Well-preserved skeleton reveals the ecology and evolution of early carnivorous mammals

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Photograph of typical fossiliferous exposures of the Willwood Formation in the southern Bighorn Basin. Credit: K. Rose.

Prior to the rise of modern day mammalian carnivores (lions and tigers and bears, as well as weasels, raccoons, wolves and other members of the

order Carnivora), North America was dominated by a now extinct group of mammalian carnivores - the hyaenodontids. While fossils of hyaenodontids are relatively common from the early Eocene (between 50 and 55 million years ago), most of these are specimens of teeth. A new find of a nearly complete skeleton, described in the most recent issue of the *Journal of Vertebrate Paleontology*, has allowed for a more detailed study of the ecology and evolutionary relationships of these early carnivores.

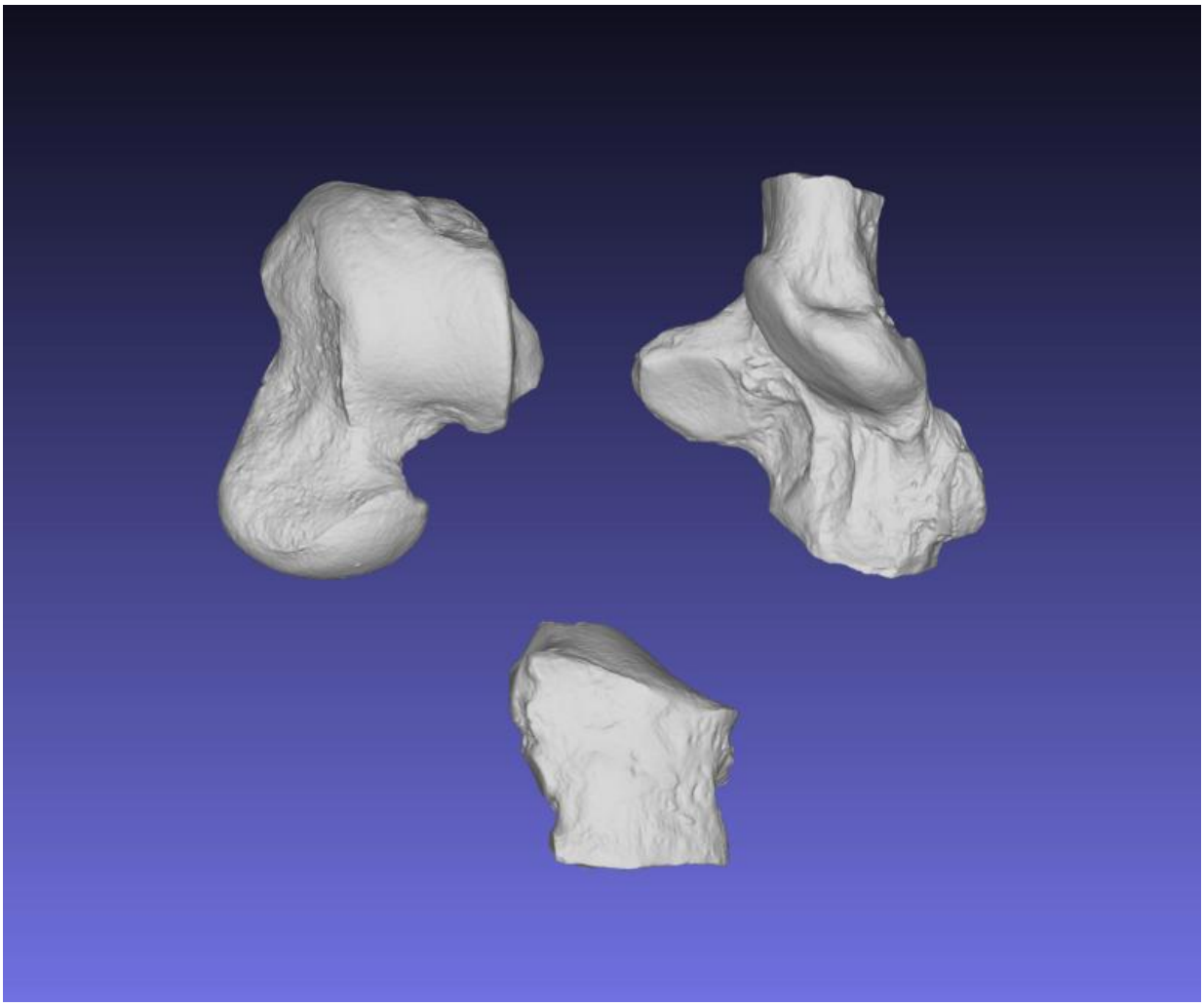
The recent find, a skeleton of the hyaenodontid Galecyon, was found in an area of Wyoming well-known for fossils of this age. Lead author Shawn Zack of the University of Arizona says, "The skeleton of Galecyon shows why we keep looking for fossils even in places where we already have a lot of specimens. When this skeleton was found, tens of thousands of mammalian fossils had been collected from the Bighorn Basin, but this was the first decent skeleton of this animal."

Galecyon was about the size of a modern coyote, and the new find allowed the researchers, Zack and co-author Ken Rose of Johns Hopkins University, to infer the locomotory abilities of this fossil taxon. "Galecyon may have moved around like a living wolverine or skunk," says Zack, "probably not much of a runner, but spending most of its time on the ground, while some of its relatives spent a lot more time in the trees."

In addition to telling us something about the way this fossil animal lived, the fossil also allowed the researchers to investigate the ecological and evolutionary relationships among hyaenodontids. Since teeth are the most commonly found elements of the skeleton, this is normally done using dental characters, but the new specimen allows for the addition of characters in other parts of the skeleton.

"This study is a 'tour de force' in terms of the completeness of the

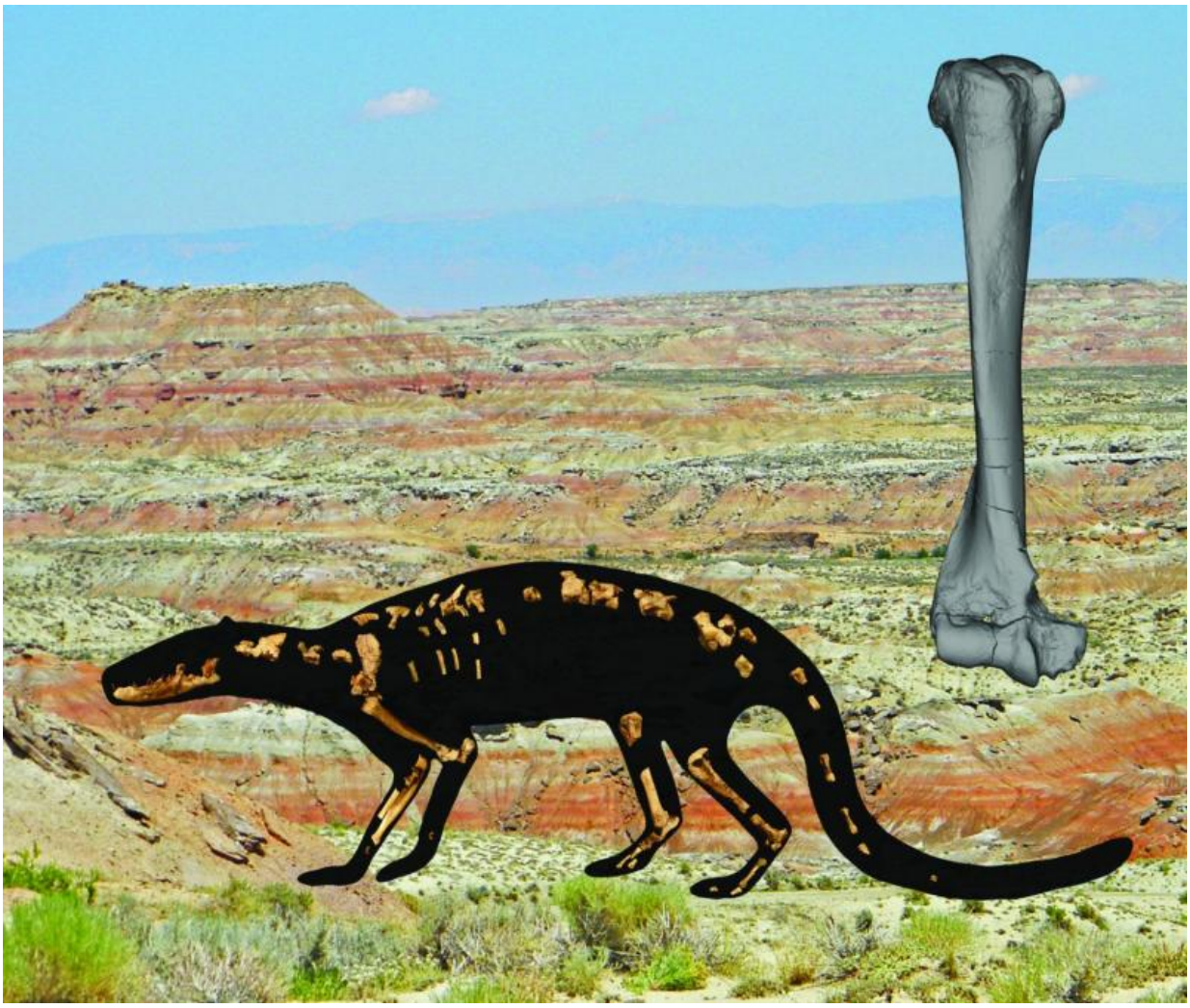
description, imaging and analysis - a great example of how to combine systematics with functional morphology and phylogenetic reconstruction to produce a solid result and testable hypotheses for future work" says Gregg Gunnell, a paleontologist from Duke University not involved with the study.



The ankle bones of Galecyon in dorsal (top) view. Elements are (clockwise from top left) astragalus, calcaneus, and cuboid. Credit: S. Zack.

"This study shows that postcranial and dental morphology support different patterns of hyaenodontid relationships. That is an indication that there is still a lot to learn about hyaenodontid evolution," says Zack. In addition, "This study shows that early hyaenodontids had diverse habitat preferences, which helps explain how several different hyaenodontids were able to coexist in the same faunas, despite having similar diets and comparable body sizes."

Humerus (arm) bone of Galecyon in anterior (front view). Credit: S. Zack.



An artist's rendition of the shape of Galecyon, with its fossilized bones laid out anatomically. Background, the Willwood Formation in the southern Bighorn Basin of Wyoming, where the bones were found. Right, the humerus (arm) bone of Galecyon. Credit: Courtesy of the *Journal of Vertebrate Paleontology*

More information: Shawn P. Zack et al. The postcranial skeleton of : evidence for morphological and locomotor diversity in early Hyaenodontidae (Mammalia, Hyaenodontida) , *Journal of Vertebrate Paleontology* (2015). DOI: 10.1080/02724634.2014.1001492