plate carrying continental crust that was subducted under the North American Plate.
9. Before the Rocky Mountains were covered by glaciers, they were more rounded. One of their main features was V-shaped valleys.
10. During the Tertiary Period, the North American Tectonic Plate slowly migrated north to a colder climate.
11. Small, flying dinosaurs and mammals took over.
12. Big dinosaurs became extinct. Some small, feathered dinosaurs survived and are believed to be the ancestors of modern birds.
13. During the Tertiary Period, many new species of mammals originated. These included big-brained primates, large grazers, and carnivorous predators.
14. The climate was becoming colder and drier. The root systems of grasses allowed them to survive cold, dry periods. The spread of ruminants and other grazers favoured grasses—which grow from the base—over plants that grow from the tips.

#### Applying Concepts

15. For much of Alberta's history, it must have been submerged by a marine environment. This explains the source of calcium carbonate present in limestone-rich soils.

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5. The event that marked the end of the Pleistocene Epoch was the retreat of the continental ice sheets. In North America, the event was the retreat of the Laurentide Ice Sheet.
6. Three examples of landforms that show evidence of extensive glaciation in Alberta's past are
  - the teardrop-shaped hills—called drumlins—that can be found at Morley Flats outside of Cochrane
  - the small hills—called kames—that formed at Peerless Lake in northern Alberta
  - the Athabasca Dunes found in northeastern Alberta

#### 3.2 Questions, page 381

##### Knowledge

1.
  - a. The Quaternary Period—1.7 million years ago to the present—is made up of the Pleistocene Epoch and the Holocene Epoch.
  - b. The Pleistocene Epoch began 1.7 million years ago when ice caps began to form. It ended 10 000 years ago as the continental ice sheets began to retreat.
  - c. The Holocene Epoch began 10 000 years ago at the end of the Wisconsin Ice Age. It has not yet ended.