

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!

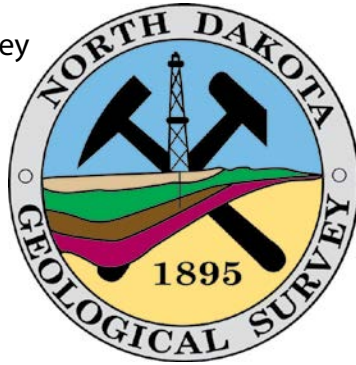
Winter 2023 No. 51

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Next Issue: March 2024

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<https://www.dmr.nd.gov/dmr/paleontology/fossils-north-dakota-find-newsletter>



Feature Fossil: *Jormungandr walhallaensis*

In 2015, Deborah Shepherd visited the Pembina Gorge fossil site, and while there discovered a fragment of bone had tumbled down the hill. She brought it to the attention of local ND Parks and Recreation officers, who in turn let the Paleontology department know of the discovery. Later that summer, paleo staff and the public returned to the area for a public fossil dig.

That first year, many of the skull bones were recovered in numerous jackets. In 2016 a few more bones were excavated, and in 2017 & 2018 the last few elements trickled back for preparation. Those of you who attended the dig these years may have heard us referring to this skeleton as "Eustace" - with so many mosasaurs on site, it was easier to give each creature a nickname, rather than refer to it by field numbers.



Above: A jumbled mess of skull bones from *Jormungandr*, excavated in 2015.

Preparation began on some of the jackets containing skull bones, such as dentaries, maxillae, jugals, frontals, and more. At first glance not much seemed out of the ordinary - mosasaurs are strangely common at the fossil site, and bones from other animals had been found previously. Bones from *Mosasaurus*, *Clidastes*, and *Plioplatecarpus* were already in the collection. Once the pterygoid was cleaned, Clint Boyd thought something looked amiss. The size of the skull was similar to *Mosasaurus* or *Prognathodon*, with an animal around 20-25 feet in length. Those types of creatures have between 8-10 pterygoid teeth. This creature had a whopping 16 teeth, more like the smaller *Clidastes*!



Left: Clint Boyd "nose" what he found! A very important, diagnostic bone called the **quadrate** was recovered in 2016. In mammals, this bone is part of the middle ear, the **incus**, or anvil.

Staff starting combing over jacket numbers, prioritizing preparation of any jacket associated with this possibly new creature.

Clint Boyd, along with PhD student Amelia Zietlow (read her V.I.P entry in FIND #45), and mosasaur specialist Nathan Van Vranken teamed up to describe, compare, and contrast all the bones discovered with already known mosasaurs. Their conclusion: this was a new, intermediate mosasaur somewhere between the more primitive (older) *Clidastes*, and the more derived (younger) *Mosasaurus*.

Walhalla, North Dakota, is a small town in the northeastern corner of the state close to the fossil site. The town takes its name from Valhalla, the great hall in Asgard from Norse mythology, ruled over by Odin. The species name "*walhallaensis*" means "from Walhalla." *Jormungandr* made sense as a genus name - as Jörmungandr, also known as the Midgard Serpent or World Serpent from Norse mythology, was a huge sea serpent that surrounded Midgard (Earth). At 20-25 feet long, our new mosasaur

wasn't huge, but it belonged to a group of creatures that lived in all the world's oceans... literally encircling Earth.

The scientific paper was published through the American Museum of Natural History, and can be downloaded here: <https://tinyurl.com/NDMosasaur>

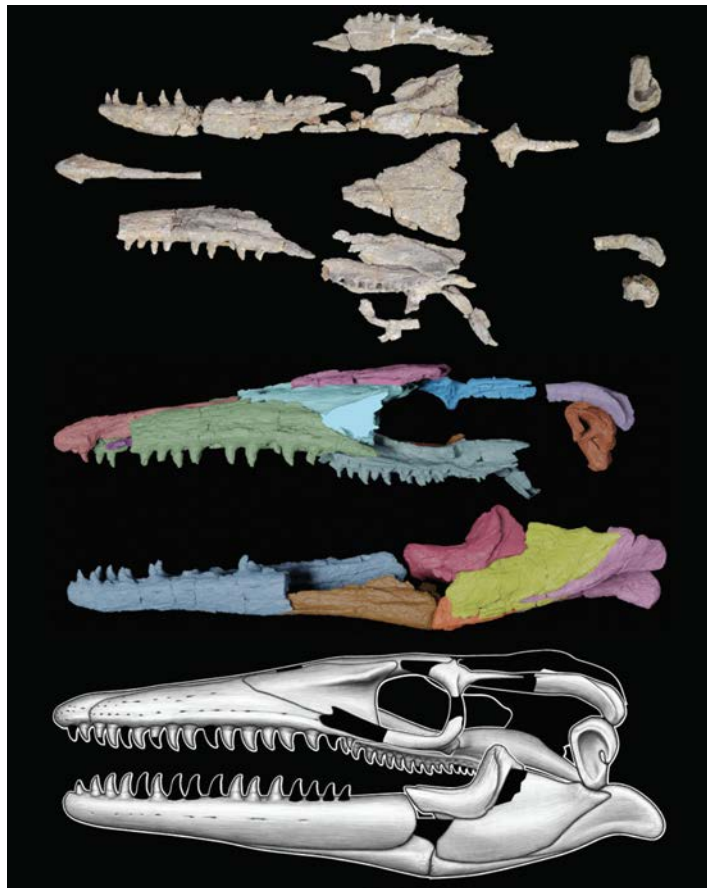
All of the bones were 3D scanned, and uploaded to Morpho Source for public view. That link is here: <https://tinyurl.com/MorphoMos>

A 3D printed skull of *Jormungandr*, thanks to Triebold Paleontology, is currently on exhibit in the Walhalla Public Library. A second skull will eventually be on exhibit at the Pembina State Museum as well.



Above: Two full-sized, and two scale models of *Jormungandr*, being painted inside Triebold Paleontology

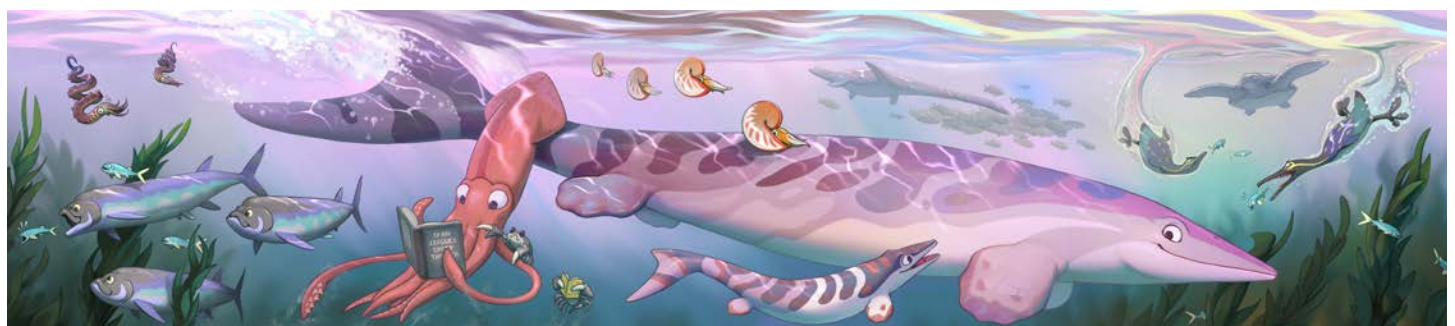
Below: Two *Jormungandr* fighting, with *Pteranodon* swooping above. Why this scene specifically? Because our skeleton was found with mosasaur bite-marks on the neck bones! Illustration by Hank Sharpe.



Above Top: Skull bones from *Jormungandr*, arranged as they would approximately be in life.

Above Middle: Scanned bones, reassembled digitally.

Above Bottom: Illustration by Hank Sharpe.



Mural by Karolina Twardosz featuring *Jormungandr*, to be installed inside the Walhalla Public Library.

Public Fossil Digs 2024

Online Registration for all digs (first come, first served!) opens February 3rd, 10am Central through Eventbrite. Once the site is updated, links will be available online at:

www.ndpaleofriends.org

www.dmr.nd.gov/dmr/paleontology

and on Social Media (Facebook & Twitter)

@NDGSPaleo

Join us during the months of June, July, and August on sites across North Dakota in the search for fossils. Take a prehistoric fishing trip to the northeastern corner of the State, in the beautifully scenic **Pembina Gorge**. Sea monsters swam in the Western Interior Seaway 80 million years ago, in this Pierre Formation location (the site where we discovered *Jormungandr*). Travel back in time to when dinosaurs roamed the land at the **Bismarck Area** site, located south of Bismarck-Mandan in the Hell Creek Formation. These 67 million-year-old creatures range from the fearsome *Tyrannosaurus*, horned *Triceratops*, and the ever-present duck-billed *Edmontosaurus* – along with other creatures that lived underfoot (crocodiles, turtles, mammals, and more). You won't need a fan-boat to view the swamps of western North Dakota, but you may need some good sunblock! The Paleocene (55-65 million-year-old) Sentinel Butte and Bullion Creek Formations hold a variety of swampy denizens, including crocodiles, giant salamanders, fish, clams, snails, and more. Or if getting out and hiking is more your style, check out the **Dickinson**

Area site inside the Little Badlands of North Dakota. These 32-30 million-year-old Oligocene rocks hold micro-mammals galore, monstrous rhinos and entelodonts, and pint-sized horses, deer, camels, cats, and bats.

GENERAL DIG INFORMATION:

- All fossils collected on these digs go to the North Dakota State Fossil Collection and are used for educational and research purposes.
- At all four dig locations, participants must bring their own lunches.
- Shade tents and porta-potties will be available on-site EXCEPT at the Dickinson dig location.
- The Experienced Digger 2-Day Site Closing Session may finish early on the 2nd day.
- Our digs have a minimum age of 15 years for a Full Day and 10 years for a Family Half-Day. No digs for children under 10 years.
- NO PERSONAL VEHICLES - All participants will be transported by van from the meeting site to the dig site.

Please go to www.dmr.nd.gov/dmr/paleontology/fossil-digs for more information and additional rules for participants. More information on early registration opportunities is available at www.ndpaleofriends.org



Find the shark! Below is a throng of festive *Jormungandr* and *Enchodus*, but hidden amongst the crowd is a shark who doesn't want to miss out on the fun. Can you find it?

