Early Hominin Meat Consumption - primate study

Our Ref:

an agency of the
Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: info@sahra.org.za
South African Heritage Resources Agency | 111 Harrington Street | Cape Town
P.O. Box 4637 | Cape Town | 8001
www.sahra.org.za

Enquiries: Ragna Redelstorff
Tel: +27 (0)21 202 8651
Email: rredelstorff@sahra.org.za
CaseID: 13977

Date: Monday July 15, 2019

Letter

In terms of Section 32(19), 35(4) of the National Heritage Resources Act (Act 25 of 1999)

Attention: Dr Tina Luedecke
Senckenberg Forschunginstitut und Naturmuseum

The overarching goal for this project is to reconstruct the tropic level of southern African Australopithecus and how much meat – compared to plant-based resources – these early hominins consumed in the Pleistocene. These essential deficits of knowledge can be addressed by nitrogen isotopes (?15N) studies, because it can inform about the individuals position in the (paleo)food chain. Until now, determination of ?15N data was only possible on (hominin) specimens younger than 100,000 years due to the need of large quantities of fossil collagen which were only insignificantly geochemically changed due to postmortem alteration. In recent years, a new biogeochemical method measures ?15N values with high precision on extremely small sample sizes, which finally permits to analyze Pleistocene samples, e.g., fossil (hominin) enamel. In cooperation with the Max Planck Institute for Chemistry (MPIC) in Mainz (Germany), A baseline ?15N values of faunal elements which were potentially available to Australopithecus will be established to then ultimately analyze the hominin tooth enamel itself. The new ?15N results will be unique and, for the first time, allow the reconstruction of trophic level and meat consumption of hominins from the Pleistocene. 1st step of the project: Baseline ?15N values of herbivorous, carnivorous and omnivorous Sterkfontein Member 4 fauna: Prior to evaluating ?15N data in hominin tooth fragments directly, we need to establish baseline nitrogen isotope data of Sterkfontein fauna, if possible including all species that were available to early hominins. After consulting with Prof. Marion Bamford and Dr. Dominic Stratford, we decided to focus on Member 4, because it inhabits, next to Australopithecus (sp. and africanus) an extremely diverse fossil fauna. Herbivores are the most common group with abundant bovids species. Member 4 carnivore fossils are represented by felids, canids, machairodontins and hyaenids. Omnivorous species (e.g. genets and bat-eared foxes) are also present in the fossil assemblage. Hence, the highly divers fossil fauna, which is housed at the collection of the Evolutionary Studies Institutes (ESI) at Wits, serves as a great baseline proxy for the nitrogen isotopic flux in a complex Pleistocene southern African food web. Teeth fragments can be used for this method and no complete teeth have to be destructed for sampling. 2nd step of the project: Trophic level and meat consumption of Australopithecus and other primates: After the baseline ?15N values of the diverse fauna is produced in the first step, nitrogen isotope ratios of the hominin teeth itself will be analyzed. We plan to measure seven individual tooth fragments to gain a robust dataset. The new nitrogen isotopic results will be

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unique and the reconstruction of trophic level and especially meat consumption of hominins this old has never been done before. Again, Australopithecus teeth fragments can be used for this method and no complete teeth have to be destructed for sampling. Moreover, we will analyze ?15N of other primates as well (Cercopithecoids, Parapapio and Papio) to compare the diet of these primates to the ones of early hominins.

Dear Drs B. Zipfel and T. Lüdecke,

Thank you for your application to sample eight (8) non-hominin primate teeth and seven (7) hominin teeth from Sterkfontein Member 4 and permanently export the samples for isotope analysis at Senckenberg Biodiversity and Climate Research Centre, Frankfurt, Germany.

It is noted that a preliminary study on bovid and carnivore teeth (SAHRIS CaseID 13608, PermitID2898) to test the feasibility of this study was successful as detailed in a submitted permit report. The sampled primate non-hominin teeth have not been analysed as yet.

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

Ragna Redelstorff
Heritage Officer
South African Heritage Resources Agency

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ADMIN:
Direct URL to case: http://www.sahra.org.za/node/524743

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.