Ontario, Canada, [3]University of Alberta, Edmonton, Alberta, Canada

Pachycephalosauria is a clade of small-bodied ornithischian dinosaurs from the late Cretaceous of North America and Asia, known for their cranial ornamentation and thickened skull roofs. Most pachycephalosaurian specimens consist of isolated cranial bones, with frontoparietal skull elements being the most common. Post cranial elements are rare, so much of our understanding of pachycephalosaurian phylogenetics is based on incomplete cranial material. Thus, the phylogenetic relationships of Pachycephalosauria within Ornithischia are unclear. Relationships within Pachycephalosauria are also clouded by variation in ontogenetic development of cranial ornamentation and frontoparietal domes. Although X-ray computed tomography (CT) has been applied to pachycephalosaurian specimens for histological studies and nasal cavity reconstruction, CT data has not been used to assess the complete cranial skeleton. Here, we present the first complete cranial description for Pachycephalosauria informed by CT scans and corroborated by direct osteological observation. We reconstruct the cranium, mandible, and dental morphology of a *Stegoceras validum* specimen (UALVP-2), one of the best-preserved examples of North American Pachycephalosauridae. We find evidence that UALVP-2 is a subadult specimen based on the presence of multiple sutures with variable patency throughout the cranium. Partial suturing exists at the medioventral contact of the frontal and parietal bones but is completely fused in the coronal region of the cranial dome. We also find asymmetrical suture patency and fusion with two supraorbital bones present on the right and a singular fused supraorbital complex present on the left side of the skull. In contrast to previous anatomical descriptions, we did not find any fusion of the prefrontal bones with the supraorbital bones on either side of the skull. Our work underscores the utility of CT scanning for investigating key anatomical and developmental characteristics that will be critical for future clarification of pachycephalosaurian ontogenetics, systematics, and taxonomy. We encourage further efforts to digitize additional pachycephalosaurian specimens to facilitate comparative studies.

Funding Sources The Weintraub Fellowship
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Technical Session 16: Mammal Evolution (Friday, November 1, 2024, 1:45 PM)

A stable isotope-based investigation of mammalian paleoecology across the Cretaceous/Paleogene boundary in the Denver Basin, Colorado, U.S.A.

Breyak, Annie[1], Fricke, Henry C.[1], Wainwright, Jensen[2], Blumenthal, Scott[2], Chritz, Kendra[4], Lyson, Tyler[3], Krause, David W.[3], Chester, Stephen G.[5]

[1]Colorado College, Colorado Springs, Colorado, United States, [2]University of Oregon, Eugene, Oregon, United States, [3]University of British Columbia, Vancouver, British Columbia, Canada, [4]Denver Museum of Nature and Science, Denver, Colorado, United States, [5]Brooklyn College, New York City, New York, United States

Understanding and mitigating the effects of our ongoing biodiversity crisis requires a deep-time perspective on how ecosystems recover in the aftermath of environmental catastrophes. The mass extinction event at the Cretaceous/Paleogene (K/Pg) boundary (ca. 66 Ma) represents a natural laboratory wherein the tempo and mode of biotic recovery can be studied with high

chronostratigraphic resolution. Although the morphological evolution of mammals across this event has been reconstructed from skeletal remains, the exact nature of any changes in dietary preference remains unknown. A primary goal here is to fill this gap by investigating how ecological preferences of mammals, reflected by diet, changed from the Late Cretaceous, when they shared landscapes with dinosaurs, to the earliest Paleogene, when they did not.

To accomplish this, carbon and oxygen isotope ratios of fossil tooth enamel (bioapatite) were measured using laser-ablation mass spectrometry in order to infer animal diet and drinking water sources, which vary depending on the niche occupied by an animal. Fossil teeth were collected from two sites located within 400 meters of one another within the West Bijou Creek field area of the Denver Basin, one 9 meters (~128 ky pre-K/Pg) below the boundary (teeth from ceratopsian and hadrosaurid dinosaurs and the multituberculate mammal *Mesodma*, as well as gar fish scales), and the other 4 meters (~57 ky post-K/Pg) above (*Mesodma* teeth and gar fish scales).

Carbon isotope ratios ($\delta^{13}C$) of *Mesodma* tooth enamel vary significantly across the K/Pg boundary, with Late Cretaceous teeth having lower and more variable $\delta^{13}C$ (-10.1 to -16.4‰, n=4) and early Paleocene teeth having higher and less variable $\delta^{13}C$ (-5.3 to -9.0 ‰, n=5), the latter being similar to values for Late Cretaceous dinosaurs. These results suggest *Mesodma* had very different dietary behaviors following the extinction event, presumably a result of the disappearance of non-avian dinosaurs as well as 57% of North American plants, both of which made new food sources and niches available to them. These results also hint at a decoupling of behavioral change from morphological change, at least in the case of *Mesodma*, over 10 ky timescales. Isotopic analysis of teeth from other Late Cretaceous and earliest Paleogene mammalian taxa is ongoing and will hopefully allow for more detailed interpretations of ecological change across the K/Pg extinction event in the Denver Basin.

Funding Sources National Science Foundation (Frontier Research in Earth Sciences grant EAR-2317666).

Regular Poster Session 1 (Wednesday, October 30, 2024, 4:30 - 6:30 PM)

A fergliotheriid mammal from the Upper Cretaceous (Campanian) Aguja Formation of Texas, USA

Brink, Alyson A.[1,2], Krause, David W.[3,4], Wick, Steven L.[5]

[1]School of Biological, Environmental, and Earth Sciences, University of Southern Mississippi, Hattiesburg, Mississippi, United States, [2]Department of Vertebrate Paleontology, Sam Noble Oklahoma Museum of Natural History, Norman, Oklahoma, United States, [3]Department of Earth Sciences, Denver Museum of Nature & Science, Denver, Colorado, United States, [4]Department of Anatomical Sciences, Stony Brook University, Stony Brook, New York, United States, [5]Texas Vertebrate Paleontology Collections, University of Texas at Austin, Austin, Texas, United States

Fergliotheriids are a very poorly known and phylogenetically enigmatic group of allotherian mammals with unique and distinct transverse “crest and groove” molariform teeth. Fergliotheriids currently include only *Fergliotherium* (including the junior synonyms *Vucetichia* and *Argentodites*) and *Trapalcotherium*, both known from the Late Cretaceous (Campanian–Maastrichtian) of Argentina. Another possible fergliotheriid, *Magallanodon*, is known from the Late Cretaceous (late Campanian–early Maastrichtian) of Chile.

A single fragmentary tooth (TMM 45947-244) representing a probable fergliotheriid was