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Synchrotron and other CT data of South African Dinocephalians

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1.Introduction
Dinocephalians are a non-mammalian therapsids (mammalian ancestors) that lived during the Permian (˜260 million years ago) [1,2, 3]. They are divided into two main groups: carnivorous (anteosaurs) and herbivorous (tapinocephalians) [1,4,5]. What unites dinocephalians as a group is their disproportionately large heads and excessively thick skulls, which can be around 10 cm thick [6].
Deciphering the evolutionary relationship between species of dinocephalians has been historically difficult, primarily due to two factors: (a) a lack of postcranial material and (b) of detailed analysis of the available cranial material. The primary cause of the latter is the extremely thick skulls that studying the braincase (a highly informative anatomical region for evolutionary studies) difficult. Recent advancements in synchrotron technology and accessibility have enabled the scanning of several dinocephalian skulls, providing us with much greater detail than ever before.

2.Results
The scanning of specimens AM 4950 and BP/1/8152 at the European Synchrotron Facility has enabled a more detailed comparison of dinocephalian cranial sutures. For AM 4950, a cranial abscess was discovered that may shed light on therapsid immunology and dinocephalian social behavior [7,8]. Current work on specimen BP/1/8152, including its cranial sutures and braincase, has allowed it to be identified as a juvenile dinocephalian and is currently illustrating how extreme bone growth occurs in dinocephalians. Both these specimens are just two examples of the benefits of synchrotron to mammalian evolution.

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