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Study offers new insights into the biology of extinct giant reptiles



Anteosaurus attacking Moschognathus

Image: Alex Bernardini

A University of Cape Town (UCT) study investigating the bone [histology](#) (microscopic structure) of multiple skeletal elements of dinocerophalians has found that the long bones of the herbivores (*Keratocephalus*, *Moschops* and *Struthiocephalus*) and omnivore (*Jonkeria*) had thick bone walls that extended right into the middle of the bone.

Reporting their findings, the palaeontologists said such micro-anatomical features occur in semiaquatic animals, and therefore suggests such a lifestyle for these animals.

Dinocephalians were hippo-sized precursors of mammals that lived about 265 to 260 million years ago. These bulky, giants had extremely thick-walled skulls, and some had peculiar, bony horns, bumps and [protuberances](#). They were particularly abundant in the Karoo region of South Africa, although their fossils have also been found from Permian aged rocks of Russia, Zimbabwe, Brazil, Tanzania, and China.

Co-principal investigator Professor Anusuya Chinsamy-Turan of the UCT Department of Biological Sciences shared that the biology and ecology of the dinocephalians have been shrouded in mystery with no clear consensus of whether they were terrestrial or amphibious.

"Some of them, like *Anteosaurus*, with its long snout and mouthful of sharp, fang-like teeth were clearly carnivorous, whereas others, such as, *Moschops* and *Jonkeria*, had numerous, small, leaf-shaped teeth with serrated edges suggesting that they were plant-eaters or omnivorous.

"Although dinocephalians have been known since the early 1900s, there is still much that we do not know about these extinct early relatives of mammals. However, in the last two months our knowledge of these animals has trebled with the publication of three studies about the microscopic structure (histology) of their bones. Such studies of the bones of extinct animals are known to provide much information about the biology of these animals," she said.

Given the abundance of dinocephalians in South Africa, Chinsamy-Turan finds it surprising that the histology of their bones has been so under-studied.

Commenting on the findings, lead investigator UCT's Dr Mohd Shafi Bhat, said the study of the bone microstructure of the predatory dinocephalian, *Anteosaurus*, suggests that it was more terrestrial, although it may have occasionally inhabited water ponds like the hippopotamus.

Dr Christen D Shelton said: "Our study has shown that when the dinocephalians were young they grew rapidly (like most modern mammals) without any stoppages, whereas later in life they grew in an episodic manner". Shelton is a former postdoctoral researcher at UCT, now based at Rogers State University in Oklahoma (USA).

Access the three research articles:

- [Bone histology of dinocephalians \(Therapsida, Dinocephalia\): palaeobiological and palaeoecological inferences.](#)
- [Bone histology of the graviportal dinocephalian therapsid *Jonkeria* from the middle Permian Tapinocephalus Assemblage Zone of the Karoo Basin of South Africa.](#)
- [Inter-element variation in the bone histology of *Anteosaurus* \(Dinocephalia, Anteosauridae\) from the Tapinocephalus Assemblage Zone of the Karoo Basin of South Africa.](#)

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