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 2014, No. 14

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

becbarnes@nd.gov

Next Issue: December 2014

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/newsletterkids.asp

Feature Fossil: Lepisosteidae: Gar

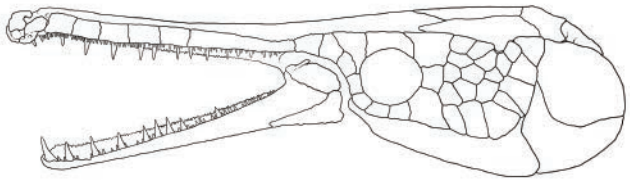
Lepisosteidae is a Family of fish known as "gar" or "garpike". These fish are living fossils, and are found in the fossil record dating back to the Cretaceous. While their range used to stretch across a good portion of North America, modern gar are generally found in the southern and eastern portions of the United States. Their name comes from the Greek words *lepis*, meaning "scale", and *osteon*, meaning "bone". This is fitting, since the scales of a gar are thick hard pieces of bone, rather than thin and flexible. They are armor-plated **predatory** (prey on other animals) fish!

Gar skull, dorsal view

The modern gar family is divided up into two Genera. The first are called *Atractosteus* (meaning "arrow bone"), which includes the alligator, Cuban, and tropical gar. The second is called *Lepisosteus* (once again meaning "scale bone"), which includes the spotted, longnose, shortnose, and Florida gar. They eat other smaller fish, and invertebrates such as crabs. Most gar live in calmer, fresh water streams or lakes, but a few have adapted to life in **brackish** (between fresh water and sea water) rivers or marshes.

We have found gar scales and bones from numerous fossil sites across North Dakota. Just this summer, we excavated more from our dig site near Marmarth, ND (65 million years in age), as well as our dig sites near Medora, ND (55-60 million years in age). What type of gar are they? That's what we're trying to figure out. The bones of gar skulls tend to rattle apart after they die – they don't have the same **sutures** (immobile links) to knit the bones together, like mammals do. Instead of finding a nice whole skull, we tend to find bits and pieces. A frontal here, a mandible there. This is where the study of modern animals comes in handy. By looking at the skull bones of modern gar, we can figure out which bones go where, in the hopes of identifying our mystery fish.

Because the scales are so tough and durable, we find plenty of those at our dig sites as well. They are diamond-shaped, shiny, and black – little dark gems that sparkle when they pop out of the dirt. The ones that sit out under sunlight for a year or more start turning a bluish color.



2014 Public Fossil Digs

We had a full roster of digs to lead this summer: Pembina Gorge, Whiskey Creek, Bismarck Area, Marmarth, and Medora. Some days were rained out, but for the most part we had perfect weather to work with.

Pembina Gorge: Up in the northeastern corner of the state, we returned to the Pembina Gorge area to continue work on our previous year's site. This area was part of the Western Interior Seaway, and we work with fossils that are 80 million years old. Sadly we lost a couple days later in the week (and afternoons) due to rain. The rest of the week we worked on pulling out more fish bones and scales, and even some mosasaur bones.

Whiskey Creek: Out in western North Dakota, we returned to one of our Paleocene (65-60 million years old) sites. It was a very productive week (over 20 plaster jackets removed!), and we were joined by students, teachers, grandparents, and paleontologists. We removed numerous crocodile scutes (dermal armor), fish bones, and on the very last day, a crocodile skull! Each year gets better at this site – the farther back in to the hill we go, the less damage from rain and vegetation there is. Can't wait until next year!

Bismarck Area: We checked out a number of sites during this week. We call it our "Bismarck Area" dig because we leave and return to Bismarck each day – not because the digging is in Bismarck. The first few sites were south of Dickinson – Eocene (35-55 million years ago) and Oligocene (25-35 million years ago) in age. Our **fauna** (animal life) changed from reptile dominant forms, to mammal dominant. Some of the fossils uncovered belonged to a hornless rhinoceros called *Subhyracodon*, a saber-toothed cat-like animal called *Dinictis*, and numerous smaller mammals such as *Mesohippus* (3-toed horse) and *Merycoidodon* (sheep-pig-like animal). The last site we visited was south of Mandan, back to our Cretaceous (65 million year old) rocks. We hit a rough patch here, and did not collect any fossils.

Marmarth: Down in the southwestern corner of the state, Marmarth is one of our few locations with dinosaurs. We did a lot of **prospecting** (hiking) looking for new sites – and managed to find a couple of fantastic "microsites". These are locations where there's a lot of smaller fossils in high concentration. Gar scales, turtle shell pieces, crocodile teeth – looks like we found the location of an old body of water. This could have been a river, lake, or even part of the Western Interior Seaway that split North Dakota.

Medora: This is our other Paleocene site – just a little younger at 60-55 million years old. We try and return to this site year after year because of the high concentration (and variety!) of fossils. Like previous years, we pulled out a lot of fish bones, **coprolites** (fossil feces), crocodile teeth, and turtle bones. Plants, while not uncommon, are very difficult to collect from this site. Knowing this, we tried something different this year: casting the trees and cones using silicone. It worked great! Easy to use, fast set-up time, and a great imprint of the fossil. We lost a couple days of digging due to rain here as well, but made up for it with the great finds earlier in the week.

Check out the dig photos on page 3!

Reader Art

We want YOUR artwork! Please e-mail us a digital copy, or mail your traditional art to our address in Bismarck, ND (see page 1).

Just Imagine...

Lazily floating in the murky waters, the gar was surrounded by dozens of its kind. Other large fish swam about in a watery dance – each individual able to float or glide around the others. The gar quietly floated towards the calmer edges of the water, where smaller fish unable to swim against the current resided. From a distance the large fish may have looked like a log – long, tubular, with branch-like fins jutting out. Perhaps the motion of its fins resembled water-tossed plants, undulating slowly in the gloom.

Motion from the shore sent a group of smaller fish fleeing towards deeper water. One small fish scurried past the gar – and with a lightning fast sideways flick of its head, the larger fish snagged the unsuspecting minnow on rows of needle-sharp teeth. Readjusting its meal with more quick movements, the minnow was swallowed whole. There was little in the waters, save the larger crocodiles, that the gar need worry about. It was near the top of the food chain, protected by armored scales.

Ask Mr. Lizard

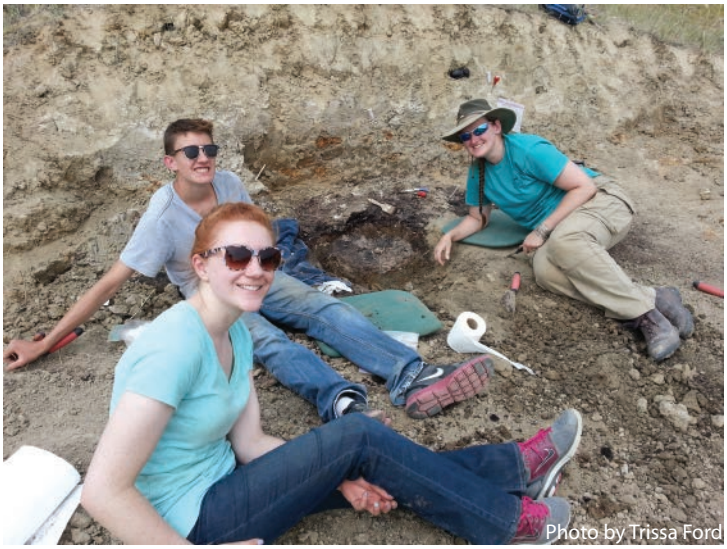
How can you tell what's fossil and what's dirt?
- (asked by public fossil diggers)

It depends! Sometimes the fossils are a completely different color than the surrounding dirt / rock. Dark bone and light dirt (or the opposite) is easy to work with. Otherwise we try and look for symmetry, or patterns - things that nature generally wouldn't use in the surrounding rocks. We train our eyes to look for something different - something out of place. We may not know right away what it is, but as long as we can find it, we can identify it later.

How you can do this [dig] all day?! - (asked by public fossil diggers)

Paleontologists by nature are an odd breed of people. We may have different interests (birds, fish, plants, dinosaurs), but we all have something in common: patience!

Above: Kat collects the Medora fossil layer in buckets, to be washed later.
Below: Sean carefully removes the debris from around the fossil layer in Medora.



Above: Chance and Rachel (left) working the Whiskey Creek site, as Becky coaches.
Below: Jeff, Sean, and Trissa, return from prospecting the hill in the background.

Above: Barb and Marty excavate a tortoise shell.