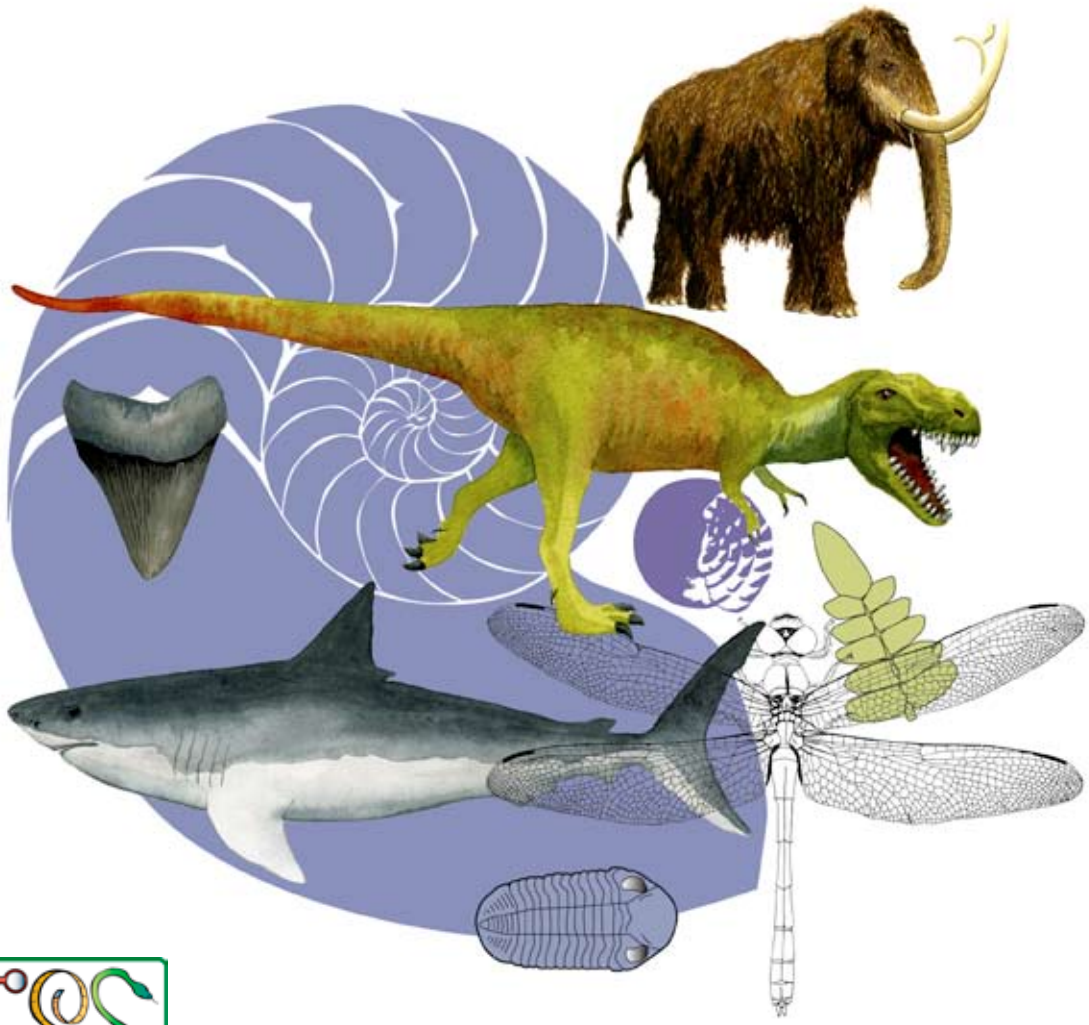
Prehistoric Life

Teacher's Guide



MESS
Marvelous Explorations through Science and Stories

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Prehistoric Life

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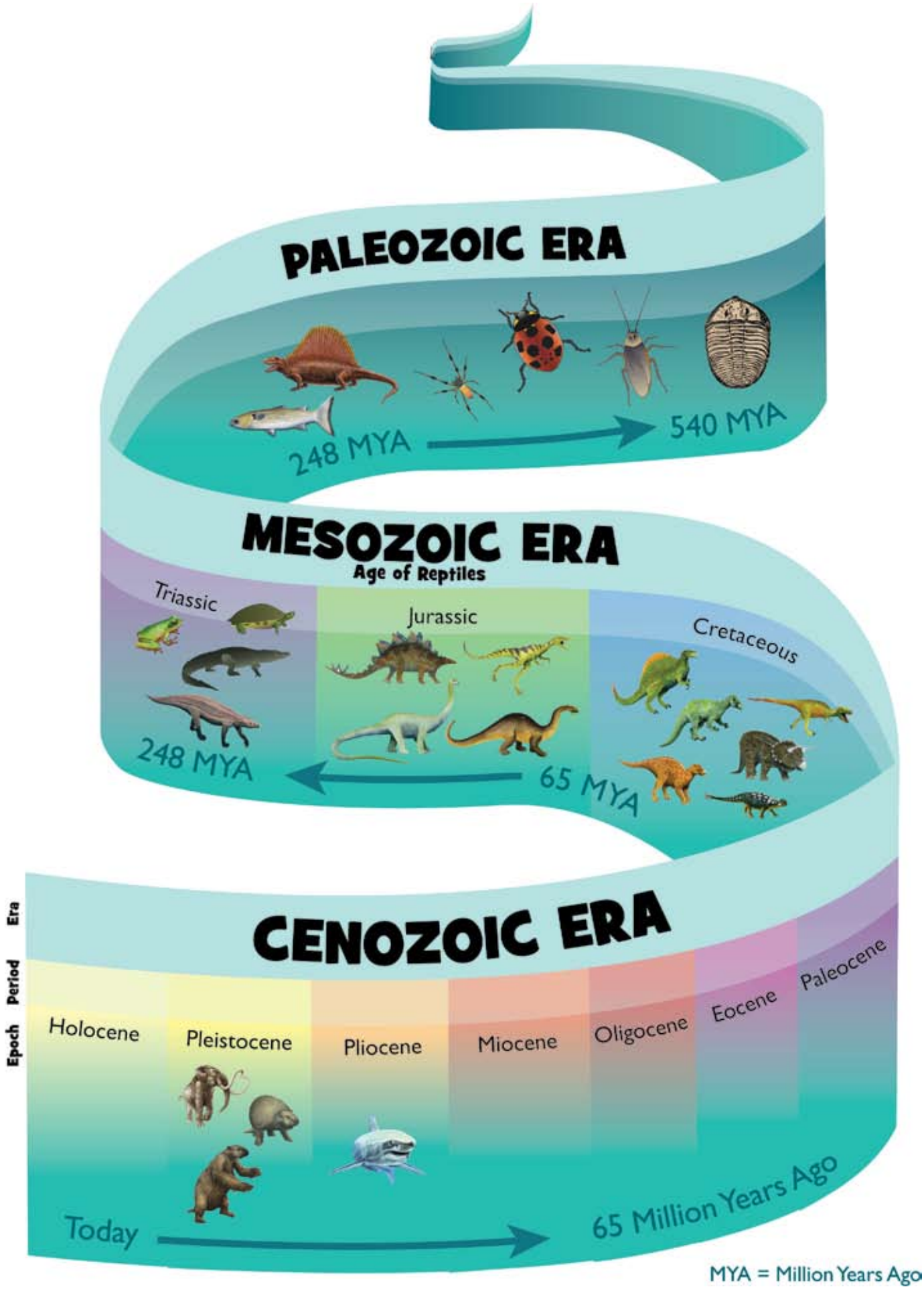


MYA = Million Years Ago

Prehistoric Life

Teacher Background Information

What is the focus of this guide?

The focus of this guide is on the ancient creatures that roamed the Earth millions of years ago. The massive size and unusual features of many of these early animals frequently fascinate young children. The experiences in this guide will capture children's imagination as they explore life on Earth long ago.

What science concepts are covered in this guide?

- Many animals and plants that once lived are now extinct.
- Fossils are evidence of plants and animals that lived a long time ago.
- Scientists use fossils to learn about the plants and animals that lived a long time ago.
- Ancient animals have distinctive features that help us identify them.
- Dinosaur offspring resemble their parents.

What is meant by "Prehistoric Life?"

Prehistoric life refers to all things that lived on Earth between the origin of life 3.5 billion years ago and 3500 B.C. when humans began to keep written records. In this guide, we focus on prehistoric animals that lived between 200 million and 10,000 years ago.

How do scientists learn about things that lived long ago?

Scientists learn about ancient plants and animals by studying **fossils**. Fossils are the remains or other evidence of life that have been preserved in the Earth's crust. For example, fossilized teeth, bones, and footprints provide clues to what ancient animals ate, how large they were, and how fast they were able to move.

Fossils cannot provide answers to every question we may have. For instance, fossils do not tell much about what color dinosaurs were. Scientists think that dinosaurs may have been as colorful as the tropical birds we see today.

Most fossils represent once-living things that are now **extinct**. Scientists who learn about the past by studying fossils are called **paleontologists**.

Prehistoric Life

How do fossils form?

Usually when animals and plants die, their remains are scavenged by other animals or simply rot away. However, if the remains are buried by **sediment** such as soil, mud, or another substance before they decompose, a fossil might form. Hard materials such as bone take longer to decay and so are more likely to fossilize than soft materials such as skin. Because it takes almost perfect conditions for fossilization to occur, we will probably never find fossils for most life forms that once lived on Earth.

Fossils can be of body parts such as bones, teeth or claws, or they can be traces such as footprints, teeth marks, or **imprints** or impressions.

Dinosaurs

Of all the animals that lived during prehistoric times, children and adults alike are probably most familiar with **dinosaurs**. Dinosaurs lived between approximately 225 million and 65 million years ago. Dinosaurs were **reptiles**. A common characteristic of dinosaurs was that their legs were directly under their bodies, instead of projecting out to the sides like the legs of lizards. Another feature shared by dinosaurs (and most modern reptiles) is that their young hatched from eggs.

Dinosaurs were **terrestrial**; that is, they lived on land. There *were* ancient flying creatures present at the same time as dinosaurs, but they are not considered to be dinosaurs. Other large creatures such as plesiosaurs lived in the seas during the same time period as dinosaurs, but also are not considered dinosaurs. Scientists have identified more than 700 types of dinosaurs. Some dinosaurs were gigantic, while other dinosaurs were relatively small. *Compsognathus*, for example, was about the size of a chicken. Some walked on four legs while others walked on two legs. Dinosaurs also varied in the lengths of their necks, the shapes of their bodies and heads, and in the presence or absence of head gear and body armor.

Dinosaur names often are based on Greek words and describe distinctive physical characteristics or behavior. For example, *Triceratop*s means “three-horned head” and *Maiasaura* means “good mother lizard.”

Prehistoric Life

Dinosaurs frequently are grouped by what they ate. Some species were **carnivores**; they ate only meat. Some species were **herbivores**; they ate only plants. Other were **omnivores**; they ate both meat and plants.

Carnivores		
Dinosaur	Size	Think about this...
Compsognathus KOMP-sog-NATH-us "pretty jaw" 	2 feet long 1 foot high 6 pounds	About the size of a chicken.
Spinosaurus SPY-no-SORE-us "spine lizard" 	35 feet long 16 feet high 12,000 pounds	Had a prominent "sail" on its back that may have helped it regulate body temperature, attract mates, or defend itself.
Tyrannosaurus rex tie-RAN-oh-SORE-us rex "tyrant lizard king" 	40 feet long 16 feet high 12,000 pounds	Believed to have had the strongest bite of any dinosaur; could penetrate through solid bone. Teeth were continually replaced as they were worn or broken.

Prehistoric Life

Herbivores		
Dinosaur	Size	Think about this...
Ankylosaurus an-KIE-low-SORE-us "stiff joint lizard" 	30 feet long 4 feet high 6-8,000 pounds	Had lots of armor all over its body and a bony tail club. Some of its bones were fused (or stuck together) to make it stronger.
Apatosaurus ah-PAT-oh-SORE-us "deceptive lizard" 	69 feet long 20 feet high 60,000 pounds	Because of its large size, scientists think it might have had to eat almost constantly. Scientists think that the long whip-like tail could have made cracking sounds as loud as a cannon!
Diplodocus DIE-plod-oh-kuss "double beam" 	88 feet long 22 feet high 20-22,000 pounds	Was so large that some scientists think that it could not lift its head more than a few feet off the ground.
Iguanodon ih-GWAN-oh-don "lizard tooth" 	33 feet long 12 feet high 10,000 pounds	Had a "thumb spike" that could have been used to defend against predators or forage for food.

More Herbivores		
Dinosaur	Size	Think about this...
Maiasaura MY-uh-SORE-uh "good mother lizard 	30 feet long 12 feet high 4,000 pounds	Fossils of this dinosuar have been found along with remains of eggshells and hatchlings, suggesting that *Maiasaura* raised their young for some period of time.
Stegosaurus STEG-oh-SORE-us "roofed lizard" 	28 feet long 8 feet high 4,000 pounds	Had two rows of plates running along its back and four spikes at the end of its tail. Tail spikes were probably used for defense.
Triceratops try-SERR-a-tops "three horn face" 	28 feet long 8 feet high 14,000 pounds	Had three horns on its skull and a "frill" at the back of its neck. Scientists think that the *Triceratops*' distinctive features helped in attracting mates and also in species recognition.

Prehistoric Life

What other animals lived during prehistoric times?

Dinosaurs are not the only animals that roamed the Earth in ancient times. Most of these ancient animals are extinct also, but many have relatives alive today. Some interesting examples of extinct animals that lived after the dinosaurs include the mammoths, *Smilodon* (saber-tooth cat), giant ground sloth, glyptodont, and megalodon.

Some Prehistoric Animals		
Animal	Size	Think about this...
woolly mammoth 	10 feet high 6,000 pounds	Had large curved tusks (up to 16 feet long) used to protect against predators, attract mates, or display dominance. Related to the Columbian mammoth (another ancient mammal that lived further south) and to the modern elephant. Herbivore
Smilodon SMY-luh-don "knife tooth" 	8-9 feet long 3-5 feet high 450 pounds	Canine teeth could be up to 7 inches long. This predator has no close living relatives. Carnivore
giant ground sloth 	15-20 feet high 6-8,000 pounds	Very slow moving but strong. Had three claws on each foot used to grab and pull branches down so it could eat leaves off trees. Related to modern tree sloth. Herbivore

More Prehistoric Animals		
Animal	Size	Think about this...
glyptodont glip-toh-dont “grooved tooth” 	10 feet long 5 feet high 2-3,000 pounds	Body and head covered in plates of armor called **scutes**. Tail was covered with armor and could be used like a club for protection. About the size of a small car. Related to modern armadillo but ten times bigger! Herbivore
megalodon MEG-a-luh-don “big tooth” 	50 feet long 100,000 pounds	Triangular teeth that were serrated for cutting through prey. Carnivore

What happened to the dinosaurs and other ancient animals?

No one knows for sure what happened to the dinosaurs. The most widely accepted explanation is that a meteorite hit the Earth about 65 million years ago. This led to a drastic change in the climate. The dinosaurs were not able to adapt to the new conditions.

We also are unsure about what caused other ancient animals to become extinct. Again, there may have been a change in climate or other catastrophic events. Or, disease may have led to massive deaths. In some cases such as the mammoth, humans probably contributed to the dwindling numbers by hunting the animals.

Prehistoric Life

What are some common misunderstandings about prehistoric life?

Dinosaurs were the first living thing on Earth.
Because we pay so much attention to dinosaurs, children may conclude that dinosaurs are the "oldest" animals or the first things that lived on Earth. In fact, many other animals lived on Earth before the dinosaurs including the ancestors of crocodiles and sharks, as well as frogs, turtles, cockroaches, and beetles.

Dinosaurs and humans lived at the same time.
Humans appeared on Earth more than 60 million years after the death of the last dinosaur. Humans did, however, co-exist with many other extinct animals, including mammoths.

Brontosaurus was the largest dinosaur.
Brontosaurus is no longer recognized as a dinosaur. Brontosaurus was supposedly "discovered" in Wyoming in the late 1800s. In reality, a paleontologist had placed the skull of a different type of dinosaur on the skeleton of an *Apatosaurus* making it appear that he had discovered a new dinosaur when in fact he had not. The error was not uncovered until the 1970s.

Scientists know everything about prehistoric life.
In the years to come, scientists will make many other discoveries that will challenge long-held beliefs about dinosaurs and life during prehistoric times. That is the nature of science—we constantly change our understanding of things as we discover new information. Perhaps your children will grow up to be among those who help solve the puzzle that is "prehistoric life."

Teacher Vocabulary

carnivore – an animal that eats only meat

dinosaur – an extinct, diverse group of terrestrial reptiles of the Mesozoic Era

extinct – no longer in existence; having no living representatives on Earth

fossil – the remains or evidence of plant or animal life

herbivore – an animal that eats only plants

imprint – a mark or pattern left on a hard surface after the original material is gone

mammal – a warm-blooded animal that breathes air, has hair, gives birth to live young, and lives on mother's milk when young

omnivore – an animal that eats both animals and plants

paleontologist – a scientist who studies the fossil remains of ancient life

prehistoric life – all the living things that inhabited the Earth before humans started keeping written records

reptile – a cold-blooded, usually egg-laying vertebrate (such as a snake, lizard, crocodile, turtle, or dinosaur) having an external covering of scales or horny plates and breathing by means of lungs

scute – a bony, external plate or scale

sediment – matter deposited by some natural process

terrestrial – living or growing on land, instead of the sea or air

vertebrate – an animal that has a backbone

MESS® Materials for Core and Center Experiences

Materials	Books
Experience 1: Introduction to Prehistoric Life	
Smilodon model & illustration giant ground sloth model & illustration woolly mammoth model & illustration *Tyrannosaurus rex* model & illustration megalodon illustration *Tyrannosaurus rex* tooth replica dinosaur footprint replica megalodon tooth replica	*National Geographic Prehistoric Mammals* by Alan Turner *Prehistoric Actual Size* by Steve Jenkins
Experience 2: Exploring Fossils	
Tyrannosaurus rex tooth replica *Camarasaurus* tooth replica dinosaur footprint replica megalodon tooth replica fossilized turtle shell fossilized mammal bones coral plant impressions seashells shark tooth magnifying tools	*Fossils Tell of Long Ago* by Aliki *Fossils* by Melissa Stewart *Bones, Bones, Dinosaur Bones* by Byron Barton
Experience 3: A Closer Look at Fossils	
Tyrannosaurus rex tooth replica megalodon tooth replica fossilized turtle shells fossilized mammal bones coral plant fossil seashells shark tooth fossil molds (e.g., trilobite, ammonite) sample fossil air-dry clay, plaster of paris, or play dough magnifying tools	*Fossils* by Melissa Stewart *The Field Mouse and the Dinosaur Named Sue* by Jan Wahl *Digging Up Dinosaurs* by Aliki

Materials	Books
Experience 4: What Can We Learn from Trackways?	
dinosaur footprint replica large sheets of brown paper shallow pan water paint or food coloring (optional) fossils magnifying tools	*Fossils* by Melissa Stewart *Fossils Tell of Long Ago* by Aliki *Dinosaur Bones* by Bob Barner
Experience 5: Going on a Fossil Dig	
scoops dirt sifters brushes fossils magnifying tools	*Bones, Bones, Dinosaur Bones* by Byron Barton *Digging Up Dinosaurs* by Aliki *The Field Mouse and the Dinosaur Named Sue* by Jan Wahl *Fossils* by Melissa Stewart
Experience 6: More About Prehistoric Animals	
Smilodon model & illustrations giant ground sloth model & illustrations tree sloth illustration woolly mammoth model & illustrations elephant illustration glyptodont illustration armadillo illustration megalodon illustration great white shark illustration megalodon tooth replica fossilized mammal bones	*National Geographic Prehistoric Mammals* by Alan Turner *Mammoths on the Move* by Lisa Wheeler *Great Big Guinea Pigs* by Susan L. Roth *Megatooth* by Patrick O'Brien *Mammoth* by Patrick O'Brien *Prehistoric Actual Size* by Steve Jenkins

MESS® Materials for Core and Center Experiences

Materials	Books
Experience 7: There Were Many Kinds of Dinosaurs	
Ankylosaurus model & illustration	*Big Book of Dinosaurs* by Angela Wilkes
Apatosaurus model & illustration	*Dinosaurs, Dinosaurs* by Byron Barton
Iguanodon model & illustration	*T. Rex* by Vivian French
Maiasaura model & illustration	*I Am an Ankylosaurus* by Karen Wallace
Spinosaurus model & illustration	*Dinosaur Bones* by Bob Barner
Triceratops model & illustration	*An Alphabet of Dinosaurs* by Peter Dodson
T. rex model & illustration	*The Dinosaur Alphabet Book* by Jerry Pallotta
Compsognathus illustration	
Diplodocus illustration	
Stegasaurus illustration	
Experience 8: Dinosaurs Hatched from Eggs	
Maiasaura model & illustration	*Dinosaur Babies* by Kathleen Weidner Zoehfeld
Maiasaura nest	
Baby Louie model	*Dinosaur Babies* by Lucille Recht Penner
miniature dinosaurs in plastic eggs	*I Am an Ankylosaurus* by Karen Wallace
Experience 9: What Did Dinosaurs Eat?	
T. rex tooth replica	*Big Book of Dinosaurs* by Angela Wilkes
Camarasaurus tooth replica	*The Dinosaur Alphabet Book* by Jerry Pallotta
dinosaur illustrations	
dinosaur models	*My Visit to the Dinosaur*s by Aliki
	I Am an Ankylosaurus by Karen Wallace
Experience 10: How Big Were the Dinosaurs?	
Ankylosaurus model & illustration	*Big Book of Dinosaurs* by Angela Wilkes
Apatosaurus model & illustration	*The Field Mouse and the Dinosaur Named Sue* by Jan Wahl
Iguanodon model & illustration	
Maiasaura model & illustration	*Big Old Bones: A Dinosaur Tale* by Carol Carrick
Spinosaurus model & illustration	
Triceratops model & illustration	*How Big Were the Dinosaurs?* by Bernard Most
T. rex model & illustration	
Compsognathus illustration	*Dinosaurs Are Different* by Aliki
Diplodocus illustration	*T. Rex* by Vivian French
Stegasuarus illustration	
tape measure	

Materials	Books
Experience 11: Dinosaur Defenses	
Ankylosaurus model & illustration	*Big Book of Dinosaurs* by Angela Wilkes
Apatosaurus model & illustration	*I Am an Ankylosaurus* by Karen Wallace
Iguanodon model & illustration	*Dinosaurs, Dinosaurs* by Byron Barton
Maiasaura model & illustration	*The Dinosaur Alphabet Book* by Jerry Pallotta
Spinosaurus model & illustration	*T. Rex* by Vivian French
Triceratops model & illustration	
T. rex model & illustration	
Compsognathus illustration	
Diplodocus illustration	
Experience 12: Review of Prehistoric Life	
Tyrannosaurus rex tooth replica	*National Geographic Prehistoric Mammals* by Alan Turner
Camarasaurus tooth replica	*Big Book of Dinosaurs* by Angela Wilkes
megalodon tooth replica	*Megatooth* by Patrick O'Brien
shark tooth	*Fossils* by Melissa Stewart
T. rex model & illustration	*Fossils Tell of Long Ago* by Aliki
megalodon illustration	*Prehistoric Actual Size* by Steve Jenkins
great white shark illustration	
fossils	
magnifying tools	

Experience 1

Introduction to Prehistoric Life

Science Concepts

Many plants and animals that once lived are now extinct.

Fossils are evidence of plants and animals that lived a long time ago.

Aim

Children will learn that there were animals that lived long ago that no longer exist.

Materials

Smilodon model & illustration
giant ground sloth model & illustration
woolly mammoth model & illustration
Tyrannosaurus rex model & illustration
megalodon illustration
Tyrannosaurus rex tooth replica
dinosaur footprint replica
megalodon tooth replica

Books

National Geographic Prehistoric Mammals by Alan Turner
Prehistoric Actual Size by Steve Jenkins

Vocabulary

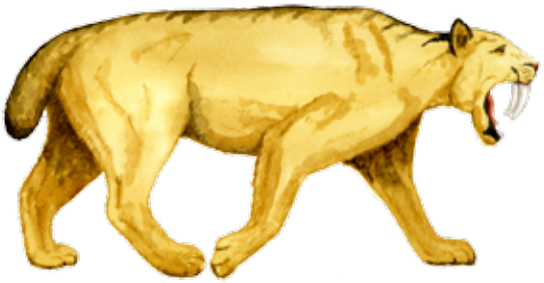
dinosaur
extinct
footprint
fossil
giant ground sloth
megalodon
shark
Smilodon
Tyrannosaurus rex
woolly mammoth

Approach

- Introduce the children to the prehistoric animals using the models and illustrations. Encourage the children to talk about the animals: *Do these models/illustrations look like any animals that we have ever seen before? How are they the same? Different? Can you tell from the picture how big the animal is?*
- Talk about some of the animals' interesting features (tusks, teeth, hair).
- Explain that the animals lived a long time ago, but are now extinct (the animals no longer exist). Talk about how we know the animals once lived because scientists have discovered teeth and other remains that they left behind. Introduce the term "fossil."
- Show the children the fossil replicas. Help the children identify them as teeth and footprints. Talk about how scientists use fossils to learn about animals that lived long ago.

Extension
Visit a natural history museum to learn more about prehistoric life.

Science Center
Place the fossil replicas in the Center for further exploration under adult supervision.



Integrated Experiences

Literacy: Have the children make a drawing of an animal that may have lived long ago. Help them describe the animal in words.

Math: While examining the models, encourage the children to count the number of legs, toes, and other body features that they see.

Experience 2

Exploring Fossils

Science Concept
Fossils are evidence of plants and animals that lived a long time ago.

Aim
Children will explore a variety of fossils.

Materials
Tyrannosaurus rex tooth replica
Camarasaurus tooth replica
dinosaur footprint replica
megalodon tooth replica
turtle shell
mammal bones
coral
plant impressions
seashells
shark tooth
magnifying tools

Books
Fossils Tell of Long Ago by Aliki
Fossils by Melissa Stewart
Bones, Bones, Dinosaur Bones by Byron Barton

Vocabulary
bone
coral
hard
shell
teeth

Approach
- Begin by showing the children the fossil replicas used in Experience 1. Review what the children have already learned about those fossils.
- Show the children the other fossils, one by one. Encourage the children to describe how the fossils look and feel: *What does it look like? Is it smooth or rough? What might it be?*
- Explain that fossils are usually the bones or other hard parts, such as teeth or shells, of living things that were buried in the ground and over many years became hard. Sometimes soft things can leave a print or impression that hardens.
- Talk about how scientists dig up fossils and study them to learn about things that lived long ago. If they find enough pieces, they may be able to put together the skeleton of a whole animal.

Science Center

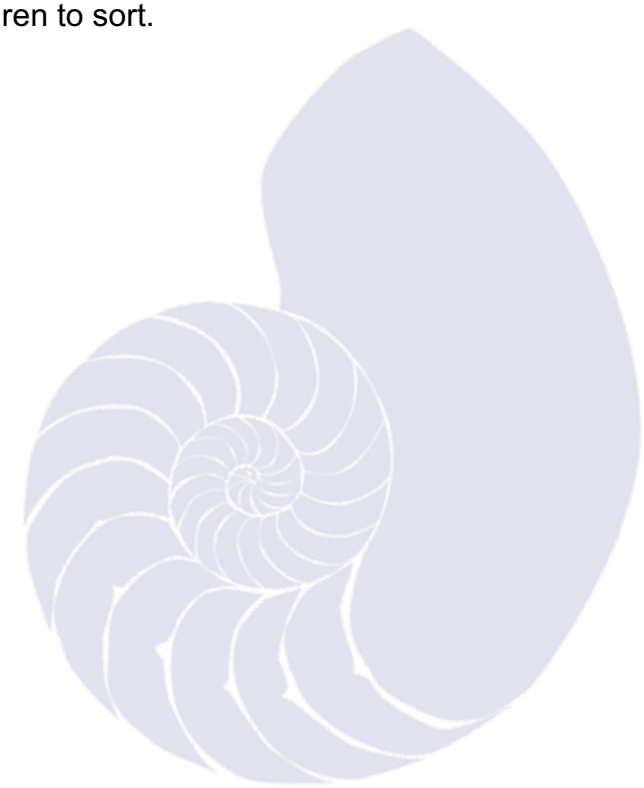
Place fossils and magnifying tools in the Center for further exploration under adult supervision.

Integrated Experiences

Literacy: Make a wall chart that shows the fossil (use either a photograph or drawing) and what the original plant or animal would have looked like. Label with words.

Math 1: Use a balance scale and compare how much the fossils weigh.

Math 2: Collect a variety of fossils for the children to sort.



Experience 3

A Closer Look at Fossils

Science Concept
Fossils are evidence of plants and animals that lived a long time ago.

Aim
Children will make a fossil replica.

Materials
Tyrannosaurus rex tooth replica
megalodon tooth replica
turtle shells
mammal bones
coral
plant fossil
seashells
shark tooth
fossil molds (e.g., trilobite, ammonite)
sample fossil
air-dry clay, plaster of paris, or play dough
magnifying tools

Books
Fossils by Melissa Stewart
The Field Mouse and the Dinosaur Named Sue by Jan Wahl
Digging Up Dinosaurs by Aliki

Vocabulary
ammonite
tooth
claw
sea animal
trilobite

Approach
- In advance, prepare the materials you are going to use to make the casts.
- Using the fossils and fossil replicas, review what the children have already learned about fossils.
- Show the children the fossil molds and sample fossil. Explain that they are going to use the molds to make casts that look like real fossils.
- Help the children fill the molds with clay or play dough. When the material is ready, remove the cast carefully from the mold.
- Encourage the children to talk about the fossils: *What does it look like? Could it be part of an animal? Does this look like any other animal? Do you think this lived on land or in the water?*

Science Center

Place fossils and magnifying tools in the Center for further exploration under adult supervision.

Integrated Experiences

Literacy: In advance, make a poster that shows the steps in making the fossil casts. Review the chart before the children make the fossils and after they have finished.

Experience 4

What Can We Learn from Trackways?

Science Concept
Scientists use fossils to tell about the plants and animals that lived a long time ago.

Aim
Children will discover that they can learn by looking at trackways.

Materials
dinosaur footprint replica
large sheets of brown paper
shallow pan
water
paint or food coloring (optional)
fossils
magnifying tools

Books
Fossils by Melissa Stewart
Fossils Tell of Long Ago by Aliki
Dinosaur Bones by Bob Barner

Vocabulary
alike
different
footprint
trackway

Approach
- In advance, put an inch of water in a shallow pan.
- Begin by showing the dinosaur footprint replica and reviewing what the print tells us about the animal that made it.
- Spread brown paper across the floor. Ask a child to step into a shallow pan of water (with shoes on) and then walk across the paper. Focus the children's attention on details of the footprint, then compare the print to the bottom of the child's shoes.
- Ask another child to do the same and compare the sizes and shapes of the two prints. Explain that scientists can learn things about animals, such as how big they were and whether they had claws or not, by looking at the tracks they left behind.
- Have the children take turns making tracks. Encourage the children to compare the ways their prints are alike and different.

Extension

Explore how different types of movement produce different tracks. Compare the prints made when the children run, hop, and walk on their feet and hands.

Science Center

Place fossils and magnifying tools in the Center for further exploration under adult supervision.

Integrated Experiences

Literacy: Describe your exploration of footprints in a class log.

Math 1: Count the footprints that were made by each child.

Math 2: Find and compare the shapes inside the footprints.

Physical Health/Development (Gross Motor): Go outdoors and make trackways in the sand by jumping, hopping, running, and other movements.

Experience 5

Fossil Dig

Science Concept
Scientists use fossils to learn about the plants and animals that lived many years ago.

Aim
Children will participate in a fossil dig.

Materials
sandy area on playground, sand table, or small pool filled with sand
small shovels
dirt sifters
brushes
fossils
magnifying tools

Books
Bones, Bones, Dinosaur Bones by Byron Barton
Digging Up Dinosaurs by Aliki
The Field Mouse and the Dinosaur Named Sue by Jan Wahl
Fossils by Melissa Stewart

Vocabulary
brushes
dig site
paleontologist
shovel
sifter

Approach
- In advance, set up a fossil dig site on the playground or fill a small wading pool or sand table with sand.
- Review with the children what they have already learned about fossils. Explain that scientists who look for fossils are called paleontologists.
- Introduce the fossil dig tools: shovels, sifters, and brushes. Model how to use the tools to find and clean fossils.
- Encourage the children to search for fossils. Talk about how it is important to handle the fossils with care. Encourage the children to describe the fossils they find: *How big is it? What do you think it could be? Is it hard? What color is it?*

Hint!
If you set up the fossil dig on the playground, mark where you place the fossils with flags or other signs so you can be sure to find them.

Science Center

Place fossils and magnifying tools in the Center for further exploration under adult supervision.

Integrated Experiences

Literacy: On a large sheet of paper, describe the sequence of steps in finding and cleaning fossils (e.g., sift, find, mark, brush).

Experience 6

More About Prehistoric Animals

Science Concepts

Many plants and animals that once lived are now extinct.

Ancient animals have distinctive features that help us identify them.

Aim

Children will compare some ancient animals with their modern relatives.

Materials

Smilodon model & illustrations
giant ground sloth model & illustrations
tree sloth illustration
woolly mammoth model & illustrations
elephant illustration
glyptodont illustration
armadillo illustration
megalodon illustration
great white shark illustration
megalodon tooth replica
fossilized mammal bones

Books

National Geographic Prehistoric Mammals by Alan Turner
Mammoths on the Move by Lisa Wheeler
Great Big Guinea Pigs by Susan L. Roth
Megatooth by Patrick O'Brien
Mammoth by Patrick O'Brien
Prehistoric Actual Size by Steve Jenkins

Vocabulary

armadillo
claw
elephant
extinct
glyptodont
great white shark
megalodon
mountain lion
saber tooth
skeleton
Smilodon
tusk
woolly mammoth

Approach

- Using the fossilized mammal bones and megalodon tooth replica, review what the children have already learned about fossils.
- Show the photos of the prehistoric animal skeletons. Have the children identify parts of the skeletons such as ribs, tusks, and claws.
- Place each prehistoric animal illustration next to the photo of its skeleton. Have the children find unique features such as the mammoth's tusks and the sloth's claws on the skeleton photos and illustrations.
- Pass around the models of the prehistoric animals. Encourage the children to describe them: *What color is the sloth? What do you notice about the sloth? Does the sloth have teeth? Where are the sloth's claws?*

Science Center
Place the illustrations and models in the Center for further examination.

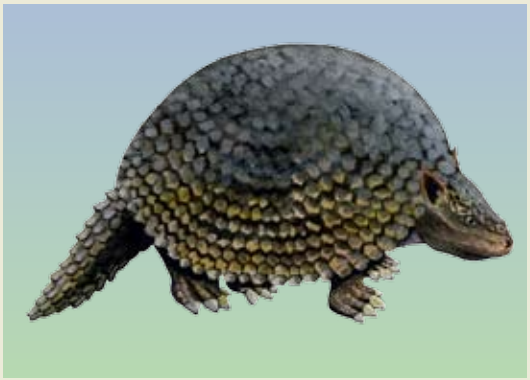
Integrated Experiences

Literacy 1: Add descriptive words to the "Word Wall" such as "big," "huge," "gigantic," and "enormous."

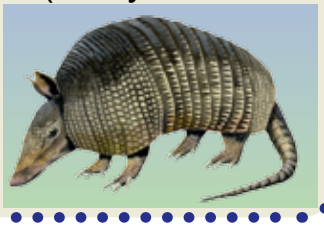
Literacy 2: Help the children complete the sentence "If I had a pet mammoth/*Smilodon*/sloth/glyptodont, I would..." in their journals using words and pictures.

Creative Arts (Dramatic Play): Encourage the children to pretend to be giant ground sloths and move very, very slowly on their hands and feet.

Math: Use a tape measure to compare the sizes of the prehistoric animals and their modern relatives.



- Explain interesting facts about each of the animals, such as that the giant ground sloths ate only plants even though they were so large and had such big claws.
- Remind the children that these animals are all extinct. Explain that similar animals are alive today.
- As the children examine the models, encourage them to think about modern animals that have similar features: *Have you ever seen an animal with a hard shell like this?* Have the children describe how the ways the prehistoric animal and its modern relative are alike and how they are different (today's animals are much smaller!).



Experience 7

There Were Many Kinds of Dinosaurs

Science Concept

Ancient animals have distinctive features that help us identify them.

Aim

Children will explore a variety of dinosaurs.

Materials

Ankylosaurus model & illustration
Apatosaurus model & illustration
Iguanodon model & illustration
Maiasaura model & illustration
Spinosaurus model & illustration
Triceratops model & illustration
T. rex model & illustration
Compsognathus illustration
Diplodocus illustration
Stegasaurus illustration

Books

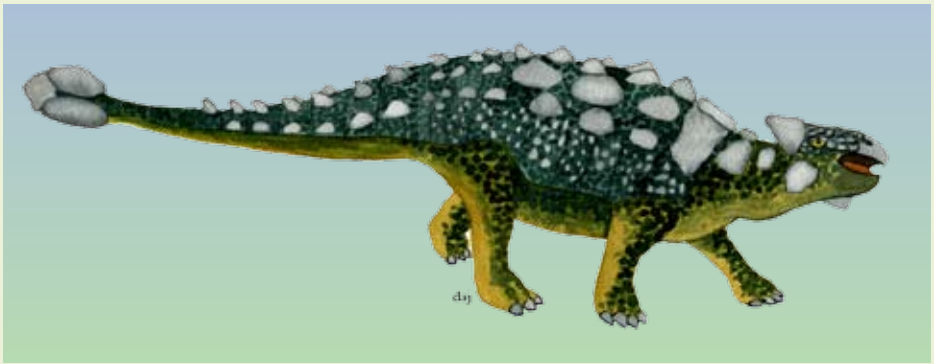
Big Book of Dinosaurs by Angela Wilkes
Dinosaurs, Dinosaurs by Byron Barton
T. Rex by Vivian French
I Am an Ankylosaurus by Karen Wallace
Dinosaur Bones by Bob Barner
An Alphabet of Dinosaurs by Peter Dodson
The Dinosaur Alphabet Book by Jerry Pallotta

Vocabulary

Ankylosuraus
Apatosaurus
Compsognathus
Diplodocus
Iguanodon
Maiasaura
Spinosaurus
Stegasaurus
Triceratops
Tyrannosaurus rex
beak
horn
jaw
plates
reptile
skull
spines

Approach

- Show the children the picture of the *T. rex* and encourage them to share what they know about dinosaurs.
- Explain that there were many other dinosaurs as well. Show the children the other dinosaur illustrations. Encourage the children to compare how the dinosaurs are alike and different: *How are these two dinosaurs alike? What does this dinosaur have that this dinosaur does not?*



- Review the concept that dinosaurs lived a long time ago and are now extinct.

Science Center
Place the dinosaur models and illustrations in the Center for further exploration.

Integrated Experiences

Literacy: Talk about how the names of dinosaurs are often based on a distinctive feature or behavior. Help each child combine her first or last name with “saurus” to make a new dinosaur name. Have the children draw pictures of themselves as dinosaurs.

Math: Have the children vote for their favorite dinosaur and graph the results. Talk about what the graph reveals about children’s favorites.

Creative Arts 1 (Dramatic Play): Have the children alternate between pretending to be four-legged and two-legged dinosaurs.

Creative Arts 2 (Art): Cut out shape pieces to make a dinosaur body. Use circles for the body, squares/rectangles for the legs, etc. Have the children glue the pieces onto paper to make a dinosaur.

Experience 8

Dinosaurs Hatched from Eggs

Science Concepts

Scientists use fossils to learn about the plants and animals that lived many years ago.

Dinosaur offspring resemble their parents.

Aim

Children will learn that dinosaurs hatch from eggs.

Materials

Maiasaura model & illustration
Maiasaura nest
Baby Louie model
miniature dinosaurs in plastic eggs

Books

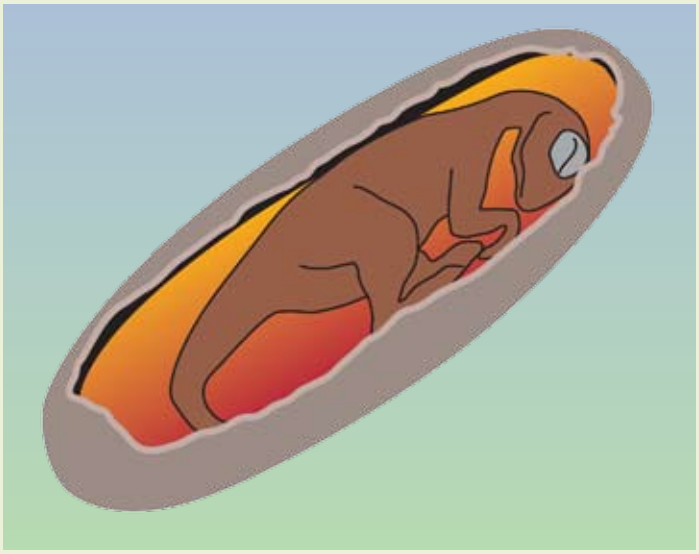
Dinosaur Babies
by Kathleen Weidner Zoehfeld
Dinosaur Babies
by Lucille Recht Penner
I Am an Ankylosaurus
by Karen Wallace

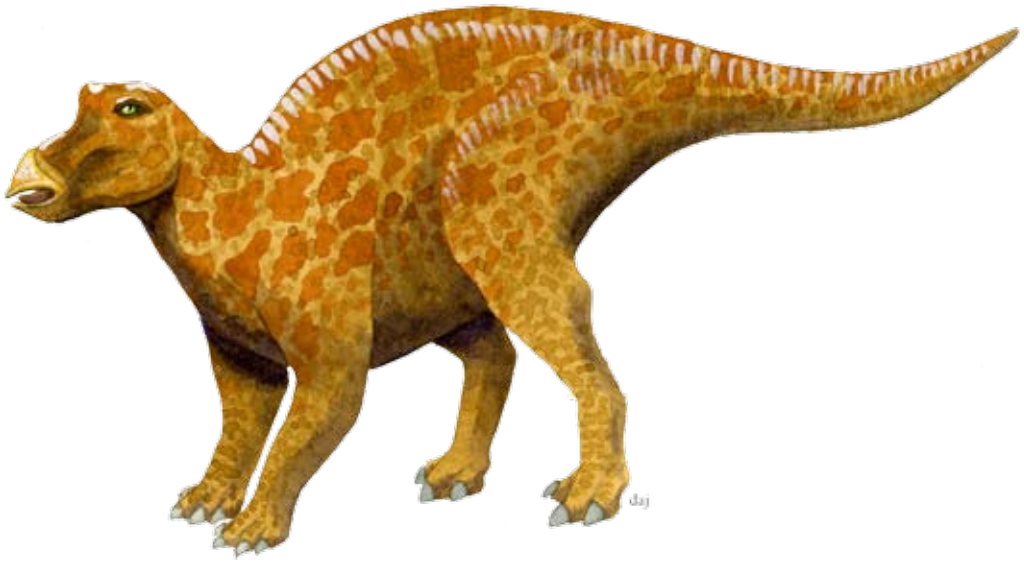
Vocabulary

adult
baby
egg
hatch
Maiasaura

Approach

- Show the children the *Maiasaura* and her nest. Have the children compare the babies to the adult. Talk about how babies look similar to the adult, only smaller.
- Explain that the *Maiasaura* babies hatched from eggs. Show the children the Baby Louie model. Draw the children's attention to how the baby looks like an adult dinosaur. Explain that all dinosaurs hatched from eggs.
- To reinforce the idea that dinosaurs hatched from eggs, pass the eggs among the children. Ask them what they think they will find inside. Have the children open the eggs and help them identify the dinosaur inside.





Integrated Experiences

Literacy: Help the children write about a dinosaur and its baby using illustrations and words.

Creative Arts 1 (Art): Using sponges cut into different sizes and shapes of eggs, paint a picture of dinosaur nests.

Creative Arts 2 (Dramatic Play): Hide some plastic eggs around the room and go on a dinosaur egg hunt.

Creative Arts 3 (Art): Place a small dinosaur inside a balloon. Blow the balloon up and tie it. Have the children paper mache the balloon and let dry. Paint the balloon. Cut open the “egg” to discover the baby dinosaur inside!

Experience 9

What Did Dinosaurs Eat?

Science Concept
Ancient animals have distinctive features that help us identify them.

Aim
Children will learn that some dinosaurs ate meat and some ate plants.

Materials
T. rex tooth replica
Camarasaurus tooth replica
dinosaur illustrations
dinosaur models

Books
Big Book of Dinosaurs by Angela Wilkes
The Dinosaur Alphabet Book by Jerry Pallotta
My Visit to the Dinosaurs by Aliki
I Am an Ankylosaurus by Karen Wallace

Vocabulary
carnivore
dull
flat
herbivore
jaw
pointed
sharp
teeth

Approach

- Begin by reviewing what the children have already learned about dinosaurs. Ask the children to share their ideas about what dinosaurs ate.
- Explain that some dinosaurs ate meat and others ate plants. Introduce the terms "carnivore" and "herbivore."
- Show the children the *T. rex* and *Camarasaurus* tooth replicas. Explain that one is the tooth from a dinosaur that ate meat and the other is from a plant eating dinosaur. Encourage the children to describe the ways the teeth differ: *Which tooth is bigger? Which tooth is sharp and pointy? Which tooth would be good for eating meat? Why?*

- Use the illustrations or models and sort the dinosaurs into carnivore and herbivore groups.

Extension
Talk about animals living today that are either carnivores or herbivores.

Science Center
Place the dinosaur models and illustrations in the Center and help children sort them into herbivore and carnivore groups.

Integrated Experiences

Literacy: Make a class display showing foods that would be eaten by an herbivore and those that would be eaten by a carnivore.

Math: Make a class graph of meat-eating dinosaurs and plant-eating dinosaurs.

Experience 10

How Big Were the Dinosaurs?

Science Concept
Ancient animals have distinctive features that help us identify them.

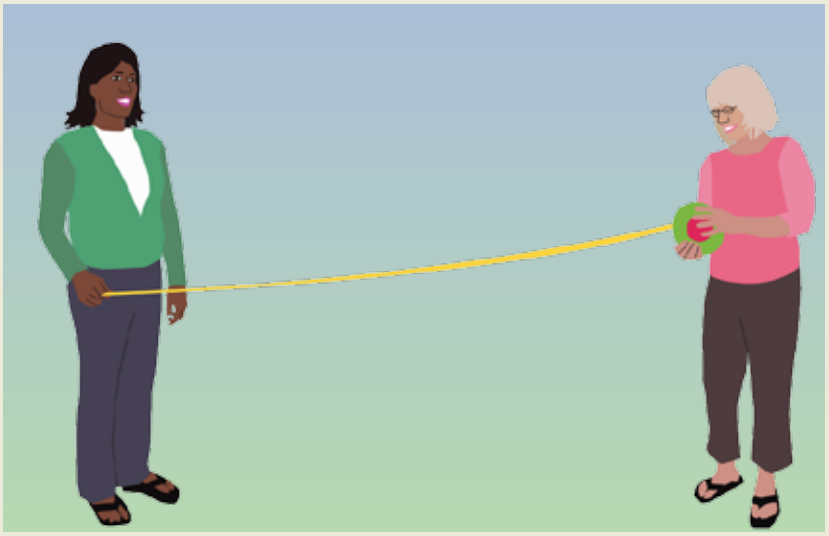
Aim
Children will learn that some dinosaurs were huge and others were small.

Materials
Ankylosaurus model & illustration
Apatosaurus model & illustration
Iguanodon model & illustration
Maiasaura model & illustration
Spinosaurus model & illustration
Triceratops model & illustration
T. rex model & illustration
Compsognathus illustration
Diplodocus illustration
Stegasaurus illustration
tape measure

Books
Big Book of Dinosaurs by Angela Wilkes
The Field Mouse and the Dinosaur Named Sue by Jan Wahl
Big Old Bones: A Dinosaur Tale by Carol Carrick
How Big Were the Dinosaurs? by Bernard Most
Dinosaurs Are Different by Aliki
T. Rex by Vivian French

Vocabulary
height
huge
length
long
measure
short
small
tall

Approach
- Using the dinosaur models, compare the sizes of the different dinosaurs. Explain that dinosaurs came in many sizes and that some were very large while others were very small. Show the children the picture of the *Compsognathus* and explain that it was only about the size of a chicken. Show them the picture of the *Diplodocus* and explain that it was even larger than the *Apatosaurus*.
- Use the tape measure or string and mark the lengths and heights of the *Compsognathus* and *Diplodocus* on the playground or in a large space indoors. Encourage the children to compare the size of their bodies with that of the two dinosaurs.



Extension

Create a life-size dinosaur using sheets of paper and tape to a wall. Have the children compare its size to familiar animals that live today.

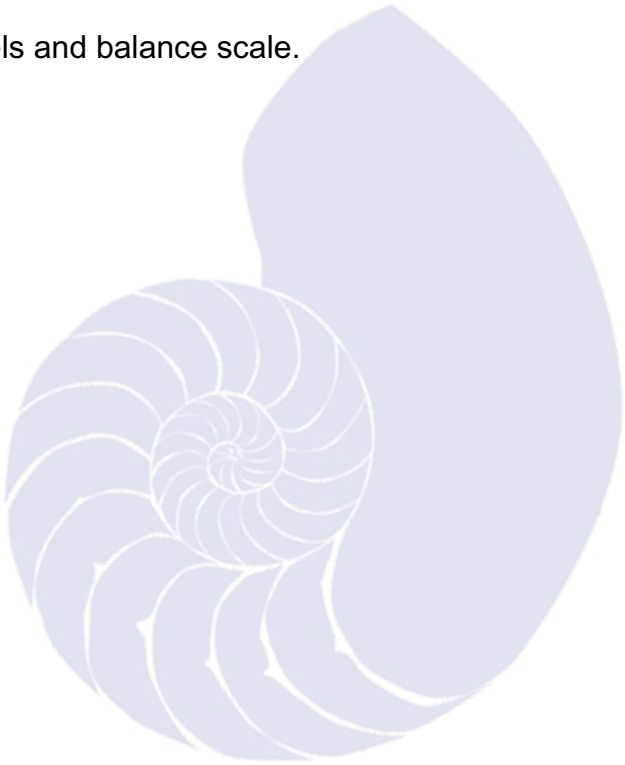
Science Center

Place the dinosaur models in the Center and encourage the children to order the dinosaurs by size.

Integrated Experiences

Math 1: During the experience, have the children lie end-to-end to represent the length or height of a dinosaur.

Math 2: Explore weight using the dinosaur models and balance scale.



Experience 11

Dinosaur Defenses

Science Concept
Ancient animals have distinctive features that help us identify them.

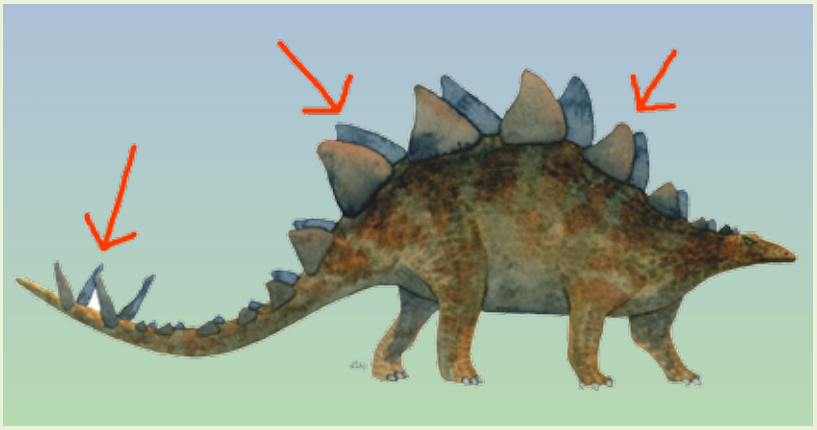
Aim
Children will learn the different ways that dinosaurs protected themselves.

Materials
Ankylosaurus model & illustration
Apatosaurus model & illustration
Iguanodon model & illustration
Maiasaura model & illustration
Spinosaurus model & illustration
Triceratops model & illustration
T. rex model & illustration
Compsognathus illustration
Diplodocus illustration

Books
Big Book of Dinosaurs by Angela Wilkes
I Am an Ankylosaurus by Karen Wallace
Dinosaurs, Dinosaurs by Byron Barton
The Dinosaur Alphabet Book by Jerry Pallotta
T. Rex by Vivian French

Vocabulary
armor
claw
defend
horn
protect
spikes
teeth

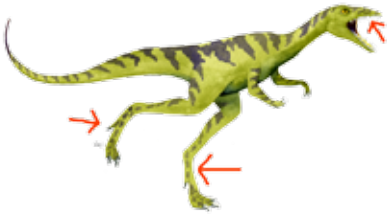
Approach
- Show the children the models and illustrations and review the distinctive features and other information that you have talked about (e.g., diet).
- Select one of the dinosaurs and ask the children to share what they think that dinosaur might do if another animal wanted to hurt it. Ask them to point out the body parts they think dinosaurs would use to defend themselves. Introduce terms such as “armor,” “horn,” and “spike” and explain how the parts might be used.



- Repeat with the other dinosaurs. Show the children the *Apatosaurus* model and talk about how its large size might be enough to scare other animals away. Explain that the small *Compsognathus* may have been able to protect itself by being able to run away from slower animals.

Science Center

Place the small dinosaur cards in the Center and have the children sort them into those with armor and those without.

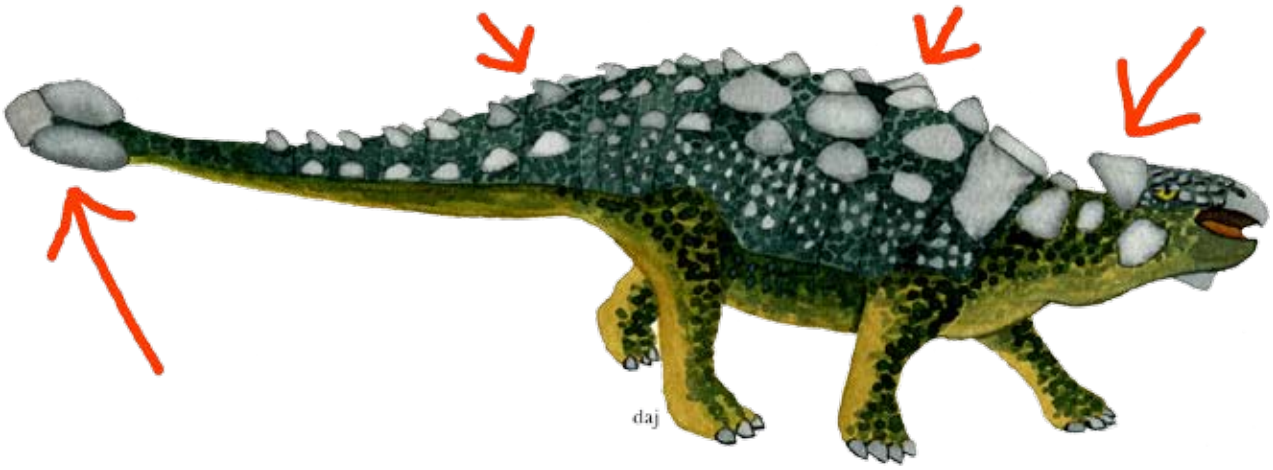


Integrated Experiences

Literacy: Help the children describe how a specific type of dinosaur defends itself in their journals using words and pictures.

Math: Count the number of horns, spikes, or claws that different dinosaur models have.

Creative Arts (Art): Have the children make dinosaur horns and spikes using construction paper.



Experience 12

Review of Prehistoric Life

Science Concepts

Many plants and animals that once lived are now extinct.

Fossils are evidence of plants and animals that lived a long time ago.

Aim

Children will review the idea that fossils help us learn about animals that lived long ago.

Materials

Tyrannosaurus rex tooth replica
Camarasaurus tooth replica
megalodon tooth replica
shark tooth
T. rex model & illustration
megalodon illustration
great white shark illustration
fossils
magnifying tools

Books

National Geographic Prehistoric Mammals by Alan Turner
Big Book of Dinosaurs by Angela Wilkes
Megatooth by Patrick O'Brien
Fossils by Melissa Stewart
Fossils Tell of Long Ago by Aliki
Prehistoric Actual Size by Steve Jenkins

Vocabulary

big
Camarasaurus
dull
flat
fossil
little
megalodon
paleontologist
sharp
Tyrannosaurus rex tooth

Approach

- Show the children the shark tooth fossil and the replicas of fossil teeth. Encourage the children to share what they have already learned about fossils: *Do you remember what these are all called? What part of an animal are these? Where would we find fossils like these?*
- Review the idea that fossils usually form from the hard parts of animals and that is why many fossils are teeth or bones. Talk about how we can learn much about animals that lived long ago by exploring fossils.
- Compare the sizes and shapes of the fossil teeth and talk about what those features suggest about the animals' diets: *This tooth is large and sharp. What do you think an animal with this tooth ate? This tooth is flat and dull. What do you think this animal ate?*
- Help the children link each tooth with the appropriate illustration and share more information about the ancient animals.

Extension 1

Organize a review of all the animals discussed around different questions: Which animals were dinosaurs? Which animals ate meat? Which animals have tusks or horns?

Science Center

Place fossils and magnifying tools in the Center for further exploration under adult supervision.

Extension 2

Using the model or illustrations, play "Who Am I? *I have three horns on my head and a bony collar around my neck. Who am I?*"

Integrated Experiences

Literacy: Help the children describe their favorite prehistoric animal in their journals using words and pictures.

MESS® Take-Home Kit Information/Experience Card

Prehistoric Life

Welcome to the Prehistoric Life *MESS*® Take-Home Kit. This page suggests ways to further explore what your child has been learning at school.

In this Kit you will find:

- *Megatooth* by Patrick O'Brien

This book describes some of the giant creatures that lived on Earth 10 million years ago. The largest was an ancient shark called megalodon. It was 50 feet long—about the same length as a semi-truck or school bus!

- a picture of a megalodon tooth
- a fossilized tooth from an ancient sand shark

This month, your child is learning:

- about animals that lived long ago.

How to use the book:

- Talk about the interesting parts of the animals in the book such as bumpy heads and large teeth.
- Help your child identify the animals as birds, turtles, cats, sharks, or dinosaurs.
- Some children will enjoy learning how to say the proper names of the different animals. See the back of this sheet for help.

How to use the objects:

- Compare the size of the teeth. Talk about how big the sharks must have been.
- Compare your teeth with the shark teeth.

To further support your child's learning:

- Visit a museum to see fossils of animals that lived long ago.
- See photos of fossil digs on the web at http://www.etsu.edu/grayfossilsite
- Explore children's activities at http://www.grayfossilmuseum.org/kids/kids.html

How do you say…?

Archelon	AR-keh-lon
Basilosaurus	BASS-il-oh-SAWR-us
Dromornis	drom-OR-nis
Elasmosaurus	ee-LAZ-moh-SAWR-us
Megacerops	MEG-a-SAIR-ops
Megalodon	MEG-a-luh-don
Meiolania	me-oh-LANE-ee-ya
Shoniosaurus	SHON-ee-oh-SAWR-us
Smilodon	SMY-luh-don
Tyrannosaurus rex	Tye-RAN-uh-SAWR-us rex

Prehistoric Life

Recommended Books

Aliki. *Digging Up Dinosaurs*. New York: Crowell, 1981. A visit to a museum provides the opportunity to learn about how the skeletons got there. Field and laboratory work are discussed by the child narrator in a main text. Additional conversation bubbles within the colorful illustrations provide more dinosaur information.

Aliki. *Dinosaurs Are Different*. New York: HarperCollins, 1985. Differences in dinosaur size, teeth, hip arrangement, and external accessories are the emphasis of this little volume. Part of the Let's-Read-and-Find-Out series, this book provides the most detailed comparative information about a number of specific dinosaurs among Aliki's many books.

Aliki. *Fossils Tell of Long Ago*/*Fosiles Nos Haban Del Pasad*o. New York: HarperCollins, 1990. Several curious children learn about fossil plants and animals. Using both a main text and conversation bubbles, the author explains how fossils are formed and what they tell us about the past.

Aliki. *My Visit to the Dinosaurs*/*Mi Vista a los Dinosaurios*. New York: HarperCollins, 1985. A visit to a natural history museum provides a little boy, and his father and sister, with an introduction to the habits, characteristics, and habitats of fourteen dinosaurs. An audio recording also is available.

Barner, Bob. *Dinosaur Bones*/*Dino Huellas*. San Francisco: Chronicle Books, 2001. The author invites children to think about how dinosaur bones found in the ground and stored in museums once belonged to living creatures. Information about dinosaurs is presented in simple rhyming text, a more expansive subtext, and brightly colored cartoon illustrations. Charts indicating name, diet, relative size, and footprint shape allow comparisons.

Barton, Byron. *Bones, Bones, Dinosaur Bones*. New York: HarperCollins, 1990. In simple text and cartoon illustrations, boldly colored workers demonstrate the process of finding and assembling dinosaur bones. While illustrations at first seem stark and simple, easy-to-find details add information.

Barton, Byron. *Dinosaurs, Dinosaurs*. New York: HarperCollins, 1989. Bold, brightly colored illustrations and simple text provide a first introduction to dinosaur size, shape, and other characteristics. Front and back pages provide names and pronunciations of specific dinosaurs.

Carrick, Carol. *Big Old Bones: A Dinosaur Tale*. New York: Clarion Books, 1989. A fictional scientist discovers some big old bones out West and later puts them together in various ways until he is satisfied he has discovered a dinosaur. But readers may not recognize it! The detailed but light-hearted illustrations and the ending author's note about other scientific mix-ups foster thoughtful conversation.

Prehistoric Life

Dodson, Peter. *An Alphabet of Dinosaurs*. New York: Scholastic, 1995. Twenty-six different prehistoric reptiles, some more familiar than others, are detailed in this interesting volume. Text on two levels, either easily edited out, is accompanied by a simple line drawing of a dinosaur's skeleton or portion thereof, on one page. The facing page presents a vibrantly colored painting of the same dinosaur in its habitat, usually in action eating, fighting, or moving. The illustrations encourage study and conversation.

French, Vivian. *T. Rex*. New York: Candlewick Press, 2006. A boy and his grandfather visit a *T. rex* exhibit at a museum. The answers the grandfather provides to the young boy's questions frequently end with "maybe." Repeatedly, the grandfather explains that "it was millions and millions of years ago" and young paleontologists will need to look for more answers. Grandfather and grandson's conversation is printed in two different type styles, while a third style within illustrations provides additional information about dinosaurs. 2005 NSTA Outstanding Science Trade Books for Students K-12

Jenkins, Steve. *Prehistoric Actual Size*. New York: Houghton Mifflin, 2005. The actual size of a variety of prehistoric animals (or parts of them) are illustrated with cut- and torn-paper. Overall sizes—from dot to more than a page—are provided, allowing for comparison. Most children will likely be unfamiliar with some of the animals so this book is best used in combination with more realistic illustrations. Some general information about each animal is provided in the back.

Most, Bernard. *How Big Were the Dinosaurs?* San Diego: Harcourt Brace, 1994. The sizes of different dinosaurs are compared to more familiar objects, such as a school bus, trombone, or bowling alley. While the comparisons are helpful, dinosaurs interacting with humans in a modern world may be confusing for young children.

O'Brien, Pat. *Mammoth*. New York: Henry Holt, 2002. The story of a great hairy animal of ancient times is told in a fun way with dramatic pictures. The preserved remains of mammoth bodies tell the story of what is known about this prehistoric ancestor of the elephant.

O'Brien, Patrick. *Megatooth*. New York: Henry Holt, 2001. This book introduces the now-extinct sharks called megalodons and many other large creatures of the period. There is a brief discussion of how scientists use fossil teeth and knowledge of modern sharks to draw inferences about this ancient one. Size comparisons with both period animals and more familiar animals (including people) are given in feet, some with small enough numbers that young children will be able to do some comparative measuring. A time line at the end begins with the age of reptiles and ends with people.

Prehistoric Life

Pallotta, Jerry. *The Dinosaur Alphabet Book*. Watertown, MA: Charlesbridge Publishing, 1990. Associated with each letter is one dinosaur name and sometimes amusing information about it, including physical features and diet. Some dinosaurs are familiar; some are not. Illustrations are colorful but relatively flat. Dinosaur names are usually long and multi-syllabic, but for the young dinosaur fan having a hard time learning the alphabet, this may be an answer.

Penner, Lucille Recht. *Dinosaur Babies*. New York: Random House, 1991. Aimed at beginning readers, this little volume provides a simple introduction to dinosaur babies and their behavior. Text is sparse, type is large, and illustrations are softly colored but appropriately detailed. Discussing dinosaur babies may help give life to an extinct animal.

Roth, Susan L. *Great Big Guinea Pigs*. New York: Bloomsbury Publishing, 2006. A baby guinea pig pet asks for a "true" bedtime story and his mother responds with the story of a recently found giant guinea pig in Venezuela. The little guinea pig asks questions, allowing mother an opportunity to provide significant information about modern and extinct animals. And how does mother know about giant, millions-of-years-old guinea pig ancestors? She read it in the newspaper lining the bottom of their cage! Textured papers from around the world make fascinating collage illustrations.

Stewart, Melissa. *Fossils*. Minneapolis, Minnesota: Compass Point Books, 2003. Clear photographs and ample text explain what fossils are, how and where they are formed, and how they are found. Children will enjoy the photos, while teachers may appreciate the factual information.

Turner, Alan. *National Geographic Prehistoric Mammals*. National Geographic Children's Books, 2004. Written by a respected paleontologist, this book introduces children to 100 prehistoric mammals through stunning color illustrations. The text—written for older elementary/middle school students—provides details on how each animal lived and behaved that can be interpreted for young children. The book is best used selectively to support children's curiosity about ancient animals popularized in the media or, ideally, those that once lived nearby and whose fossilized remains may be viewed in local museums.

Wahl, Jan. *The Field Mouse and the Dinosaur Named Sue*. New York: Scholastic, 2000. Through the adventures of a small field mouse who accidentally gets transported to a museum, this book tells about the discovery of the most complete set of *T. rex* bones found to date. As readers share the mouse's plight, they learn about museums and paleontology. Detailed smaller and larger illustrations successfully break the ample text into scenes to observe and discuss.

Prehistoric Life

Wallace, Karen. *I Am an Ankylosaurus*. New York: Atheneum Books for Young Readers, 2003. A fair amount of scientific information about dinosaur life is imparted as this brightly illustrated story follows an ankylosaur mother from the laying of her eggs to the hatching of her babies. Life can be rough! Different colors and textures for the dinosaurs, especially the troodon, encourage discussion about what is known (or not known) about dinosaur skin. The plot also supports conversation about animal defenses.

Wheeler, Lisa. *Mammoths on the Move.* New York: Harcourt, 2006. Watercolor illustrations and a rhyming text tell the story of a hazardous annual woolly mammoth migration thousands of years ago. There is a wonderful variety of descriptive words. Some, like “steppes” and “permafrost,” may be sufficiently explained in illustration or context; some like “trumpeting” and “gnawing,” may require demonstration. Details like the other animals in the mammoth world encourage close observation. An opening author’s note explains the co-existence of three kinds of mammoths, although the story is only about the woolly mammoth. 2007 ALA Notable Children’s Book

Wilkes, Angela. *Big Book of Dinosaurs*. New York: DK Children, 1994. This informative, oversize volume includes full-color photos of dinosaur replicas that convincingly convey how these creatures appeared millions of years ago. Simple text describes how a variety of dinosaurs lived, camouflaged themselves, found their food, and survived, while questions encourage readers to make comparisons among the dinosaurs.

Other Recommended Books

Aliki. *Dinosaur Bones*. New York: HarperCollins, 1988. A teacher looking for an overview of dinosaur science or a young budding dinosaur fan will appreciate this book. In it, an interested young reader and museum-goer explains the history of dinosaurs and how scientists learned about them. Softly colored illustrations with both conversation bubbles and picture captions support an ample main text.

Andreae, Giles. *Dinosaurs Galore!* Wilton, CT: Tiger Tales/ME Media, 2004. Ten dinosaurs (and two ancient reptiles that are not dinosaurs) introduce themselves in amusing rhyming verse. Bright cartoon illustrations provide details that promote conversations about color, design, movement, body parts, etc. Pronunciations for dinosaur names are included.

Arnold, Caroline. *Giant Shark: Megalodon, Prehistoric Super Predator*. New York: Clarion Books, 2000. A megalodon, the extinct shark that was more than fifty feet long and could swallow an object the size of a small car, is the subject of this book. A large amount of information, including detailed watercolor illustrations, makes this a good teacher reference.

Prehistoric Life

Blaisdell, Molly. *Fossils*. Logan, IA: Perfection Learning, 2006. Written as an introduction for young readers, this book provides good illustrations with very limited text. In few words and several photographs, it defines fossils, suggests where they might be found, illustrates different kinds, suggests what fossils can tell us, and introduces the method of dating fossils.

Brillhart, Julie. *The Dino Expert*. Morton Grove, IL: Albert Whitman, 1993. Five-year-old Eric is considered the "Dino Expert" around town. When his mother correctly identifies the great blue heron that Eric was calling a pteranodon, his confidence is shaken. She gives him hope again by reading to him about the new scientific thinking that birds may be descendants of dinosaurs. This book stimulates discussion about new discoveries that can change scientific thinking.

Carle, Eric. *"Slowly, Slowly, Slowly," said the Sloth*. New York: Philomel Books, 2002. Challenged by the other jungle animals for its seemingly lazy ways, a small modern tree sloth explains some advantages of his slow and peaceful existence and in the end, "that's just how I am." While the animals in this book are not prehistoric, many of them, including the sloth, have prehistoric ancestors. Perhaps the size of the prehistoric sloth makes the temperament of the modern sloth more understandable.

Cauley, Lorinda Bryan. *The Trouble with Tyrannosaurus Rex*. New York: Harcourt Brace Jovanovich, 1988. Writing for some curious sons, the author uses science-based illustrations to tell a fictitious story about the relationship of the dinosaurs of the Cretaceous period. Human feelings and motivations are assigned to the dinosaur characters, but physical features and diets are accurate. The detailed drawings encourage conversation about what people can learn from fossils.

Cutchins, Judy, and Johnston, Ginny. *Ice Age Giants of the South*. Sarasota, FL: Pineapple Press, 2000. This book focuses on recent fossil discoveries in the southern United States. While most appropriate as a teacher reference, the photographs appeal to all ages.

Dixon, Dougal. *Dinosaurs: Carnivores*. Milwaukee, WI: Gareth Stevens Publishing, 2001. An abundance of information about the groupings and characteristics of meat-eating dinosaurs is provided. This is a fantastic teacher reference for this group of dinosaurs.

Dixon, Dougal. *Dinosaurs: Herbivores*. Milwaukee, WI: Gareth Stevens Publishing, 2001. An abundance of information about plant-eating dinosaurs is provided. It is a great teacher reference.

Gerrard, Roy. *Mik's Mammoth*. New York: Sunburst, 1992. A small, young, shy caveman separated from his tribe finds a young woolly mammoth, and together they learn to survive. While the story is fictitious, it and the detailed watercolor illustrations nicely portray the woolly mammoth and its prehistoric environment.

Prehistoric Life

Halls, Kelly Milner. *Dinosaur Parade: A Spectacle of Prehistoric Proportions*. New York: Lark Books, 2008. This group of young friends stages an imaginative parade with dinosaurs—even though they clearly know there are no living dinosaurs. Both levels of text provide good dinosaur information. The upper text provides just a sentence of two rhyming phrases about the dinosaur group displayed. The lower text provides name, pronunciation, translation of name, size in length and weight, time period of existence, place of discovery, and year named. An old paleontologist, tools in hand, ends the parade. A concluding page gives general information about each group of dinosaurs in the parade.

Hennessy, B.G.*The Dinosaur Who Lived in My Backyard/El Dinosaurio Que Vivia En Mi Patio*. New York: Penguin Books, 1988. A young boy imagines what it was like long ago when a dinosaur might have lived on the land where his backyard is now. Within his fantasy is information about dinosaur eggs, size, etc. Size comparisons with familiar objects (bigger than our car) are useful for young children, while blue and green watercolors retain the imaginative qualities.

Johansen, K.V. *Pippin and the Bones*. Toronto: Kids Can Press, 2000. Mabel's dog, Pippin, only wants to safely bury his beef bone. Instead his digging uncovers an intact giant mastodon skeleton which a museum then excavates and displays. Pippin is an unappreciative hero! While the idea of a large intact skeleton is most often only a paleontologist's dream, the silly story and its cartoon illustrations do convey the process of fossil discovery from field to exhibit.

Kudlinski, Kathleen V. *Boy, Were We Wrong about Dinosaurs!* New York: Dutton Juvenile, 2005. Once-accepted dinosaur theories are being revised as scientists discover new information. The possibility of changes in scientific thinking is always a good conversation to have with children, both for its inspirational value and science's encouragement to be open to new evidence and ideas.

Martin, Rafe. *Will's Mammoth*. New York: G.P. Putnam's Sons, 1989. In spite of admonition from his parents that mammoths no longer exist, Will is fascinated by woolly mammoths. His prehistoric playmates lead him on a wild adventure—complete with a spatter paint snowstorm, cavemen, a purple flower, and a whole herd of mammoths! Hopefully the wonder of it all leads readers to find out which parts of the adventure could be true and which were part of Will's vivid imagination.

McCarty, Peter. *T Is for Terrible*. New York: Henry Holt, 2004. The word "dinosaur" means "terrible lizard." This story's text and gentle, softly colored illustrations tell about a *Tyrannosaurus rex* who does not think he deserves that "terrible" designation. Text is brief but still provides some good *T. rex* information. The muted illustrations are so different from the usual view of dinosaurs that they foster discussion of the meanings of "terrible."

Prehistoric Life

Moncure, Jane Belk. *Dinosaurs Back in Time*. Chicago: Childrens Press, 1990. Dinosaur Day at the museum is the occasion for Annie to learn about dinosaurs, as will readers. What she sees raises questions that Prof. Facto answers with a pretend trip back in time. Her visit also inspires her to learn still more by reading about dinosaurs. The story is simple and undramatic, with illustrations that match, but the book may inspire other young children to learn more by reading.

Riehecky, Janet. *Megalodon/Megalodonte*. Minneapolis, MN: Capstone Press, 2006. Simple text and illustrations, plus a glossary, present the life and death of the megalodon, a giant shark whose huge teeth were as sharp as knives.

Sis, Peter. *Dinosaur!* New York: Greenwillow Books, 2000. A bathtub toy dinosaur and a little boy's active imagination soon have the bathroom full of a variety of dinosaurs—and the tub overflowing. The arrival of mother and a big towel seems to dissipate the herd. Illustrations are generally simple line drawings, with dinosaurs in green with some detail. At its most active, the little boy's imagination gives the dinosaurs more color and detail, including a habitat! Since the book contains no words, readers can provide their own dialogue and interpretation of what is happening.

Wahl, Jan. *I Met a Dinosaur*. New York: Harcourt Brace, 1997. A trip to a natural history museum spurs a young girl's imagination to see dinosaurs wherever she looks. Rhyming explanations from her parents are no deterrent. Muted, warmly colored, dreamlike illustrations allow readers' imaginations to draw their own conclusions. The book concludes with general information about the dinosaurs the girl thinks she sees.

Waite, Judy. *Digging for Dinosaurs*. New York: Crabtree Publishing, 2004. Reading a book about fossils inspires Dan to go digging for dinosaurs in his backyard. In fact, he is so motivated that mom's announcement of a trip to the museum is an unwanted interruption. Thought bubbles throughout the story suggest Dan's creative visions of what he might find. During the dreaded museum visit, he finds there is even more to learn. While the story is silly, it suggests to budding paleontologists that there are numerous ways—books, museums, field work—to learn about their favorite topic.

Worth, Bonnie. *Oh, Say Can You Say DI-NO-SAURS? All About Dinosaurs.* New York: Random House, 1999. Dr. Seuss's Cat in the Hat shows Sally and Dick how dinosaur fossils are excavated, assembled, and displayed in a museum. In the process, beginning readers are introduced to important basic concepts about the natural world.

Prehistoric Life

Zoehfeld, Kathleen Weidner. *Dinosaur Babies*. New York: HarperCollins, 1999. The author uses discoveries about *Maiasaura* nests to propose ideas about how dinosaur young were born and raised. Evidence-based information is stressed. The colorful illustrations are appealing in their uncommon colors, helping readers get beyond the idea that we know for certain what dinosaurs looked like. Text is sometimes a little long, but tells a nice story and encourages conversation.

Domain & Indicators	Experience												
LANGUAGE DEVELOPMENT	1	2	3	4	5	6	7	8	9	10	11	12	T-H
Demonstrates increasing ability to attend to and understand conversations, stories, songs, poems.	•	•	•	•	•	•	•	•	•	•	•	•	•
Shows progress in understanding and following simple and multi-step directions.	•	•	•	•	•	•	•	•	•	•	•	•	•
Understands an increasingly complex and varied vocabulary.	•	•	•	•	•	•	•	•	•	•	•	•	•
For Non-English speaking children, progresses in listening to and understanding English.	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops increasing abilities to understand and use language to communicate information, experiences, ideas, feelings, opinions, needs, questions, and for other varied purposes.	•	•	•	•	•	•	•	•	•	•	•	•	•
Progresses in abilities to imitate and respond appropriately in conversation and discussions with peers and adults.	•	•	•	•	•	•	•	•	•	•	•	•	•
Uses an increasingly complex and varied spoken vocabulary.	•	•	•	•	•	•	•	•	•	•	•	•	•
Progresses in clarity of pronunciation and towards speaking in sentences of increasing length and grammatical complexity.	•	•	•	•	•	•	•	•	•	•	•	•	•
For Non-English speaking children, progresses in speaking English.	•	•	•	•	•	•	•	•	•	•	•	•	•
LITERACY													
Shows increasing ability to discriminate and identify sounds in spoken language.													
Shows growing awareness of the beginning and ending sounds of words.													
Progresses in recognizing matching sounds and rhymes in familiar words, games, songs, stories and poems.													
Shows growing ability to hear and discriminate separate syllables in words.													

Domain & Indicators	Experience												
LITERACY CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	T-H
Associates sounds with written words, such as awareness that different words begin with the same sound.													
Shows growing interest and involvement in listening to and discussing a variety of fiction and nonfiction books and poetry.													•
Shows a growing interest in reading-related activities, such as asking to have a favorite book read; choosing to look at books; drawing pictures based on stories; asking to take books home; going to the library; and engaging in pretend-reading with other children.													•
Demonstrates progress in abilities to retell and dictate stories, to act out stories, and to predict what will happen next in a story.													
Progresses in learning how to handle and care for books; knowing to view one page at a time in sequence from front to back; and understanding that a book has a title, author and illustrator.													•
Shows increasing awareness of print in classroom, home and community settings.	•					•	•	•	•	•	•	•	•
Develops growing understanding of the different functions of forms or print such as signs, letters, newspapers, lists, messages, and menus.	•					•	•	•	•	•	•	•	•
Demonstrates increasing awareness of concepts of print, such as that reading in English moves from top to bottom and from left to right, that speech can be written down, and that print conveys a message.	•					•	•	•	•	•	•	•	•
Shows progress in recognizing the association between spoken and written words by following print as it is read aloud.	•					•	•	•	•	•	•	•	•
Recognizes a word as a unit of print, or awareness that letters are grouped to form words, and that words are separated by spaces.	•					•	•	•	•	•	•	•	•
Develops understanding that writing is a way of communicating for a variety of purposes.													

Domain & Indicators	Experience												
LITERACY CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	T-H
Begins to represent stories and experiences through pictures, dictation, and in play.													
Experiments with a growing variety of writing tools and materials, such as pencils, crayons, and computers.													
Progresses from using scribbles, shapes, or pictures to represent ideas, to using letter-like symbols, to copying or writing familiar words such as their own name.													
Shows progress in associating the names of letters with their shapes and sounds.													
Increases in ability to notice the beginning letters in familiar words.													
Identifies at least 10 letters of the alphabet, especially those in their own name.													
Knows the letters of the alphabet are a special category of visual graphics than can be individually named.													
MATHEMATICS													
Demonstrates increasing interest and awareness of numbers and counting as a means of solving problems and determining quantity.													
Begins to associate number concepts, vocabulary, quantities, and written numerals in meaningful ways.										•			
Develops increasing ability to count in sequence to 10 and beyond.													
Begins to make use of one-to-one correspondence in counting objects and in matching groups of objects.	•			•	•	•	•	•	•	•	•	•	•
Begins to use language to compare numbers of objects with terms such as more, less, greater than, fewer, equal to.													
Develops increased abilities to combine, separate and name “how many” concrete objects.													
Begins to recognize, describe, compare, and name common shapes, their parts and attributes.		•	•	•	•				•				•

Domain & Indicators	Experience												
MATHEMATICS CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	T-H
Progresses in ability to put together and take apart shapes.													
Begins to be able to determine whether or not two shapes are the same size and shape.		•	•	•	•								
Shows growth in matching, sorting according to 1 or 2 attributes such as color, shape or size.													
Builds an increasing understanding of directionality, order and positions of objects, and words such as up, down, over, under, top, bottom, inside, outside, in front, and behind.													
Enhances abilities to recognize, duplicate and extend simple patterns using a variety of materials.													
Shows increasing abilities to match, sort, put in a series, and regroup objects according to one or two attributes such as shape or size.													
Begins to make comparisons between several objects based on a single attribute.						•	•	•	•	•	•	•	
Shows progress in using standard and non-standard measures for length and area of objects.										•			
SCIENCE													
Begins to use senses and a variety of tools and simple measuring devices to gather information, investigate materials, and observe processes and relationships.	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops increased ability to observe and discuss common properties, differences and comparisons among objects and materials.	•	•	•	•	•	•	•	•	•	•	•	•	•
Begins to participate in simple investigations to test observations, discuss and draw conclusions and form generalizations.	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops growing abilities to collect, describe and record information through a variety of means, including discussion, drawings, maps and charts.	•	•	•	•	•	•	•	•	•	•	•	•	•

Domain & Indicators	Experience												
SCIENCE CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	T-H
Begins to describe and discuss predictions, explanations, and generalizations based on past experiences.	•	•	•	•	•	•	•	•	•	•	•	•	•
Expands knowledge of and abilities to observe, describe and discuss the natural world, materials, living things, and natural processes.	•	•	•	•	•	•	•	•	•	•	•	•	•
Expands knowledge of and respect for their body and the environment.													
Develops growing awareness of ideas and language related to attributes of time and temperature.													
Shows increased awareness and beginning understanding of changes in materials and cause-effect relationships.													
CREATIVE ARTS													
Participates with increasing interest and enjoyment in a variety of music activities, including listening, singing, finger plays, games, and performances.													
Experiments with a variety of musical instruments.													
Gains ability in using different art media and materials in a variety of ways for creative expression and representation.													
Progresses in abilities to create drawings, paintings, models, and other art creations that are more detailed, creative or realistic.													
Develops growing abilities to plan, work independently, and demonstrate care and persistence in a variety of art projects.													
Begins to understand and share opinions about artistic products and experiences.													
Expresses through movement and dancing what is felt and heard in various musical tempos and styles.													
Shows growth in moving in time to different patterns of beat and rhythm in music.													

Domain & Indicators	Experience												
CREATIVE ARTS CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	T-H
Participates in a variety of dramatic play activities that become more extended and complex.													
Shows growing creativity and imagination in using materials and in assuming different roles in dramatic play situations.													
SOCIAL & EMOTIONAL DEVELOPMENT													
Begins to develop and express awareness of self in terms of specific abilities, characteristics and preferences.	•	•	•	•	•	•	•	•	•	•	•	•	
Develops growing capacity for independence in a range of activities, routines, and tasks.	•	•	•	•	•	•	•	•	•	•	•	•	
Demonstrates growing confidence in a range of abilities and expresses pride in accomplishments.	•	•	•	•	•	•	•	•	•	•	•	•	
Shows progress in expressing feelings, needs and opinions in difficult situations and conflicts without harming themselves, others, or property.	•	•	•	•	•	•	•	•	•	•	•	•	
Develops growing understanding of how their actions affects others and begins to accept the consequences of their actions.	•	•	•	•	•	•	•	•	•	•	•	•	
Demonstrates increasing capacity to follow rules and routines and use materials purposefully, safely, and respectfully.	•	•	•	•	•	•	•	•	•	•	•	•	•
Increases abilities to sustain interactions with peers by helping, sharing, and discussion.	•	•	•	•	•	•	•	•	•	•	•	•	
Shows increasing abilities to use compromise and discussion in working, playing, and resolving conflicts with peers.	•	•	•	•	•	•	•	•	•	•	•	•	
Develops increasing abilities to give and take in interactions; to take turns, and to interact without being overly submissive or directive.	•	•	•	•	•	•	•	•	•	•	•	•	•
Demonstrates increasing comfort in talking with and accepting guidance and directions from a range of familiar adults.	•	•	•	•	•	•	•	•	•	•	•	•	•
Shows progress in developing friendships with peers.													

Domain & Indicators	Experience												
SOCIAL & EMOTIONAL CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	T-H
Progresses in responding sympathetically to peers who are in need, upset, hurt, or angry; and in expressing empathy or caring for others.													
Develops ability to identify personal characteristics including gender, and family composition.													
Progress in understanding similarities and respecting differences among people, such as genders, race, special needs, culture, language, and family structures.													
Develops growing awareness of jobs and what is required to perform them.													
Begins to express and understand concepts and language of geography in the contexts of their classroom, home, and community.													
APPROACHES TO LEARNING													
Chooses to participate in an increasing variety of tasks and activities.	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops increased ability to make independent choices.	•	•	•	•	•	•	•	•	•	•	•	•	
Approaches tasks and activities with increased flexibility, imagination, and inventiveness.	•	•	•	•	•	•	•	•	•	•	•	•	•
Grows in eagerness to learn about and discuss a growing range of topics, ideas and tasks.	•	•	•	•	•	•	•	•	•	•	•	•	•
Grows in abilities to persist in and complete a variety of tasks, activities, projects, and experiences.	•	•	•	•	•	•	•	•	•	•	•	•	•
Demonstrates increasing ability to set goals and develop and follow through on plans.				•	•		•		•	•	•		
Shows growing capacity to maintain concentration, despite distractions and interruptions.	•	•	•	•	•	•	•	•	•	•	•	•	•
Develops increasing ability to find more than one solution to a question, task or problem.	•	•	•	•	•	•	•	•	•	•	•	•	•
Grows in recognizing and solving problems through active exploration, including trial and error, and interactions and discussions with peers and adults.	•	•	•	•	•	•	•	•	•	•	•	•	•

Domain & Indicators	Experience												
APPROACHES TO LEARNING CONTINUED	1	2	3	4	5	6	7	8	9	10	11	12	T-H
Develops increasing abilities to classify, compare, and contrast objects, events, and experiences.	•	•	•	•	•	•	•	•	•	•	•	•	•
PHYSICAL HEALTH AND DEVELOPMENT													
Develops growing strength, dexterity, and control needed to use tools such as scissors, paper punch, stapler, and hammer.													
Grows in hand-eye coordination in building with blocks, putting together puzzles, reproducing shapes and patterns, stringing beads and using scissors.													
Progresses in abilities to use writing, drawing and art tools including pencils, markers, chalk, paint brushes, and various types of technology.													
Shows increasing levels of proficiency, control and balance in walking, climbing, running, jumping, hopping, skipping, marching and galloping.													
Demonstrates increasing abilities to coordinate movements in throwing, catching, kicking, bouncing balls, and using the slide and swing.													
Progresses in physical growth, strength, stamina, and flexibility.													
Participates actively in games, outdoor play and other forms of exercise that enhance physical fitness.													
Shows growing independence in hygiene, nutrition and personal care when eating, dressing, washing hands, brushing teeth and tolieting.													
Builds awareness and ability to follow basic health and safety rules such as fire safety, traffic and pedestrian safety, and responding appropriately to potentially harmful objects, substances and activities.			•										

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