

New Paleontology Exhibits Opened Across North Dakota

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For the past 25 years the North Dakota Geological Survey (NDGS) has been working with partners across the state to develop exhibits highlighting the paleontology of North Dakota. The most extensive of those exhibits are in the North Dakota Heritage Center and State Museum on the capitol grounds in Bismarck. However, there are also twenty other exhibits and displays in museums and other institutions across the state that the NDGS has had a hand in developing. The broad geographic distribution of these exhibits ensures that North Dakota's residents can learn about the state's prehistory at a relatively nearby location. The paleontology program at the NDGS continues to seek out new opportunities for displays throughout the state and regularly monitors and updates existing displays with new information and specimens when necessary. The past year has been an especially busy time for such work, and the following article highlights the upgrades and new exhibit opportunities that were recently installed.

New Paleontology Exhibit in the Barnes County Museum [Valley City]

In the heart of downtown Valley City is a small, unassuming storefront (fig. 1). Behind these large plate-glass windows is a treasure trove of artifacts and specimens documenting the history of the area. Boasting approximately 10,000 square feet of exhibit space between two floors, the exhibits are much larger than you would expect upon initial inspection from the street. First founded in 1930, the Barnes County Museum was located in the courthouse for 60 years, moved around Valley City and finally landed in its present location in the late 1990s.

For nearly 18 months the skeleton of a very large *Triceratops* ("Bob") was on exhibit in this building. "Bob" was collected on a private ranch in Bowman County.

Unfortunately, the specimen was only on loan for a short while and eventually was removed from display in December of 2015. Upon hearing of the specimen being removed from exhibit, the NDGS offered to help fill the newly vacated exhibit space. By a happy bit of happenstance, the NDGS had a *Triceratops* skeleton on loan to the Gray Fossil Site in Tennessee that was about to be returned. It was decided that instead of returning the skeleton to Bismarck, it would be easier to just ship the skeleton to Valley City directly. This would allow for more efficient use of our time and would not waste money shipping the specimen to Bismarck, just to have us ship it to Valley City.

This new *Triceratops* ("Gundy") is a cast of a specimen found in 1992 on a private ranch in northwestern South Dakota by Valley City native Mike Triebold. After the arrival of "Gundy" from Tennessee the NDGS paleo team spent two days in Valley City installing the skeleton where "Bob" once stood (fig. 2), and also installing two new exhibit cases. One case contains more fossils from the Hell Creek Formation of North Dakota. The species of animals found in that display lived at the same time as *Triceratops*, and in the same kind of environment. These were plants and



Figure 1. The Barnes County Museum in Valley City, ND.



Figure 2. "Gundy" the *Triceratops* on exhibit in the Barnes County Museum in Valley City, ND.

animals that *Triceratops* would have likely seen over the course of its life. A variety of plant fossils are in the case including the Dawn Redwood (*Metasequoia*) and a partial palm frond, indicating the environment in North Dakota during the Late Cretaceous was much warmer and wetter. Also included in the exhibit are fossils of crocodiles and turtles, reflecting a wetter, likely swampy environment. Pieces of a second *Triceratops* skeleton, recently found south of Mandan in Morton County, are also on view in the case, including a broken rib displaying bite marks. The likely suspect making these bite marks is *Tyrannosaurus rex*, whom also lived in the area during the Late Cretaceous, but a lot of crocodile fossils are also found at that dig site and could have made the marks on the bone. A cast of a *T. rex* tooth found south of Mandan is a big highlight of this case (fig. 3).

of eastern North Dakota showing where fossil-bearing rocks are exposed in the region. Though less extensively exposed than in western North Dakota, eastern North Dakota still has its fair share of fossil-bearing rocks. Many fossil discoveries in North Dakota are made by average citizens out enjoying the scenic outdoors. In fact, both of the mosasaur fossils on display in that case were not found by scientists, but by people out exploring the countryside. When they realized the importance of what they had found, they contacted paleontologists working for the North Dakota Geological Survey and worked with them to recover these important pieces of North Dakota's natural heritage. We like to highlight these partnerships when possible to demonstrate that the best results are obtained when everyone works together to identify and preserve these resources.



Figure 3. Fossils from the Hell Creek Fm. on exhibit in the Barnes County Museum in Valley City. The bottom shelf contains three vertebrae and the upper shelf has a turtle shell (right) a broken rib and a *Tyrannosaurus rex* tooth (behind the rib).

The second display case holds specimens collected from the Pierre Formation in eastern North Dakota, including the Valley City area. This display includes a relatively complete backbone from a large, swimming reptile called a mosasaur, a partial skull from a smaller mosasaur, three different kinds of ammonite shells (*Sphenodiscus*, *Jeletzkytes*, and *Baculites*), and a fragment of a giant squid (*Tusoteuthis*) (fig. 4). Also in that case is a map

and *Tyrannosaurus* may have turned out. There were only two possible outcomes for the battle: one or the other animal winning. The user could simply turn the iPad to see different areas of the environment or track the dinosaurs as they moved around during their battle.



Figure 4. Fossils from the Pierre Fm. on exhibit in the Barnes County Museum in Valley City. The string of bones are vertebrae from a large swimming reptile called a mosasaur.

Shortly after opening the gallery to the public in 2014 it was clear to us that this interactive experience was wildly popular, and that we would need to upgrade the hardware to a sturdier platform to handle the constant wear and tear the devices were experiencing and expand the interactive to include more than just the dinosaur fight scene. The exhibits staff at the Heritage Center and the NDGS began working together in the fall of 2015 to develop a new interactive dinosaur exhibit to replace the old Cretascope. The museum exhibit design firm Angle Park out of Chicago, Illinois was selected for the project, and all three parties worked hard over the next nine months to produce an expanded and engaging experience for the visitors. The renovated dinosaur interactive exhibit opened in March of 2016 and is centered around one large, 55-inch touch screen set at a 45 degree angle rather than two small, vertically

Dinosaur Interactive Exhibit in the North Dakota Heritage Center [Bismarck]

For the past two years, two iPads in the gallery of Geologic Time at the Heritage Center in Bismarck helped visitors visualize what the animals and environment of North Dakota would have looked like around 67 million years ago during the end of the age of the dinosaurs. The original experience, called the Cretascope (“Creta” for Cretaceous and “scope” for view/observation), was duplicated between two iPads on stands of different heights. The iPads could be rotated through approximately 180 degrees vertically and horizontally, giving the visitor the illusion of being able to look around in the environment. There was a gyroscope in each iPad that would track the direction it was facing and allow the user to feel as if they were immersed within the environment. The main focus of the exhibit revolved around allowing the user to watch how a fight between adult *Triceratops*

oriented iPads. The new interactive is divided between two separate experiences, a battle scene between *Triceratops* and *Tyrannosaurus*, and an explorable environment allowing the user to walk through a reconstruction of what western North Dakota may have looked like during the Cretaceous Period, 67 million years ago (fig. 5).



Figure 5. The two versions of the Cretascope at the Heritage Center in Bismarck. The top image shows the first version used from July 2014 through April 2016. The bottom image shows the current version. Both versions were acquired with funds from the Williston Basin Petroleum Conference through the North Dakota Petroleum Council.

The battle between the two large dinosaurs was expanded to include the option to select either a young or fully mature individual of each dinosaur to take part in the battle. They can also choose to add feathers to the *Tyrannosaurus* or spines to the *Triceratops* (fossil evidence supports the possibility of both options), and can choose between three different color palettes for each dinosaur (fig. 6). Once the dinosaurs are set to the user's preferences, the battle commences with a randomized outcome. As a part of the new fight scene, a third outcome was added to the battle scene where the animals can fight to a draw, meaning that the *Tyrannosaurus* gives up on the attack and leaves the battle, to show that not all fights ended with a clear victor. All of these variations expand the possible outcomes of the battle to nine instead of our previous two, increasing the replay potential of the exhibit. During the battle, the user can move the camera along an invisible track circling the ongoing battle, allowing for a 360-degree view of the action that varies from a low angle (close to the ground) to a high angle (looking down on the fight). The new fight scene also includes sound for the first time, allowing

the user to feel the power and the fury of these animals as they clashed in battle.

The completely new second part of the dinosaur interactive exhibit involves walking through a reconstructed environment of western North Dakota during the Cretaceous. Simple arrow keys on the screen allow you to walk in any direction and at specific points along the path, arrows highlight specific animals or plants the user can interact with and learn more about. This provides the user with a more immersive experience and for more animals from this time period and specimens from the State Fossil Collection to be highlighted, expanding the learning experience.

Surveys conducted during the first few weeks after installation have revealed an overwhelmingly positive reception of the new exhibit. People find it easy to use, more intuitive than the old exhibit, and gave it a satisfaction rating of just over 96%. Due to the popularity of this interactive, we have begun initial research into additional exhibits very similar to this one for the Oligocene and Pleistocene Epochs.

Pioneer Museum of McKenzie County [Watford City]

In the spring of 2015, the NDGS was contacted by the Medora Ranger District office of the U. S. Forest Service in Watford City about moving a small paleontology exhibit. The exhibit contained fossils collected from the Little Missouri National Grasslands and was housed in a building that was going to be remodeled, after which there would not be room for the exhibit. Both the U. S. Forest Service and the NDGS wished to keep these fossils on exhibit somewhere in the area, and it was decided to move the specimens up the street to the Pioneer Museum of McKenzie

County, which is housed in the Long X Visitors Center. Since there were already NDGS and USFS specimens on exhibit in that museum, it was a perfect fit.

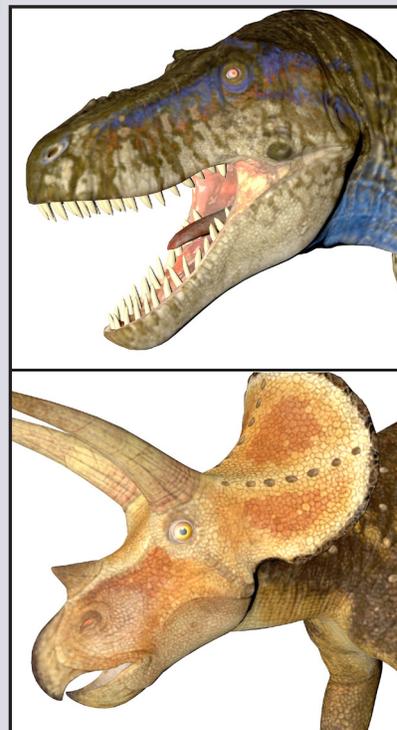


Figure 6. Two possible color palettes for the Cretascope dinosaurs, *Tyrannosaurus rex* (top) and *Triceratops* (bottom).

There were a few details that had to be addressed before the new exhibit could be installed. After a decade on display, much of the exhibit signage needed to be updated or replaced and it was determined that several of the specimens would benefit from additional cleaning and stabilization. Furthermore, the current exhibit case had an open top since it was constantly supervised when in the U. S. Forest

Service office. In its new location, that level of supervision would not always be possible, so a secured exhibit case was needed. Luckily, there was a secure case of similar size in use in the U. S. Forest Service office in Bismarck, so an arrangement was made to swap out the cases. Over the course of the next year the cases were exchanged, new signage was made, and the specimens were cleaned and stabilized.

The existing paleontology exhibit at the Pioneer Museum of McKenzie County was centered around a 17,000-pound fossil tree trunk that was collected from Paleocene rocks south of Watford City, (fig. 7). That exhibit was shuffled around to make space to the left of the tree stump, and the new case contains a variety of fossils ranging from plants, to snails, to crocodiles that would have shared the environment with the massive tree stump. A

mural added to the wall above the case shows an interpretation of what the environment may have looked like in western North Dakota approximately 60 million years ago (fig. 8). The updated exhibit now provides a comprehensive look at the whole of the flora and fauna preserved in the Watford City area.

Re-opening of the Dinosaur Exhibits in Dickinson

The Dakota Dinosaur Museum first opened its doors in 1994 and was open to the public during the summer tourist season (roughly from Memorial Day to Labor Day) for 22 years. During that period the total visitation was reported at over 426,000 people, an average of almost 20,000 individuals a year. In 2015, the non-profit organization that ran the museum announced plans to permanently close after the summer season because the primary operators, Alice and Larry League, were retiring. Though the Dakota Dinosaur Museum and the associated non-profit organization would officially cease to exist after 2015, there was a desire to maintain the collections and exhibits



Figure 7. View of the expanded exhibit in the Pioneer Museum in Watford City.



Figure 8. Mural of western North Dakota approximately 60 million years ago during the Paleocene Painting by and courtesy of T. Martinez.

at the location so as to continue to provide a valuable resource to the local community. Negotiations began between the city of Dickinson and the Dakota Dinosaur Museum to transfer all of the museum's assets to the city, which would then take over operation of the museum. Those plans were finalized by the end of 2015 and the former dinosaur museum was combined with several adjacent museums, including the Joachim Regional Museum, the Prairie Outpost Park, and the Pioneer Machinery Building, to form the Dickinson Museum Center. A single entrance fee now allows visitors access to all of these sites, rather than each operating under different admissions policies.

The paleontology program at the NDGS was notified of these developments in August of 2015 because several of the specimens on display in the museum were on long-term loan from the State Fossil Collection. Once it was determined that the city was taking over operation of the museum it was decided that those fossils were best served remaining on display in Dickinson for the general public to see. Since that time, we have been working with various city employees to assist in the transition of the museum, providing technical advice and assistance until the city could hire the proper people to manage the collections and exhibits. We assisted in the development of the position description for the new Museum Curator position who will oversee the paleontology collections and exhibits, and NDGS senior paleontologist Dr. Clint Boyd served on the hiring committee. In March of 2016 the city offered the position to Dr. Denver Fowler, a paleontologist specializing in dinosaurs and a recent graduate of Montana State University. Denver began work in April and immediately dove into the work of learning the collections and preparing for an overhaul of the museum.

We are excited to have a new partner in the region that we can work with to bring the story of North Dakota's prehistory to the people. Moving forward, the NDGS paleontology program and the Dickinson Museum Center

are planning a wide range of collaborations, beginning with an overhaul of the paleontology exhibit hall (fig. 9). Work on a new set of paleontology exhibits should begin within the next year, transforming the exhibit space and bringing the latest discoveries and interpretations to the people of Dickinson. As a part of that project, the NDGS is providing access to specimens in the State Fossil Collection for use in those new exhibits and will be working with the Dickinson Museum Center to determine what other assistance we could provide. In the near term, a temporary paleontology exhibit is being installed in part of the space within the Joachim Museum that showcases some of the great fossils discovered in western North Dakota and some fascinating specimens Denver has been working on from neighboring Montana. Several of the specimens in that exhibit are on loan from the State Fossil Collection, including a mounted skeleton of the crocodile-like reptile *Champsosaurus gigas* that used to be on display in the U.S. Forest Service office in Washington D.C. That specimen was collected from the Little Missouri National Grasslands in western North Dakota (fig. 10).



Figure 10. *Champsosaurus gigas* skeleton as it looked on exhibit in the USFS office in Washington D.C.



Figure 9. NDGS paleo staff taking inventory at the Dickinson Dinosaur Museum.

The NDGS will also be providing a set of curation-grade specimen cases for housing Dickinson's fossil collection to replace the current collections cabinets that were damaged in a flood a few years ago. We will be working with Denver Fowler to produce a digital catalog of the fossil collection at Dickinson in software that is compatible with that used at the State Fossil Collection so that both institutions can easily trade information regarding the specimens housed at each facility. We also plan to work together to provide a cooperative public fossil dig experience in the Dickinson area. Overall, the new paleontology program at the Dickinson Museum Center will be a valuable resource to the people of the region, providing an important educational resource and serving as a continuing draw for tourists traveling through western North Dakota.