



Preparatory Reading

Read the introduction below and the following reference materials:

- *Fact Sheet: General Information on Polar Bears*
http://nature.ca/education/cls/lp/lppbfsgen_e.cfm
- *Map: range of the polar bear*
<http://www.hww.ca/hww2.asp?id=99#sid14>
- *Map: range of the grizzly bear*
<http://www.hww.ca/hww2.asp?id=90#sid14>

Introduction

Skull and jaw structure reveal many things about a mammal's diet, both in broad terms and more specific terms. By examining the teeth, a scientist can quickly discern whether the specimen is a carnivore, an omnivore or a herbivore.

The placement of the teeth reveals clues about how a mammal takes food into its mouth and how it chews its food. When comparing the dentition of a carnivorous predator to that of an herbivorous prey animal, one can easily see the difference between the two.

Predators have pronounced canines and sharp, pointy molars. The incisors on herbivorous prey animals are usually more pronounced and their molars have flatter surfaces than the molars of most carnivorous animals. These differences are related to the way that the mammal has adapted to its environment.

Over time, the carnivore has thrived eating a diet of meat. Its sharp canines have given it an advantage to hold prey and/or kill it, and their sharp molars help them to slice flesh from their prey's carcass.

Herbivores, on the other hand, have excellent incisors that they use to snip grass, leaves and branches, and to browse. They have flat molars to grind and chew this food. Each mammal has specialized teeth to give it an advantage to survive on a particular diet found in its habitat.

The physical traits of mammals from the same family (i.e., mammals that are closely related) are very similar. Scientists must engage in a close examination of these traits to distinguish between one species and the next. This examination helps them to understand how these species evolved and how they are best suited to their environments.

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Activities

1. Observation

Carefully study the diagrams of the polar bear and grizzly bear skulls.
http://nature.ca/education/cls/lp/lppbskl_e.cfm

1.1 Describe at least two major differences between the two bear species.

2. Size of the Temporal Muscle

Open the interactive activity *Comparing the Adaptations of Polar Bears and Grizzlies*.
http://nature.ca/education/cls/lp/lppbinac_e.cfm

2.1 Calculate the relative size of the temporal muscle of the two bears in the activity. Throughout the activity, write down **your calculations and results** for each bear.

Polar Bear	Grizzly



Once you have finished the interactive activity, answer the following questions:

2.2 Which of the two bears in the activity has the most-developed temporal muscle?

2.3 What does the difference between the two bear species imply in terms of bite strength?

2.4 Why is the skull of one of the bears adapted for the development of bigger temporal muscles?

2.5 What habitat-related factors could explain this difference?



3. Premolars, Molars and Canines

Study the following documents:

- Diagrams of polar bear and grizzly bear skulls
http://nature.ca/education/cls/lp/lppbskl_e.cfm
- Photos of polar bear and grizzly bear teeth
http://nature.ca/education/cls/lp/lppbth_e.cfm

3.1 Note all the differences in the shape of the teeth.

Next, answer the following questions:

3.2 What can explain these differences in the teeth?

3.3 What do these differences imply in terms of the animal's food?



3.4 What features of the habitat can explain these differences? What influence can they have on the diet of the two bear species?

4. Presentation

Extrapolate from the results of the skull analyses. Prepare a short presentation on the following theme:

- How differences in the skull and teeth show the polar bear's adaptation to the Arctic climate.

The following documents may be useful for you:

- *Fact Sheet: Polar Bears and Climate Change*
http://nature.ca/education/cls/lp/lppbfsc_e.cfm
- *Fact Sheet: General Information on Polar Bears*
http://nature.ca/education/cls/lp/lppbfsgen_e.cfm
- *Map: range of Polar Bear*
<http://www.hww.ca/hww2.asp?id=99#sid14>
- *Map: range of Grizzly Bear*
<http://www.hww.ca/hww2.asp?id=90#sid14>

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5. Enrichment

How can climate change threaten the survival of polar bears in the Arctic?

Additional Resources

- *Polar Bear: Natural History Notebooks*
<http://nature.ca/notebooks/english/polbear.htm>
- *Polar Bear: Hinterland Who's Who*
<http://www.hww.ca/hww2.asp?id=99>
- *Grizzly Bear: Natural History Notebooks*
<http://nature.ca/notebooks/english/grizzly.htm>
- *Grizzly: Hinterland Who's Who*
<http://www.hww.ca/hww2.asp?id=90>

Online Version
http://nature.ca/education/cls/lp/lppbsw_e.cfm

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