Recent Research on the MSA in KwaZulu-Natal, South Africa

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Abstract: *The Middle Stone Age (MSA) of southern Africa is central to current discussions on the early behavioral evolution of modern humans. Recent MSA research has focused on two technocomplexes, the Still Bay (SB) and Howiesons Poort (HP) that are associated with the early appearance of many cultural innovations. Apart from this temporal emphasis, a regional focus of research on the southern and western coasts of South Africa is largely due to taphonomic factors and research history. This research bias constituted the starting point for two PhD dissertations at the University of Tübingen, whose main findings are summarized here. The current contribution focuses on new results concerning lithic assemblages from the understudied region KwaZulu-Natal during the lesser-known period of MIS 3, and provides a general overview on recent Stone Age research by the University of Tübingen. Our main study site of Sibudu is a key locality for the chrono-cultural stratigraphy of southern Africa due to its exceptional finds, excellent preservation of organic materials, long sequence and secure chronology, though the site has long been regionally isolated. Our research thus aimed to generate a comparative regional framework for the MSA archaeology of KwaZulu-Natal, with the nearby – but mostly forgotten – sites of Holley Shelter and Umbeli Belli as ideal case studies. The MIS 3 lithic assemblages of Sibudu following the HP provide evidence of sophisticated knapping behaviors associated with technological innovations. Based upon clear techno-typological signals, these assemblages were used to define the "Sibudan" technocomplex. The large amount of diachronic variability within the sequence is mostly due to the exceptionally high temporal resolution for the MSA. Comparisons with Holley Shelter show many similarities, whereas site-specific differences can be attributed to differential access to raw materials influencing techno-economic behaviors on small scales. New archaeological work at Umbeli Belli provides insights on the technology and chronology for the relatively unknown end of the MSA on the eastern seaboard of South Africa, the so-called "final MSA." Our research suggests that the archaeology of MIS 3 in southern Africa can be characterized by persistent cultural complexity after the HP, with a high degree of regional variability and dynamic change through time. These results have important implications for models of the early behavioral evolution of* Homo sapiens. *We conclude with outlining future directions of research by the University of Tübingen in the MSA of South Africa which intend to extend the spatio-temporal scope of the work presented here.*
Keywords: *South Africa; Middle Stone Age, MIS 3, lithic technology, variability*

Neue Forschungen zum MSA in KwaZulu-Natal, Südafrika

Zusammenfassung: Das Middle Stone Age (MSA) im südlichen Afrika steht seit vielen Jahren im Mittelpunkt zahlreicher Diskussionen hinsichtlich der Evolution des Verhaltens früher moderner Menschen. Der Forschungsschwerpunkt innerhalb des MSA lag seit den späten 1990er Jahren mehrheitlich auf zwei Technokomplexen – dem Still Bay (SB) und Howiesons Poort (HP) – die im Zusammenhang mit dem frühen Auftreten kultureller Innovationen stehen. Außer dieser zeitlichen Konzentration entstand eine forschungsgeschichtlich und taphonomisch bedingte regionale Fokussierung auf die Süd- und Westküste Südafrikas. Dieses Ungleichgewicht in der Erforschung des MSA war der Ausgangspunkt von zwei Dis-

sertationen an der Eberhard Karls Universität Tübingen durch die Autoren des vorliegenden Artikels. Hier fassen wir unseren neuen Erkenntnisse zum MSA in der vergleichsweise wenig erforschten Region KwaZulu-Natal während der Marinen-Isotopenstufe 3 (MIS 3) zusammen und bieten einen Überblick über die Steinzeit-Forschung der Universität Tübingen in Südafrika. Die von uns primär untersuchte Fundstelle Sibudu stellt aufgrund ihrer außergewöhnlichen Funde, exzellenten Erhaltungsbedingungen, langen Stratigraphie und gesicherten Chronologie eine Referenzfundstelle für das MSA dar. Da die Fundstelle allerdings lange Zeit in räumlicher Isolation stand, war ein weiteres Ziel unserer Forschung die Generierung eines regionalen Vergleichsrahmens in KwaZulu-Natal. Holley Shelter und Umbeli Belli, zwei in Vergessenheit geratene Fundstellen weniger als 100 km entfernt von Sibudu, erwiesen sich hierbei als ideale Forschungsobjekte. Unsere Ergebnisse zeigen, dass die bis dato kaum untersuchten lithischen Inventare aus den MIS 3-Schichten von Sibudu, die auf das HP folgen, einen hohen Grad an technologischem Knowhow und Innovationskraft aufweisen. Die klar unterscheidbaren technologischen und typologischen Signale wurden zur Definition des „Sibudan"-Technokomplexes benutzt. Die ebenfalls vorhandene, ausgeprägte diachrone Variabilität innerhalb der Sequenz ist größtenteils durch die für das MSA außergewöhnlich hohe zeitliche Auflösung bedingt. Direkte Vergleiche mit Holley Shelter belegen überwiegend techno-typologische Übereinstimmungen. Fundstellenspezifische Unterschiede legen jedoch nahe, dass lokale Bedingungen wie der Zugang zu bestimmten Rohmaterialien sich innerhalb eines engen räumlichen Bereiches auf die techno-ökonomischen Verhaltensweisen auswirkten. Mit Umbeli Belli konnten wir schließlich neue Daten für das ausgehende MSA („final MSA") an der Ostküste gewinnen und mittels neuer Datierungen und umfassender technologischer Analysen Klarheit in eine kaum erforschte Periode bringen. Zusammenfassend lässt sich feststellen, dass die archäologische Überlieferung des MIS 3 in Südafrika sich durch anhaltend hohe kulturelle Komplexität sowie ein hohes Maß an regionaler Variabilität und dynamischen Veränderungen auszeichnet. Diese Resultate haben wichtige Implikationen für Modelle hinsichtlich der frühen kulturellen Evolution von modernen Menschen. Abschließend bieten wir einen Ausblick über zukünftige Forschungen der Universität Tübingen im MSA Südafrikas, welche die hier vorgestellten Arbeiten sowohl räumlich als auch zeitlich erweitern sollen.
Schlagwörter: Südafrika, Middle Stone Age, MIS 3, Steintechnologie, Variabilität

Introduction

The Middle Stone Age (MSA) of southern Africa represents one of the most intensely studied Paleolithic periods of the last decades. Although already defined by John Goodwin and Clarence van Riet Lowe (1929) almost a century ago – with many additions and adjustments to its chrono-cultural sequence over the years (Clark 1959; Bishop and Clark 1967; Sampson 1974; Volman 1981; Singer and Wymer 1982) – the MSA received special attention only within the last three decades. Apart from the increasing awareness of an early appearance of *Homo sapiens* in Africa between 300-200 ka (White et al. 2003; McDougall et al. 2005; Richter et al. 2017; Schlebusch et al. 2017), implying a temporal association of our direct ancestors with MSA technology, numerous behavioral innovations and early examples of complex material culture attracted the interest of researchers. Artifacts such as personal ornaments (Henshilwood et al. 2004; d'Errico et al. 2005, 2008; Vanhaeren et al. 2013), organic tools (Backwell et al. 2008; Rots et al. 2017), grave goods (d'Errico and Backwell 2016), beddings made from plant materials (Wadley et al. 2011), microlithic industries (Brown et al. 2012) and abstract decorations on ochre and ostrich eggshells (Texier et al. 2010, 2013), but also behaviors encompassing heat treatment (Schmidt et al. 2013, 2015; Schmidt and Mackay 2016) and coastal foraging (Will et al. 2013, 2016), have been found within MSA contexts dating back to roughly between 120-50 ka. These artifacts and behaviors are thus much older than comparable finds in Europe after ~40 ka, leading to intense discussions concerning the evolution of cultural capacities and cognitive complexity in *Homo sapiens*. As a result, these observations shifted the attention from Europe, and the associated "Human Revolution"-paradigm (Mellars and Stringer 1989; Bar-Yosef 2002), to the African continent (Wurz 1999; d'Errico and Vanhaeren 2009; Henshilwood 2012; Lombard and Haidle 2012).

In southern Africa many of these cultural innovations are thought to appear during a relatively short timeframe and have been predominantly associated with two distinct technocomplexes: the Still Bay (SB) and the Howiesons Poort (HP). It thus comes of little surprise that archaeological research during the last decades has strongly focused on the SB (Lombard 2006; Wadley 2007; d'Errico et al. 2008; Henshilwood et al. 2009; Soriano et al. 2009, 2015; Villa et al. 2009; Lombard et al. 2010; Henshilwood 2012; McCall and Thomas 2012) and HP (Wurz 1999; Cochrane 2006; Pargeter 2007; Soriano et al. 2007, 2015; Lombard and Phillipson 2010; Texier et al. 2010; de la Peña et al. 2013; Texier et al. 2013; de la Peña and Wadley 2014). Along with the numerous innovations mentioned above, one reason for the strong focus on the SB and HP arose from a large-scale luminescence dating program (OSL; TL) at several MSA sites revealing that these technocomplexes are relatively short-lived of about ~5000 years (Jacobs and Roberts 2008; Jacobs et al. 2008a). Based on these observations, some scholars developed a model for the trajectory of the early cultural evolution of modern humans in this region (Jacobs and Roberts 2008; Jacobs et al. 2008a; Henshilwood 2012). The model maintains that this process is characterized by abrupt and discontinuous behavioral change with exceptional cultural innovations and complexity in two short and disconnected periods (the SB and HP), followed (MIS 3) and preceded (MIS 5) by less sophisticated phases. The causal mechanisms behind this pattern could be differences in demography (Powell et al. 2009) or adaptations to harsh and unpredictable environmental conditions during MIS 4 (McCall and Thomas 2012; Ziegler et al. 2013). More recently, however, dating results from different parts of South Africa (Tribolo et al. 2009, 2013; Guérin et al. 2013; Steele et al. 2016) and increasing uncertainties about the comparability of assemblages in diverse geographic settings of the subcontinent (Porraz et al. 2008, 2013; Mackay et al. 2014a) started to challenge this "Synthetic Model" (Conard et al. 2014).

As it stands now, the MSA archaeology of southern Africa has both temporal and regional biases. While the emphasis on the SB and HP has undoubtedly yielded many new insights and bolstered research into the MSA of the subcontinent in general, the side effect has been a comparative neglect of periods preceding or following these technocomplexes (for discussion see Soriano et al. 2007; Mitchell 2008; Lombard and Parsons 2010, 2011; Wurz 2013; Douze et al. 2015). This imbalance is associated with the predominant view that assemblages dating to MIS 5 and MIS 3 are comparatively simple, unsophisticated, and less innovative in their technology. Younger stages of the MSA after the HP, the so-called "post-HP" or MSA 3, are further seen as a return or reversal to an earlier "pre-SB" technology (Sampson 1974; Singer and Wymer 1982; d'Errico et al. 2005; Mellars 2007; Jacobs et al. 2008a). Little over five years ago, Wadley (2010, 2404) aptly summarized the current view of the "post-HP" as being poorly understood while at the same time regarded as "dark ages" that followed the HP. This temporal research bias is also more generally exemplified by the usage of informal terms such as "pre-SB" and "post-HP" for periods pre- or postdating MIS 4.

From a spatial perspective, although the sub-continent has an incredible number of sites preserved in different kinds of environments, the Western and Eastern Cape region, and particularly the Indian South coast and Atlantic west coast, have received the most attention. To a certain degree this situation is due to taphonomic and discovery bias with many rockshelters and deep cave sites existing in these regions, especially those with astonishingly good preservation conditions and long stratigraphic sequences such

as Klasies River (Singer and Wymer 1982; Wurz 2000, 2002), Pinnacle Point (Brown et al. 2009; Marean et al. 2010), Blombos (Henshilwood et al. 2001, 2009, 2011; Henshilwood, 2005; Thompson and Henshilwood 2014), Diepkloof (Porraz et al. 2008, 2013; Tribolo et al. 2009; Texier et al. 2010), Klipdrift (Henshilwood et al. 2014) or Elands Bay Cave (Davis 1980; Porraz et al. 2016; Schmid et al. 2016; Tribolo et al. 2016). A long research tradition anchored at the universities of Cape Town and Stellenbosch, and directly connected with pioneering researchers such as Janette and Hilary Deacon (Deacon 1984, 1995; Deacon and Deacon 1999) or John Parkington (Parkington 1972; Parkington and Bailey 1988; Parkington et al. 2004) who explored a large number of the archaeological sites in this region, also had a lasting influence on this spatial patterning of research. The Cape region of South Africa moreover exhibits a well-accessible landscape with comparatively open vegetation in some areas, and often with low modern population density and large areas of farm-land, providing ideal preconditions for archaeological survey with thousands of artifacts accessible on the surface (Will et al. 2015b; Hallinan and Parkington 2017; Mackay et al. 2018).

Contrary to this situation, KwaZulu-Natal (KZN) in the eastern part of South Africa falls into the Summer Rainfall Zone (SRZ) and is covered by dense (sub-tropical) vegetation in many areas. This is particularly the case along the coastline, likely hiding many potential archaeological sites. Although archaeological investigations taking place before World War II are documented from this region, many of these endeavors have been of a destructive nature, are poorly documented, or are covered today by modern housing and road developments (Maguire 1997; Mitchell 1998). Pioneer work using more advanced methods of excavation has been done by Aron Mazel, who discovered a large number of LSA and also MSA sites such as Sibudu (Mazel 1984, 1986, 1988a, b). Further, Gordon Cramb (Cramb 1952, 1961) and Jonathan Kaplan (Kaplan 1989, 1990) conducted fieldwork at Holley Shelter and Umhlatuzana and uncovered fairly deep MSA deposits. Raymond Dart directed excavations at Border Cave on the northernmost edge of KZN in 1934 (Cooke et al. 1945) and later Cooke, Malan and Beaumont (Beaumont 1978; Butzer et al. 1978; Grün and Beaumont 2001) continued research at the site. When Aron Mazel found Sibudu and started a first test excavation in 1983 (Wadley and Jacobs 2004) he uncovered Iron Age deposits directly overlying typical MSA layers. His research scope at this time, however, was to investigate the ecology of Holocene LSA hunter-gatherers in the Thukela Basin (Mazel 1988a), and finding nothing comparable at Sibudu, he abandoned the site again. It took another 15 years until Lyn Wadley recognized the great potential of Sibudu for Stone Age archaeology and conducted new excavations there from 1998 onwards (Wadley 2001; Wadley and Jacobs 2004). Her work at this large rockshelter uncovered one of the most complete and intact archaeological sequences of the entire sub-continent. It covers the youngest deposits of the final MSA roughly dating to around 35 ka (Wadley 2005b), late MSA (~47 ka) (Villa et al. 2005), as well as "post-HP" (~58 ka) (Cochrane 2006), HP (~65-59 ka) (Wadley and Mohapi 2008), Still Bay (~77-72 ka) (Wadley 2007) and pre-Still Bay (>80 ka) (Wadley 2012).

Despite the widely recognized value of Sibudu for understanding the MSA sequence of southern Africa, two major research gaps remained. First and in accordance with most current research focusing on the SB and HP as described above, Sibudu also received most attention regarding these periods, although some work on the late and final MSA deserves credit (Villa et al. 2005; Wadley 2005b). In general, however, the

assemblages associated with MIS 3 remained poorly understood in this region, as in many others (Mitchell 2008). Secondly, Sibudu became a hallmark site in regional isolation. Although other MSA sites had been documented at a short distance such as Holley Shelter and Umhlatuzana, little was done to understand the regional MSA signal. It was thus the goal of new research carried out by the University of Tübingen starting in 2011 to improve our knowledge of the MSA in KZN, beginning with a major focus on MIS 3 assemblages and supported by a DFG grant awarded to N. Conard ("Characterizing the late MSA sequence at Sibudu Cave, KwaZulu-Natal, South Africa", CO 226/27-1). In order to achieve these aims, the fieldwork at Sibudu focused on the "post-HP" deposits and examined the lithic assemblages to uncover the archaeological signal of this period and its variability over time. Further on, the project expanded its research focus to a wider regional scale and investigated archaeological assemblages of two sites, Holley Shelter and Umbeli Belli. Both are situated less than 100 km away from Sibudu. The results of this work, while included in other publications, are also presented in two PhD dissertations by the authors of this article (Will 2016; Bader 2017). In the following, we will summarize the principal outcomes of six years of intensive collaborative research in this region and contextualize them in a second step with other regions and recent research. In a last step, we will point out future directions of research, focusing on the continuing work of the University of Tübingen in particular.

Tübingen research in South Africa

Archaeological research projects of the University of Tübingen in South Africa go back to 1998 with multiple campaigns of survey and excavations at the open-air sites of Geelbek Dunes and the Anyskop-Blowout in the Western Cape near Langebaan (Kandel and Conard 2003; Dietl et al. 2005; Kandel and Conard 2005; Kandel et al. 2006). Investigations on both MSA and LSA settlement patterns and material culture have been the subject of numerous publications and contributed to a refined understanding of hunter-gatherer behavior in this area. In a second phase of fieldwork conducted in 2011, a joint team from the universities of Tübingen and Cape Town under the direction of N. Conard (with J. Parkington) returned to the Western Cape to pursue renewed excavations at the MSA shellfish-bearing site of Hoedjiespunt on the Saldanha Peninsula. The work here focused primarily on early modern human adaptations to marine resources and coastal landscapes during MIS 5 that the team uncovered at the locality (Will et al. 2013; Kyriacou et al. 2015), and this line of inquiry has been continued since on larger scales (Will et al. 2015a, 2016).

A third phase of Tübingen archaeological research in South Africa started also in 2011 with renewed fieldwork at Sibudu, which also for the first time marks a move to the eastern seaboard of the country. In 1983, Aron Mazel dug the first small trial trench (ca. 1 m deep) at the site. Subsequently, Lyn Wadley from the University of the Witwatersrand directed 25 field seasons of excavation at Sibudu from 1998-2011. Wadley's team excavated MSA deposits over an area of 21 m² to a depth of up to three meters. In 2011, Wadley finished her long-term research of outstanding quality at the site and handed over the excavations to N. Conard. Since then, the University of Tübingen team has carried out field and laboratory work at the site on a yearly basis building on the long-term work and stratigraphy by Wadley. The seven campaigns so far have resulted in

several publications concerning the lithic artifacts and cultural stratigraphy of the site (Conard et al. 2012; Will et al. 2014; Conard and Will 2015; Will and Conard 2016), but also included work on residue and use-wear analyses on stone tools and other material types (Rots et al. 2017).

As a direct response to the two major research gaps formulated above, Sibudu has not only been investigated with regard to its MIS 3 assemblages but more generally with the hope of understanding the regional signal and variability of the MSA archaeological record in this timeframe. In the long term, archaeological research at Sibudu aims at providing the key chrono-stratigraphic sequence for the MSA of KZN. Other sites might then be anchored in this sequence, or might refine and amend the behavioral patterns seen at Sibudu. This part of our research had already started in 2013 when we expanded our focus to MSA assemblages from old excavations, which are stored in the KwaZulu-Natal Museum in Pietermaritzburg. With the help of Gavin Whitelaw and Peter Cramb, we were able to investigate the archaeological material of Holley Shelter. This site near Wartburg was excavated in the 1950s (Cramb 1952, 1961) but never adequately published. Although the MIS 3 character of the site was suggested before (Wadley 2001; Mackay et al. 2014a), apart from isolated typological descriptions the site remained completely unknown. That is why we undertook a reanalysis of the assemblages with specific research questions regarding the archaeological signal and its variability over time (Bader et al. 2015). No systematic new excavations at the site were possible to date due to uncertainties regarding landownership. This being said, by using multifaceted evidence from raw materials, technological and techno-functional comparisons we were able to attribute the assemblages roughly to MIS 3.

With a similar attempt in mind, we further expanded our research scope to the archaeological site of Umbeli Belli in 2016. This rockshelter close to Scottburgh on the south coast of KZN was previously excavated by Charles Cable from the University of Cambridge in 1979 (Cable 1984). Cable's research scope was tailored to the understanding of the late Holocene LSA occupations of KZN and, apart from other sites such as Borchers rockshelter, Umbeli Belli only constituted a small part of his PhD thesis. Thus he excavated the LSA on top of the stratigraphy down to about 20 to 30 cm in 9 m² and dug 4 m² in the center of the trench down to what he presumed to be bedrock. He mentioned the presence of typical MSA tools in the lower part of the sequence only with a single sentence in his dissertation (Cable 1984, 86), without devoting further attention to them. In the first phase of research at Umbeli Belli, we therefore re-examined the lithic artifacts from the old excavation and published our results (Bader et al. 2016). We were also able to relocate the site during surveys, clarify the landownership and begin new excavations using state of the art methods in 2016 and 2017 that focused specifically on the MSA component of the site. Preliminary age estimations using OSL by C. Tribolo (Bader et al. in prep.) suggest that the entire MSA sequence of the site falls within the late phase of MIS 3.

Our recent comparative work on Sibudu, Holley Shelter and Umbeli Belli represents one of the most comprehensive archaeological investigations in this part of South Africa. Indeed, only two more MSA sites from KZN are known (Umhlatuzana and Border Cave). The aim of this article is to summarize the current status of our research at this stage, with a focus on MIS 3 and the contextualization within the region.

The MIS 3 archaeology of KwaZulu-Natal – a provisional summary

Within the last 10 years there has been a surge of interest in the MSA of KZN. This situation is largely due to the exemplary work that has been carried out by Lyn Wadley since the late 1990s. Her fieldwork and multidisciplinary research at Sibudu have resulted in numerous publications concerning all aspects of human material culture such as lithic artifacts (Wadley 2005b, 2007; Cochrane 2006; Wadley and Mohapi 2008; de la Peña et al. 2013; de la Peña and Wadley 2014), organic remains (Backwell et al. 2008; Clark and Ligouis 2010), personal ornaments (d'Errico et al. 2008), bedding events (Goldberg et al. 2009; Wadley et al. 2011) and pigments (Wadley 2005a; Soriano et al. 2009) from the final MSA down to the pre-Still Bay. This seminal work created a basis for future research in the region.

On top of this, there has also been considerable work on the assemblages from Umhlatuzana excavated by Kaplan in the 1980s (Kaplan 1989, 1990) that were followed up by more recent analyses of Marlize Lombard (Lombard et al. 2010) and Moleboheng Mohapi (Mohapi 2013). For many years, Umhlatuzana thus represented the only close-by, directly comparative site for Sibudu. Notwithstanding the important role Border Cave has played and will continue to do so based on new excavations by Lucinda Backwell, Lyn Wadley and colleagues, so far only few aspects of the site received attention with a recent focus on the transition between the MSA and LSA (Grün and Beaumont 2001; d'Errico et al. 2012; Villa et al. 2012; d'Errico and Backwell 2016). Previous results will also need to be evaluated in light of the different field methods employed by former excavators (Cooke et al. 1945; Beaumont 1978) and in how far these have influenced the archaeological signal from the site.

The Tübingen research has to be placed in the context of the recent work described above. Rather than reiterating recent archaeological findings, the Tübingen team aimed to produce new data by improving upon field methods in the region, such as employing 3D-plotting of all archaeological finds with a Total Station and EDM, but also by focusing on previously neglected or understudied parts of the record. In particular, the first phase of research since 2011 has focused on the MIS 3 lithic assemblages of Sibudu and aimed to extend the range of sites for this and other time periods beyond Umhlatuzana. In Holley Shelter and Umbeli Belli we found two candidates to achieve these goals.

We started this work with the conviction that a thorough understanding of the empirical record is the basis for any further-reaching interpretations such as inferring human behavioral adaptations, assessing mechanisms of cultural change and elucidating patterns of cultural evolution. Such empirical work should begin by understanding the extent of variability on several scales, including spatial (sites, catchments, regions), temporal (individual spits, layers, stratigraphic aggregates, technocomplexes, MIS-scales) and formal (material, stylistic, morphological, metric, technological) dimensions. While this article does not represent a finalized outcome of research, it presents the ongoing efforts to provide reliable data for the archaeological region of KZN along these dimensions. Three out of five known MSA sites in this region have been the subject of our research (Fig. 1) and the principal findings will be summarized in the following. As expected from previous work (Mitchell 2008; Villa et al. 2010; Wadley 2010; Lombard and Parsons 2011;

Mackay 2011; Lombard et al. 2012; Wurz 2013; Mackay et al. 2014a) we could generally confirm that the archaeological signal of MIS 3 is diverse with high amounts of inter-assemblage and diachronic variability. This, however, does not imply that the record is unstructured or unsophisticated as has sometimes been claimed (Sampson 1974; Deacon 1989; McCall 2007; Mellars 2007; Jacobs et al. 2008a; Henshilwood 2012).

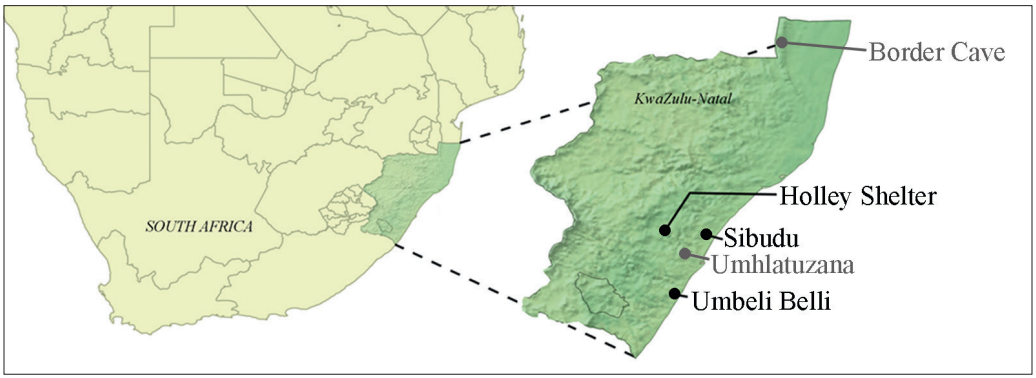

Fig. 1: *Locations of MSA sites in KwaZulu-Natal. Black dots indicate recent investigations by the authors.*

Starting with recent analyses from lithic assemblages from the early MIS 3 at Sibudu – with so-called "post-HP" assemblages overlying the HP and dating to ~58 ka (Wadley and Jacobs 2006; Jacobs et al. 2008b) – two overarching signals emerge: First, there is a large amount of diachronic variability in all principal technological domains (*sensu* Tostevin 2013), encompassing raw material procurement, blank production, core reduction, the number, outcomes and diversity of retouch activities, as well as occupation intensities. Importantly, however, detailed quantitative observations show that these behavioral changes are always gradual and cumulative, instead of erratic or random (Conard and Will 2015; Will and Conard 2016). There are also certain features that run through the entire sequence, such as the simultaneous use of variable core reduction strategies to produce flake and blade assemblages and a dichotomous approach to blank production with soft stone hammer knapping for blades and hard stone hammer for (convergent) flakes. In combination with the short time depth of deposition spanning potentially only a couple of centuries (Wadley and Jacobs 2006; Jacobs et al. 2008b) and the absence of any visible stratigraphic breaks or external elements, this suggests continuous transmission of cultural information (Boyd and Richerson 1985; Henrich 2001; Eerkens and Lipo 2005; Mesoudi 2011; Lycett 2015) across multiple generations living in the region with subtle and gradual modifications over time. We were not able to document a consistent correlation between the behavioral variations and environmental change, demographic proxies or hunting behavior, suggesting that short-term cultural variability at the site is best explained by changes in technological organization and socio-economic dynamics instead of environmental forcing (Conard and Will 2015). Finally, it is also worth pointing out that issues of scale-dependency come into play, with the Sibudan assemblage offering data on a higher temporal resolution compared to most other MSA sites so far. It is likely that comparable fine-grained sequences will also find higher levels of diachronic change as analyses move away from studying technocomplex to individual find horizons (Conard and Will 2015; Will and Conard 2016).

Secondly, our detailed lithic analyses have uncovered several positive and defining aspects of these layers that not only unite many (though not all) of these assemblages, but also indicate sophisticated knapping behaviors on level with previous techniques and methods during the HP and SB. Among other aspects, this includes soft stone hammer percussion for the production of morphometrically standardized blades, the manufacture of recurring and specific tool classes with clear morphologies and reduction chains among the larger class of unifacial points (Tongatis, Ndwedwes, and asymmetric convergent tools [ACTs] [see Fig. 2]; definitions in Conard et al. 2012; Will et al. 2014), and

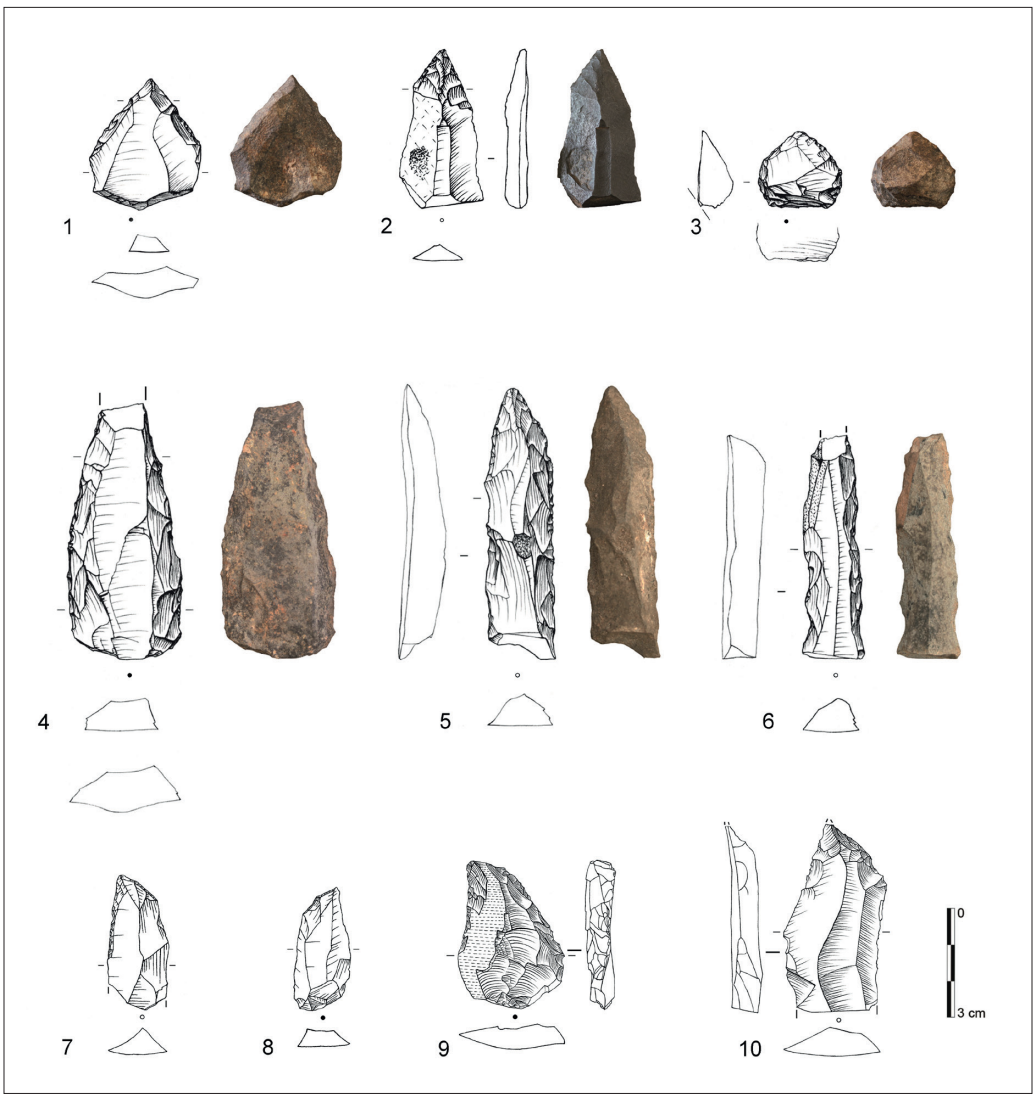

Fig. 2: *Characteristic tools from the Sibudan assemblages of Sibudu. 1-3 = Tongati tools; 4-6 = Ndwedwe tools; 7-10 = ACT's. 1-6 modified after Will et al. 2014; 7-10 modified after Conard and Will 2015.*

the production of bifacial pieces. Some of these aspects occur only in the middle and top (Tongatis and Ndwedwes) or bottom (bifacials) of the sequence, while others run throughout (soft stone hammer blade production). We proposed the term "Sibudan" for these assemblages based on positive elements to replace the informal notion of "post-HP" that defines early MIS 3 technology based on the absence of certain elements (Conard et al. 2012; Will et al. 2014). The technocomplex thus serves as a useful analytical tool that provides a hitherto missing structure to the geographical and temporal variation in the archaeological record of MIS 3, especially in its earlier part. Importantly, the Sibudan intends to capture both clearly recognizable techno-typological traits, but also short-term gradual and cumulative change throughout the sequence with an exceptional pace for the MSA (Conard and Will 2015; Will and Conard 2016) and is conceived of as a starting point for more comparative and interpretative studies.

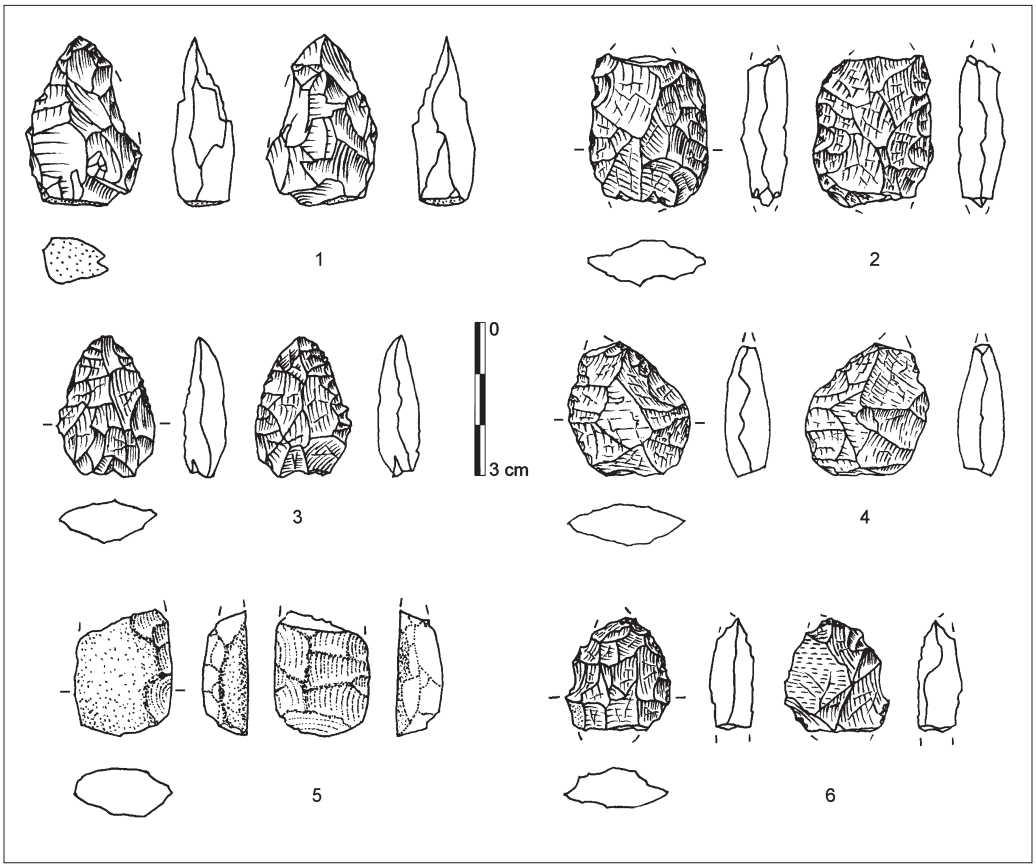

Fig. 3: *Bifacial points from the lowermost Sibudan layers at Sibudu. Modified after Will and Conard 2016.*

The Sibudan sequence also shows that we should not use single assemblage elements, such as bifacial points, to define technocomplexes, as this ultimately masks variability. Particularly in KZN, bifacial technology appears to play a role from MIS 5 to late MIS 3, with Sibudu as the prime example. Here, bifacial points with variable modes

of production (Fig. 3), morphologies, sizes, raw materials and relative quantities occur in the pre-SB, SB, HP, Sibudan, and final MSA layers (Wadley 2005b; Mohapi 2012; de la Peña et al. 2013; Conard et al. 2014; Soriano et al. 2015). Its presence in different forms and contexts during the Late Pleistocene further erodes the old idea that bifacial technology in southern Africa is confined to the SB. Again, a focus on detailed studies and the variability within bifacial technology, as well as situating these elements within their entire assemblage context, proves to be a superior heuristic concept compared to an approach that draws predominantly upon *fossiles directeurs*, mental templates, and normative ideas, ultimately resulting in a concept that is overly homogenized.

Our work at Sibudu has also helped us to place the re-analyzed assemblages of Holley Shelter in a regional comparative context. In the absence of absolute chronological ages, and the problematic stratigraphic context of old excavated assemblages, we had three major objectives for our analysis of Holley Shelter: 1) Detect archaeologically coherent horizons based on the field documentation; 2) Provide rough age estimates for the site based on comparative work since no reliable dates were published; 3) Study in how far Holley Shelter provides evidence on regional signals of variability and similarity within the MSA.

In relation to the first question, we were able to distinguish between three archaeological clusters throughout the sequence based on detailed lithic analyses. The lowermost cluster is characterized by a low find density, the predominant use of quartz for the production of flakes, abundant bipolar knapping, and the almost complete absence of formal tools (Bader et al. 2015). The overlying unit shows a considerable increase in artifacts, predominant production of thick elongated blades made on distinct platform cores (semi-circumferential and narrow-sided cores; see Bader et al. 2015, Fig. 2), an almost exclusive use of hornfels and an exceptional high number of formal tools. Most diagnostic among these retouched elements were large unifacial points that exhibit strong similarities with the Ndwedwe tool class and reduction sequence found at Sibudu (Conard et al. 2012). In addition, we observed a large number of splintered pieces of various shapes and sizes (Fig. 4). The uppermost archaeological cluster, and the end of the occupational sequence of the site, is similar to the previous one with the exception that the distinct Ndwedwe tools disappear, associated with an increase in the number of splintered pieces. Importantly, we were not able to detect clear evidence of a Later Stone Age (LSA) signal. This was surprising in light of the publications by the former excavator Gordon Cramb (Cramb 1952, 1961) who observed a Smithfield N (Goodwin 1930) type assemblage at the top of the sequence, which was most likely present only in isolated parts of the shelter.

In terms of roughly estimating the age or relative chrono-cultural position of the site, we used a comparative approach on the lithic assemblages, including the nearby sequences of Sibudu and Umhlatuzana as well as Border Cave and Rose Cottage Cave. Based on changes in raw material preference, frequencies of specific tool classes comparable to specimens defined at Sibudu (Conard et al. 2012), similarities in core reduction and soft stone hammer production of blades, the middle part of the Holley Shelter sequence resembles the Sibudan most closely (e.g., Will et al. 2014). This points toward an early MIS 3 age for these assemblages. While we still lack absolute chronological ages to test this initial interpretation, we consider this as a robust working hypothesis for what would otherwise be a forgotten archaeological site in KZN.

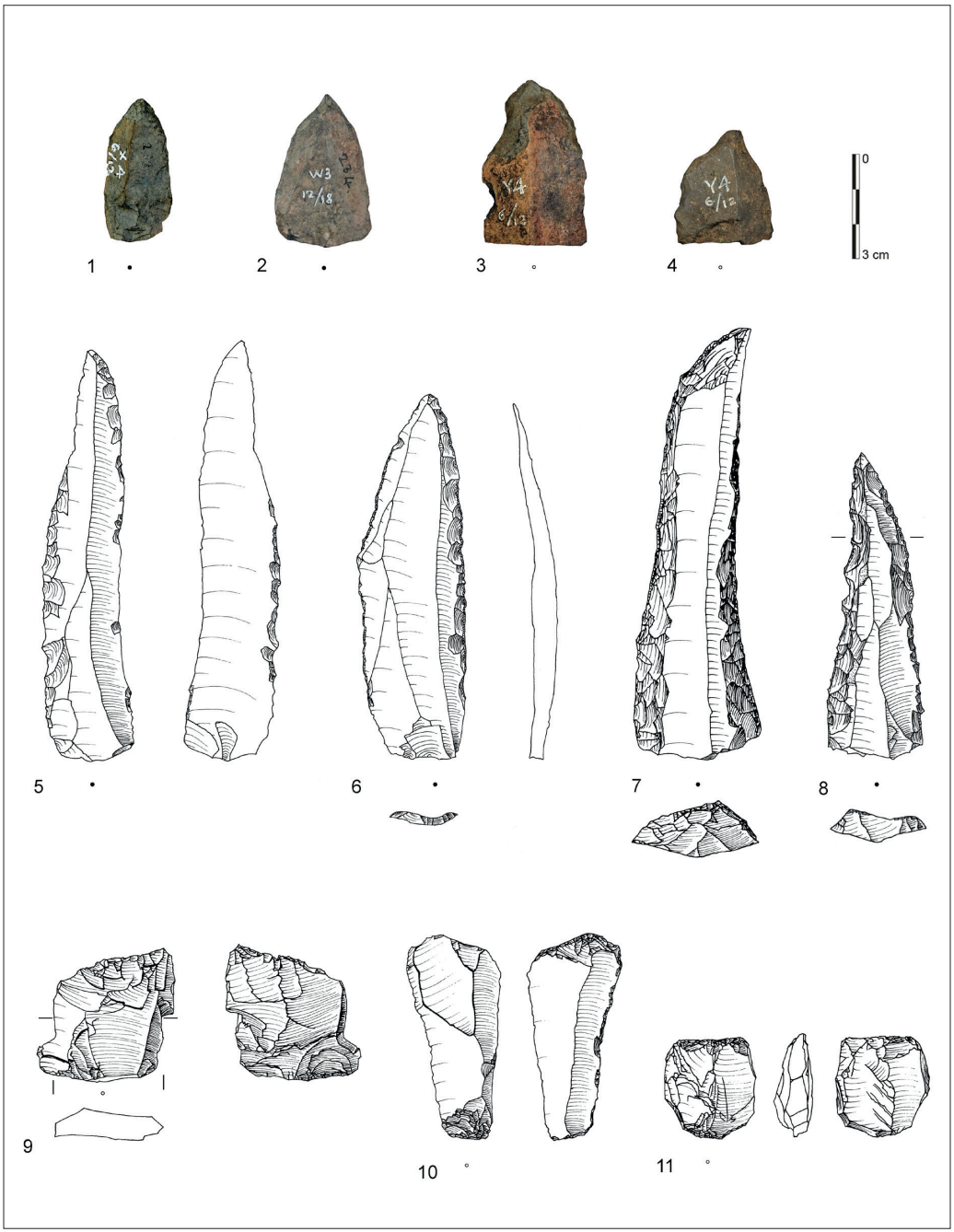

Fig. 4: *Characteristic tools from the Sibudan assemblages of Holley Shelter. 1-4 = Tongati tools; 5-8 = Ndwedwe tools; 9-11 = Splintered pieces. 5-11 modified after Bader et al. 2015.*

Both the knappers at Sibudu and Holley Shelter followed comparable ways in structuring their overall lithic technology, observed by many similarities, such as in particular knapping techniques applied to the same raw material (hornfels) or the production of particular tool classes with the same reduction chains. These similarities could be due to population contact – or even the same populations producing similar assemblages in broadly contemporaneous timeframes – but also convergent adaptations to similar environmental and raw material circumstances within a comparable context of site and land use. A combination of these factors is likely. Beyond these similarities there is a certain degree of variability and distinctiveness on the level of the site. While the Sibudan knappers produced large amounts of Tongati tools firstly, and Ndwedwe tools secondly, at Holley Shelter we see a reversed picture with the Ndwedwe tools found at the site being the most abundant in the entire KZN region (Fig. 4). At Holley Shelter, the access to large slabs of hornfels from primary outcrops favored the reduction of large blades from semi-circumferential and narrow sided platform cores (Fig. 5) that are not seen at Sibudu where hornfels occurs in smaller amounts and with outcrops further away. In addition, to the best of our knowledge Holley Shelter represents the only site with an overwhelmingly high percentage of splintered pieces associated with clear MSA technology, adding further layers of complexity that require additional functional studies.

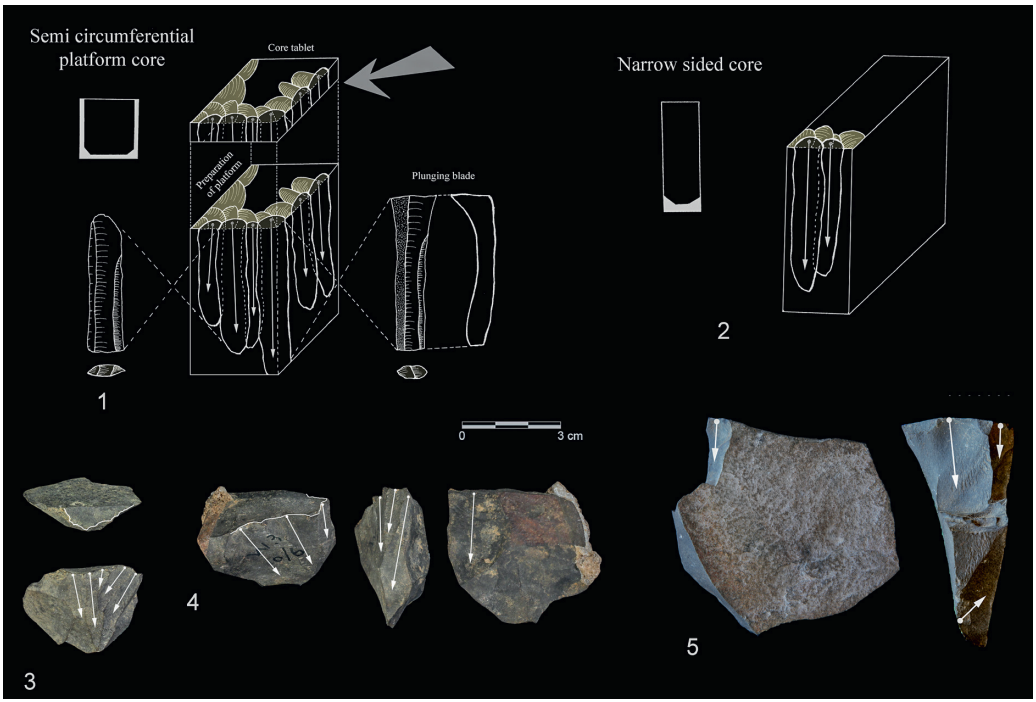

Fig. 5: *Core concept of Holley Shelter indicating adaption towards raw material (Hornfels) of slab like conditions. 1 = Semi circumferential concept; 2 = Narrow sided concept; 3-4 = semi circumferential platform cores; 5 = Narrow sided platform core. Modified after Bader et al. 2015.*

On a larger regional scale, and while taking both space and time within the MIS 3 into consideration, we see similarities in cultural change through time, most evident from the similar pattern of raw material choice at Sibudu, Holley Shelter and also Umhlatuzana. Observations on the last site are exclusively based on the published literature (Kaplan 1989, 1990), but in all three sites there is a gradual change from quartz-dominated assemblages with few retouched tools at the very bottom of the MIS 3 (Bader et al. 2015; Will and Conard 2016) - happening shortly after the HP at Sibudu and Umhlatuzana - towards a preference for hornfels and dolerite. The middle part of the sequence at Holley Shelter also shares features with both the Sibudan at Sibudu and the "late MSA" assemblages at Umhlatuzana, such as a high amount of unifacial points with similar morphometric characteristics, the presence of Tongatis, Ndwedwes and ACTs, and similar varieties of core reduction. The late MSA at Umhlatuzana differs, however, in providing no evidence for blade production and the occurrence of finely made bifacial points.

The top of the sequence at Holley Shelter, with its very high frequency of splintered pieces, might represent a further signal of the late phase of the MSA. The overall techno-typological signals differ in several aspects from the Sibudan assemblages we have examined. Interestingly, we did not find typical tools of the final MSA in the region such as, for example, hollow based points (Kaplan 1989; Wadley 2005b); thus, the upper MSA phase at Holley Shelter could be either an expression of the MSA located in between the Sibudan and final MSA – like the late MSA described by Villa and colleagues (2005) – or a very late instance of the MSA that has more in common with assemblages from Sehonghong (Carter et al. 1988), Rose Cottage Cave (Clark 1997a) or Strathalan B (Opperman 1996). These preliminary observations remain to be tested by new excavations using modern standards and would be strengthened by new absolute chronological ages, especially at Holley Shelter. It will be interesting to see whether diachronic change throughout MIS 3 follows a unidirectional pattern or rather a multidirectional trajectory, particularly when more sites from different ecological zones within KZN are added to the current picture.

Moving forward in time, our new excavations and analyses at Umbeli Belli have started to improve our knowledge regarding the very end of the MSA in KZN, the so-called "final MSA" (Kaplan 1989, 1990; Wadley 2005b). Preliminary age estimations confirmed that the MSA sequence at Umbeli Belli correlates with the terminal phase of the MSA (ca. 35-30 ka; C. Tribolo pers. comm.). An initial examination of the Umbeli Belli assemblage excavated by Charles Cable in 1979 (Cable 1984) provided a large number of unifacial and bifacial pieces (Fig. 6) and a high diversity of raw materials. The most common rock types for the entire sequence are hornfels, dolerite and quartz, and they derive mostly from the river. Other materials such as sandstone, mudstone or crypto crystalline silicates occur as well, but all in low numbers (apart from quartzite). Chronologically we observe a trend from hornfels and dolerite being the most common raw materials in the lower and middle part of the sequence (Spits 6, 5C and 5B) towards an increasing importance of quartz in the upper two spits 5A and 5.

The most common blank types are flakes throughout the sequence with blades and bladelets being less common (see Bader et al. 2016). A comparative attribute analysis, however, showed that platforms of blades are much more often prepared than the ones of flakes, suggesting that knappers invested more time and effort into the detachment

of elongated products. We also identified a total of 69 bladelets from the screens within the MSA sequence. This is surprisingly low in the light of a relatively large number of

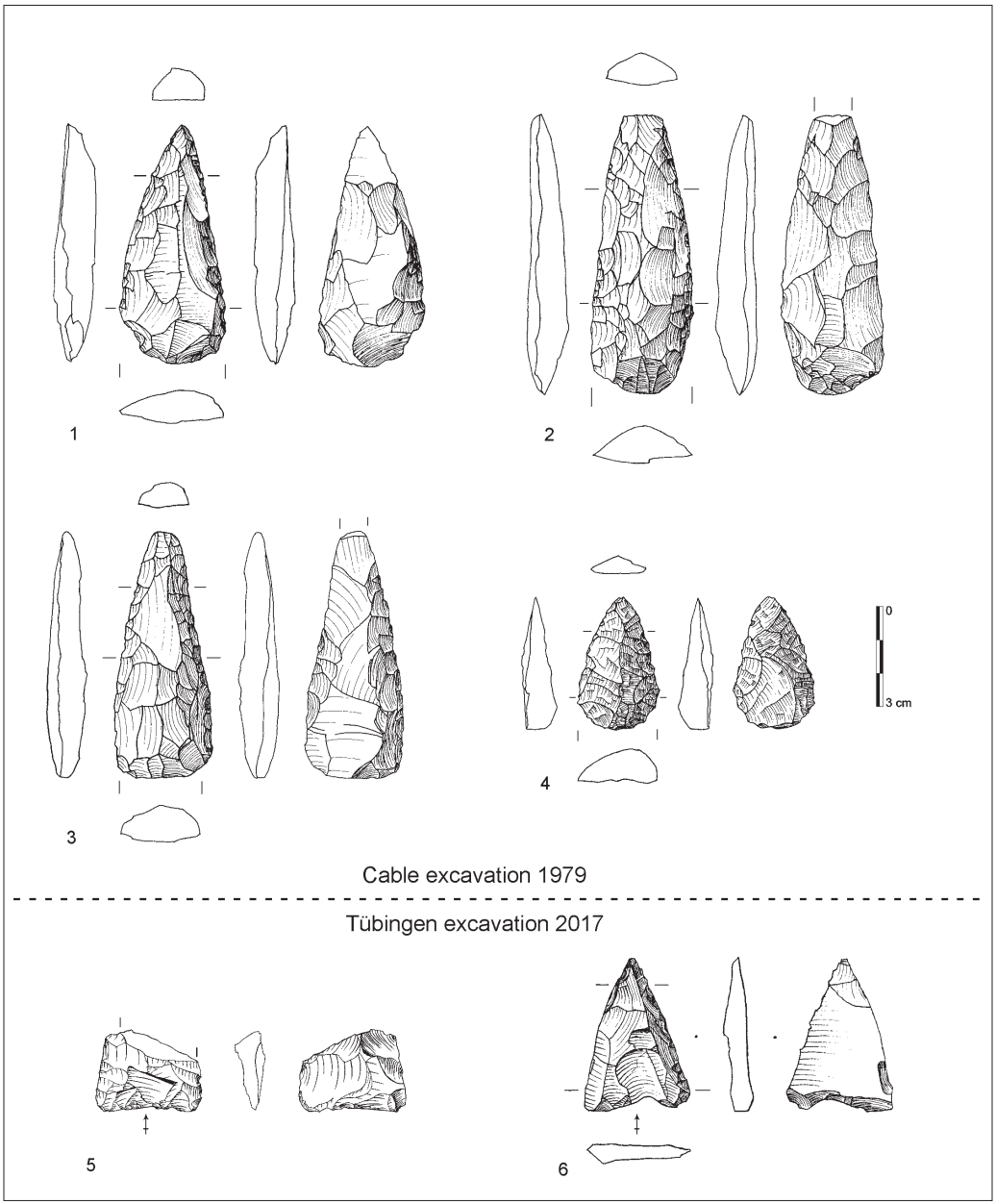

Fig. 6: *Characteristic tools from the final MSA assemblages of Umbeli Belli. 1-4 = bifacial points from Cable's excavation in 1979; 5-6 = hollow based points from the Tübingen excavation in 2017. 1-4 modified after Bader et al. 2016; 5-6 modified after Bader et al. in prep.*

bipolar bladelet cores made out of quartz compared to other core types such as platform, parallel and inclined cores. Different scenarios for this discrepancy are possible, including off-site discard of bladelets, fragmentation, or that a limited number of bladelets was successfully removed from the brittle quartz cores. We could not observe a clear structure in terms of core technology throughout the sequence, with knappers applying various kinds of core reduction methods to different raw materials. The association between quartz and bipolar technology remains the only clear signal, predominantly occurring in the upper part of the sequence (Spits 5A and 5) directly underlying a rock fall event separating MSA and LSA occupations.

The retouched tool component is one of the most characteristic features of the MSA occupation at Umbeli Belli. Bifacial technology is commonly associated with the SB assemblages of southern Africa (Villa et al. 2009; Porraz et al. 2013; Soriano et al. 2015). Recently de la Peña and colleagues (2013) and our own work (Will and Conard 2016) pointed out, though, that at least in eastern South Africa, bifacial technology is not limited to the SB but comes and goes throughout the MSA (see above). These are not entirely new results as Kaplan (1989, 1990) and Wadley (2005b) provided earlier evidence for bifacial technology in the final MSA. The lithic assemblages from the MSA occupations at Umbeli Belli show strong evidence for both unifacial and bifacial points and the associated shaping technology, being the most common types in Cable's spits 5B and 5C. This coincides with the highest artifact density and the percentage of tools within the sequence. Unifacial points occurred in this unit about twice as often as bifacial ones, and most have been made on elongated blanks via intensive surface shaping. More than half of all unifacial and almost all bifacial points exhibit intensive surface retouch, and the corresponding shaping flakes have also been identified, indicating their local production.

Due to the high frequency of these tools we also examined potential functional purposes. Apart from metric calculations (TCSA, TCSP, TPA) (Larsen Peterkin 1993; Shea 2006; Villa and Lenoir 2006; Wadley and Mohapi 2008; Sisk and Shea 2011; Mohapi 2012, 2013) providing strong evidence for projectile use, C. Lentfer conducted a small-scale residue analysis and confirmed that some pieces retain evidence of proteinaceous residues, embedded hair and pinkish stains on the proximal part being associated with hafting and the use as projectiles. The bifacial points provide evidence for recurrent and clear symmetrical shape, suggesting that these pieces were end products of a specific reduction sequence and potentially curated forms (see Bader et al. 2016).

More recent results (Bader et al. in prep.) concerning our own excavations at Umbeli Belli supplied evidence that the final MSA of the site is more clearly structured than what could be observed from the material of the old excavations. In fact, there is also much more diachronic variation in the sequence than previously anticipated. Furthermore, we recovered several examples of hollow based points (Fig. 6) which are so far only documented from the final MSA assemblages of Sibudu and Umhlatuzana (Kaplan 1989, 1990; Wadley 2005b). In light of these findings and preliminary OSL dating to about 35-30 ka, Umbeli Belli will be the subject of increasing research concerning the end of the MSA and the beginning of the LSA, potentially helping to answer questions about transitional scenarios or a clear separation between these two classificatory units.

The bigger picture: MIS 3 archaeology in southern Africa

Returning back to initial considerations of space and time, our recent work in KZN more generally informs on patterns of MIS 3 archaeology on the subcontinental scale in southern Africa. Similar to recent research on individual assemblages (Soriano et al. 2007; Villa et al. 2010; Wadley 2010; Mackay 2011; Mohapi 2013) and larger-scale reviews (Mitchell 2008; Lombard et al. 2012; Wurz 2013; Mackay et al. 2014a; Wadley 2015), we found an increased diversification in lithic technology with abundant diachronic variation within KZN in relation to the preceding and more homogeneous signal of the HP. Recent studies of MIS 3 stone artifact assemblages have provided evidence for both distinctive techno-typological signals and sophisticated knapping behaviors, falsifying previous assessments of "unstructured," "unsophisticated" or "conventional MSA" technologies (Sampson 1974; Singer and Wymer 1982; Deacon 1989; Henshilwood 2005; Mellars 2007; McCall 2007; Jacobs et al. 2008a). The multiple repetitive forms and distinctive reduction chains of unifacial points (Tongati, Ndwedwe, ACT; Conard et al. 2012; Will et al. 2014), diverse forms of bifacial points with production modalities differing from the SB (Bader et al. 2016; Will and Conard 2016) and the manufacture of morphometrically standardized blades executed by soft stone hammer percussion are examples from our work in KZN. Additional instances of innovation in lithic technology within the early MIS 3 derive from the Western Cape: The distinctive Nubian core reduction method, which is a specific and elaborated variation of Levallois reduction for the production of thick points (Usik et al. 2013), has been reported for both open-air and rockshelter sites in the Western Cape, age bracketed between 60-50 ka (Hallinan and Shaw 2015; Will et al. 2015b; Hallinan and Parkington 2017). Importantly, this technology has not been reported anywhere else south of Kenya or after MIS 4, providing an exceptional case for independent innovation among populations living in more arid environments of southern Africa after the HP.

Our new research in KZN, in combination with studies in the Western Cape and those of other researchers (Soriano et al. 2007; Lombard and Parsons 2010, 2011; Villa et al. 2010; Wadley 2010; Mackay 2011; Lombard et al. 2012; Porraz et al. 2013; Mackay et al. 2014a), allows us to draw provisional conclusions about trajectories of cultural change after the HP within the subcontinent. The key pattern appears to be the emergence of regional cultural evolutionary pathways after the more homogeneous HP, with variation potentially following more strongly along environmental axes. Technological heterogeneity constitutes the most pronounced signal when comparing the Summer (SRZ), Winter (WRZ) and Year-Round (YRZ) rainfall zones, which correspond broadly to the eastern part of South Africa (KZN) plus Lesotho, the southern coast of Africa and the Western Cape, whereas intra-regional similarities are more common (Mackay et al. 2014a; Will et al. 2014; Bader et al. 2015; Will and Conard 2016). In all of these regions there is evidence for the maintenance of cultural complexity in lithic technology, but also in other find classes (Wadley et al. 2011; d'Errico et al. 2012; Hodgskiss 2013; Villa et al. 2015). These observations are further supported by theoretical considerations (Lombard and Parsons 2010, 2011) and recent meta-analyses of relevant findings across the entire MSA of South Africa (Kandel et al. 2016).

Apart from environmental influences, some of the regional differences in lithic technology might be explained by divergent demographic histories: Whereas the WRZ and YRZ exhibit a decrease in the number of sites and occupation intensity particularly between 50-25 ka (Singer and Wymer 1982; Mackay 2010; Porraz et al. 2013; Mackay et al. 2014b; Stewart et al. 2016), we found the opposite trend for the SRZ in KZN. In addition, find densities at Sibudu, and also at other sites, increase after the HP, suggesting the maintenance of large populations during MIS 3 in southern Africa in some areas, potentially affecting rates of innovation (Powell et al. 2009). Increased levels of population isolation between the different regions might have resulted in reduced levels of cultural transmission, producing a regionally variable signal concerning technology. These preliminary conclusions on the trajectories and mechanisms of cultural evolution during MIS 3 of southern Africa require more rigid quantitative testing, supported by more comparable data and new theoretical models, as well as further examination of the effects of the variable access, quality and quantity of raw materials which crosscut environmental zones in southern Africa.

Looking at assemblages within southern Africa associated with the end of the MSA, sites such as Rose Cottage Cave in the Basutolian eco-zone (Clark 1997a, b), Border Cave at the northern edge of KZN (Beaumont 1978; Villa et al. 2012) or Putslaagte 1 in the WRZ (Mackay et al. 2014b) appear significantly different from the final MSA at Sibudu, Umhlatuzana and Umbeli Belli. These sites also exhibit asynchronous dates. Other localities such as Sibebe in Swaziland (Price-Williams 1981) are insufficiently published and require detailed reinvestigations in order to clarify their relation to the KZN sites. Further comparative studies between the final MSA assemblages at Umbeli Belli, Umhlatuzana and Sibudu need to be conducted to document the cultural signal from the eastern part of South Africa in more detail. It is also possible that the cultural fragmentation during MIS 3 is a gradual process which increases through time, with its maximum extent around 40-30 ka. The reasons behind this regional cultural variability and abundant behavioral change remain an important question for future research, and will likely include various external and internal factors, encompassing climate and environment, but also subsistence behaviors, demographic variables and socio-cultural factors such as the variable pathways for the transmission of knowledge.

In sum, we would now classify MIS 3 as a period of dynamic change, local innovations and reduced cultural transmission between the regions of the subcontinent. While there is still much to learn from MIS 3 archaeology in southern Africa, recent studies by multiple groups of researchers show that the notion of a "dark age" can now be considered to be dead and buried. This view will likely be replaced by a more realistic picture of the geographical and temporal patterning of technological variability and cultural evolution of modern humans during the later part of the MSA of southern Africa as we gain empirical data with a more balanced spatio-temporal distribution. This process will ultimately require a re-thinking of the currently dominant "Synthetic Model" which is challenged on both empirical and theoretical grounds, with new ideas already emerging (Lombard et al. 2012; Conard et al. 2014; Conard and Will 2015).

Within and beyond KwaZulu-Natal and MIS 3: Future directions in research

We want to finish this contribution on recent MSA research in KZN by outlining future directions in our team's research. Returning to the spatial, temporal and formal dimensions of empirical research, ongoing and future work will focus on expanding the scope in all of these directions and can be broadly put into two categories: 1) Within KZN: Continuation of work at Sibudu and Umbeli Belli within a wider temporal framework; 2) Beyond KZN: Expanding the geographical scope to understand larger-scale patterns and intensify work on causal mechanisms.

Our first priority with regard to future work within KZN will be the extension of our research at Sibudu on a temporal scale. Since 2011, the focus of our fieldwork and analyses has been largely on the "Eastern Excavation" with its MIS 3 assemblages. The next steps will involve intensified research on the deposits in the "Deep Sounding," with continuing excavations below the "pre-SB." Wadley stopped her fieldwork in 2011 on top of a major rock fall in layer Brown Sand (BS16), which is dated to ~77 ka (Jacobs et al. 2008b). Initial work on this part of the excavations from a test trench below the rock fall event has uncovered multiple rich archaeological layers without yet reaching bedrock. Underlying both the classic SB with a reduction system targeted towards bifacial shaping and re-sharpening (Wadley 2007; Soriano et al. 2015) and "pre-SB" without bifacial technology (Wadley 2012), these assemblages surprisingly reveal abundant evidence for the production and shaping of various bifacial implements, including serrated pieces (Conard et al. 2014; Rots et al. 2017) that were so far only known from Umhlatuzana (Lombard et al. 2010; Högberg and Lombard 2016) within southern Africa. A first more detailed examination of residues and use-wear analysis on the serrated pieces from those lower levels have found evidence for their manufacture with pressure flaking by bone compressors and for their use as projectiles for hunting (Rots et al. 2017). A PhD dissertation concerning a more holistic lithic analysis for some of these older assemblages is currently under way by Viola Schmid at the University of Tübingen.

Our future field work and analyses in this deeper part of the site will be funded by a recently approved grant by the German Research Foundation awarded to Nicholas Conard and Manuel Will as principal investigators (CO 226/34-1/MW 4978/1-1; "Dynamics of subsistence and technology before and during the Still Bay at Sibudu, South Africa"). In addition to previous work, this new phase of research will also involve more detailed studies of the well-preserved faunal and botanical remains at the site, including the numerous organic tools (e.g., Becher 2016). Geoarchaeological and taphonomic research (Goldberg et al. 2009; Miller 2015), as well as an absolute dating program, will also continue as we extend the excavations further down. The numerous find-rich and well-stratified assemblages in the deeper part of Sibudu offer enormous potential to analyze the period before and during the SB on both an intra- and inter-assemblage basis.

We will also continue our research at Umbeli Belli to exploit the full potential of the site. Notwithstanding taphonomic issues such as the absence of organic remains and the acidic nature of the sediments (Bader et al. in prep.), our preliminary age estimations provided promising results for Umbeli Belli as a key locality for further investigations concerning the end of the MSA and the beginning of the LSA. We did not yet

reach bedrock at the site and, contrary to Cable's (1984) notes, no entirely sterile occupation horizon has been found so far, opening up the potential for a more complete MSA sequence. We will also provide more solid chronometric ages for the deeper layers and conduct detailed examinations of the lithic assemblages. In addition, large quantities of ochre pieces found at the site provide further research potential on behavioral aspects other than stone tools. Following our general approach in understanding archaeological signals on a broader geographical scale, we also plan to conduct comparative analyses between the final MSA of Umbeli Belli and the assemblages recovered by Wadley's excavations from Sibudu.

As it stands today, we are still left with only five adequately documented MSA sites in the entirety of KZN, an area of close to 100,000 km² which equals the size of the federal states of Baden-Württemberg and Bavaria taken together (see also Table 1). Regarding the outstanding archaeological remains of the currently known sites, and their low number overall, we plan to conduct intensive site surveys in collaboration with geographers and support by the KwaZulu-Natal Museum in order to increase the resolution of the MSA in this region. Examples such as Alfred County Cave (Bazley 1905; Mitchell 1998), which must be somewhere in KZN but has not been relocated within more than 100 years, prove that the verdant valleys and forests of this region cover untapped potential.

Site	Date of excavation	Cultural period	MIS 3 occupation	Key publications
Sibudu	1983, since 1998	Iron Age, final MSA, late MSA, "Sibudan"/post-HP, HP, SB, pre SB	Yes	Wadley 2001, 2005a, b, 2007, 2010, 2012; Conard et al. 2012; de la Peña and Wadley 2014; Will et al. 2014; Conard and Will 2015
Umhlatuzana	1985	Iron Age, LSA, final MSA (MSA/LSA transition), late MSA, HP, SP, (pre SB?)	Yes	Kaplan 1989, 1990; Lombard et al. 2010
Holley Shelter	1951-1959	"Sibudan", *(late/final MSA?)*	Yes	Cramb 1952, 1961; Bader et al. 2015
Umbeli Belli	1979, since 2016	LSA, final MSA	Yes	Cable 1984; Bader et al. 2016
Border Cave	1934, 1940-1942, 1970-1975, 1987, since 2016	Iron Age, early LSA, MSA/LSA transition, MSA3/post HP, HP, early MSA	Yes	Cooke et al. 1945; Beaumont 1978; Butzer et al. 1978; Grün and Beaumont 2001; Villa et al. 2012
Alfred County Cave	~1900	LSA, HP, undefined MSA	???	Bazley 1905; Mitchell 1998

Table 1: *MSA sites in KwaZulu-Natal. HP = Howiesons Poort; LSA = Later Stoner Age; MSA = Middle Stone Age; SB = Still Bay.*

Apart from scientific matters, we also plan to further intensify the German-South African research collaboration by the continuing participation of South African students in the fieldwork at Umbeli Belli and other sites. Over the years we have also started to build a local outreach community in KZN, including science communication and education with the general public. We hope that this engagement, such as visits to schools or public lectures, will help to further the knowledge and understanding of the region's past and heritage more broadly.

As the modern geographic borders of KZN have no relevance for Stone Age societies, we also consider a spatial expansion of the analytical focus to be necessary. This work will not only allow direct comparisons between regions of the subcontinent, but also help to understand larger-scale patterns and causal mechanisms driving cultural change. In order to expand our research towards the north, one of us (GDB) began collaborative work with the German Archaeological Institute (DAI) under the direction of Jörg Linstädter which recently began research on the archaeology of Swaziland. This work will encompass multiple time periods from the Iron Age to the MSA, with the potential to track cultural similarities and dissimilarities within a poorly investigated area that actually is rich in archaeological remains.

A move to the west has been part of recent research by one of us (MW), constituting renewed work in the Western Cape since 2014. The predominant study of lithic assemblages has been done in close collaboration with A. Mackay (University of Wollongong), focusing on MIS 3 archaeology in the Cederberg area. The work aims to look both at early MIS 3 – at sites such as Klein Kliphuis (Mackay 2010, 2011) and Uitpanskraal 7 (Will et al. 2015b) – but also into the lesser known later phase between ~50-30 ka (e.g., at the key site of Mertenhof rockshelter excavated by A. Mackay). Lithic analyses at Klein Kliphuis, Mertenhof and Uitpanskraal 7 are also part of a large-scale landscape study in the Doring River catchment led by A. Mackay that focuses on mobility and settlement patterns during the last 120,000 years in this area by examining the relationship between caves, rockshelter and open-air occupations. The findings from this region will be a crucial part of a more comprehensive, inter-regional comparison of MIS 3 lithic technology in southern Africa that is currently underway. This work will be based on comparable quantitative data between the regions, with a focus on individual attributes, guided by theoretical approaches of cultural transmission (Shennan 2001; Henrich 2004; Eerkens and Lipo 2005; McElreath et al. 2008; Tostevin 2013), but also by more nuanced and complex models of cultural change such as gene-culture co-evolution (Cavalli-Sforza and Feldman 1981; Boyd and Richerson 1985; Mesoudi 2011), complexity theory (Kauffmann 1995, 2000; Bentley and Maschner 2003) and the concept of multi-dimensional fitness landscapes (Wright 1932, 1982; Lombard et al. 2012).

Based on both a summary of our recent work as well as outlines for future research, we want to conclude with a similar statement to the one made by Conard and colleagues (2014) while reflecting on the outcomes of a DFG-funded workshop in Tübingen that brought together various researchers under the umbrella of recent MSA research in southern Africa: With ongoing work and more detailed empirical data, we end up with more questions than answers. We see this in a positive light as the hallmark of good science. The current situation will undoubtedly stimulate the development of new and

innovational methods and theories as well as more large-scale comparative and collaborative work to understand the MSA archaeological record of southern Africa and the evolution of early modern human behavior.

Acknowledgements

As this article provides a summary of our PhD dissertations, there are more people to thank than space allows. A full list can be found in our respective theses. Nevertheless, we both want to thank our primary supervisor Nick Conard for his enduring encouragement, enthusiasm and trust in our work. Without him the research presented here would not have been possible. Thank you for this opportunity and the many good times we had in South Africa together! In the following we restrict our acknowledgements to the scientific work in KZN. We thank our colleagues at the KwaZulu-Natal Museum, especially Carolyn Thorp and Gavin Whitelaw, and the staff of Amafa for supporting our research in the region. We are both indebted to numerous drawers of artifacts and to all of the members of the many excavation and laboratory crews at Sibudu (2011-2017) and Umbeli Belli (2016-2017). We are fully aware of the large amount of work and the importance of your contributions to this research. We also want to thank colleagues who have contributed significantly to the scientific aspects of these dissertations, namely Michael Bolus, Charles Cable, Peter Cramb, Andrew Kandel, Alex Mackay, Guillaume Porraz, Viola Schmid, and Mohsen Zeidi. Our final thanks go to Lyn Wadley for her constant support of our research at Sibudu and in KZN more broadly. Manuel Will has been supported by a Doctoral Dissertation Grant from the Studienstiftung des Deutschen Volkes and Gregor Bader by the state of Baden-Württemberg. The excavations and analytical work were funded by the Deutsche Forschungsgemeinschaft and through funds from the Heidelberger Akademie der Wissenschaften in the context of the long-term research project "The Role of Culture in Early Expansions of Humans."

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