Scientists cite evidence that mosasaurs were warm-blooded

May 10 2016, by Richard Lecomte

Mosasaurs – an extinct group of aquatic reptiles that thrived during the Late Cretaceous period – possibly were "endotherms," or warm-blooded creatures, a paper co-written by a University of Alabama professor suggests.

Dr. Alberto Perez-Huerta's paper on endothermic mosasaurs— co-written with now-graduated doctoral student Dr. T. Lynn Harrell Jr. and Dr. Celina Suarez of the University of Arkansas—was published in a March issue of *Palaeontology*, a journal published by the Palaeontological Association.

Mosasurs were large aquatic reptiles that went extinct at the end of the Cretaceous period, about 66 million years ago. The paper focuses on a debate in the paleontological community over how mosasaurs employed "thermaregulation," or how they controlled their body heat—whether mosasaurs were endotherms (warm-blooded) or ectotherms, cold-blooded creatures taking their body temperature from the surrounding sea.

A paper published in 2010 suggested that mosasaurs were ectotherms, but Harrell and Perez-Huerta thought otherwise.

"There was a paper published in *Science* in 2010 reporting the thermoregulation in marine reptiles at the time of the dinosaurs focusing on the iconic extinct taxa: ichthyosaurs, plesiosaurs and mosasaurs," said Perez-Huerta, a UA associate professor of geology. "This conclusion

bothered me a bit because there was not a warm-blooded member organism used for comparison, and we know that size can matter in terms of thermoregulation."

The study by Harrell (lead author), Perez-Huerta and Suarez used an oxygen isotope analysis on mosasaurs fossils in the collection of UA's Alabama Museum of Natural History and compared them to fossils of known cold-blooded animals, such as fish and turtles, from the same period, as well as the bones of such contemporary warm-blooded organisms represented by birds – "true" endotherms.

"Lynn came up with good ideas for two chapters of his dissertation, already published as well," Perez-Huerta said. "We discussed looking for endothermy in mosasaurs given his knowledge on this group of extinct marine reptiles, the large collections of these fossil organisms in the Alabama Museum of Natural History and the scientific controversy related to the *Science* paper."

The study states that mosasurs' body-temperatures compared to the temperatures of modern, warm-blooded sea birds, suggesting that mosausurs were indeed warm-blooded. The study found that this tendency toward higher body temperature held despite the size of the particular mosasur genus or species – body size (gigantothermy) didn't matter.

"The findings of the present study support that mosasaurs were able to maintain a higher internal temperature independent of the ambient seawater temperature and were likely endotherms, with values closer to contemporaneous fossil and modern birds and higher than fish and turtles," the researchers said. "Although there are small differences of body temperature among mosasaur genera, these are independent of size, and thus inferred body mass, suggesting that mosasaurs were not gigantotherms."

Perez-Huerta noted that the study was possible thanks to the Alabama Museum of Natural History's extensive collection.

"This research study was the 'perfect storm' because Lynn is a very good vertebrate paleontologist, amazing collections at the natural-history museum—one of the best in North America for mosasaurs," Perez-Huerta said. "There are great outcroppings containing mosasaur fossils in Alabama. This research could not have been possible with the great fossil collections housed at the history museum on the University's campus, and the collaboration of their staff to facilitate our access."

More information: T. Lynn Harrell et al. Endothermic mosasaurs? Possible thermoregulation of Late Cretaceous mosasaurs (Reptilia, Squamata) indicated by stable oxygen isotopes in fossil bioapatite in comparison with coeval marine fish and pelagic seabirds, *Palaeontology* (2016). DOI: 10.1111/pala.12240

Provided by University of Alabama in Tuscaloosa