Teaching Activity Guide

DINO TRACKS and DINO TREASURES

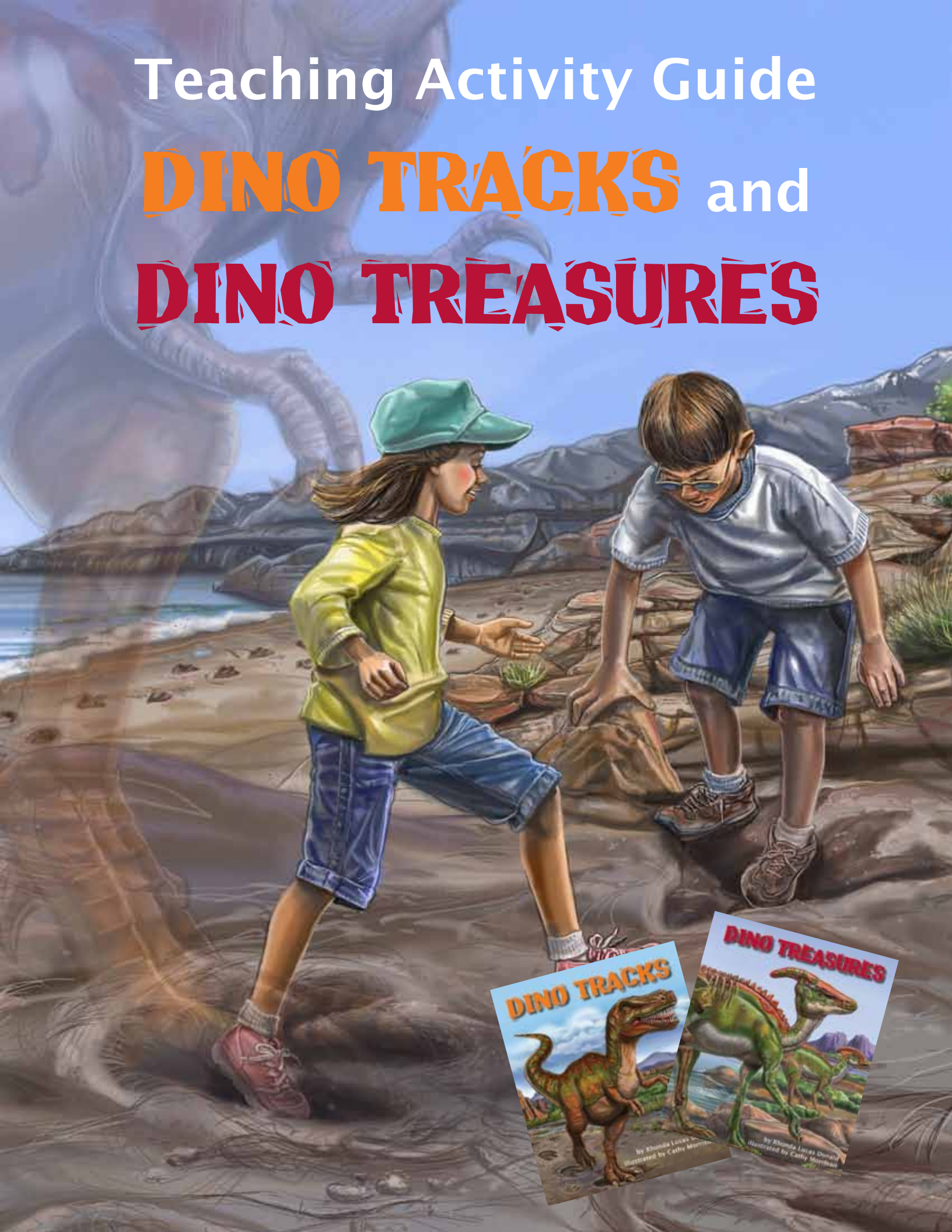


Table of Contents

3 How to Use This Activity Guide (General)
4 What Do Children Already Know?
4 Pre-Reading Questions
5 Book Club Discussion Questions
6 Comprehension Questions & Writing Prompts
7 Language Arts: Word Families & Rhyming Words
8 Comparing Tracks
9 Making and Reading Tracks
11 Tracks: Measuring Up
12 Reading the Clues
13 TX: Glen Rose Trackway
14 Hadley, MA and the CT River Valley
15 Morrison, CO
16 Wyoming
17 Holy Cross Mountains, Poland
18 Crayssac, France
19 Australia
20 Moccasin Mountain Tracks, UT
21 Shandong Province, China
22 Lesotho, Africa
23 Lima, MT
24 Nesting Evidence
25 Skin Samples
26 Feathers
27 Colorful Critters
28 Dino Poop
29 What's for Dinner?
30 Sound
31 Life's Tough
32 Fighting
33 Sleeping
34 Tracks
35 Head Butting
36 Birds
37 Science Journal (Vocabulary)
41 Dinosaur Math
42 Maps: Dinosaurs in the US
43 Dinosaurs in the book
52 Coloring Page
53 Dino Track-o-licious Cookies
54 Dino Mask
58 Appendix A—"What Children Know" Cards

Arbordale Publishing
formerly Sylvan Dell Publishing
Mt. Pleasant, SC 29464

How to Use This Activity Guide (General)

There are a wide variety of activities that teach or supplement all curricular areas. The activities are easily adapted up or down depending on the age and abilities of the children involved. And, it is easy to pick and choose what is appropriate for your setting and the time involved. Most activities can be done with an individual child or a group of children.

For teachers in the classroom: We understand that time is at a premium and that, especially in the early grades, much time is spent teaching language arts. All Arbordale titles are specifically selected and developed to get children excited about learning other subjects (science, geography, social studies, math, etc.) while reading (or being read to). These activities are designed to be as comprehensive and cross-curricular as possible. If you are teaching sentence structure in writing, why not use sentences that teach science or social studies? We also know and understand that you must account for all activities done in the classroom. While each title is aligned to all of the state standards (both the text and the For Creative Minds), it would be near impossible to align all of these activities to each state's standards at each grade level. However, we do include some of the general wording of the CORE language arts and math standards, as well as some of the very general science or social studies standards. You'll find them listed as "objectives" in italics. You should be able to match these objectives with your state standards fairly easily.

For homeschooling parents and teachers in private schools: Use as above. Aren't you glad you don't have to worry about state standards?

For parents/caregivers: Two of the most important gifts you can give your child are the love of reading and the desire to learn. Those passions are instilled in your child long before he or she steps into a classroom. Many adults enjoy reading historical fiction novels . . . fun to read but also to learn (or remember) about historical events. Not only does Arbordale publish stories that are fun to read and that can be used as bedtime books or quiet "lap" reading books, but each story has non-fiction facts woven through the story or has some underlying educational component to sneak in "learning." Use the "For Creative Minds" section in the book itself and these activities to expand on your child's interest or curiosity in the subject. They are designed to introduce a subject so you don't need to be an expert (but you will probably look like one to your child!). Pick and choose the activities to help make learning fun!

For librarians and bookstore employees; after-school program leaders; and zoo, aquarium, nature center, park & museum educators: Whether reading a book for story time or using the book to supplement an educational program, feel free to use the activities in your programs. We have done the "hard part" for you.

Questions and activities relating to Dino Tracks is in orange and those relating to Dino Treasures is in red.

What Do Children Already Know?

Young children are naturally inquisitive and are sponges for information. The whole purpose of this activity is to help children verify the information they know (or think they know) and to get them thinking "beyond the box" about a particular subject.

Before reading the book, ask the children what they know about the subject. A list of suggested questions is below. The children should write down their "answers" (or adults for them if the children are not yet writing) on the chart found in Appendix A, index cards, or post-it notes.

Their answers should be placed on a "before reading" panel. If doing this as a group, you could use a bulletin board or even a blackboard. If doing this with individual children, you can use a plain manila folder with the front cover the "before reading" panel. Either way, you will need two more panels or sections—one called "correct answer" and the other "look for correct answer."

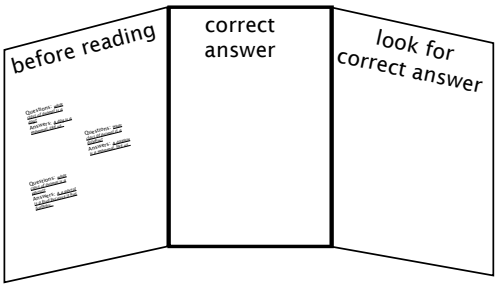
Do the children have any more questions about the subject ? If so, write them down to see if they are answered in the book.

After reading the book, go back to the questions and answers and determine whether the children's answers were correct or not.

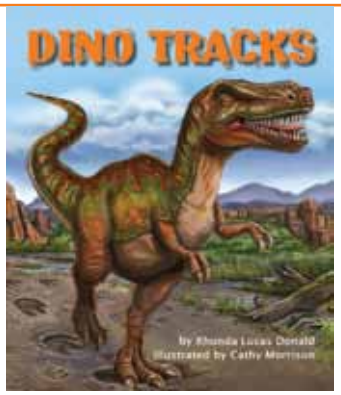
If the answer was correct, move that card to the "correct answer" panel. If the answer was incorrect, go back to the book to find the correct information.

If the child/children have more questions that were not answered, they should look them up.

When an answer has been found and corrected, the card can be moved to the "correct answer" panel.



Pre-Reading Questions



What are tracks and trackways?

How do they compare to footprints?

How big are dinosaur tracks?

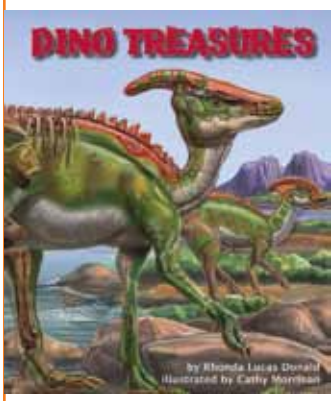
Are dinosaur tracks the same shape?

What are some things dinosaur scientists can learn by looking at dinosaur tracks?

Where in the world did dinosaurs live?

Did dinosaurs live near the North or South Poles?

Did any dinosaurs once live near where you live now?



What are some things that scientists have learned about dinosaurs by "reading" fossils?

What kind of skin did some dinosaurs have?

What colors were dinosaurs?

What did dinosaurs eat and how do scientists know?

What did dinosaurs sound like?

Did dino moms and dads raise their young?

DINO TRACKS

1. If you were a dinosaur, which one would you be?

2. Which dinosaur looks the most gentle? which one looks the most ferocious?

3. What can we tell about dinosaurs from their tracks?

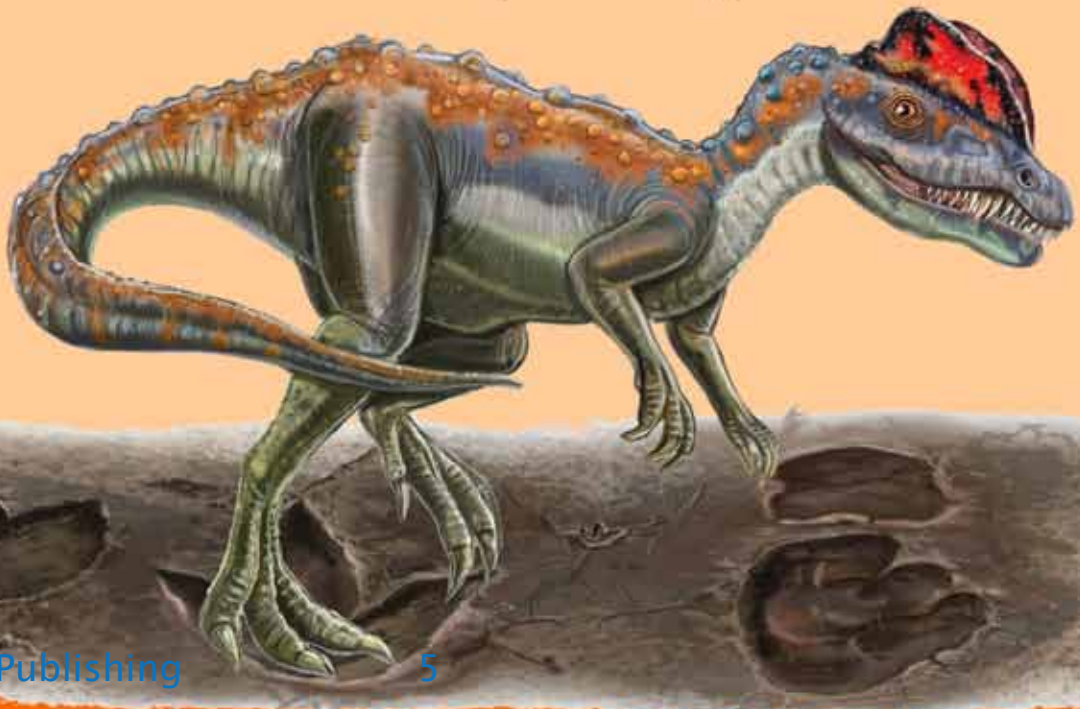
4. Where do you leave “tracks”?

5. Where did the dinosaurs roam?

6. If you could go back in time, would you want to meet a dinosaur? why or why not?

7. Where might you find a dinosaur fossil today?

8. What could we tell about you from your “tracks”?



Comprehension Questions & Writing Prompts

Objective Core Language Arts, Speaking and Listening: Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
Retell stories, including key details, and demonstrate understanding of their central message or lesson.
Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

How are these two books alike and how are they different?

What are tracks and trackways?

How big and how little can these tracks be?

What are some things scientists can tell about dinosaurs if:

- there is only one set of tracks
- there are many kinds of tracks of the same kind
- there are many kinds of tracks of different kinds
- the tracks show three toes that left sharp tracks like claws
- the tracks show three toes that left rounded tracks
- the tracks are rounded in shape with smaller front feet and bigger back feet
- the tracks go down to what was once water and then disappear

Describe how scientists know that some dinosaur parents cared for their young.

Describe how scientists know about dinosaur skin, feathers, and colors.

How did scientists figure out how one type of dinosuar sounded?

How do scientists know that dinosaurs fought with each other, got sick or injured?

Why do scientists say that birds are living descendants of dinosaurs?

What are some types of scientists that study dinosaurs? How are their jobs alike and how are their jobs different?

Would you like to be a dinosaur scientist when you grow up? If so, which type of scientist do you think you'd like to be?

Do you have to graduate from college before you can find dinosaur bones? Why or why not?

Language Arts: Word Families & Rhyming Words

Language Arts, Reading Standards: Foundational Skills, Recognize and produce rhyming words.

Word families are groups of words that have some of the same combinations of letters in them that make them sound alike…or rhyme. For example ad, add, bad, brad (Brad), cad, Chad, clad, dad, fad, gad, glad, grad, had, lad, mad, pad, plaid (silent 'i"), sad, shad, and tad all have an "ad" letter combination and rhyme.

- Find and write down rhyming words in the poem.
- Are they in the same word family?
- If so, circle the combination of letters that are the same.
- Can you think of more words in the word family?

Rhyming words are:

abound

and

found

They are / are not from the same word family.

Other words that rhyme are:

Rhyming words are:

trod

and

squad

They are / are not from the same word family.

Other words that rhyme are:

Rhyming words are:

fly

and

dry

They are / are not from the same word family.

Other words that rhyme are:

Rhyming words are:

wing

and

thing

They are / are not from the same word family.

Other words that rhyme are:

Comparing Tracks

Compare the dinosaur tracks to other animal prints. These images are not scaled to size but you should be able to see shapes of toes and whether they are sharp or rounded. Do you think scientists use knowledge of animals today and their tracks when making assumptions about dinosaur tracks? Why or why not. What are some assumptions that a scientist might be able to make, if they do so.

Raccoon

Wolf

Dog

Fox

Badger

Brown bear

Thick-knee

Plover

Goat

Reindeer

Stork

Crow

Sheep

deer

Making and Reading Tracks

Scientists use what they already know and understand to help them try to understand things that they can't see. By understanding things about animal tracks made today, they can better understand the puzzle pieces left by dinosaurs in their tracks long ago.

What can you tell by your own tracks? This activity may be done with a few children or many.

What you'll need:

- a large roll of craft or butcher paper
- tape, optional
- several washable water-based paint
- shallow pan for paint that is big enough for dipping feet
- clean up materials
- tape measure or yardstick
- paper, pencils

How to do:

- roll or lay out several yards of craft or butcher paper
- tape paper down if desired
- pour a color of paint into the pan
- have first child step into pan so that the bottom of his or her feet are covered in paint
- ask the child to step onto the paper and to walk or run across the paper
- other children should write down observations of how the child moved across the paper (slow walk, short steps, run, etc.)
- as soon as that child is finished, clean off his/her feet and the pan
- change the paint so that each child has a different color paint, make sure to write down which child made which color footprints
- repeat the process until you have several different colors of footprint tracks in different colors made by different children

Measuring the footprints:

- What is the size of each footprint?
- Does the size of each footrpint correlate to the height of the child who made it?
- What's the distance between the prints?
- Do the prints look the same or are they different?

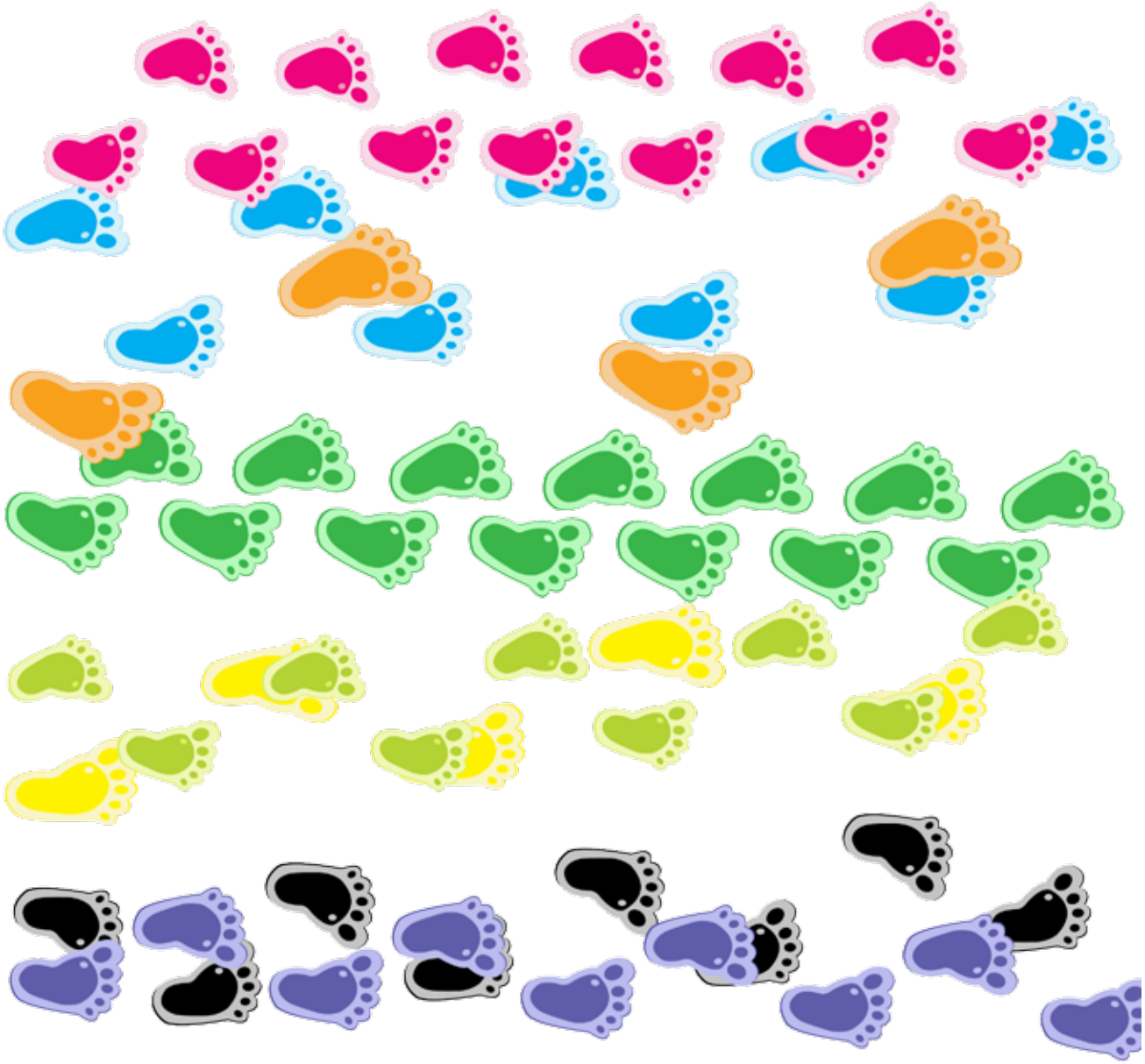
Reading the footprints:

- Can you tell which person was running by the distance between their footprints?
- Can you tell whether one person walked before or after another person?

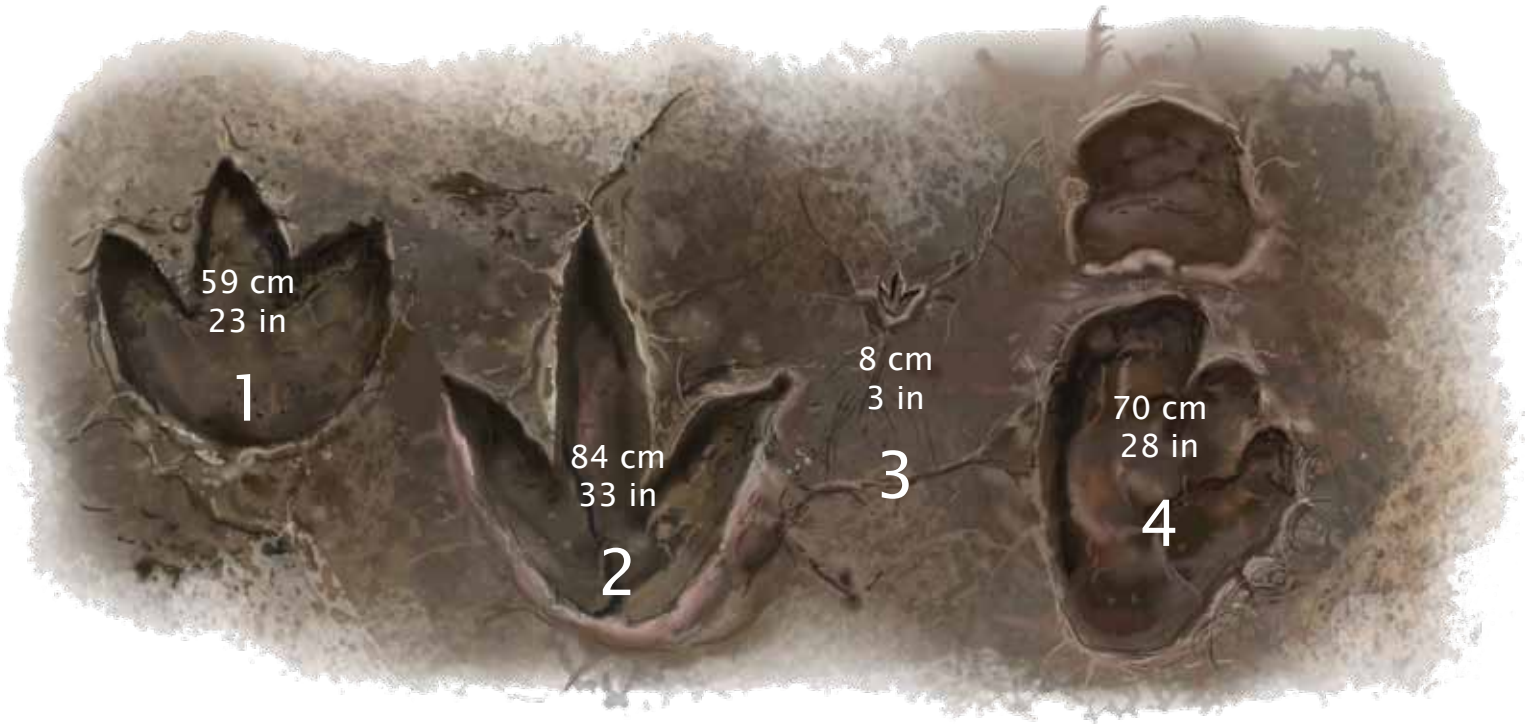
What can you tell by looking at the colored footprints below? Use the colors to represent the “child” who made the footprint.

- Which color has the biggest feet?
- Is that child older or taller than the others?
- Which color has the smallest feet?
- Can you tell/guess by the footprints which children ran or walked slowly and carefully?
- Can you tell by which footprints are on top of others which child walked across the area before or after another one? For example, can you put the red, blue, and orange footprints in order of who walked first just by looking at the footprints?

If you were a scientist “reading” these footprints, were you able to “see” information about the children who made the footprints?



Tracks: Measuring Up



1) Ornithopod	23 inches	59 centimeters
2) Theropod	33 inches	84 centimeters
3) Theropod	3 inches	8 centimeters
4) Sauropod	28 inches	70 centimeters

How does your footprint compare to a dinosaur track?

- Use craft/butcher paper and pencils or a sidewalk/playground and chalk, to measure and draw lines to represent the size of each of the above tracks.
- Using the size measurement, draw a “track” to scale.

When finished drawing all four tracks, answer the questions, below:

- Which tracks are smallest? Largest?
- Which tracks are close to the size of your hand?
- Which type of dinosaur might make deeper footprints: large, heavy ones or small, light ones? Why?
- Could you lie down in any of the tracks? If so, can lie straight or do you need to curl up?
- How many of your feet can fit from heel to toe inside the largest track?
- Can you tell which tracks were made by meat-eaters? Plant-eaters?

Reading the Clues

Scientists use things they know about animals today to infer things about dinosaurs. For example:

Lions and other meat-eaters have sharp teeth to bite into the meat. Dinosaurs with sharp teeth probably ate meat.

Predators have sharp claws to grab prey. Dinosaur tracks with sharp claws probably belonged to a predator (meat-eater).

Many deer and other plant-eaters leave soft, rounded footprints or tracks. Dinosaurs that left soft, rounded footprints were probably plant-eaters.

Animal herds travel or migrate in the same direction. Dozens of trackways next to each other might mean a herd of dinosaurs or migrating dinosaurs.

Animals travel to and gather around watering holes. Many different animals leave tracks near watering holes and on shorelines where it is muddy. Large groups of tracks from different dinosaurs in one area may indicate that there was a watering hole in the area.

When running, animal tracks or human footprints are deeper and further apart. Scientists can tell whether a dinosaur was walking or running by the distance between the tracks.

Scientists can tell which dinosaur walked in the area before others by looking at which tracks are on top of the others.

Different size tracks left by the same type of dinosaurs at about the same time may have been left by adults and their young. That tells scientists that those particular type of dinosaurs raised and cared for their young.

Scientists are still finding dinosaur trackways and are still putting together pieces of the dinosaur puzzles. Maybe you can help find some puzzle pieces when you grow up!

Author Rhonda Lucas Donald based each page in the story on a real trackway and the scientists inferences about the dinosaurs that made the tracks. Some of these trackways are places you might even be able to visit and see for yourself! Learn the real stories in the next few pages.

TX: Glen Rose Trackway

Once thought to be bird tracks, dinosaur tracks are plentiful in the Glen Rose area of TX (SW of Dallas). You can see the tracks by visiting Dinosaur Valley State Park, part of the Texas State Park System.

Most of the tracks came from unidentified sauropods.

Dinosaur Valley State Park

Paleo

Photo credit: Glen J. Kuban
http://paleo.cc/paluxy/glenrose.htm

Hadley, MA and the CT River Valley

Tracks have been found in the Conneticut River Valley as recently as August, 2006! Some of the places you can see tracks include:

Dinosaur State Park in Rocky Hill, CT

The Nash Dinosaur Track Site and Rock Shop in South Hadley, MA

Most of the tracks in this area were made by meat-eating dinosaurs.

The Trackway at Dinosaur State Park

Morrison, CO

Not only are there dinosaur tracks in this area, but dinosaur fossils have been found as well. Some of the tracks are found a short walk off of roads. For more information, check out:

Morrison Natural History Museum

Dino Ridge

http://www.sciencebuzz.org/buzz_tags/dinosaur_tracks

Wyoming

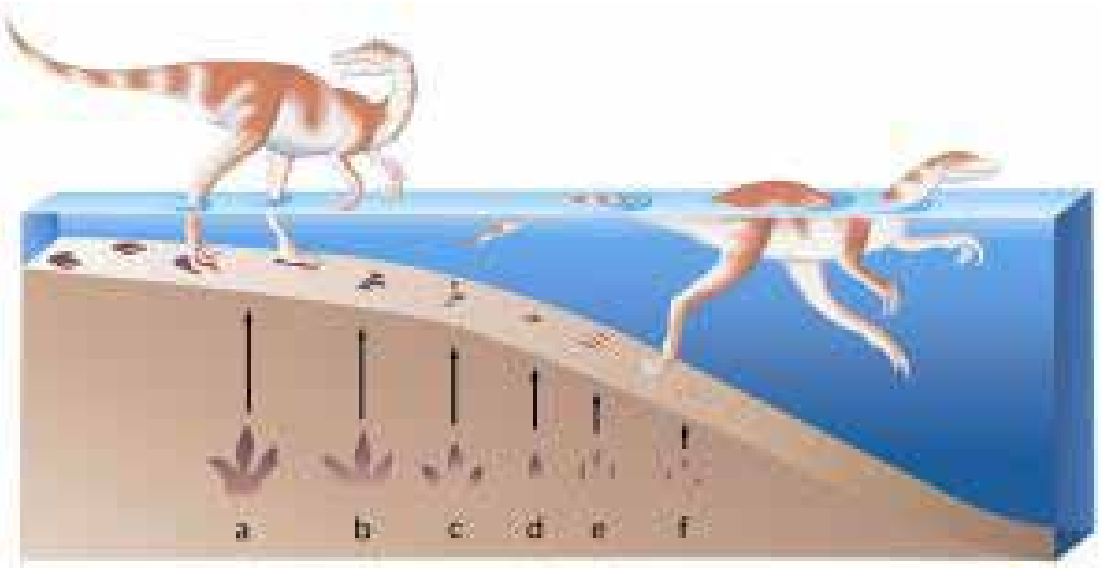
Paleontologist Debra Mickelson and a research team from Colorado University-Boulder's geological sciences department identified the tracks of the six-foot-tall, bipedal dinosaur at a number of sites in northern Wyoming, including the Bighorn Canyon National Recreation Area. "It was about the size of an ostrich, and it was a meat-eater," she said. "The tracks suggest it waded along the shoreline and swam offshore, perhaps to feed on fish or carrion."

Specific locations are not identified.

Articles about this discovery include:

Scientific American

Science Daily



The illustration shows a swimming dinosaur leaving deep, complete footprints in shallow water and incomplete footprints as it gradually loses contact with the sea floor. (Illustration courtesy of Paleontologist Debra Mickelson)

Holy Cross Mountains, Poland

These tracks are believed to be some of the oldest in the world. You can read about these tracks through:

The American Musuem of Natural History

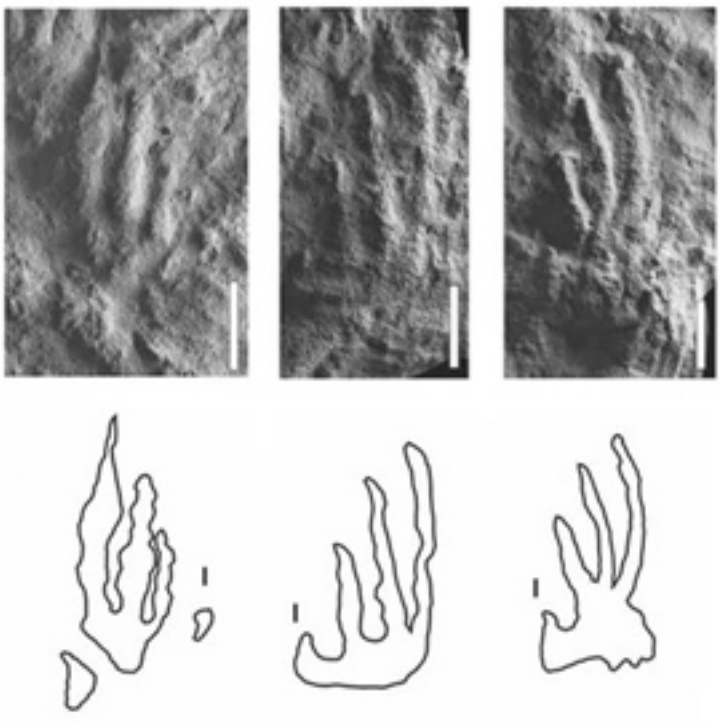
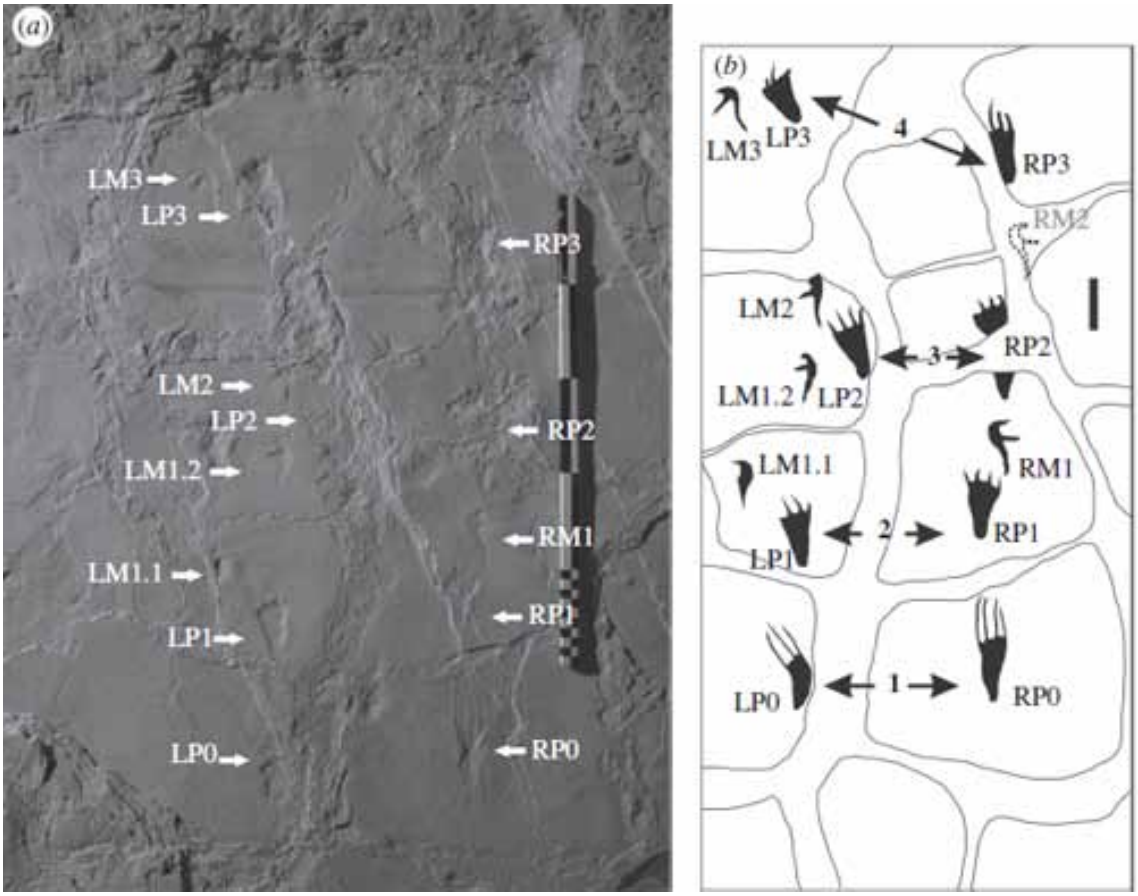


photo credit: The American Musuem of Natural History

Crayssac, France

These tracks indicate that these giant flying reptiles landed, hopped, landed again and then walked off on four feet. At least 30 different trackways are found on “Pterosaur Beach” near Crayssac, France. You can read about it at Discover Magazine



Discover Magazine

Australia

Milanesia Beach in Victoria, Australia was once part of the South Pole. The tracks were discovered by Dr. Anthony Martin and other scientists in the summer of 2010. They believe that these tracks were made by theropods — meat-eating dinosaurs related to modern birds. The scientists believes that the tracks were made by three different sized animals, ranging from the size of a chicken to around the size of a crane.

Read Dr. Martin's Great Cretaceous Walk blog here.

photo credit: Paleontologist Anthony Martin of Emory University

Moccasin Mountain Tracks, UT

Hundreds of tracks from at least six different types of dinosaurs are found in an area about the size of a football field. The tracks are on Bureau of Land Mangement grounds, a few miles from the entrance to Coral Pink Sand Dunes State Park. Read about the trackways and get directions from the Bureau of Land Management and Zion National Park. There are several other trackways in the area.

Photo credits: Zion National Park

Shandong Province, China

The tracks of at least six different dinosaurs that don't overlap tell scientists that these "raptor" dinosaurs travelled in "packs." The tracks also show that the dinosaurs held the claw up as they walked.

You can read about the tracks at Science Daily.

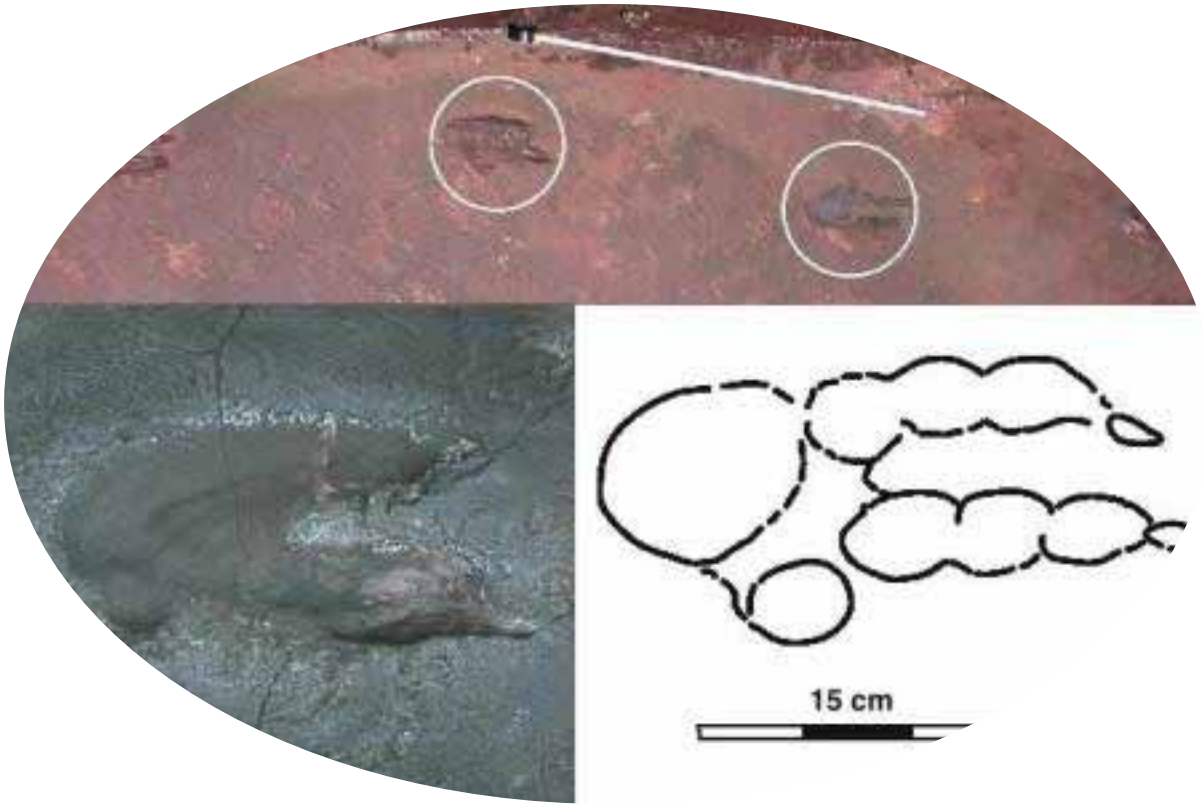


Photo credit: Dr. Martin Lockley of the Dinosaur Tracks Museum, University of Colorado at Denver

Lesotho, Africa

Over 250 tracks show how four-legged dinosaurs moved between a muddy riverbed, a sloping bank, and a flat surface area. Scientists notice that different types of dinosaurs walked differently in the different conditions. They believe that ornithischians changed their way of walking as surface conditions changed. In the river bed, they crept along flat-footed, dragging their feet. On the slope, they narrowed their stance, still walking on all fours, but picking up their feet. Once they reached the flat, stable ground on top, they switched to walking on two legs. On the other hand, the theropod stayed upright on two legs, using claws on its toes to grip slippery surfaces.

You can read about this trackway at Science Daily.

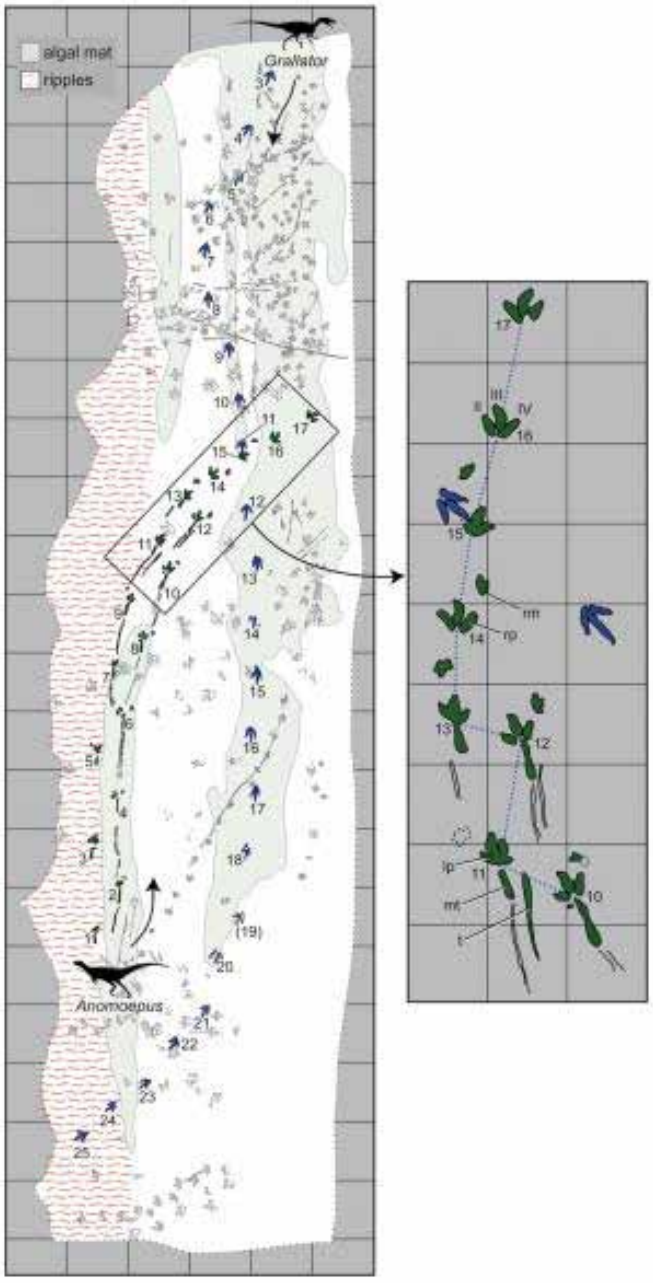


Photo Credit: Wilson JA, Marsicano CA, Smith RMH. Dynamic Locomotor Capabilities Revealed by Early Dinosaur Trackmakers from Southern Africa. PLoS ONE, 2009; 4 (10): e7331 DOI: 10.1371/journal.pone.0007331)

Lima, MT

Tracks and trackways aren't the only things that scientists study to learn about dinosaurs. In 2005, scientists discovered the fossilized remains of an adult and two young dinosaurs in an underground burrow, similar to burrows that animals live in today. Wildlife biologists know that many animals dig burrows to protect themselves from heat. Could the dinosaurs have done the same?

Interestingly, just two years later, in 2007, scientists found evidence of other burrowing dinosaurs in Australia, near the "Polar" tracks featured earlier in the book. Could the burrowing dinosaurs have left some of those tracks?

You can read about these burrowing dinosaurs at National Geographic News and Science Daily.

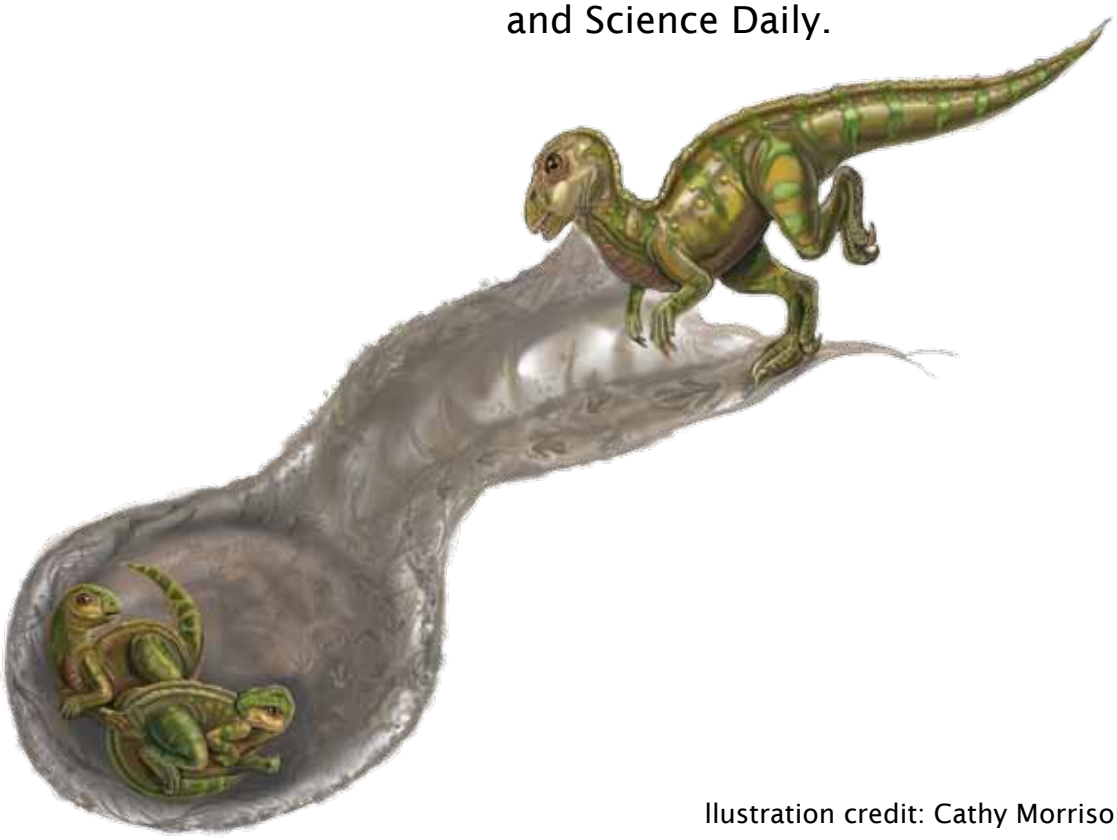


Illustration credit: Cathy Morrison

Nesting Evidence

Fossils of birds sitting on nests of eggs have been found in Mongolia.

Other fossilized nests (*Maiasaura peeblesorum*) show older young sharing a nest with younger hatchlings. This may mean that parents cared for the young for some time before they left the nest, much the way birds do today.

Fossil remains of an adult *Psittacosaurus* were found with numerous young.

Troodon males likely tended their large nests of eggs.

Dinosaur's closest relatives, birds and crocodiles, care for their young today.

Images and Links:

Citipati osmolskae on nest of eggs from the Smithsonian
Maiasaura peeblesorum with nest and hatchlings from Natural History Museum of London
Psittacosaurus adult and young
Live Science Photo Gallery
Troodon male tending hatchlings

A photograph of an adult *Psittacosaurus* and 34 babies found in Laioning Province in northern China in 2003. (Photo courtesy of Jinyuan Liu, Dalian Natural History Museum)

Skin Samples

In 1999, a then young teenager found a hadrosaur, or duckbilled dinosaur, on his family farm in North Dakota. Now a paleontologist himself, he spent several years working with scientists to dig out the dinosaur and to study it.

Caso well preserved that even the skin had fossilized.

They called the dino “Dakota” because it was found in North Dakota.

The way the fossil formed, the skin was preserved much like a mummy.

Scientists are using sensitive medical equipment to scan the mummy and learn as much as they can from this rare find.

Images and Links:
NPR
National Geographic
Wired

The skin of a *hadrosaur*, a dinosaur that lived some 66 million years ago, pokes out of the soil at Hell Creek Formation, North Dakota. Photo credit: Tyler Lyson/Courtesy National Geographic

Scientists uncovered the mummy of a plant-eating hadrosaur, a duck-billed herbivore common to North America.
Photo credit: National Geographic Channel

Feathers

Some dinosaurs, such as *Sinosauropteryx* and *Tianyulong confuciusi*, had early versions of feathers called protofeathers. Others, such as *Anchiornis huxleyi* and *Microraptor gui* were fully feathered.

The four-winged dinosaur *Microraptor gui*, is thought to have glided among the trees. But it is possible that it or other feathered dinos were flying before evolving into the birds we know today.

In 2011, scientists in western Canada found numerous dinosaur feathers trapped in amber.

Scientists in China have unearthed a fuzzy close relative of *T. rex*.

Images and Links:

BBC News
BBC News
TIME for Kids
BBC Science
BBC Nature

feathers trapped in amber
photo credit BBC Science

A close-up view of the well-preserved
feather imprints on the *Microraptor* fossil
Photo credit: American Museum of Natuaral History, M. Ellison

Colorful Critters

Bird feathers (and human hair too) have tiny structures in their cells that carry color. The shape of the structure shows what color it is. For example, a round shape indicates a reddish color. Scientists can see the shapes under a powerful microscope.

Dinosaurs had many colored feathers and patterns—like birds today.

The fully feathered *Microraptor gui* from China had shimmering black feathers, much like those of a crow.

Images and Links:
American Museum of Natural History
Discovery
National Geographic
Wired

A fossilized *Sinosauropteryx*, the first dinosaur to have its colors revealed. Photo credit: Institute of Vertebrate Paleontology and Paleoanthropology, Bejing

Dino Poop

Fossilized dino poop is called coprolite. By studying it, you can tell what kind of diet a dinosaur had, even if you can't often tell which dinosaur left it behind.

At first scientists weren't sure the poop was really poop. But when they found the fossilized remains of dung beetle tunnels in them, they knew what it was. Like today, dung beetles not only ate poop, but they also laid their eggs in tunnels they dug inside it.

One of the few samples believed to be from a specific kind of dinosaur was found in Canada. This mega pile is believed to have come from a *T. rex* and contains bone bits from a plant-eating dino.

Images and Links:
National Geographic
Dr. Karen Chin, dinosaur poop expert

Coprolite, fossil feces, Hell Creek Fm (North Dakota)., Morton Co., length 84 mm.
https://www.dmr.nd.gov/ndfossil/poster/hellcreek/Hellcreekp2.asp

What's for Dinner?

Sinocalliopteryx gigas, was a fuzzy, wolf-sized dino that ate smaller dinos and early birds.

The narrow, crocodile-like snout of Baryonyx walkeri was designed to catch and eat fish. Fish scales and teeth were found in the stomach of one fossil.

The bone of a pterosaur was found in the stomach of a *Velociraptor*. Scientists think the raptor might have scavenged from a dead animal, as it would have been difficult for the much smaller raptor to capture prey as large as the flying reptile.

Finding proof of plant-eating dinos has been tough. But a very well preserved duck-billed dinosaur's stomach contained the remains of more than 40 kinds of plants!

Images and Links:
Sinocalliopteryx gigas ate smaller dinos and early birds
Baryonyx walkeri ate fish
ScienceDaily
Live Science Brachylophosaurus Canadensis, a plant-eating hadrosaur

Artist's impression of a Velociraptor scavenging the carcass of a Pterosaur. (Illustration credit: Brett Booth, Science Daily)

Sound

Parasaurolophus was a type of duck-billed dinosaur that ate plants and lived in herds. It sported a large bony crest atop its head. The purpose of the crest had scientists puzzled.

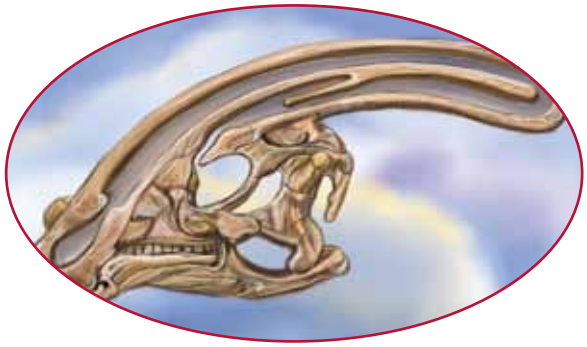
Scientists used medical scanners to see inside fossils of a *Parasaurolophus* skull. Inside the crest were hollow passages similar to the inside of a horn. Using computer simulations, they were able to recreate the sound made when air passed through the crest. You can hear those sounds on the youtube link, below.

Scientists think *Parasaurolophus* used the sounds to communicate with others over long distances.

Images and Links:

Dinosaur Headquarters You Tube Video with Sounds!
Smithsonian blog with You Tube video of sounds
Museum of Life and Science
Sandia National Laboratories

Sound-making horn of Parasaurolophus dinosaur
illustration by Rich Penney,
paleo-artist, Santa Fe, NM.



Life's Tough

Sue is the name of the largest and most complete *Tyrannosaurus rex* skeleton ever found. She lived to be quite old, and her bones show evidence of a very hard life. Sue suffered numerous broken ribs and an injured arm and leg, which scientists think may have happened at the same time. She survived, but suffered later with infections in a leg and in her jaw. In fact, the jaw infection could have been what killed her. As if all that weren't bad enough, Sue also had arthritis!

Images and Links:
The Field Museum, Chicago: T-Rex "Sue" photo gallery of injuries
The Guardian Science (UK)

T-Rex "Sue's" humerus (upper right arm) shows sign of an old injury caused by the triceps muscle tearing off the bone. Scientists don't know what caused the damage, but "Sue" appears to have sustained several injuries from the same incident. Photo credit: The Field Museum, Chicago

Have YOU ever had a broken bone?

Did you see the x-ray? if so, how did it compare to "Sue's" broken bone on the right?

Fighting

Fossils of two dinosaurs fighting came from Mongolia. A *Velociraptor* pinned a *Protoceratops* with its sharp foot claw, but not before it broke one of the raptor's arms. These two may have been trapped in a collapsing sand dune, which buried them so fast that they were "caught in action."

Images and Links:
American Museum of Natural History

Replica image:
Black Hills Institute of Geological Research
http://www.bhigr.com/store/product.php?productid=464#detailed

Sleeping

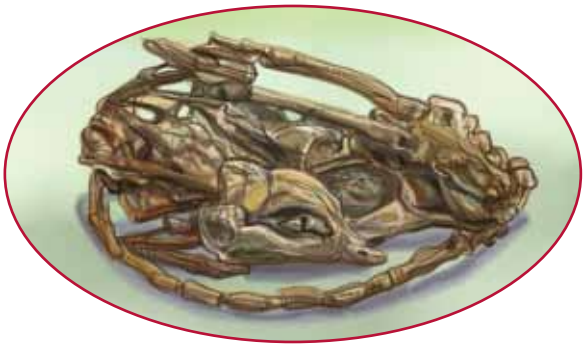
Scientists Xing Xu and Mark Norell found the Mei long fossil in 2004. It is among few fossils that show how an animal behaved. Mei long means “soundly sleeping dragon.”

This feathered dinosaur died in its sleep—either buried by volcanic ash or killed by poisonous gas from an eruption. The animal apparently slept much as birds do, with its feet tucked under its body and its head underneath one wing.

The dinosaur was about the size of a duck and lived about 135 million years ago in the forests of China’s Liaoning (lee-OW-ning) Provence.

Images and Links:
American Museum of Natural History
American Museum of Natural History
National Geographic

Photo and illustration credits: American Museum of Natural History



Tracks

Footprints are trace fossils. Many footprints together form a trackway. They can tell us how large a dinosaur was and give us clues about what the animal looked like. Fossilized footprints can tell us what an animal was doing. There are tracks that show dinosaurs walking, running, slipping in the mud, and even swimming! The shape of the prints also tells us whether the track maker ate plants or meat.

It is rare to be able to identify the species that made the track. If scientists can find a skeleton nearby and compare the foot bones with the tracks, they can make a match. Scientists have identified *Nodosaur, Stegosaurus*, and *T. rex* tracks.

Images and Links:
NASA: DC area tracks
Clayton Lake State Park (NM)
CT Dinosaur State Park
DinoRidge (CO)
Dinosaur Valley State Park (TX)
Morrison Natural History Museum (CO)
Tuba City Dinosaur Track Site (AZ)
Utah State University Museum
Zion National Park (UT)

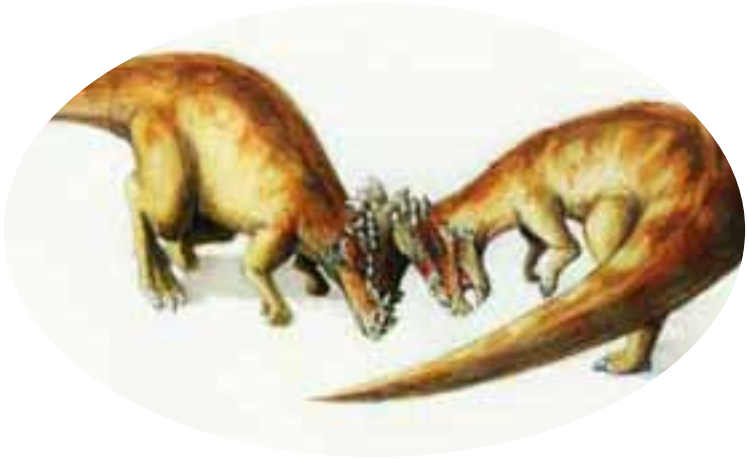
Coral Pink Sand Dunes
Dinosaur Tracks near Zion
National Park in Utah

Head Butting

Studying the skulls of *Pachycephalosaurus wyomingensis* ("thick-headed lizard"), scientists found signs of injury and pitting. They can't say for sure, but think the injuries might have been caused by butting heads similar to the way bighorn sheep do today.

Images and Links:
Smithsonian
Discovery News

A pair of Pachycephalosaurus face off at the Museum of Ancient Life in Utah.



A bison-like head-shoving between two Pachycephalosaurus dinos. Photo credit: University of Wisconsin-Oshkosh, Ryan Steiskal

Birds

Today, most scientists agree that birds descended from dinosaurs. They have many common features, including egg-laying, feathers, hollow bones, and more. Scientists were able to remove the remains of proteins from the *T. rex* fossil. The proteins were most akin to an ostrich and chicken.

Images and Links:
American Museum of Natural History
MSNBC Science News
UC Berkeley

Archaeopteryx is believed to be the world's earliest bird and a descendant of the dinosaurs. The crow-sized creature lived about 150 million years ago. Its feathers and birdlike wishbone — along with reptilian features such as a long bony tail, claws and teeth — are seen as strong evidence that birds evolved from dinosaurs. Illustration credit: Todd Marshall

Science Journal (Vocabulary)

fossil	
my definition	my drawing

track	
my definition	my drawing

trackway

my definition	my drawing

theropod

my definition	my drawing

sauropod

my definition	my drawing

ornithopod

my definition	my drawing

biologist

my definition	my drawing

paleontologist

my definition	my drawing

Dinosaur Math

Scientists estimate that each inch of track from the heel to the toe, equals approximately one foot (12 inches) in length or height of the dinosaur.

- If a baby dinosaur's track was 3 inches, how long or tall was that baby?
- If the mother's track, right next to it was 20 inches, how long or tall was the mother?
- Two trackways appear to have been made by two dinosaurs walking in the same direction at approximately the same time. One track measures 15 inches and the other track measures 22 inches. Which one was the smaller dinosaur? By how much?

We know from observations that running animals make tracks that are four or more times longer than their length. Assuming that the same was true for dinosaurs, scientists can estimate whether dinosaurs were walking or running by measuring both the track size (to get the animal size) and the distance between the prints of the right and left feet.

- If a scientist finds tracks with step lengths three times the track (footprint) length, was the dinosaur walking or running?

Maps: Dinosaurs in the US

North

South

What do you notice about where most of the trackways are located? Are there more trackways in the Eastern US or the Western US?

Are there any dinosaur trackways near where you live?

If so, would you drive north, south, east, or west to get there?

Have you ever been there to see them?

Do you think the trackways mentioned in the book and shown on the map are the only trackways in the United States? Why or why not?

If you wanted to become a scientist and look for trackways, in which of the states or which part of the country would you start to look? Why?

Dinosaurs in the book

Scientists may be able to identify an overall type of dinosaur by the tracks but they can't tell you what specific type of dinosaur made the track. If you were to compare it to footprints today, it would be as though they were trying to identify a panther or a bobcat from just a footprint. Both are cats but they are very different cats. But, just like biologists can make inferences based on knowledge of what animals live in what climate or habitat, scientists can make inferences about what types of dinosaurs made the tracks based on where the tracks or trackways were found.

Looking at the dinosaur images on the next few pages, explain what kind of track you think the dinosaur made and why. Can you draw it?

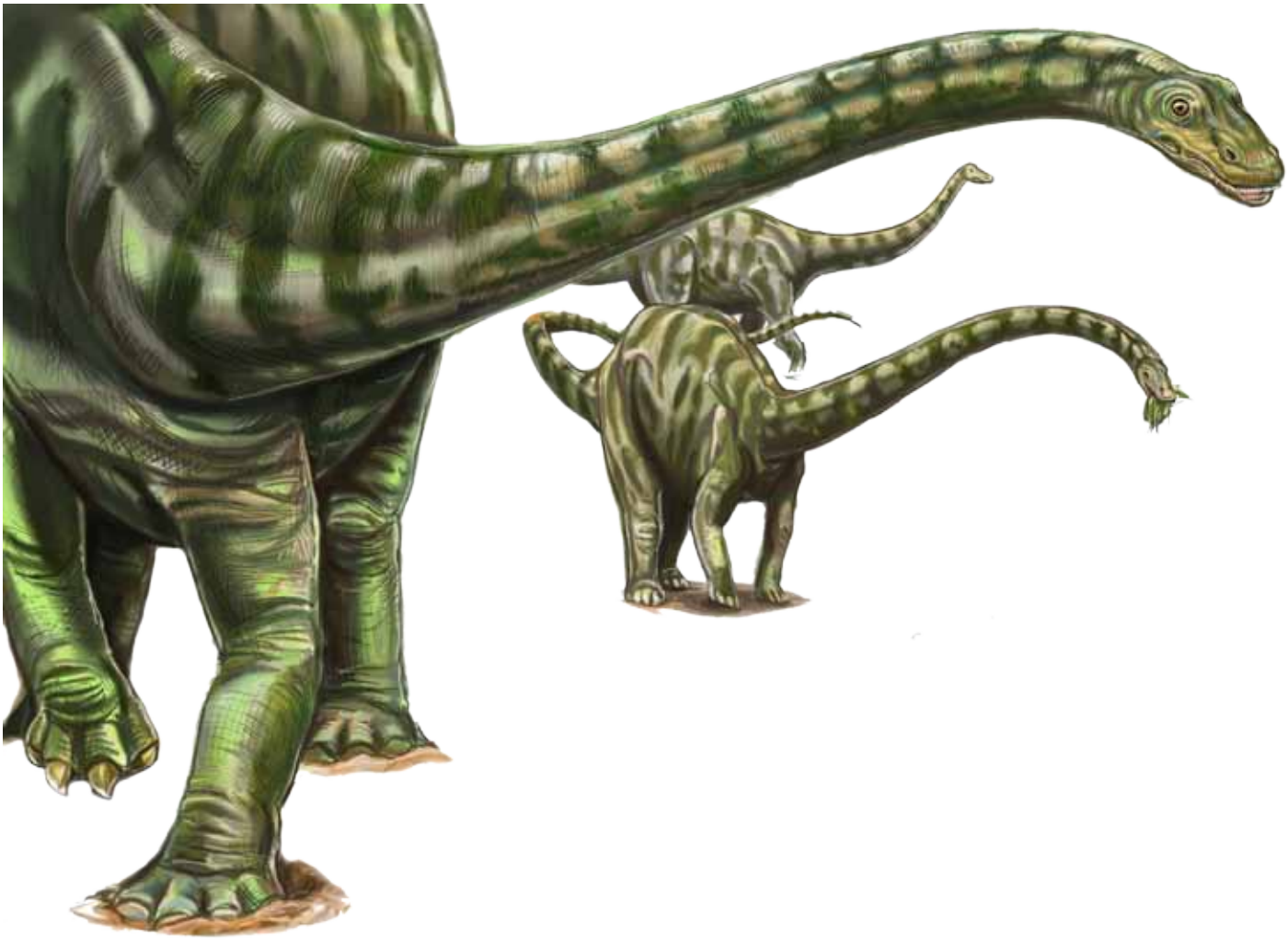
To which group did the dinosaur belong?

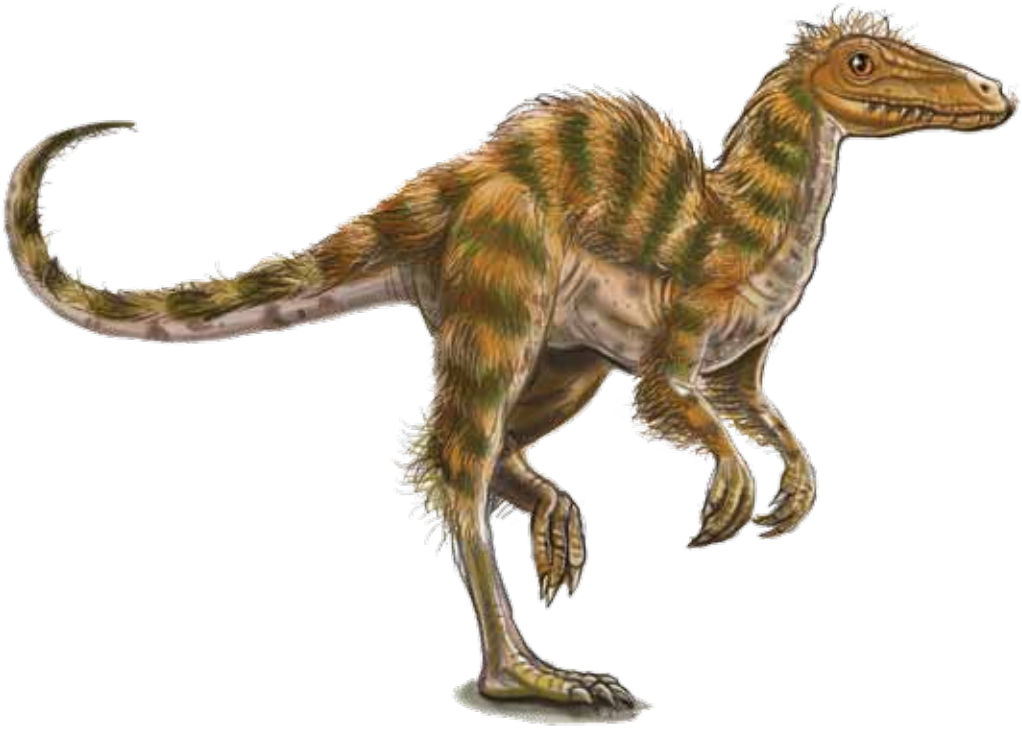
Theropods had sharp teeth, walked on two back feet and had short front legs and feet. These meat eaters left narrow, three-toed tracks with sharp claws.

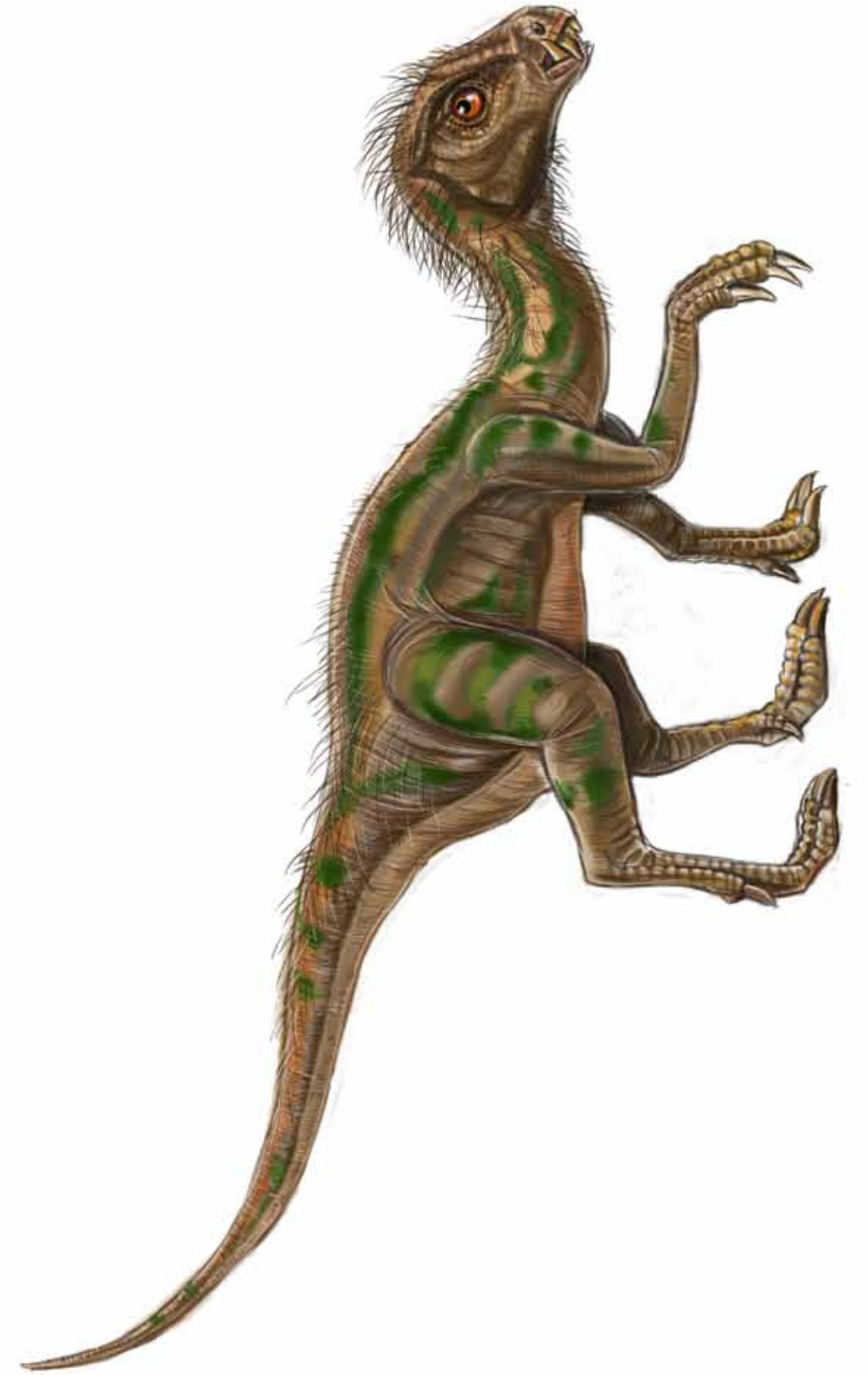
Sauropods had long necks, walked on all four feet, and were plant-eaters. They left two pairs of rounded tracks. The back feet were often much larger than the front feet, so the tracks are different sizes.

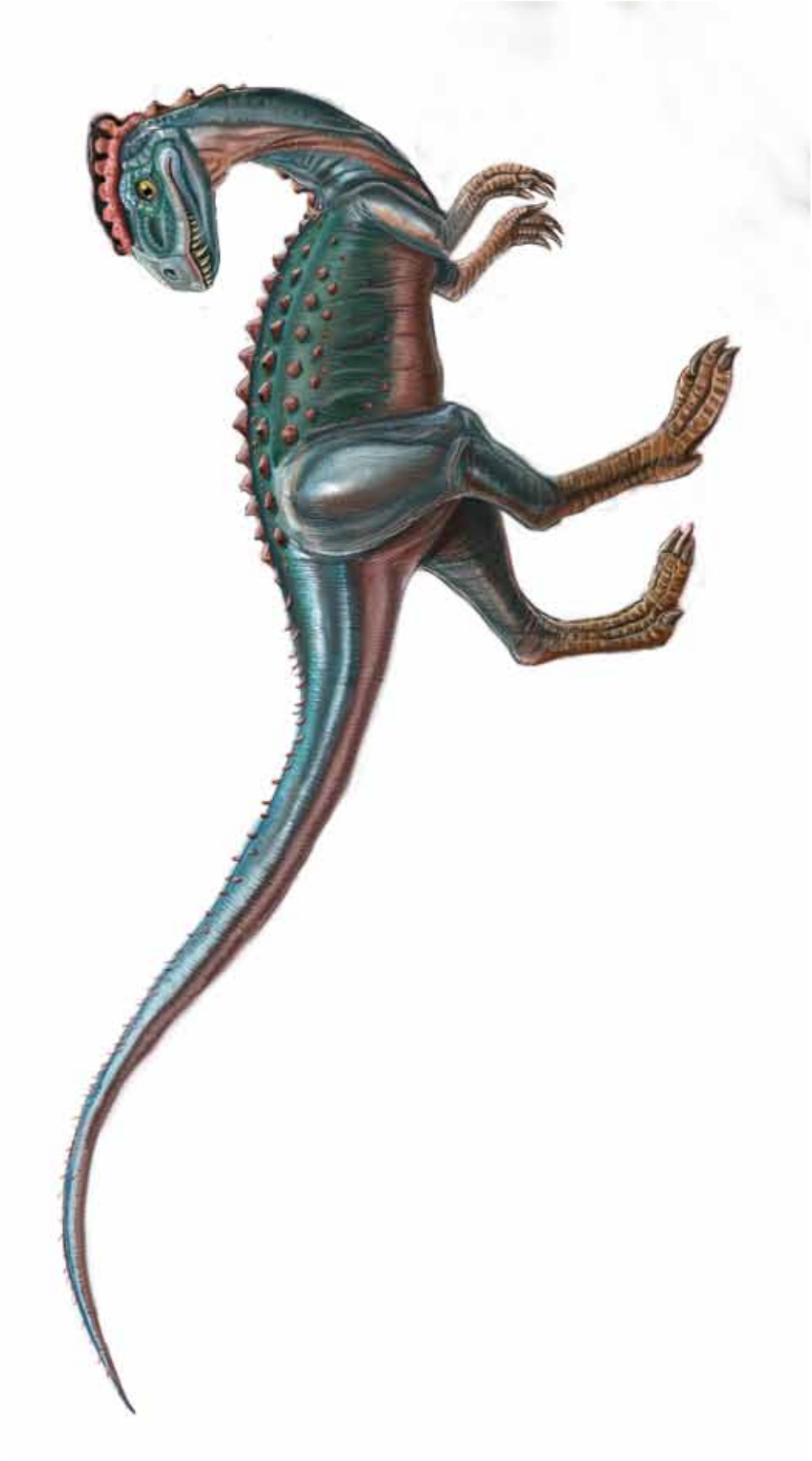
Ornithopods walked on two bird-like feet and were plant eaters. They left three-toed, rounded tracks.

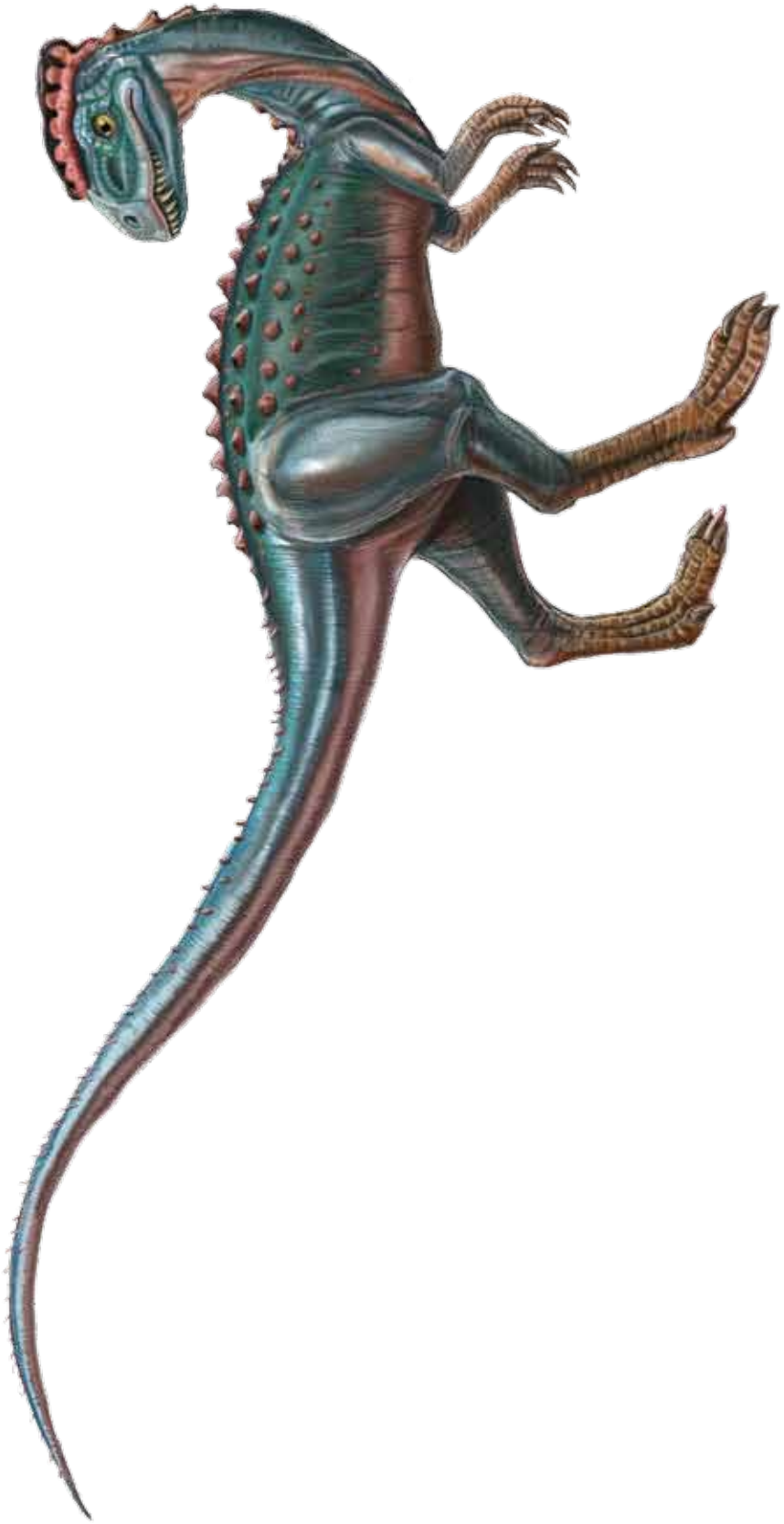
Based on the feet, can you tell whether the dinosaur ate meat or plants?











DINO TRACK-O-LICIOUS COOKIES

1 cup or 2 sticks of butter, softened
1 cup sugar
1 large egg (chicken egg not dinosaur)
1 and 1/2 teaspoons vanilla extract
3 cups of flour
1 and 1/2 teaspoons baking powder
1/2 teaspoon salt

Cream butter and sugar until light and fluffy. Add egg and vanilla extract, mix well.

Combine flour, baking powder and salt in a separate bowl. Slowly add dry ingredients to the butter mixture. Mix well.

Shape dough into a log and place in the middle of a piece of plastic wrap and wrap tightly like a big piece of wrapped candy. Place in the refrigerator for about 1 hour. After it's well chilled slice into round cookies.

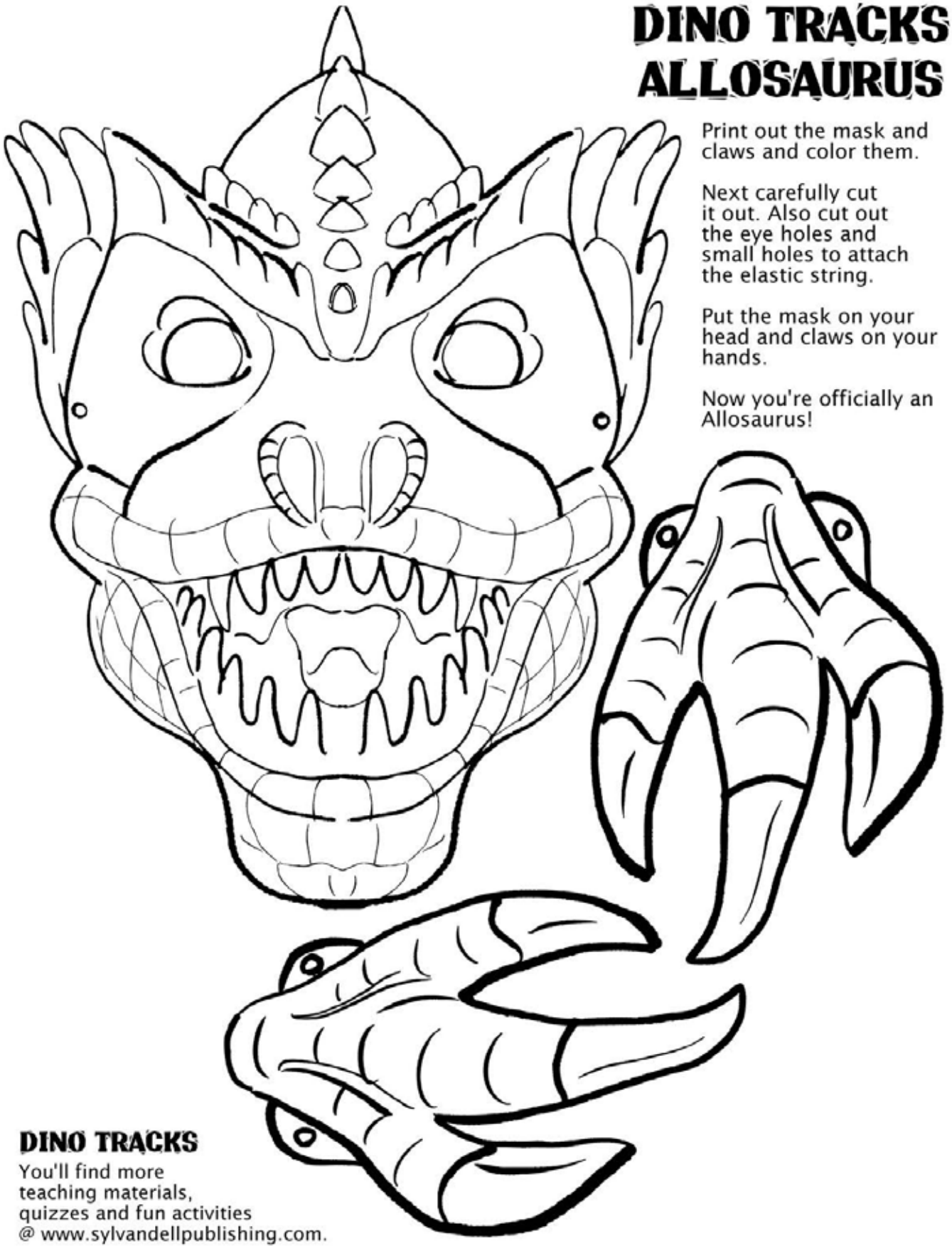
Press a clean dinosaur toy foot into each cookie. The cookie dough will puff up while baking so don't be afraid to make the tracks deep. Sprinkle with sugar and cinnamon. The more cinnamon, the more they will look like dino tracks in the dirt.

Bake at 350 degrees for about 8 - 10 minutes.

Let them cool a little and EAT! Yum yum.

We found this recipe at:
http://www.dipitinchocolate.net/2012/06/dinosaur-fossil-sugar-cookies-basic.html.
There are details, photos and more suggestions on their website.

DINO TRACKS
ALLOSAURUS



Print out the mask and claws and color them.

Next carefully cut it out. Also cut out the eye holes and small holes to attach the elastic string.

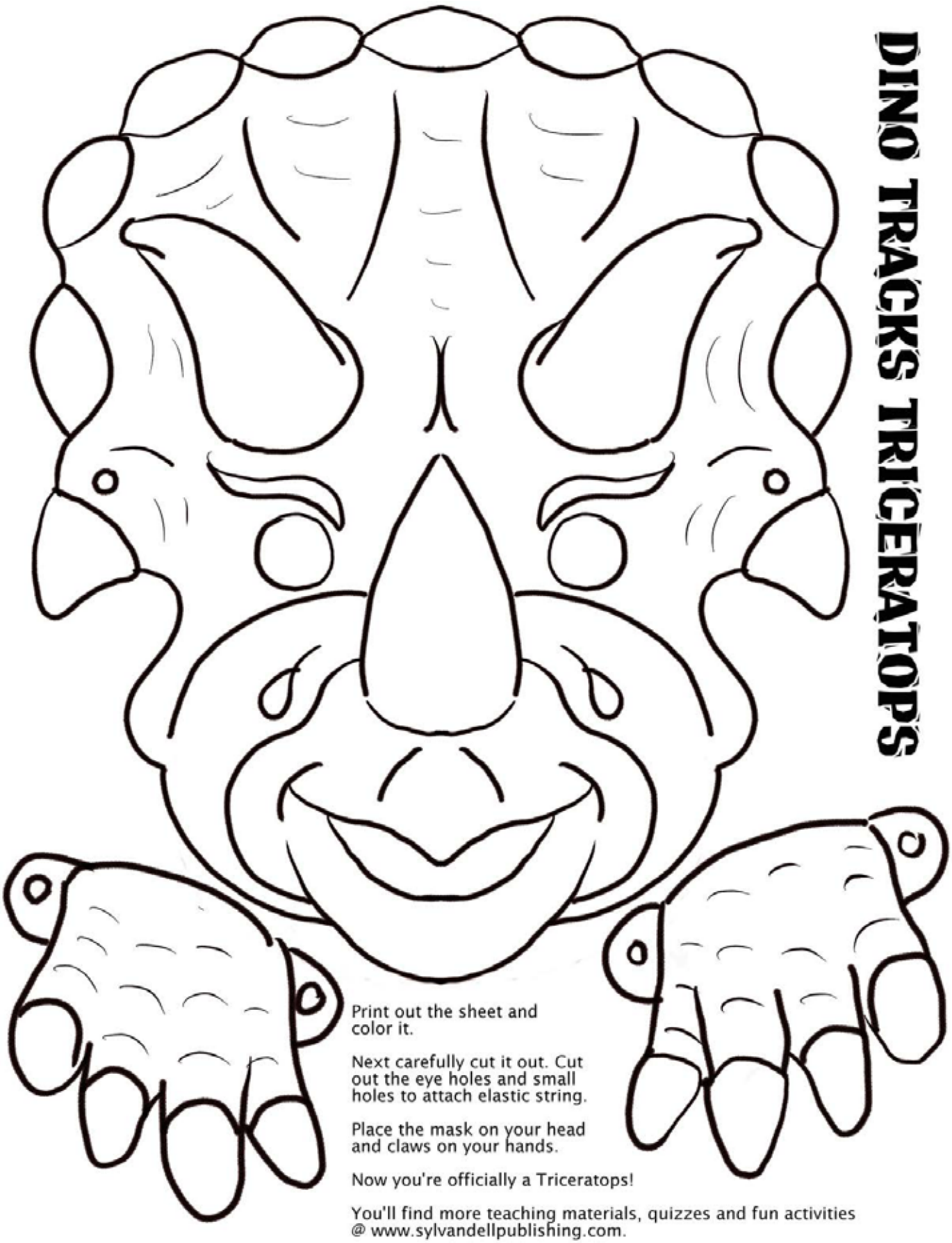
Put the mask on your head and claws on your hands.

Now you're officially an Allosaurus!

DINO TRACKS

You'll find more teaching materials, quizzes and fun activities @ www.sylvandellpublishing.com.

DINO TRACKS TRICERATOPS



Print out the sheet and color it.

Next carefully cut it out. Cut out the eye holes and small holes to attach elastic string.

Place the mask on your head and claws on your hands.

Now you're officially a Triceratops!

You'll find more teaching materials, quizzes and fun activities @ www.sylvandellpublishing.com.

DINO TRACKS
ALLOSAURUS

Print out the mask and claws.

Next carefully cut it out. Also cut out the eye holes and small holes to attach the elastic string.

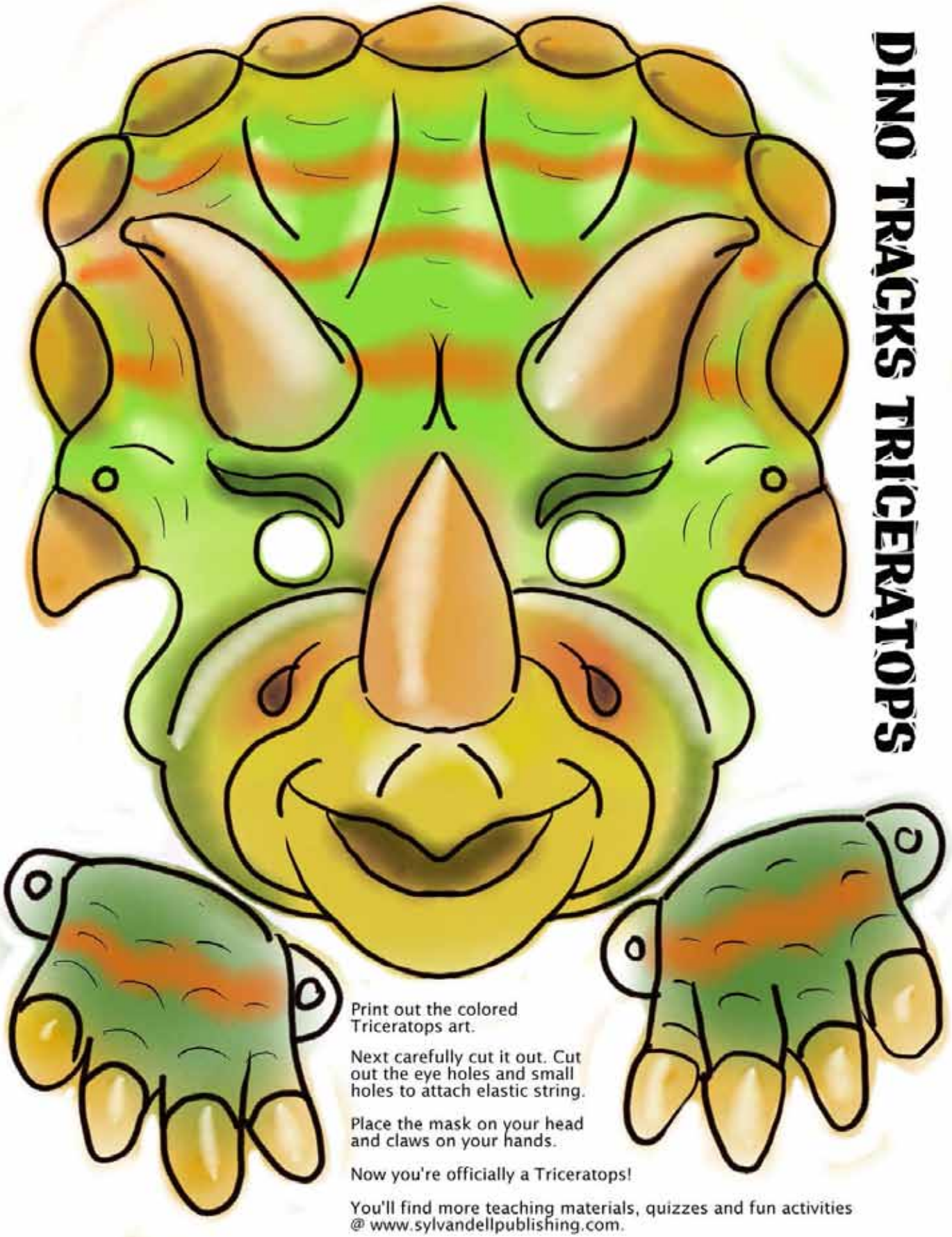
Put the mask on your head and claws on your hands.

Now you're officially an Allosaurus!

DINO TRACKS

You'll find more teaching materials, quizzes and fun activities @ www.sylvandellpublishing.com.

DINO TRACKS TRICERATOPS



Print out the colored Triceratops art.

Next carefully cut it out. Cut out the eye holes and small holes to attach elastic string.

Place the mask on your head and claws on your hands.

Now you're officially a Triceratops!

You'll find more teaching materials, quizzes and fun activities @ www.sylvandellpublishing.com.

Appendix A—"What Children Know" Cards

Question: My answer: This information is correct! This information is not correct; can you find the correct information?	Question: My answer: This information is correct! This information is not correct; can you find the correct information?
Question: My answer: This information is correct! This information is not correct; can you find the correct information?	Question: My answer: This information is correct! This information is not correct; can you find the correct information?