

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!

Fall 2019 No. 34

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

becbarnes@nd.gov

Next Issue: December 2019

Please e-mail us if you wish to receive the electronic version of FIND, or view past issues at:
<https://www.dmr.nd.gov/ndfossil/kids/>



Feature Fossil: *Hesperornis*

What has feathers, teeth, scales, and was an expert swimmer? A swimming bird called *Hesperornis*. The name means Western Bird, although we find it commonly in the northeastern part of the state. This bird lived at the same time as dinosaurs, but would not have mixed with its relatives on land or in the air. It was heavily modified for swimming – so much so that its wings were no more than tiny splints of bone. They had enlarged toes which would have held lobes similar to what you can see on a modern grebe. The back half of its jaw was filled with tiny teeth – perfect for snagging small fish from the water.

Bird bones are delicate to begin with, and fossil bird bones are even more so. Finding a bird bone in the field is always an exhilarating experience! This year at the Pembina Gorge dig we found not one, but TWO vertebrae from a

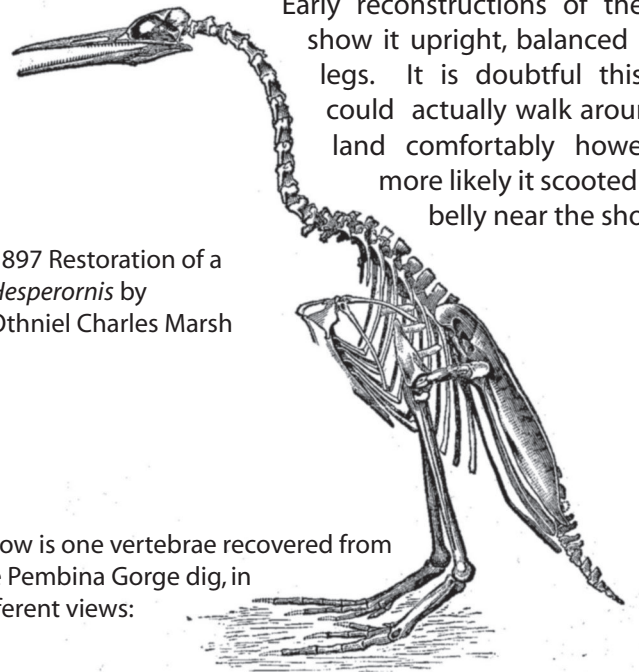


Painting by Dan Varner

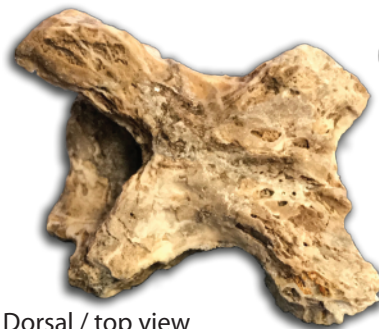
swimming bird (possibly from a relative called "*Baptornis*").

Early reconstructions of the bird show it upright, balanced on its legs. It is doubtful this bird could actually walk around on land comfortably however – more likely it scooted on its belly near the shore.

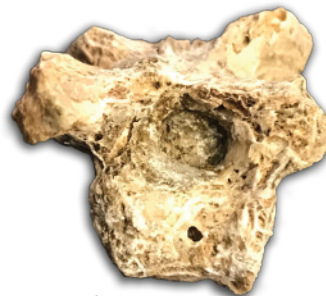
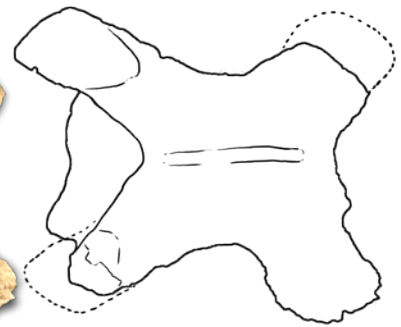
1897 Restoration of a *Hesperornis* by Othniel Charles Marsh



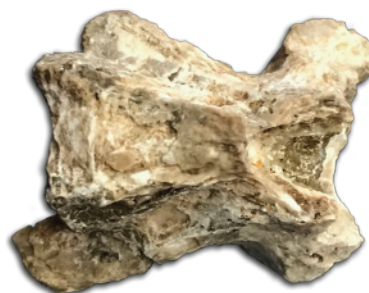
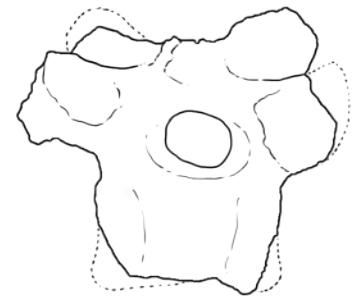
Below is one vertebrae recovered from the Pembina Gorge dig, in different views:



Dorsal / top view



Anterior / front view



Ventral / bottom view



2019 Public Fossil Dig in Review

This was one of our most wet years on record. From 2008-2018, we lost a total of 12 days to rain. This year alone, we lost 11 days! Definitely not the best news, but we can't control Mother Nature.

To try and accommodate the school year better, and since fewer kids join us on our Dickinson dig, we swapped the order around on which dig we went to first. This ended up putting our digs in an interesting sequence of bone layers. Running through this year's fossil sites actually puts them in order from thinnest to thickest, starting with Medora.

Medora Public Fossil Dig

This 55-60 million year old Paleocene site has had a productive fossil layer for us since our first dig there in 2005. Imagine a wet swampy area that is slowly drying, heavy in vegetation, with pools of water gradually shrinking over the years. The water is calm, yet filled with life. Small fish, trees, clams, snails, turtles, snakes, birds, and the larger champsosaurs and crocodiles made the area their home. All of this life eventually sank down to the bottom and compressed

into a single band of carbon rich (coal-like) mudstone no thicker than your finger is wide. We can move quickly through the upper layers of rock until we get close to the fossil layer, then slow to a crawl. The trowels are put away in favor of small probes, or even fingernails. This year we found a good variety of fossils, but the best find was probably a partial champsosaur skeleton. The lower legs and hip, and a good number of vertebrae and ribs were uncovered. If luck holds – we'll find more next year!



Top-right: fish **cleithrum** (part of the gill / shoulder area) from a large bowfin.

Bottom-right: tiny baby scorpion *Paruroctonus boreus* that was hiding in the cracks of the rock.



Bismarck Public Fossil Dig

Our site south of Bismarck-Mandan is the one area we had this year where you could actually dig dinosaur fossils. We have fossil sites all over, but not very many dinosaur sites. This area looked more like an old oxbow or bend in a river, rather than a whole swampy area. When our initial prospecting trip took us to the area, we walked and walked without finding a scrap of bone. As we crested a hill, we looked down to a sea of bone scraps littering the surface.

Now as we work the site, the bones are coming out of about 4' of rock, and can be anywhere within that thickness. Not as fast as Medora, for sure. Instead of digging fast down to the last inch of rock, we must proceed slowly through the entire area. Who knows where that elusive bone will

be? Sometimes we work all day and find nothing, others we're stuck in a log-jam of bones crisscrossing each other. Unfortunately we don't have x-ray vision.

Edmontosaurus tooth



This year we found one carnivore tooth each from a tyrannosaur, a dromaeosaur, and an *Acheroraptor*. The bone that caused the most

uproar on site was a small hip bone – it's too early to tell what exactly it came from, but... it's small enough it

could be from a small raptor like *Dromaeosaurus*.

The crocodile osteoderm ("bone skin" armor) below is one of the clues that tell us the bones we're finding were transported. The edges are very worn, as water and wind act like a giant rock tumbler.

The size of the osteoderm is very impressive - it came from a VERY large crocodile!



Pembina Gorge Public Fossil Dig

Where Medora had a half-inch of fossil layer, and Bismarck had 4 feet, the Pembina Gorge has dozens of feet. The Pembina Gorge was the home of the great Western Interior Seaway – so rather than fossils concentrating in the bottom of a constricted lake, or a sharp bend in a river, they gently settled along the bottom of an entire sea floor. This makes for a very broad and deep area to find fossils in, and doesn't make our life easy at all. There are fossils everywhere from fish (scales and vertebrae are very common), and from what Clint says "I've been told there are a lot of fish in the sea!"

Bones from larger or more rare animals such as squid, mosasaurs, and our feature fossil *Hesperornis* or *Baptornis* are like eating your favorite dessert at the end of dinner. Dinner may have some things you like, and some things you don't – but dessert is always good. This year our dessert included a helping of bird neck bones, and an exceptional mosasaur: one articulated flipper, and a jaw that had been bitten by another sharp-toothed critter!

All of these creatures lived at the same time as dinosaurs, but unless they came across a bloat-and-float carcass, probably never met one. The site is within the Pierre Formation, and is our oldest location at 75-80 million years.



Dickinson Public Fossil Dig

Some of the coolest fossils from this 34 million-year-old Oligocene site was a jaw from an early camel (probably *Poebrotherium*) relative – only the second camel fossil found in these particular rocks in North Dakota. Near the rhino quarry was an explosion of fossil egg shell fragments – maybe even from a nesting site! Way more fragments than a single egg could produce. Eggs, being fairly fragile, are rare and delicate fossils to find. Rodents were fairly common, including the upper jaw of an early beaver. Good things come in small packages sometimes – one of the best finds was a complete set of lower jaws from a *Heliscomys*, which was a small rodent in the jumping mouse branch of the tree – so small, the connected jaws were smaller than a piece of candy corn.



Above, Katy gets her nose close to the rock in order to see the tiny fossils poking out of the butte.



I have to cut off the FIND here! We're just too swamped in the lab to add more pages (although we'd like to). Check out our website for more information on our 21+ party, the Mesozoic Masquerade:

https://www.dmr.nd.gov/ndfossil/fossil_day/MesozoicMasquerade.asp

Keep an eye on our Social Media @NDGSPaleo for news on dig dates, or add yourself to our notification list here:

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