

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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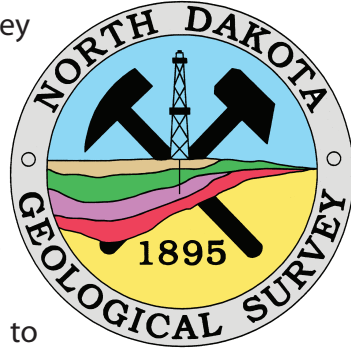
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Feature Fossil: *Inoceramus*

When you think of a clam, perhaps you imagine walking along a beach and finding shells. Or maybe you visualize the small shelled creatures available at the fish-counter in a grocery store. Some *Inoceramus* were indeed small, but these bivalves could grow up to multiple feet in length. This bivalve, like modern clams or mussels, had two halves of a shell covering a soft body. *Inoceramus* was very diverse, with dozens of species. Because of this radiation of species through time, it also makes for a good **Index Fossil** – fossils that can be used to narrow down spans of time.

English naturalist James Sowerby (1757-1822) was the first to describe *Inoceramus*, in 1814. The name was originally meant to mean “fibrous shell”, as a nod towards the texture of calcite that formed the shell. However, the name wasn’t formed right, and also translates to “strong vessel / pot.” So, if you search the recesses of the internet, you’ll probably come across both translations.

These filter feeding animals were so plentiful, at times they seemed to almost carpet the muddy floors of the Western Interior Seaway. Their life-history spanned from the Jurassic all the way through the Cretaceous. Their shells are made from calcite and if lucky can be found with a mother-of-pearl coating on the inside made from aragonite. Both minerals are produced from **calcium carbonate** dissolved within the water. Calcite is the more stable form, and over

time aragonite dissolves away via acid or may chemically shift to calcite. These minerals also make up the hard bodies of corals and some plankton.

Other objects made from aragonite are pearls! We may think of pearls as pretty jewels perfect for decorative earrings or necklaces, but did you know that pearls are a self-defense mechanism for bivalves? If an irritant (like a grain of sand) or a parasite gets past the hard outer shell, and poses a problem to the soft inner body, the bivalve reacts by coating the object with aragonite – the mother-of-pearl (also called “nacre”). Some *Inoceramus* have been found with pearls lodged into their shells - but most of the aragonite nacre has reformed into calcite - so don’t expect to see that lustrous mother-of-pearl color.

Inoceramus are most often found in what would have been a very muddy habitat, and their shells were very broad with large growth ripples. Their large size could have supported a massive gill area, which would have helped them breathe easier in muddy low-oxygen environments. Other animals like oysters, which need a hard substrate for their shells to latch onto, have in turn been found colonizing the outer surfaces of *Inoceramus*.



Two *Inoceramus* from collections. At left NDGS 10842, and below NDGS 10843.

1 inch



Lumpers vs Splitters

You may have noticed some news shaking up (some) of the paleontology world with a proposal for *Tyrannosaurus* breaking into three species: *T. rex*, *T. regina*, and *T. imperator*. The authors compared and contrasted tyrannosaur femurs, looking for differences in how robust, or thick they were, based on length. Right now in paleo social media the lumpers are battling it out with the splitters. What are those? They're terms to indicate how people sort things into categories; not just in paleontology however - the terms have been adopted into many disciplines. The phrase actually dates back to Charles Darwin talking to Joseph Hooker: "It is good to have hair-splitters & lumpers." (1857)

<https://www.darwinproject.ac.uk/letter/DCP-LETT-2130.xml>

Since then many fields have picked up the term, and in the world of paleontology it makes things confusing at times.

For instance, there used to be over a dozen different species split out from *Triceratops*. Over time it was realized that some of the key differences were due to preservation bias (bones being stretched or squashed during fossilization), or variation between males and females. As of now, all of those previous species are now lumped together into *Triceratops horridus*, and *Triceratops prorsus*.

A similar instance happened with the dome-headed pachycephalosaurs. Different sizes of skulls, domes, and spikes were split into *Pachycephalosaurius*, *Stygimoloch*, and *Dracorex*. It was later realized that the skulls were simply from different ontogenetic (age) groups. The first name is kept, and the others are retired - except when they've found their way into general vocabulary and movies - then the names just seem to stick around forever.

Sometimes the extra names are lumped together under a singular recognized name - this makes the others a **synonym** (so the names mean the same thing, but we only use the recognized name when writing). Or the names may be scrapped entirely and considered a *nomen dubium*, or "dubious name."

So will the division of *Tyrannosaurus* stand firm? Science, and time, will tell - but I don't want to split hairs.



Jurassic World Dominion

Movie time! Love them or hate them, the Jurassic Park / Jurassic World saga has been a huge influence in the world of paleontology, and the accessibility of dinosaurs and many other things prehistoric in the lives of people. Over the centuries, paleontology has had its share of ups and downs in the public eye. At some points it was fashionable to collect shells and bone fragments, or **curios**, while at other points to be told



you were a "dinosaur" meant you were outdated, or lived past your usefulness. The dinosaur renaissance began in the 1970s with Ostrom and Bakker - transforming dinosaurs from sluggish cold-blooded reptiles, to warm-blooded active creatures more reminiscent of birds. Once the original Jurassic Park hit theaters in 1993 - there was no turning back. Stop-motion and puppet dinosaurs had been in movies and on TV for years, but JP had an air of believability that made the public go "wow!"

To be clear, even in the movies themselves, the dinosaurs portrayed are not meant to be 100% accurate. They're 'genetically engineered' to be bigger, with more teeth, more mixing of traits to create modern monsters. I personally watch the movies not as dinosaur movies - but as monster movies. To me it makes it more fun, and I don't feel like I have to justify my like for one creature portrayal over another. That's the fun with movies and imagination! My daughter is a fan of the spin-off series Camp Cretaceous, which is also stuffed full of hybrid monster dinosaurs. In the latest trailers for Jurassic World Dominion, we see a mix of creatures - and not all are dinosaurs - showing off design choices from throughout the series. Scaly-skinned "raptors", a feathered *Pyroraptor*, a scythe-clawed therizinosaur, a monstrous *Quetzalcoatlus* and mosasaur, *Giganotosaurus* and *Allosaurus*, and more.

For some Jurassic Park / World is the doorway to wanting to learn more science, and that's a VERY good thing. Whatever sparks that wonder of curiosity, be it a movie, a book, or a museum display - I am here for it.