



# SAPIENCE

CENTRE FOR EARLY SAPIENS BEHAVIOUR  
UNIVERSITY OF BERGEN



# ANNUAL REPORT 2023



Norwegian  
Centre of  
Excellence



# STATEMENT

## FROM THE CHAIR OF THE BOARD

The opening of the Early Human Behaviour exhibition at the University Museum of Bergen in May was one of several highlights of SapienCE's impressive outreach activities in 2023. The exhibition speaks volumes of the generous spirit of Team SapienCE as well as how the Museum continues to excel in a role it has had for nearly two centuries: A museum with research at its heart, and as a meeting place for curious minds.

The exhibition received an enthusiastic response from the press and the audience alike. The exhibition invites all age groups to meet world leading researchers of today – and tomorrow – in their natural habitat. In this exhibition it is not the research results as such, but the research process itself that is the focal point.

The emphasis on demystifying and displaying how research is done could hardly have come at a more urgent point in time. We live in a climate where research-based knowledge has come under increasing pressure, a society that has been described as «in love with the future» and with increased attention on what sets human beings and societies apart. In contrast to this, Team SapienCE focuses on our most distant past and what we all have in common. When and how did we become human? How did our cognitive abilities develop? How did the first humans adapt to climate change?

The search for answers to these questions has led the scholars of SapienCE hunting high and low. They venture both ashore and offshore and explore deposits from the past buried deep under the seabed, in caves and in rivers. One of the most fascinating aspects of their research is the carriers of information they are working on – including ostrich shells, fungus, and marine sediments.

One of Team SapienCE's many strengths is their willingness and ability to share their knowledge with the broader public.

As a research centre, SapienCE has also succeeded in making sure that the whole is greater than the sum of its parts. The Centre Director, Professor Christopher Henshilwood has underscored the integration between archeology, climate and cognition and hence the three arms of SapienCE as one the most important outcome of the Centre. This has not only been crucial towards unlocking our common, human past, but has also laid a foundation for other, exciting conversations in the future too.

As a Centre of Excellence, SapienCE also epitomizes the inherent international nature of groundbreaking research. The glowing achievement of SapienCE would not have been possible without genuine, strong partnerships across academic, geographical and political borders. This is a particularly pertinent reminder in a time where the political winds increasingly lean towards populism and nationalism, including within our sector. The decision of the Norwegian government to introduce tuition fees for all students outside Europe is one of several examples of a policy that in the longer run will make us poorer both as an academic community and as a society.

On behalf of the Board of SapienCE, I would like to thank every single member of Team SapienCE for their relentless efforts towards continued success for the Centre and for keeping on reminding us of our common past as well as our common future. I would also extend our heartfelt thanks to the Norwegian Research Council for their unwavering support – we look very much forward to welcoming you to a site visit of the Centre later this spring!



*Camilla Brautaset*

# CONTENTS

Statement from the Chair of the Board	2
Statement from the Director	4
Scope	6
Key Research Questions	7
<b>ACTIVITIES</b>	
Archaeology	9
Climate	11
Cognition	14
<b>STORIES</b>	
Heating up the past: Reconstructing cooking temperatures of marine shells	17
Collecting shells on the seashore	18
Ancient pigments	20
The ochre workshop	22
Evolutionary mechanisms of culture: an inquiry into modern behaviours	24
Using FMRI to map brain activation during flint-knapping of stone-tools from vastly various periods	26
From forest to mind: A mycological odyssey of human evolution	28
There and back again - a geochemist's tale	30
Singling out seasonality	32
A Moroccan adventure	33
New SapienCE directors	35
New Researchers	36
<b>SAPIENCE OUTREACH</b>	
Outreach activities in South Africa	41
Exhibition opening - The University Museum of Bergen	42
University Museum of Bergen - Educational programme based on "Early Human Behaviour" exhibition	44
Representation and outreach based on SapienCE UMB exhibition	46
The Origins of Early Southern Sapiens Behaviour Exhibition at Cape Point	47
!Kwhaa Ttu San Culture & Education Centre visit SapienCE Cape Point Exhibition	49
Activity Book	50
SapienCE Team Meetings	51
SapienCE Lunchtime Talks	53
<b>SAPIENCE STAFF AND MANAGEMENT</b>	
Centre structure and Leader Group	55
PIs and researchers at SapienCE	56
SapienCE administration 2023	58
SapienCE statistics	59
Selected publications 2023	62
Social Media	63





# STATEMENT FROM THE DIRECTOR

A pivotal milestone was reached in 2023 when the Research Council of Norway (NFR) confirmed full funding for SapienCE until the conclusion of 2027, after the cancellation of the expected mid-term evaluation in 2023. Extensive discussions among SapienCE members shaped the blueprint for SapienCE's next phase (2024-2027) of research activities. These plans, originally intended for the RCN's mid-term evaluation, now serve as a robust yearly research framework, ensuring continued progress.

The excavation seasons at Blombos Cave and Klasies River Middle Stone Age sites in 2023 yielded remarkable results, complemented by thorough excavated material analysis at our Cape Town Satellite Laboratory, at the University of Bergen, and at Wits University. The fieldwork in South Africa contributed positively to further consolidating our team bonds and connections. Our outreach activities have helped to convey our scientific discoveries to a wide audience including schools. Further, collaboration across SapienCE's three core branches—Archaeology, Climate, and Cognition—has strengthened, culminating in cross-disciplinary publications in esteemed journals.

Dr Karen van Niekerk has been appointed as Deputy Director with responsibility for Archaeology and Psychology/Cognition. Prof Simon Armitage, Royal Holloway University of London, is Deputy Director with responsibility for our early career researchers and leading our GEO and NORCE climate sections. We thank Prof. Eystein Jansen, Deputy Director of SapienCE since 2017, who retired from his position in early 2023 but continues to serve as a member of our Leader Group.

The SapienCE team expanded in 2023, comprising 19 researchers, including a Leader Group of 10 members, 6 PhDs, 7 Postdocs, and 13 administrative staff. This growth aligned with the Centre's consistent scientific impact, evident in 54 journal publications, 12 chapters in books/edited volumes/proceedings, and a monograph released in 2023. The original aim to merge climate and cognition with archaeology at the outset of this Centre of Excellence in 2017 has borne fruit. This fusion has unveiled new insights into the evolution of early modern humans in southern Africa, shedding light on the potential roles of climate shifts and cognitive advancements in their development. Collaborations with various universities and centres have flourished, yielding scientific excellence and an array of publications.

Noteworthy outreach initiatives, include our exhibition's 'Early Human Behaviour' at the University Museum of Bergen and 'Origins of Early Southern Sapiens Behaviour' at SANParks Cape Point Nature Reserve, both which have attracted substantial public engagement. These exhibitions, featuring rare artefacts, interactive displays, and multimedia installations, delve into the evolution of *Homo sapiens* and have drawn significant visitor numbers. Beyond the excavations, team members engaged with local communities in South Africa and Norway which fostered community participation and interest in our work, an essential component of outreach efforts.

In summary, in 2023 SapienCE has left a substantial imprint on the exploration of human behavioural evolution, fostering the emergence of fresh research themes and methodologies within this domain. Its emphasis on collaboration and interdisciplinary cooperation has effectively dismantled boundaries between various academic disciplines, facilitating the emergence of novel revelations and a deeper understanding of the behavioural origins of our own species after 100 ka. Looking ahead, the SapienCE Centre of Excellence anticipates further strengthening our bonds with the University of the Witwatersrand and expanding the University of Bergen and Norway's global standing in the realm of early human origins research over the next five years.

Christopher Stuart Henshilwood



# SCOPE

The SapienCE Centre of Excellence is built around a carefully selected interdisciplinary team of archaeologists, climatologists and psychologists. The team aims to increase our understanding of how and when *Homo sapiens* behaviour changed, making us who we are today.

Within the next decade, the SapienCE team will investigate Middle Stone Age (MSA) archaeological sites by looking in detail at the evidence, layer by layer, site by site.

## HIGH-RESOLUTION RECORDS

SapienCE researchers will produce an exceptional range of securely dated, high-resolution records of early human cultural, social, technological and subsistence behaviours, alongside global, regional and site-based palaeoenvironmental information. The centre's aim is to integrate these records, allowing a holistic analysis which will provide groundbreaking insight into the diverse aspects of what it means to be human.

## ACCESS TO UNLOCK THE PAST

The SapienCE team has exclusive access to Blombos Cave, Klasies River main site and the Klipdrift Complex; sites that contain the key for unlocking the past. Blombos Cave is known as the cradle of human culture. Engraved ochre, shell beads and world's earliest drawing are amongst the significant finds from this cave. Early modern humans occupied the cave between 100 000 - 70 000 years ago.

Klasies River main site is famous for its numerous human fossils and the extensive 20-meter archaeological archive of early human behaviour. Early modern humans occupied the site between 120 000 - 59 000 years ago. The Klipdrift Complex covers both the Middle and Later Stone Age. The site is particularly associated with the Howiesons Poort techno-complex dating to approximately 65 000 - 59 000 years ago.

# KEY RESEARCH QUESTIONS

- 1 When, why and how did humans first become behaviourally modern and how is this defined?
- 2 Did cognitive changes accelerate behavioural variability?
- 3 How were these groups of hunter gatherers socially organised?
- 4 Was social cohesion enhanced by the adoption of symbolic material culture and did it lead to innovation?
- 5 What cognitive skills had to be in place in order for other skills to develop?
- 6 How adaptable were humans to environmental change and did climate impacts act as drivers for technological innovation and subsistence adaptations?
- 7 Can we determine, from our planned genetic research, the relationship of these early *H. sapiens* to extant human populations?

# ACTIVITIES

---

# ARCHAEOLOGY

BY SIMON ARMITAGE, KAREN VAN NIEKERK

Excavations remained a core part of SapienCE's archaeological research in 2023. Work at Blombos Cave, led by Deputy Director Karen van Niekerk, began in early February and continued for six weeks. Karen's all-female team consisted of SapienCE researchers, MA students from the University of Bergen and a PhD student from the University of the Witwatersrand. The 2023 excavations explored the 80-100 ka levels of Blombos. The youngest of these levels are dense deposits of shellfish, bone, particularly tortoise, ochre, lithics and hearths. Below layer CJ (~85 ka) the sediment is lighter and contains lower densities of artefacts and shellfish, though bone is relatively abundant with tortoise still dominating, but some bird, snake and fish bones are also present as is ostrich eggshell. One aim of the 2023 season was to reach the lowest excavated level at Blombos (CP/CPA, ~100 ka). In previous seasons these levels yielded ochre processing toolkits and a red ochre floor. The edges of this floor were exposed during the season, but so was a large rock surface below the base of CP/CPA. The 2024 season will begin with the careful removal of this surface, allowing access to underlying material.

In August, SapienCE PI Sarah Wurz renewed her excavations at Klasies River main site, accompanied by

postgraduate students from the University of the Witwatersrand and the University of Cape Town. Work on the Silty Black Soil (SBLs) levels resulted in the excavation of more than 95 litres of deposit across nine squares. A new layer, provisionally termed the Brown Grey Ashy Sands, was encountered in two of these squares. The 2023 excavations also produced shellfish, fauna, ochre and MSA I lithics. In addition, several intact hearths were excavated, and the ashes and burnt material were curated for future examination.

Alongside the excavations at Blombos, Åshild Thorsen from University Museum of Bergen interviewed a number of SapienCE researchers in the field. Edited films of these interviews form a key component of the SapienCE exhibition at the University Museum, which opened in May.

Laboratory-based research on material excavated from Blombos and Klasies River also progressed during the year. In April, a post-excavation research and training season was conducted at the University of the Witwatersrand satellite laboratory in Cape Town. SapienCE PI Francesco d'Errico and our invaluable curator Samantha Mienies worked with Jasmine Culey and Beth Veliky on the analysis of cultural material. Beth has now





completed the documentation of >2,000 ochre pieces from Blombos and Klipdrift Shelter, and also conducted an ochre survey in the Klein Karoo, funded by the Leakey Foundation. Alex Pearson, Åshild Stuen Jensen and Asia Alsgaard continued their faunal analysis. The latter pair's passion for collecting modern reference material was a notable feature of the field season at Blombos. Asia also conducted two research trips to South Africa, visiting the University of Cape Town and working with Professor Judith Sealy. During these visits she worked on faunal material from a range of sites and timeframes to understand whether coastal resource diversity increased between the Middle and Late Stone Age along the southern African coast.

Post-excavation research also continued at SapienCE's partner institutions. Christopher Miller (Tübingen, Germany) has worked with Magnus Haaland to show that the enigmatic "black layer" at Blombos was formed by burning of rock hyrax dung. He also used some of his

sabbatical to complete a manuscript on the geoarchaeology of Klipdrift Shelter. Zahra Haghghi visited laboratories in the University of Copenhagen to measure proteins associated with a number of artefacts, including an ochre preparation toolkit, stone tool and ostrich eggshells. Francesco d'Errico (Bordeaux) published a number of papers on African Middle Stone Age material, including one on the new shell beads found at Blombos Cave (with SapienCE Director and Deputy Director, Christopher Henshilwood and Karen van Niekerk).

Lastly, the SapienCE archaeologists welcomed one new PhD candidate (Jasmine Culey) and one postdoctoral fellow (Ella Walsh) and has two further postdoctoral positions in various stages of recruitment. 2024 looks likely to be a busy and productive year.

# CLIMATE

BY SIMON ARMITAGE, CARIN ANDERSSON DAHL

Work within the climate group aims to understand the nature of the environments experienced by our ancestors living along the southern African coastline. We are particularly interested in the timeframe during which coastal cave sites such as Blombos Cave, Klipdrift Shelter and Klasies River Main Site were occupied, i.e. from ~120-50 thousand years ago (ka), though data from outside this timeframe are valuable too. Our approach has been to obtain climate data from a wide range of sources, and to combine these with climate model results. Each approach has its strengths and weaknesses. On land we are focused on obtaining long, detailed climate records from cave speleothems (stalagmites), with the disadvantage that linking these data to human activities is imprecise. More fragmentary records have been obtained from faunal remains and the archaeological sediments themselves, where a lack of detail is compensated by unequivocal relationships with the archaeology. We also continue to study deep-ocean sediments from locations close to the south coast of South Africa. In principle, these should provide continuous, detailed records of climate, though linking this information to human activity is not straightforward. Climate model data helps us to understand the probable causes of the environmental changes which we discover. In each of our areas of research, 2023 has been a productive, if occasionally challenging, year.

Our pilot study on South African speleothems by Jenny Maccali, Stein-Erik Lauritzen and Nele Meckler was published (Maccali et al. 2023) along with companion papers (Fernandez et al. 2023; Sodemann et al. 2023) focusing on specific methodological aspects of our measurements. We also reached a number of laboratory-work milestones 2023. The trace element x-ray fluorescence (XRF) scanning, used to understand hydroclimate, was completed for all speleothem samples. A total of >330 cm of speleothem

samples was scanned in 42 separate sections. The data had to be processed and precisely matched on the same reference scale as our other climate proxies (e.g. oxygen and carbon isotope data) for comparison.

The first dating on the speleothem samples revealed some incoherent ages, i.e. ages being out of chronological order. After careful examination of the samples, we identified layers of different crystalline fabric showing signs of dissolution, which makes them difficult to date accurately using uranium-thorium techniques. We drilled new subsamples, carefully avoiding these layers to complete the dating of the speleothem samples. To calculate a sample's age, we need to accurately and precisely measure ratios of different uranium and thorium isotopes using dedicated instruments called mass spectrometers. Mass spectrometers are highly sensitive instruments, but accurate measurements are only possible where a large number of different instrument parameters are properly adjusted. Jenny spent a lot of time in 2023 solving problems with the setup of our mass spectrometer, in the process learning a new German word, *Verschlimmbesserung* that could be translated into English as an attempted improvement that only makes things worse. There were a lot of *Verschlimmbesserung* in 2023. Fortunately, the last issue was solved by the end of the year, and we have now resumed the dating of the speleothem samples.

We were also very excited that two highly motivated Master's students joined us to work on SapienCE's speleothem samples. Alfred Skeidsvoll will perform temperature reconstruction on a sample covering the 65-85 ka time interval. Cynthia Arend will be dating and measuring hydroclimate proxies on a sample collected at Klipdrift Sea Cave overlapping with human occupations at Klipdrift Cave (10-15 ka).

Work on faunal remains and sediments from Blombos Cave also produced a new publication in 2023. Ozan Mert Göktürk and Margit Simon lead a publication combining regional climate modelling results with environmental data derived from studying plant leaf waxes extracted from the archaeological sediments. Both lines of evidence point towards a drying of the area immediately surrounding Blombos Cave as a result of weaker westerly winds and cooler sea-surface temperatures. Some of this change is attributable to factors driving regional climate, i.e. predictable variations in the Earth's orbit around the Sun leading to lower winter rainfall. However, local factors are also important, since falling sea-level exposed a larger portion of the continental shelf, leading to additional year-round reductions in rainfall. In 2023, Ozan and Stefan Sobolowski completed additional model work, extending the time-period covered to 63 ka, which will be particularly relevant for ongoing work at Klasies River and Klipdrift Shelter. Margit collected new leaf wax samples from a range of archaeological sites in both northern and southern Africa, with a view to conducting a larger-scale study.

Work on deep ocean cores also progressed during the year, led by PhD candidates Ellie Pryor (Cardiff University) and Karl Purcell (University of Bergen and Sapientia) and their supervisors. Margit worked with Ellie to produce a high-resolution ocean temperature and sea-surface salinity record for the last 160 ka. This suggests that warm and saline ocean sea-surface conditions occurred off the southern South African coast during periods of lower sea-level. This is counter-intuitive since lower sea-levels are associated with enlarged terrestrial ice volumes associated with colder glacial climates. Postdoc Katrina Nilsson-Kerr, who started in 2023, will further investigate sea surface temperature at this site, but focusing on changes in seasonality, which will shed more light on the complicated interplay of various ocean currents in the region. This work will also be highly relevant for the work on fauna remains from Blombos Cave. Less counter-intuitive were Karl's results from a nearby ocean core. Working with his supervisors Margit, Eystein Jansen and Simon Armitage, he found that the geochemistry of his core was dominated by oscillations between high (wetter) and low (drier) terrestrial input from rivers. His data for the 82-70 ka time period neatly match Ozan's model data.

Lastly, considerable work on understanding the age of various sediments was conducted in 2023. By developing a good understanding of the age of samples which also contain climatic or archaeological information, we can tie together our disparate speleothem, sediment, ocean and archaeological records. One approach to correlating different records is to identify events which occur in all of them. Volcanic eruptions are particularly important in this research, since they potentially blanket an entire region in tiny ash particles called tephra. Sunniva Rutledal examined samples from Blombos Cave and Karl Purcell's core, and found ash in both dating to ~75 ka. This is tantalizingly close to a major volcanic eruption from the Toba volcano on Sumatra at 74 ka. Tephra from this eruption have been found in nearby archaeological sites and a core from Lake Malawi. Unfortunately, Sunniva's painstaking work showed that the chemical composition of the tephra from Blombos and the ocean core are different from both one another and the Toba ash. Understanding the source of Sunniva's tephra is a challenge for 2024.

Fernandez, A., Lland, M. H., Maccali, J., Krüger, Y., Vonhof, H. B., Sodemann, H., & Meckler, A. N. (2023). Characterization and correction of evaporative artifacts in speleothem fluid inclusion isotope analyses as applied to a stalagmite from Borneo. *Geochemistry, Geophysics, Geosystems*, 24, e2023GC010857. doi: 10.1029/2023GC010857

Maccali, J., Meckler, A.N., Lauritzen, S.E., Brekken, T., Rokkan, H.A., Fernandez, A., Krüger, Y., Adigun, J., Affolter, S. and Leuenberger, M. (2023) Multi-proxy speleothem-based reconstruction of mid-MIS 3 climate in South Africa. *Clim. Past* 19, 1847-1862, doi: 10.5194/cp-19-1847-2023

Sodemann, H., Dekhtyareva, A., Fernandez, A., Seidl, A. and Maccali, J. (2023) A flexible device to produce a gas stream with a precisely controlled water vapour mixing ratio and isotope composition based on microdrop dispensing technology. *Atmos. Meas. Tech.* 16, 5181-5203, doi: 10.5194/amt-16-5181-2023





# COGNITION

## – RECONSTRUCTING PAST COGNITION

BY ANDREA BENDER, LARISSA MENDOZA STRAFFON, HEIDI ØHRN

In the past year, the cognition group has undergone substantial staff changes, with senior colleagues leaving and a new member joining, as well as a concomitant shift in focus.

The two colleagues who retired earlier this year – Kenneth Hugdahl and Torill Christine Lindstrøm – had been there from the beginning of SapienCE and were foundational for the work in our group, specifically those projects investigating brain activation during the production of material culture. Their contributions and achievements are described in detail in the Stories Section further down. The incoming member, Katharina Wolff, will add a different perspective aligning with a new line of research that has emerged more recently. With her background in social psychology and her expertise on risk assessment, Katharina Wolff will predominantly contribute to shedding more light on the cognitive processes, social factors, and behavioural patterns involved in the accumulation of knowledge of food sources.



### *Research projects*

Our group is working on three on-going projects, all of which share a concern with the cultural transmission of cognitive skills, tools, and knowledge. The first of these projects explores brain networks involved in (simulated) cultural evolution. Combining a transmission-chain design with brain imaging, it aims to understand how individual teaching and learning change across generations. PhD candidate Heidi Øhrn completed the first study of this project last year, together with Master's Student Emilie Pettersen Sjursen, and has started to work on the manuscript. Data collection for study 2 was completed earlier this year, and the process of analyzing the data is underway.

The second on-going project investigates the role of mushrooms in cognitive and cultural evolution. While most efforts so far have been directed towards securing funding for empirical work and building a scientific network for collaboration (in particular with the Norwegian Institute of Food, Fisheries and Aquaculture Research, Nofima, and with the MPI for Evolutionary Anthropology), there was also remarkable progress in data collection. As part of her postdoctoral work, Aliko Papa has designed and executed

*"Three of the core members of the cognition group (i.e., Andrea Bender, Larissa Mendoza Straffon, Aiki Papa) with two of their key collaborators (Akiko Sawada, Kyoto, and Jean-Charles Pelland, UiB/Quanta) at CogSci 2023 in Sydney"*

a first study (including two pilots and the main study) and is now in the process of analyzing the data and writing the manuscript.

The third project (QUANTA), funded by the ERC with a Synergy Grant, focuses on the evolution of cognitive tools for quantification. In collaboration with researchers from the CNRS Bordeaux, the Max Planck Institute for Evolutionary Anthropology in Leipzig, and UCSD, we are building databases on different types of counting tools and systems, analyzing their structural properties and testing hypotheses on how these properties may have co-evolved with cultural driving forces. This includes a sub-project led by researcher Larissa M. Straffon that investigates the relevance and potential role of Pleistocene fiber technologies for the emergence of mathematical thinking.

In addition to these on-going studies, several projects have reached completion in the year ending, including those on flint-knapping (described in more detail elsewhere in this report), on the culturalization of the human body and symbolism more generally (spearheaded by Francesco d'Errico and his CNRS team), and on visual signs as cognitive tools through phylogeny and ontogeny (headed by Larissa M. Straffon with a grant from the John Templeton Foundation). The latter involved studies on visual preferences in great apes and on human identification of

conspecific vs non-human made art.

#### *Productivity, outreach, and major milestones*

Over the past year, the cognition group as a whole has been actively engaged in both academic discourse and outreach to a wider audience: delivering a total of 15 presentations at conferences, workshops, colloquia and guest lectures; writing 10 papers now published or under review in renowned journals; and contributing a text and a short film showcasing cognitive research within SapienCE to the exhibition at the Bergen University Museum.

Finally, besides the completion and dissemination of key projects and their results, major achievements made by the cognition group include (i) a UiB SPIRE Grant to invite a guest researcher from Japan for collaboration on the Fungus Culture & Cognition project, (ii) the Diversity & Integration Award of the Cognitive Science Society to our symposium on "Mushrooms as 'food for thought'" at the CogSci conference in July this year, which is now also slated to become a special issue, (iii) a joint commentary in the renowned journal Behavioral and Brain Science on "The different paths to cultural convergence" and, last but not least, (iv) the election of Francesco d'Errico as Fellow of the Cognitive Science Society, in recognition of his outstanding contributions to the field.

# STORIES

---



## HEATING UP THE PAST:

### RECONSTRUCTING COOKING TEMPERATURES OF MARINE SHELLS

BY CHRISTOPHER MILLER, NELE MECKLER, CARIN ANDERSSON DAHL

The ability to use and control fire was an essential adaptation for the Middle Stone Age inhabitants of Blombos, Klipdrift and Klasies River. Fire not only provided warmth and protection, it also was an essential technology for modifying raw materials and for cooking. Although the fires that past humans built have long since been extinguished, the heat from these fires left behind traces in the form of archaeological features that contain heated residues, such as charcoal, ash, and mineral grains. Geoarchaeologists working in SapienCE have been developing novel analytical techniques for investigating the microscopic residues of past fires. They employ a technique called “micromorphology,” where intact blocks of archaeological deposits and features are removed from the site and then indurated in a resin. These hardened blocks of the site are then sliced and thin-sectioned, so that the microscopic components and microstratigraphy can be analysed in the laboratory. In 2017, Magnus Haaland and other SapienCE researchers published a study utilising these resin-indurated samples to reconstruct temperatures reached in past fires. They noticed that a certain sand-sized mineral grain—glaucanite—changes color from green to red, when it undergoes heating. Combining a detailed study of this color change with microspectroscopic techniques that confirmed heat-induced structural changes to these mineral grains, they were able to identify maximum temperatures reached in the hearths and also reconstruct “heat distribution maps” of the fire-related features. These results allowed the authors to investigate the life-history of fire features and determine whether they were still in situ, or if the features had been impacted by subsequent trampling or sweeping.

Other materials change their mineralogical characteristics

as a result of heat. The presence of marine shell—which is an abundant artifact class at many coastal Middle Stone Age sites in South Africa—reflects a strong reliance on marine resources for subsistence by these early foragers. The shells are composed of calcium carbonate, either in the form of calcite or aragonite. Heating of marine shell at high temperatures, above 550°C, causes well-known structural and mineralogical changes to occur. While excavators find shell at archaeological sites “burnt” at these temperatures, normal temperatures reached during cooking or processing of shellfish are usually lower. Until recently, it was difficult to identify clear changes in the composition of marine shell that had been heated for cooking. A study published in 2017 proposed an isotopic technique—carbonate clumped-isotope thermometry—that can be used to reconstruct lower-temperature heating of marine shell from archaeological contexts. Based on temperatures recorded within the isotopic composition of the shells, the authors imply that one may be able to identify shell heated for cooking and even potentially distinguish between shell that was roasted or boiled. A team of SapienCE scientists, including Christopher Miller, Carin Andersson, and Nele Meckler, are now planning to test these results on experimentally heated modern shell collected from South Africa, with the goal of applying these techniques to archaeological materials. In particular, they hope to apply this “paleothermometry” technique by drilling shell contained within the resin-indurated sediment blocks from Blombos and Klipdrift. If successful, this approach will not only represent an additional method for reconstructing past temperatures of fires but may also shed light on cooking behaviours during the Middle Stone Age. Stayed tuned for updates!

# COLLECTING SHELLS ON THE SEASHORE

BY SIMON ARMITAGE, JANNE-BEATE BUANES DUKE

SapienCE researchers Francesco d'Errico, Karen van Niekerk and Christopher Henshilwood have been studying personal ornaments from Blombos Cave for well over a decade. In 2023 they published a landmark study in *Journal of Human Evolution* describing how seashells may have been transformed into personal decorations, and the implications of this finding for understanding how and when our ancestors may have started developing modern human identities.

“The discovery of eye-catching unmodified shells with natural holes from 100 to 73 ka confirms previous scant evidence that marine shells were collected, taken to the site and, in some cases, perhaps worn as personal ornaments. This was before a stage in which shells belonging to selected species were systematically, and intentionally perforated with suitable techniques to create composite beadworks”, van Niekerk says.

Similar shells have been found in North Africa, other sites in South Africa and the Mediterranean Levant, meaning that the argument is supported by evidence from other sites, not just Blombos Cave. In other words, the unperforated and naturally perforated shells provide evidence that marine shells were collected and possibly used as personal ornaments before the development of more advanced techniques to modify the shells for use in beadworks at around 70 ka.

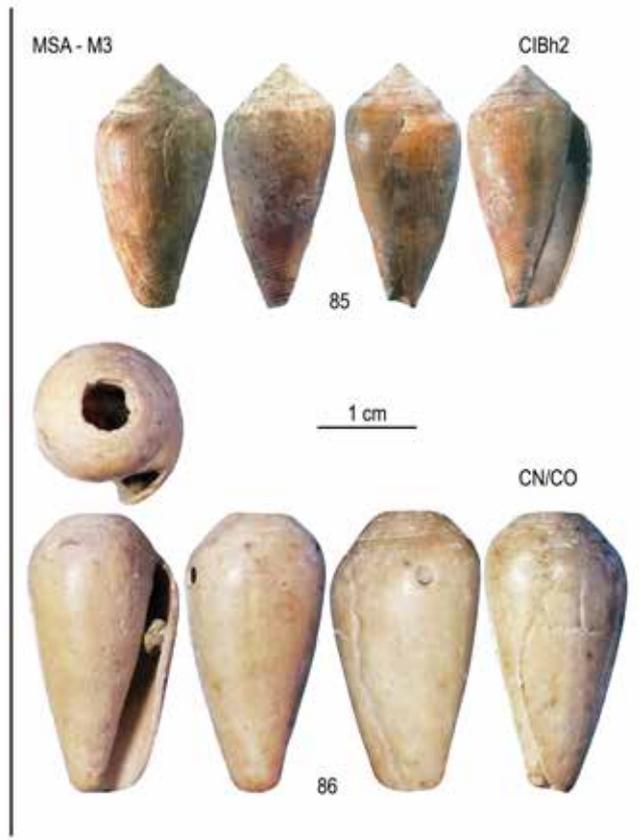
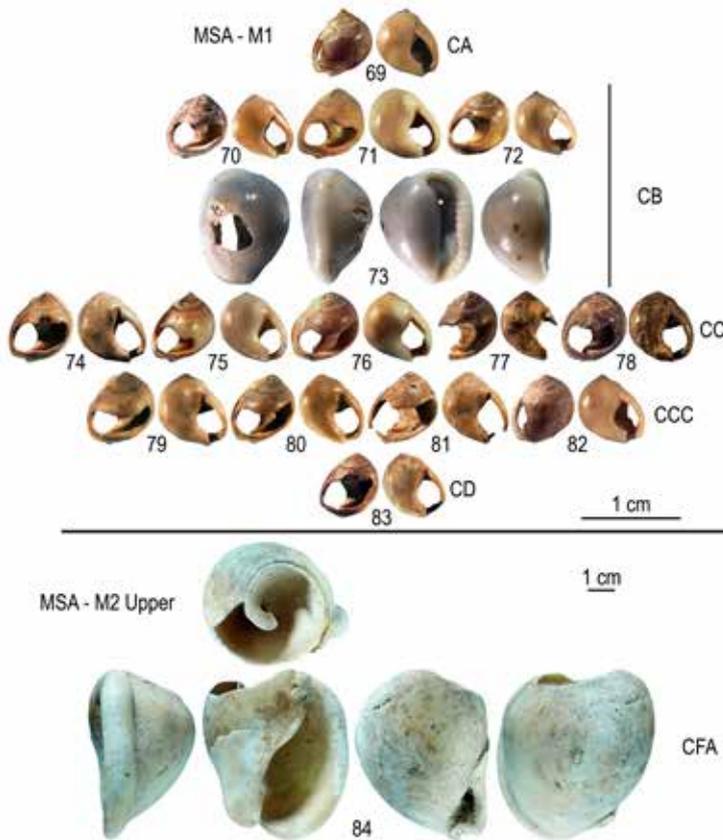
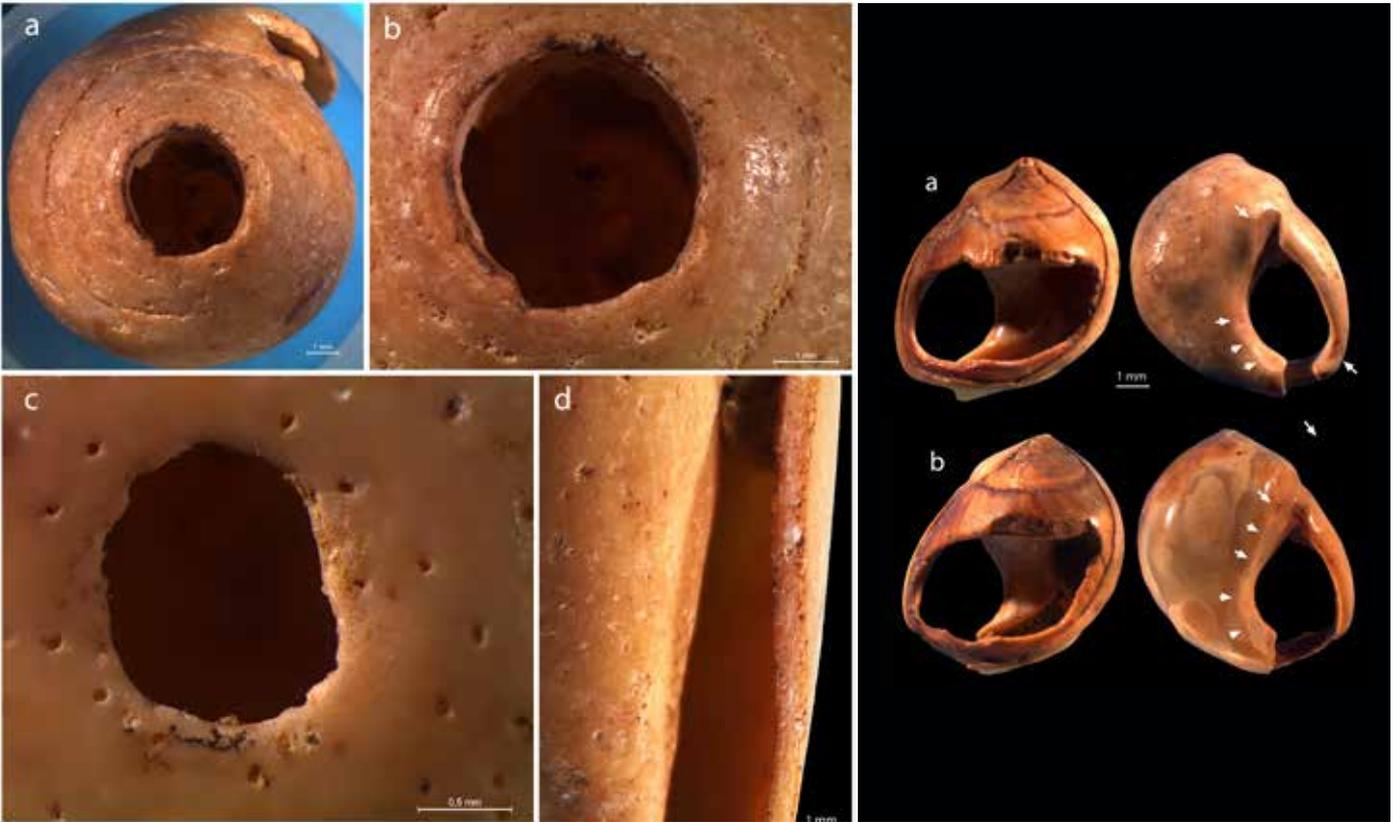
Karen van Niekerk is certain that the shells are not the remains of edible shellfish species that were collected and brought to the site for food.

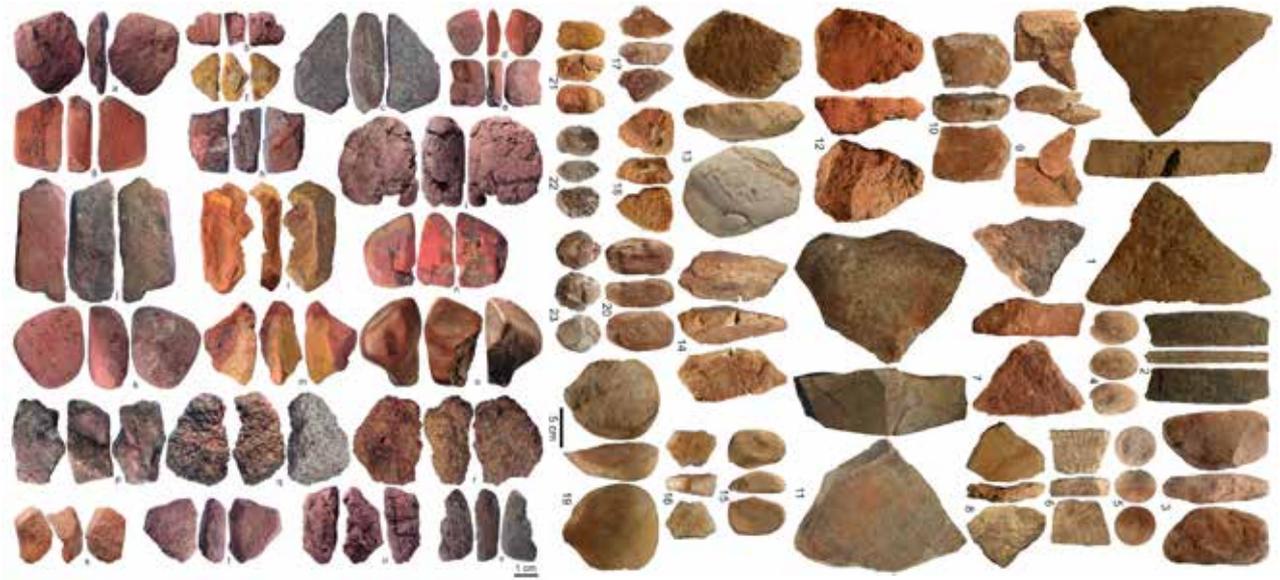
“We know this because they were already dead when collected, which we can see from the condition of most of the shells, as they are waterworn or have growths inside them, or have holes made by a natural predator or from abrasion from wave action.”

The team took detailed measurements of the shells, including a microscopic examination of wear on the edges of the holes that developed while the shells were worn on strings as beads. They also examined the location of each shell within Blombos Cave, in an attempt to determine whether shell beads found close together could have belonged to single items of beadwork. These techniques provide insights into the potential use of shells for symbolic purposes.

Van Niekerk says that they identified eighteen new marine snail shells from 100 to 70 ka layers that were or could have been used for symbolic purposes, and proposed a multistep progression for the culturalization of the human body with roots in the deep past.

“With this study we specifically show that humans gradually complexified practices of modifying their appearance and transformed themselves into tools for communication and storage of information. We also think we can possibly see a creation of identity that gradually but radically changed the way we look at ourselves and others, and the nature of our societies”, van Niekerk says.





# ANCIENT PIGMENTS

BY SIMON ARMITAGE, JANNE-BEATE BUANES DUKE

SapienCE's Francesco d'Errico and his international team have published their analysis of the largest known collection of Middle Stone Age (MSA) red and yellow mineral pigment fragments, commonly called ochre. Their work reveals the evolving use of ochre over a period of 4,500 years. The study, published in *Scientific Reports*, was conducted by a team of researchers from Norway, Spain and France. Together, they analysed a large collection of ochre from Porc-Epic Cave, Ethiopia, and demonstrated that groups visiting this site gradually modified the techniques used to produce pigments. These modifications may have resulted from changing fashions or environmental variations which reduced their access to good quality raw materials. Francesco d'Errico says that the new study is key to understanding the persistent and constantly evolving use of ochre 40,000 years ago in Ethiopia.

"Discoveries documenting the emergence of behavioural modernity in Africa have revealed that innovative cultural traits emerge in this continent at different times and in different regions. However, ancient sites that yielded archaeological collections large enough to precisely trace how these minerals were acquired, processed and used are rare. Porc-Epic cave is, in this respect, a remarkable exception", explains d'Errico.

"Porc-Epic features the largest African collection of MSA ochre in a region with few sites providing information on this key behavioural innovation. The findings from Porc-Epic therefore represent a unique opportunity for comparison with other African records", d'Errico says.

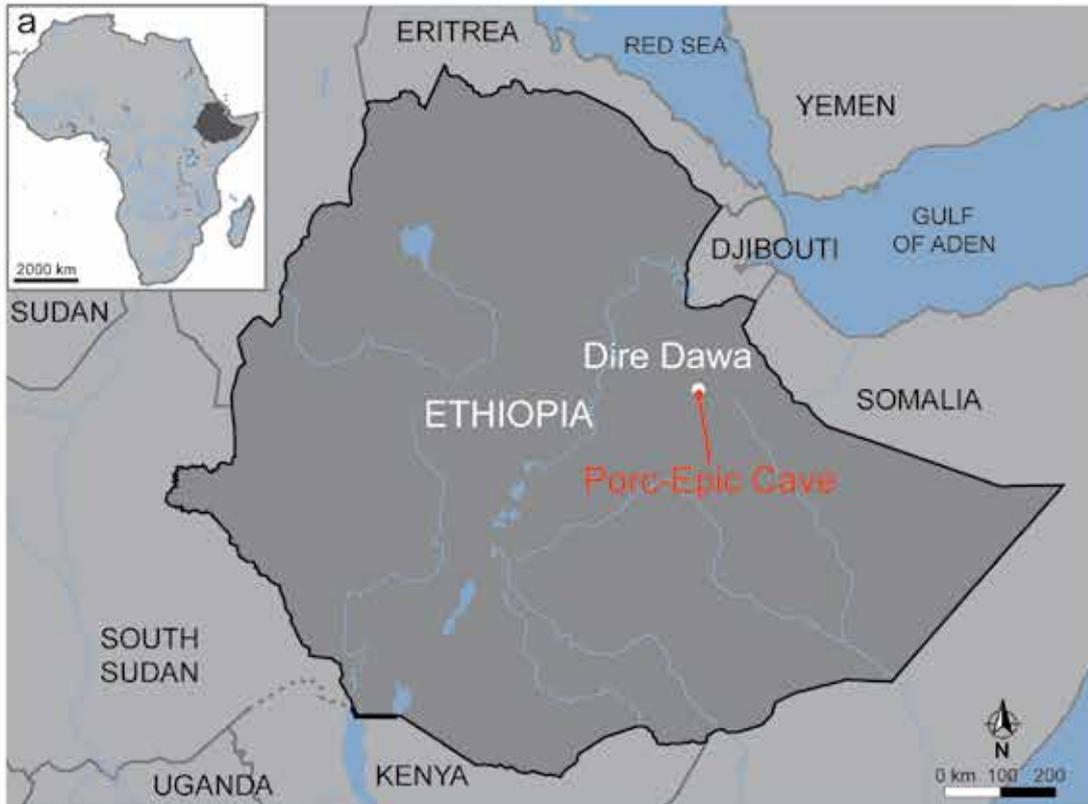
Porc-Epic is an archaeological site located in a cave near the city of Dire Dawa in Ethiopia. It was occupied around

40,000 years ago, and represents one of the few Palaeolithic sites that have yielded a continuous and extensive record of ochre use, spanning a period of at least 4,500 years. More than 40 kg of ochre (4213 pieces), 21 ochre processing tools, and two ochre-stained artefacts were found during excavations at the site. By conducting chemical analysis of ochre pieces from the site and natural ochre from the cave's surroundings, and studying the techniques used to process these rocks, the authors unveil how MSA inhabitants exploited mineral resources.

"Results show that they were able to predict the properties of different ochre types accessible in their environment, and gradually adapt their technology to changes in the availability of raw materials," d'Errico says.

He explains that a wide variety of ochre types were collected and brought to the site to produce ochre powder of different textures and shades, probably adapted to different symbolic or functional activities. However, the presence throughout the site of red ochre, which is rich in the mineral hematite, indicates that Porc-Epic inhabitants were particularly interested in this colour and mineral. It is probable that they favoured it when collecting ochre pieces in the surrounding landscape or exchanging them with neighbouring populations.

"Study of the Porc-Epic ochre record indicates the production of mineral pigment was deeply rooted in late East African MSA societies, but was also in constant evolution, during a period essential to our understanding of the emergence and evolution of complex cultures", d'Errico says.



# THE OCHRE WORKSHOP

BY ELIZABETH VELLIKY

The «ochre workshop», organized by SapienCE postdoc Elizabeth Velliky and PhD Jasmin Culey, took place on November 14th at the University Museum of Bergen. The ochre workshop was part of a 3-day seminar organized by Geir Harald Samulesen (artistic research leader) and Eamon O’Kane (Professor) both from The Art Academy – Department of Contemporary Art and Elizabeth Velliky (SapienCE), whose focus was to experience ochre pigments from a multitude of disciplines and practices. A key aspect of the workshop was the involvement of bachelor students from The Art Academy as part of their paints and pigments course. The seminar began with the “Resisting Nature: The Aesthetics of a Fading Division” symposium, featuring talks given by renowned artists Cyril de Commarque, Marte Johnslie and Nicolas Bourriaud, as well as more ochre-focused presentations by Elizabeth Velliky and ochre archivist Heidi Gustafson. The second day involved an ochre experiment exploring the origins of ochre surfaces in archeological contexts, specifically at Blombos and Klipdrift Caves. The experimental day was kicked off with a talk by Francesco d’Errico on his extensive work with the Blombos ochre toolkits, and then participants (29 in total) recreated ochre surfaces using various tools and implements as close as possible to those found at Blombos Cave. The experiment was designed by Jasmin Culey as part of her PhD research at SapienCE. Participants smashed, ground, and pulverized ochre materials collected in South Africa into usable powder. These were either mixed with different binders or not and deposited into clear plastic boxes to replicate different depositional events. The boxes will be monitored over a series of several months and then examined to study

possible origin events that could have created the ochre surface at Blombos Cave.

At lunch, the participants received a personal tour of the SapienCE exhibition at the University Museum of Bergen by Åshild Thorsen, the curator of the exhibition. They then continued with ochre experiments until the museum closed. The final day of the seminar, the participants returned to the contemporary art department with the South African ochres to create classic paints out of the materials they worked with the day before.

Overall, the symposium and workshop provided a unique experience for all participants. Several students commented on how they did not know about the antiquity of pigment use beforehand, and many enjoyed learning about how ancient humans used pigments first-hand through the experiments and exhibition. The symposium showcased how different disciplines can converge to create a dynamic, thought-provoking, and fun experience for all participants. While archaeological research often incorporates perspectives from other disciplines, these are traditionally natural science or humanities. SapienCE has been collaborating with the contemporary art department at UiB for over 3 years as part of the *Matter, Gesture, Soul* project run by project leader Geir Harald Samulesen. Discussions are currently underway for future projects, collaborations and workshops with the contemporary art department, so stay tuned!





## EVOLUTIONARY MECHANISMS OF CULTURE: AN INQUIRY INTO MODERN BEHAVIOURS

BY HEIDI ØHRN

If you found yourself stranded on a desert island, how much basic survival technology would you be able to reproduce on your own? As Tom Hanks' character discovered in the film 'Cast Away', the answer is probably: very little. That is because we live in a world that has been built on the collective knowledge and labour of many generations. Yet, we seldom think about how the material culture that surrounds us works, how it originated, how it has been transformed, or how it has been refined through the centuries. Unlike the cultures of non-human animals, which remain relatively stable over time, ours not only changes but diversifies and accumulates allowing for novel variations and combinations that in turn give way to new cultural forms. This process of cultural accumulation took off some time over the past half a million years, but seriously accelerated with anatomically modern humans during the African Middle Stone Age. Yet, it is still not fully understood how or why it happened.

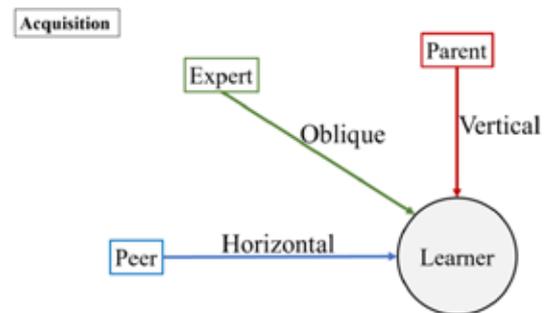
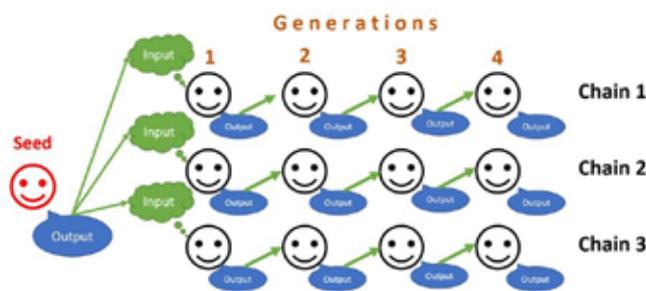
Unfortunately, no written documents exist that describe human modes of communication, thought processes, or the formation of social bonds in the deep past. However, we have devised methods to study how these aspects of human culture arise, function, and change in contemporary populations. These methods can point us to the species-level mechanisms that underlie the key processes of cumulative cultural evolution: learning, innovation, and knowledge transmission.

Nowadays, the field of cultural evolution has become fundamental to understanding the origins of modern human behaviours. Since the seminal work of Cavalli-Sforza and Feldman in the 1980s, mathematical models to explain

how cultural traits can be transmitted along different pathways have proliferated. One of these pathways is vertical transmission, which occurs from parent to child, ensuring the passage of cultural information from one generation to the next. Another is horizontal transmission, which involves the exchange of knowledge among peers, fostering cultural diversity within a generation. They also introduce oblique cultural transmission, which occurs when individuals learn from experts or older members of the community, gaining specialized knowledge. Finally, we have the reverse vertical transmission pathway, which involves the transmission of cultural traits from child to parent, highlighting the bidirectional nature of cultural evolution.

The quantitative methods devised by Boyd and Richerson further consolidated the field of cultural evolution by exploring how biases determine why certain cultural variants persist, resembling how certain genetic variants endure. Their pioneering work explored how specific cognitive biases shaped the acquisition and transmission of cultural variants. For example, *conformity* and *anti-conformity biases*, which dictate the likelihood of a cultural variant being adopted according to the number of individuals displaying it or the frequency of its display.

Finally, Tomasello's suggestion that modern humans have devised ways to transmit and preserve knowledge to prevent cultural loss has served in recent years as a model to explain the cumulative nature of cultural evolution. Each new cultural trait builds upon the previous, accumulating over generations and contributing to a richer cultural world. Of course, for this to be achieved, our species has



evolved cognitive mechanisms that allow us both to retain information and to pass it on to others with high fidelity, and to change the information we receive from others.

With the increasing recognition of the field of cultural evolution in the scientific community, a growing number of researchers found motivation to employ mathematical and theoretical frameworks to address complex questions, such as the origins of language and technology. For instance, a recent paper by Oliver Morin dealt with the cultural evolution of written language which, as far as we know, only emerged four times in world history despite its usefulness in transmitting information across time and space, which enables you to read this story right now. Morin's conclusion was that the pathway leading to the evolution of script was historically difficult to reach. In a commentary to that paper, we in contrast asked whether following that pathway was even necessary at all. We explored examples of societies that also managed to transmit information through time and space using practices other than script, such as visual art or notation systems. This means that different cultures may arrive at diverse solutions to similar problems, so that there are many roads leading to cultural convergence.

For their part, empirical studies of cultural evolution have developed specific methodologies tailored to simulating the transmission of information. For example, computer simulations have been used to model how artificial cultural traits will change over multiple generations. Researchers have also conducted naturalistic studies, which offer insights into actual cultural traits in complex contexts, crucial for understanding cultural transmission in authentic social settings.

Finally, we have lab studies, such as the ones our group is currently conducting. These can include experimental designs like linear transmission chains and replacement chains. The linear design involves sequential transmission of a trait from one participant to another. Conversely, the replacement chains design introduces complexities by replacing participants, allowing exploration of more intricate interactions.

Two of our researchers in the cognition group are currently using these methods to study the domains of technology and diet, by focusing on two cases that can be traced back to the Middle Stone Age: knot tying and mushroom foraging. We want to investigate how the type of information transmitted and the interactions during transmission affect how people learn, teach, remember, and change cultural practices. With these studies, we hope to contribute to a broader understanding of the ways in which modern humans have built such rich cultural worlds, and how this process has accelerated exponentially over the past 100,000 years. The achievements of other cultural evolutionary theorists have greatly informed our own designs, and their results allow us to make more coherent assumptions about how humans learn from others and how they teach new learners. Our group aims to add to the existing literature on human cognition by investigating practical behaviours shared by our ancestors in a way that integrates data from the lab with SapienCE's goal of gaining a deeper understanding of the contexts and forces that shape human cognition.

# USING FMRI TO MAP BRAIN ACTIVATION DURING FLINT-KNAPPING OF STONE-TOOLS FROM VASTLY VARIOUS PERIODS

BY KENNETH HUGDAHL, TORILL CHRISTINE LINDSTRØM

Complexity of material culture is regarded as a sign of high brain-complexity and intelligence. Material simplicity, in contrast, is thought to be a sign of low levels of both. Our study is based on the question of how evolution of the brain might be mirrored in tool-making skills, particularly in the case of changes in flint-knapping between 2.6 million to 100,000 years BP. Functional magnetic resonance imaging (fMRI) was used to map brain activation during flint-knapping by expert flint-knappers. This idea was originally suggested by one of the SapienCE members, Torill Christine Lindstrøm. UiB has an active fMRI research-group, headed by Kenneth Hugdahl, so brain-activation during flint-knapping imagery could be recorded and analysed. fMRI measures regional changes in blood flow and oxygen extraction as a function of neuronal activity.

Similar experiments have been conducted before to study brain-mechanisms during the learning of flint-knapping. These experiments emphasize relationships between language and complex visuo-motor activity but compare only two epochs (Oldowan/Acheulean). Here, we compare Oldowan, Acheulean, Levallois, and Still-Bay stonetool-production using only skilled knappers to reflect the skill level of the ancient knappers. In the fMRI experiment, pictures of template flint stone-tools were presented to the knappers. They were instructed to imagine creating each stone-tool. We added a control-condition: pictures of four different LEGO-objects presented together with building-blocks to make them (Figure 1). Each participant was scanned twice to increase the dataset and to assess reliability within participants.

Through archaeologist Morten Kutchera, we had access to a select group of expert stonetool-knappers. Most of these experts lived outside Norway, so unfortunately the pandemic hampered the number of knappers that could be

recruited. This resulted in a reduced sample of participants, and reduced the amount of data obtained.

*Figure 1:*

The fMRI scanning was performed on a GE 750 HD 3 Tesla scanner at the Haukeland University Hospital, Bergen, Norway. The results are shown in Figure 2, where brain regions of significant activations (in red/yellow colours) are rendered on an anatomy template for the left and right hemispheres of the brain. Each column represents a single subject (S1-S4, and each row represents either LEGO (L) or Flint (F) performance, with the numbers 1 and 2 representing the first and second scanning.



Figure 2:

As shown in Figure 2, the activated regions were reliably replicated from scan 1 to scan 2 for all participants. We also found similarities in activation-patterns across all participants, and across both flint-knapping and LEGO object-building. The activations seen in Figure 2 were similar to the pattern of activation found by Kenneth Hugdahl et al (2015) for the Extrinsic Mode Network (EMN). EMN is a cortical network that is up-regulated to tasks requiring access to higher prefrontal cognitive functions. In regard to comparisons between the groups as a whole, the most eye-catching difference between flint-knapping and LEGO object construction was the strong occipital activation for LEGO. This was to be expected since the LEGO building-blocks were novel to the participants and thus needed careful visual inspection.

Comparison of activations for the flint-knapping across the four different time-epochs (Oldowan, Acheulean, Levallois and Still Bay) are shown in Figure 3.

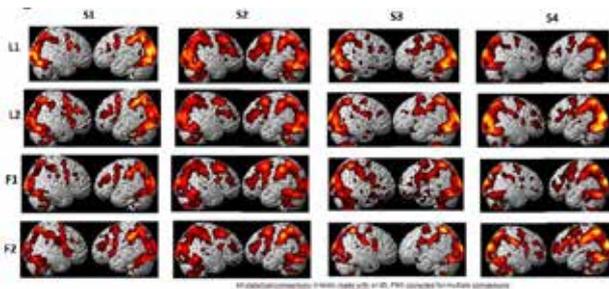
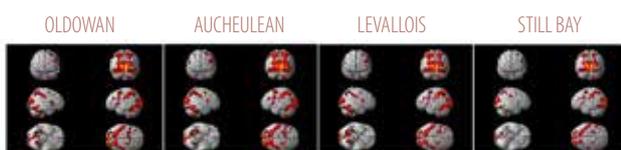


Figure 3:

Although there were no significant differences between the four time-epochs, there was a tendency for more intense activation in the left compared to the right prefrontal cortex across the epochs. These brain areas are associated with language production. A similar pattern emerged when comparing the four LEGO-objects assembled, where activation in occipito-parietal regions occurred, with no obvious differences between the objects. The activated brain patterns were highly reproducible from the first to the second scanning sessions across all subjects, indicating reliability both within and between subjects.



Our hypothesis of increasing cognitive capacities over time was not statistically supported by the data, yet we did see small differences between the different periods. A possible

interpretation of this data is that the fronto-parietal regions necessary for co-ordination of visuo-motor activities, including language, were already established in Oldowan-artefact-producing humans. A recent article (Barham & Everett, 2021) concludes that origins of language were present in Homo Erectus, and so would definitely have been present in Oldowan stone-tool producing humans. We suggest that the simplicity of their stone-artefacts may be due to reliance on scavenging, where they wouldn't have needed elaborate hunting-tools. In contrast, the Still Bay-tools were effective for hunting, and even "overdone" for that purpose, which could be an indication of possible symbolic functions.

An analogy for this can be illustrated in a comparison between the characteristics of wineglasses in 1910 and 2020. The former were far more elaborate than the latter (Figure 4), yet this does not prove any intelligence-differences in the makers. Similarly, some indigenous people of today, living good lives with very simple technology, are equally as intelligent as others in societies with contemporary technology. Perhaps the Oldowan artefact-producers' brains weren't that different from the Still Bay artefact-producers'? Our findings could also suggest that modern humans tend to activate more neural networks than necessary. This would be particularly true if they are recruited as "expert flint-knappers". Our results need replication before any conclusions can be drawn. By simulating the mental processes required for production of knapped flint-tools, we may get a glimpse of the corresponding processes in ancient humans.



Wine-glasses 1910 2020



# FROM FOREST TO MIND:

## A MYCOLOGICAL ODYSSEY OF HUMAN EVOLUTION

BY ALIKI PAPA

Amidst the mystical atmosphere of an ancient forest, where towering trees shrouded in moss beckon the curious wanderer, a sense of timelessness envelopes the surroundings. This is a realm where time appears to have paused, where the whispers of the leaves and the dappled sunlight on the forest floor conjure an ethereal tranquillity. As you venture deeper into this ancient woodland, your senses awaken, and a thrilling anticipation takes hold. You bask in the soft embrace of the forest's cool earthy scent, a fragrance that has endured across the ages. The mossy roots of ancient trees cradle your every step, offering a resilient path through this hallowed realm.

In this place, you cease to be a mere observer; you become a time traveller, transported back to an era when our ancestors were nomadic foragers, driven by the primal urge to find sustenance, to survive. They moved with a primal connection, in harmony with the forest's heartbeat.

Tracing the shifting shadows cast by the towering canopy, the forest floor becomes your canvas. It holds the footsteps of countless generations, preserving the essence of those who roamed before you. The air teems with the promise of discovery, and a profound sense of wonder fills your soul. The forest floor reveals itself as a treasure trove, hiding the bounty of mushrooms that have been a lifeline for your forebears for centuries.

In this journey, your mind channels the thought processes

of those who came before, shaped by an age-old pressure of the ever-persistent need for sustenance. The question of what's edible and what's perilous becomes paramount. Your ancestors, much like you, straddled the thin line between nourishment and danger, their instincts honed by a dance of exploration, discovery, and experience.

Each cluster of fungi you encounter carries with it a tale of trial and error, of life and death. Caution mingles with the hope of finding sustenance, a cautious dance on the edge of survival. Your senses keenly discern the shapes and colours of the mushrooms, guided by the recognition bias that seeks safety in the familiar.

Then, a voice emerges from the forest's embrace. An elderly woman from your tribe beckons you. Her years of experience have sharpened her eye for the safest picks. You find solace in her presence, a seasoned guide amidst the wilderness. Unbeknownst to you, you've already chosen your preferred method of learning: you've elected to learn from another, bypassing the trial-and-error approach. Your decision is influenced by her perceived expertise and the wisdom of her age.

Following her every step, you gather an abundant harvest, enough to sustain yourself. Contentment wells within you, born of your choice and confidence in your newfound foraging prowess.



This amalgamation of emotions, cognitive processes, and learning biases constructs a bridge through time, linking you to your forebears as they ventured into the forest in search of mushrooms.

Time flows, and you stumble upon a cluster of mushrooms like none you've ever seen. This time, you stand alone in your quest. No seasoned guide to lead you. These curious fungi emit an otherworldly glow. A siren's call to your curiosity, while ancient instincts urge you to tread with caution. Your ancestors, too, would have felt this strange allure, yet their innate vigilance would have restrained them from indulging in this spectral feast. Following in their footsteps, you also turn a blind eye to the novel items. What has kept you from experimenting with these enigmatic elements is a bias that acts as both a protector, shielding you from potential harm, and an obstacle to nourishment, leaving you in the dark about their potential nutritional value.

As you feel the fatigue weighing you down, you decide to rest amidst the curling roots of a nearby tree. The day's quest has left you famished, and you decide to replenish your energy by consuming some of your gathered harvest. As you savour the nourishing morsels, your gaze shifts to a cluster of mushrooms you've encountered countless times before. In hushed tones, a handful of old folks in your tribe have cautioned against these particular mushrooms, whispering tales of potential danger. Yet, the prevailing chorus of your fellow foragers insists that these mushrooms

are not only safe but also exquisitely delicious.

Staring at the mushrooms before you, you find yourself at a crossroads, torn between conflicting voices within your tribe. The need to make a choice intensifies, your hunger now serving as a constant reminder. In the midst of this dilemma, you decide to follow the advice of the many. This choice reflects yet another facet of human cognition, a mechanism that has guided our survival for generations. As the sun dipped below the forest canopy, it cast long, reaching shadows across the forest floor. The growing chill of the evening air served as a reminder that the forest held its own mysteries, with dangers that emerged under the cloak of night. Your journey was far from over, and the return through the darkening woods was a story yet to be told.

In leaving the ancient forest, you carry with you a profound sense of the timeless connection between humanity and the natural world. The echoes of the past continue to illuminate our quest for knowledge and expand our understanding of the mysteries that envelop us. As you depart, you leave the ancient forest not as a mere observer but as a partaker in the story of human survival. We are the culmination of our ancestors' biases and their choices, and we, in turn, shape the wisdom of generations yet to come. Throughout it all, the mushrooms have been our companions, witnesses to the ever-unfolding saga of our shared evolution.



# THERE AND BACK AGAIN

## A GEOCHEMIST'S TALE

BY JENNY MACCALI



### BACK TO THE BAT CAVE

Speleothems are likely the best continental archives to reconstruct past climate as they can be precisely and accurately dated and a suite of methods can be applied. A stalagmite (dripstone that rises from the cave floor) previously collected in Bloukrantz cave was used in a pilot study to test i) the applicability of a set of new methods and ii) if reliable climate information can be reconstructed based on these results. Not only can all the methods tested be applied but the results can also be reliably interpreted in terms of climate signal: absolute temperature and relative precipitation (i.e. wetter/drier). Bloukrantz cave speleothem samples have proven quite valuable as they provide high resolution archives of past climate and the initial findings prompted further testing of additional methods. To expand the temporal coverage (the period of time for which we can reconstruct climate) we need additional samples. Additionally, to ensure that our climate signal is regional, coeval samples (covering the same time period) from other caves would also prove useful. We hence need to find new speleothem samples, so...back to the cave.

## ON THE ROAD AGAIN

After a short stop at Blombos to gather equipment, the 2023 De Hoop team was on its way. The return to De Hoop after the disrupted field season in 2020 felt a bit strange, but nothing had really changed, the same hotel, the same dusty gravel road... And off we went, back on the road, direction Bloukrantz cave - or the 'bat cave' as the park rangers call it. And in terms of road, Simon had to navigate through almost invisible tracks with serious patches of overgrown vegetation, indicating that we might very well have been the last visitors to the cave, back in 2020. There is no trail to the cave, we had to rely on memory - 'Oh... I forgot that first embayment, I guess we turned too soon', 'We climbed down right to the blue barrel, didn't we?' - and after the final stretch in thick spiky thicket here we were. And as a welcome-back gift, the logger I thought I hid very well in a wall cavity was lying on the ground. I obviously did not outsmart the baboons. Once in the cave, we quickly found the other loggers we left in the cave and replaced them with new ones. As we were looking for dripping sites to install a new type of logger, we realized there were none, there was no active dripping, no echoing sound from drops falling, just the screeching bats, quite different from our last visit.

As we tested new methods in the lab, Bloukrantz speleothem samples revealed high contents of organic matter that can be used as climate and vegetation proxies. In order to identify the source of this organic matter, inherited from the soils above vs. from bacterial activity within the cave, we collected soil samples within and above the cave. The collection of drip water was postponed to our next visit to Bloukrantz cave, hoping the cave will be dripping then.

## ON THE RIGHT OF THE WHALE SKULL AFTER AN EASY HIKE

The De Hoop nature reserve harbors numerous caves along its coast, some of which were mapped and explored during Jane Noah's Master's project (Wits). We decided to visit West cave as the most promising site to contain speleothems, and to test the regionality of our climate reconstruction and potentially expand the temporal scope. The cave was supposedly easy to find as it was located along the touristic whale trail. With a GPS pin and some cryptic information - 'once on the pebble beach, the cave entrance is on the right of the whale skull' - we managed to locate the beach, but it took Simon's patience and determination to actually locate the cave entrance. The cave indeed contains several promising speleothem samples that we drilled to get an estimate of the time period during which they grew. Should that time period be of interest, we will go back and collect them, if not, we will drill some more, hoping to find the right sample.

Research is an iterative process, from the cave to the lab, from the lab to the cave, there and back again...



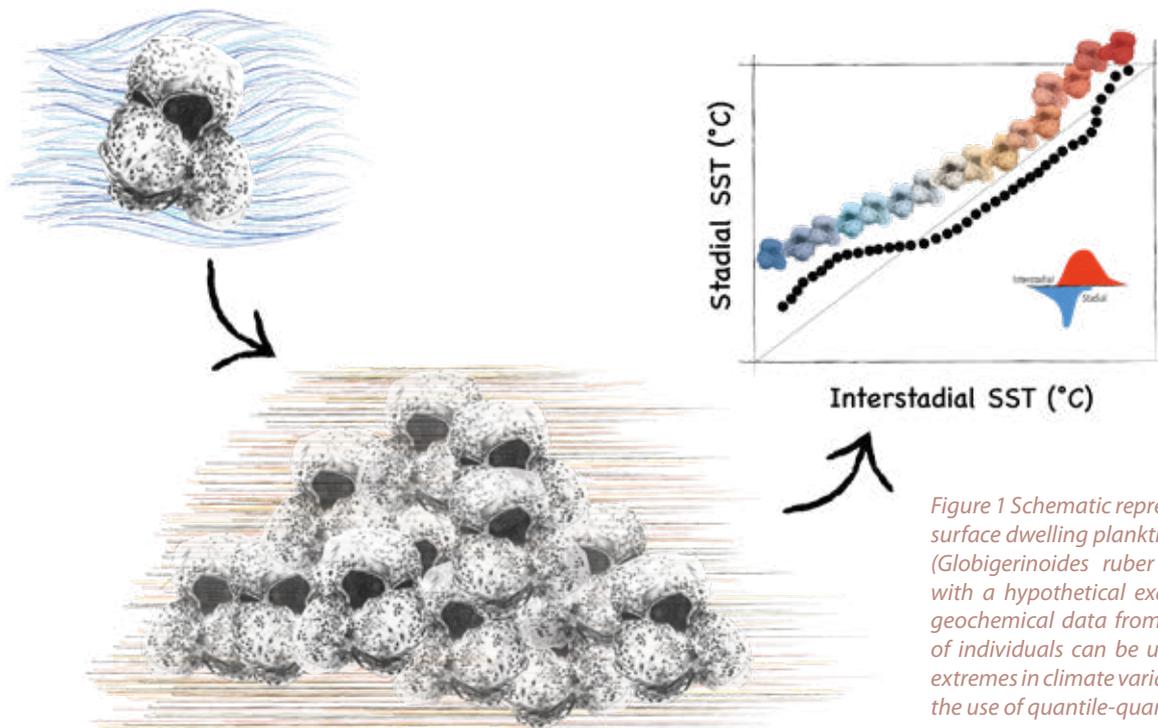


Figure 1 Schematic representation of a surface dwelling planktic foraminifera (*Globigerinoides ruber sensu-stricto*) with a hypothetical example of how geochemical data from a population of individuals can be used to discern extremes in climate variability through the use of quantile-quantile plots.

## SINGLING OUT SEASONALITY

BY KATRINA NILSSON-KERR

Constraints on how the temperature and salinity of the oceans have varied across hundreds, thousands, to millions of years has been made possible by exploiting the unique archive of paleoceanographic information contained within the shell chemical composition of fossil foraminifera. Planktic foraminifera are microscopic unicellular organisms that inhabit the upper layers of the ocean and live for around a month, during which time they continuously grow their calcium carbonate shells. It is thought that one of the primary drivers dictating the geochemical make-up of their shells is that of the ambient seawater conditions (e.g. temperature, salinity). Scientists have long exploited this fact, using analytical techniques to extract the trace element and isotopic composition of fossil foraminifera shells to reconstruct past oceanographic conditions. The conventional approach to glean paleoceanographic information has been to integrate a population of specimens (typically 10+ individuals) from a sediment package. Thus, the reconstructed signal reflects the average seawater conditions captured within the combined population spanning the time period of the deposited sediment package, which can range from decades to thousands of years. However, considering the month-long lifespan of foraminifera, this approach is unable to discern short-term climate fluctuations such as seasonality and interannual variability or changes in the depth habitat of the foraminifera. An emerging approach, owing to analytical advancements, has been to perform geochemical analysis on individual foraminifera specimens instead of combining a population of specimens. This approach relies on measuring a population of foraminifera specimens individually as a means

to constrain ocean temperature and salinity distributions, in addition to providing further constraints on the ecological preferences of foraminifera.

We will employ such individual foraminifera analysis techniques using a combination of laser ablation mass-spectrometry to obtain trace element data from individual chambers across a population of individual foraminifera specimens. This will give data that will be primarily used to reconstruct past ocean temperature using the widely applied Mg/Ca-temperature calibration approach. Subsequently, the same individual foraminifera specimens will be analyzed for their oxygen and carbon isotopic compositions. The combination of Mg/Ca-derived temperatures and oxygen isotopic composition of the foraminiferal calcite will allow for the deconvolution of the oxygen isotopic composition of the seawater, a proxy for salinity. Owing to the nature of the location of core MD20-3591, positioned within a region sensitive to both shifts in atmospheric and oceanographic circulation patterns in response to changing climate conditions across the late Pleistocene, this approach has the potential to further constrain such changes that would be exerted on the seawater properties at the core-site. The records of climate variability captured by populations of individual foraminifera measured on targeted time-intervals (e.g. cold stadial and warm interstadial periods). We hope to be able to identify episodes of increased oceanographic variability and place them in the context of the wider regional climate dynamics. Further, these records will complement the existing bulk foraminiferal geochemical record from the core.

# A MOROCCAN ADVENTURE

BY MARGIT SIMON

What do Morocco and South Africa have in common? At first sight, not that much, but looking closer into the Middle Stone Age (MSA) *H. sapiens* records of these areas, many commonalities appear. Many cave sites in both areas have access to the sea along the coastline, have at least partially a Mediterranean climate and vegetation, and have many decades of archaeological research history.

As I delved deeper into the literature to better understand the concept of indicators for behavioural complexity in the archaeological record, my fascination for shell beads grew. What makes them unique? One of the earliest signs of symbolic behaviour among our ancestors is the use of personal ornaments such as perforated beads, frequently made from marine shells. They appear quite early within the MSA contexts in North Africa, South Africa, and southwest Asia. The appearance of these shells signals important developments in cognition and social relations. It is intriguing that we can find them in the archaeological records of NW Africa and South Africa approximately simultaneously, mainly associated with Marine Isotope Stage 5 (MIS 5) (ca. 128–73ka), which is a period of warm (MIS 5e, 5c, 5a) and cool (5d and 5b) climate.

Recent findings from Bizmoune Cave in North Africa, Morocco, push back the presence of perforated marine shells to older dates reaching into the penultimate full glacial ( $\geq 142$  ka; MIS 6). That extends the earliest date for this behaviour and highlights the North African record as potentially the earliest evidence for the use of marine shells in symbolic contexts. The use of the same type of beads

over a large territory, as seen in North Africa, certainly reflects a large communication network. In contrast, in South Africa, a large series of perforated shells from Blombos Cave is dated to be younger than the earliest North African findings between ca. 76 and 100 ka, while more varied assemblages of shell beads from the site of Sibudu Cave date to somewhat later.

Why the earliest shell bead culture emerged in these specific regions during that particular period, and the environmental context surrounding these deposits, are questions worth investigating. In 2022, I sought collaboration with various research teams operating in Northwest Africa, inquiring about the possibility of sampling sediments from archaeological sites. This prospect was, and is, fascinating, as it would enable me to compare my discoveries from Blombos Cave with environmental reconstructions specific to the Northwest Africa region.

In Autumn 2022, I was invited to Rabat by a research team led by Jean-Jacques Hublin, who also discovered the oldest known fossil evidence of *H. sapiens*, dating back to around 300,000 years ago, from Jebel Irhoud, Morocco. In the last six decades, archaeological excavations in the Rabat-Temara region of Morocco have yielded a substantial number of human fossils from the Middle and Later Stone Age layers. Notably, some of these finds include nearly intact skulls. This specific coastal area, spanning just 10 km along the Atlantic, stands out as one of the most abundant sources of *H. sapiens* specimens, encompassing both early and late forms.



Figure 2: View onto Dar Es-Soltan 2 cave with ongoing excavations in 2022.



Figure 3: Sampling procedure at Contrebandiers Cave.

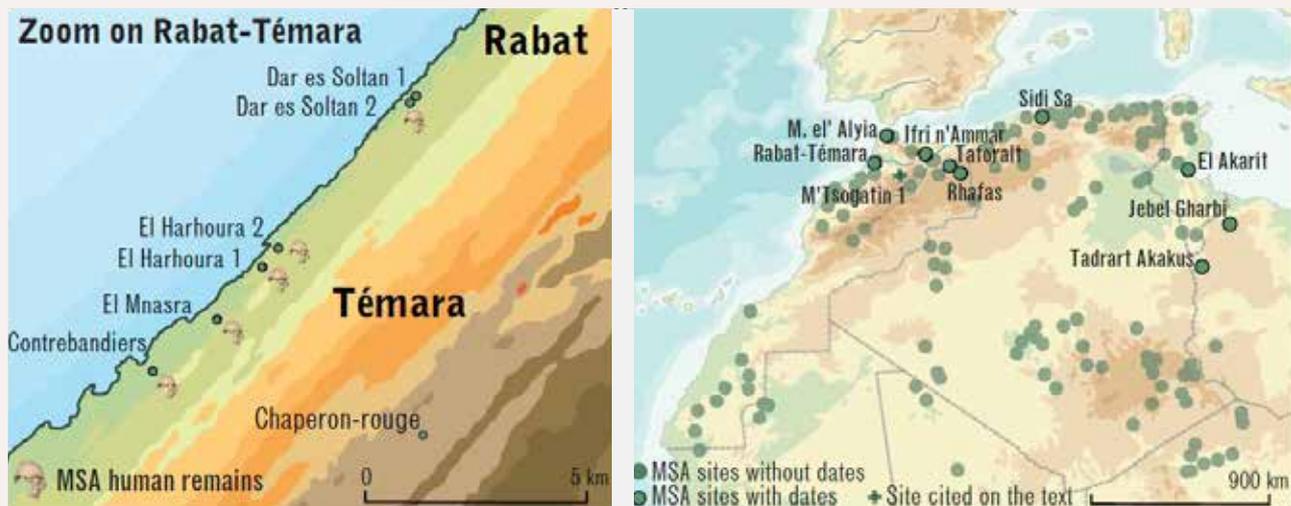


Figure 1: Map from Ben Arous, E., Falgueres, C., Nespoulet, R. & El Hajraoui, M. A. 2020. Review of chronological data from the Rabat-Temara caves (Morocco): Implications for understanding human occupation in Northwestern Africa during the Late Pleistocene. In Leplongeon, A., Goder-Goldberger, M. & Pleurdeau, D. (Eds.), *Not Just a Corridor: Human Occupation of the Nile Valley and Neighboring Regions Between 75,000 and 15,000 Years Ago*. Paris: Museum national d'Histoire naturelle, pp. 177-201

In 2022, new excavations in two sites: Contrebandiers Cave and Dar Es-Soltan 2 (Fig.1-3), were conducted (twelve and forty years, respectively, after their last excavations by Dibble, El Hajraoui, and Debenath).

The invitation to join the excavation was both tempting and challenging, especially given the last-minute nature of it. I was on maternity leave, and my little daughter had just turned 2 months old. This was potentially a one-off invite to come and join the excavation. However, can I leave my daughter behind that early after birth? Balancing family life with an academic career, a question many young parents face, weighed heavily on my decision. With the encouragement and support of my family and colleagues, I decided to embark on this unexpected journey. Two weeks later, I found myself on a plane bound for Rabat via Paris, contemplating what awaited me at these unfamiliar sites and among a team of multidisciplinary researchers working in a region completely different from my previous experiences in Africa.

Upon arrival, the excavation leader warmly introduced me to the team and provided insights into the ongoing excavations at both locations. The cave sites intrigued me, one situated next to the city's main highway, and the other adjacent to a recently established landfill near the coastal cliffs. It struck me how heritage and everyday life coexist in Morocco.

The following days were busy with intensive sampling at both sites, a task I had to accomplish within a tight three-

day timeframe. Amidst the demanding schedule, I also had to find time and a private space to pump breast milk, as I was still breastfeeding. The experience brought to light the unique challenges faced by mothers balancing fieldwork commitments with the demands of motherhood.

How can sediments from an archaeological cave tell us something about past environmental conditions?

Archaeological cave sediment deposits, where ancient people lived, can retain substances from plant leaves. These compounds come from the protective layer on the outside of leaves, which helps plants keep water and protects them from various things like bugs, wind, and sunlight. Their abundances and isotopic fingerprints are controlled by environmental factors. By analysing these compounds from the caves closer, I can achieve two main goals: first, an understanding of what type of plants were around the cave site at different times in the past by quantifying the concentration of leaf waxes (n-alkanes) and their carbon isotopes ( $\delta^{13}\text{C}$ ), and second, an understanding of changes in where the water (rain) entered the site? and how much by examining the leaf wax' isotopic composition ( $\delta\text{D}$ ). As with all scientific projects, there are challenges: for example, can we even detect enough plant material in the deposits to get accurate enough results, or has the plant material been destroyed when people were making a fire in the caves? We currently have some pilot samples measured to answer some of these questions, and I am very excited about the results.



## NEW SAPIENCE DEPUTY DIRECTORS PROFESSOR SIMON ARMITAGE AND DR. KAREN VAN NIEKERK

In 2023 SapienCE appointed two new Deputy Directors elected by the Centre's Board: Professor Simon Armitage (Royal Holloway University of London) and Dr. Karen van Niekerk (UiB). This followed the appointment of the previous SapienCE Deputy Director, Professor Eystein Jansen, to the position of Vice-President of the European Research Council. Van Niekerk and Armitage are tasked with supervising archaeology/cognition and climate/early career researchers, respectively.

Karen van Niekerk is a researcher at the Department of Archaeology, History, Cultural Studies and Religion at the University of Bergen. Her work primarily focuses on the use of marine faunal resources in prehistoric (Middle Stone Age) South Africa. Karen has a BSc and PhD degrees from the University of Cape Town, South Africa and MPhil in archaeology from UiB. She is the SapienCE Deputy Director in charge of archaeological fieldwork in South Africa, primarily at Blombos Cave and Klipdrift cave and shelter, all in the Western Cape province. Karen has been with SapienCE since its foundation.

Simon Armitage is a professor of Quaternary science at the Department of Geography at Royal Holloway University of

London. He received a BA in Geography at the University of Oxford and PhD from the University of Wales Aberystwyth. After finishing his PhD, he moved back to Oxford for a postdoctoral position associated with two NERC-funded projects. Simon has worked at Royal Holloway since 2006. His research is based upon the application of Optically Stimulated Luminescence (OSL) dating to late Quaternary sediments. His interests particularly lie in climate change and archaeology in dryland environments. His current work focuses on the impacts of late Quaternary climatic changes upon pre-industrial human/hominin populations in Africa and the Arabian Peninsula. Simon is working on research projects in Libya, Nigeria, South Africa and the United Arab Emirates and has been part of SapienCE since its foundation.

Both new Deputy Directors have significantly contributed to the research on topics central to SapienCE and the future of the project is in great hands!



## NEW RESEARCHERS

### ELLA WALSH

During the period of MSA occupation of Blombos Cave, glacial oscillations in sea levels occurred. Changing climate conditions and distance between the cave and coastline have been drawn on to explain findings in the archaeological sequence, where environmental variability and periods of social stress can drive complexity in social interactions. Regional climate model experiments suggest that the local coastal climate in southern Africa is sensitive to changes in land extent following shifts in the coastline position. To gain an insight into the local environments in which humans were living in, sediments preserved across the surrounding coastal landscape can be investigated. Palaeosol and aeolian sequences surrounding Blombos provide a window into contrasting periods of environmental stability and variability over time, but these landforms have not been studied in detail.

In my project I will use optically stimulated luminescence (OSL) dating, and sedimentological, pedological and geochemical analyses to understand the evolution of the coastal landscape over time. Samples will also be analysed for biomarkers and terrestrial gastropod assemblages to reconstruct palaeoenvironmental conditions. This research aims to establish a palaeolandscape model that can be used to aid interpretation of archaeological changes and that can be linked to palaeoclimate data produced by other SapienCE researchers. Using data from this characterisation of coastal sediments, we also seek to establish the source of sediment in the archaeological sequence and to understand the nature of within-cave sedimentation over time.



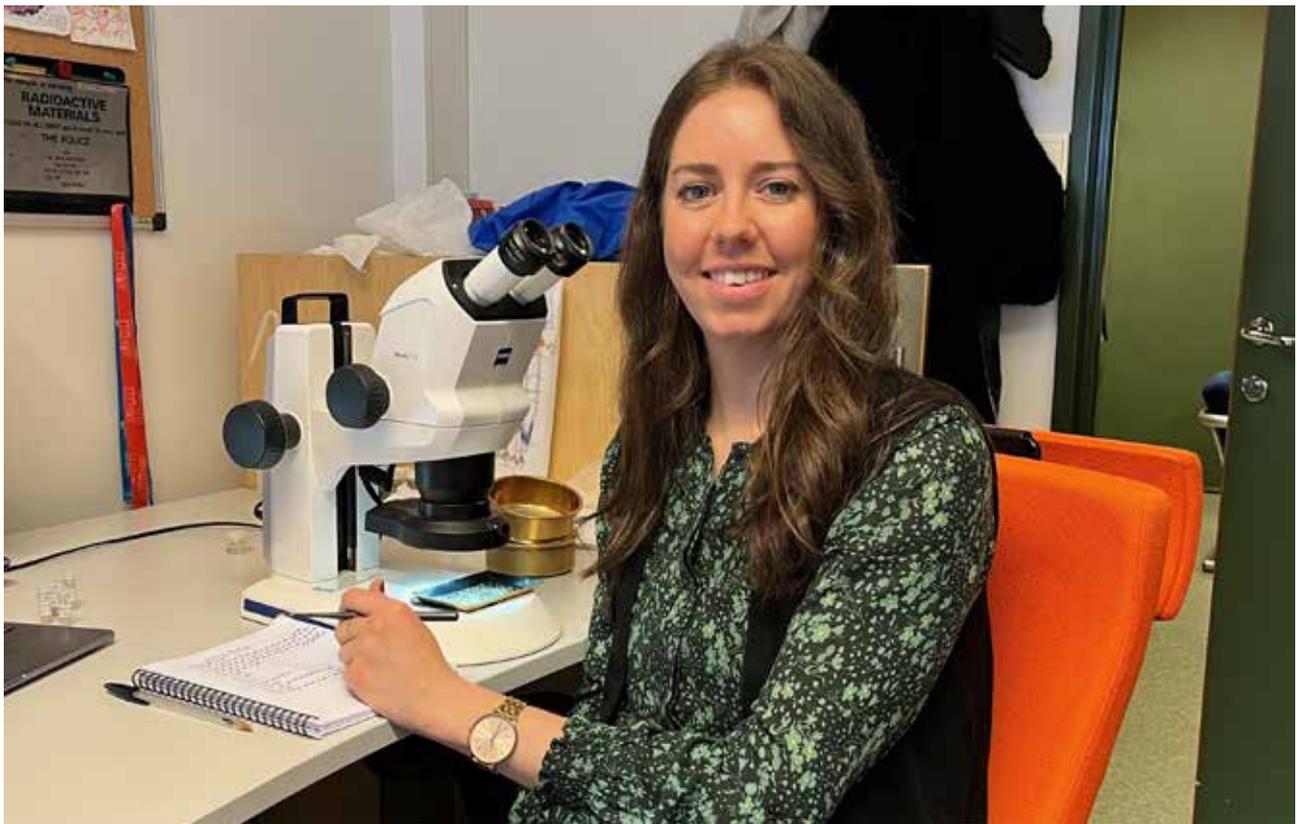
## NEW RESEARCHERS

### JASMIN CULEY

#### **Unravelling Ancient Minds – insights into Human Culture and Cognitive Evolution through Blombos Cave's Layers CP and CPA**

Activities which once formed part of daily life 100 000 years ago, such as gathering, processing, and eating food, creating and maintaining a living space, and engaging with other humans, leave traces that are archaeologically visible. Clues about these aspects can be found in, for example, the ways lithics are used and the residues left on them, in the spatial distribution of artefacts and the characteristics of the soil, and in the use-traces left on potentially symbolic (but also functional) materials like ochre. Given that all of these forms of evidence are available and relatively well-preserved at Blombos Cave, this site represents a unique window into the lives of some of our earliest ancestors along the southern coast of South Africa. My PhD project aims to synthesise these diverse strands of evidence (i.e., shell, fauna, lithics, soil samples, ochre) in order

to develop a holistic narrative of ochre-related behaviours at Blombos Cave around 100-110 000 years ago, as evidenced by finds from layers CP and CPA, with a broader goal of understanding the human capacity for culture and complex cognition through the lens of these specific layers. Under the supervision of Dr Karen Van Niekerk, Prof. Francesco d'Errico, and Dr Elizabeth Velliky, and with substantial collaboration with my colleagues at SapienCE, I plan to create databases which correlate all available information on each artefact and enable detection of correlations and patterns across different find types, design and execute experiments aimed at recreating the ochre surface/layer present in CP/CPA and understanding the nuances of the traces this leaves, and to perform residue and use-trace analyses on ochre-stained artefacts. I hope to help shed light on the intricacies of the ochre use process, as well as the function of ochre in the *chaîne opératoire* of other artefacts, and in doing so unravel the story of what transpired at Blombos Cave during this particular, pivotal moment in time.



## NEW RESEARCHERS

### KATRINA NILSSON-KERR

In my 2-year postdoc position with SapienCE, I will be building on the geochemical investigations and past climate reconstruction that has already been undertaken on marine sediment core MD20-3591. This core is ideally situated to capture changes in the Agulhas Current and link changes in the current strength into a wider global framework on climate fluctuations during the late Pleistocene and the associated regional imprint. Reconstructing changes in ocean temperature variability and salinity is critical for understanding the feedbacks such changes would have on the local climate surrounding the sites of human occupation. The work that has already been undertaken has generated sea-surface temperature records using traditional bulk foraminifera analysis providing an average account of ocean temperature change. My project will contribute to assessing changes in temperature and salinity extremes at a seasonal scale to infer the sensitivity of temperature

and salinity to large-scale changes in global climate across the studied interval. To achieve this, I will apply advanced analytical techniques to extract finer-detailed geochemical and climate information from fossil foraminifera shells. This approach takes into consideration the month-long life span of foraminifera and thus, within each individual specimen there is the potential to extract a climate signal across the timeframe from within which they were living. Foraminifera specimens will be analyzed individually to provide an account of the range of temperature and salinity changes within a given time-period covered by a specific package of sediment. The records of climate variability captured by a combined population of individually analyzed foraminifera will help with the identification of time periods that underwent increased oceanographic variability and these will then be placed in the context of wider regional and global climate dynamics.



## NEW RESEARCHERS

### KURT WOGAU

My name is Kurt Wogau. I am a Mexican geologist. My research involves studying past environmental conditions and geoarchaeology during the Pleistocene and the Holocene. I conduct my research using sedimentary records such as lake sediments, fluvio-lacustrine sequences, and sea sediments. My methodology includes X-ray diffraction, X-ray fluorescence, environmental magnetism, SEM studies of magnetic fraction, C-14 dating, microfacies analysis, and GIS.

I started my academic career at the National University of Mexico, working on the palaeoenvironmental reconstruction of the Oriental Mesoamerican region during the Late Holocene, using the lake sediments from crater maar Aljojuca (2009-2012). During my Ph.D., I studied the past environmental conditions of the Mesoamerican Northern Frontier using the palaeolimnological record of Lake la Alberca.

In my previous postdoctoral position, I worked at the Anthropology Institute of the National University of Mexico. I

investigated the fluvio-lacustrine sediments from the Texcoco Basin, Central Mexico, to understand the palaeolandscape evolution between the Pleistocene and the Early Holocene transition and its impact on hunter-gatherer dynamics.

Currently, I am a postdoctoral fellow in the SEAS programme and at the SapienCE. My work will explore the trigger mechanism of sea transgressive and regressive phases during the Middle Stone Age period (120-50 ka) in South Africa, their impact on the continental landscape evolution at the Palaeo Agulhas Plain and its possible implications in early modern humans' behaviour. To reach these aims, a palaeoenvironmental reconstruction will be performed using the Calypso MD20-3591 marine core. Moreover, I will investigate the Little Karoo palaeo-landscape evolution during diverse climatic events (e.g., MIS 5 and MIS 4) potentially inhabited by Middle Stone Age hunter-gatherers. Various natural archives such as pans systems, dune fields, and floodplains will be studied.

# OUTREACH

---



## OUTREACH ACTIVITIES IN SOUTH AFRICA

BY ŽARKO TANKOSIĆ

As every year, members of SapienCE continued their fruitful collaboration with individuals and organisations in South Africa. These collaborations have particularly taken place in areas immediately adjacent to our excavations sites.

In 2023, we continued working with the Gouritz Cluster Biosphere Reserve (GCBR), a UNESCO-affiliated organisation based in Riversdale. This collaboration is significant to SapienCE on multiple levels. It provides valuable logistical help to our project in general and to individual research activities of our early career researchers. GCBR's intimate knowledge of the local landscape and customs, and their excellent relationship with the local population, is particularly invaluable.

We have also continued to cooperate with the Hessequa Municipality, which is the region of South Africa in which Blombos Cave is located. We particularly thank Mr Hendrik Visser, the Municipal Director of Development Planning, for his continued support to SapienCE. In collaboration with Hessequa, we are planning to create a permanent home for our current exhibition that will be displayed at Cape Point until 2027.

In 2022 we enlisted the help of a local geologist, Pieter-Jan Grabe. In 2023, he began his SapienCE-supported project of mapping significant sources of raw materials such as ochre and silcrete that were of particular importance

to the people who used and inhabited the Blombos Cave in prehistory. This research has been conducted in collaboration with SapienCE postdoc Elizabeth Velliky. It will establish a reference collection which will be of special use to SapienCE scientists as well as other researchers interested in this area and materials in coming years.

SapienCE researcher and previous postdoc Jenny MacCalli trained staff of De Hoop Collections in installing and monitoring rainwater collection gauges. Alongside this, we have also intensified our collaboration with De Hoop Collection, resulting in another SapienCE-related exhibition that opened in 2024.

We thank Chris Keightly and OPTRON for conducting a free-of-charge 3D scan of Blombos Cave in 2023 using the latest technology from Trimble. We are also grateful to Chris Davies from Romanskraal for yet again granting us access to the cave located on his property that has breathtaking painted ornaments.

Finally, we continued our fruitful contacts with the Hessequa Archaeological Society and the local museum in Still Bay. They have put us in touch with local artists who produce replicas of prehistoric artifacts from the region. These are now being used in our outreach activities in Bergen and elsewhere.





# EXHIBITION OPENING

## THE UNIVERSITY MUSEUM OF BERGEN

BY BJØRN T. BØE



The SapienCE and Museum teams during the official opening of the exhibition on 25 May.

*Head Curator of the exhibition, Åshild Sunde Feyling Thorsen (left), Head of the Department of Research and Science Communications and Project Owner, Eli Kristine Økland Hausken (centre), and Project Manager Marit Kjeksrud Amundsen (right).*

This year marked the opening of the exhibition “Early Human Behaviour” (EHB) at the University Museum of Bergen. The exhibition, which was a collaboration between SapienCE and the Museum’s Department of Research and Science Communication, showcases the project’s research processes and findings. In addition to highlighting archaeological fieldwork and analyses, cognition research and climate research, the exhibition also places a special emphasis on the Centre’s holistic approach and the message of our shared human origins. The exhibition shines a spotlight on the UiB researchers and their international colleagues who were brought together by SapienCE to explore our species’ long journey to cognitive modernity through increased innovation, complex behaviour and symbolic thinking.

The exhibition project was led by Museum Project Coordinator Marit Kjeksrud Amundsen, with Žarko Tankosić coordinating for SapienCE, and Museum Head Curator Åshild Sunde Feyling Thorsen led the curation. The exhibition was officially opened by University of Bergen Rector Margareth Hagen on 25 May, 2023, with South African Ambassador to Norway, Her Excellency Ms. Delores Kotzè, in attendance. The exhibition will be open throughout 2024. Throughout the year, the Museum has prioritised activities corresponding with the exhibition in many of its outreach channels and venues. This includes a specially developed educational programme, museum events, and representation with a focus on the exhibition and its associated activities.



*South African Ambassador to Norway, Her Excellency Ms. Delores Kotzè, during the official opening of the exhibition on 25 May.*

# UNIVERSITY MUSEUM OF BERGEN

## EDUCATIONAL PROGRAMME BASED ON “EARLY HUMAN BEHAVIOUR” EXHIBITION

BY BJØRNT. BØE

An educational programme based on the exhibition *Early Human Behaviour* (EHB) was launched at the University Museum in Bergen in Q3 of 2023. The programme was developed by the Museum's pedagogical team in consultation with SapienCE Project Manager Žarko Tankosić. Its aim is to give school students in Years 5-7 in the Norwegian school system practical and theoretical insight into research matters focused on by the SapienCE project. Classes are split into two groups alternating between two exercises. The first comprises performing a simulated excavation in dig boxes. In the second, students engage in drama pedagogical exercises designed to encourage and stimulate reflections on our shared human past, human behaviour and cognitive development. At the end, the class reunites, and they collectively share their observations and experiences.

The custom dig boxes used in the archaeological activity were developed specifically for this educational programme. Each box simulates an ideal archaeological scenario that reflects various relevant findings in either the African MSA or the Nordic Stone Age. These scenarios are carefully excavated by the students, who plot, register, and clean each object. Subsequently, they analyse and discuss their findings, viewing each object and their placement relationally. The practical, tangible excavation is designed to connect with the more introspective drama pedagogical exercises to form a greater context. This is aimed to reflect

the project's interdisciplinary and holistic approach. It is especially fruitful to see how conclusions vary between groups who start with the drama pedagogical activities and groups who start with the practical excavation.

Several PhD candidates and Master's students affiliated with SapienCE joined Project Manager Žarko Tankosić in aiding Bjørn T. Bøe and Ida Sagen, from the Museum pedagogical team, with the design and production of these scenarios. The development of the drama pedagogical exercises were led by Pedagogical Leader Odette Tetlie at the Museum.

The content matter and concept of the educational programme is anchored in the Norwegian national curriculum to ensure educational applicability and relevance for teachers. To stimulate increased interest, the pedagogical team has temporarily adjusted availability of educational programmes with overlapping subject matter. This way, classes from Year 5-7 looking to book educational programmes with themes such as the Stone Age or human development are encouraged to book EHB rather than thematically similar programmes. This has led to an increase in bookings. Booking numbers for Q3 and 4 in 2023 have still been somewhat lower than anticipated, but this can be attributed to curricular progress and which part of the school year schools normally engage with the relevant subject matter. Bookings for this programme are therefore expected to rise significantly during Q1 of 2024.



School student's illustration of their findings from the excavation activity in the Museum's Learning Laboratory.



One of the Museum pedagogical team's specially developed dig boxes.



Postdoctoral fellow Asia Alsgaard and SapienCE Project Manager Žarko Tankosić consider carefully handmade replicas for placement in the Museum pedagogical team's dig boxes.



School students studying their findings under the microscope in the Museum's Learning Laboratory



: School students performing the excavation activity in the Museum's Learning Laboratory.

# REPRESENTATION AND OUTREACH BASED ON SAPIENCE UMB EXHIBITION

BY BJØRN T. BØE

The pedagogical team of the University Museum of Bergen represented the Museum at various events during the year, and in Q3 and Q4 2023 the chosen focal theme has been activities connected with the “Early Human Behaviour” (EHB) exhibition at the University Museum. This has been part of a conscious effort to boost awareness of and attendance to the exhibition.

During the Bergen Research Days, the team brought the EHB dig boxes to the school and family events held at Torgallmenningen. On Friday the 22nd of September, around 1,300 students in Year 6 had the opportunity to try their hand at a simplified version of the SapienCE-inspired archaeological excavation simulation from the Museum’s educational programme. The second day, Saturday the 23rd of September, saw around 3,000 visitors of all ages. In October, the pedagogical team hosted Skolelaboratoriet’s course for Secondary and Upper Secondary School teachers (Years 8-10 and VGS). During this course, the attending teachers were given practical demonstrations of the EHB educational programme.

October also included the Museum’s Archaeological Day, an event showcasing archaeological research in and around the Museum. Researchers from SapienCE, led by Žarko Tankosić, assisted with outreach by operating an activity station featuring the project, and the Museum’s own visitor activities featured the EHB dig boxes. In November, the pedagogical team attended the “Tillit til tingene?” Museum Outreach Research Conference held in Bergen. During the conference, the team hosted a workshop in developing educational programmes and used the development of the EHB educational programme for their demonstrations.

In January 2024, the Museum is planning a family event based on the EHB exhibition. In addition to talks, research stations and researcher meetings, the event will encompass several practical activities related to the project, including painting ostrich eggs, ochre decorations and the EHB dig boxes.



Dig box with school students' findings marked, from the Museum pedagogical team's activity during the Bergen Research Days in September.



During the School Market of the Bergen Research Days, more than 1300 Year 6 students visited the Museum's station. The EHB dig box activity was one of the most popular activities available to the students.





# THE ORIGINS OF EARLY SOUTHERN SAPIENS BEHAVIOUR

## EXHIBITION AT CAPE POINT, SOUTH AFRICA

BY JANNE-BEATE BUANES DUKE, CRAIG FOSTER

In the summer of 2023 we opened a new exhibition at Cape Point, part of the Table Mountain National Park, titled "The Origins of Early Southern Sapiens Behaviour". The exhibition, co-curated by the Academy Award-winning documentary film director Craig Foster and Petro Keene and assembled by Carl Miller, showcases the discovery of early innovative material culture made by our own species, *Homo sapiens*, in southern Africa and attempts to recreate the life experiences of our early ancestors, living in partnership with nature, including the Great African Seaforest, about 100 000 years ago.

The exhibition jointly presented by South Africa National Parks, University of the Witwatersrand, and SapienCE represents the culmination of some 30 years of archaeological research in the southern Cape undertaken by SapienCE scientists Professor Christopher Henshilwood, Dr Karen van Niekerk, Professor Sarah Wurz and their research teams. Their remarkable discoveries highlight the rich archaeological record of SapienCE main excavation sites: Blombos Cave, Klipdrift Shelter and Klasies River, all

situated on the southern Cape coast of South Africa. The sites were occupied by early *Homo sapiens* between 120 000 and 50 000 years ago – a key period in the evolution of modern human behaviour.

SapienCE Director, Professor Henshilwood is "proud to say that this exhibition represents the culmination of 30 years of archaeological research and collaboration between our teams of experts in various fields including psychology, chronology and palaeoclimate. Our goal has been to shed light on the complex and fascinating evolution of early *Homo sapiens* and their cultural and cognitive abilities".

The exhibition consists of 19 unique display panels, including films by Craig and Damon Foster, augmented by content from the Sea Change Project, allowing visitors a unique multi-sensory experience.

The daily life of early *Homo sapiens* has been visually recreated for the exhibition that also includes exact replicas of the oldest engravings on earth, some of the earliest beads, the first known drawing and what is likely the first



evidence for bows and arrows. The material remains of symbolic expression constitute the earliest confirmed evidence of recording information that could be shared and stored outside of the human brain - an invention that would change the course of our entire species.

The exhibition is on display at the Cape of Good Hope Buffelsfontein Visitor Centre in Table Mountain National Park, where it is exposed to hundreds of thousands of visitors that come to visit the Cape of Good Hope every year and it will be there at least until the summer of 2026. The exhibition has also been attracting distinguished visitors, such as the Mayor of Cape Town, Mr Geordin Hill-Lewis, and Professor Nithaya Chetty, the Dean of the Faculty of Science

at the University of the Witwatersrand. Following his visit, Professor Chetty remarked: "I am especially delighted to see how far Archaeology has broken away from its difficult past going back centuries, when discoveries in far flung places were largely seen as objects of curiosity for entertainment and for asserting European superiority. It is in this light that I would like to commend the Wits-Bergen partnership that is giving credence to African voices, both those of the present and the past and this sets us on a path of advancing African-led science, bringing us all closer to home, and forming a stronger basis for us to imagine a better future."

The opening of the exhibition received notable press coverage in both South Africa and internationally.





## !KHWAA TTU SAN CULTURE & EDUCATION CENTRE VISIT SAPIENCE CAPE POINT EXHIBITION

In collaboration with Craig Foster's Sea Change Project, members of the !Khwaa ttu San heritage center visited the Cape Point Nature Reserve, with a goal of reigniting some of the lost knowledge of nature that few of the younger generations possess. They were guided by Craig Foster and Craig Marais (also of the Sea Change Project).

The San group has spent part of their visit at the Buffelsfontein Visitor Centre, where our exhibition "Early Southern Sapiens Behavior" is hosted. This gave them a chance to come face to face with the story of their ancestors, as told through the eyes of SapienCE scientists, some of whom have worked in the area for more than 30 years. This provided a useful historical context to their other activities at the Cape point.

The Sea Change project has produced a wonderful and touching documentary about this visit that is available on YouTube:

<https://www.youtube.com/watch?v=Vj93dpC4X0E>



Amanda Esterhuysen, Tammy Hodgskiss & illustrations by Alastair Findlay  
**ORIGINS CENTRE ACTIVITY BOOK**  
*Early sapiens*



# ACTIVITY BOOK

SapienCE was happy to support the publication of the "Origins Centre Activity Book: Early Sapiens". The booklet is authored by our colleagues and collaborators from Wits University, Amanda Esterhuysen and Tammy Hodgskiss, and is illustrated by Alistair Findlay. It is an educational activity book inspired by the life and lifeways of early *Homo sapiens*. It offers a fun way for kids and schoolchildren to learn about the past.

Partly thanks to SapienCE support, the booklet has been distributed to schools across South Africa, where it will serve as an important educational tool and will play a role in the planned reform of South African school curricula that will for the first time include teaching on prehistory and human evolution.

Numerous copies have been brought to Norway where they have been successfully used by SapienCE members in several educational and outreach activities co-organised with the University Museum of Bergen.



Ochre is a soft, iron-rich stone that can be ground to make coloured powder. Ochre is found all over South Africa, you might even find some in your garden or the park.

Most ochre pieces found in archaeological sites are red and yellow, but pink, brown and purple ochre has been found.

**ACTIVITY:** What might the different colours found in archaeological sites tell us about early humans? What is your favourite colour? What else do you think they used the ochre powder for? What sicknesses are caused by certain kinds of mosquitoes and flies?



At Blombos Cave, South Africa, archaeologists found a *Halotis midiae* shell (commonly known as perlemoen or abalone) with residues of ochre mixed with seal fat and charcoal. It is 100 000 years old.





## SAPIENCE TEAM MEETINGS

SapienCE continued to create opportunities during 2023 for in-person interaction among researchers. This practice builds the team spirit and allows for direct exchange of opinions and research results and fosters collaboration. We often combine these meetings with fun non-academic activities. The two main events, as every year, were the Spring team meeting and the Autumn meeting of the Scientific Advisory Committee.

During the Spring meeting at Voss, team SapienCE had the chance to discuss in more detail the plans for phase two of the Centre of Excellence. Following a lively discussion, new research trajectories were outlined, as well as plans on how best to operationalise them in terms of personnel and funding. To support this, we also devised a plan for the targeted employment of new early career researchers (ECRs) to support increased data integration in phase II of SapienCE. This meeting also introduced plans for additional ECR-organised activities, that resulted in the establishment of successful ECR Writing Group Meetings that take place at SapienCE headquarters every Friday, which are often followed by game nights.

SapienCE scientists from all affiliated institutions, and particularly our ECRs, had a chance to present the status of their research and their results at our annual Scientific Advisory Committee (SAC) meeting at Norheimsund in October. This was an excellent opportunity to receive constructive feedback from SAC members, who are all distinguished scholars in the fields related to SapienCE research.







## SapienCE LUNCHTIME TALKS

19.01.	Eoghan Reeves	Where archaeology (might) meet analytical geochemistry: new methods and experimental infrastructure in the Biogeochemistry Lab since 2017	Department of Earth Science, University of Bergen
13.03.	Akiko Sawada	Mushroom-eating behaviour by wild Japanese macaques on Yakushima Island	Primate Research Institute, Kyoto University
08.06.	Brenna Henn	Population genetics and relevance to SapienCE research	University of California Davis
28.09.	Kurt Wogau	A brief journey through three Mesoamerican regions and their paleoenvironmental records	SapienCE/SEAS, Department of Earth Science, University of Bergen
18.10.	Christopher Miller	Geoarchaeological and micromorphological research within the framework of SapienCE	University of Tübingen
16.11.	Heidi Gustafson	Living Ochre Practices	Artist
13.12.	Gopesh Jha	Tiny Tale of Terrific Toba: Assessing the environmental impact of the 74 ka Toba super-eruption in South Asia	University of Tübingen

# **SAPIENCE STAFF AND MANAGEMENT**

---

# SAPIENCE LEADER GROUP



Christopher Henshilwood  
Professor  
Director, PI



Carin Andersson Dahl  
Research Professor  
PI



Andrea Bender  
Professor  
PI



Eystein Jansen  
Professor  
Deputy Director, PI



Žarko Tankosić  
LG Secretary



Karen van Niekerk  
Senior Researcher  
PI



Sarah Wurz  
Professor  
Senior Scientist



Francesco d'Errico  
Professor  
Senior Scientist

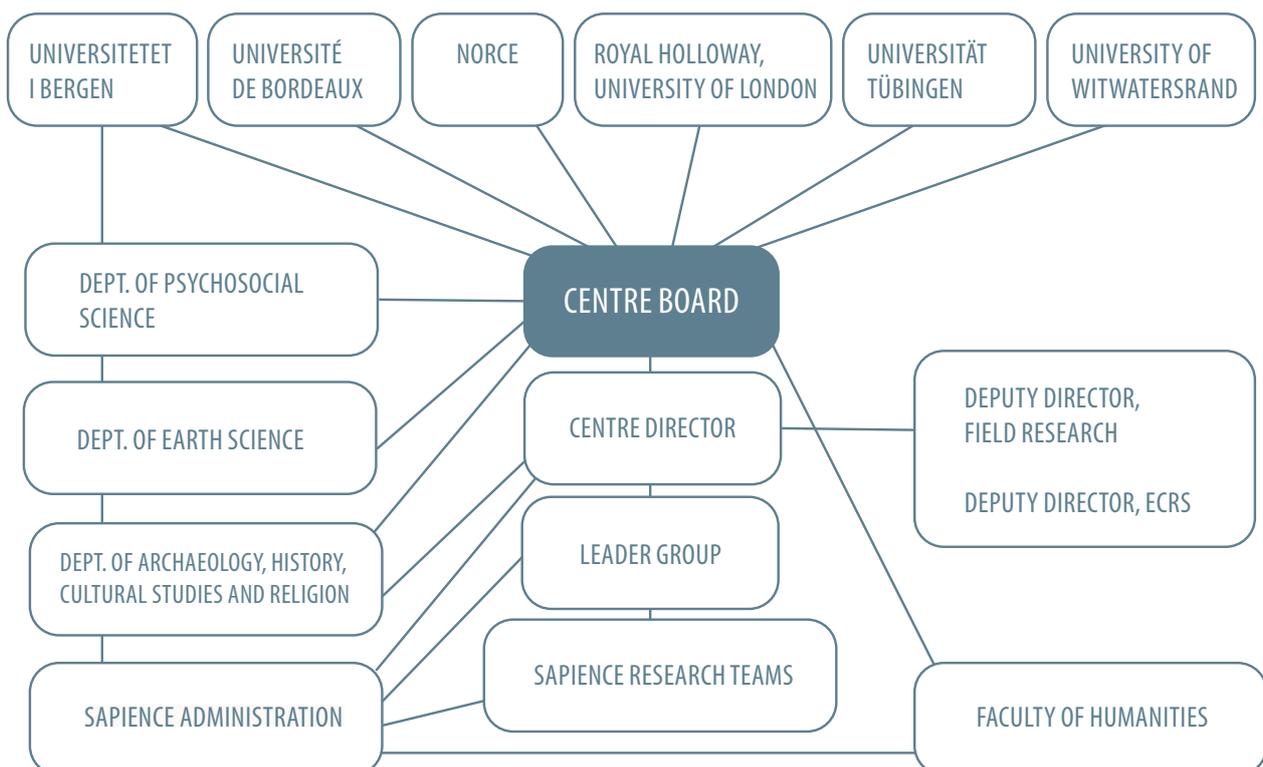


Christopher Miller  
Professor  
Senior Scientist



Simon Armitage  
Professor  
PI

# CENTRE STRUCTURE



# PIs AND RESEARCHERS AT SAPIENCE

Christopher Stuart Henshilwood	PI, Professor, SapienCE Director  Distinguished Professor	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen Evolutionary Studies Institute University of the Witwatersrand Johannesburg, South Africa
Eystein Jansen	PI, Professor	Department of Earth Science, University of Bergen
Karen van Niekerk	PI, Senior Researcher, SapienCE Deputy Co-Director	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Andrea Bender	PI, Professor	Department of Psychosocial Science, University of Bergen
Simon Armitage	PI, Professor, SapienCE Deputy Co-Director	Centre for Quaternary Research, Department of Geography, Royal Holloway University of London
Carin Andersson Dahl	PI, Research Professor	NORCE Norwegian Research Centre Division of Climate & Environment
Francesco d'Errico	Directeur de recherche de classe exceptionnelle  Professor II	CNRS Université de Bordeaux  Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Christopher Miller	Professor  Professor II	Institute for Archaeological Sciences, University of Tübingen Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Sarah Wurz	Professor  Professor II	School of Geography, Archaeology and Environmental Studies, University of Witwatersrand Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Torill Christine Lindstrøm	Professor Emerita	Department of Psychosocial Science, University of Bergen
Anna Nele Meckler	Professor	Department of Earth Science, University of Bergen
Margit Hildegard Simon	Researcher II	NORCE Norwegian Research Centre, Division of Climate and Environment
Zhongshi Zhang	Researcher II	NORCE Norwegian Research Centre Division of Climate & Environment
Odd Helge Otterå	Researcher II	NORCE Norwegian Research Centre Division of Climate & Environment
Amandine Tisserand	Senior Engineer.	NORCE Norwegian Research Centre Division of Climate & Environment
Stefan Pieter Sobolowski	Research professor	NORCE Norwegian Research Centre Division of Climate & Environment

Dag Inge Blindheim	Chief Engineer	NORCE Norwegian Research Centre Division of Climate & Environment
Katerina Harvati	Professor, Director Palaeanthropology  Professor II	Eberhard-Karls-Universität Tübingen Senckenberg Centre for Human Evolution and Palaeoenvironment Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Eoghan Reeves	Associate Professor	Department of Earth Science, University of Bergen
Katharina Wolff	Professor	Department of Psychosocial Science, University of Bergen
Jenny Maccali	Researcher	Department of Earth Science, University of Bergen
Larissa Mendoza Straffon	Researcher	Department of Psychosocial Science, University of Bergen
Ozan Mert Göktürk	Researcher II	NORCE Norwegian Research Centre, Division of Climate and Environment

### SapienCE Postdoctoral Research Fellows 2023

Turid Hillestad Nel	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Magnus Mathisen Haaland	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Katrina Nilsson-Kerr	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Elizabeth Velliky	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Kurt Heinrich Wogau Chong	Department of Earth Sciences, University of Bergen, SEAS
Asia Alsgaard	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Aliki Papa	Department of Psychosocial Science, University of Bergen
Ella Walsh	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen

### Doctoral Fellows (Ph.D. candidates) 2023

Ole Fredrik Unhammer	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Karl Purcell	Department of Earth Science, University of Bergen
Jovana Milić	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Zahra Haghighi	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen
Heidi Øhrn	Department of Psychosocial Science, University of Bergen
Jasmin Culey	Department of Archaeology, History, Cultural Studies and Religion, University of Bergen

# SAPIENCE ADMINISTRATION

The organisation, management and administration of SapienCE is regulated through the "Guidelines for Centre of Excellence (SFF-IV) at the University of Bergen". The guidelines are based on the requirements and guidelines of the Research Council of Norway, and were adopted by the University Board on 24 August 2017.

The guidelines state that SapienCE is led by a centre Director responsible for all activity at the centre and who reports to the board. The centre has a Leader Group consisting of the centre director, vice director and research directors (PIs). The Leader Group shall participate in the preparations of the items to be discussed by the Board. In addition, SapienCE has a Scientific Advisory Committee to support the centre by providing input on the centre's scientific strategy and challenges throughout the project period. The centre has an Administrative Leader who shall assist the centre Director in the day-to-day operations of the centre, serve as secretary to the Leader Group and be the liaison to other administrative personnel and partners. Additional administrative resources shall possess expertise to meet the needs of the centre; infrastructure, finance, HR, research administration and advisory services, administration of doctoral education, information dissemination and communication. The administrative resources are partly funded by the Research Council of Norway and partly by the University of Bergen.

The resources are organised so that the centre's administration, beyond the position of Administrative Leader, shall be an integral part of the ordinary administration. This ensures administrative expertise at the department and faculty levels, and ordinary guidelines and procedures are followed as in the regular university units. Thus, administrative support is provided for their respective employees by all the SapienCE partners, which either contribute with in-kind funding or receive dedicated grants from the centre. The employer's liability follows the employment, and the local administrations are responsible for HR related and ordinary financial matters.

## Personnel involved in SapienCE administration in 2023

Žarko Tankosić	Administrative leader
Janne-Beate Buanes Duke	Adviser, Media and communication
Mari Knudsen	Adviser, Finance and accounting
Marit Matthiessen	Senior executive officer, Web and laboratory support
Magnus Halsnes	Adviser, Doctoral education and research administration
Anna Lisa Arefjord	Adviser, HR
Grethe Bruvoll	Higher Executive Officer, Front Desk and expedition
Björg Anja Teigland	Senior Executive Officer

## Faculty of Humanities

Asbjørn Sæther	Adviser, HR
Kirsten Moen	Senior Adviser, Research

## SapienCE administrators, curation and field support in Cape Town, South Africa

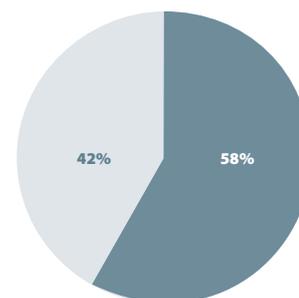
Samantha Mienies	Curator/Collections Manager Evolutionary Studies Institute, University of the Witwatersrand
Lisa Hulett	Assistant Evolutionary Studies Institute, University of the Witwatersrand

# SAPIENCE FUNDING IN 2017-2023

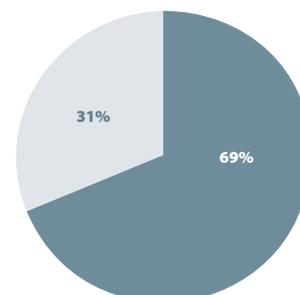
<b>SapienCE Funds 2017-2023 (*1000 NOK)</b>							
<b>Source</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Own financing (Host Institution)	1 630	7 640	9 450	12 567	10 142	10 002	5122
Agreed in-kind plus additional estimated in kind (Partner Institutions)	248	1 275	1 109	662	683	599	286
RCN contribution	0	11 725	9 607	11 641	18 962	12 771	18974
Additional project funds (University of the Witwatersrand, South Africa; HUMEVAL, Norway)	0	2 880	3 316	2 852	14 550	27 627	24489
<b>TOTAL FUNDING OF CENTRE ACTIVITY</b>	<b>1 878</b>	<b>23 656</b>	<b>23 483</b>	<b>27 946</b>	<b>44 337</b>	<b>50 999</b>	<b>48871</b>

# DISTRIBUTION OF GENDER IN SCIENTIFIC POSITIONS AT SAPIENCE

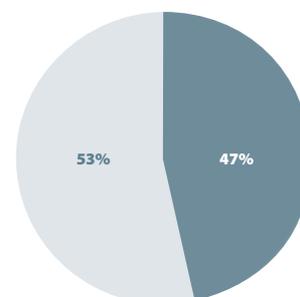
All scientific positions		
	Number of	% number of
Women	18	58
Men	13	42
Total	31	100



Early career researchers		
	Number of	% number of
Men	5	31
Total	16	100

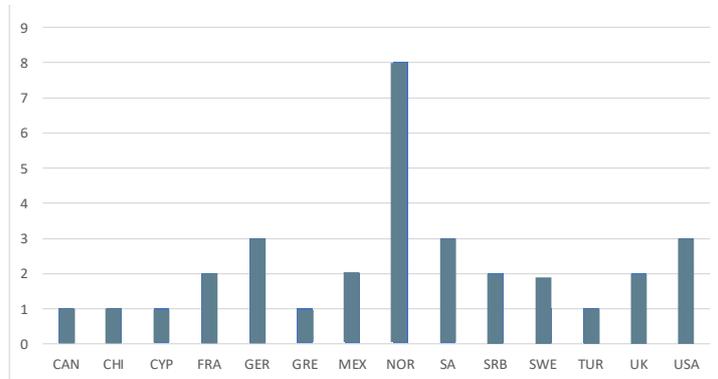


Senior scientific positions		
	Number of	% number of
Women	7	47
Men	8	53
Total	15	100

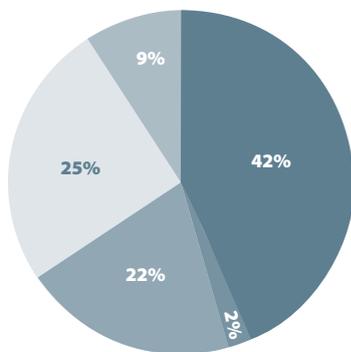


■ Female ■ Male

SapienCE researchers by nationality

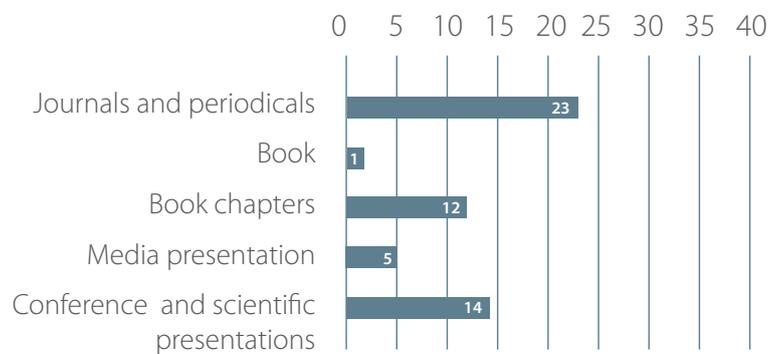


SCIENTIFIC AND ACADEMIC OUTPUTS



- Journals and periodicals: **23**
- Book: **1**
- Book chapters: **12**
- Media presentation: **5**
- Conference and scientific presentations: **14**

SapienCE scientific OUTPUTS 2023



Self-reported by October 2023

## SELECTED PUBLICATIONS 2023

Boone, J.L. and Alsgaard, A. (2023) Surf & Turf: The role of intensification and surplus production in the development of social complexity in coastal vs terrestrial habitats. *Journal of Anthropological Archaeology* 73.

D'Errico, F., van Niekerk, K.L., Geis, L., Henshilwood, C.S. (2023) New Blombos Cave evidence supports a multistep evolutionary scenario for the culturalization of the human body. *Journal of Human Evolution* 184.

Göktürk O.M., Simon M.H., Sobolowski S.P., Zhang Z., Van Der Bilt W., Mørkved P.T., D'Andrea W.J., van Niekerk K.L., Henshilwood C.S., Armitage, S.J., Jansen E. (2023) Behaviourally modern humans in coastal southern Africa experienced an increasingly continental climate during the transition from Marine Isotope Stage 5 to 4. *Frontiers in Earth Science* 1, PLOS ONE.

Göktürk, O.M., Sobolowski, S., Simon, M., Zhang, Z., Jansen, E. (2023) Sensitivity of coastal southern African climate to changes in coastline position and associated land extent over the last glacial. *Quaternary Science Reviews*, 300.

Maccali, J., Meckler, A.N., Lauritzen, S-E, Brekken, T., Rokkan, H.A., Fernandez, A., Krüger, Y., Adigun, J., Affolter, S., Leuenberger, M. (2023) Multi-proxy speleothem-based reconstruction of mid-MIS 3 climate in South Africa. *Climate of the Past*, 19 (9).

Mendoza Straffon, L., Papa, A., Øhrn, H., Bender, A. (2023) The different paths to cultural convergence. *Behavioural and Brain Sciences*, 46.

Morrissey, P., Wurz, S., Mentzer, S. (2023) The stratigraphy and formation of Middle Stone Age deposits in Cave 1B, Klasies River Main site, South Africa, with implications for the age and cultural association of the KRM 41815/SAM-AP 6222 human mandible. *Journal of Human Evolution*, 183, 103414.

Nel, T.H., Peters, C., Korzow Richter, K., Henshilwood, C., van Niekerk, K., Douka, K. (2023) Peptide mass fingerprinting as a tool to assess micromammal biodiversity in Pleistocene South Africa: The case of Klipdrift Shelter. *Quaternary Science Reviews*, 322.

Papa, A., & Bender, A. (2023). Mushrooms as 'food for thought': Cognitive science perspectives on fungi. In M. Goldwater et al. (Eds.), *Proceedings of the 45th Annual Conference of the Cognitive Science Society* (pp. 36-37). [<https://escholarship.org/uc/item/4014047c>]

Pelland, J.C., S. Greenhill, O. Parkinson-Coombs, O., and L.M. Straffon (2023) Methodological issues in the cross-disciplinary study of numerical cognition. *Proceedings of the Annual Meeting of the Cognitive Science Society* 45, 45.

Rosso, D.E., Martine Regert, M., d'Errico, F. (2023) First identification of an evolving Middle Stone Age ochre culture at Porc-Epic Cave, Ethiopia. *Scientific Reports*, DOI: 10.1038/s41598-023-39957-y

Wojcieszak, M., Backwell, L., d'Errico, F. and Wadley, L.. (2023) Evidence for large land snail cooking and consumption at Border Cave c. 170–70 ka ago. Implications for the evolution of human diet and social behaviour. *Quaternary Science Reviews*, 306, p.108030.

## SOCIAL MEDIA

The decision from 2022 to organise a separate SapienCE social media (SoMe) and outreach team started paying off massive dividends in 2023, with positive impact on the centre's SoMe exposure and outreach activities.

This is best seen in the social media statistics. On Facebook, our audience and especially engagements have been massively improved in 2023 in comparison to 2022, including a 93% increase in new Facebook page likes, 252% increase in page visits, and an overall 91% increase in our Facebook page reach.

Predictably, most of our audience comes from Norway and South Africa, with UK, US, and Greece trailing behind. Most of our followers are of the professionally active age (25-55) and we are very happy to see that the majority of them are women.

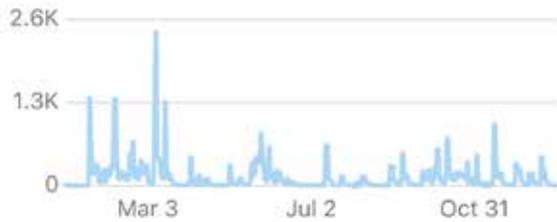
Sadly, we were unable to acquire reliable X (former Twitter statistics) for 2023, but we can see a 43% increase in the number of followers between January 2023 and January 2024 (i.e. from 737 to 1059 followers). Particularly well liked and shared were our X posts regarding new ECR positions at SapienCE.

Since 2023, SapienCE has also been indirectly present on TikTok through posts of our postdoc Asia Alsgaard, which are often based on the work she does in relation to SapienCE and its research.



Facebook Page Reach:

**18.4K** +91,3%



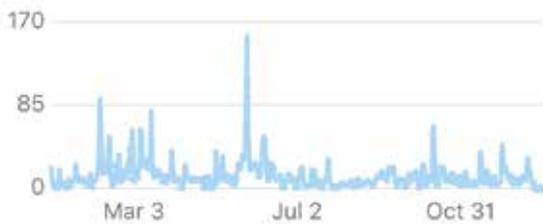
Facebook Page Likes:

**83** +93%



Facebook Page Visits:

**4,8K** +252%

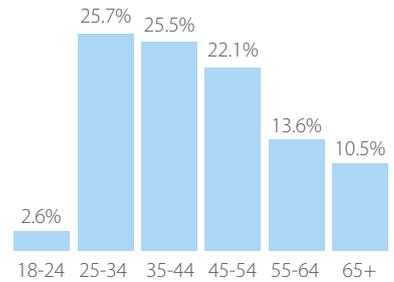


Facebook Followers:

**876**

Women 53%

Men 46%



Of course, we have a Facebook page! We post news, events and papers here, but there are big differences between the interests of our Twitter and Facebook followers. Follow our Facebook page for future announcements of grants and vacancies. Scan the QR code and reflect on the fact that, like our SapienceCE archaeologists, you're interested in yesterday's cutting-edge technology.



Join us on X! Be the first to receive interesting news and information about SapienceCE events in Norway and South Africa. Links to new publications and events are regularly posted to Twitter. Scan the QR code to stay up to date.



**EDITOR-IN-CHIEF:**

Žarko Tankosić

**EDITORIAL COMMITTEE**

Asia Alsgaard  
Simon Armitage  
Carin Andersson Dahl  
Andrea Bender  
Janne-Beate Buanes Duke  
Ozan Göktürk  
Jenny Maccali

**DESIGN & LAYOUT**

Renate Paulsen

**CONTRIBUTORS**

Bjørn Terje Bøe  
Jasmin Culey  
Carin Andersson Dahl  
Asia Alsgaard  
Simon Armitage  
Andrea Bender  
Camilla Brautaset  
Janne-Beate Buanes Duke  
Francesco d'Errico  
Craig Foster  
Ozan Göktürk  
Christopher Henshilwood  
Kenneth Hugdahl  
Mari Knudsen  
Torill Christine Lindstrøm  
Jenny Maccali  
Nele Meckler  
Christopher Miller  
Katrina Nilsson-Kerr  
Aliko Papa  
Margit Hildegard Simon  
Larissa Mendoza Straffon  
Žarko Tankosić  
Karen van Niekerk  
Elizabeth Velliky  
Ella Walsh  
Kurt Wogau  
Sarah Wurz  
Heidi Øhrn

**PEOPLE IN PHOTOS**

Asia Alsgaard p. 10, 41, 42, 45  
Simon Armitage p. 13, 30, 42, 51, 52  
Marit Kjeksrud Amundsen p.42  
Andrea Bender p. 14  
Camilla Brautaset p.2  
Jasmin Culey p. 37, 41, 42, 50, 52  
Francesco d'Errico p. 37, 42, 51  
Steve du Toit p. 41  
Craig Foster p. 47, 49  
Ozan Mert Göktürk p. 42  
Margaret Hagen p. 43  
Zahra Haghghi p. 53  
Eli Kristine Økland Hausken p. 42

Christopher Henshilwood p. 4, 41, 42, 43, 53  
Eystein Jansen p. 51  
Åshild Stuen Jensen p. 10, 41  
Petro Keene p. 49  
Peter Kjærgaard p. 51  
Dolores Kotze p. 42, 43  
Torill Christine Lindstrøm p. 42, 51  
Jenny Maccali p. 13, 30, 41, 42, 51  
Christopher Miller p. 42, 51  
Karen Van Niekerk p. 10, 42, 51, 53  
Katrina Nilsson-Kerr p. 38, 51  
Aliko Papa p. 14, 24, 42, 50, 53  
Alexandra Pearson p. 10, 41  
Jean-Charles Pelland p. 14  
Karl Purcell p. 42  
Akiko Sawada p. 14  
Margit Hildegard Simon p. 35  
Larissa Mendoza Straffon, p. 14, 23, 42, 51, 53  
Žarko Tankosić p. 30, 41, 42, 43, 45,  
Åshild Sunde Feyling Thorsen p. 41, 42  
Lillian Time p. 10, 41  
Maarten van den Eynde p. 13, 30, 41  
Elizabeth Velliky p. 42  
Ella Walsh p. 36  
Kurt Wogau p. 39, 53  
Sarah Wurz p. 42, 51  
Heidi Øhrn p. 41, 42, 51

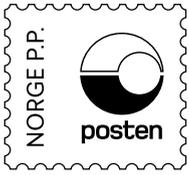
**PHOTO CREDITS**

Bjørn T. Bøe  
Francesco d'Errico  
Craig Foster  
Kenneth Hugdahl  
Torill Christine Lindstrøm  
Christopher Miller  
Katrina Nilsson-Kerr  
Aliko Papa  
Eivind Senneset  
Margit Hildegard Simon  
Sea Change Project  
Žarko Tankosić  
Maarten Vanden Eynde  
UiB  
Elizabeth Velliky  
Ella Walsh  
Kurt Wogau  
Heidi Øhrn  
Andrea Bender

**ILLUSTRATIONS FROM PUBLICATIONS**

p. 19 from D'Errico, F., van Niekerk, K.L., Geis, L., Henshilwood, C.S. (2023) New Blombos Cave evidence supports a multistep evolutionary scenario for the culturalization of the human body. *Journal of Human Evolution* 184.

p. 20-21 from Rosso, D.E., Martine Regert, M., d'Errico, F. (2023) First identification of an evolving Middle Stone Age ochre culture at Porc-Epic Cave, Ethiopia. *Scientific Reports*, DOI: 10.1038/s41598-023-39957-y



Return Address:

Centre for Early Sapiens Behaviour  
Dept. of Archaeology, History,  
Cultural Studies and Religion,  
University of Bergen, Post Box 7805  
N-5020 Bergen  
Norway

