Langston Lecture

Hip deep in giant snakes
climate, environment, and the evolution of the vertebrate body plan

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The serpent is the most subtle of all the wild animals, or so it is written. Basically elongated lizards, snakes have one of the most specialized, yet simplest spines of all the vertebrates making them an almost literal example of vertebrate evolution because their skeleton consists of little more than a back and tail. They have plentiful but underutilized fossil record that has plenty to say about how vertebrate body plans have evolved and how changing environments have impacted life on Earth. In collaboration with colleagues and students, we have developed likelihood algorithms to analyze the often fragmentary and difficult remains of snakes. From it we have learned about *Titanoboa*, the largest land vertebrate in the Paleocene aftermath of the K-Pg extinction and how Cenozoic climates have constrained the evolution of snakes. We have also learned that, despite the apparent homogeneity of snake bodies, the locomotor specializations of snakes have a high fidelity to the landscapes in which they live, landscapes that have changed dramatically over the Cenozoic. And despite the apparent simplicity of their skeletons, they are more regionalized than the ancestors of mammals turning our understanding of the evolution of vertebrate complexity on its head. Using these topics as examples, this talk will explain how quantitative analysis of morphology has allowed vertebrate paleontologists to use the fossil record to answer new questions about the history of life.

Brown bag talk

Paleontology and US National Monuments: Why downsizing Grand Staircase-Escalante and Bears Ears is bad for science

In 2017, Grand Staircase-Escalante (GSENM) and Bears Ears (BENM) national monuments, both in Utah, were cut by 47% and 85% respectively. These monuments were established under the Antiquities Act to protect paleontological resources, but the Trump administration asserted that the same protection could be provided with smaller boundaries. The Society of Vertebrate Paleontology and other plaintiffs filed suit arguing that presidents lack constitutional authority to rescind protection and (2) that downsizing

substantially weakened protection for paleontological sites. National monuments exist to protect specific historic, archaeological, or scientific objects. GSENM was established in 1996 to protect paleontological and geological resources, motivated by discoveries of unique Late Cretaceous mammals. Its original boundaries enclosed units from Permian through Cretaceous, all with "medium" to "high" potential for paleontological resources. The reductions systematically excluded all of the Permian (including the type section of the Kaibab Fm.) and most of the Triassic and Jurassic sections. More than 1,200 scientifically important localities were excised, including many of the original Cretaceous mammal sites. BENM was established in 2016 to protect archaeological and Pennsylvanian through Cretaceous paleontological sites. The reduction systematically excluded the Paleozoic units, including important early tetrapod sites, and most of the Triassic sections, some of which were pilfered prior to monument protection. Verifiability is a key feature of the scientific process, and monument status ensured that sites were protected in perpetuity for reinvestigation by new generations of scientists. Despite the Paleontological Resources Preservation Act, sites in the excluded areas have considerably less protection and lower scientific priority than they did within the original monuments.