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The Role of Culture in Early Expansions of Humans (ROCEEH)



Entrance area of Fumane Cave, Veneto, Italy. Photo: Fotoluisa



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THE ROLE OF CULTURE IN EARLY EXPANSIONS OF HUMANS

Editorial

In the 15th issue of ROCEEH's newsletter, we address the difficulties in defining Aurignacian industries and their spatio-temporal variability. We present our latest findings on the final phase of the Middle Stone Age in southern Africa. Finally we report on geomorphological field work associated with Sibudu Rock Shelter in South Africa and a ROAD training event in Mohali, India.

The importance of re-evaluating the Aurignacian industry for understanding the Early Upper Paleolithic

The spread of Anatomically Modern Humans (AMHs) into Europe represents one of the most stimulating topics in Paleolithic archaeology. This period witnesses significant biocultural processes that mark a gradual cultural shift from late Mousterian to Upper Paleolithic techno-complexes. The Aurignacian industry is seen as the culmination of these processes because it shows the consolidation of a set of cultural traits, such as long-distance mobility patterns, production of standardized lithic implements, various organic artifacts, figurative arts, and consistent use of personal ornaments. However, little is known about its spatio-temporal behavioral patterns. The regional scale of analysis is the most effective method to overcome this limitation, because it helps to address variability on a higher scale of definition and identify short-term cultural changes.

The Aurignacian was first defined and divided into successive stages based on the typological variability of stone and organic tools. Technological assessments were only conducted over the last two decades. The two earliest stages are known as Protoaurignacian and Early Aurignacian. To some, their geographical distribution is the outcome of different spreading routes of AMHs into Europe. The makers of Protoaurignacian assemblages would have followed the Mediterranean coastline, while foragers bearing an Early Aurignacian material culture would have spread across the Danube Basin. To others,

Protoaurignacian and Early Aurignacian represent two successive stages of the Aurignacian phenomenon, reflecting different settlement dynamics of AMHs. In this regard, a recent study has concluded that the shift from Proto to Early Aurignacian adaptive systems was triggered by deterioration of the environment at the onset of the Heinrich Stadial 4 (about 40,000 years ago). AMHs would have needed to adapt to new climatic conditions after a short-term pioneering phase. Two major problems over the construction of these scenarios arise; first, the lack of strict archaeological definitions for the Aurignacian variants, and second, the fact that its spatio-temporal variability is not yet well-defined. The latter problem is usually eluded by generalizing the archaeological evidence from southwestern France to the entire extent of Europe.

From the perspective of the stone artifacts, the Protoaurignacian and Early Aurignacian are characterized by a high technological investment in the production of blade and bladelet implements, although the modes of fabrication are described as being sharply divergent. The Protoaurignacian is said to be characterized by the use of a single and continuous reduction sequence for the production of both blades and bladelets. In contrast, blades and bladelets are considered strictly independent in the Early Aurignacian. Short and curved bladelets are obtained from carinated end scrapers, while thick blades come from prismatic cores. Recent assessments have questioned the validity of these archaeological definitions, showing how research tradition, cultural taxonomy, and unidirectional developments hinder our understanding of the sociocultural dynamics that led to the formation of the Upper Paleolithic.

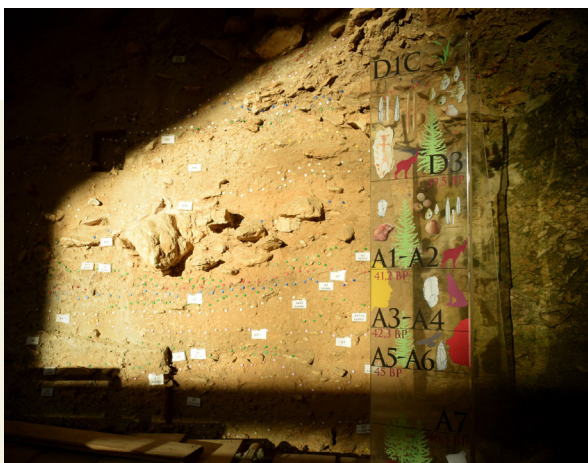
Among the studies conducted in the last few years, the site of Fumane Cave (Venetian Pre-Alps, northeastern Italy) was the object of an extensive analysis of the lithic assemblages and re-evaluation of organic tools and ornamental objects recovered from five cultural units spanning from about 41,000 to 36,000 years ago. This site is often recognized as one of the most important prehistoric sites in southern Europe because of the systematic and modern excavations conducted for decades, the presence of a high-resolution stratigraphic sequence that includes the Mousterian, the Uluzzian, and the Protoaurignacian (Fig. 1), and the discovery of modern human remains in the earliest Protoaurignacian cultural unit. Results of the techno-typological analysis of the stone artifacts confirm that the Protoaurignacian is a techno-complex dominated by bladelet implements (Falcucci et al. 2017; Falcucci and Peresani 2018; Falcucci et al. 2018), although bladelet production is based on a broad range of reduction strategies that are not related to the dwindling core dimensions as blade production progresses (Fig. 2). The dissociation of blade and bladelet production is thus not only restricted to Early Aurignacian assemblages. Furthermore, the techno-typological features of the Proto-aurignacian clearly persist throughout the stratigraphic sequence, giving a sharply different cultural signal as compared to the chrono-cultural developments seen in southwestern France (Falcucci 2018). Thus, the idea according to which the Protoaurignacian represents a short-term phase that vanished at the onset of the Heinrich Stadial 4 should be viewed with caution.

In conclusion, this research shows that the Aurignacian is a technocomplex characterized by a high heterogeneity that cannot be reduced to a static model in which adaptive systems are divided by temporal hiatuses or geographical domains. Further studies are needed to test different models of cultural evolution and understand the changes in human behavior that appear to be fully consolidated at the beginning of the Upper Paleolithic. These research questions have been largely neglected because of the need to easily track the spread of AMHs across Europe.

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Armando Falcucci



▲ Figure 1. The stratigraphic sequence of Fumane Cave at the entrance of tunnel A with evidence of late Mousterian (A6–A5), Uluzzian (A4–A3) and Protoaurignacian layers (A2–D3). Photo: A. Leone, University of Ferrara.



▲ Figure 2. Example of refitted semi-circumferential blade core from the earliest Protoaurignacian unit A2. Note that blade production is not replaced by bladelet production. Photo: A. Falcucci, University of Tübingen.

Umbeli Belli Rock Shelter in KwaZulu-Natal – Current results on the final MSA of southern Africa

The end of the Middle Stone Age (MSA) in South Africa, also known as the final MSA, represents one of the most enigmatic periods of the Stone Age. While several researchers have conducted investigations into understanding the transitional phase between the MSA and Later Stone Age (LSA), we still know little about this last stage of the MSA.

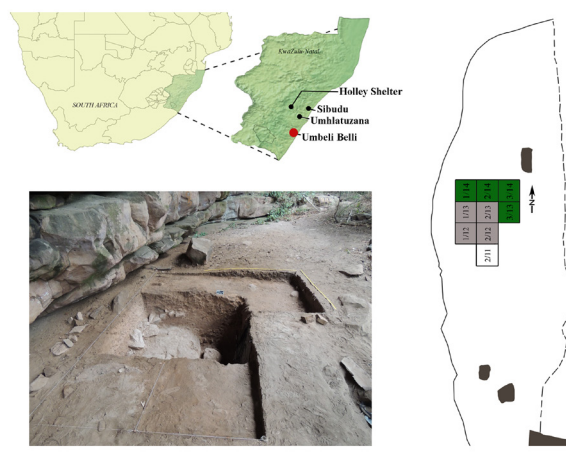
In light of an increasing awareness that the original criteria used to distinguish the MSA from LSA, for example the presence of personal ornaments, organic tools and art, are no longer valid, this lack of research seems odd. Most assemblages associated with the final MSA date between roughly 40,000 and 30,000 years ago, but many of them require renewed dating and detailed reinvestigation. While the majority of these assemblages provide distinctive LSA characteristics including bladelets, bipolar cores and the near absence of MSA points, the assemblages from other sites in KwaZulu-Natal, specifically Sibudu and Umhlatuzana, remain exceptional. At these sites, numerous bifacial and unifacial points and occasional hollow based points have been considered as the most characteristic features.

Since 2016, Gregor Bader and Nicholas Conard have conducted new research on the MSA and LSA site of Umbeli Belli near Scottburgh in KwaZulu-Natal (Fig. 3). The project is funded by ROCEEH and the German Research Foundation (DFG). Umbeli Belli was originally excavated in 1979 by Charles Cable of the University of Cambridge and published in 1984. However, his research focused mainly on the transitional period between hunter gatherers and farming societies, encompassing roughly the last 2000 years. Thus, while the older LSA and MSA deposits were partly excavated, they were

never adequately reported. After analyzing and publishing the MSA materials in collaboration with Cable (Bader et al. 2016), the research team renewed excavations at Umbeli Belli. These efforts revealed a two meter stratigraphic sequence subdivided into 12 archeological horizons covering the time span between >40,000 and 17,000 years ago. All artifacts larger than 2 cm were piece plotted individually using a Leica total station. Chantal Tribolo from Bordeaux, France used a technique known as optically stimulated luminescence to date the layers (Bader et al. 2018). In the three annual campaigns conducted until now, the team recovered more than 15,000 additional artifacts. The majority comprise stone tools, although ochre artifacts, some of them ground or knapped, are common as well.

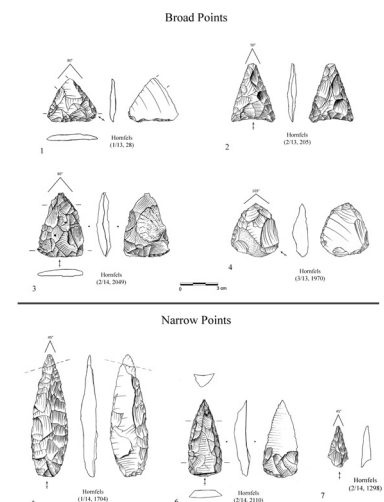
Umbeli Belli is of special interest because its layers 7 to 10 fall within the range of the final MSA. In 2018, Bader and colleagues published their study on the final MSA assemblage of layer 7 dating to 29,000 years ago, representing the latest expression of the MSA in the entire region of KwaZulu-Natal. Analysis of the assemblage showed a high number of specific flakes that are associated with intensive surface shaping of stone tools. This fits well with the high number of unifacial and bifacial points uncovered from layer 7. Such points were previously considered to be a unique characteristic of the much older Still Bay technocomplex, which dates to more than 70,000 years ago.

The majority of the points could be classified into two separate groups called broad points and narrow points (Fig. 4). Broad points are triangular in shape, exhibiting sharp lateral edges and are much wider than thick, while narrow points are elongated with steep lateral edges and a much more acute distal tip angle. Use wear and residue analysis are planned, but preliminary indications suggest that the two point types served different



▲ Figure 3. Top: Geographic setting of Umbeli Belli and other MSA sites in the region. Bottom: Original trench by C. Cable reopened in 2016. Right: Site plan. White square excavated by Cable down to top of layer 3; grey squares excavated by Cable down to bedrock/sterile sand; and green squares excavated by the Tübingen team between 2016 and 2018. Photo and graphics: G.D. Bader.

► Figure 4. Stone tools from Umbeli Belli layer 7: Finds 1-4, broad points; finds 5-7, narrow points. Graphics: G.D. Bader.



functions due to their different physical properties.

Finally, the overall presence of basal thinning to reduce the thickness of each of those points indicates that they all were hafted in a similar manner. Although the final MSA horizons below layer 7 have not yet been studied in detail, preliminary observations indicate that there are significant differences within the range of tools and reduction techniques. Future research at Umbeli Belli will test this. For now, it is likely that the catch-all category “final MSA” in fact lumps together several distinct traditions of stone tool manufacture. In parallel, comparative studies between Umbeli Belli and the well-known MSA site Sibudu Rock Shelter are underway. The comparison will provide a better understanding of the regional variability of the terminal phase of the MSA in southern Africa.

Geomorphological field campaign in the KwaZulu-Natal (RSA) in spring 2018

As mentioned in the last article, Sibudu Rock Shelter represents a valuable archaeological archive. However, it also tells us a story about environmental changes in the neighboring Tongati Valley during the Pleistocene. The rock shelter was formed by the Tongati River as fluvial erosion incised more than 100 meters down into the hard sandstone formations of the Natal Group. Close to Sibudu, one of the river's meanders bends to the right, causing the Tongati to cut 20 m into its left bank. It is interesting to note that the rock shelter in which the archeological site is situated was itself excavated by the action of the river when it flowed at a level about 15 m above the present-day river course. In this way, a sheltered location was created which protected the deposited sediments from weathering and erosion for more than 77,000 years.

References

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Gregor D. Bader & Nicholas J. Conard

The lowering of the Tongati riverbed can be differentiated into phases of stability, characterized by confined meandering and deposition of transported sediment, and phases of instability, during which the river continued to cut its valley deeper. Alternating cycles of stability and instability generated a stepped relief marked by fluvial terraces. These phases were triggered by the concurrence of multiple factors, such as changes in relative sea level, climate, vegetation cover and tectonic uplift. During the Penultimate Glacial Maximum (about 160,000–140,000 years ago) and the Last Glacial Maximum (about 24,000–18,000 years ago), global sea level dropped about 100 m and 130 m, respectively, as compared to modern sea level. During these cold periods, more water was tied up in the polar glaciers, causing a lowering of sea level, which is also called a marine regression. This effect lowered the shoreline during these maximum cold phases, so that Sibudu was situated more than 35 km from the coast, instead of 10 km, as it is today. During



◀ Figure 5. Pebbles and cobbles in an alluvial gravel terrace located about 1.5 km from Sibudu. Scale = 30 cm. Photo: C. Sommer.

two well-known phases of human occupation called Still Bay and Howiesons Poort (about 80,000–60,000 years ago), sea level was at an intermediate stage, about 60 m lower than today. At this time, the coast was still about 25 km away from the site. As sea level continued to drop, the base level of the river also lowered, as did the lower limit of stream erosion. As a result, new phases of erosion began. Thus we see that changes of climate and vegetation play an important role as they affect the runoff and sediment load of a river, regulating its capacity for erosion and incision.

During a field campaign in January and February, 2018 we investigated the residuals of the former landscape. We found several corresponding terrace levels between 5 and 30 m above recent stream level. Related to the terrace levels we found remnants of former valley bottoms and paleo-meanders. We applied geophysical techniques such as Electrical Resistivity Tomography and Inductive Electrical Resistivity measurements to examine the properties of the subsurface (e.g. fluvial terraces, paleosoils). During fieldwork we excavated soil profiles and retrieved soil and sediment samples for dating and soil analytics. In a soil profile 1.5 km upstream from Sibudu and situated about 20 m above modern stream level, layers containing well-rounded pebbles and cobbles were found indicating a fluvial transport of the material. By mapping remnants of the paleo-landscape and dating these features, we can better understand their evolution and gain valuable information to help reconstruct the development of the Tongati River basin.

In addition, we started mapping the Masotcheni Formation in the foothills of the Drakensberg Mountains, located about 100 km northwest of Sibudu. The sediments of this colluvial formation have accreted in response to several cycles of deposition, pedogenesis and incomplete erosion over the last 100,000 years (Botha 1996). The Masotcheni Formation overlaps with the time span covered by the excavations at Sibudu, and many stone artifacts can be found on its surface. We conducted a detailed terrain analysis based on the new TanDEM-X elevation data with 12 meter resolution, an analysis of aerial stereo photography, and a multispectral assessment of satellite data (ASTER/Sentinel-2). These techniques allow us to gather information about the spatial distribution and composition of the Masotcheni Formation in the foothills of the Drakensberg, whose extent is thus far only partially documented in the geological maps of the area. This joint research program is conducted in collaboration with the South African Geological Survey in Pietermaritzburg.

References

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Christian Sommer

ROAD Training Event

Indian Institute for Science, Education and Research (IISER), Mohali (Punjab, India), August 23-28, 2018
Organizers: Christine Hertler & Andrew Kandel

ROCEEH organized an introductory training course for future users of the ROCEEH Out of Africa Database (ROAD) in Mohali, India. The class was attended by 19 students of the Department of Archaeology at IISER.

The course consisted of three modules focusing on archaeological data entry, understanding and writing queries, and mapping data retrieved from the ROAD database using the MapModule. The course served to educate users of ROAD about the intricacies of the database and broaden collaboration between ROCEEH and IISER.

Christine Hertler and Andrew Kandel

► Figure 6. The participants of the ROAD training event at IISER, Mohali; standing on the left, our host, Prof. Parth Chauhan. Photo: IISER.



Forthcoming

- Computer Applications and Quantitative Methods in Archaeology (CAA) Meeting
23–27 April 2019 in Krakow, Poland, Session: Progress in WebGIS and DB solutions for Archaeology.
<https://ocs.caaconference.org>
- METHOD IFG Workshop 2019: Modeling Humans and their behavior around the MPR—from data to models
29–30 April 2019 in Rome, Italy.
- Advanced Database Workshop for South Asia
3–28 June 2019 in Tübingen, Germany, course on the practical use of ROAD focusing on the prehistory of South Asia.
<http://www.roceeh.net/academics/classes>
- Workshop of the NECLIME working group on “Taxonomy of Neogene Palynomorphs”
17–20 June 2019 in Weimar, Germany.
<https://www.neclime.de/news.html>
- Cultural Dynamics in the Middle Stone Age in Coastal and Interior Contexts in Southern Africa
20–22 June 2019 in Tübingen, Germany.
- International Union for Quaternary Research (INQUA)
25–31 July 2019 in Dublin, Ireland, Session: Before and after the earliest Homo dispersal in Eurasia.
<http://www.inqua2019.org/programme/special-sessions/#toggle-id-14>
- International Union for Quaternary Research (INQUA)
25–31 July 2019 in Dublin, Ireland, Session: Human and non-human responses to the mid-Pleistocene transition.
<http://www.inqua2019.org/programme/special-sessions/#toggle-id-21>
- East African Association for Paleoanthropology and Paleontology, 7th biannual conference: ROAD Workshop
1–4 August 2019 in Nairobi, Kenya, meeting co-sponsored by ROCEEH.
<https://eaappinfo.wordpress.com>
- Neogene Climate Evolution in Eurasia (NECLIME) Annual Meeting
10–17 September 2019 in St. Petersburg, Russia. With a session on “Plio-Pleistocene palaeobotanical records of Northern Eurasia” and a field trip to the Polar-Alpine Botanical Garden-Institute in Murmansk. (Due to visa requirements, deadline for pre-registration is February 10) <https://www.neclime.de/news.html>
- International Conference, “Caves as Natural and Cultural Monuments”
11–16 September 2019 in Yerevan, Armenia. With post-conference field trip to sites of geological and archaeological interest.
<http://armconference2019.com>

Who's who?

This issue: Matthias Göden

Matthias B. Göden studied Prehistoric Archaeology, Paleoanthropology and Geology at the University of Tübingen, receiving his Master's degree in 2015. In his thesis he investigated the geoarchaeology and site formation processes at the Middle Stone Age site of Hoedjiespunt in the Western Cape of South Africa. This open-air archaeological site is situated directly on the modern seashore within a coastal dune environment. This site is especially known for its early use of marine resources. His micromorphological investigations revealed that small fragments of shells form the main component of both the local geological formations and the archaeological deposits. An exception is the archaeological horizon named DAMA, whose main components include fragments of burnt bone, secondary phosphates and organic material. Matthias joined the ROCEEH project in 2011 as a student assistant and now works as a research assistant, entering geological and archaeological information into the ROCEEH Out-of-Africa Database. His research interests focus on geoarchaeology and micromorphology.



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THE ROLE
OF CULTURE
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The Heidelberg Academy of Sciences and Humanities is a member of the Union of German Academies of Sciences and Humanities, which coordinates the Academies' Program. The research project, „The Role of Culture in Early Expansions of Humans“, was incorporated into the Academies' Program in 2008.



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