

## **Request for an Export permit for Radiocarbon Dating of Holocene Layers in Excavation 1 of Wonderwerk Cave, Northern Cape Province**

**Request from:** David Morris (MacGregor Museum, Kimberely, SA) and Liora Kolska Horwitz (The Hebrew University, Jerusalem, Israel).

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As part of ongoing research at Wonderwerk Cave, Northern Cape Province, we would like to undertake additional dating of material from the Holocene layers of the site: (a) charcoal samples, (b) bovid teeth.

(a) A recent re-compilation by our team of all Holocene radiocarbon dates for Excavation 1, has found several gaps in the chrono-stratigraphy. These gaps have limited our understanding of site formation processes, the timing of human occupations and palaeoclimatic reconstructions. Thirteen charcoal samples were selected for dating (which have been examined and identified by Prof. Marion Bamford - BPI, University of Witwatersrand- who is studying the material) and these are intended to fill the gaps in the sequence and enable us to have tighter chronological control of the archaeological record from this site.

(b) A second subsidiary project entails radiocarbon dating of teeth of two fossil bovid species from the Holocene layers of Excavation 1 at Wonderwerk Cave, Northern Cape Province. One of the fossil teeth represent the extinct springbok *Antidorcas bondi*, a species thought to have become extinct in southern Africa ca. 7000 years ago. The Wonderwerk Cave specimens both derive from a context with problematic stratigraphic attribution. They may date to either ca. 8000-7000 BP (Stratum 4c) or 6500-5600 BP (mid-4b) depending on the archaeological layer from which they derive. If from Stratum mid-4b then it may represent the last appearances of this species in the sub-continent. To resolve this issue, we would like to directly radiocarbon date one of the teeth. Since the 14C sampling procedure is destructive, we have arranged to make a permanent digital record of the teeth beforehand using micro-ct scans, work that will be undertaken by Dr. Frikkie de Beer at Necca (Pelendaba, Pretoria).

The second tooth is that of a blesbok (*Damaliscus pygargus phillipsi*). The known biogeographic distribution of this species included the highveld of the Free State and Gauteng provinces, parts of western and north-western KwaZulu-Natal, western Lesotho and the northern Karoo in the Eastern and Northern Cape. Consequently, its natural distribution would not have included the Wonderwerk Cave region. The Wonderwerk specimen may thus represent a unique record of this species in the arid interior. It derives from Stratum 3a III, a layer that has been dated by association to 2799-2096 BP. In order to refine the chronology of the appearance of this species in the Wonderwerk region, the tooth will be sent for radiocarbon dating. As for the *Antidorcas* teeth, before being sent for dating, a permanent digital record of this tooth will be made at Necca using micro-ct scans.

Copies of all scans will be available to researchers from the Wonderwerk Cave research group.

**Dating Facility:** All samples will be dated at the Oxford Radiocarbon Accelerator Unit (ORAU), Oxford University, UK.

The dating will be carried out by Ms. Michaela Ecker (supervised by the Oxford dating laboratory staff), as part of her DPhil thesis on the isotopic analysis of the fauna of Wonderwerk Cave (under the supervision of Prof. Julia Lee-Thorpe, Oxford University).

Ms. Ecker has received a special grant from Oxford University to undertake this radiocarbon dating study.

**Transport of Samples:** All samples will be couriered to the University of Oxford from South Africa.

Since the analyses are destructive, no samples will be returned to South Africa.

**Detailed list of samples for Dating from Wonderwerk Cave, Excavation 1:**

<b>Charcoal Samples</b>						
<b>Layer</b>	<b>quadrat</b>	<b>piece/specimen</b>	<b>Family</b>	<b>genus</b>	<b>species</b>	<b>w</b>
4aIII	Q21	B	Ochnaceae	<i>Ochna</i>	<i>serrulata</i>	0
4aIII	Q22	B	Apiaceae	<i>Heteromorpha</i>	<i>trifoliata</i>	0
4aIII	Q23	A	Ochnaceae	<i>Ochna</i>	<i>pulchra</i>	0
4aIII	Q23	B	Heteropyxidaceae	<i>Heteropyxis</i>	<i>natalensis</i>	0
4aIV	Q21	A	not identified			0
4aIV	Q21	B	Anacardiaceae	<i>Searsia</i>	<i>lancea</i>	0
4aIV	R 21	A	Verbenaceae	<i>Vitex</i>	<i>mombassae</i>	0
4aLF	R 23	A	Apiaceae	<i>Heteromorpha</i>	<i>trifoliata</i>	0
4aLF	R 23	B	Boraginaceae	<i>Cordia</i>	<i>caffra</i>	0
4aLF	R 23	D	Verbenaceae	<i>Vitex</i>	<i>mombassae</i>	0
4bl	Q24	A	Anacardiaceae	<i>Searsia</i>	<i>lancea</i>	0
4bl	T25	B	Anacardiaceae	<i>Searsia</i>	<i>lancea</i>	0
4bl	T25	C	Lamiaceae	<i>Vitex</i>	<i>mombassae</i>	0
<b>Bovid Teeth</b>						
3aIII	T28	lower M <sub>3</sub>	Blesbok	<i>Damaliscus</i>	<i>pygargus phillipsi</i>	
4c /mid-4b	R27	lower left P <sub>3</sub> and M <sub>1</sub>	extinct springbok	<i>Antidorcas</i>	<i>bondi</i>	