

An Anthracological study at Jubilee Shelter: Woody recollection economy, fire use and past landscape during the final Later Stone Age in Magaliesberg mountain, South Africa.

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Abstract

Archaeological charcoal analysis is a well-established technique for the study of past landscape and climate but, above all to understand the selection/management of wild woody resources and fire use during prehistoric times. This project applies an anthracological analysis to combustion structures (hearths), of the Jubilee Shelter, a Later Stone Age (LSA) archaeological site located in South Africa. The site has a continuous Holocene sequence with high potential to study hearth's functionalities, wild woody resources (used as sources of fire, and for other purposes), as well as changes in the landscape identifiable through the presence/absence of some woody species present in the hearths. This way, paleoethnobotanical data can help to light up on changes in survival strategies of hunter-gatherers, and consequent impacts on modern human cognition, social organization, and technology in the studied area.

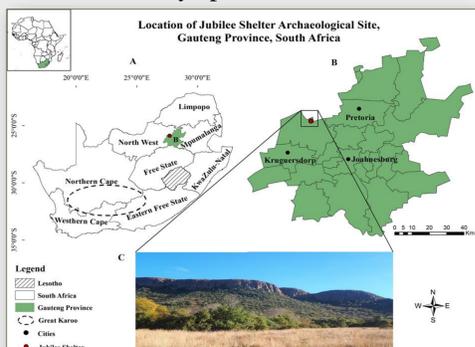
1. Introduction

Charcoals remains scattered in well stratified, and dated LSA layers from archaeological sites have contributed to reconstruct past environments and climate from several regions in South Africa, mainly located on the coastal regions of the country. The potential wood use, and collection strategies have been taken into consideration when interpreting the vegetation, and climate signature. Nevertheless, **the use of fire, and the management of wild resources by previous Stone Age hunter-gatherer communities remains poorly explored.**

This project proposes the analysis of charcoal collected in seven sequenced hearths, identified in different levels of occupations spanning the Later Stone Age (c. 8500 BP.) to Later Iron Age (c. 1550 BP.), in the archaeological site of Jubilee Shelter, located in Magaliesberg mountain, South Africa (Map 1). Hearth deposits, composed of its main by product – charcoals, are perfect to study the role of fire across time, and the management of wild woody resources. This is important to understand possible **cultural transformations across time, as well as human adaptations, and evolution to their environment in the studied area during the Later Stone Age, that need more research.**

2. Objectives

- 1 ⇒ Identify the woody species present in seven hearths (Fig. 1);
- 2 ⇒ Analyse the charcoal present in the sediments surrounding the hearths;
- 3 ⇒ Investigate the hearth functionalities, and their spatial distribution through time at the site, correlating with other artefacts in the same hearth area;
- 4 ⇒ Characterize the surrounding landscape of the archaeological site through the woody species identified.



Map 1 - Jubilee Shelter location. A) South Africa showing the Provinces and the location of Great Karoo (dashed); B) Gauteng Province, and C) Magaliesberg Mountain.

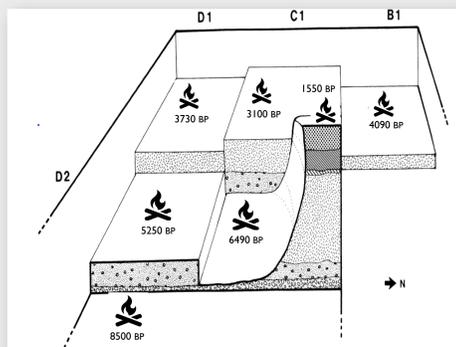


Figure 1 - Jubilee Shelter: Schematic representation of the radiocarbon dates made in charcoals from hearths (symbols). Source: Wadley, 1986, p. 56.

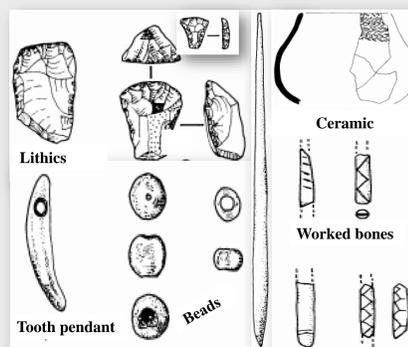


Figure 2 - Part of the artefact recovered in Jubilee Shelter. Source: Wadley, 1986, p. 56.

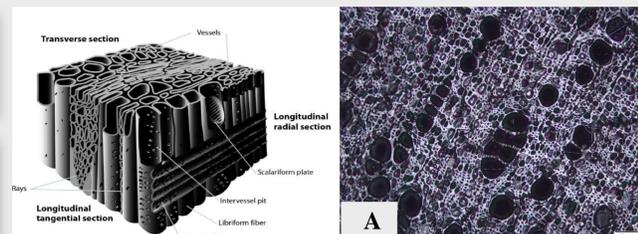


Figure 3 - The three anatomical section of charred wood.



Figure 4 - An example on how to analyse charcoal fragments. A archaeological charcoal specimen (*Diospyros* sp.) - reference collection of the University of Algarve.

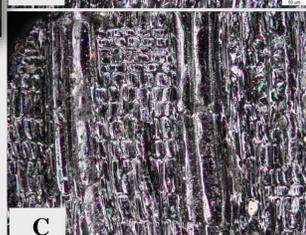
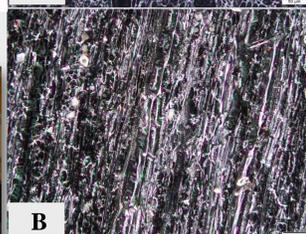
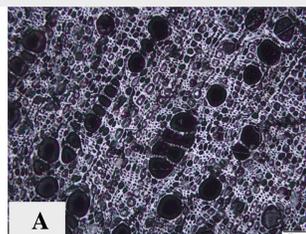


Figure 5 - *Diospyros* sp. A archaeological charcoal specimen A) Transverse section; B and C) Tangential/radial longitudinal section.

3. Methodology

The charcoal fragments present in the seven hearths will be analysed in their entirety or a sub-sample of at least 300 fragments will be made for hearths with high fragment density. This number is considered the minimum for the appearance of the vegetal spectrum (Chabal *et al.*, 1999), allowing both paleoethnobotanical and paleoecological interpretations.

In each fragment the three main sections will be observed: transverse (TS), tangential, and radial longitudinal (TLS/RLS) (Fig. 3), using the reflected light microscope (Olympus BX51TRF) with 50x, 200x and 500x magnification (Fig. 4). All fragments will be photographed (Olympus Stream Essentials image analysis software), measured (per/mm² and μ) and statistics will be performed.

To **recognize the modern vegetation** of the Province under study the Field Guide to Trees of Southern Africa (Van Wyk & Van Wyk 2013) will be used.

For the **anatomic identification of the fragments studied** it will be used:

- 1) the modern and fossil charcoal reference collection stored in the Evolutionary Studies institute (Witwatersrand University, Johannesburg, South Africa);
- 2) online references that have images of their cellular structure (e.g. Allott 2005; Lennox 2016; House & Bamford 2019);
- 3) the online database Inside Wood for hardwood identification and description (Wheeler 2011, InsideWood. 2004-onwards).

4. Significance of the Project

Jubilee Shelter, discovered and excavated in the 1980s, is an exceptional LSA archaeological site where it has been possible to obtain data (Fig. 2) on the culture, technology, settlement patterns, social activities, mobility, gift exchange, diet, and past environment of the human groups based in this area from almost all the Holocene period (Wadley 1986).

Specific anthracological research was not yet undertaken in Jubilee shelter. In this way, this study becomes important as it is one of the **few inland archaeological sites in South Africa with charcoal assemblages.**

Furthermore, it will be possible to contribute for the **enrichment of African Anthracology** with the creation of an **anatomical Atlas of wood**, specific to and so far unpublished for the Magaliesberg area. It will be a unique anatomical Atlas for this region, **accessible online, which will complement this project.**

Bibliography

- CHABAL, L., FABRE, L., TERRAL, J.-F., THÉRY-PARISOT, I., 1999. IN: La botanique. Paris: Editions Errance. pp: 43-104
 VAN WYK, B. & VAN WYK, P. 2013. Field Guide to Trees of Southern Africa. 2^o Edition. Published by *Striok Nature*
 HOUSE, A & Bamford, M. 2019. Investigating the utilisation of woody plant species at an Early Iron Age site in KwaZulu-Natal, South Africa, by means of identifying archaeological charcoal. IN: *Archaeological and Anthropological Sciences*
 LENNOX, S., J. 2016. *Woody Taxa from Charcoal in Sibudu's Middle Stone Age Hearths*. PhD thesis. University of the Witwatersrand, Johannesburg.
 WHEELER, E.A. 2011. InsideWood - a web resource for hardwood anatomy. IN: IAWA Journal, 32(2): 199 – 211. Cape Town.
 WADLEY, L. 1986. Segments of time: A Mid-Holocene Wilton Site in the Transvaal. IN: *The South African Archaeological Bulletin*.

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