

Our Ref:



an agency of the  
Department of Arts and Culture

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CaseID: 18723

Date: Thursday June 09, 2022

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## Letter

### In terms of Section 32(19) of the National Heritage Resources Act (Act 25 of 1999)

Attention: Dr Jonah Nathaniel Choiniere  
Evolutionary Studies Institute  
University of the Witwatersrand  
Private Bag 3, WITS 2050

Please see attached successful ESRF application for beam time as well. This loan seeks to obtain high-resolution CT data from a variety of vertebrate specimens in care of the Iziko South African Museum to support student led research projects. The first project, which will collect data for the PhD of Bailey Weiss (Wits ESI), seeks to non-destructively scan the limbs of a variety of early branching crocodylomorphs for palaeohistological reconstruction. These specimens represent either the best or the only postcranial material for their respective species, and by scanning them at high resolution we hope to obtain data suitable for reconstructing their growth history, and data suitable for imaging their ankle morphology. Growth history is poorly understood in extinct crocodylomorphs, and while living crocodiles have slow metabolic rates and slow growth, their common archosaurian ancestors had much more rapid growth and potentially higher metabolic rates. Understanding when the crocodylomorph line changed its growth patterns is therefore of macroevolutionary importance. Surprisingly, the earliest crocodylomorphs show evidence of having highly active, terrestrial lifestyles, with erect postures and running capability that is lacking in living members of the group. Our scans of the ankle of *Orthosuchus* in particular will be useful for understanding the mechanics of these postures because of the intrinsic role the ankle plays in terrestrial locomotion. These data are tightly linked to the understanding of growth and metabolism from the first objective, and we hope that by integrating locomotory data with growth history data, we can gain a better picture of what the life habits of the earliest crocodylomorphs were. The resolution necessary for palaeohistology ( $\pm 7$  micron voxel size) precludes scanning at any facility in South Africa. The second project, which will collect data for the MSc of Lutendo Mukwevho (Wits ESI, cosupervised by Roger Smith and Jonah Choiniere), seeks high resolution anatomical imagery of two exquisite SAM specimens. The first is an aggregation of more than 20 *Youngina capensis* specimens, preserved in a single block that perhaps represents a burrow terminus. Understanding the taphonomy of this fossil will allow us to determine its

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**depositional history and whether the aggregation represents information on brooding or huddling behavior in one of the earliest reptiles. The second specimen is a therapsid (*Olivierosuchus* sp.) postcranial skeleton that bears gut contents containing a small reptile. This specimen provides rare direct fossil evidence of predator/prey interactions in the early Triassic, and by imaging the gut contents we hope to determine the taxonomic identity of the prey item. Both of these specimens have been examined using lab-based CT scanning at the Wits Microfocus facility, but they suffer from dense metallic oxide inclusions and could not be adequately imaged for study.**

Dear Prof Jonah Choiniere,

Thank you for your application to temporarily export five fossil crocodylomorph, therocephalian and diapsid specimens for synchrotron analysis at the European Synchrotron Radiation Facility, France.

SAHRA has reviewed the application and has decided to approve it.

We wish you every success with this project.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

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Ragna Redelstorff, PhD  
Heritage Officer  
South African Heritage Resources Agency

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Phillip Hine

Manager: Archaeology, Palaeontology and Meteorites Unit  
South African Heritage Resources Agency

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**ADMIN:**

Direct URL to case: <https://sahris.sahra.org.za/node/598481>

**Terms & Conditions:**

1. This approval does not exonerate the applicant from obtaining local authority approval or any other necessary approval for proposed work.
2. If any heritage resources, including graves or human remains, are encountered they must be reported to SAHRA immediately.
3. SAHRA reserves the right to request additional information as required.