

## ACTIVITY 1

### *Dino Ditties*

Have fun!

## ACTIVITY 2

### *My Little Trilobite*

Have fun!

*Cont.*

# ACTIVITY 3

## Wetlands Word Search

P F R W O H E C P V H X V A S O P D V S  
H Z A J Z H L L M X S S T F N M U D N D  
Z O Y Z D Z I L F C O A C X A N I G H N  
N I O U P Z T Y R L I M R W I S F N H A  
H A M Z K I R H Q V L V S T B M V V S L  
V J J L E X E A C S U H M S I X Y D F T  
O V D O Q N F N Y N B F D O H R G T X E  
I F S E L I D O C O R C H X P I X G X W  
P J N O E O C O A L F W J Y M H E Z K C  
H M Y Z H A F P D N A E N G A U C S Q A  
J Q K M M A W F S T H Z R E A G M T F C  
P H D A B S D Z E D J P J N R T G C F D  
T M X U H P M R B B P I C D S F U E D D  
O N X M S K R Y O W F I E Z S K V S P B  
E A D M V P J V O S A J J G G X B N L F  
C T E R V A O U V U A L K S C S Z I I C  
T L S W Q F C D B U I U H E Y T E S J B  
V E Q Z R E T A W H S E R F W R H I R S  
A D N L R A A G G E K A A S E M E K Z T  
O E M E T S Y S O C E I D M O R G K A K

### Word Bank

AMPHIBIANS	CYCADS	COAL	CROCODILES	DELTA
ECOSYSTEM	FERNS	FERTILE	FISH	FRESHWATER
HADROSAUR	INSECTS	MUD	OXYGEN	SOIL
SWAMP	WATER	WETLANDS		

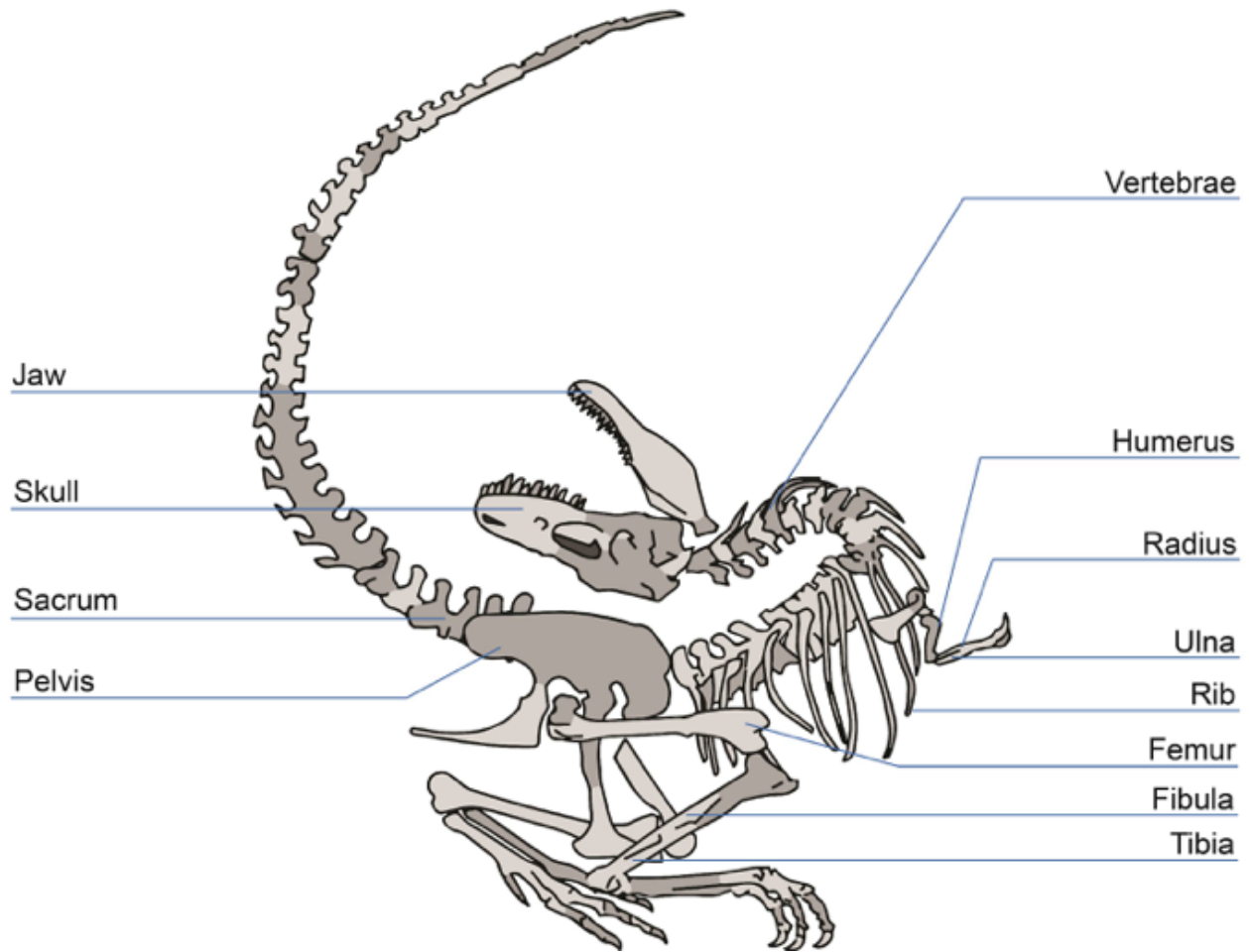
# ACTIVITY 4

## Mesozoic Time Scramble

<p><b>145 MYA – 66 MYA</b></p> <p><b>CRETACEOUS</b></p>  <p><i>ALBERTOSAURUS</i></p> <p><b>NAME MEANS</b> “Alberta Lizard” A member of the theropod family Cousin of <i>Tyrannosaurus rex</i></p>	<p><b>201 MYA – 145 MYA</b></p> <p><b>JURASSIC</b></p>  <p><i>ARCHAEOPTERYX</i></p> <p><b>NAME MEANS</b> “ancient wing” One of the first feathered dinosaurs The size of a magpie</p>	<p><b>252 MYA – 201 MYA</b></p> <p><b>TRIASSIC</b></p>  <p><i>COELOPHYSIS</i></p> <p><b>NAME MEANS</b> “hollow form” A small, primitive theropod Ancestor of <i>Tyrannosaurus rex</i></p>		
 <p><i>PARASAUROLOPHUS</i></p> <p><b>NAME MEANS</b> “near-crested lizard” A member of the hadrosaur family Crest on head was likely used for communication</p>	 <p><i>STEGOSAURUS</i></p> <p><b>NAME MEANS</b> “roofed lizard” A well-armoured vegetarian Usually travelled alone or in pairs</p>	 <p><i>PLATEOSAURUS</i></p> <p><b>NAME MEANS</b> “flat lizard” A primitive sauropod or “long-necked” dinosaur A bipedal vegetarian</p>		
<p>the extinction event that marks the end of the Age of Dinosaurs</p>			<p>glue to backside of Cretaceous</p>	<p>glue to backside of Jurassic</p>

# ACTIVITY 5

## *Beastly Bones*



## ACTIVITY 7

### *Designer for a Day*

#### *Ice Age Survivors*

**What animals evolved and lived during the last ice age?**

**Which ones died out and which ones are still with us today?**

**Extinct:** Sabre-toothed cat, American lion, steppe bison, American camel, woolly mammoth, mastodon, short-faced bear, American cheetah, giant ground sloth, glyptodont, dire wolf, giant beaver

**Extant:** Caribou, bald eagle, mountain goat, muskox, grey wolf

**What do scientists think caused the ice ages?**

Scientists believe that there are several factors that contributed to the global cooling. One hypothesis is that our planet's orbit, tilt, and wobble fluctuate over large time spans, which may have resulted in variable radiation to Earth's surface and affected temperatures as a result.

Others suggest that albedo (reflection of light away from Earth) created from the initial cooling and snowfall would have created a feedback loop of increased light reflection as opposed to light absorption, thus dropping the temperature of the planet as it became covered in snow and ice. The accumulation of snow and ice would also trap CO<sub>2</sub> and methane, further cooling our atmosphere. Lastly, the movement of the tectonic plates may have altered the ocean currents, which could potentially disrupt the temperature of the seas.

**What adaptations helped animals survive the extreme changes in conditions?**

Some adaptations include:

- Dense fur to keep warm
- Mass migrations
- Large sizes
- Body parts specialized to dig up or sweep away snow

## Dinosaurs at Large

### What do we know about dinosaurs? What different kinds are there?

To date, there are over 1,000 species of dinosaur found worldwide.

Dinosaurs can be divided into the following suborders:

- Thyreophora*: Included the armoured ankylosaurs and the spiked stegosaurs. (e.g., *Euoplocephalus* and *Stegosaurus*)
- Marginocephalia* : Included the horned ceratopsians and the dome-headed pachycephalosaurs. (e.g., *Triceratops* and *Stegoceras*)
- Ornithopoda* : Included the large, herbivorous duckbilled hadrosaurs. (e.g., *Edmontosaurus* and *Iguanodon*)
- Sauropodomorpha*: Included the long-necked sauropods. (e.g., *Brachiosaurus* and *Diplodocus*)
- Theropoda*: Included the large carnivorous tyrannosaurs, as well as small predatory dromaeosaurs, swift ornithomimids, and the oviraptors. (e.g., *Tyrannosaurus*, *Velociraptor*, *Struthiomimus*, and *Chirostenotes*)

### How do we think they lived, and what was their environment like? Where do we find fossil remains of dinosaurs?

Different dinosaurs lived in different environments, similar to how different bird species specialize in different habitats. Dinosaurs lived during the Mesozoic Era and roamed our planet between 252 to 66 million years ago (if we exclude living birds). During that time, our planet was much warmer with mild temperatures and higher sea levels. During the Triassic Period, all of the continents had merged into the supercontinent Pangaea, but this split apart by the Jurassic Period.

In Alberta, the weather was subtropical, with large *Metasequoia* forests, ferns and cycads dominating the land. There was an inland sea to the east that helped to regulate temperatures, and many rivers, lakes and swamps throughout the province. During the Mesozoic, there were likely periods of time when there was no ice present at all on our planet. We find fossilized remains around the world on every continent. Alberta's Dinosaur Provincial Park is one of the best localities on Earth to find dinosaur remains.

### What did they eat and who ate them?

Dinosaurs ate a variety of foods and included carnivores, herbivores, and omnivores. Carnivorous dinosaurs ate mammals, birds, fishes, and other reptiles, including other dinosaurs. Herbivorous dinosaurs ate ferns, coniferous needles, flowers, seeds, and fruits. Omnivorous dinosaurs ate insects, eggs, ferns, fruits, and small vertebrates. Dinosaurs were also preyed on by other animals living alongside them such as the flying reptiles known as pterosaurs, marine reptiles like mosasaurs, sharks, and crocodiles. Early in the Triassic Period, when dinosaurs were still small and first evolving, they were preyed on by many large reptilian predators including rauisuchians, phytosaurs, and proterosuchids.

## *The Bearpaw Sea*

**During the Cretaceous Period, much of North America was covered by a shallow sea.**

**What evidence is there to prove this?**

The inland sea was called the Bearpaw Sea and it was part of the Western Interior Seaway.

We have marine sediments found throughout Manitoba, Saskatchewan, and Alberta from the Cretaceous strata that shows the extent of this sea. Fossils of many animals that are exclusively marine have also been found within these layers.

**What animals used to live in the Bearpaw Sea? How did they interact with one another, and are any creatures around today that resemble them?**

Bearpaw sea animals include:

- Sharks and rays
- Mosasaurs
- Plesiosaurs and pliosaurs
- Sea turtles
- Bony fish
- Ammonites
- Molluscs
- Shellfish

These animals interacted in the same way that animals in terrestrial ecosystems do. There were predators like the sharks and marine reptiles that would prey on the fishes, squids and molluscs. The salinity was likely lower than the ocean, which would explain the absence of corals and many echinoderms. In the oceans today, we can see marine reptiles like sea turtles and sea snakes, but large marine reptiles have become extinct. Many similar bony fish are still around, as are the cartilaginous fishes like sharks and rays. There are still cephalopods, with only the nautilus remaining in shelled form.

## ACTIVITY 7

### *Deltas of Doom!*

#### *Questions*

Here are some follow-up questions for classroom discussion and review:

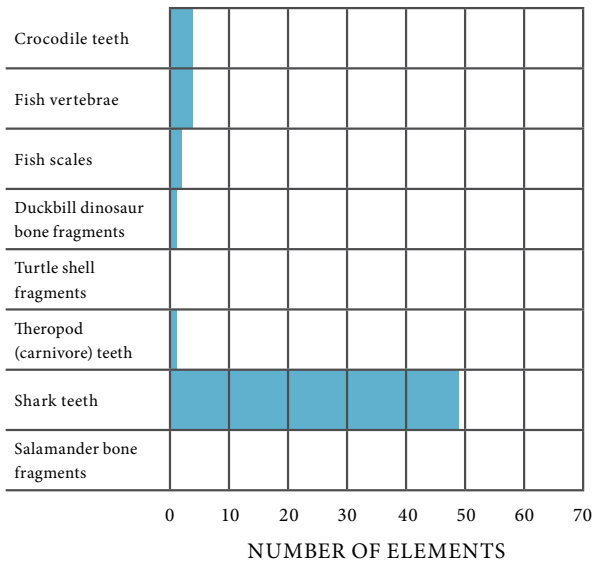
- **What is a delta?** Deltas are wide channels that deposit many types of sediment.
- **How can we tell where deltas formed millions of years ago?** Sedimentary rock layers of sandstone formed in these high deposition environments, often trapping animal remains, which have a higher chance of fossilization.
- **Why are deltas likely to flood?** Some deltas like the one in the story are close to the ocean, so the risk for flooding is higher since the river can flood due to high rainfall and the ocean can surge during storms. These combined events create a higher probability for flooding and more violent flooding than in either location alone.
- **What conditions are necessary for fossilization?** In order for fossilization to occur, a plant or animal needs to be buried quickly and remain undisturbed underground for long periods of time. Ground water rich in minerals must also make its way through the sediments to replace the organic material.
- **What happened to the Bearpaw Sea?** Due to the movement of the North American plate, the continent began to rise, sea levels dropped and the seaway dried up.
- **Do you think events like those that occurred in the story still happen to animals today? Why or why not?** Yes, many herding and migratory animals are casualties of flooding. We have witnessed mass herd fatalities around the world from flooding, including in Canada. In the 1980s, a flooded river in Quebec resulted in the drowning of over 7,000 caribou during their annual migration in one day.
- **What do you think the environment was like in Alberta 68 million years ago? Was it warmer or cooler? Wet or dry? Why do you think it was different from today?** During the Cretaceous Period, Alberta was much warmer and wetter than it is today. The global temperatures were higher on average around the world in a 'greenhouse Earth'. The Bearpaw Sea also helped to keep the climate consistently mild and moist along these coastal areas in Alberta, much as it does in coastal communities on our planet today.



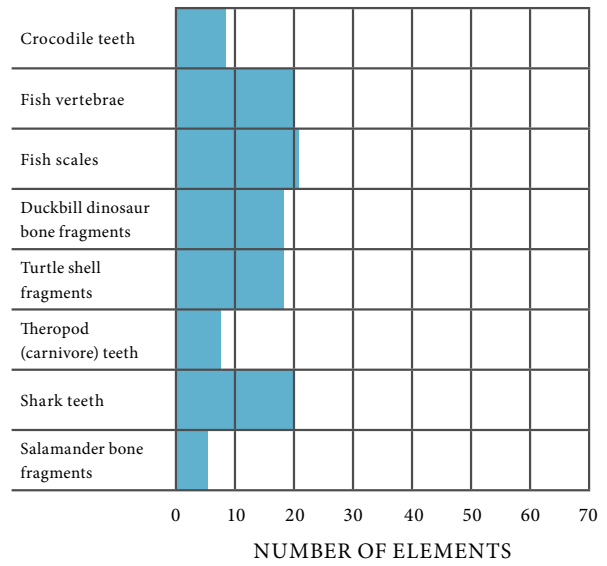
# ACTIVITY 8

## Buckets of Time

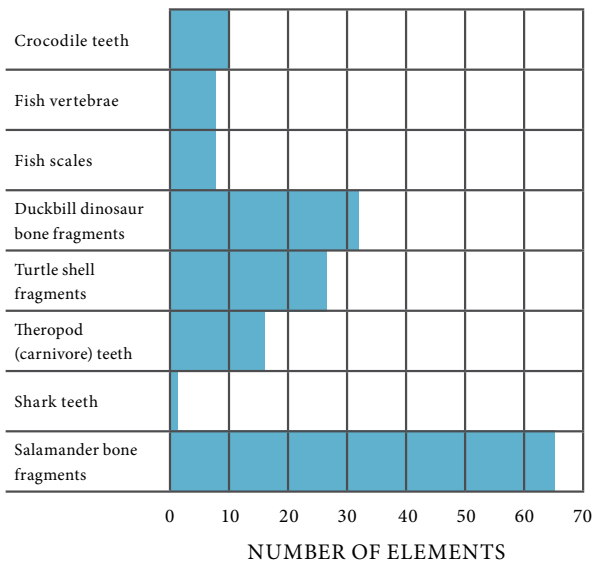
BUCKET ONE (72 MYA)



BUCKET TWO (70 MYA)



BUCKET THREE (68 MYA)



## Conclusion

The evidence reveals that there was a change in the populations and communities in that area over a period of several million years. Based on the evidence charted, answer the following questions:

**1. What do you think caused the changes in the populations represented?**

The changes in populations would have been a result of changes in the environment.

**2. What kind of changes do you think occurred in the environment?**

The environment changed from a mostly marine habitat, to a coastal environment and ended with a wet predominantly terrestrial environment.

**3. What can we learn about ancient life from fossils?**

We can learn about how the climate changed and how living things adapted to those changes. We can also determine which animals may have been more abundant and in some cases what the diet of these animals would be. In some cases, we can compare ancestors of living animals to their relatives that lived long ago.

**4. What can we learn from the sediments fossils are found in?**

The sediments can tell us about the environment from that time. We can determine if it was freshwater or saltwater, and the type of depositional environment that was present (e.g., fast moving river compared to a stagnant swamp).