

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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Editor: Becky Barnes
North Dakota Geological Survey
600 East Boulevard
Bismarck, ND 58505

becbarnes@nd.gov

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



Feature Fossil:

Pembina Mosasaur

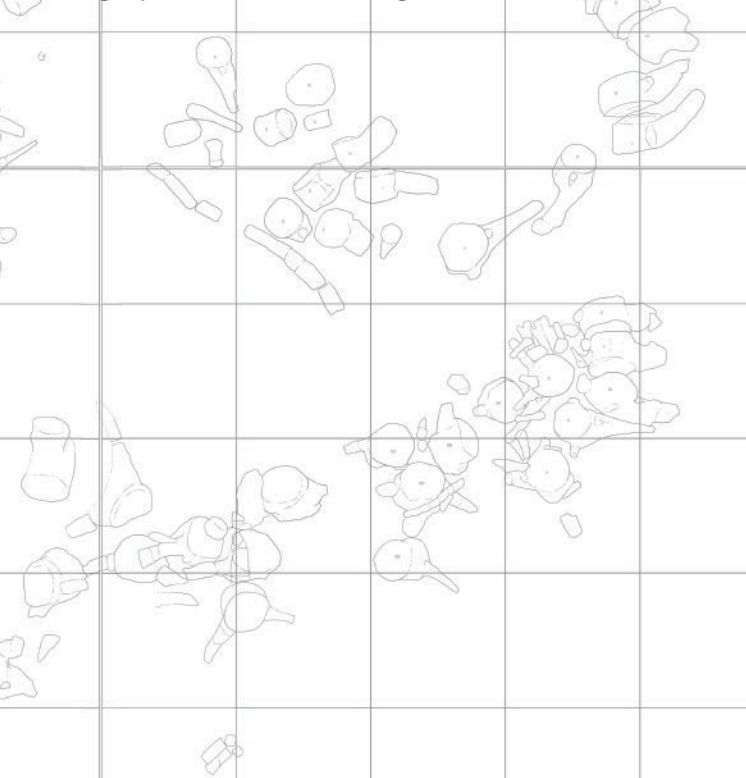
The last few summers we have been working in the Pembina Gorge, up in the northeastern part of the state, uncovering a mystery mosasaur. We won't know what type it is (so we can't say *Plioplatecarpus* or *Clidastes*, for example) until we uncover more of the skull and arm bones. So what is a mosasaur? They are large marine (ocean-dwelling) reptiles, related to varanid lizards still alive today like the komodo dragon or monitor lizards. You could almost think of a mosasaur as a giant komodo dragon with flippers.

Their name comes from both Latin and Greek, with "mosa" referring to the Meuse river, where the first animals were discovered; and "sauros" meaning 'lizard'. While their ancestors may have appeared lizard-like, mosasaurs were fully adapted for life in the water. Their limbs were modified into four great flippers, and their tail ended in a fluke, resembling a shark. This last feature is a relatively new discovery. While mosasaurs have been found since the late 1700s, they were usually reconstructed snaking and sinuous, in a more eel-like fashion. In 2008 a mosasaur was discovered, and described in 2013, which had imprints of soft tissue – including a tail fluke! Read more about the discovery here:

<http://www.nature.com/ncomms/2013/130910/ncomms3423/full/ncomms3423.html>

The mystery mosasaur from the Pembina Gorge seems to have average sized-vertebrae, when compared to the *Plioplatecarpus* that is currently on display in the Underwater World of the Adaptation Gallery: Geologic Time. The preservation of the fossils is completely different. The *Plioplatecarpus* is dark brown in color, rich in iron, and heavy. The mystery mosasaur is flaky and dirty-white, very soft and fragile due to the high gypsum content found in and around the fossils. Gypsum is what is used to make plaster, a common building and craft material. The dirt surrounding the bones, called matrix, is called "Pierre Shale" – also very soft and flaky. It can be difficult to safely remove bones because of how crumbly both bone and matrix is. So, we end up making many plaster casts around the bones, called "jackets," to transport them back to the lab. Once there, we can work on the bones in a safe atmosphere, where we can take the proper time to clean and preserve the fossils.

Below, you can see a partial quarry map that we have drawn as we find and clean the skeleton. This way, we have a record of where the bones were found if we try and put the animal back together again. Each small square represents 20cm, with five in a row making up one of our meter grids.



Special Interest:

Public Fossil Digs

This year we have five public fossils digs available for people to participate in. Some are easy, some require a lot of effort, but all offer great opportunities. We try to take weather into consideration when we plan the dig dates, in order to avoid spring rains or scorching heat. Most of the time we're lucky, but sometimes Mother Nature has other plans! For more information on the digs, please visit:

<https://www.dmr.nd.gov/ndfossil/digs/digs.asp>

June 22-26th: Bismarck Area Dig (day minimum)

We say "area" because we will be starting and ending the day in Bismarck, but traveling to surrounding locations. Depending on the weather, and the concentration of fossils at different locations, our destinations may shift. This year, our site(s) could be a 67 million year old dinosaur site, a 50 million year old crocodile site, a 30-40 million year old mammal site, a fossil leaf site, or somewhere completely new.

July 7-11th: Marmarth dig (week minimum)

This dig is co-sponsored by the NDGS, the US Forest Service, and the Marmarth Research Foundation. These areas are one of the few in the state that are home to dinosaurs. We will be working in the Hell Creek Formation, which was during the last gasp of dinosaurs before they went extinct, some 65 million years ago. While dinosaurs tend to be the largest things found, they are not necessarily the most common. Other creatures that lived during the same time, including crocodiles, turtles, fish, and plants, are also found frequently. This is a great week-long opportunity for those looking for a challenge, and up for hiking in rugged terrain. During the evenings, or if the weather is poor, you can learn to prepare fossils in the MRF paleontology laboratory in Marmarth.

July 20-26th: Pembina Gorge dig (day minimum)

This dig is co-sponsored by the NDGS, North Dakota Parks and Recreation Department, and Walhalla Economic Development. We will be returning once again to the beautifully scenic Pembina Gorge in our ongoing search for sea monsters. This Pierre Formation location, 80 million years old, holds some of the oldest surface rocks in North Dakota. This was a time when North Dakota was covered with the Western Interior Seaway, and was home to great swimming reptiles called mosasaurs, giant squid, sea turtles, aquatic birds,

large (and small) fish, snails, clams, and more. These past few years we have been slowly uncovering the partial skeleton of a mosasaur, and hope to find more yet.

August 3-9th: Medora dig (day minimum)

This dig is co-sponsored by the NDGS and the Theodore Roosevelt Medora Foundation. After dinosaurs went extinct, crocodiles became the dominant predator in North Dakota, and the environment turned swampy. In Medora, we will be digging in Sentinel Butte Formation rocks, 55-60 million years old. This site is rich in a variety of swamp denizens, including crocodiles, giant salamanders, fish, champsosaurs, clams, snails, and more. The rugged badlands in the nearby Theodore Roosevelt National Park may also be a draw for those not interested in digging in the dirt.

August 17-21st: Whiskey Creek dig (day minimum)

While you might call Medora a crocodile buffet, Whiskey Creek is the crocodile graveyard. This 60-65 million year old Bullion Creek Formation was very swamp-like. It is in close proximity to the decade-long worked site called Wannagan Creek, made famous by the Science Museum of Minnesota. Each year we work at this site, the fossils get better and better. While other creatures can be found, crocodiles are by far the most numerous.

Ask Mr. Lizard

Why do you collect really small things you can only see under a microscope? How do you find them?

There are a bunch of answers to this. Because these "microfossils" are so small, our best chance of finding them is by collecting buckets or bags full of dirt, and bringing it back to the lab. Once there, we wash it (yes, we wash dirt), and use a microscope to slowly pick through whatever is left. We do this because those microfossils can answer a lot of questions, like what types of animals were alive, and the bracket of time they lived in. Pretend we find a dinosaur site. Now, pretend everything we find is painted on a blank sheet of paper. Dinosaurs are big, yes, they take up a lot of room – but what other plants were around? What insects? What birds or mammals? Each of those little fossils helps us fill in the blank spaces. Another bonus: microfossils don't take up a lot of room in our collection space!

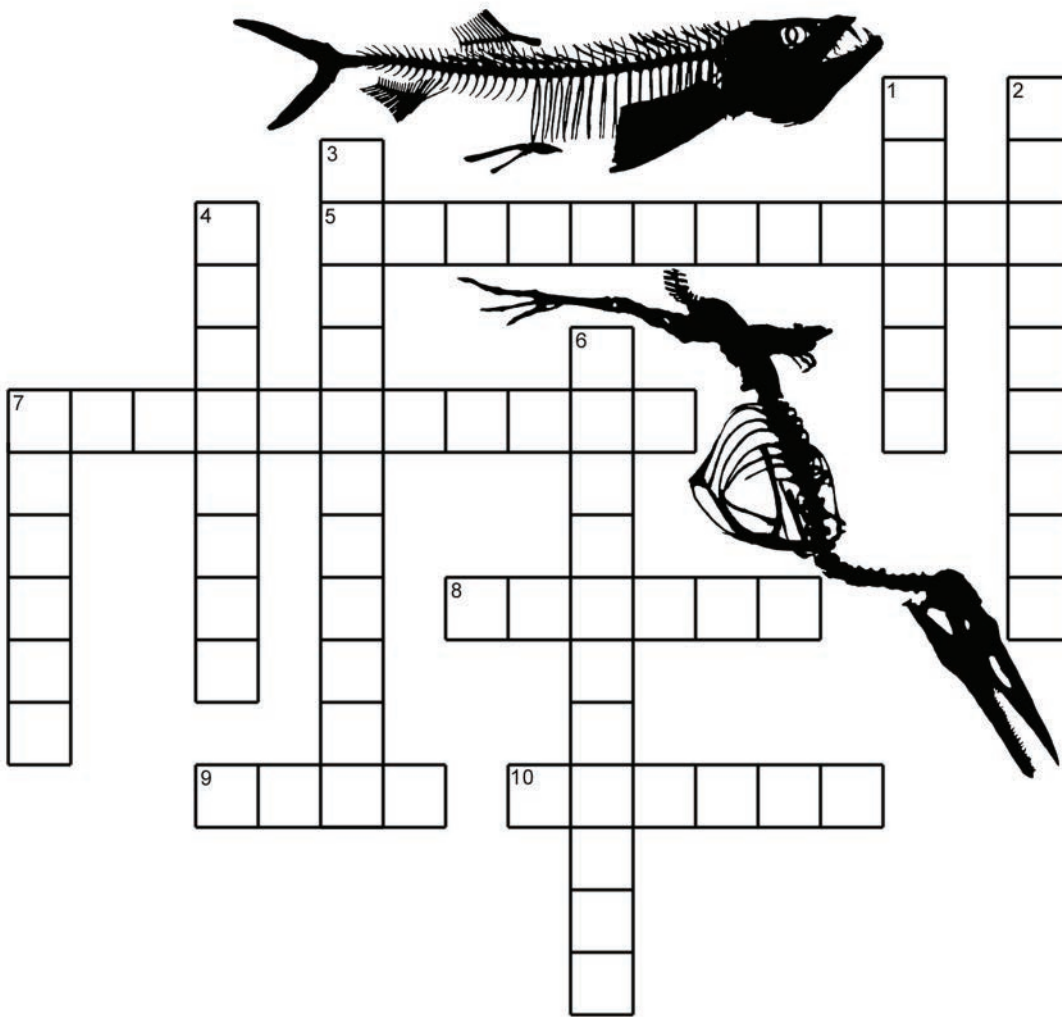
Cretaceous Crossword

Hints to some questions can be found in previous issues of the FIND.

Still stumped? Check out more detailed information about North Dakota's underwater world here:

<https://www.dmr.nd.gov/ndfossil/Poster/pierre/Pierre.pdf>

Answers will be posted in the next issue!



DOWN

- 1 *Callianassa* is a type of mud- or ghost ____, a crustacean. (hint: good with cocktail sauce)
- 2 Many types of snails, a type of ____ (meaning "stomach foot"), are also found here. (hint: issue 13)
- 3 Large flightless sea bird, name means "western bird"
- 4 Closest living relative is the chambered nautilus (clue: issue #8)
- 6 ____, large predatory bony fish, have often been found with the remains of their last meal still in their gut.
- 7 The Archelon, as big as a car, is a type of ____

ACROSS

- 5 The long-necked plesiosaur called ____ used to swim across ND
- 7 Giant squid found in ND (Clue: issue #1)
- 8 Many cartilaginous fish (skeletons made from cartilage instead of bone) lived in ND, including ____ and rays.
- 9 *Enchodus*, also known as the "sabertooth herring," is a type of ____
- 10 The ____ Formation is made up of fine grained silts and clays, forming a shale.