

4th Grade – Monumental Hike

Fall Theme; Discovering Fossils: Change Over Time/Fossils

Class Description

Students will explore the different rock layers in Lower Monument Canyon and learn about past environments of the area on their way to Independence Monument. During the hike students will use fossil evidence from the rock layers to discover how the area has changed.

Location: Lower Monument Canyon

Duration: 4½ hours – 5 miles round trip

Standards Addressed

Science 2.2 – Comparing fossils to each other or to living organisms reveals features of prehistoric environments and provides information about organisms.

Enduring Understandings/Essential Questions

How does fossil evidence help me understand how a specific environment has changed over time?

Vocabulary Addressed

Climate

Fossil

Colorado

Geography

Theme, etc.

Theme:

The rock layers and fossils they contain preserve a record of the Monument's past environments and climates.

Objectives:

- Students will be able to describe 2 past environments of the Monument.
- Students will be able to distinguish between a trace fossil and a body fossil, and give an example of each.
- Students will be able to explain how 1 type of fossil is formed.

Major Concepts:

- what a fossil is, trace vs. body fossils
- how fossils form
- what fossils and rocks can tell us about past environments

Sample Class Outline

Introduction:

We will be hiking up Monument Canyon to Independence Monument, 2.5 miles, general welcome/arrowhead talk...

Stop 1 (in Cottonwoods at mouth of Monument Canyon):

Theme: Bison Fence/Intro to theme of hike

Props: John & Bison, Buffalo Nickel

Tips: Ask students what they think the large fence was for, tell Otto & Bison story, tell them that they'll hear more about Otto at lunch time at Independence Monument (point it out in the Canyon). Ask students/teachers what they know about fossils, tell them that all of the different rock layers and fossils

they contain teach us about what this area was like a long, long time ago...On the hike we'll be looking at the rock layers and fossils to learn more about past environments.

Transition: At our next stop we'll be looking at the sandstone that makes up the cliff walls, on the way think about how sandstone is formed.

Stop 2 (at Wingate sandstone slabs):

Theme: How sandstone forms, Wingate SS depositional environment

Props: SS rock cycle diagram, Sand dunes photo, grallator track/coelophysis photo, grallator track

Tips: What do we need to make SS? How do you think it forms? Touch the sandstone, can you feel tiny layers of sand in it? What do you think this area was like when it was forming? Good...it was a giant desert, with huge sand dunes (show photo)...We find the tracks of lizards and even larger dinosaurs like Coelophysis (See-lo-fi-sis)- (show picture and grallator track)

Transition: We'll have a nice shady rest spot coming up and we'll eat a snack there, on the way think about what you've learned about fossils and the different types of fossils.

Stop 3 (at large shady boulder around the first bend):

Theme: What are fossils? Types of fossils

Props: Allosaurus finger, Plant Fossils, petrified wood, grallator track (real fossils/models)

Tips: Ask students what a fossil is? Go through different types of fossils:

1. Body fossil – *an actual part of a plant or animal that gets preserved (explain how Allosaurus' finger would have been preserved as a fossil)*

2. Trace Fossil - *signs of an animal/dinosaur that are preserved, ask for examples of animal signs (tracks, poop/scat, burrows, etc.) Show grallator track and explain how it would have been preserved*

Transition: Alright, at our next stop we are going to look at a different rock layer, the rocks that make up the dark red hills below the cliffs (point to Chinle across the canyon). Think about what this area was like when that rock was forming.

Stop 4 (at shade tree in the Chinle formation):

Theme: Chinle depositional environment

Props: chinle swamp illustration/ phytosaur drawing, petrified wood

Tips: pick up a piece of the red rock around you, try to break it, does it feel weak? What do you think it's made out of...right, mud! Where would you find a lot of mud? What about in a swamp? (show photo) This rock is made from layers and layers of mud at the bottom of a swamp. What types of animals would you expect to live in a swamp? Alligators, crocodiles, right, (show photo of phytosaur) show them how large his jaws would have been (spread arms)

Transition: We are getting close to Independence and the trail is much easier for the rest of the hike. We have one last layer of rock to talk about, and it's the layer that has tons of fossils in it, and is actually why this area is famous for fossils. It is also the youngest layer of rock in the park, so on the way guess where it might be located in the canyons, at the top or at the bottom?

Stop 5 (at the last corner after the tunnel in the rock):

Theme: Morrison Formation

Props: Morrison environment photo, allosaurus photo, brachiosaurus photo

Tips: Where do you think the youngest rocks are located?...Good, at the top of the canyons, point out the Morrison Formation on top of the cliffs explain that it is the reason this area is famous for fossils, describe environment (show photo) Tell them there were big plant eating dinosaurs like Brachiosaurus and big meat eating dinosaurs like Allosaurus, we don't find a lot of body fossils from these dinosaurs in the Monument because we don't do a lot of digging, but we have found trace fossils like footprints.

Transition: Does everyone understand now how we can use the rock types and the fossils we find to learn about past environments? It's kind of like the rocks here all tell us a story, pretty neat huh? Ok...We have a little farther to go, but when we get to the base of Independence it's lunch time!

After Lunch Activities/Lesson (at the base of Independence)

Lay out all the fossil pictures and props on the ground away from Declaration rock. You will be doing 3 activities, the easiest way is to start all together for story time, have students climb up on the rock, then have them look at fossil props afterwards. If it's a particularly large group, you may want to split into 2 groups and have them do the Declaration Rock Climbing & Looking at fossils separately so it's easier to manage.

John Otto Story Time

Theme: John Otto History

Props: variety of John Otto pictures; Wedding, Climbing/SAR on 4th of July, Leading Tours, etc. all of the

Tips: Have students in a large group in an area where you can see Otto's route up Independence (if you look at the west-facing side of the Monolith, Otto's route follows the diagonal crack up to the large V-shaped gap near the top of the monolith). Tell a few stories about John Otto & his patriotism, climbing Independence story & wedding story are good ones, show photos.

Transition: *John Otto did another funny thing to show how much he loved America...he carved last sentence of Declaration of Independence into the big boulder next to you. In a minute, we will be climbing up on the rock to look at the carving (if you want to). These are the words you are looking for....*

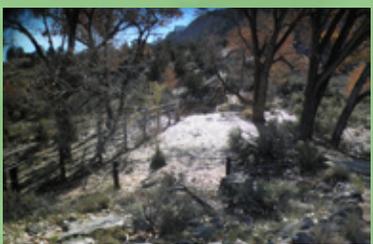
And for the support of this declaration with a firm reliance on the protection of divine providence, we mutually pledge to each other our lives, our fortunes and our sacred honor.

John Hancock

Checking out carving on Declaration Rock

Tips: Have students get in a single file line behind the rock steps on the east side of the boulder. Position a few chaperones near the steps to offer their knees for students to use to climb up onto the rock. Have at least one chaperone on the left (looker's left) side of the rock to help students jump down off the rock. Ranger should climb up before any students. Then have 5-6 students get up at a time to check out the carving, do not let them step or sit on it (so we can help preserve it). May need to explain that this is historic since it's over 100 years old and was made by the park's first ranger, but we shouldn't carve into rocks today, can have students find some graffiti on the rock. Have students climb down off the rock to the right (looking down the rock) Then have next group come up until all students who want to climb up have done so. After Declaration Rock have the students go look at the fossils and props from the hike.

Stop 1 Cottonwoods



Stop 2 Wingate Slabs



Stop 3 Shady boulder Snack

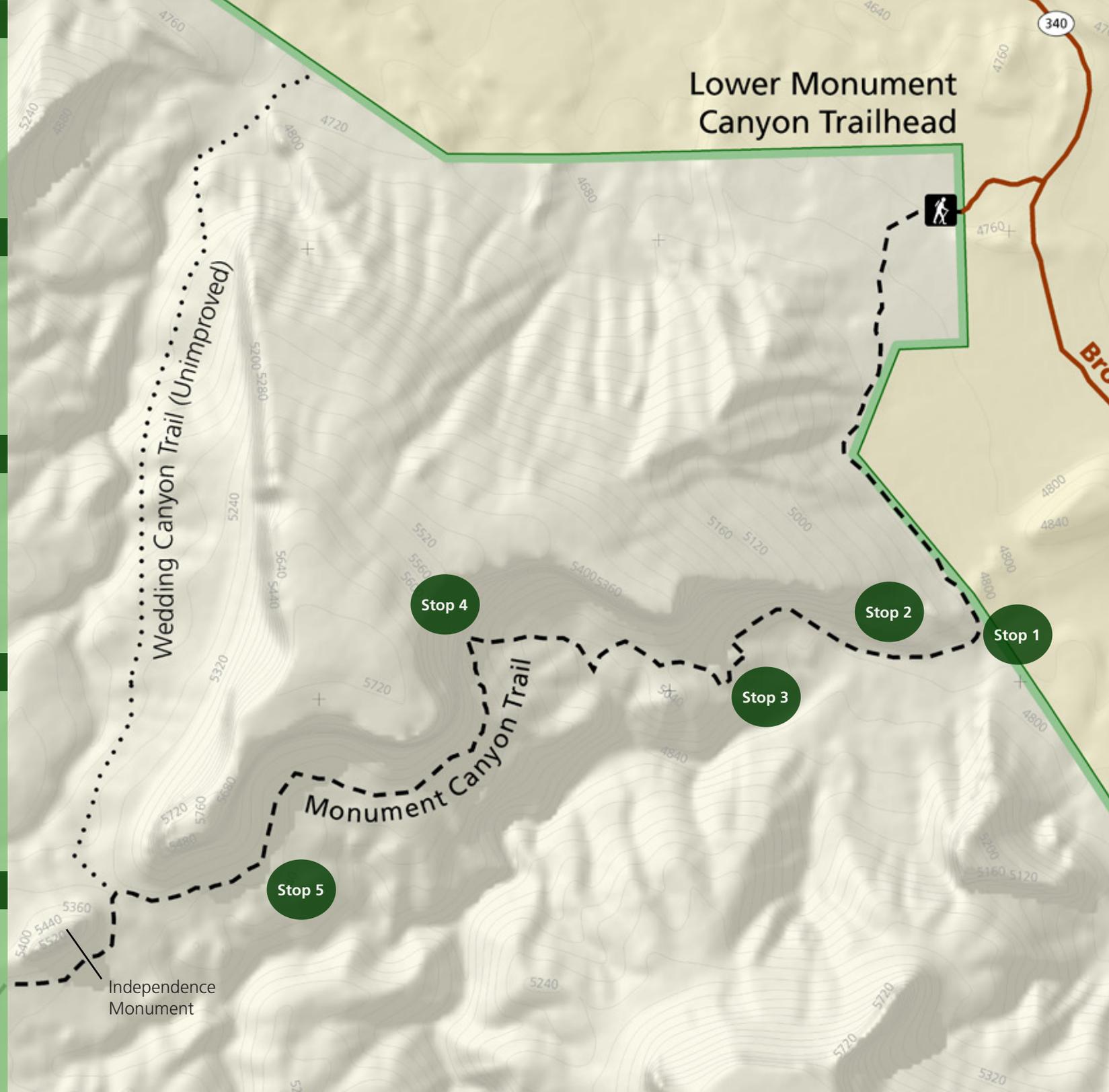


Stop 4 Chinle shade tree



Stop 5 Last Corner

Need a photo

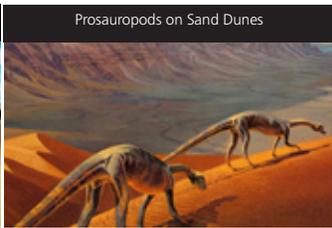
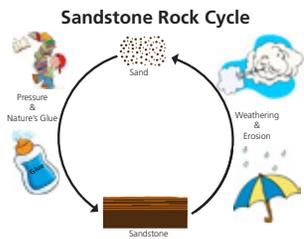


4th Grade - Monumental Hike - Fall Theme (Fossils) Props & Stops

Stop 1 - At Cottonwoods at the mouth of the Canyon



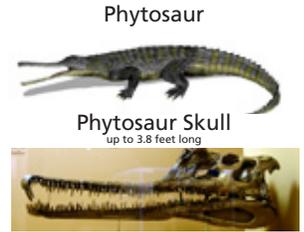
Stop 2 - At Wingate Sandstone Slabs



Grallator Track



Stop 4 - At shady tree in the Chinle Mudstone



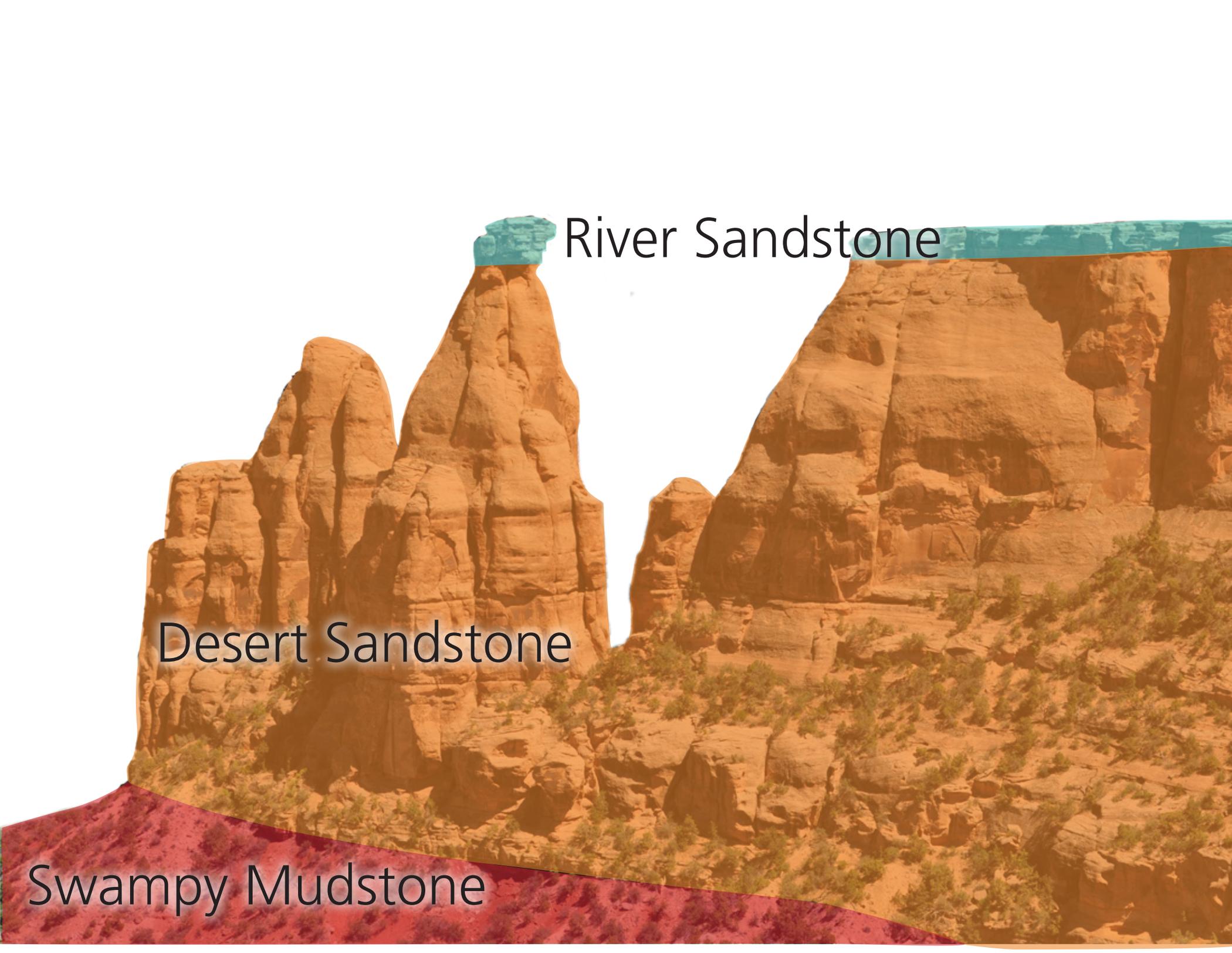
Stop 5 - At the last corner after the tunnel



4th Grade Monumental Hike Fall Theme - Fossils





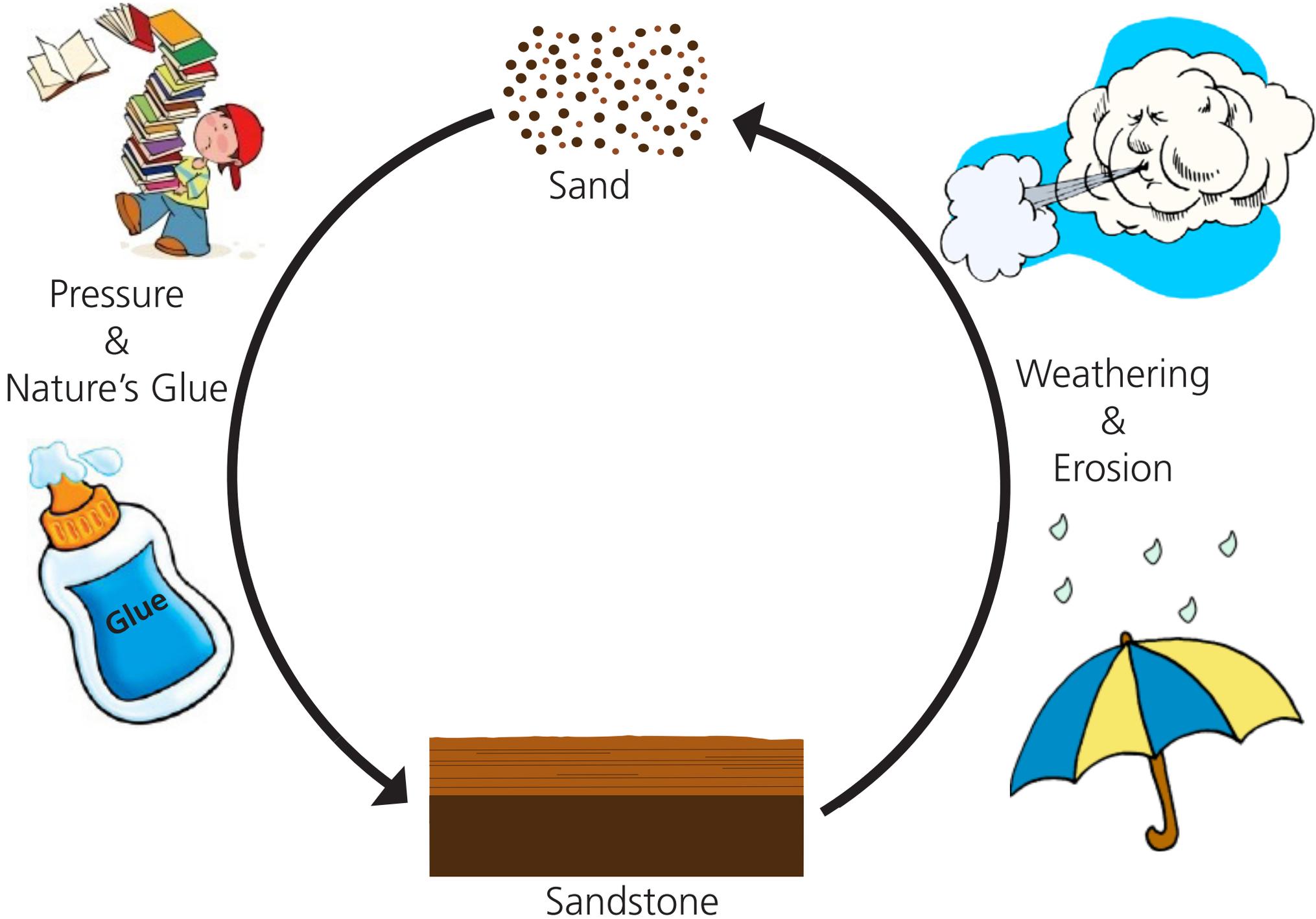


River Sandstone

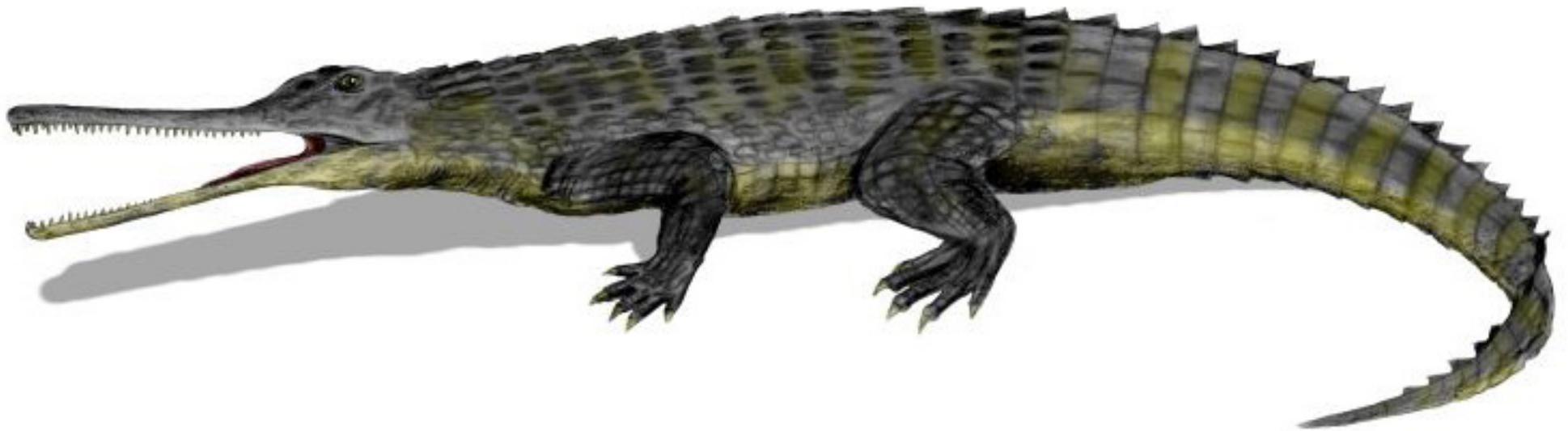
Desert Sandstone

Swampy Mudstone

Sandstone Rock Cycle



Phytosaur



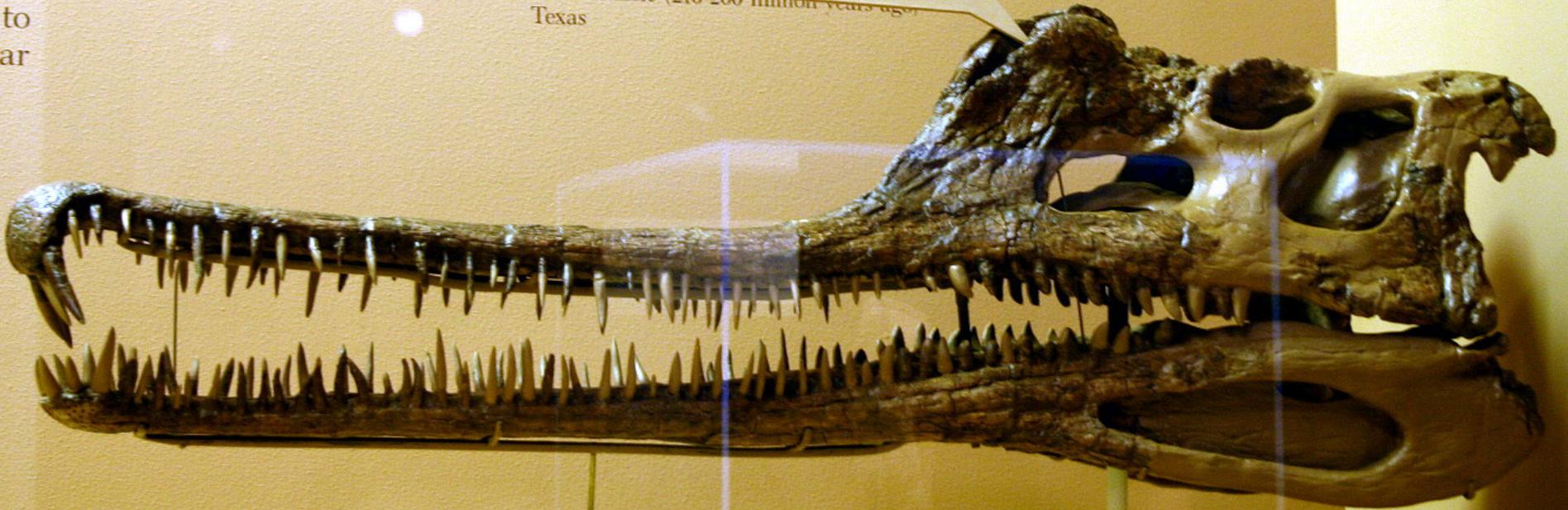
Phytosaur Skull

up to 3.8 feet long

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Phytosaur skull
Late Triassic (210-200 million years ago)
Texas

External nostrils



Swampy Mudstone



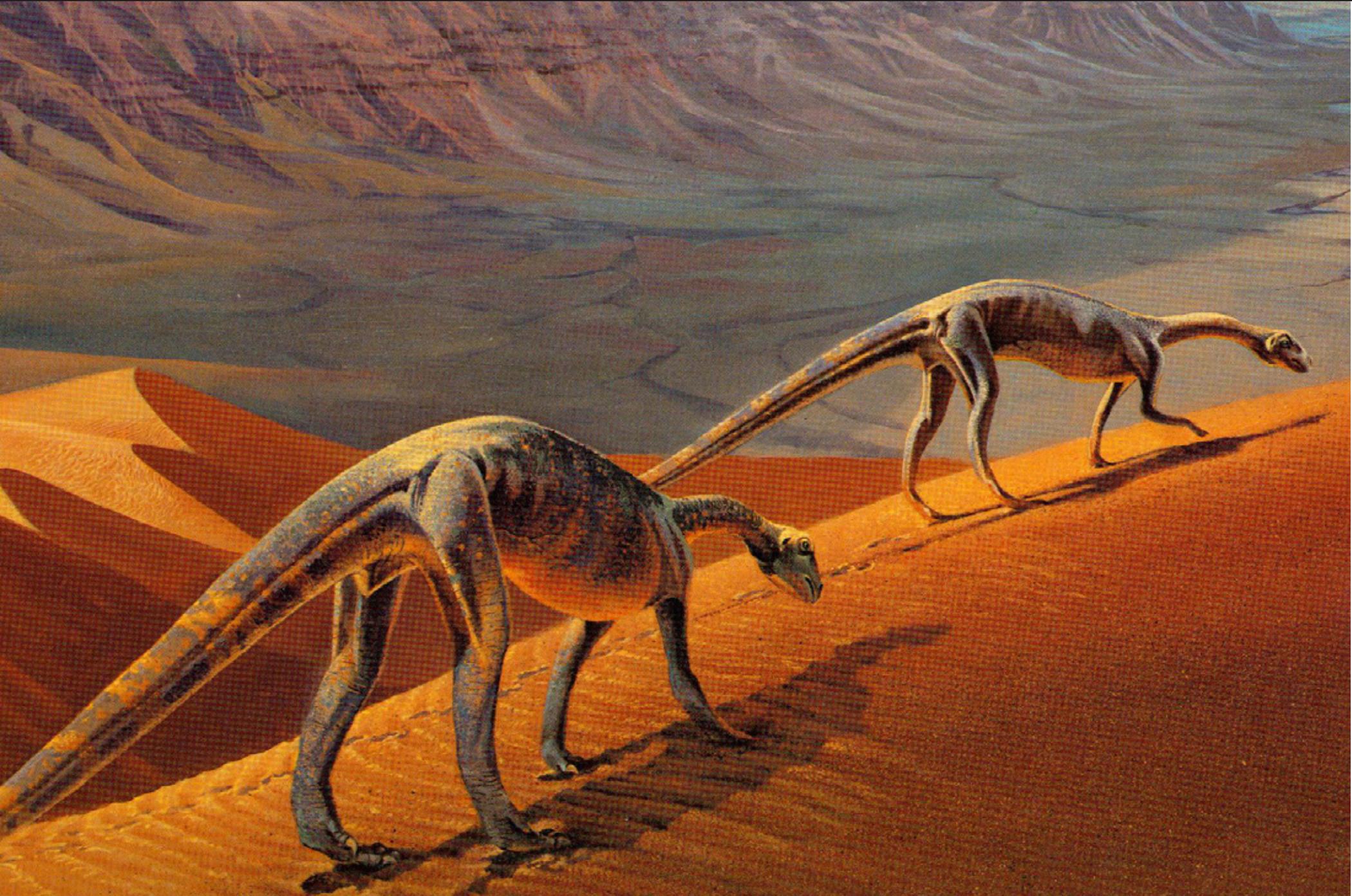
Swampy Mudstone



Desert Sandstone



Prosauropods on Sand Dunes

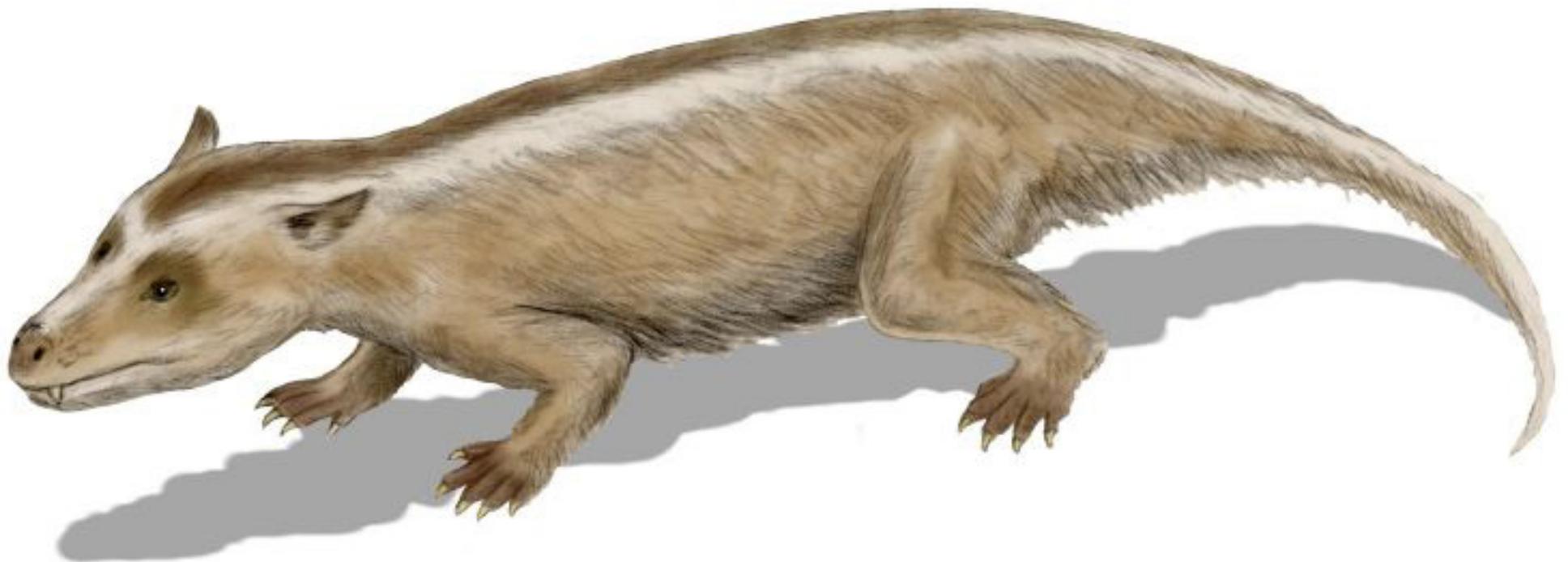




Grallator Track



Tritylodont



River Sandstone



Morrison

(Land of the Dinosaurs)







Allosaurus

Brachiosaurus







R. Hall
'01



Independence Monument





John Otto's Wedding