Early members of those two clades exhibited similar levels of intraspecific variation across the entire skeleton. However, the early mosasaurine *Clidastes propython* exhibited significantly higher variation within tooth-bearing elements. Temporally and phylogenetically, that homoplasy preceded an increase in disparity in those elements in later mosasaurines with the origin of taxa such as *Mosasaurus*, *Globidens*, and *Prognathodon*. Variability in the anatomical system associated with prey capture was likely associated with an increased propensity for the Mosasaurinae to diversify taxonomically, morphologically, and ecologically during the last 15 Ma of the Cretaceous compared to other mosasaur clades.

Funding Sources Geological Society of America; Evolving Earth Foundation; Texas Academy of Science Lundelius Fund for Vertebrate Paleontology; Jackson School of Geosciences; Christopher Bell, PhD.

Symposium: Dietary Reconstruction

APPLYING REFINED CLUMPED AND OXYGEN ISOTOPE TEMPERATURE CALIBRATIONS TO TEETH FROM *T. REX* AND *C. MEGALODON*

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Clumped isotope analysis of carbonates has been shown to be a reliable tool for reconstructing marine and terrestrial temperatures with a precision of a few degrees centigrade, independent from the oxygen isotopic composition of the mineralizing fluid. Preliminary results suggested that this thermometer may also be applied to bioapatites to determine body temperatures of extinct vertebrates, even though discrepant Δ_{47}-$1/T^2$ relationships were ascertained. The existing (bio)apatite Δ_{47} record has therefore been extended ultimately resulting in Δ_{47} and $\delta^{18}O$ temperature calibrations for (bio)apatite that range from 1 to 80 °C, which facilitates quantitative thermophysiological and paleoenvironmental studies on vertebrates. Here, we present results from applying these calibrations to fossil tooth enamel(oid) from a *T. rex* (66.75 ±0.75 Ma) and a *Carcharodon megalodon* shark (5.75 ±0.06 Ma) yielding temperatures and $\delta^{18}O_{H2O}$ values that are well in agreement with previous studies. The reconstructed body temperature of the adult *T.rex* specimen (RGM 792.000) falls within the range of modern endothermic vertebrates of 34 to 44 °C, while the calculated $\delta^{18}O_{H2O}$ of the body fluid is in line with previously reported mean surface water $\delta^{18}O_{H2O}$ values calculated from Late Cretaceous North American foreland basin sediments.
The reconstructed habitat temperature of *C. megalodon* agrees with previously published mean annual ocean temperatures derived from ecological niche models and furthermore matches the preferred habitat temperature range of its modern analogue, the lamniform great white shark (*Carcharodon carcharias*), of 16 to 22 °C. Additionally, the oxygen isotopic composition of the seawater surrounding the *C. megalodon* is, within error, indistinguishable from Miocene to Pliocene seawater-$\delta^{18}O$. The fact that consistent and reasonable temperatures and $\delta^{18}O_{H2O}$ values can be reconstructed on fossil tooth enamel(oid) from the Miocene and Cretaceous corroborates the potential of coupled oxygen and clumped isotope analyses on tooth enamel(oid) for paleontological studies on vertebrates.

Funding Sources This research was supported by German Science Foundation (DFG; BO 1548/8 and FI 948/7) within EXCALIBOR project and Leibniz IOW.

Late Cenozoic Mammalian Macroecology & Macroevolution

NEW INSIGHTS INTO THE PHYLOGENY OF EARLY MUROID RODENTS

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Muroid rodents are one of the most evolutionarily successful clades of mammals. Increasing interest in muroids has resulted in the publication of molecular phylogenies of living species. However, no attempt has been made to build phylogenies using characters of extinct representatives. We performed a cladistic analysis to shed light into the interrelationships of extinct species of murid and cricetid rodents. Preliminary results recover two large clades corresponding to Muridae and Cricetidae (mainly Cricetodontinae). The basalmost murid is '*Myocricetodon*' *sivalensis* from the middle Miocene of Pakistan. Further from the base of Muridae are the two species of *Dakkamyoides*, which form together the sister group to the clade that includes all the remaining murids. The latter is composed of two speciose lineages: *Mellalomys-Zramys-Aisamys* on one side and a clade that comprises the Myocricetodontinae, *Dakkamys*, *Paradakkamys*,