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

View from Geißenklösterle Cave overlooking the Ach Valley. Photo: Conny Meister, State Office for Monument Preservation in the Regional Council of Stuttgart.

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THE ROLE
OF CULTURE
IN EARLY
EXPANSIONS
OF HUMANS

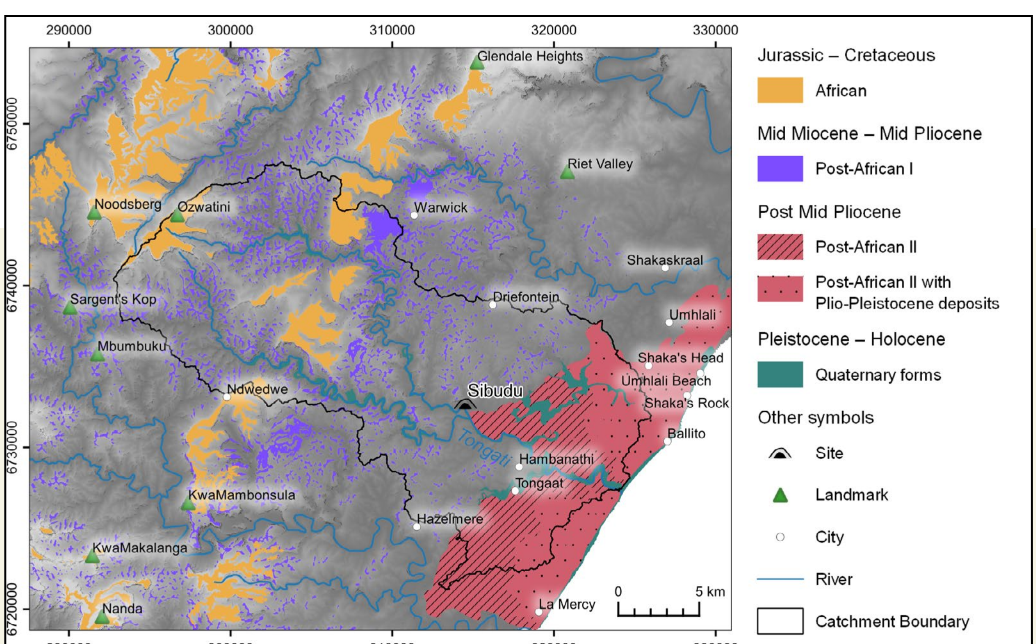
Editorial

In the 19th ROCEEH newsletter, we look at geographic methods for the study of habitat change, the analysis of stone artifacts from the Upper Paleolithic in Armenia, the research history of one of the most important Paleolithic sites in Germany, and the cognitive abilities of our ancestors. We hope you enjoy!

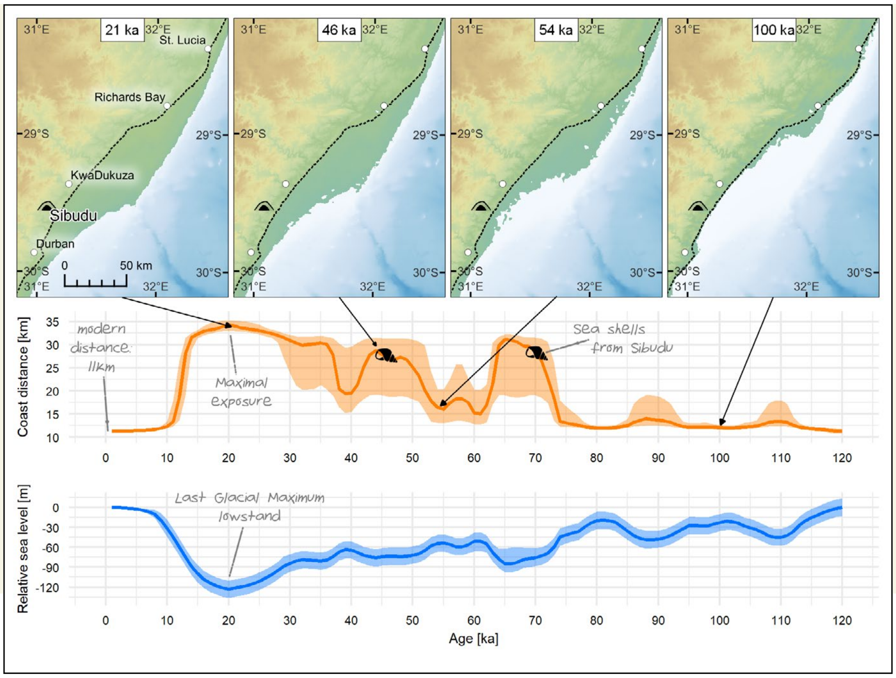
The evolution of the landscape surrounding Sibhudu Cave – and its implications for early occupants

The lifeways of early hominids were certainly firmly embedded in their natural environment, which shaped their daily foraging behavior and mobility patterns. No wonder, that there are a number of hypotheses that hold the drastic environmental changes of the Pleistocene responsible for geographic, biological, and cultural expansions of our ancestors. In order to verify these hypotheses, it is necessary to get as exact a picture as possible of the paleoenvironment and to examine the evidence of earlier humans in this light. This report aims to illustrate how geographic methods, i.e. geographic information systems, geospatial data and remote sensing, can be used to reconstruct the elements and processes of the past landscape surrounding Sibhudu Cave, one of the best studied Middle Stone Age sites in South Africa.

The first question that arises concerns the age of the landscape, or better, the age of the individual components. This can be answered with a geomorphological map, in which the different landscape elements are located and categorized, and thus allows us to interpret the processes and timing of their development. Figure 1 shows a map of the geomorphic history of the Tongati Valley, with different colors reflecting the different stages of landscape evolution. This map is the result of an extensive GIS



▶ Figure 1. Map of the geomorphic history of the Tongati catchment. The colored areas indicate remnants of several stages of the valley's landscape evolution that can be attributed to specific geological epochs. Graphic: after Sommer (2021).



◀ Figure 2. Coastal dynamic of the Natal Bight during the Late Pleistocene. The costal distance from Sibhudu Cave (orange line) was modeled using the sea level curve (blue line) by Waelbroeck et al. (2002) and the GEBCO dataset (Weatherall et al. 2015). The dashed line in the maps indicates the modern shoreline. Graphic: after Sommer (2021).

analysis that takes into account high-accuracy digital terrain models (DTMs) from the TanDEM-X mission, geologic maps, field observations, and also tectonic activity. It shows, for example, that the high plateaus and hilltops above the valley (orange) developed long before the appearance of hominids and remained comparatively stable ever since, thanks to protection by hard, well cemented layers called duricrusts. During the Pliocene, the period when earliest hominins appeared in Africa, the landscape was much flatter than today and the sea extended inland (violet, red). At that time, the location that is now Sibhudu Cave was close to the beach, as evidenced by littoral deposits like fossilized dune cordons and high-lying paleo-shorelines. In the middle of this epoch, about 5 million years ago, the land was uplifted by tectonic forces, so that the coastline retreated and erosion began to excavate the present valleys, gorges and hilly landscape. Also the rockshelter, which now hosts the Late Pleistocene finds of Sibhudu Cave, was carved out during this phase by the lowering of the Tongati River. One can summarize that the landscape was subject to enormous changes throughout the time of human evolution. That's why such a map is of great value for paleo-research, as it shows which elements were already part of the landscape at a certain point in time, and which developed later.

To better understand the relatively short phase of the Late Pleistocene during which Sibhudu Cave was occupied, the Tongati Valley must be studied in more detail on a smaller scale.

Hydromorphometry is a GIS-based method of examining the geometry of a river's longitudinal profile for anomalies caused, for example, by geology, tectonic movements, or sea level changes. These revealed that the lower reaches are exceptionally shallow, suggesting that the valley is now filled with sediments. It can be inferred that the lower valley was much deeper during MSA occupation, but sedimentation buried the former river channel in response to a rise in sea level, that is linked to the Termination of the last Ice Age. Furthermore, Earth Observation Analyses allowed the identification of up to three levels of former river channels, in the form of fluvial terraces, cut-off meanders and meander spurs. These were then investigated during a field campaign using geomorphological techniques, such as soil samples, electric resistivity imaging and OSL dating. The field results indicate that the terraces formed during Late Pleistocene sea level standstills, during which the river widened its floodplain; during periods of sea level lowering, it deepened. This is relevant to archaeological research because the results show that the Tongati valley we see today does not correspond to the valley of its early occupants. With some parts being exposed and others buried, this has implications for the availability of resources, such as lithic raw materials from the valley.

This variability in sea level not only shaped the course of the river, but also exposed considerable areas of what is now the submarine coastal plain of the Natal Bight (Fig. 2). The temporal and spatial dynamics of this coastal plain could be modeled using a paleo sea level curve and bathymetric data, including a digital depth map created from nautical charts, ship sonar and satellite measurements. The results show that due to the topography of the Natal Bight, the coastal plain grew by more than 5,000 km² at times of sea level low stand. Furthermore, at those times, Sibhudu was 35 km from the coast, about three times the distance today. Based on its geomorphological features, we assume that the once exposed coastal plain did not resemble today's coastal platform, which is characterized by a narrow coastal strip followed by an elevated hinterland, but rather resembles a flatter coastal plain. Such a landscape type is nowadays atypical for the region, but widespread in Northern KwaZulu-Natal, where it covers large areas with aeolian landforms, lagoons and wetlands. These findings shed new light on marine resources found in Sibhudu Cave, like specimens of the snail shells *Nassarius kraussianus* (46,000 years old), *Mancinella capensis* and *Afrolittorina africana* (both 70,000 years old) (Vanhaeren et al. 2019), that were likely not collected within daily foraging distance, but longer trips to the coast. It also means, that early occupants had access not only to additional land, but a diverse landscape likely with a distinct set of faunal and floral resources that are yet to be studied.

In summary, a broad mix of methods including spatial analysis using GIS, remote sensing and a range of geomorphological techniques are well suited to complement the picture that emerges from the archaeological, botanical and biological investigations at the site itself. This shows that processes such as erosion and sea level change fundamentally reshaped the landscape in the past. These developments posed a challenge to humans not only then, but also today, intensified by recent rapid climate change.

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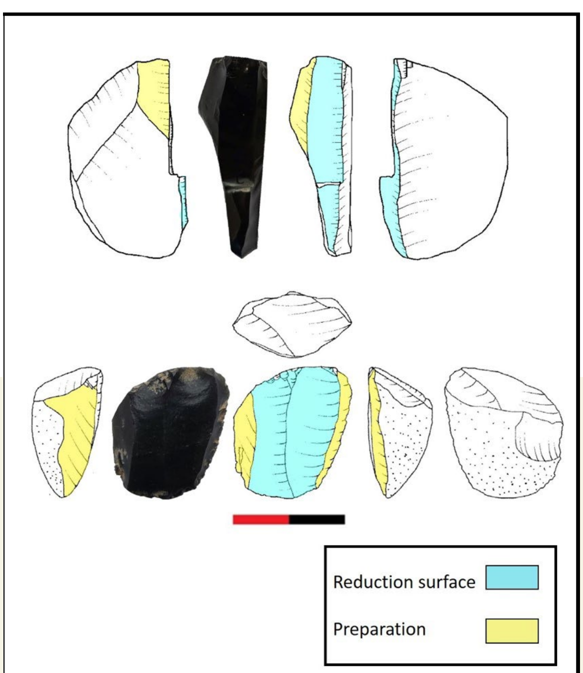
Christian Sommer



▲ Figure 3. Cores from both techniques: narrow-faced technique from AH VII (top) and wide-faced technique from AH III (bottom). Graphic: Firas Jabbour.

Analysis of Upper Paleolithic stone artifacts from Aghitu-3 Cave, Armenia

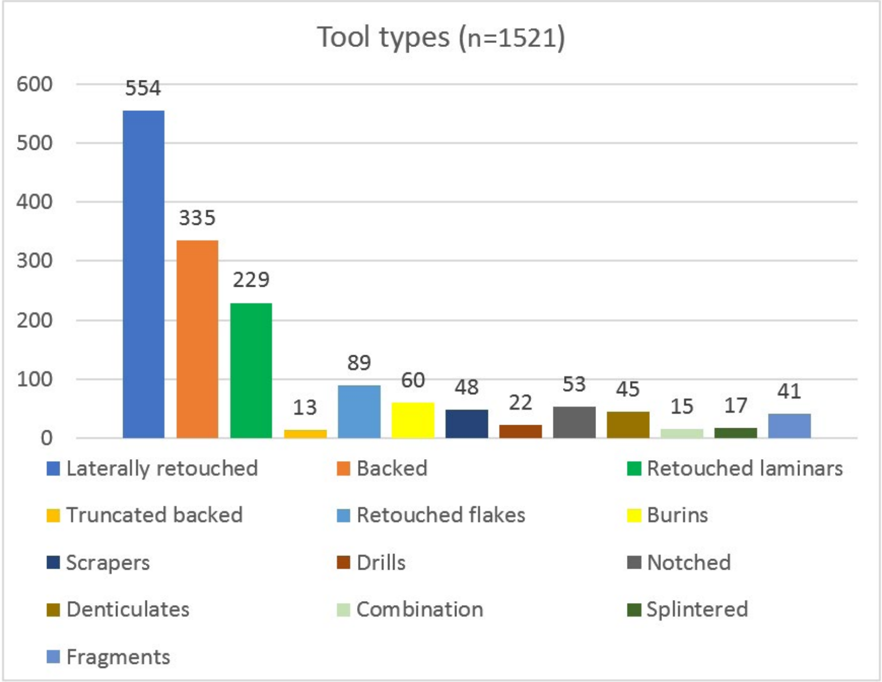
Aghitu-3 Cave is an Upper Paleolithic site located along a basalt massif at an elevation of 1601 m above sea level, close to the Vorotan River in the Syunik Province of southern Armenia. Archaeological excavations at the site revealed five layers that provide evidence of occupation. These archaeological horizons AH VII to AH III yielded notable finds including shell beads, an eyed bone needle, and other bone tools, plus a large assemblage of lithic artifacts. The layers date between 39,000 and 24,000 years ago and highlight the earliest evidence for the presence of modern humans in Armenia.
To begin, we classified the lithic artifacts based on raw material, to describe the rocks from which the artifacts were made. Next, we grouped them into four categories (see below) regardless of the knapping methods or preparation techniques. After the typological classification and statistical analysis of the stone artifacts, we conducted a technological study aimed at understanding the methods of production, and how they changed over time. We examined each layer separately to explain activities and developments related to human behavior within a chronological and environmental framework.

The first artifact category includes cores, which are defined as artifacts prepared to extract blanks (flakes, blades and bladelets) for further use. The second category is technical pieces, which are important because they provide us with an overall understanding of the techniques used in core preparation. In addition, technical pieces show the steps of the production process, including mistakes and methods of repair. The third category consists of tools, which are blanks that have been further modified into specific, standardized forms through a process known as retouching. The last category includes angular debris, represented by shattered fragments of knapped stone without a clear form. The results of the raw material study show that a glassy rock known as obsidian dominates the lithic assemblage with 85%. A colorful, fine-grained rock known as chert is far less common, representing 14.7%, while the few remaining artifacts (about 0.3%) consist of volcanic rocks like dacite and basalt. Ellery Frahm (Yale University) conducted non-destructive chemical studies of the obsidian artifacts using a portable x-ray fluorescence detector. He measured the minerals present and compared them to his obsidian catalog.

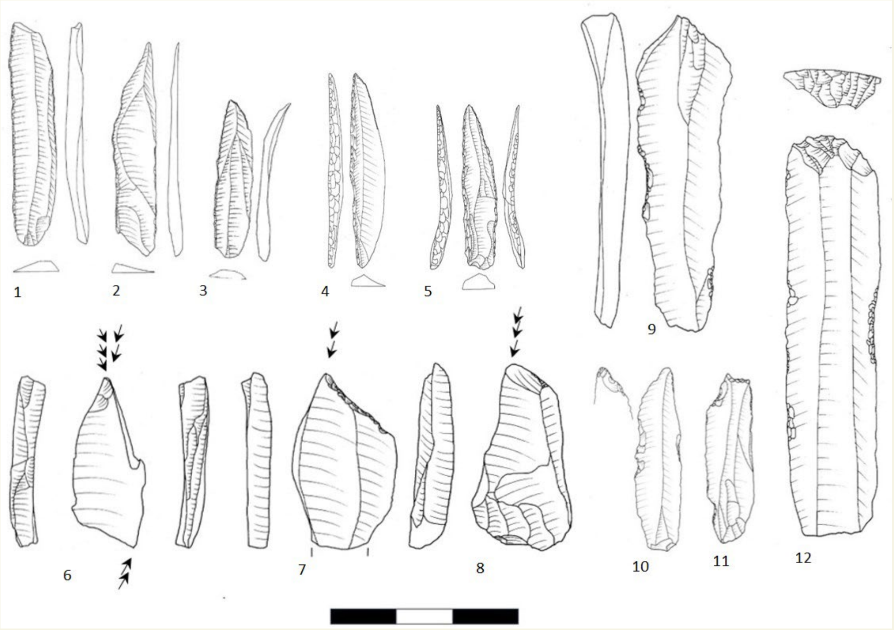
The chemical studies of obsidian showed that most varieties are available regionally from the Syunik volcanic sources located about 30-40 km away. However, some obsidian comes from distant sources in northern Armenia and eastern Turkey about 150 to 250 km away. This shows us that people must have been mobile over very long distances, or at least in contact with other groups who covered vast territories. In the older layers, AH VII and AH VI, just 1% of the obsidian comes from distant sources. However, in the youngest layer, AH III, the amount of distant obsidian increases to 8%, which suggests a noticeable shift in the range of human mobility.

For chert, based on our own field surveys, we concluded that it likely comes from different sources about 8-20 km away. Dacite and basalt are very common rocks located within a radius of less than 5 km from the site. These raw materials suggest short distances of movement.

The people who inhabited Aghitu-3 Cave used two main techniques to produce the blanks which they subsequently retouched to create different types of tools:



◀ Figure 4. Distribution of the different types of tools. Graphic: Firas Jabbour.



◀ Figure 5. (1-3) laterally retouched bladelets; (4-5) backed bladelets; (6-8) burins; (9) denticulate; (10-11) drills; and (12) end scraper. Graphic: Firas Jabbour.

1) *narrow-faced,* unidirectional or bidirectional, platform cores made from rectangular shaped blocks that were free of cortex (Fig. 3, top). The intersection of the two surfaces is represented by a narrow angle from which people started knapping the block after removing a few preparation flakes. This technique dominated in the lower archaeological horizons, especially in AH VII.

2) *wide-faced*, unidirectional, bladelet cores made from cobbles, thick blocks or flakes without preference for a specific shape (Fig. 3, bottom). The production of bladelets started after the creation of a simple platform and some preparation on one or both sides. This technique dominated in the upper archaeological horizons such as AH III.

The people who lived at Aghitu-3 Cave produced a high proportion of bladelets, defined as long, thin blanks less than 10 mm in width with parallel sides. They retouched these standardized bladelets to create tools of different shapes with forms suitable for specific functional uses. Bladelets with lateral retouch and steep, backed retouch are the most common types, accounting for 74% of the total number of tools (Fig. 4).

With regard to the type and distribution of retouch, laterally retouched blades and bladelets with fine and semi-abrupt retouch on a single long edge comprise the most common type of tool (Fig. 5, 1-3). The next most common are abruptly and steeply backed bladelets (Fig. 5, 4-5). Some blades and bladelets even have complete or partial retouch on both laterals, which creates pointed artifacts. All of these kinds of retouch suggest that these tools could have been hafted along their blunted edge, with the sharp edge used as part of a cutting or hunting implement. We see other kinds of tools that were likely used for more tasks specialized. One example is the burin (Fig. 5, 6-8), which is usually viewed as a tool suitable for scoring and scraping wood or bone. But a burin could also serve as a core from which thin spalls could be struck. We found just a few of these burin spalls, which suggests that the products were instead used outside of the cave. We note denticulated tools (with one or more notch), drills and scrapers (Fig. 5, 9-12) made on blades and flakes. These larger tools were likely used for cutting, grooving and scraping organic materials.

Based on the results of our studies of the cave, we divided Upper Paleolithic settlement into three main stages: early, middle and late. During the early Upper Paleolithic, people relied on large, narrow-faced cores to produce their tools. Based on the small number of artifacts, the diverse types of tools, the variety of activities including single fire events, and the presence of fewer obsidians from distant sources, people used the cave as a temporary camp for stays of shorter duration.

During the middle and late Upper Paleolithic, people relied on smaller, wide-faced cores. Based on the large amount of artifacts, the many types of tools, the variety of activities including complex combustion features, the presence of more obsidians from distant sources, and shell beads from possibly distant sources, we conclude that people used the cave as a seasonal camp for stays of longer duration.

Firas Jabbour & Andrew W. Kandel

Research at the Geißenklösterle cave site (Ach Valley, Swabian Jura)

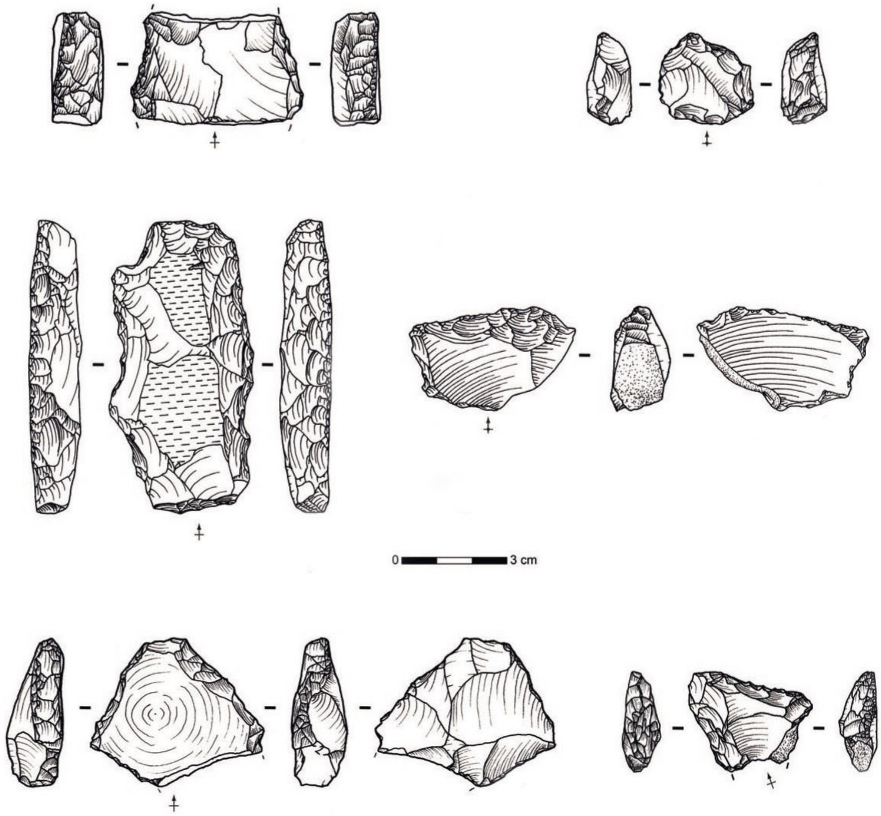
Introduction

Geißenklösterle in the Ach Valley of the Swabian Jura in southwest Germany is one of the most important Paleolithic cave sites in Europe. Today, largely collapsed, it is situated 585 m above sea level or 60 m above the valley floor and opens to the west towards the valley (Fig. 6). Since the end of field work in 2002, the analyses and publication have made significant progress. Extensive new dating was carried out for both the Middle and Upper Paleolithic horizons. In particular, a considerable amount of data entry was in part supported by ROCEEH. The following article is a brief summary of the current state of knowledge, data analyses and publication of the Geißenklösterle site.

History of research

Geißenklösterle was discovered in 1958 by Reiner Blumentritt, who at that time supported Gustav Riek in his excavations in the nearby Brillenhöhle. After some exploratory work, the first serious field campaign began in 1973 with a test trench dug by Eberhard Wagner. From 1974 (that year still together with E. Wagner) to 1983, and then from 1986 to 1991, Joachim Hahn carried out annual excavations in the cave. Final fieldwork, particularly in the lowest strata, was carried out between 2000 and 2002 under the direction of Nicholas Conard (Hahn 1988; Conard 2019).

▶ Figure 6. View of Geißenklösterle (red arrow) from the Ach Valley. Adopted from Conard 2019. Photo: M. Malina.



◀ Figure 7: Selection of side scrapers from the Middle Paleolithic layers of Geißenklösterle Cave (modified after Conard et al. 2020).

Since 2017, Geißenklösterle together with two other caves in the Ach Valley and three caves in the Lone Valley is inscribed into the UNESCO World Cultural Heritage List under the name 'Caves and Ice Age Art in the Swabian Jura' (Conard and Kind 2017).

Stratigraphy and dating

The importance of Geißenklösterle lies not least in its extensive Pleistocene stratigraphy, which comprises find layers from the Middle Paleolithic, Aurignacian, Gravettian and Magdalenian. Moreover, the site also yielded scattered artifacts from the Holocene Mesolithic.

Overall, within a sediment thickness of more than four meters, 23 geological horizons with eight archaeological horizons (AH), most further subdivided, were uncovered, of which the lowest five (AH VIII-IV) belong to the Middle Paleolithic. After several attempts to date the Middle Paleolithic layers using ESR and AMS, new ESR measurements now provide a fairly solid framework for the Middle Paleolithic of Geißenklösterle (Richard et al. 2019; Conard et al. 2020). With these measurements, dates between around 90,000 and 45,000 years ago could be determined. In the stratigraphic sequence, a horizon almost lacking finds with an age of about 48-44,000 years follows. It separates the Middle Paleolithic and early Upper Paleolithic find horizons from each other. The earliest calibrated and modeled 14C dates for the overlying Aurignacian layers yield an age of 43-41,000 years, while the Gravettian horizons point to an age of 35-34,000 years (Higham et al 2012; Conard 2019). This means that both the Aurignacian and Gravettian of Geißenklösterle count among the earliest occurrences of these techno-complexes in Europe. The Magdalenian begins after the Last Glacial Maximum (LGM) starting about 15,000 years ago.

◀ Figure 8: Bone flute from the Aurignacian layer AH II of Geißenklösterle Cave. Photo: H. Jensen, University of Tübingen.

Middle Paleolithic

The Middle Paleolithic of Geißenklösterle was recently published in an extensive article with contributions by the present author (Conard et al. 2020). Middle Paleolithic finds were excavated in AH VIII-IV. Within the overall rather low density of finds, only AH VII and AH VI yielded higher numbers of finds. A regular application of the Levallois concept for producing small flakes and tools mainly from local Jurassic chert can be observed. Other reduction methods are less well documented. Side scrapers (Fig. 7) and splintered pieces are by far the most common tool types. Tools made of organic materials and features have not yet been found.

Aurignacian

Probably the most famous finds of the cave come from the Aurignacian horizons AH III and II. Since the Upper Paleolithic layer package was separated from the uppermost Middle Paleolithic layer by the above-mentioned almost find-lacking layer, possible encounters between Middle Paleolithic Neanderthals and anatomically modern people of the early Upper Paleolithic seem unlikely. The Aurignacian artifacts unearthed up to 1983 were presented in a first large monograph (Hahn 1988). They represent typical assemblages of the early Aurignacian with carinated stone tools, end scrapers, burins, splintered pieces, pointed blades and other types of tools. The Aurignacian stone artifacts excavated from 1986 to 2002 are currently being analyzed as part of a PhD dissertation at the University of Tübingen.

The tools made of organic materials are significant and numerous, including projectile points made of ivory and antler, some with split bases, as well as a noticeable *bâton percé* (perforated rod) made of ivory. Among the personal ornaments, double-perforated beads carved from ivory, which seem to be limited to the Aurignacian of the Swabian Jura, are among the most striking finds. Perhaps the most spectacular items are four figurines carved from mammoth ivory and several unique flutes made of both bone (Fig. 8) and ivory, which are among the oldest evidence of three-dimensional art and music in the world. Two fire-related features are also deserve mention.

Post-Aurignacian layers

The stone artifacts of the Gravettian have already been published in a monograph (Moreau 2009). They are typical of an early facies of the Gravettian with Gravette points, microgravettes, flechettes, atypical Font Robert points, backed knives and burins. Organic artifacts, including projectile points, complete the assemblage. Among the personal ornaments of Gravettian age, teardrop-shaped ivory pendants are particularly noteworthy.

The Magdalenian horizon is only represented by a few stone artifacts, including backed knives; in addition, a small fireplace was detected. Some scattered Mesolithic microliths belong to the early Holocene.

Fauna

The fauna, which is particularly rich in the Middle Paleolithic, Aurignacian and Gravettian layers, was recently presented in a monograph (Conard et al. 2019). Noticeable is the high proportion of cave bear bones in both the Middle Paleolithic and Aurignacian layers (Münzel 2019). Among the hunted large mammals, horses and reindeer dominate, other species such as mammoth and rhinoceros are less frequently represented. Numerous remains of small mammals, reptiles and amphibians and, moreover, bird and fish remains provide important information on the climatic and environmental development over the entire stratigraphic sequence of the cave.

Discussion and conclusions

Geißenklösterle, together with its neighbor, Hohle Fels Cave, is part of the UNESCO World Cultural Heritage 'Caves and Ice Age Art in the Swabian Jura'. These sites represent a reference point for the transition from the Middle Paleolithic to the Upper Paleolithic as well as the behavioral changes observed between the Aurignacian and Gravettian. While Neanderthal groups used the cave rather sporadically, the quantity of materials in the layers of the Aurignacian and the Gravettian indicate that anatomically modern people used it much more intensively. During the Magdalenian, however, the intensity of use decreased significantly, with minimal levels of occupation during the Holocene Mesolithic.

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Michael Bolus

"Technology and the human species" – A philosophical research

Archaeology investigates the material traces of prehistoric cultures. Cognitive archaeology logically continues this research interest by asking: What must have been the cognitive abilities of our ancestors to be able to intentionally produce the artifacts we know?

With this question, cognitive archaeology has already adopted a dynamic view. Not only does the 'content' of cognition change – our worldviews and beliefs, our 'cosmologies', to name a few – so does cognition itself, at least on an archaeological timescale. Cognigrams developed by Miriam Haidle provide a fascinating method to describe the cognitive depths of different artifacts, making them comparable and allowing us to rank them.

The next logical step is to ask about the driving forces and governing laws of this dynamic. There is still a widespread conviction among researchers that this dynamic ultimately reduces to a biological process. This conviction can be broken down into two parts, though both are questionable. First, that we are dealing with a monocausal phenomenon—a 'single-trait event' instead of a 'multifactorial process' in the words of Miriam Haidle. Second, that the story which starts here is essentially that of the human brain. According to this view, culture is only the 'expression' of our cognitive capacities. As early as the 1960s, André Leroi-Gourhan mocked this 'cerebralist' view. A broader conceptual framework to make this criticism plausible, but also to formulate alternative hypotheses, is offered by the model for the Evolution of the Expansion of Cultural Capacities developed in Tübingen. According to this model, cognitive development takes place in a three-dimensional space represented by biological or phylogenetic, individual or ontogenetic, and finally cultural or socio-historical axes. Incidentally, such a model with three axes was already proposed around 1930 by the Soviet developmental psychologists Lev Vygotsky and Aleksandr Luria who devoted their entire work to the study of the historical development of behavior.

In this model, the cultural axis has a twofold significance, namely an external and an internal one, as we might call them. Culture provides first an external reality that exists outside of individuals and their ideas, a reality that can provide a kind of scaffold for thinking and that also develops with its own internal dynamics. In addition, humans imbibe and internalize culture to a much higher degree than other non-human animals. This is due to the fact that we are (according to Alfred Portmann) 'secondary nestlings'. We come into the world organically and mentally immature and only mature in a culturally imbued environment—a social and cultural uterus—the elements of which we absorb and internalize. Taking this point of view, two questions arise for me to explore in my research project:
The first question assumes that we accept the view that an autonomous dynamic exists within material culture independent of humans and their cognitive abilities. If so, can we then identify mechanisms to explain how techniques evolve, originate from each other? How can one tool lead to the invention of the next? A positive answer to this question would be very informative for a general theory of cultural evolution. Indeed, candidates for such mechanisms can be found in the literature. One is the so-called exaptation, that is, the use of an old tool for a new purpose. Another mechanism is based on modularization, namely the idea that within complex behaviors modules of segments or of aspects of action emerge. These modules can dissociate themselves from the overarching goal of action, attain a certain autonomy, and subsequently re-combine to form new techniques and behavioral sequences. Both mechanisms concretize Leroi-Gourhan's idea that innovation is due to a 'milieu favorable' in which the basic components of the new were already present, and in which the emergence of innovations basically becomes just a question of time, but not of human ingenuity.

The second question concerns the significance of external culture for human cognitive abilities. The impact of technology on the evolution of the human body (for example, the skeleton, the digestive system, the brain) is well documented in the literature with many examples ('co-evolution of genes and culture'). However, understanding the impact on cognition and culture still requires fundamental work on the level of the conceptual framework. A primary significance of external culture has been discussed for some time in the cognitive sciences under the term 'extended cognition': material artifacts can serve as sorts of crutches for thinking. Plausible everyday examples include a pocket diary as an externalized memory, or calculating instruments. Some such external aids, however, can also be internalized. Their use leaves traces in the way we think. When we do mental calculations, for example, we basically perform the operations that were made possible by the Indo-Arabic place-value notation on paper. Mental calculation is calculation on paper, but without paper.

As a visiting researcher in the ROCEEH project from 2018-19, I worked on some of these aspects. For example, I published a paper (Schlaudt 2020) exploring the question of whether Upper Paleolithic art provided a 'milieu favorable' for the emergence of arithmetic structures in thought. Together with Miriam Haidle (2020, 2021), I have also published on some basic methodological questions of cognitive archaeology and cultural evolution. Two main theses have crystallized in our work. First, the thoroughly social nature of many living things allows for mechanisms of cultural transmission that are far more basic than the familiar mechanisms of imitation and learning. This has led us to the radical notion that cumulative culture is not the exception, but rather, culture is intrinsically cumulative. And from this it follows, secondly, that cumulative culture should not be reduced to the linear mechanism of a ratchet, moving ever forward. Cumulation, as we wrote in an article, is 'not necessarily linear, additive, and beneficial', but follows serpentine paths and generally has a mixed balance with regard to dimensions like efficiency or adaptiveness.

After an interruption, I will return to the ROCEEH project as a guest in the coming months and continue along the path we embarked on. The next crucial step in this direction has turned out to be the elaboration of what might be called an 'ecological approach to technology'. The basic idea is to understand tools not as autonomous entities that can be studied independently from their context. On the contrary, we want to study them in their actual context, focusing on their 'fit' to the body and cognitive profile of the user, to the 'resource space' the tool requires, and to the 'application space' which the tool opens up. The tool will thus be understood as one element within an 'eco-system' of mutually affecting and stabilizing parts. In combination with the developed measure of the inner complexity of tool use, which permits us to link tools to cognitive profiles, this ecological understanding of tool-use might take us one step further on the way to a full understanding of the inherent dynamics of cultural evolution.

This project does not involve empirical work, but rather aims at the elaboration of fundamental concepts for describing and understanding cultural evolution. Accordingly, this project has the particularity of relying not only on current research at the interface of cognitive science, archaeology, behavioral science and psychology), but also on classical texts from these sciences (e.g. Uxküll, Köhler, Vygotsky, Portmann, Gibson and others). The concrete goal of the next months is to introduce the basic concepts of the ecological approach to tool use and to substantiate them in a case study on stone knapping in the Lower Paleolithic. In perspective, however, I would also like to reflect on some genuinely 'philosophical' questions. For example, if we are right to consider humanity not as a species which was able to produce the world of technology due to its innate biological characteristics, but as a thoroughly technical species, which is at the same time the originator and the product of the technosphere, what vistas does this open up for our understanding of present and future technology? Can we distinguish between technology that expands our possibilities and that which limits us? In what ways might modern technology change us in our further cultural evolution?

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Oliver Schlaudt

▶ Figure 9: High impact on the study of cultural and cognitive evolution: André Leroi-Gourhan (Jesus Elosegi Irazusta, Wikimedia Commons), Lev Vygotsky (unknown author, public domain, Wikimedia Commons)

Forthcoming

- Conference „Modes - Forms - Structure“

9-11 March 2022, Karlsruhe Institute of Technology, Germany

Conference co-organized by Mathias Gutmann (KIT, Karlsruhe), Marco Tamborini (TU Darmstadt) and Christine Hertler (ROCEEH).

- Congress of the Indo-Pacific Prehistory Association

7-12 November 2022, 22nd Meeting of the Indo-Pacific Prehistory Association, Chiang Mai, Thailand

Session „Exploring Distant Shores: Simulating Dispersal Across Archipelagoes“, organized by Mika Rizki Puspaningrum and Christine Hertler

For more details see:
https://www.ippasecretariat.org/22nd-ippa-congress/sessions/s16

Who’s who?

This issue: Firas Jabbour & Oliver Schlaudt

While **Firas Jabbour** was studying archaeology at the University of Aleppo in Syria, he became interested in prehistory. He participated in the Paleolithic excavations of many European missions, such as the University of Tübingen, Paris-Nanterre, Basel, and others. After obtaining his Master’s degree at the University of Aleppo, he left the country for Germany. After arriving there, he pursued his passion and began collaborating with the ROCEEH Project by classifying stone artifacts. After gaining a scholarship from the Gerda Henkel Stiftung, he started his Ph.D. at the University of Tübingen to study the stone artifacts recovered from the Upper Paleolithic excavations at Aghitu-3 Cave in southern Armenia. His research focuses on changes in modern human behavior between 39,000 and 24,000 BP, during a key period of cultural development. He studies the different production techniques and tools in each of the archaeological horizons of the cave. Firas joined the ROCEEH team in April 2021, and enters archaeological information from the Caucasus and Near East into the ROCEEH Out-of-Africa Database.

After studying physics, **Oliver Schlaudt** switched to the subject of philosophy, about which he wrote a doctoral thesis on measurement as a scientific practice. While his primary interest lies in the material culture of the sciences, especially measuring instruments, he also examines symbolic practices such as formal logic and bookkeeping. His interest in the philosophy of technology led him to cognitive archaeology, and in 2018 a Heisenberg fellowship from the German Research Foundation (DFG) allowed him to work as a visiting researcher with the ROCEEH team. He interrupted his time with ROCEEH to serve as interim Chair of Epistemology and Theory of Science at University College Freiburg, returning to ROCEEH in October, 2021. Recently, he published a new book entitled, *Philosophy of Economics. A Heterodox Introduction* (London: Routledge, 2022).

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