

## CRETACEOUS ALBERTA

1. This exhibit is based on a discovery made in Dry Island Buffalo Jump Provincial Park
2. What type of dinosaur was found at this site and how many individuals were there?  
Albertosaurus. Twenty-two individuals were found in this bonebed.
3. How did the dinosaur bones end up in a bonebed? The carcasses were swept downstream by the water and caught in a log jam formed by hundreds of trees.

## FOUNDATIONS

1. What is evolution?
  - A A process by which seeds grow in to plants
  - B Changes in the genetic information between generations of a species
  - C Changes in climate over time
  - D A delicious dessert that can be found at most bakeries
2. To be considered a living organism, something must have which of the following characteristics (circle all that apply)?
  - A Composed of one or more cells
  - B Able to move freely
  - C Respond to stimuli (light, sound, touch, etc.)
  - D Able to reproduce
3. The study of how burial, preservation and modification effect fossilization is called?
  - A Taxidermy
  - B Typology
  - C Taphonomy
  - D Fossilology
4. What can be found in the Late Cretaceous Scollard Formation near Trochu, Alberta?
  - A P/Tr boundary
  - B C/Pg boundary
  - C O/S boundary
  - D K/Pg boundary

5. Fill in the blank boxes in the chart.

ERAS	PERIODS	AGE (Years Ago)
CENOZOIC	Quaternary	2.6 million to Present
	<i>Neogene</i>	23 – 2.6 million
	<i>Palaeogene</i>	66 – 23 million
<i>MESOZOIC</i>	<i>Cretaceous</i>	145 – 66 million
	<i>Jurassic</i>	201 – 145 million
	<i>Triassic</i>	252 – 201 million
<i>PALAEOZOIC</i>	Permian	299 – 252 million
	Carboniferous	359 – 299 million
	<i>Devonian</i>	419 – 359 million
	<i>Silurian</i>	444 – 419 million
	Ordovician	485 – 444 million
	Cambrian	541 – 485 million
PRECAMBRIAN		4.6 billion years to 541 million years

CONTINUE UP THE RAMP AND PROCEED TO THE RIGHT, THROUGH THE TIME TUNNEL.

## THE BURGESS SHALE

The information for this section is found in writing before the Burgess Shale glass floor and in the study hall just beyond the glass floor. Some answers are repeated during the recording in the glass-floored area.

1. Match the definition on the left by writing its letter beside the correct answer on the right.

### DEFINITIONS

- A** The Burgess Shale has yielded more than this number of fossils.
- B** The Burgess Shale creatures are enlarged this many times.
- C** The animals lived in shallow seas during the Cambrian Period, this many years ago.
- D** This was a member of our own phylum because it had a stiff rod down its back.
- E** This was the largest predator in the Burgess Shale.
- F** This animal had the head of an insect and the body of a fish.
- G** The Burgess Shale is a layer of rock high in these mountains.
- H** This person found the first fossils of the Burgess Shale.
- I** This is the term for shedding an external skeleton.
- J** He was the author of *Wonderful Life - The Burgess Shale and the Nature of History*.
- K** This is the most common Burgess Shale creature with feathery legs.
- L** These were carnivorous worms armed with spines and hooks on a retractable snout.
- M** Armed with protective spines on its back, early studies misinterpreted this animal's spines as stilt-like walking legs.

### TERMS

- L** *Priapulida*
- I** Molting
- M** *Hallucigenia*
- G** The Canadian Rockies
- D** *Pikaia*
- K** *Marrella*
- E** *Anomalocaris*
- B** Twelve (12)
- C** 505 million
- A** 200,000
- F** *Nectocaris*
- H** Charles D. Walcott
- J** Stephen J. Gould

PROCEED TO THE DEVONIAN REEF EXHIBIT

## PALAEOZOIC ERA

1. What Alberta resource is locked in rock layers accumulated 375 - 365 million years ago?

Petroleum

2. What material was the resource trapped in? Porous rock

GO DOWN THE SPIRAL STAIRCASE

3. What was the major shift for life during the Palaeozoic Era? Moving onto land

4. What progressed first onto land?

- A plants  
 B amphibians  
 C insects

5. What plant fossil is the first evidence of life on land? A plant named Cooksonia.

6. In what three ways did vascular plants change during the Early Carboniferous?

They increased in size, complexity and diversity.

7. What group of animals were the first to colonize land? Invertebrates

8. Name two examples from this group. Millipedes, centipedes, cockroaches, dragonflies

9. During which period does our fossil evidence indicate that animals first lived on land?

Silurian Period

10. Why are insects considered to be a very successful group?

1. There are more species of insects than all other species of animals combined.

2. They have existed on Earth for more than 400 million years.

11. The first vertebrates, or animals with backbones, that lived partially on land were

- A amphibians  
 B insects  
 C reptiles

## PALAEOZOIC ERA continued

12. Fill out the following table about early vertebrates that lived on land:

	Animal	Description of egg shell	Reproductive area
First	<i>amphibians</i>	<i>soft/permeable</i>	<i>water</i>
Second	<i>reptiles</i>	<i>hard</i>	<i>land</i>

13. During what period did reptiles begin to overshadow amphibians? *Permian Period*

14. What reptile lived during this period, had a large sail on its back, and is often mistaken for a dinosaur? *Dimetrodon*

## MESOZOIC ERA—TRIASSIC GIANT

1. What is the name of the specimen on display in this gallery and how large is it?  
*Shonisaurus sikanniensis; 21 metres long*
2. How long did it take to prepare the skeleton once it was brought to the Royal Tyrrell Museum? *Over four years*
3. What is the significance of this specimen? *It is the fossilized remains of the world's largest marine reptile (30% larger than any previously known ichthyosaur).*

## CRETACEOUS GARDEN

1. The plants in the Cretaceous Garden are representative of plants that lived in Alberta how many millions of years ago? *75-65 MYA*
2. Describe the climate at the end of the Cretaceous in Alberta? *Warm-temperate, seasonal*
3. A living fossil is an organism thought once to have gone extinct but found still living (extant) on Earth. There are two examples in the Cretaceous Garden, what are they?  
*Metasequoia, Ginkgo biloba*

## DINOSAUR HALL

1. Name three dinosaurs on display that lived during the Jurassic Period.  
*Camarasaurus, Allosaurus, Camptosaurus, Ornitholestes, Stegosaurus*
2. Which two dinosaurs are shown in a Late Cretaceous confrontation?  
*Euoplocephalus and Albertosaurus*
3. Ceratopsians (horned dinosaurs) originated in *Eastern Asia* during the middle to late Jurassic Period, about *157* million years ago.
4. What are some theories as to the primary role of ceratopsian frills and horns?  
*Species recognition, defence against predators, make them appear larger to deter predators or other males during breeding confrontations.*
5. Which ceratopsian on display is named after a Museum palaeontologist, and where was it discovered? *Centrosaurus brinkmani was named after Dr. Don Brinkman.*  
*It was discovered in Dinosaur Provincial Park.*
6. Ceratopsian dinosaurs are divided into two groups based on differences in the frill and the facial horns. Name the two groups and list one example from each group.  
*Centrosaurines – had larger nasal horns, shorter orbital horns and shorter frills.*  
*Examples: Centrosaurus, Albertaceratops, Styraeosaurus and Pachyrhinosaurus*  
*Chasmosaurines – had shorter nasal horns, longer orbital horns and larger frills.*  
*Examples: Chasmosaurus, Anchiceratops and Triceratops*
7. What is the scientific name for the group of dinosaurs commonly known as “raptors”?  
*Dromaeosaurs*
8. Scientists group duckbill dinosaurs into two subfamilies based on skull features. What are these subfamilies? *(Lambeosaurinae) crested duckbills and*  
*(Hadrosaurinae) non-crested duckbills.*
9. During the Late Cretaceous, the interior of North America was covered by a shallow inland waterway. What was it called and how far did it extend? *Bearpaw Sea;*  
*stretched from the Gulf of Mexico to the Arctic Ocean.*
10. Name three types of animals that lived in this aquatic environment?  
*Baculites, mosasaurs, plesiosaurs, ammonites, clams*

## EXTINCTION THEATRE

- How large was the asteroid believed to have crashed into the Yucatan Peninsula at the end of the Cretaceous? 10-15 km in diameter
- What could have been some of the resulting problems from the asteroid impact?  
Dust blocking the sun, fires, tsunamis, volcanic activity, acid rain
- Describe the difference between Gradualistic and Catastrophic theories of extinction.  
Gradualistic: Slowly over a long period of time  
Catastrophic: Single event caused extinction suddenly (e.g. asteroid impact)

## MAMMAL HALL

- What is the name and the age of the first period of the Cenozoic Era?  
Palaeogene Period, 65 - 25 million years ago

- Fill in the following table:

Type of Mammal	Characteristics of Offspring	Example
Monotremes	<i>egg</i>	<i>platypus</i>
<i>Placental</i>	Live	<i>mouse, whale or bear</i>
<i>Marsupials</i>	<i>carried in pouches</i>	kangaroo or opossum

- List three uses for horns. Self-defence, fighting for territory or a mate, and digging for food.
- How did the grass-eating mammals adapt to open grassland?  
Lost some of their toes - remaining toes developed hard cover (hooves).
- What are the names of the two groups of grass-eaters? Give an example for each.  
Odd - toed ungulates — horse or rhino  
Even - toed ungulates — camel or deer
- Name a tiny fossil thermometer and explain how it is used to demonstrate climate change through geologic time. Fossil pollen shows a decrease in tropical vegetation.  
The direction of the coil on small fossil shells indicates cooler temperatures.  
Fossil plankton show changes in their adaptation to a cooling climate.

## ICE AGES

1. During the Pleistocene, the sea level was low, exposing the sea floor between Alaska and Siberia. Why was this, and how did it affect the animals? *Water was frozen on land in glaciers. Many species crossed the resulting land bridge known as the Bering Strait.*
2. Which new predator to North America may have caused the extinction of many large Pleistocene mammals? *Humans were the new species. Stone and bone weapons helped them to be efficient hunters, perhaps even causing the extinction of many large Pleistocene animals.*
3. The cause of the Great Extinction at the end of the last ice age is still uncertain. State the four questions we still have about the disappearance of ice age mammals.
  1. *Were the ice age animals so specialized that they couldn't adapt to changing environments after the glaciation?*
  2. *Did humans wipe out entire populations with their weapons and hunting techniques?*
  3. *Did animals migrating from Asia outcompete North American species?*
  4. *Did animals entering North America bring new deadly diseases?*
4. In general, how do modern animals compare in size to Pleistocene animals? *Modern animals are slightly smaller than the animals of the Pleistocene.*
5. What is the only constant of life on Earth? *Change*