

Jaws of death: Paleontologist renames giant, prehistoric marine lizard

September 23 2020, by Mary-Ann Muffoletto



A cast of the mosasaur *Gnathomortis stadtmanni*'s bones mounted at Brigham Young University's Eyring Science Center in Provo, Utah. Using phylogenetics and other analysis, Utah State University Eastern paleontologist Joshua Lively described and renamed the new genus, which roamed the oceans of North America toward the end of the Age of Dinosaurs. Credit: BYU

Some 92 to 66 million years ago, as the age of dinosaurs waned, giant marine lizards called mosasaurs roamed an ocean that covered North America from Utah to Missouri and Texas to the Yukon. The air-breathing predators were streamlined swimmers that devoured almost everything in their path, including fish, turtles, clams and even smaller mosasaurs.

Coloradoan Gary Thompson discovered [mosasaur](#) bones near the Delta County town of Cedaredge in 1975, which the teen reported to his high school science teacher. The specimens made their way to Utah's Brigham Young University, where, in 1999, the creature that left the fossils was named *Prognathodon stadmani*.

"I first learned of this discovery while doing background research for my Ph.D.," says newly arrived Utah State University Eastern paleontologist Joshua Lively, who recently took the reins as curator of the Price campus' Prehistoric Museum. "Ultimately, parts of this fossil, which were prepared since the original description in 1999, were important enough to become a chapter in my 2019 doctoral dissertation."

Upon detailed research of the mosasaur's skeleton and a [phylogenetic analysis](#), Lively determined the BYU specimen is not closely related to other species of the genus *Prognathodon* and needed to be renamed. He reclassified the mosasaur as *Gnathomortis stadmani* and reports his findings in the most recent issue of the *Journal of Vertebrate Paleontology*.



A model of the mosasaur *Gnathomortis*' skull, top, and the jaw fossils discovered by Colorado teen Gary Thompson in 1975, below, are on display at Brigham Young University's Museum of Paleontology in Provo, Utah. Credit: Joshua Lively

His research was funded by the Geological Society of America, the Evolving Earth Foundation, the Texas Academy of Science and the Jackson School of Geosciences at The University of Texas at Austin.

"The new name is derived from Greek and Latin words for 'jaws of death,'" Lively says. "It was inspired by the incredibly large jaws of this specimen, which measure four feet (1.2 meters) in length."

An interesting feature of *Gnathomortis*' mandibles, he says, is a large depression on their outer surface, similar to that seen in modern lizards,

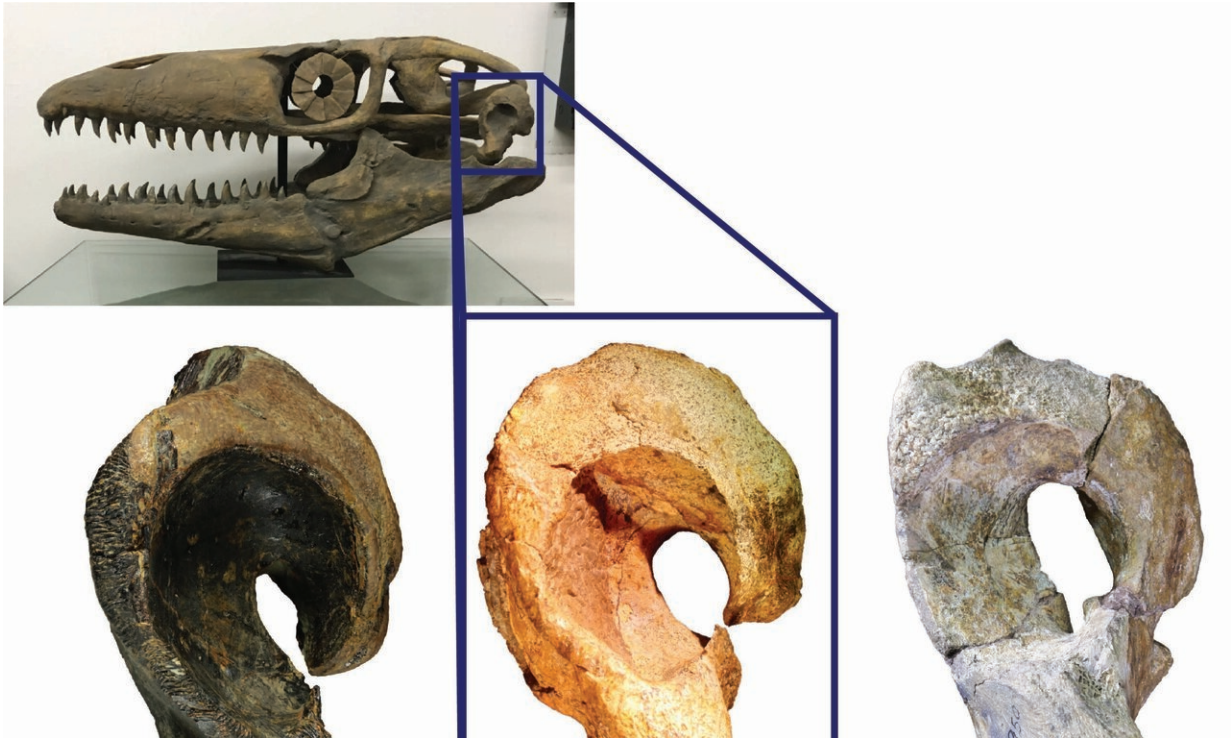
such as the Collared Lizard. The feature is indicative of large jaw muscles that equipped the marine reptile with a formidable biteforce.



Joshua Lively, curator of paleontology at the Utah State University Eastern Prehistoric Museum in Price, describes a new genus of mosasaur, *Gnathomortis stadtmani*, that roamed the oceans toward the end of the Age of Dinosaurs. Credit: Christopher Henderson

"What sets this animal apart from other mosasaurs are features of the quadrate—a bone in the jaw joint that also forms a portion of the ear canal," says Lively, who returned to the fossil's Colorado discovery site and determined the age interval of rock, in which the specimen was preserved. "In *Gnathomortis*, this bone exhibits a suite of characteristics that are transitional from earlier mosasaurs, like *Clidastes*, and later

mosasaurs, like Prognathodon. We now know Gnathomortis swam in the seas of Colorado between 79 and 81 million years ago, or at least 3.5 million years before any species of Prognathodon."



Features of the quadrate – a bone in the jaw joint that also forms a portion of the ear canal – of a mosasaur fossil discovered in Colorado tipped off Utah State University Eastern paleontologist Joshua Lively that the bones, originally identified as *Prognathodon stadtmanni*, were from a different genus of mosasaur. Credit: Joshua Lively

He says fossil enthusiasts can view Gnathomortis' big bite at the BYU Museum of Paleontology in Provo, Utah, and see a cast of the skull at the Pioneer Town Museum in Cedaredge, Colorado. Reconstructions of the full skeleton are on display at the John Wesley Powell River History

Museum in Green River, Utah, and in BYU's Eyring Science Center.

"I'm excited to share this story, which represents years of effort by many citizen scientists and scholars, as I kick off my new position at USU Eastern's Prehistoric Museum," Lively says. "It's a reminder of the power of curiosity and exploration by people of all ages and backgrounds."

More information: Lively, J.R. 2020. Redescription and phylogenetic assessment of 'Prognathodon' stadmani: implications for Globidensini monophyly and character homology in Mosasaurinae. *Journal of Vertebrate Paleontology*, www.tandfonline.com/doi/10.1080/2724634.2020.1784183

Provided by Utah State University

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