

A Teacher's Guide to **Unearthing the Past**

Grades Pre-K–2

Standards

PA 3.1 A1, A5, C2, C3,

PA 3.3 A1, A3

PA 4.1 D

NJCCS 5.1 A, B, C, D

NJCCS 5.3 A, B, C, E

NGSS: K-2: LS3, LS4

Dinosaurs continue to inspire awe in people of all ages, but what exactly classifies an animal as a dinosaur? When and where did they live? How do we know? Take dinosaur measurements, touch real fossils, and participate in role-playing activities during this introductory

Outcomes: Students will understand what makes a dinosaur a dinosaur and will be able to name and give characteristics of prehistoric animals that were and were not dinosaurs. Students will examine the methods by which paleontologists study dinosaurs and their relatives.

Suggested Activities Before Your Visit:

- Create a K-W-L chart about dinosaurs and fill in what the students already know about dinosaurs and what they want to know. Leave the “What We Learned” column blank and have students fill in new information after the lesson. Discuss the word “dinosaur.”
- Discuss extinction with your students. Show your students animated and computer-generated images and videos of dinosaurs. Are those images real? Could someone really videotape a dinosaur like *Tyrannosaurus rex*? Why not? How do we know what they might have looked like? Do we know what noises dinosaurs made?

Vocabulary

Dinosaur
Body Fossil
Trace Fossil
Herbivore
Carnivore

Suggested Activities After Your Visit:

Classroom Activities:

- Discuss the lesson with your students. What new ideas or information did they learn? Was anything confusing? What did they like best? Fill in the final column of the K-W-L chart.
- Make your own trace fossils. Purchase or make clay. Press hands and feet into the clay and allow the clay to dry overnight to simulate fossilization. The teacher should create mystery fossils without the students' knowledge. Then, provide the students with the pre-made mystery fossils. Allow different adults and pets—as long as it is safe for the animals—to create fossils. Enlist dolls and action figures to create very small fossils. Push feathers and cloth into clay. Make footprints in socks and handprints in gloves. Push plants, shells, and other natural objects into the clay. Ask students to interpret the fossils. What sort of animal would have made the impression? Do just animals leave fossils behind? Write or draw the story of the mystery animals.

- Not all animals that lived at the time of the dinosaurs were dinosaurs! Review the characteristics of dinosaurs with your students. Were Pterosaurs dinosaurs? Why or why not? Were Plesiosaurs dinosaurs? Why or why not?
- Read *Dinosaurumpus!* by Tony Mitton as a class. Talk about how dinosaurs might have moved. Walk like alligators and other modern reptiles with your legs out to the sides and then walk like dinosaurs with your legs under your body. Have your students identify animals in the book that are not dinosaurs, such as alligators, Pterosaurs, flying reptiles, and rats.
- Make “trackways” in your classroom. Use the attached **Dinosaur Activities: Trackways** to tell dino-stories. Some suggestions for activities are attached to the templates. Go to the Discovery Channel at dsc.discovery.com/dinosaurs for video clips depicting how dinosaurs might have moved. Not all of the animals in *Dinosaurumpus!* are dinosaurs. Discuss with your children what defines a dinosaur.
- Create your own dinosaurs. Create dinosaurs that would have been herbivores or carnivores, dinosaurs that were fast or slow, and dinosaurs that could jump high or climb. Draw a picture of what your dinosaur might have looked like. Pay attention to claws, teeth, tails, scales, and feathers!

Homework Assignments:

- Try the **Dinosaur Detectives** handout that is attached, and reinforce what makes a dinosaur a dinosaur.

Interdisciplinary Activities:

- Color the attached illustrations of dinosaurs. Discuss what each dinosaur might have eaten, how big it might have been, and where it might have lived.
- Create the attached **Dinosaur Flipbook** to explore the different types of dinosaurs. Give each student a copy of all four of the Dinosaur Flipbook pages. You may find it helpful to print the first and second pages on cardstock. On the first and second pages, cut along the left, bottom, and right sides of the “Flip to Find” boxes making sure to leave the top line attached. Glue the first page to the third and the second to the fourth making sure to not glue your newly formed “Flip to Find” flaps. Allow the students to draw pictures of each kind of dinosaur under the flaps. Allow them to share their books with parents and friends.

Writing/Drawing Prompts:

- What would a dinosaur’s home look like?
- I am a (dinosaur of the student’s choosing). Every day I...

Class Project Ideas:

- Write and perform a play that would show the rest of the school what you have learned about dinosaurs. Allow groups of students to research different dinosaurs to portray in your play. Show how a bone becomes a fossil. Portray a paleontologist. Invite other classes to see your play and encourage them to ask questions about dinosaurs after the performance.

Resources for Students

- Discover just one of the stories of the Academy’s very own *Hadrosaurus foulkii* in *The Dinosaurs of Waterhouse Hawkins* by Barbara Kerley
- *Dinosaurs (DK Eyewitness Books)* by David Lambert
- *How Big Were the Dinosaurs?* by Bernard Most
- *Maia: A Dinosaur Grows Up* by John R. Horner and James Gorman

- Check out Dragonfly TV for a look at how two kids just like you investigate which animals lived with the dinosaurs: pbskids.org/dragonflytv/show/dinosaurs.html
- *Dinosaurs: The Ecosystems Explorer* by Joanna Turner and Nicholas Harris
- *The Time-Life Guides: Dinosaurs* edited by Michael K. Brett-Surman
- Play Magic School Bus dinosaur quiz: scholastic.com/magicschoolbus/games/quizzes/dinosaurs

Additional Resources for Educators

- *Dinosaurs: The Most Complete, Up-to-Date Encyclopedia for Dinosaur Lovers of All Ages* by Dr. Thomas R. Holtz Jr.
- The website for the Academy of Natural Sciences includes wonderful information on the dinosaurs that can be found in our very own Dinosaur Hall: ansp.org/museum/dinohall
- For a quick reference guide to all things prehistoric, pick up a copy of *Dinosaurs and Prehistoric Life (DK Handbooks)* by Hazel Richardson
- Additional dinosaur activities can be found in *Dinosaurs for Every Kid: Easy Activities that Make Learning Science Fun* by Janice VanCleave.
- For some of the more probing questions about fossils, what happened to the dinosaurs, and the connections between dinosaurs and other animals, check out University of California Museum of Paleontology at ucmp.berkeley.edu
- *Last Child in the Woods* by Richard Louv. This is a wonderful book for any educator who wants to bring nature back into the classroom.
- *Janice VanCleave's Animals: Mind-Boggling Experiments You Can Turn into Science Fair Projects* by Janice VanCleave (general animal resource)
- *How Nature Works: 100 Ways Parents & Kids Can Share the Secrets of Nature* by David Burnie (general animal resource)
- *A Dictionary of Nature: 2,000 Key Words Arranged Thematically* by David Burnie (general animal resource)

Dinosaur Flip Book by _____.

Flip to Find...



a dinosaur that was a
carnivore.

Flip to Find...



a dinosaur that was very
big.

Flip to Find...



a dinosaur that had horns
or spikes.

Flip to Find...



a dinosaur that had a long
neck.

Flip to Find...



a dinosaur that was an
herbivore.

Flip to Find...



a dinosaur that was small.

Flip to Find...



a dinosaur that had sharp
claws.

Flip to Find...



my favorite dinosaur.

This is a _____.

This is a _____.

This is a _____.

This is a _____.

This is a _____.

This is a _____.

This is a _____.

This is a _____.

Dinosaur Activities: Trackways

Paleontologists don't necessarily need the bones of dinosaurs to learn about them.

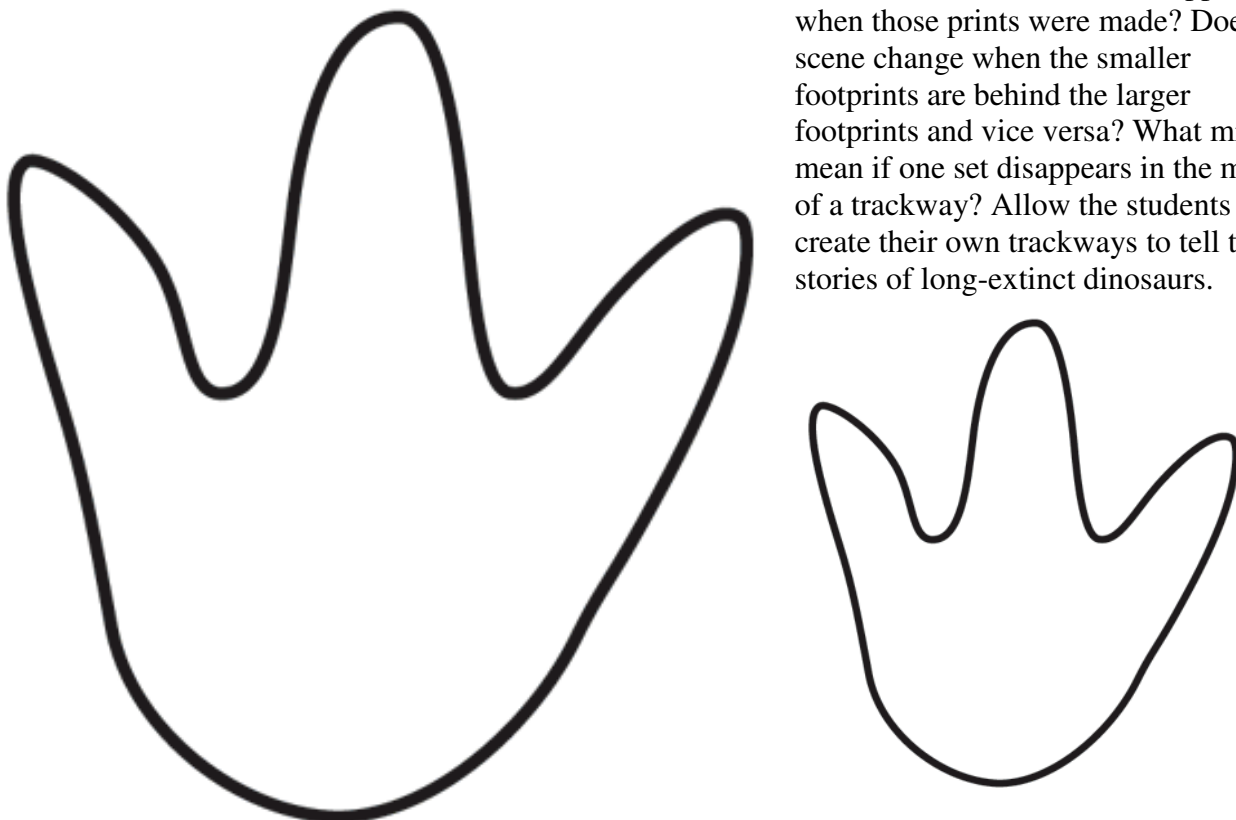
We can also look at things left behind by dinosaurs called trace fossils. Trace fossils, such as footprints, eggs, and coprolites—fossilized dinosaur dung—can give clues about the size, speed, eating habits, and family structure of animals that went extinct millions of years ago. We can see how dinosaurs might have interacted by studying sets of footprints, sometimes referred to as trackways.

Below are re-creations of theropod dinosaur footprints. Theropods were dinosaurs that walked upright on two legs like we do. Theropod species that have been found can be very large, such as the *Tyrannosaurus rex*, or relatively small, such as *Deinonychus*, which stood about 3 feet tall.

Copy this page onto a transparency sheet and project onto a larger piece of paper. Move the projector back until the smaller footprint is about 8 inches long. Trace the footprints onto the paper and cut out both the larger and the smaller prints. Make at least 10 sets of the prints.

Discuss trace fossils with your students. Show them a small and a large footprint. What can we learn about these two dinosaurs? Have the students walk quickly and slowly, jump, and walk on their tiptoes. How do their steps change? Lay out just one set as if the animal was walking, either the large or the small. Move the footprints closer to each other and ask the class to guess about what that means. Move them farther apart. What does that tell us? What was the dinosaur doing? How big was the dinosaur? Was it fast or slow?

Then lay out both sets of footprints. If the sets are side by side, what could that mean? If one set follows the other, what was happening when those prints were made? Does the scene change when the smaller footprints are behind the larger footprints and vice versa? What might it mean if one set disappears in the middle of a trackway? Allow the students to create their own trackways to tell the stories of long-extinct dinosaurs.



Discovering Dinosaurs Activities: Dinosaur Detectives

ANSWERS

1. Animals that *fly without feathers*: Bee, Bat
2. Animals that *have hair or fur*: Dog, Human, Bat
3. Animals that *are not extinct*: Dog, Bee, Human, Fish, Bat
4. Animals that *live in water*: Elasmosaurus, Fish
5. Animals without an X (these are the dinosaurs): Hadrosaurus, Chasmosaurus, Tyrannosaurus
6. 2 Red X's
7. 3 Blue X's
8. 5 Green X's
9. 2 Yellow X's
10. 3 Circles

Discovering Dinosaurs Activities: Dinosaur Detectives

Name: _____

Dinosaur Detectives!

1. Put a **red** X on the animals that *fly without feathers*.
2. Put a **blue** X on the animals that *have hair or fur*.
3. Put a **green** X on the animals that *are not extinct*.
4. Put a **yellow** X on the animals that *live in water*.
5. **Circle** the animals that do not have an X on them.

Hint: Some animals may have more than one X.



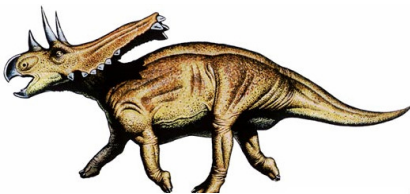
Dog



Bee



Hadrosaurus



Chasmosaurus



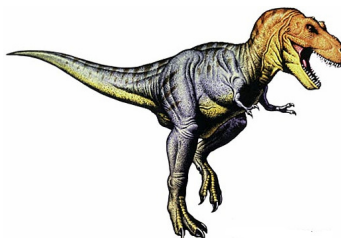
Human



Elasmosaurus



Fish



Tyrannosaurus



Bat

Please turn over!

6. Count the number of animals that have a red X.

_____ animals

These are not dinosaurs.

Dinosaurs did not fly without feathers.

Let's keep going!

7. Count the number of animals that have a blue X.

_____ animals

These are not dinosaurs.

Dinosaurs did not have hair or fur.

Let's keep going!

8. Count the number of animals that have a green X.

_____ animals

These are not dinosaurs.

Dinosaurs are extinct (except for birds!)

Let's keep going!

9. Count the number of animals that have a yellow X.

_____ animals

These are not dinosaurs.

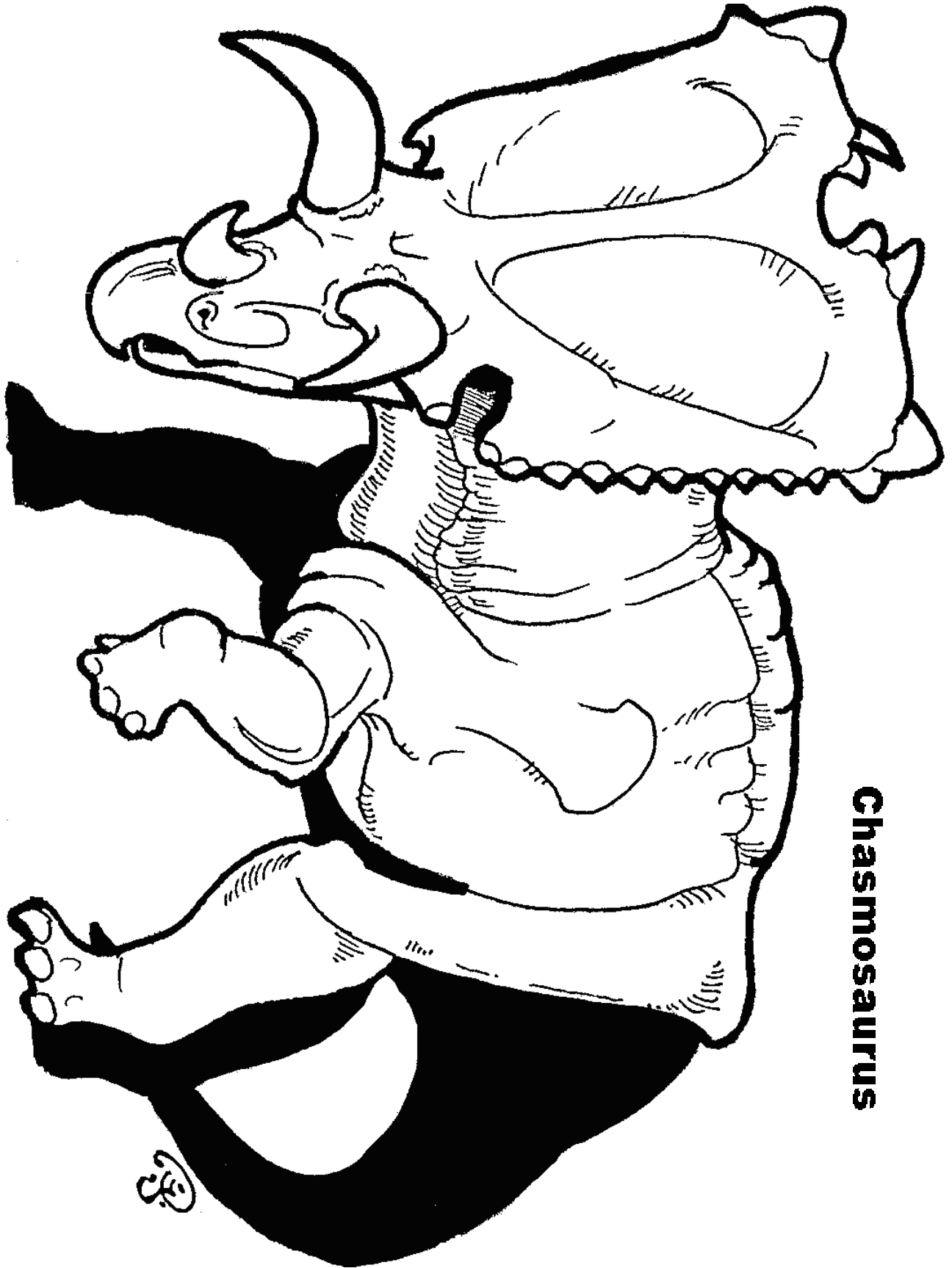
Dinosaurs did not live in water.

Let's keep going!

10. Count the number of animals that are circled.

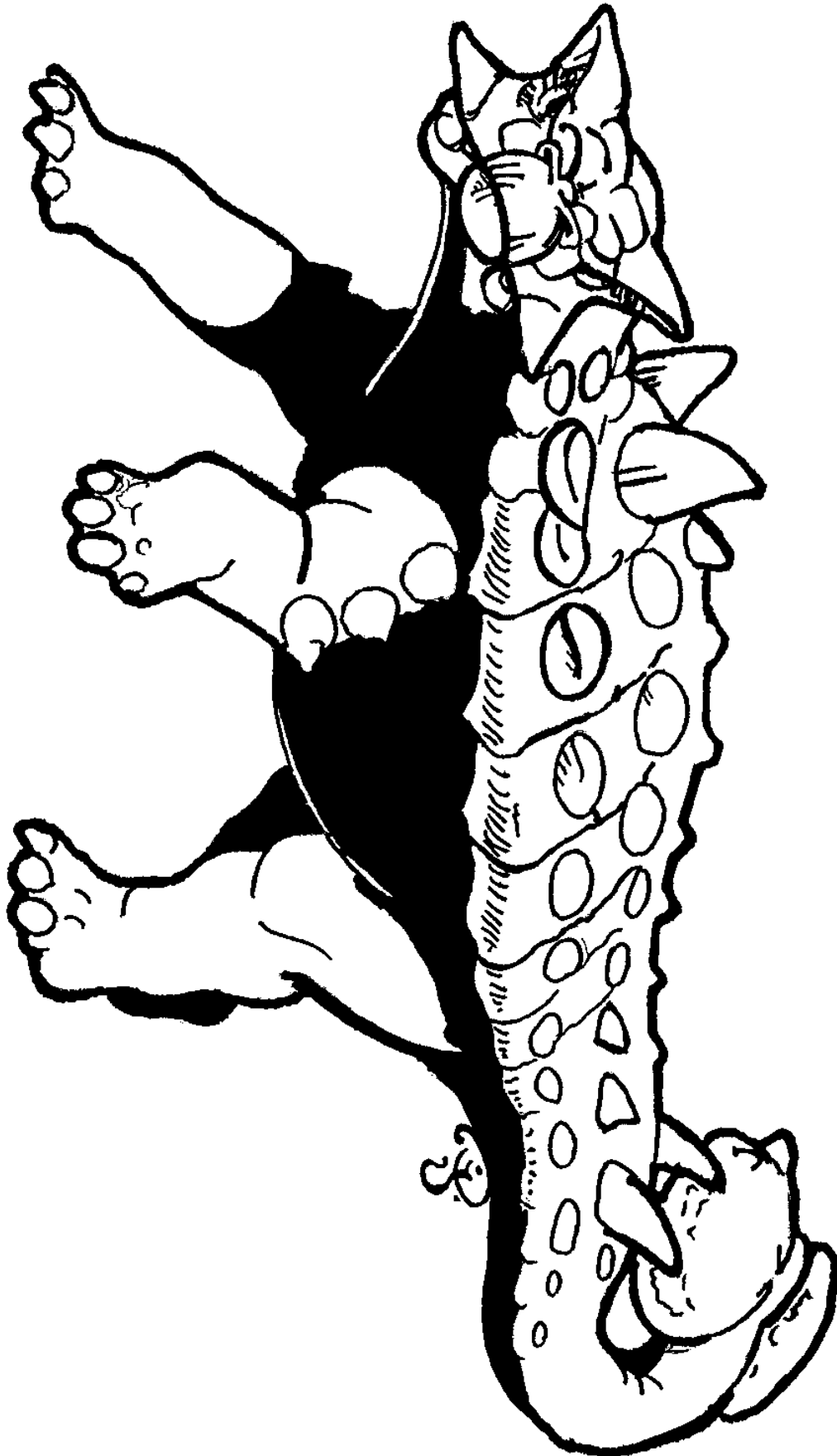
_____ animals

Good job! You found the dinosaurs.



Chasmosaurus

Ankylosaurus



Teacher Information about Chasmosaurus and Ankylosaurus

Chasmosaurus

- Lived during the late Cretaceous Period (80–72.8 million years ago)
- Was about 23 feet (7 m) long
- Weighed about the same as a rhinoceros
- Found in Alberta, Canada
- Herbivore

Ankylosaurus

- Lived during the late Cretaceous Period (66.8–65.5 million years ago)
- Was about 29.5 feet (9 m) long
- Weighed about the same as a rhinoceros
- Found in Montana and Wyoming
- Herbivore