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Small mammals from Marine Isotope Stage 5 at Klasies River, South Africa—Reconstructing the local palaeoenvironment

Turid Hillestad Nel^{a, b, *}, Sarah Wurz^{c, d}, Christopher Stuart Henshilwood^{d, e}

^a Department of Archaeology, History, Cultural Studies and Religion, University of Bergen, P.O. Box 7805, 5020, Bergen, Norway

^b Western Norway University of Applied Sciences, Campus Sogndal, P.O. Box 133, 6851, Sogndal, Norway

^c School of Geography, Archaeology and Environmental Studies, Private Bag 3, University of the Witwatersrand, Johannesburg, 2050, South Africa

^d SFF Centre for Early Sapiens Behaviour (SapienCE), University of Bergen, Post Box 7805, 5020, Bergen, Norway

^e Evolutionary Studies Institute, Private Bag 3, University of the Witwatersrand, Johannesburg, 2050, South Africa

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ABSTRACT

Klasies River, a significant Middle Stone Age (MSA) site, preserves remains of anatomically modern humans and a 21 m sequence of human habitation that shows use of sophisticated lithic technology and systematic exploitation of marine and terrestrial resources. In this paper micromammals recovered from the lower MSA sequence (MSA I and MSA II) at Klasies River Main site have been analysed to provide proxy data for palaeoenvironmental reconstruction. Small mammals recovered from 183 separate layers ensure a detailed record of local climate and vegetation during Marine Isotope Stage (MIS) 5. Taphonomic analyses indicate that avian predators accumulated the micromammals. Analysis of post-depositional processes has provided information on intra-site variability and utilisation. The palaeoenvironmental reconstruction shows changes in rainfall seasonality within MIS 5. There was transient movement towards more aseasonal rainfall and significant alterations in the vegetation composition from MIS 5e to MIS 5a. Our study adds new insights to palaeoenvironmental conditions on the Cape coast during MIS 5.

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1. Introduction

During the Middle Stone Age (MSA) of southern Africa, climatic fluctuations may have had an important impact on the environment in which modern humans evolved. Obtaining palaeoenvironmental information to gain holistic contexts for interpreting MSA people's subsistence strategies, technological innovations and site choices is increasingly prominent (e.g. Clark, 2011; Compton, 2011; Blome et al., 2012; Ziegler et al., 2013; Backwell et al., 2014; Mackay et al., 2014; Wurz, 2016).

Past local environments can be reconstructed by analyses of micromammal species that become incorporated into archaeological sites. Micromammals are suitable as palaeoenvironmental indicators due to their limited territorial ranges, precise ecological requirements and their role as primary consumers in the food chain. Analyses of modern micromammal samples have

demonstrated close correlation between relative abundance of species and composition of vegetation substrate in the vicinity of sample sites (Andrews, 1990; Reed, 2003, 2005; Avery et al., 2005). Local alterations in vegetation substrate and climatic conditions may thus be reflected in presence/absence and/or variations in proportions of micromammal species in an archaeological assemblage. Our palaeoenvironmental reconstruction of the lower MSA sequences, c. 120 ka to c. 85 ka, at Klasies River Main site aims at gaining further knowledge of local environmental conditions that prevailed during Marine Isotope Stage (MIS) 5 (Fig. 1).

The MSA I (MIS 5e/d), MSA II Lower (MIS 5c) and MSA II Upper (MIS 5b/a) phases at Klasies River were relatively intense human occupation periods. This sequence contains remains of anatomically modern *Homo sapiens*, the oldest dated to c. 115 ka (Singer and Wymer, 1982; Rightmire and Deacon, 1991, 2001; Grine et al., 2017). The lithic traditions are characterised by a recurrent strategy to produce elongated products in MSA I (Klasies River techno-complex), followed by manufacturing of products using unipolar convergent Levallois strategies in MSA II (Mossel Bay techno-complex) (Wurz, 2012). Bone tools and ochre are recovered from the MIS 5 levels (Wurz, 2000, 2016; d'Errico and Henshilwood, 2007; d'Errico et al., 2012) and there was systematic exploitation

* Corresponding author. Western Norway University of Applied Sciences, Campus Sogndal, P.O. Box 133, 6851 Sogndal, Norway.

E-mail addresses: turhi@hotmail.com (T.H. Nel), Sarah.Wurz@wits.ac.za (S. Wurz), Christopher.Henshilwood@uib.no (C.S. Henshilwood).



Fig. 1. Location of Klasies River and other sites mentioned in the text. Blue and red lines mark approximate positions of the winter rainfall (WRZ) and summer rainfall zones (SRZ) respectively. The area between the contour lines is the intermediate gradient rainfall zone (YRZ), characterised by all year rainfall at transient intervals moving from west to east. Satellite maps: NASA Earth Observatory (public domain): <http://earthobservatory.nasa.gov/>, insert from Maplibrary.org (public domain): <http://www.maplibrary.org/index.php>. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

of terrestrial and marine resources (Singer and Wymer, 1982; Deacon and Geleijnse, 1988; Deacon, 2001; Wurz, 2000, 2012; 2016). The results of the micromammal analysis add context to lithic technologies and resource procurement strategies employed by human occupants of the site.

1.1. Site background

The Klasies River Main site (34°06'S, 24°24'E) is situated on the Tsitsikamma coast in the Eastern Cape Province, South Africa, approximately 43 km northwest of Cape St. Francis (Singer and Wymer, 1982; Deacon and Geleijnse, 1988) (Fig. 2). Main site consists of a number of openings cut into quartz arenite of the Silurian Cape Supergroup. A 21 m shell midden has accumulated in and against two caves (1 and 2) and two overhangs (1A and 1B) (Deacon and Geleijnse, 1988; Deacon, 2001; Wurz, 2012, 2016) (Fig. 2).

1.1.1. Stratigraphy, dating and previous analysis of micromammals

There have been several excavations at Klasies River Main site, first by Singer and Wymer (1982), later by Deacon (2001) and currently by Wurz. The MSA deposits comprise multiple human occupation units containing shell, fish, bone and cultural artefacts, hearths and carbonisation of organic matter. Naturally accumulated culturally sterile sands containing terrestrial microfauna and ichthyofauna separate these units. The sediments built up and eventually covered the entrance of cave 1 and at a later stage filled up cave 2 (Singer and Wymer, 1982; Deacon, 2001) (Figs. 2 and 3).

The MSA sequence was divided into four main cultural phases, MSA I, MSA II, Howiesons Poort and MSA III by Singer and Wymer (1982). Deacon and Wurz further sub-divided the MSA II phase into MSA II Lower and MSA II Upper (Wurz, 2012). MSA I, also termed MSA 2a (Volman, 1981) and Klasies River techno-complex (Wurz, 2002), comprises the lowest cultural stratigraphic unit (Deacon

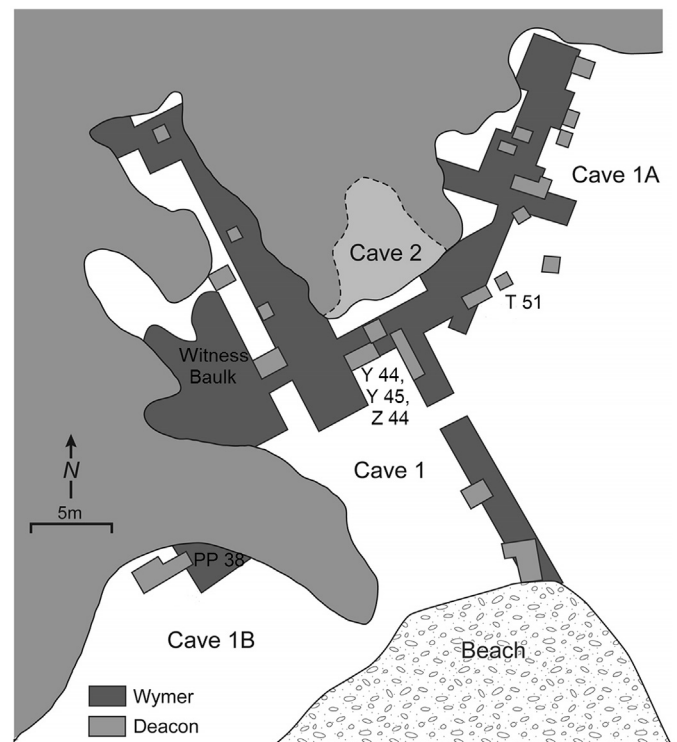


Fig. 2. Site layout of Klasies River main site. Our study assemblage is from the Deacon excavations; squares T 51, Y 44, Z 44 and Y 45 in cave 1A, Witness Balk in cave 1 and square PP 38 in cave 1B. Site layout adapted with permission from Grine et al. (2017).

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