Fossils In North Dakota

FIND is a newsletter dedicated to helping young readers (in age or spirit) express their love of fossils and paleontology, and to help them learn more about the world under their feet. Each issue will be broken up into sections including Feature Fossils, Travel Destinations, Reader Art, Ask Mr. Lizard, and more!

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https://www.dmr.nd.gov/ndfossil/kids/

Feature Fossil: *Stylemys nebrascensis*

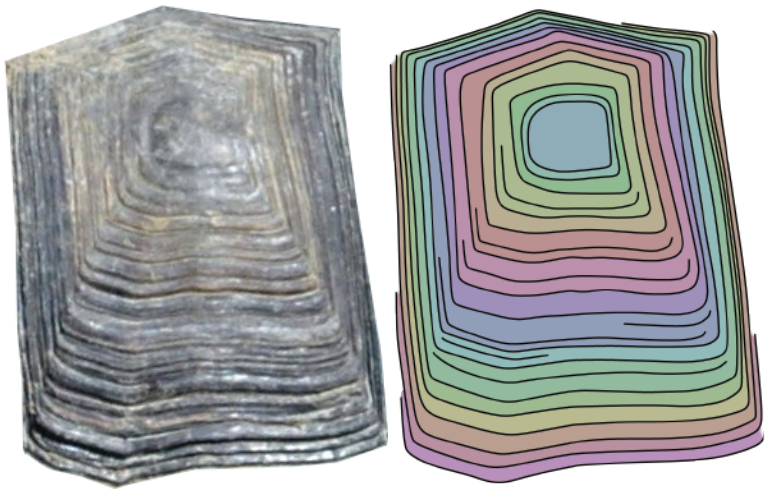
Stylemys is a tortoise found from the Oligocene (23-34 mya) rocks of North Dakota, surrounding states, Europe and Asia. It was first described by Joseph Leidy in 1851, and North Dakota has the species *Stylemys nebrascensis*. It has been compared with the living gopher tortoises, and probably had a similar lifestyle of eating plants – however the arms of *Stylemys* were a little different, so it probably didn't dig the tunnels that gopher tortoises are named after. The name *"Stylemys"* comes from Greek origins, with **stylos** meaning pillar or column, and **emys** meaning tortoise or turtle. "Mys" in Greek means mouse – so if you're not careful with the translation, you might think it means "pillar mouse!"

A tortoise is in the order of animals called Testudines, along with turtles. Tortoises are divided out from turtles into the family **Testudinidae**. One of the differences is unlike turtles, a tortoise lives on land rather than land *and* water. They are reptiles like snakes or crocodiles, but don't have any teeth – they have a sharp beak instead to snip and crush plants. The first turtles evolved back in the Permian, about 260 million years ago. These first turtles still had teeth, and primitive shells.

Stylemys from the Oligocene mural at the Heritage Center in Bismarck, ND.

Stylemys has a **carapace** (upper shell), and a **plastron** (lower shell) that act together like armor to help protect these tortoises from predators. What we see in living tortoises when we look at the carapace is the outer keratin covering, called "scutes" that grow on top of the bone shell. The shell is modified from the ribs and backbone of the animal, with everything flattened and fused together. One scute may overlap two ribs and part of a backbone – staggered, kind of like how you would build a wall out of LEGOs, for added support. As the tortoise grows, so does the bone and keratin. Bone is a **dynamic** (active) tissue in your body, that responds very well to stresses and breaks. It can heal itself, and reform as needed to battle stress. Part of that stress means growth! As you grow, your skeleton gets bigger; so does the skeleton of a tortoise. The keratin on the outside of the shell is a hard, horn-like covering, which once deposited doesn't change much except due to abrasion or weathering. Bone has blood vessels and nutrients to rebuild itself – keratin doesn't. Just look at your fingernails or hair – if you break a nail, or cut your hair, you just have to wait for more to be produced by your body (through a nailbed or hair follicle). It doesn't grow from the outside (dead) end – it grows from the base, where your body has all those blood vessels and nutrients.

As a tortoise deposits more keratin on a scute, depending on how much good food or water there was available will determine how much material is added.

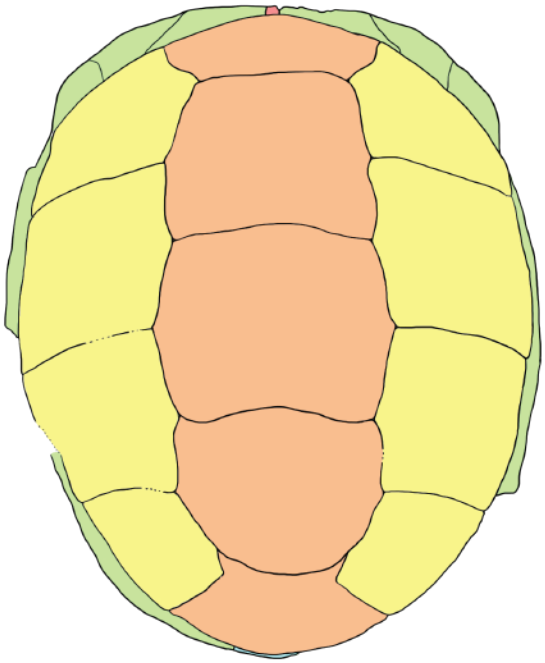


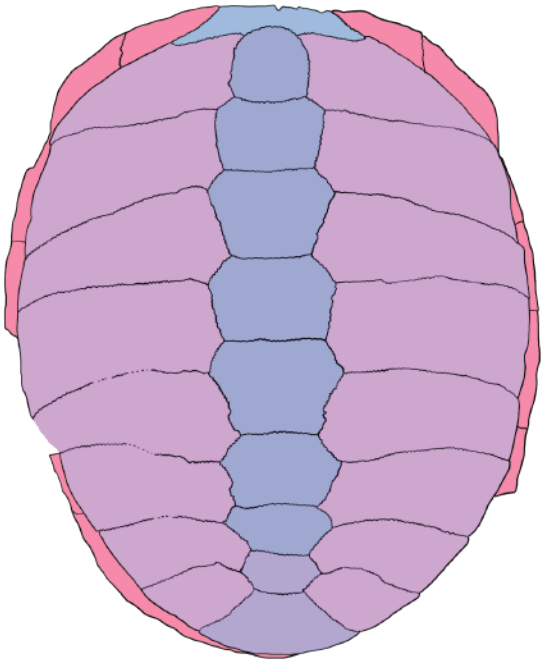
Left: scute from a gopher tortoise
Right: scute color-coded with rings - how many rings do you count? How old to you think this tortoise is?

Scutes end up looking like a cross-section of a tree, with many rings. At first you might think this is a great way to tell how old an individual is, but it's not quite as easy as it looks. It would give you a good starting point, but it's not 100% accurate. If there were years of plenty all in a row, then maybe one big rings is deposited. If there were spurts of plenty, interrupted by drought or poor food, then you may get two or three small rings all in one year. And, as a tortoise gets older, their shells take damage and wear, and some of those rings might get sanded or worn off.

Take a look at the *Stylemys* carapace at right. On the outside of the shell (top left) you can see the sutures (seams) between the bones as well as the imprint where the scutes used to be. The scutes are more of a soft-tissue structure, so don't fossilize easily, but their trace remains - kind of like a fingerprint! The top right drawing shows where the scutes would have been - notice how they overlap multiple bones for support? The bottom left drawing shows which bones are where. If you look at the bottom right photo of the underside of the carapace, you can see how the vertabrae running along the midline are actually fused into the shell.

This brings us to a question: where are the shoulder blades? If you wiggle your shoulders around, you can feel your scapula (shoulder blade) on the *outside* of your ribs. But a tortoise's ribs are all fused together! Yes, turtles and tortoises have their scapulae on the *inside* of their shell.





proneural (neck)
neural (vertebrae)
suprapygal (tail)
pleural (rib)
peripheral

nuchal (neck) scute
central scutes
costal (rib) scutes
marginal scutes
supracaudal (tail) scutes

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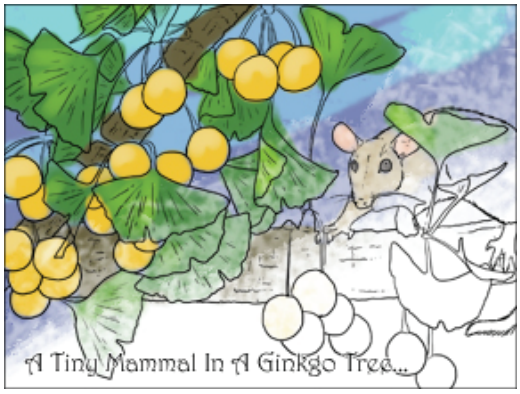
12 Days of Cretaceous

If you're looking for something fun to do at home or in your classroom - please feel free to download and color our "12 Days Of Cretaceous" - a fun prehistoric critter-filled journey inspired by the classic 12 Days of Christmas. Take a photo or scan your finished product, and we'll stick your masterpiece up on Social Media for the world to "oooh" and "aaah" over!

https://www.dmr.nd.gov/ndfossil/paleo_primer/



2020 Public Fossil Dig Updates

It's never to early to start planning for future fossil digs! We have our dates set, and we've made a few changes, which we'll outline below:

Ages & Half-Days: our age minimum for half-days is still at 10 years (with a registered adult), however our full-day age minimum has been raised to 15 years. This is to help keep our fossils AND our diggers safe. We just found that a full day was just too long for most 13-14 year-olds, and we're trying to be fair. We also found that a full day was just too long for some adults too! So we're now including "adult" half-days (ages 15+) on some of the digs.

Dickinson Area: this site has been worked HARD for the last number of years, and needs to "rest" to allow Mother Nature to do her thing, and erode out new fossils. The Dickinson dig will not be visited this year. Don't worry - it'll be back in future years.

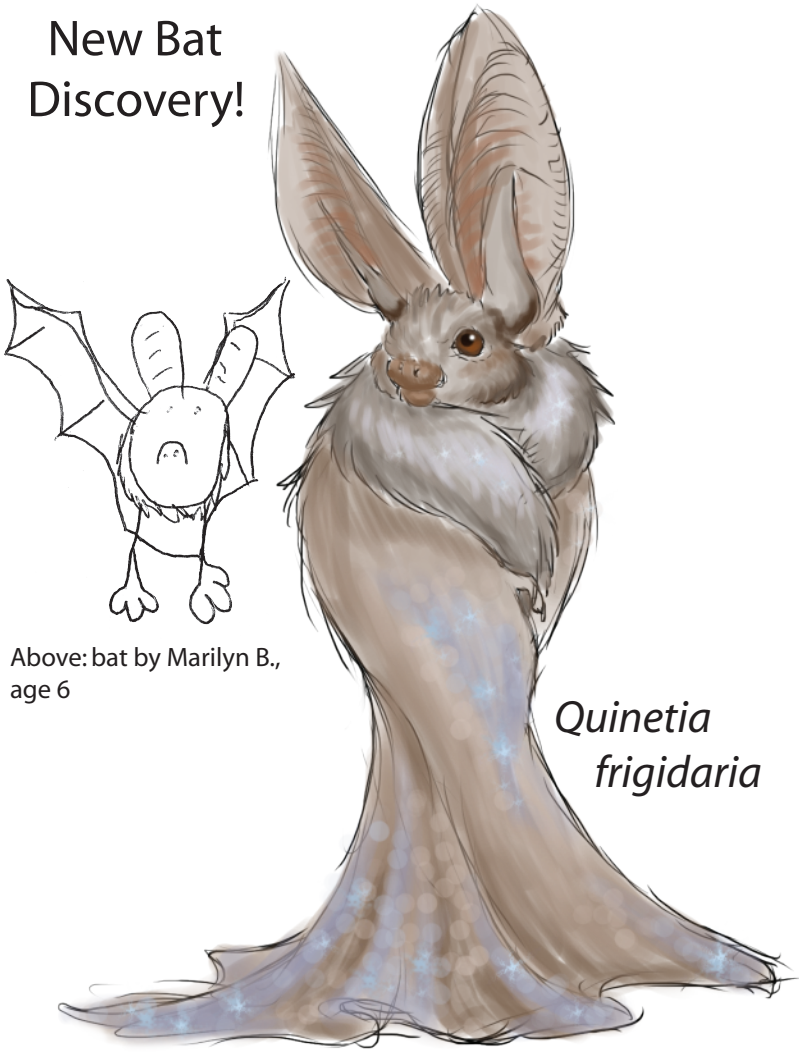
Medora: June 18-28th, with family half-days on the 19-21st, and adult half-days on the 27-28th.

Bismarck: July 6-31st, with family half-days on the 10th, 17th, and 24th. We spent a lot of weekends in the Field during 2019, so to cut down on some of the mass of Comp Time (and give OUR families a break), we will not be including weekends on this dig for 2020.

Pembina: August 7-16th, with family half-days on the 8th and 15th, and an adult half-day on the 16th.

www.ndgsdigs.eventbrite.com

New Bat Discovery!



Above: bat by Marilyn B., age 6

Quinetia frigidaria

We recently described a new species of extinct bat from North Dakota based on a partial upper jaw with teeth: *Quinetia frigidaria*. This species lived about 30 million years ago in the area south of Dickinson, North Dakota. The bat fossil record during this time in North America is very poor, making this an important new discovery. The species name "frigidaria" mean "of cooling" in latin, referring to the fact that the climate in North America during this time was becoming cooler and drier that it was earlier. This species is closely related to a species of extinct bat known from Europe, *Quinetia misonnei*, and is part of the group of living bats that includes the long-eared bats.