

Society of Africanist Archaeologists (SAfA) 2021 Conference Abstracts

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PLENARY SESSIONS

1. AFRICANISING AFRICAN ARCHAEOLOGY

Panel discussion chaired by Shadreck Chirikure and featuring Wazi Apoh, Per Ditlef Frederiksen, Albino Jopela, Scott MacEachern and Sada Mire.

This plenary panel discussion addresses growing calls for a more explicitly postcolonial archaeology responsive to African systems of knowledge and needs, rather than those inherited solely from the Western academic tradition or inspired by institutional frameworks that were often set up before independence.

2. AFRICAN ARCHAEOLOGY AS HERITAGE DEVELOPMENT

Panel discussion co-ordinated by Solange Macamo and Chantal Radimilahy and featuring David Gadsby, Kodzo Gavua, Gilbert Pwiti, Tore Saetersdal and Alinah Segobye.

This panel explores some of the key challenges we confront in enhancing its relevance to the needs of contemporary African societies and promoting African voices in its theoretical agendas via a focus on the entanglements of archaeology, heritage and community identities. Topics to be explored include the relationship between infrastructural expansion and development and the protection of Africa's archaeological heritage; the latter's role in economic growth and political movements within the continent and in constructing or challenging senses of identity at multiple spatial scales; the potential of — and challenges for — tourism to archaeological sites and museums as a contributor to sustainable development; and initiatives (especially those promoting intra-African co-operation) that facilitate the long-term conservation of cultural resources.

3. ARCHAEOLOGY AS LONG-TERM ANTHROPOLOGY

Panel discussion co-ordinated by Ann Stahl and Ibrahima Thiaw and featuring Noémie Arazi, Shadreck Chirikure, Kathryn de Luna, Kevin MacDonald and Morongwa Mosothwane.

Key topics in this discussion include archaeology's role in constructing regional histories across Africa and its successes and failures in engaging with complex local narratives and their concerns, contestations and aspirations; recent developments (theoretical and methodological) in the sphere of community archaeology and its relationship to broader developments in public archaeology and Indigenous archaeology; how archaeologists (should) use oral histories; archaeology's role in interrogating, questioning or upholding established community identities; and the roles of museums and material objects in helping to build, recover or challenge community histories.

4. ARCHAEOLOGY, CLIMATE CHANGE AND SOCIETAL RESILIENCE

Panel discussion co-ordinated by Kristina Douglass and Emuobosa Orijemie and featuring Matt Davies, Chap Kusimba, Innocent Pikirayi, and Patrick Roberts.

Key topics in this panel include archaeology's potential for identifying future changes in climate and in mitigating their impact; the place of contemporary debates about climate change within the longer-term perspectives of climate change provided by archaeological research; the threats that climate change may pose to the future of African heritage resources; whether archaeologists can/should contribute to broader societal debates about climate change; and how far — if at all — the current climate emergency should encourage changes in how archaeology is practised, thought about and taught.

Plenary Panel Participants

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RESEARCH SESSIONS

1. MADAGASCAR AND THE SOUTHWESTERN INDIAN OCEAN

(Zoe CROSSLAND and Chantal RADIMALAHY)

18th – 19th August 2021, 13.00 – 16.00 BST

This session provides an opportunity to gather researchers working on the archaeology of Madagascar to present and discuss research from across the island. Madagascar has recently attracted more attention from scholars as interest has grown in its connections across the Indian Ocean and the Mozambique Channel. Given the island's enormous size, researchers working in disparate areas rarely have the chance to meet each other to learn about and discuss recent developments. This session therefore deliberately includes researchers working in different regions of the island, both those who have worked there for decades and those who have more recently initiated projects with the aim of sharing results and in the hope of building a framework for future study and collaboration.

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Reconstructing the Holocene savannas of Madagascar: implications for long-term disturbance dynamics and modern human land use

Contrasting human and large mammal histories between Africa and Madagascar provide a unique point of comparison for investigating the long-term influence of anthropogenic land use on grassy biome development. Vegetation reconstructions from the past 20,000 years demonstrate non-linear responses of forest and grassy biomes to climate change, raising questions about Holocene anthropogenic disturbance. Here, we outline our collaborative research program, using a cross-disciplinary approach to develop new understanding of grassy biome change. We do this by: (1) compiling existing records on Holocene land use and land cover change; (2) investigating relationships between stable isotopes, human land use and floral composition at forest-savanna boundaries; and (3) using remotely sensed fire data to quantify Malagasy fire regimes and their drivers relative to similar climatic spaces worldwide. We detail our progress and preliminary findings in the context of existing African land use and land cover reconstructions and invite relevant opportunities for collaboration.

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The past spread of pastoralism and extinction of Madagascar's endemic megafauna

Early estimates of human arrival on Madagascar (~10,000 years ago) coupled with much later megafaunal extinctions (~2000-500 years ago) suggest that a late shift from foraging/hunting to farming/pastoralism contributed to these extinctions. We evaluate the potential for apparent

competition between introduced bovids (i.e. cows and sheep/goats) and endemic megafauna (e.g. pygmy hippopotamuses and giant tortoises) in southwest Madagascar using radiocarbon and stable carbon and nitrogen isotope data from the bone collagen of these animals. We present data from specimens housed in museums and from specimens recently excavated at archaeological/palaeontological sites near Tampolove, southwest Madagascar. Radiocarbon dates confirm that introduced and endemic herbivores overlapped chronologically in this region between at least 800 and 1000 calendar years before present. Moreover, stable isotope data suggest that sheep/goats, tortoises and hippopotami had broadly similar diets and exploited similar habitats. These data thus support the potential for past apparent competition between introduced and endemic herbivores.

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Early foragers in Madagascar

Traditional scholarship has held that the first successful human settlement of Madagascar after AD 500 was by mariners from Southeast Asia speaking an Austronesian language bringing with them iron technology, ceramics, domesticated plants and animals and many other cultural features. Subsequent further contacts with Africa, South and East Asia, the Middle East and Europe further enriched the development of Malagasy culture. This position has been called into question by the dating of apparently cut mammal bones from southwestern Madagascar to about AD 100 in 1993, the discovery of a stone tool assemblage in the far north of the island in 2007 and the dating of another stone tools assemblage to older than 2300 BC in the same area in 2012. These studies have been fiercely criticised. This paper summarises the state of knowledge and present unpublished information from excavations in 2012 and other more recent studies.

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Remote sensing and spatial analysis reveal coastal settlement strategies in southwest Madagascar

Large tracts of Madagascar's vast landmass remain archaeologically unexplored. Foraging sites, in particular, are under-represented in the current literature as they are often materially ephemeral and difficult to locate. Innovative approaches are needed to identify new sites and improve our understanding of the island's early human history. Here, we develop a predictive remote sensing algorithm based on population ecology frameworks to detect such cultural deposits in southwest Madagascar. Using this information, we conduct point-pattern analyses

to gauge the importance of environmental and social contexts for settlement patterns in southwest Madagascar since the Late Holocene. Our results indicate that palaeodunes and vegetative productivity are good predictors for archaeological deposits, suggesting a strong relationship with certain terrestrial species such as elephant birds of the ratite genera *Aepyornis* and *Mullerornis*. There are also strong connections with marine resources, such as corals and offshore islands, which extend fishing grounds and provide safe havens during periods of political instability.

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Decision-making in the face of climate variability and intergroup conflicts, sixteenth to nineteenth centuries, southwest Madagascar

This presentation establishes a narrative of why riverine communities preferred to occupy specific parts of a valley over others in the face of unpredictable climate and intergroup conflicts during the sixteenth to nineteenth centuries AD in southwest Madagascar. Using human niche construction theory, I investigated this issue at different scales, including spatial, temporal, and organisational scales. I used GIS-based approaches to explore settlement patterns and land uses at spatial scales. I also employed the archaeological approach to scrutinise the cumulative effects of human-environment interactions at temporal scales. Finally, I used the ethnohistorical approach to analyse and interpret decision-making at an organisational scale. I drew on settlement patterns, intrasite layout, features, ceramics, faunal remains and ethnohistorical data to answer my research question. The results demonstrated the importance of integrating functionalistic and interpretive approaches in the study of human niche construction theory.

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Adorning localities: an investigation of shell beads in Holocene southwest Madagascar

In African and Indo-Pacific contexts, beads play a significant role in the maintenance of social and economic networks across long distances. In modern continental African contexts, these networks are argued to represent delayed reciprocity, with beads acting as a currency to secure the relationship between distant gifting partners. However, archaeological studies have tended to focus on the oldest contexts, colonisation era glass beads and imports. As such, locally produced mid-late Holocene shell beads have received less attention. This project represents the first look at an assemblage of whole shell and disc beads from 12 sites along the southwest coast of Madagascar. As such, it seeks to understand: 1) which shells were used to make beads, 2) from which ecologies shells were harvested; and 3) how beads were made and used. The paper approaches these questions using a *chaîne opératoire* framework to reconstruct the process of transforming a mollusc into jewellery.

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Recent fieldwork in northeastern Madagascar: new evidence for settlement pattern and resource exploitation

In the framework of the Swiss-Malagasy project “Metals, Stones and Pots by the Rasikajy”, three fieldwork campaigns were organised in the northeastern part of Madagascar focusing on the archaeological remains left by the exploitation of mineral resources before the arrival of Europeans. About 100 iron smelting slag heaps were located in the coastal area between Vohémar and Antalaha and were active from the eleventh to fourteenth centuries AD. About 30 quarries for the production of carved stone vases were located in the hinterland, sometimes quite far from the coast. Chlorite schist artefacts are identified in layers dated from the eighth to fifteenth centuries. During our survey, numerous settlements sites were also observed. The paper presents the new data and discusses the settlement pattern of the area.

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Excavating a medieval softstone quarry in northeast Madagascar: results from Bobalila

Lathe-turned softstone vessels are frequent finds in eighth- to fifteenth-century AD assemblages in northern Madagascar, the Comoros and even some East African port contexts. The raw material for these vessels, widely called chlorite schist, has been quarried in the crystalline hinterland of Madagascar, as was shown over a century ago by early authors. However, none of these remarkable sites has ever been studied in detail and little is known about the timing, organisation or workflow of these quarries. The quarry of Bobalila, located 50 km north of Vohémar, is mostly known for a spectacular block with around 20 cylinders carved into its surface, giving the impression that it was abandoned mid-operation. Our excavations allowed valuable insights into the operational chain employed, while radiocarbon dating produced a thirteenth-century AD date and suggested an operating time of approximately 100 years.

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The Rasikajy iron metallurgy chaîne opératoire in northeastern Madagascar through the example of the Amboronala site

La chaîne opératoire de la métallurgie du fer Rasikajy dans le Nord-Est de Madagascar à travers l'exemple du site d'Amboronala

As part of the “Metals, Stone and Pot among the Rasikajy” project, three prospecting and excavation campaigns were carried out between 2017 and 2019. About a hundred iron slag

heaps were located along the coast between Vohémar and Antalaha. Radiocarbon dating show that this production took place between the eleventh and fifteenth centuries. Characteristics of the Rasikajy technical tradition have been established in Amboranala. The study of the site helps to better understand the *chaîne opératoire* used. Lateritic concretions were collected from the surrounding hills and brought back to the site to be crushed on a large stone acting as an anvil. They were then disposed in a furnace with charcoal. The furnace was dug directly into the sand with a superstructure also made of sand. A single tuyère was connected to bellows. No post-reduction work could be identified on this site.

Dans le cadre du projet « Métaux, Pierre et Pot chez les Rasikajy », trois campagnes de prospections et de fouilles ont pu être menées entre 2017 et 2019. Une centaine d'amas de scories de fer ont ainsi été localisés le long de la côte entre Vohémar et Antalaha. Les datations semblent montrer que cette production a eu lieu entre l'onzième et le quinzième siècle. Le site d'Amboranala est caractéristique de la tradition technique des Rasikajy. L'étude du site a permis de comprendre la chaîne opératoire mise en œuvre. Des concrétions latéritiques étaient ramassées dans les collines environnantes et ramenées sur le site pour être concassées sur une large pierre jouant le rôle d'enclume. Elles étaient ensuite disposées dans un fourneau avec du charbon de bois. Le fourneau était creusé directement dans le sable avec une superstructure également construite en sable. Une tuyère unique était reliée à des soufflets. Aucun travail de post-réduction n'a pu être identifié sur ce site.

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Archaeological investigations into Islamisation in northern Madagascar: interpretation of finds from Kingany Site II

Boeni Bay, 50 km west of Mahajanga, contained numerous mid-second millennium urban settlements active in Indian Ocean mercantile networks in north-western Madagascar. Following the fifteenth-century collapse of Mahilaka, oceanic trade prioritisation and the often-associated trend of urbanisation swept southward along the western coast of Madagascar. Kingany emerged at this time. Fieldwork in partnership with the Université d'Antananarivo and the Musée d'Art et d'Archéologie in Antananarivo, Madagascar, in May 2019 was designed to investigate Islamisation at Kingany Site II and the Mozambique Channel at large. Dating of recovered materials reveals habitation from the mid-twelfth century with evidence for Islamisation appearing shortly after. Recovered trade goods demonstrate four centuries of access to long distance trade networks terminating in the late 1400s. Boeni Bay shared in the networks supplying Mahilaka, with connections to East Asia, South East Asia and the Red Sea

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Les céramiques de la côte Est de Madagascar (neuvième-dix-neuvième siècles)

L'étude de la céramique tient un rôle important quant à la connaissance du passé et des communautés humaines anciennes. Dans le cadre du projet « Carrière de pierre et mine de fer

à Madagascar », réalisé de 2017 au 2019, des poteries locales et des céramiques d'importations ont été trouvés sur trois sites étudiés. Ces trois sites se répartissent entre Vohémar et Antalaha et leur occupation s'étend du onzième au quinzième siècles. La céramique locale peut aider à établir la chronologie dans la mise en place du peuplement et les céramiques d'importation peuvent traduire les relations avec l'extérieur, notamment dans le cadre du grand commerce médiéval de l'Océan Indien. Elles aident aussi à comprendre l'organisation spatiale sur ces sites. Certaines analyses plus complètes, comme, par exemple, la composition, la provenance de l'argile donneraient certainement des données essentielles. Notre présentation se penchera sur les céramiques des sites archéologiques de la côte est de Madagascar, durant un millénaire, du neuvième au dix-neuvième siècles.

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The decorative patterns of archaeological ceramics

How did the Malagasy of the distant past represent the world and translate it? Considering an aspect of Malagasy art, the often-similar decorative motifs on different materials may have represented symbolic interpretations of the world. Geometric patterns dominate on all decorated materials (rock, clay, wood, fabric, mat, skin, etc.). On archaeological ceramics, we often observe punctiform impressions of triangles and rectangles. Incisions of horizontal lines, sometimes parallel, or vertical lines and curves, are forms that have always been present from very ancient times to the present. The main question is whether the meanings given to these motifs were similar in past human communities in different regions. A detailed study could not only help unlock the chronology of these motifs, but also assess what kind of representations of important symbols of life and the surrounding world are being made.

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Development and environment: a difficult choice. The case of the preservation of archaeological sites in the framework of mining projects in Madagascar

In the 1990s, when a major mining project for the exploitation of nickel was set up in Madagascar, a team of Malagasy archaeologists was commissioned to study the mitigation of the impacts of the project on all sites between the mine and the plant, about 300 km away. To comply with international ethics, the promoters of the project needed environmental and social permits from the Malagasy government beforehand. This obligation covers several areas, among them respect for cultural heritage, including archaeological sites. This contribution aims to show how, starting from a purely industrial project oriented towards the search for profit, archaeologists could take advantage of it in saving cultural sites from destruction but at the same time complete the prospection of new areas. At the end of the fieldwork, the archaeologists succeeded in convincing the mining company to finance the conservation of the sites and the artefacts found.

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Archéologie préventive et paysages sacrés (Moramanga Madagascar)

A Madagascar l'archéologie préventive a pris son essor quand le projet minier pour l'exploitation du nickel et du cobalt de la société Ambatovy s'est engagé dès son implantation en 2005 dans la préservation et la sauvegarde du patrimoine naturel et culturel dans les zones impactées par projet. Les travaux entrepris sont énormes et ont entraîné de grands changements sur l'environnement concerné. Les archéologues sont intervenus le long du tracé du pipeline devant relier la mine d'Ambatovy de Moramanga pour le drainage des matières premières à l'usine de transformation implantée à Toamasina. Ils ont remis au jour des sites archéologiques d'implantation humaine mais surtout ont dégagé de lieux de culte, de pierres érigées, d'étangs sacrés et de sépultures anciennes qui sont les signes distinctifs de paysages sacrés qu'il faut sauvegarder pour préserver l'identité des groupes de population implantés dans la région.

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The Sacred Rice Project: archaeology of rice cultivation in Highland Madagascar

Rice is the main dietary staple in Madagascar and is also understood as sacred and life-sustaining. Rice cultivation and irrigation played an important role in the claims to sovereignty by historic kings in the highlands. However, little is known of how rice was introduced to the highlands, its impact on the landscape and changing role in social and political life over the course of the second millennium. This paper outlines the Sacred Rice Archaeological Project and describes the work done so far and our goals for future research. It also acts as an introduction to other papers in the session that present the results of different aspects of the project (notably, archaeobotanical, soils and faunal research).

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Recovering rice: field methods at Ambohidahy, Madagascar

The Sacred Rice Project seeks to connect the history of rice agriculture, politics and the relationship between people and their ancestors in highland Madagascar. During excavations in 2018 at the fifteenth-century site of Ambohidahy, we sought macrobotanical evidence of rice use in domestic contexts. Specimens of carbonised rice were successfully retrieved using a variety of methods, including dry screening through coarse (4 mm) and fine (1 mm) mesh sediment screens, a hand pump flotation tank and bucket flotation (0.25 mm light fraction). We compare recovery rates among the different field methods, hoping to maximise rice recovery as the project goes forward. Comparing these samples, we discuss the efficacy and efficiency of recovery methods across contexts and sediment types, allowing a discussion of diverse yet standardised methods. We make recommendations for field methods that can be easily adopted by future researchers in Madagascar, particularly by Malagasy colleagues.

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A morphometric analysis of fifteenth-century, carbonised rice from highland Madagascar

This paper presents the results of morphometric analysis of rice grains from the fifteenth-century site of Ambohidahy in Madagascar's central highlands. Rice was probably introduced to highland Madagascar in the early second millennium AD, but its history is not well understood. Koji Tanaka has shown that Malagasy highland rice varieties can be distinguished morphometrically. Morphometric studies undertaken elsewhere have worked to establish a method of differentiating between rice subspecies using the length/width ratios of laboratory-carbonised grains. This paper is the first to test the effectiveness of subspecies identification of ancient carbonised rice in Madagascar by comparison with these carbonisation experiments, providing an opportunity for further refinement of this technique. Discrimination of different varieties of rice will allow better understanding of when and how different strains were introduced into the highlands, with implications for farming techniques and the question of on-island hybridisation, recently identified through genetic study.

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The body of the cow: navigating highland food practices through animal bones in highland Madagascar

Local oral history in the highlands of Madagascar seems to recall a moment in which the relationship between people and cattle was reconfigured and new forms of social relation were imagined using cattle as a foundation. This project investigates how the body of the cow may have mapped out social, political and economic relations at Ambohidahy, a fifteenth-century highland site. Cattle clearly had a great importance beyond their meat alone, not simply for the raw materials they offered for artisans, or for their uses as working animals used for traction or to prepare the rice fields for sowing, but also as a key conceptual resource through which relationships could be made visible and acted upon. This project uses fine-scale examinations of skeletal element representation and butchery to trace these potential relations and interactions archaeologically through the distribution of the slaughtered cattle present on the site.

2. EARLY HOLOCENE PALAEOCLIMATE AND HUMAN ADAPTATIONS IN AFRICA: THE CURRENT STATE OF RESEARCH

(Amanuel BEYIN)

21st August, 13.00 – 17:20 BST

The early Holocene (*c.* 12,000–6000 years ago) was a period of remarkable ecological and cultural change globally. Emerging palaeoclimatic studies demonstrate multiple climatic swings between humid episodes and dry spells throughout this period. These climatic shifts are known to have stimulated novel cultural developments and human territorial expansion. Among other things, current research by Africanist archaeologists into this period seeks to elucidate how African foragers modified their adaptive behaviours in response to the prevailing environmental changes and how the cultural novelties that appeared during it may have contributed to the onset of food production and social complexity. With these overarching questions in mind, this session brings together archaeologists and geo-scientists whose research is contributing new archaeological, chronological and palaeoclimatic datasets, as well as new theoretical insights, to our understanding of early Holocene climatic conditions and human adaptations across all regions of Africa.

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Early Holocene human adaptations and pottery production in Jebel Sabaloka (Sixth Nile Cataract, central Sudan)

Early Holocene human occupation in the western part of Jebel Sabaloka, upstream of the Sixth Nile Cataract, is now recorded from the mid-eleventh millennium cal. BP and is associated with the Early Khartoum complex, anticipating early Holocene human settlement in central Sudan as early as that in northern Sudan. While various terminal Pleistocene cultural units exist in northern Sudan and have thus been considered as the forebears of early Holocene adaptations, no terminal Pleistocene sites have previously been recorded in central Sudan. The assumption that early Holocene human occupations derives from previous ones therefore needs to be revised and a contemporary human territorial expansion across Sudan must be supposed. Among novel cultural developments, systematic pottery production is a conspicuous artefactual marker and Jebel Sabaloka provides ample evidence of its local manufacture. The site of Sphinx, the focus of this paper, provides a consistent Early Khartoum record dated to from the mid-eleventh to the end of the eighth millennia cal. BP.

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Early Holocene human occupation in the Sabaloka Mountains (Sixth Nile Cataract, central Sudan)

A new series of AMS radiocarbon dates on sites in the western part of the Sabaloka Mountains (Jebel Sabaloka) at the Sixth Nile Cataract on ostrich eggshell and human and herbivore tooth enamel are concordant with previous dates on charcoal. These dates show that the earliest Mesolithic occupations in central Sudan began around 10,600 cal. BP. Dates from Jebel Sabaloka also show that occupation by Early Khartoum foragers continued up to 7000 cal. BP. These nearly four millennia are represented by a large number of densely distributed sites, many of which feature evidence of intensive resource exploitation, local artefact production and millennia-long continuity in occupation. Two early Holocene sites contain very large cemeteries of hunter-gatherers and human burials have also been identified in other locations. These latest results and their implications for the early Holocene occupation of the eastern Sahel are evaluated in this paper.

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Early and mid-Holocene human adaptations in the Nile Valley of central Sudan: a report from Sabaloka East

Since 2013, archaeological research in Sabaloka East, an area north of the Sixth Cataract of the Nile in central Sudan, has documented human occupations from the Late Pleistocene to the mid-Holocene. A survey of the area and a limited excavation of an open-air locality at Sabaloka 07, conducted so far primarily as a student field school, have revealed a potentially rich record of early sedentary hunter-gatherer communities comprising stone artefacts, pottery, fauna and ostrich eggshell beads. This paper reports on new findings in this area from the last two field seasons. It also reports the preliminary results of currently ongoing analyses of human mobility, environment and animal and plant dietary components based on stable isotopic evidence from a limited sample of excavated human remains and discusses them in the context of adaptation and landscape use during the early and mid-Holocene of the Sahel zone of the Nile.

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Human adaptation in the Lake Abhe Basin (Ethiopian Afar) during the Early to Middle Holocene African Humid Period

Research conducted since 2014 in the Lower Awash Valley, northern Lake Abhe Basin, has provided the first Early to Middle Holocene human occupation sequence in the Ethiopian Afar. These Later Stone Age sites cover the African Humid Period from the end of the Younger Dryas arid event (~12.9–11.7 ka) to the Middle Holocene (4.2 ka) during which humid conditions were interrupted by a hyper-arid event (8.2 ka). The correlation of new archaeological and geomorphological data and new radiocarbon dates has provided a high-precision reconstitution of the fluctuating levels of Lake Abhe in association with human occupations. We observe continuity and ruptures in the material culture technocomplexes and resource economies of Early to Middle Holocene human groups and discuss these in relation to changing paleo-shorelines. Finally, we evaluate the effects of Holocene hydro-climatic oscillations on littoral morpho-sedimentary formation processes, site preservation, settlement strategy and subsistence economies at the height of the African Humid Period.

BREAK

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Shifts in subsistence strategies and material culture at the onset of the Holocene in the Ziway-Shale Basin, Main Ethiopian Rift

Research conducted since 2007 in the Ziway-Shala Basin of the Main Ethiopian Rift has revealed a detailed archaeological record for the Late Glacial and several early Holocene occurrences. Test excavations on several sites, and particularly at the Deka Wede 2 locality, have provided us with rich collections of both lithic artefacts and faunal remains which permit the reconstruction of subsistence strategies and lithic productions at the Late Pleistocene-Holocene boundary. The Deka Wede 2 early Holocene occurrences, which coincided with a rise in the water level of the lake basin, indicate an important change in subsistence strategies with the intensive exploitation of fish replacing the hunting of mid-size wild bovids and the emergence of original microlithic tool kits. The sites of Deka Wede 2 give us a rare opportunity to question the impact of environmental changes that took place during the early Holocene in the lacustrine environments of the East African Rift system.

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The big gap: Sodicho Rockshelter and the Early Holocene palaeoenvironment and settlement history of the southwestern Ethiopian highlands

Archaeological sites dating to the Early Holocene are rare in the Horn of Africa. The few known ones seem to represent a phase of re-settlement after the arid phase of the Younger Dryas, which separated the late Pleistocene African Humid Period from Early Holocene conditions. Occupation of lake margins seems to be one way in which humans adapted to the environmental stress associated with the Younger Dryas. Another possibility might have been to retreat to highlands, which are today known for their higher precipitation rates. Questions remain regarding the consequences of these two scenarios. Did, for example, retreat to highland habitats lead to unique adaptations different from those that ensued along shoreline habitats? The southwestern Ethiopian highlands provide an ideal setting in which to examine this question. This paper reviews sedimentological, geochemical and archaeological datasets from the Sodicho Rockshelter where a rare early Holocene human occupation of southwestern Ethiopia has been detected. The Sodicho record provides insights into the interplay of environmental and human settlement dynamics during the early Holocene.

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Human settlement successions and lithic technology in the Kalokol area (Lake Turkana, Kenya) during the African Humid Period

Due to its geographic setting at the nexus of macrohabitats, the Turkana Basin occupies a crucial position for studying human responses to different past climatic scenarios. During the early Holocene (12,000–6000 years ago), Lake Turkana's watershed rose repeatedly, creating a human-supporting lacustrine niche. However, our understanding of the frequency and nature of human adaptation there during this period remains incomplete. This paper presents lithic data and human land-use behaviour derived from two early Holocene sites on the west side of the lake, namely Dilit and Kokito. The spatial and geological contexts of these sites suggest human exploitation of lakeshores near foothills and pre-existing beach strands. Such locations would have afforded their inhabitants access to aquatic and terrestrial resources and to stone raw material. The inhabitants exploited primarily chert, a locally available high quality raw material, and the production of blades and geometric backed microliths characterises the lithic technology.

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The role of non-pollen palynomorphs in palaeoecological research

Non-pollen palynomorphs such as fungal and algal spores, bacteria and microscopic insect parts are usually encountered when analysing pollen slides. Their saprophytic nature is associated with plant hosts in areas of poor pollen preservation. Hence, they can provide additional insights into climate and vegetation shifts within the context of palaeoenvironmental reconstruction and the ecological characteristics of a site. The palynological and human-ecological interaction potentials of non-pollen palynomorphs were tested against pollen data obtained from Ita-Ogbolu, a Later Stone Age rock shelter in southwestern Nigeria. Three distinct phases of

vegetation and cultural changes were noted in the Ita-Ogbolu deposits; they were also accompanied by the paucity and subsequent abundance of non-pollen palynomorphs which indicated an endemism phenomenon or association with specific cultural practices. This non-pollen palynomorph approach offers promising results in archaeopalynology in regions like Nigeria which has been characterized by poor pollen counts, preservation and diversity.

BREAK

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Reconstructing Early Holocene environments in northern Malawi with herbivore tooth stable isotopes

Environmental shifts at the onset and throughout the Holocene likely influenced forager subsistence, settlement and socio-territorial organisation strategies. Behavioural ecological models predict the size of foragers' social networks and defended versus open territories based on abundance and spatiotemporal distribution of food resources. These models predict large open territories during arid periods and small defended territories during humid periods. Evidence from Lake Malawi and other cores suggests that the end of the Pleistocene was humid and the Early Holocene cold and dry in east-central Africa, whereas in southern and eastern Africa these periods were arid and humid, respectively. Testing these models requires local terrestrial environmental records. We use herbivore tooth enamel carbon and oxygen isotope evidence from five archaeological sites in the Kasitu Valley and adjacent highlands of northern Malawi to reconstruct seasonal and millennial environmental change and compare it to the record from Lake Malawi.

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Exploring the Later Stone Age at a micro-scale: new high-resolution excavations at Wonderwerk Cave, South Africa

Wonderwerk Cave, located in the Kuruman Hills, is a key locality for understanding the palaeoecology of the South African arid interior. In 2018 we began new excavations of the late Pleistocene and Holocene deposits in Excavation 1, deriving a high-resolution record of microstratigraphic, lithic, faunal and botanical materials. In this paper we describe the results of the first two seasons of excavation, including a new stratigraphic sequence. Previous excavations by Beaumont and Thackeray and suggest that these levels span a period from ~10,000 cal. BP to historic times. We also discuss variation in the density of lithic artefacts,

faunal remains and ostrich eggshell fragments. Finally, we outline our plans for the next three seasons of excavation and material analysis, as well as the role of Wonderwerk within the larger scope of the new Northern Cape Archaeology and Ecology Project (NCAEP).

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Preliminary look at the late Quaternary palaeoenvironments of southern Mozambique: a multi-proxy study of the Lake Nyalonzelwe sediment cores

Understanding the role of climate on the onset of behavioural modernity in anatomically modern humans has never been more vital in the quest to reconstruct our origins. In order to understand the role that climate played in facilitating the development and expression of modern human behaviours, our interdisciplinary research team cored a series of coastal lakes in the Inhambane region of southern Mozambique during the summer of 2019. Here, we present a preliminary palaeoenvironmental reconstruction of two stratigraphically correlated cores from Lake Nyalonzelwe using carbon, nitrogen and hydrogen analyses and aragonite/calcite ratios of fresh and brackish water gastropod species. Together, these data represent the late Quaternary palaeoenvironmental evolution of Lake Nyalonzelwe in Inhambane, Mozambique, and further illuminate the importance of climate (in)stability in the region and its impact on early modern human populations.

3. EARLY STONE AGE TECHNOLOGY AND REGIONALITY

(Rosa MOLL and Carmen MARTIN-RAMOS)

23rd August, 13.00 – 16.00 BST

Early Stone Age (ESA) assemblages are found across the African continent, with archaeological assemblages ranging from 3.3 mya to 300 kya. Recent studies have revealed new sites and technocomplexes, as well as emphasising the need for inter-site comparative studies to determine the diversity of the Oldowan and Acheulean technocomplexes. This session brings together archaeologists working across the African continent who are interested in the technological trends of the Early Stone Age to present new and established studies and ideas that will hopefully lead to future collaboration. ESA archaeology is identified in multiple regions and advances in comparative work should begin to cover these questions of regionality. It may also be of interest to investigate and discuss the nature of transitional sites, behaviours and technologies. Exploring current hypotheses and theories will allow co-operation between institutions and researchers and new opportunities and avenues for insight.

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The Oldowan Industry in South Africa: pattern and variation in the Cradle of Humankind

The two most informative South African Oldowan assemblages occur at Sterkfontein and Swartkrans ~2.2 mya, both with geologically associated fossils of *Homo habilis* and *Paranthropus*. Both assemblages are time-averaged. At Sterkfontein, 3513 lithics are well preserved, with size profile data showing that quartz and chert were knapped on-site, but some quartzite was knapped off-site and transported a short distance. Raw material selection was important at Sterkfontein, as a majority of cores have platform angles too steep for further flaking. At Swartkrans, the size profile data for 1849 lithic artefacts show the loss of some material, particularly small flaking debris. Selection for rock quality, shapes and sizes was highly variable, with no indication of transport and very little intensive flaking. Raw materials were sourced more randomly than at Sterkfontein and both bipolar flaking and battering are more prominent. The significance of both patterning and variability is discussed for these earliest southern Oldowan sites.

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Chert exploitation at Olduvai Gorge Bed II: a reanalysis of the MNK Chert Factory Site

Recently the majority of Beds I and II lithic assemblages from Olduvai Gorge, Tanzania, have undergone detailed technological re-analysis, resulting in re-interpretations of a number of sites, increased understanding of hominin technical abilities and the suggested abolishment of typological variants within the Oldowan. This paper presents a technological analysis of the MNK Chert Factory Site and a synchronic comparison of chert exploitation within the wider landscape. Results suggest that hominins in Lower Bed II employed simple yet effective techniques of maximising flake production from a morphologically difficult raw material. Although the MNK Chert Factory Site may have been a source of raw material for the wider Olduvai Basin at times, full reduction sequences were also applied at this site. This re-analysis

challenges previous interpretations of this site acting as a factory where chert cores were initially flaked and transported into the wider landscape.

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Early lithic technology from southern Egypt: three-dimensional representation of the Abu Oda lithic assemblage from the University of Pennsylvania Expedition to Nubia

The site of Abu Oda is an Early Stone Age site lacking bifaces that was discovered and excavated during the ‘University of Pennsylvania Expedition to Nubia’ from 1964 to 1965. Here, we show results from a renewed analysis of the Abu Oda lithic assemblage. At first glance, the assemblage presents a variety of different knapping strategies based on complex sequences. Using a combination of three-dimensional analysis and technological descriptions, we test the working hypothesis that this assemblage was produced based on a single set of basic technological principles applied to different raw material volumes in sequences of varying length. We also discuss the usefulness and potential new insights that lithic analysts can gain by combining traditional analytical methods with newer approaches to the quantification and representation of three-dimensional artefact forms.

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Early Acheulean technological trends at Sterkfontein Caves, South Africa

Sterkfontein Caves in the Cradle of Humankind, South Africa, is known for its palaeontological and archaeological remains found in the cave deposits. Archaeologically, assemblages span the period from the Oldowan to the Middle Stone Age, including a large Early Acheulean assemblage of over 700 artefacts. A recent study of the cores has demonstrated a consistent technological reduction process emphasising core edge management while demonstrating little success in exploiting the central volume of the blank. Percussive marks are common and hammerstones were sometimes transformed into core blanks. A larger representation of quartzites in the Acheulean for both large cutting tool and core production resulted in sturdier heavy duty tools, but a decrease in reduction intensity due to the density of the raw material. The preliminary results of the study are presented along with initial interpretations and comparisons of the unique technological behaviours of the Early Acheulean tools and their manufacturers at the site.

BREAK

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Efforts at contextualisation of the Mbulu Plateau assemblages in northern Tanzania

Of late scholars and the University of Dar es Salaam field school have encountered a rich assemblage of artefacts spanning the Acheulean-Later Stone Age continuum in the northern Mbulu Plateau. Several test pits accompanied by reconnaissance surveys have yet to establish the stratigraphic context of the different assemblages. This paper discusses the observations that have been made on the pattern of distribution of the artifacts. Hitherto it seems mind boggling because despite belonging to different industries, artefacts are found intermixed together as surface finds. Examination of edge modification such as rounding that might signal water action has not been fruitful. The Mbulu Plateau can be described as a relatively flat piece of land that lies between the escarpments of Lake Manyara in the east, Lake Eyasi in the west, the Samarary Mountains in the south and the southern foothills of the Ngorongoro Crater highlands.

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The 'tranchet blow technique', a cultural marker of the Late Acheulean at Melka Kunture, Ethiopia?

While morphological analysis still dominates the understanding of the Acheulean, tool shape provides only partial information in terms of cognition and culture. This paper presents the final results of my PhD project, focused on the technological characterisation of the Garba I assemblage, one of the biggest accumulations of handaxes in East Africa. The results of our analysis highlight several important aspects related to the diversity of Acheulean industries, most specifically the stability of the mental templates for bifaces and cleavers. Moreover, the unique identification in the African context of a specific technical procedure (the coup de tranchet), present in the large cutting tools as well as in the small retouched pieces allows us to talk about a cultural marker. This feature, together with small retouched tools and percussive implements, suggests potential links between the Acheulean and Middle Stone Age industries in Ethiopia.

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A synthesis of the Sundays River archaeological sequence, Eastern Cape Province, South Africa

The lower Sundays River Valley is an important palaeolandscape with three newly published sites providing crucial data for understanding the southern African Acheulean and the regional Eastern Cape Earlier Stone Age sequence. These sites are preserved within a complex fluvial landscape that in recent years has been dated through the application of cosmogenic nuclide burial dating, providing a chronological framework for a series of artefact-bearing terrace deposits. This paper provides an historical background to the Stone Age archaeological work carried out in this region and tracks the progress that has been made in recent years in understanding and characterising the Acheulean tradition within this particular near-coastal environment.

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The Later Acheulean of South Africa: a comparative analysis of lithic production strategies between inland versus coastal and near-coastal sites

Acheulean assemblages excavated from the interior region of South Africa have provided significant insights into the variability of lithic manufacturing and thus the extrapolation of hominin behavioural and cognitive patterns that underlie tool use. In contrast, Acheulean sites towards the coastal margins of South Africa have yet to be thoroughly investigated. For this reason, developing a better understanding of the lithic production strategies used in assemblages from coastal and near-coastal sites will provide a new dataset able to provide a new capacity for comparative technological studies with established inland Acheulean sites. This research focuses on identifying and describing the large cutting tool and core reduction strategies and intensities evident at the following coastal, near-coastal and interior sites: Elandsfontein, Montagu Cave, Duinefontein 2, Klasies River, Amanzi Springs, Canteen Kopje, Kathu Pan 1 and Cave of Hearths. This comprehensive study allows for a better understanding of regional Acheulean technological practices on the broader palaeolandscape.

4. ENTANGLED AFRICA: INTERACTIONS, RELATIONS AND NETWORKS WITHIN AFRICA

(Alexa HÖHN and Friederike JESSE)

24th August, 13.20 – 18.00 BST

This session addresses questions of entanglements and their contribution to the formation and development of human societies in Africa in the past. Presentations address intra-African interactions, whether they involve the transfer of ideas, knowledge, material culture, animals, plants or people. The spatial scale of entanglement may cover long distances or be confined to a limited area. In addition, the means of interaction (e.g. migration, trade, networking or war), the necessary infrastructure (e.g. pack animals, routes and roads, marketplaces), the external conditions and the motivations for entanglement and interaction are all of interest. The session includes theoretical and methodological papers as well as case studies aiming at a better understanding of the indicators, forms, patterns and consequences of entanglement and interaction within Africa. It is hosted by researchers involved in the project “Entangled Africa: Intra-African relations between rain forest and Mediterranean, c. 6000–500 BP” (<https://www.dainst.blog/entangled-africa/en/home/>), but seeks to initiate discussions with researchers from outside the project working on or interested in this challenging subject.

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Herders’ representations as a marker of Saharan entanglements

This paper discusses the preliminary results of the ASArt-DATA Project (Ancient Saharan Art-Decoding Art through Theoretically sounded Archive). The main aim of the project is to propose a comprehensive archaeological and anthropological enquiry of Saharan rock art, focusing on the artworks produced by the mobile pastoralists who inhabited this region between 6300 and 850 BC. The figures represented, in particular human representations, are investigated through a detailed iconographic analysis, oriented by a theoretical background combining archaeology, anthropology, visual studies and the digital humanities. The research process will move from a specific and micro-/meso-regional scale of analysis, outlining variability and local sets of regularities, to a subsequent search for enforcing regularities at the macro-regional scale, in order to identify possible patterns of the contacts and ideological interactions inside Sahara during the Pastoral Neolithic period since its formative phases.

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The testimony of the necked axes: interaction within the Sahara

At the beginning of the twentieth century, necked axes were described in the Sahara region for the first time. The widespread distribution of this special type of stone axes, which are marked by a wide hafting groove and a knob or mushroom-shaped neck, was noted early on. Necked axes are known from West Africa to the Nile Valley. A general assignment to the fifth to the third millennia BC is emerging. This is the time of pastoral groups with a particular focus on cattle pastoralism. Different cultural entities are known mostly defined because of a special pottery design style. A mobile way of life is supposed for these cultural groups and therewith

interaction. Taking a closer look at the necked axes, this paper discusses the role of a special type of object as an indicator of interaction and contact within the Sahara.

BREAK

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Nok and beyond – exploring relations and interactions within and outside the Nok Culture

The Nok Culture has been known as the oldest figural terracotta tradition in sub-Saharan Africa, reaching back almost 3000 years. Subsequent figural traditions in Nigeria are known from the beginning of the Common Era onwards and stand in some respect in the Nok representational tradition such as in the depiction of beads as a symbol of power. But are all other Nigerian traditions indeed subsequent? And what exactly do we define as Nok when looking at its large distribution area? Were there regional variations inside the Nok sphere or did they have neighbours? Was the uniformity of the Nok terracotta style a result of trade intercourse, a common ritual belief system or a political entity? Though this paper cannot provide answers to all these questions, it is worth looking at the possibility that Nok was not the oldest, but perhaps only the most prominent and well-researched terracotta tradition in what is today Nigeria and that it was part of a wider network of similar terracotta traditions.

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In an upside-down position: functional and comparative approach on ceramic remains in funerary and ritual contexts from Senegambia and West Africa during the first and second millennia AD

Based on the original study of archaeological ceramics associated with megalithic funerary architectures from Senegal and The Gambia, this paper questions the place of pottery in funeral and ritual context in West Africa during the last two millennia. Senegambian ceramic assemblages illustrate a typo-functional evolution of certain categories of containers. In the Wanar necropolis, the ability of some carinated pottery to be adapted as a lid on the mouth of large jars disappears in the most recent phases in favour of small containers incompatible with this function. If the commemorative character of the latter has already been suggested, an opening to broader archaeological contexts leads to consider that the former may have a funerary nature. The recurrence of upside-down funeral pottery in these two regions thus interrogates the spread of a common conception of funeral practices in medieval West Africa, notably via the Senegal and Niger Rivers.

BREAK

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Early Iron Age cooking pots in inter-regional perspective: the transmission of food and function

The study of long-distance interaction often relies upon the analysis of pottery, especially its decorative aspects. These stylistic traits usually have limited distributions in time and space, making them ideal for the study of inter-regional interaction. Less attention, however, has been paid to functional traits. These tend to have broader distributions in time and space and are rarely restricted to a single culture area. They can also be ‘analogous’, wherein different cultures with no contact can happen upon the same technological solution to similar functional requirements, making cultural interaction and transmission difficult to infer. Distinguishing homologous (i.e. transmitted) from analogous phenomena is therefore central to the study of the inter-regional transmission of functional traits. Building upon detailed analysis of cooking pots in kitchen contexts by the Connecting Foodways Project, this paper presents a preliminary analysis of the transmission of functional traits across north-central and northeastern Africa during the Early Iron Age.

Iris Gerlach and Kristina Pfeiffer

Routes of interaction: interregional contacts between the northern Horn of Africa and the Nile region

During the second and early first millennia BC the northern Horn of Africa was part of a wide-ranging network of interaction involving various mobility systems such as the migration of peoples, trade and exchange. Obsidian, pottery styles and historic sources such as the Egyptian Punt Expedition reports provide evidence that regional and supra-regional interaction routes connected the Ethiopian and Eritrean highlands not only with South Arabia, but also with the region of the Nile River and the Gash Delta in Sudan. The site of Rama in northern Tigray is a site at the interface between the vast landscapes of the Blue Nile tributary the River Gash with the adjoining lowlands on the one hand and the landscape of the highlands on the other. In terms of networks Rama is therefore located in an area of high geostrategic value. Corresponding to this, the detection and identification of interaction routes and possible settlement patterns in a supra-regional, long-distance approach is a central part of this project.

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Living and travelling in the Bayuda — The Wadi Abu Dom as a transfer and contact zone

The Wadi Abu Dom Itinerary Survey project conducted by the University of Münster between 2009 and 2016 was initially intended to clarify the longstanding theory of the Wadi Abu Dom as a major trade route and the “King’s Road” of the ancient Kushite empire. However, the archaeological record revealed not a single linear trunk route, but a network of short and middle ranged communication patterns, indicating manifold processes of interaction. The Wadi Abu Dom turned out to be a zone of economic and cultural transfer between the Nile Valley-based, centrally administered heartlands of the Kushite state and (partly sedentary, partly mobile) desert dwellers with their own particular way of life.

BREAK

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A first look at the population of medieval Soba (Sudan): the cemetery on Kom OS

Soba was a vibrant capital of the medieval kingdom of Alwa, according to Arab historians known for both its might and its riches. Located at the crossroads of major trade routes, it was presumably a melting pot of cultures and ethnicities. The newly launched project of the University of Warsaw aims, among other things, at investigating the social make-up of medieval Soba. Its first fieldwork campaign revealed the existence of a small cemetery on Kom OS in the northern part of the site. The 22 graves unearthed show remarkable diversity in terms of their manner of burial, seemingly within the range of Christian Nubian funerary customs. This paper presents the results of multidisciplinary bioarchaeological analysis of these burials as an introduction to the large-scale investigation of population diversity in medieval Soba.

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Northern Kordofan, a corridor between the Nile Valley and the Sahel

This paper presents some first results about the role of the Sudanese region of northern Kordofan as a region of interaction between the cultures of the Nile Valley and the Sahel zone. Until recent times, the cultures of ancient and medieval Nubia were mostly interpreted from a Nile-valley background. Recent research in Northern Kordofan indicates that as well as considering lines of interaction along the Nile they have also to be seen as Sudanic states that relied on large hinterland regions and their rangeland economies. They must thus be reckoned as part of the east-western chain of state building cultures based in the Niger Valley as well as the Chad Basin. Northern Kordofan seems to be an important border zone where manifold linkages between the Nile Valley and its intra-African neighbours are visible in the archaeological record.

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Linking the Horn: archaeology of trade routes in western Somaliland

For hundreds of years, the route between Zeila and Harar was one of the most important avenues for trade into the Horn of Africa, but little is known of the characteristics and material evidence of trade along this route. This paper approaches the study of the route from Zeila (Somaliland) to Jijiga (Ethiopia) during the thirteenth to sixteenth centuries, when the region was integrated in the important Muslim sultanates of Ifat or Adal. It analyses the potential routes used by the caravans through the combination of cartography, nineteenth-century travellers' accounts, medieval texts, GIS methodologies and archaeological evidence, inserting the results in the broader trade framework of Somaliland. It also pays attention to the interactions between the different actors involved in the management of commerce — nomads, foreign merchants, urban dwellers, states — and their co-ordination to make this route one of the most active in Africa.

BREAK

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Local ceramics from the medieval Islamic trade site of Harlaa, eastern Ethiopia: contact, chronology and change

The archaeology of Islam in Ethiopia is an underexplored area of research. The site of Harlaa in Eastern Ethiopia shows strong evidence for links with Indian Ocean trade networks and for the presence of Islam from the twelfth century AD. This paper will provide an overview of the previously unstudied local ceramics of Harlaa from excavations undertaken as part of the ERC funded Becoming Muslim project. The key wares, forms and styles present will be highlighted and the development of the local ceramics across the use of the site, including after access to the Indian Ocean Trade networks and the introduction of Islam will be considered. The local ceramics will be situated within the wider Horn of Africa, investigating potential links with contemporary sites in the region, and how access to the Red Sea and Indian Ocean trade networks influenced local ceramics within the Horn of Africa.

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Swahili mobilities and interaction: a case study from northern Zanzibar

The settlements occupying 3000 kilometres of East Africa's coastline since the sixth century AD, commonly known as the Swahili coast, were strongly interconnected through shared material and immaterial culture and extensive trade connections with the wider Indian Ocean world. Yet these settlements also maintained a significant degree distinction and independence. Using data from recent field work in northern Zanzibar, this paper explores how the distribution of a shared material culture across the archipelago highlights an interconnected landscape where movement of things, people and knowledge was integral to the development of local and regional histories and identities. It seeks to understand how settlements were connected and partly depended on each other for products in order to sustain and maintain their populations and proposes that, while certain regions of the Swahili coast may have been independent from each other, local settlements within these regions could only be sustained through mutual interdependence.

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Entangled towns — urban networks and public spatial features in coastal East Africa

In the complex built environment of towns, public relations between places and the people associated with them are realised on a network of connecting routes. These routes are represented by streets and open spaces that channel movement, allowing specific ways of approaching or passing by buildings and open congregation spaces. The distribution of public features in the urban street network is hence important as a component of the intangible cultural heritage. However, the structure of the voids in-between buildings remains less frequently studied compared to the architectural heritage. This paper presents a consideration of several (pre)colonial towns of East Africa in terms of the spatial organisation of their built environment.

On the basis of cross-regional comparisons, it provides a reflection on how the spatial network of towns on the Swahili coast might have altered with the colonial era, including the placement of public features (congregation spaces) and the layout of urban quarters.

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The cowrie shell in southern African archaeology: an entangled approach

Cowrie shells, *Monetaria annulus* and *Monetaria moneta*, have been exchanged and used in a variety of ways across the African continent. While often discussed only in relation to their exchange value, biographical studies of cowrie shells that expand on the types of exchanges through which these shells passed as well as addressing the ways in which they became embedded in different practices through time provide a novel lens through which to explore a variety of questions pertinent to African archaeology. Building on archival research and analyses of cowries from southern African collections dating between AD 600 and 1400, this paper presents an overview of the distribution, depositional patterns and uses of cowrie shells in the region. The implication of this study for developing new insights into the material entanglements of the cowrie shell and similar objects associated with long-distance trade networks are discussed.

BREAK

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The material and immaterial heritage of Swahili-Arab interaction in the Upper Congo Basin

Over the course of the nineteenth century Muslim merchants from the coastal Swahili city-states developed a vast commercial network over eastern Central Africa, which mainly involved the trade in slaves and ivory. They founded important markets that grew into thriving settlements as far west as Kasongo and Nyangwe in the Upper Congo Basin. However, our understanding of the eastern Congo during this period has been warped by the colonial archive, which basically depicts as a dystopian space of war, slavery, and cannibalism. Archaeological evidence along might not be able to redress this image. This paper draws on a methodology that combines archaeological investigations with the collection of oral histories and memories, participant observation, archival research, and recent anthropological and historical scholarship. It shows that this hybrid praxis reveals a more nuanced reading of the Swahili-Arab merchants and their entanglements with the populations in the Upper Congo Basin.

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Reconstructing the history of exchange networks in Central Africa: insights from the nineteenth-century copper trade

Long-distance and regional trade routes have played a major role in the sociopolitical history of Central Africa throughout the second millennium AD, but largely remain understudied. In the late nineteenth century in West Central Africa, exchange was organised through a complex set of networks, intermingling local, regional and long-distance trade. Copper and brass, as valuable metals, were commonly exchanged items in those networks and, as such, offer an opportunity to better understand the flow of goods and how those networks operated, both at a local and at a regional level. By combining several lines of evidence — historical and anthropological sources, the distribution of objects and exploratory pXRF analyses of copper and copper alloys — this paper outlines the role in exchange and the circulation of copper and brass along the Congo River and some of its tributaries in the late nineteenth century. It also highlights to what extent these nineteenth-century case studies could contribute to more robust analytical and theoretical frameworks for interpreting exchange evidence in earlier centuries in Central Africa.

FINAL DISCUSSION

5. THE COMMON AND THE PRECIOUS: SOCIO-ECONOMIC INFERENCES ABOUT SOUTHERN AFRICAN HUNTER-GATHERER COMMUNITIES THROUGH THE STUDY OF THEIR MINERAL RESOURCES

Sara Watson, Alex Mackay and Sam Lin

Effects of heat treatment on silcrete flake variation: quantitative evaluation of changes in flake formation

Heat treatment of lithic raw materials is considered an important technological innovation, allowing knappers to improve the flaking properties of rocks for tool production. Previous controlled experiments have explored structural, mechanical and geochemical changes in silcrete during heat treatment, but not the implications of those transformations for the flakes produced. Studies of flaking effects tend instead to rely upon replicate flintknapping, with possible confounding effects from uncontrolled parameters. In this study we provide quantitative data with which to understand the effects of heat treatment on silcrete flake production. We used a flaking machine to control variables related to knapping in order to isolate the effects of heat treatment on flaking in silcrete. Our results show changes in flake dimensions and the force required for detachment as a result of heat treatment, but suggest that the benefits of the latter may only occur within a limited temperature range.

Patrick Schmidt, Will Archer and Guillaume Porraz

A first chemical study of the provenance of silcretes from Diepkloof Rockshelter, South Africa

Studies of the origins of lithic raw materials have a long tradition in prehistoric archaeology. In igneous rocks and obsidian such analyses are routinely conducted using chemical analysis of minor and trace elements. Unfortunately, in many sites the main raw materials used are silica rocks like chert and silcrete, a material class for which trace element analyses have been shown to be more problematic. Only recently, two case studies from Botswana and South Africa have shown that there is potential in geochemical analyses for investigating the origin of continental pedogenic rock silcrete. This work has allowed the reliable separation of silcretes from sources that lie several tens to hundreds of kilometres apart. We applied these analyses to silcrete from Diepkloof Rockshelter, South Africa, to evaluate their feasibility in a context where silcrete sources lie only a few kilometres apart. We found that some of these sources have very distinct suites of trace elements that allow their distinction within the group of silcrete sources. We also explored the feasibility of applying this method to artefacts from Diepkloof. Our findings have implications for future silcrete provenance studies using trace elemental composition in South Africa and other parts of the world.

Marine Wojcieszak and Lyn Wadley

A multi-analytical study of archaeological and experimental giant snail shells

Occurrences of broken land snail shells are rather common in archaeological sites. The difficulty lies in understanding their provenance, i.e. whether they are anthropogenic or natural in origin. There is limited information on the deposition of these shells. At Border Cave (South Africa) a large number of land snail fragments were excavated throughout the cultural sequence and in both ashy and sandy deposits. Their colours vary from lustrous beige to brown and matt

grey. Accidental heating or deliberate heat treatment should mainly be responsible for this variability, possibilities explored through experimental heat treating of a giant land snail shell (Achatinidae: *Metachatina kraussi*, the brown lip agate snail) in a muffle furnace from 200° to 550°C for different lengths of time. The aragonite to calcite transformation was followed. by Infrared and Raman spectroscopies and, in addition, gloss measurement as well as scanning electron microscopy were implemented on the samples. All the techniques used present advantages and limitations for assessing whether the shell underwent heat treatment, but they can allow a better understanding of the Border Cave fragments depending upon the layer with which the latter are associated.

Noora Taipale and Veerle Rots

Raw materials and trace formation: adapting reference frameworks to reality in southern Africa

Recent advances in functional studies, including the development of a method for identifying hafted tools, make this approach highly relevant for understanding early technologies. However, most of the reference framework available is based on experimental work with flint, while the African archaeological record is characterised by a wide range of lithic raw materials, not all of which are well-studied in terms of use-wear formation. This can lead to difficulties in comparing tools within and between sites. We use the results of a blind test to address differential wear patterns on quartzite, dolerite, hornfels, silcrete and mudstone in southern Africa. This test sheds light on the basic differences in macroscopic edge damage and microwear formation and allows us to evaluate the biases that analysts used to flint may face. We discuss our observations in the context of previous studies and offer new guidelines for researchers who wish to tackle questions related to aspects of raw material economy and tool use in southern Africa.

BREAK

Magnus Haaland, Susan Mentzer, Elizabeth Velliky, Christopher Miller, Karen van Niekerk and Christopher Henshilwood

Characterising microscopic ochre fragments at Middle Stone Age sites: implications for evaluating prehistoric ochre use and deposition

Use-wear analysis of modified ochre pieces recovered from Middle Stone Age (MSA) sites suggests that powder production through crushing, grinding and pulverising was an important reason for ochre acquisition among hunter-gatherers during this time period. Indeed, at many MSA sites ochre in powder form — i.e. clay-, silt- and sand-sized fragments of ochre — has been encountered within the archaeological sedimentary matrix. So far little effort has been made to develop methods capable of documenting the occurrence, distribution, composition, alteration and depositional setting of *in situ* microscopic ochre contexts. To better understand how MSA ochre powder deposits originally formed and to fully assess their behavioural significance we present here a micro-analytical framework that facilitates the identification, sampling and characterisation of individual, sand-sized *in situ* ochre fragments found within MSA deposits. Specifically, we present the results of a microanalysis using micromorphology and petrography, micro-FTIR, micro-XRF, Raman spectroscopy and GIS of ochre-rich sediments from Blombos Cave and Klipdrift Shelter, South Africa.

Laure Dayet, Guillaume Porraz and Sarah Wurz

Inferring the symbolic value of pigment use from raw material characterisation: some case studies from the Stone Age in southern Africa

Pigment use in southern Africa was widely associated with symbolically mediated behaviours such as ritual practices, body ornamentation and visual art. However, red and yellow pigments, also called ochre, can be used for other purposes, such as in the manufacture of adhesives, the preparation of hides or for protection against the sun. Raw material characterisation and provenance research can provide crucial data for discussing the purposes for which ochre was used and its possible embodiment of symbolic information. Here, we present some case studies from southern Africa where this approach has been tested, two from the Middle Stone Age (Diepkloof and the Klasies River main site) and one from the Later Stone Age (Bushman Rock Shelter). The use of shiny minerals that are often less common and non-local appears to be an interesting feature favouring the symbolic usage of ochre materials. Other aspects such as colour and grain size should, however, also be taken into account.

Elizabeth Velliky, Brandi MacDonald, Jörg Linstädter, Lisa Ehlers and Gregor Bader

Archaeological, archaeometric and ethnographic perspectives on ochre behaviours in eSwatini

Although several archaeological sites lie close to Ngwenya, the oldest reported ochre mine located on the western edge of eSwatini (c. 40 kya), little is understood of prehistoric ochre behaviours in this region. Here, we present results of recent fieldwork aimed at documenting and understanding the relationships between the Ngwenya mine and five archaeological sites in eSwatini dating from the late Middle Stone Age to the Later Stone Age as seen through their ochre assemblages. The ochres from these sites — Mlawula 1, Mlawula 2, Nyonyane, Sibebe and Siphiso — were examined qualitatively and with trace element geochemistry in order to identify temporal changes in the types of ochre collected. Additionally, seven ochre pieces bearing use-traces were examined using a combination of macroscopic, microscopic and geochemical methods. When compared to present-day ethnographic observations, the prehistoric ochre behaviours identified attest to the longevity and complexity surrounding ochre use in our human lineage.

Joseph Matembo and Guillaume Porraz

The Middle Stone Age, the Later Stone Age and crystal quartz at Pomongwe Cave, Matopos, Zimbabwe

Stone Age hunter-gatherers selected a wide array of raw materials for lithic production, including crystal quartz. Unlike other rocks, crystal quartz is anisotropic in nature and consequently presents mechanical properties that require knappers to respect specific constraints during its exploitation and/or shaping. In this paper we review crystal quartz exploitation in southern Africa and emphasise its growing importance at the end of the Late Pleistocene. We illustrate this by taking as an example the Middle (MSA) and Later (LSA) Stone Age lithic assemblages from Pomongwe Cave, Matopos, Zimbabwe. The paper presents our sample, introduces our methodology and provides a first comparison between MSA and LSA crystal quartz technologies. It concludes by emphasising the importance of the Matopos'

landscape for elucidating the history of Late Pleistocene hunter-gatherers there and the multifaceted nature of crystal quartz economy, technology and symbolism.

BREAK

Brandi MacDonald, Elizabeth Velliky, Jörg Linstädter, Lisa Ehlers and Gregor Bader

Ochre provenance in eSwatini: geochemical insights on Middle Stone Age/Later Stone Age ochre procurement

We present preliminary results of a multi-method, regional scale ochre provenance study centred on five Middle (MSA) and Later (LSA) Stone Age sites and two ochre sources in eSwatini. Ochre artefacts are abundant at MSA and LSA sites and the variation observed in ochre typologies shows changes over time in mineral selection. eSwatini is home to several high-grade iron ore deposits that are conducive to the production of high quality, vibrant red pigment. Those sources, such as Ngwenya (Lion Cavern), were sites of ochre collection at least 40,000 years ago, if not earlier. Here, we synthesise data from trace element analysis (NAA, LA-ICP-MS) and mineral and structural characterisation (XRD, SEM-EDS), applying the methods to ochre nodules, lithic residues and geological materials. Our results provide insights into the potential for using changes in ochre procurement as a proxy for changes in mobility, land use patterns and artistic and mineral preferences during the MSA and LSA.

Guilhem Mauran, Matthieu Lebon, David Pleurdeau and Jean-Jacques Bahain

Exploitation of colouring materials at the ornate site of Leopard Cave, Namibia: provenience, transformation and usages

The recurrent presence of traces of exploitation of colouring materials at rock art sites in southern Africa makes them an interesting case for understanding the social-cultural behaviour of past communities, although they nevertheless remain largely understudied. Since 2007, a joint French-Namibian team has been excavating the site of Leopard Cave (Erongo), allowing the unearthing of coloured materials and tools bearing pigment traces in layers dating back to approximately 3000 BP. These artefacts support the existence of a *chaîne opératoire* for processing colouring materials. We have sought to identify the different stages of treatment of these colouring materials at Leopard Cave. To do this we have carried out *in situ* non-invasive analyses of the site's paintings and field survey of potential geological sources followed by structural observations and elemental and mineralogical analysis of all the material collected. Our results highlight the sub-local provenience of the material and differences in the treatment of the raw colouring materials used at Leopard Cave.

Justin Coppe, Noora Taipale and Veerle Rots

The importance of understanding the influence of raw material on fracture mechanics when searching for projectiles

The results of an elaborate experimental program on projectiles indicate that raw material is among the key variables affecting the fracture mechanical behaviour of a lithic armature on impact. This aspect has been underestimated in earlier projectile studies, where results have either been directly compared to previously published experimental data irrespective of raw material differences, meaning that raw material has been considered to be an irrelevant

parameter, or experimental replicas have been made of materials that closely resemble their archaeological counterparts. Considering the variability of lithic resources in Africa, projectile studies focused there should rely upon a clear understanding of the effect of raw material on fracture formation. We conducted a pilot experiment with a universal testing machine to examine how different raw materials react to standard mechanical stress. This paper presents the results of the experiment and puts them into the context of the experience gained from our previous work.

Paloma de la Pena, Tammy Hodgskiss, Guilhem Mauran

Leswika a geodatabase: a rock and colouring materials library in southern Africa

Prehistorical raw mineral and materials studies have increased during the past decades. Mineral resources, mainly rocks and colouring materials, were used in every-day life to produce tools and weapons, or as skin care products as well as for symbolic uses. They therefore offer great opportunity to interrogate past communities' behaviors and mobility. Understanding the choices made by the communities in the past requires a large knowledge of the raw materials (lithic and colouring materials) available at the time and of their properties before and after potential anthropic modifications.

In this view, we are building a library of southern African natural rocks and colouring materials. The first step of this open access library and geodatabase has been initiated in archaeologically-rich areas of South Africa. The project will consist in both a material library of rocks and colouring materials freely accessible to all and an online open access geodatabase combining geographical, geological, geochemical data.

The present talk aims at presenting our project and aims at calling for collaborations to build up a robust library, which will benefit to the whole archaeological community.

6. THE SAHEL: RETHINKING ‘MARGINAL’ ENVIRONMENTS

(Mike BRASS, Isabelle GREGORY and Paul SERENO)

To what extent is marginalization grounded in historical trajectories? This session examines the marginalization of dynamic areas. Specifically, we focus on the Sahel. While it is a transitional place in terms of its ecoclimate and biogeography, nevertheless it hosts a diversity of life and cultures over a span of 5400 km, from the Atlantic Ocean to the Red Sea. It is defined by a diversity of environments, people and history. It is also an area that continues to face desertification and social instability.

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The archaeological significance of the Gobero Site Complex, Niger

The burial record at Gobero spans more than 5000 years, from the Early through the Middle Holocene (9700–4400 BP), with one hiatus of severe aridity across all of the Sahara c. 7800 BP. Burials spanning this duration were excavated from similar levels in single burial grounds, documenting a duration of human occupation far greater than at any other Saharan site. We now understand that the anchor for such sustained community stability, as well as the maintenance of a diverse hydrophilic fauna and flora, was a groundwater-fed, fault-bounded palaeo-lake that provided a stable water source and surrounded reed-fringed palaeodunes that served as semi-sedentary habitation and burial sites. Stable water and faunal resources led to the persistence for millennia of hunting, fishing and gathering as a way of life at Gobero, long after surrounding communities had transitioned to transhumance. The absence of transhumance at Gobero, now confirmed from multiple lines of evidence, suggests that hunting, fishing and gathering may persist with stable water resources as a viable and preferred economy for semi-sedentary habitation in the Sahara during the African Humid Period.

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Jebel Moya: rewriting narratives of the southern Gezira plain (Sudan)

The agropastoral site of Jebel Moya presents a unique case-study in the southern Gezira plain. Until the resumption of fieldwork in 2017 by the joint UCL-UoK-NCAM expedition the site was considered marginal. First explored by Henry Wellcome, the site had all but faded from archaeological memory. Results from the 2017 and 2019 seasons show a longer, more continuous occupation than previously recognised. Archaeobotanical evidence is dominated by domesticated sorghum (*Sorghum bicolor*), radiocarbon dated to c. 2550–2210 BC. Mortuary activity also began early in the site's history, contemporary with the presence of domesticated faunal remains. These initial results indicate the long-term association of the site with pastoralism and agriculture and with environmental change. Furthermore, there is continual engagement with the local community over their heritage, the impact upon their community from Henry Wellcome's excavations a century ago, their memories and the modern socio-economic context of the current everyday lives. Results show that Jebel Moya was part of a vibrant environment and have reshaped thinking on what constitutes marginality in the region.

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New surveys and discoveries along the western bank of the White Nile

The White Nile, below Khartoum, is a vastly understudied area of Sudan. Its geographical position in the eastern Sahel is important to studies of west to east movements as well as to examining relations between central and southern Sudan. Materials collected by surface field survey have not always been adequately studied. Fieldwork was undertaken in January and December 2019 between El Dueim in the north and Kosti in the south, seeking to identify, map and determine the nature of Late Neolithic sites. This paper presents the results of this work and draws parallels with that done by other scholars along the White Nile's eastern bank. Besides confirming a *longue durée* of human occupation, this work aims to highlight and open discussions on the potential of the area for future research work.

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Late prehistoric sites in the Fifth Cataract area, Sudan

In the framework of archaeological research in the Fifth Cataract area, which started in 2008 and continues to the present, an archaeological survey was conducted in 2016 on the western bank of the Nile to identify sites dating back to the Mesolithic/Neolithic period. Fifteen sites were recorded, distributed over an area of 20 km along the River Nile, that show unusual variation in their function and distinct archaeological materials, reflecting the cultural diversity of the regional interactions provided by the geographical location of the study area. The results encourage us to use different approaches in order to know more about the stability, movement, economic sources and other things regarding late prehistoric groups in the area.

BREAK

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Mid-late Holocene environment and subsistence in northeastern Sudan: evidence from archaeobotanical studies

Data from plant impressions on pottery and dry sieving of soil samples from excavation units enabled the recovery of several thousands of seeds and fruit stones from sites in northeastern Sudan, including Mahal Teglinos (KI, Kassala), Kashim el Girba and Shurab el Gash. The recovered and analysed botanical remains were both desiccated and charred. Their study allowed us to reconstruct the diet of the sites' inhabitants during the mid-late Holocene and to comment on prevailing environmental conditions in the region. Ethnoarchaeological studies were conducted among traditional farming communities on the outskirts of Kassala to gain a better understanding of ancient ways of cultivation and domestication and to observe possible change and continuity in the ancient diet of the inhabitants.

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Hydroclimate, palaeodiets and ecosystem structure at Gobero during the African Humid Period

During the African Humid Period (~9 to 4 kya), Gobero was far from a marginal environment, as evidenced by the remarkable record of sustained human occupation and the rich faunal assemblage that suggests abundant fresh water. The history of water at Gobero during this part of the African Humid Period remains central for understanding the human occupation there, which may have been interrupted by one or more hyper-arid periods. We measured stable isotope ratios of oxygen, hydrogen and carbon in tooth enamel and plant waxes to evaluate hydroclimate, diet and vegetation at Gobero. The wide range of oxygen isotope values suggests strong aridity while the lowest oxygen isotope values suggest a sustained, perhaps groundwater-fed, source of water to the lake. Carbon isotopes indicate that most humans and mammals had mixed C₃-C₄ to C₄-dominated diets. Carbon isotopes suggest that the vegetation was likely dominated by C₄ Gramineae.

Nick Drake,¹ Katie Manning,¹ Julie Dunne,² Paul Breeze,¹ Richard Evershed,² William Amidon,³ Kevin Uno,⁴ Peter Felix-Henningsen⁵ and Paul Sereno⁶ nick.drake@kcl.ac.uk

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Reassessing palaeohydrology and subsistence at Gobero, Niger

Gobero is one of the most important Holocene archaeological sites in the Sahara as it provides evidence for occupation of different human groups around a palaeolake throughout much of the African Humid Period. Palaeohydrological mapping shows that the lake has a very small catchment, suggesting that it was largely groundwater-fed. Investigation of satellite imagery shows a number of water sources that could be springs and this was confirmed by field investigations. The lake's reliance on groundwater made it resistant to short term climate fluctuations, making it a prime site for human and animal occupation. Animal resource exploitation strategies were investigated using organic residue analysis of potsherds in conjunction with zooarchaeological data. The latter suggest that the people living at Gobero were principally fisherfolk. Pastoralism was less significant. Only three domestic cattle bones were identified and organic residue analysis of the pottery demonstrates evidence of dairying from only three potsherds, with the vast majority showing evidence of animal and plant processing.

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Archaeobotanical investigations of 'vegetation mounds' in the western Sudanese Desert

The vegetation mounds in the El Ga'ab depression (Western Dongola, Sudan) are a natural phenomenon that attest to human activities in an environment considered marginal. Detailed archaeobotanical investigations have reconstructed both the mounds and their relationship with nearby archaeological sites. A University of Khartoum survey identified the initial potential of the site. My research identified 1219 mounds, of which 57% were live mounds. Among other things, research has identified salt-tolerant plant species, indicating old areas of salinity in the region. Pollen studies show a diverse environment, including the presence of underground water. Prior to this, the mounds were overlooked by archaeologists investigating the El Ga'ab. This ongoing project reveals the importance of these mounds for understanding an environment that has previously been seen as hostile and demonstrates the need for an integrated heritage management plan that takes into account natural phenomena.

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The Middle Palaeolithic in north Sudan: evidence from the El Ga'ab depression

The Aterian industry is found in North Africa from the eastern Sahara westwards. The El Ga'ab depression is situated south of the Nile's Third Cataract at the northern end of the Dongola Region. It is a seemingly remote area extending 123 km. Nevertheless, this area has witnessed many population movements, from the Palaeolithic down to AD 1700, when the El Kababish tribe settled in the region. It was also home to the Gur'an (Garamantes), who now live in Darfur. Despite this, the area has been largely overlooked by archaeologists and there have been only sporadic investigations by colonial functionaries. In 2009 an ongoing systematic project was started by the University of Khartoum to rectify the situation. This project has uncovered over 45 Palaeolithic sites, identified ancient lakes and shed light on the western Sahara as a cultural exchange point. This paper will elucidate the nature of the Aterian in Sudan and present the results of my lithic studies.

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L'outillage lithique de certains sites archéologiques du Kawar et du Djado au Niger

Le Kawar et le Djado constituent la partie orientale de la région d'Agadès. Plusieurs reconnaissances archéologiques ont concerné cette partie du Sahara nigérien. Du coup, d'importants sites préhistoriques et historiques y ont été identifiés. Les principaux sites préhistoriques connus sont à Fachi (Dogom Blem), à Bilma (Silemi), à Aney, à Siguidine, au Djado, à Madama et à Mangueni. La mission de prospections archéologiques et paléontologiques de 2018 de l'équipe du Prof. Paul. Sereno de l'Université de Chicago Illinois a revisité certains sites à Adey, Bilma, Fachi, Madama, Mangueni et Siguidine. D'importantes pièces lithiques (bifaces, pointes pédonculées ou non, grattoirs, racloirs, perçoirs, armatures de flèche) ont été récoltées sur certaines sites. Ainsi, le point de mire de cet article peut s'articuler autour de l'origine de la matière première utilisée et la typologie des outils.

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A heritage caravan: combining social and mobile technologies to reconnect communities to their material culture

This paper describes the methodology and process of *Rethinking Relationships and Building Trust around African Collections*, a project that develops new practice around the Nigerian collections at the Horniman Museum, the Pitt Rivers Museum in Oxford, the Museum of Archaeology and Anthropology, Cambridge, and the World Museum in Liverpool. The project collaboratively developed a toolkit with community members which supports them to navigate the museum collections and carry out research. This is both provenance research as well as work described by community members that ‘uplifts the collections’ by bringing their multi-layered stories to the fore whilst reinvigorating community engagement with them. This combination of social and mobile technologies echoes the caravans that have traversed the Sahel for millennia, providing information, negotiating risk and opening new routes to knowledge for Nigerian material cultural heritage stakeholders.

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NigerHeritage: connecting research to community development and national aspirations

NigerHeritage is an international project that arose from 30 years of collaborative fieldwork in Niger that unearthed a remarkable array of archaeological and palaeontological specimens of world-class significance. These finds bring back to life two periods central to Africa’s story: a rich archaeological phase during Africa’s Humid Period (c. 10–5kya) and a remarkable palaeontological tapestry of sites that cover much of the Mesozoic (180–90 mya). The aim of NigerHeritage is twofold: to use Niger’s new-found archaeo-palaeontological heritage to jumpstart community development (workforce, technical and research training) and to capture in two new inspiring and energy-efficient institutions — a grand pavilion in Niamey and a cultural centre/museum in Agades — the aspirations of a nation as a whole and a cultural centrepiece for the nomadic peoples at the crossroads of the Sahara.

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From site to an online database: collection, curation, digitisation and an online portal

The Gobero site complex in central Niger preserves an exceptional cultural, biological and climatic record for an unusually long interval (c. 5000 years) during the African Humid Period. We aim to capture as much data as possible in this palaeodune setting, using a combination of traditional and more recent geoarchaeological techniques as well as modified palaeontological ones. We then digitise data not already in digital form and make these data available via an online portal supported by OCHRE (Online Cultural and Historical Research Environment), a high-end performance XML database system. We have been able to make available data genres rarely accessible after excavation (digital field books, full collection records, a vast array of photographic images, illustrations, computed-tomographic scans of burials and artefacts, laser-scanned landscapes, skeletal animations, field videos and commentary by content experts).

7. TECHNOLOGIES AND TERMINOLOGIES OF SUBSISTENCE

(Marianna FUSCO and Rocco ROTUNNO)

1st September, 13.20 – 17.20 BST

Though often marginalised in the development of models for food procurement, production and management, Africa presents unique and theoretically informative case studies for global comparison. The archaeological record from the mid-late Pleistocene up to the early and middle Holocene presents an extraordinary wealth of data concerning the adoption of different subsistence strategies related to environmental changes and cultural variability. From food's production/procurement to food processing and consumption and on to its ultimate discard, the stages and actions performed are commonly indicative of social identity and complexity. Reconstructions and interpretations of the relationship between people and food are more often weakened by inadequate terminologies considering recent advances in archaeological research. This session aims to draw together research and data gathered from African prehistoric contexts. With a focus on the northern and eastern parts of the continent, the contributions will help to develop updated explicative models to better define the highlighted variability of subsistence strategies within human groups and cultural entities. The following research topics are emphasised: 1) technologies and economies (lithic analysis, pottery studies, faunal and botanical remains; 2) landscape and sites (landscape and territorial analysis, site function, environmental studies; 3) people and mobility (bioarchaeological analysis, mobility patterns, trade and exchange studies).

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Late Pleistocene palaeoenvironments: stable isotope and faunal evidence from the Gotera archaeological site, southern Ethiopia

The origin and subsequent dispersal of Anatomically Modern Humans (AMH) within and out of Africa have often been linked with the late Pleistocene palaeoenvironmental and palaeoclimatic conditions. The impacts of past contexts of environmental change and climatic fluctuations on human behaviour and geographical expansion within and out of Africa are subjects of current debate. Zooarchaeological and stable isotope studies as a palaeoenvironmental proxy have revolutionised our understanding of the topic. In this paper, we investigate faunal assemblages from the Gotera archaeological site, southern Ethiopia through classical archaeozoological analysis combined with carbon ($\delta^{13}\text{C}$) and oxygen ($\delta^{18}\text{O}$) stable isotopic analysis of mammalian tooth enamel. In addition to palaeoenvironmental evidence, this field and laboratory-based research is expected to enhance our understanding of the emergence and development of ancient hunter-gatherers in this area. It will also lay foundations that will open up new research avenues into the appearance of human modern behaviour and resource exploitation strategies during the late Pleistocene.

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Change, or not? Grinding tools from the Mesolithic and Neolithic sites in the Sabaloka Mountains (Central Sudan)

This discusses ground stone assemblages from late prehistoric sites in Jebel Sabaloka in central Sudan. Large numbers of grinding tools (both querns and grinders) and grinding hollows in this region point to the important role of grinding in the subsistence and food strategies for several millennia. We focus on the question of whether it is possible to recognise trends and changes in tool types and their distribution that would correspond to the assumed change of economy and lifestyle between the Mesolithic and Neolithic. Finds studied in detail at two major settlements, one occupied only by late foragers and the other also by early herders, were included in the analysis. The results show conspicuous similarities between the assemblages. Can we talk about unchanged food and subsistence strategies, or are the similarities caused by a lack of more precise contextual information?

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Intra-site spatial analysis to understand past foodways: the case of the Early Holocene occupation at Takarkori (southwest Libya)

The Takarkori rockshelter (Tadrart Acacus, southwest Libya) has a rich archaeological sequence spanning a long chronological interval from the Early to the Middle Holocene. Due to the extent of the excavated area and its well-preserved deposit, it is considered one of the key sites for the reconstruction of the transition from acquisitive to productive economies in the central Sahara. The early phases of occupation (Late Acacus, 10.2–8.0 ka) refer to groups of hunter-gatherer-fishers characterised by forms of management and programmed exploitation of food resources that are reflected in the organisation of their living space. This work focuses on the integrated analysis of structural evidence and faunal remains from the Late Acacus levels: geostatistical analysis may specify significant pattern of assemblages in relation to the use of space and the activities performed at the site. The definition of behaviours related to animal food resources (use-reuse-discard) may widen interpretation of Late Acacus hunter-gatherers' economic strategies.

BREAK

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Taxonomie et strates géologiques des stations néolithiques de Patte d'Oie et de Njenwatt (Ouest-Sénégal): caractérisation technotypologique et stratigraphique

La présence des préhistoriques dans l'Ouest sénégalais est favorisée par un contexte pédologique et géologique complexe propices à la taille de la pierre et au façonnage de la poterie, dont la reconstruction a longtemps privilégié les caractères typologiques et stylistiques

des artefacts. Mais la rareté des axiomes paléontologiques milite pour une reconstitution du processus technotypologique et chronologique des évidences stratigraphiques des cultures matérielles héritées de la région afin de proposer un «expédient» des comportements techniques de la production des populations néolithiques de la Patte d'Oie et de Njenwatt et les relations intercommunautaires entretenues. Le schéma initial est d'analyser et d'interpréter les industries dans leur contexte taphonomique.

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Did you catch something to eat? How transitional hunter-gatherers adjusted their socio-economic life to survive the variable Shashe-Limpopo climate conditions

The Thune River area, which falls within the greater Shashe-Limpopo catchment areas of southern Africa, has experienced variable decadal and sometimes multi-decadal climate conditions. These constant alternating arid and wet conditions were always moving towards a mean average of greater aridity during the Holocene than was the case during the Pleistocene. These fluctuations affected the region's water availability and vegetation cover which, in turn, would have affected animal presence and thus have led to modifications and adjustments in the social and economic formations of the hunter-gatherer societies that occupied the area during the late Holocene. Poor vegetation would have led to the development of new strategies for harvesting and possibly storing plant foods. With poor vegetation cover becoming the norm, animals, especially the large-bodied ones, are also likely to have migrated to less affected regions and to hunter-gatherers exploiting small-bodied territorial animals. These small-bodied animals included tortoises, springhares, rock hyraxes, guinea fowl, francolin, steenbok and impala. Exploitation of territorial animals would thus have resulted in reduced hunter-gatherer mobility over time. With reduced mobility and size of prey, tools were adjusted and refined to maximise successful hunting expeditions. Sharing relationships also had to be adjusted.

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Feeding the dead and the living: the "ritual killing" of animals and humans in the Kerma kingdom

In the Kerma Culture, which developed in the north of Sudan between 2500 and 1500 BC, the presence in and around a grave of domestic animals, either complete or carefully cut, and of humans placed next to other individuals is one of the most impressive features we can observe today in the cemetery of the first known kingdom of Sub-Saharan Africa. The definition and logic behind such animal and human remains are a real issue for current archaeological research, despite the discoveries made over a century ago. The diversity of approaches and the variability of the vocabulary used by scholars tend to make the interpretation of such funeral practices more complex. This paper attempts to unify our understanding of this phenomenon through a critical and comparative examination of archaeological and ethnographic data and by linking it to an ostentatious and sacrificial economy, which is essential for feeding the living as well as the dead.

8. SUDAN UNDER THE RULE OF SENNAR. MATERIAL CULTURE PERSPECTIVES ON NUBIAN SOCIETY IN THE FUNJ PERIOD

Dorotea DZIERZBICKA and Maciej WYZGOŁ

This session discusses topics related to Nubian society in the Funj period with special focus on its material aspects. The main focal point is on the changes that occurred in the wake of the fall of the Christian kingdoms and the transition to Islam in the 14th-16th centuries, how these changes influenced social structures and identity of the Nubians and how Islam was perceived and adapted by the inhabitants of the Middle Nile Valley. The growing volume of material evidence on the life of Nubians in the Funj Period provides an opportunity for revisiting ethno-historic sources concerning Nubian society, which were very often written from a Eurocentric viewpoint. Papers present archaeological studies focused on the Funj period, socio- historical research and discussions on the role of the Funj material culture in Sudan's heritage and studies of memory.

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Locals or newcomers? Social diversity of sixteenth- and seventeenth-century Dongola from the house perspective

After the decline of the kingdom of Makuria, Old Dongola became a capital of a local polity known as the kingdom of Dongola, remaining under the rule of the Funj Sultanate from the sixteenth century. Until the end of the Funj period it was an important political and trade centre. Until recently, the Funj-period city of Old Dongola was known mainly from the accounts of travellers who passed it by on their journeys. Excavations conducted since 2018 as part of the European Research Council Starting Grant “UMMA– Urban Metamorphosis of the Community of a Medieval African Capital City” brought to light the streets and houses of sixteenth- and seventeenth-century Dongola. Fieldwork revealed several living quarters located both inside and outside the city walls. Most of the houses are rather uniform in terms of layout and construction and diverge only in size and number of rooms. However, the quarter located in the northern part of the city comprises houses that testify to two different building traditions. This paper examines the relationship of wattle-and-daub and sun-dried brick houses that neighbour each other and form a complex urban landscape. Possible reasons for the choice of a particular building technique are considered. The paper also tries to determine how building traditions reflect inhabitants' identities in terms of wealth, origin and individual taste. Another equally important point of interest is how the built environment influenced the life of those dwelling within it. The diversity of this capital city is shown from the perspective of household and material evidence against a wider African background.

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Aspects of pottery production and use in Dongola of the Funj period

In the seventeenth to twentieth centuries the inhabitants of Old Dongola used a variety of ceramic vessels, mostly handmade wares indicating local production. However, some glazed imported wares from the Ottoman Empire and the Far East also occur in the material from the site. The ceramic assemblage includes a variety of bowls, basins and jars of different sizes, with large ones used for storage. It has to be stressed that this material is in most cases decorated, especially with incised designs, although applications and painted motifs were also popular. The pottery found shows that the inhabitants of Old Dongola had a need for aesthetic aspects in their everyday life, while the vessels indicate a range of possible uses, from storage to the serving of food. Some pots, for instance incense burners and water jars (*zirs*), are still visible in modern-day Sudanese households. Many forms of decoration and technology reflect continuous production in contemporary contexts. The general distribution of pots across the excavated areas shows that an especially large percentage of vessels was associated with the preparation and serving of food. However, specially designated places for cooking and storage are also visible in the investigated spaces. The ceramic material from Old Dongola can be characterised by two key terms: multifunctionality and a no waste-strategy.

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Characteristics of Islamic pottery in the Sennar region, central Sudan

Sennar is considered one of the most important civilisational and cultural centres of central Sudan, as it represented the foundation on which the Funj kingdom was built from the beginning of the sixteenth century until the end of the nineteenth century AD, becoming its capital and main seat of government. Of the material culture produced by Funj one of the most important was pottery, with distinct types produced for various purposes. Sennar's geographical location played a prominent role in the kingdom's pottery production as the region is a focus for many trade routes and pilgrims. This paper aims to identify the kinds of pottery produced there by conducting laboratory comparisons and analyses and to establish the key features of pottery in the Funj kingdom as a whole.

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An unusual intra-settlement burial in Funj-period Old Dongola

During the winter 2019 field season at Old Dongola, Sudan, a surface burial (FN362), which had been partially exposed along the western edge of the citadel within the remains of House B.H.121, was excavated. The east-west oriented supine burial was located directly against the preserved remains of a wall. This burial of a young adult female (c. 18–24 years old) was unique in several ways, conforming neither to Christian nor Muslim burial traditions and having previously been identified with the burnt remains of a set of cattle horns and a pottery vessel atop the burial area. Ethnographic parallels among Nilotic burial traditions, including those of the Nuer and Dinka, suggest that this burial may have an affiliation with the burial practices of the Shilluk. This presentation examines the implications of this approximately seventeenth- to twentieth-century burial within the preserved remains of the earlier Makurian capital of Old Dongola (Tungul).

9. POPULATIONS AND INTERACTIONS IN LATE HOLOCENE SOUTHERN AFRICA

(Tim FORSSMAN and Iris GUILLEMARD)

6th September, 13.20 – 18.20 BST

Southern Africa's Late Holocene sequence integrates a wide array of identities and cultural sequences that frequently overlap. Hunting and gathering societies, for example, lived in contrasting environments and expressed variation in terms of material culture, mobility patterns and exploitation of natural resources. From around 2000 BP, evidence of sheep occurs in LSA contexts which some suggest indicates the arrival of livestock herding, stone-tool producing communities. It is followed a few centuries later by the appearance of agropastoralist communities associated with several widespread migrations. Archaeological, linguistic and genetic studies have highlighted the many interactions occurring between groups of people during this time. Beyond these interactions, the internal dynamics of diverse societies are also considered as factors of change, notably regarding the adoption of food-producing economies. This session aims to review the archaeological sequence of the Late Holocene in order to investigate the relationships between societies practicing different or episodic subsistence strategies and engaging in various forms of social, economic and political networks across southern Africa. Theoretical perspectives on how to conceive past populations, by moving away from essentialist conceptions, will be encouraged. Researchers from different fields, including archaeology, rock art, anthropology, linguistics and genetics are invited to contribute to the discussion.

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Morpho-functional variability of the late Holocene microlithic backed tools from Pomongwe Cave Matobo, Western Zimbabwe

This paper addresses the question of the morphological variability of late Holocene microlithic backed tools (MBTs) at Pomongwe Cave (Matobo, Zimbabwe), focusing on the Amadzimba phase (4800 to 2200 BP). The study follows a morpho-technical approach which aims at questioning the traditional typological classification by characterising the physical properties of the active and passive parts of MBTs (namely the back, the point and the edge). Macro-fracture and macro-scar analyses are employed to infer the function of MBTs and results show that they were laterally and disto-laterally hafted for a variety of uses, including projectile weapons. We finally address the importance of the Matobo landscape to discuss the historical processes that characterise the development of the last hunter-gatherer societies in southern Africa.

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The Later Stone Age in Mozambique: geographical discontinuity of the existing industries and problem of chronology

The Later Stone Age (LSA) in Mozambique remains poorly explored and its archaeological heritage is still largely explained in terms of better-known sequences to the south, west and north of southern Africa. Mozambique is nevertheless rich in sites with archaeological evidence related to different groups of hunter-gatherers. Along with rock art, lithic assemblages from its south, central and northern regions are one of the few sources of information for explaining the use of rock shelters and open-air sites. Lithic analysis and radiocarbon dating shows that formal tools were produced or used at different sites as part of the hunting and gathering way of life. To build an understanding of the LSA sequence of the country, this communication considers the sequence of the occupation of the known sites based on the typological features recognised via lithic and other artefacts. Diverse diagnostic tools strongly suggest a continuity of hunter-gatherer presence through the Pleistocene, but geographical discontinuities and the lack of a clear chronological sequence remain to be resolved by future research.

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An archaeological contribution to the Kalahari Debate from the middle Limpopo Valley, southern Africa

Western knowledge systems and colonial histories have shaped much of anthropological and archaeological discourse. Rehearsing this epistemology for over three decades is the Kalahari Debate, which is primarily concerned with the analogous relationship between the San, their Later Stone Age ancestors and farming communities. However, the debate has more recently and more-or-less stagnated without significantly new approaches or perspectives being raised. This contribution intends to reignite some of the debate's embers by providing insights from the middle Limpopo Valley. It was here that forager communities witnessed and participated in the rise of state society among farmer communities. Examining forager responses to farmer contact during the various phases of socio-political development offers a different perspective to those provided by the two schools of thought in the Kalahari Debate. Moreover, it questions the Western-centric framework of such a prominent debate concerned with indigenous communities and their representation.

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Another testimony of cross-cultural interaction? The wall grooves of Bushman Rock Shelter

In the Limpopo Basin, many wall groove sites are found, sometimes in a very large number. Their function remains debated (rock art? ritual practice? tool sharpening?) and their chrono-cultural attribution varies between hunter-gatherers, herders and farmers, according to the sites and researchers concerned. New data from ongoing studies at Bushman Rock Shelter indicate an appearance of this graphic practice during the Later Stone Age. These marks could thus be another perceptible transcultural element within the material culture of hunter-gatherers and herders, further blurring their respective archaeological signatures. Is this a simple convergence? Or, is the sharing of beliefs, ritual practices and patterns of rock modification testimony to a new proof of cultural permeability between these two populations in this region?

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Assembling new worlds: from 'context' to 'assemblage' in characterising late Holocene rock art in the Northern Cape, South Africa.

Constructs of culture and society — or of rock art traditions — have tended to assume tacitly how events are constituted and the ways in which individuals behave and produce material culture. A focus on longer term and/or culture-wide patterning provides generalisations that become the 'contexts' that archaeologists may reference to understand local level cultural outcomes. In a late Holocene era of interaction between 'groups' or 'traditions', the 'contexts' appear often to mesh, becoming locally 'creolised'. Variability may further arise in response to multiple dynamics, external as well internal to any given situation. This paper builds on thoughts about Driekopseiland and other Northern Cape rock art sites to characterise their histories not so much in terms of cultural 'contexts' — in passive relation to which people and things reflect a 'culture' or 'tradition', or their mixing — but of active 'assemblages' of people, materials and circumstances that are also generative in processes of on-going reassembly.

BREAK

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Interpersonal violence in a Khoesan sample assessed using crania

This study assessed trauma in a broader sample of crania from 150 adult Khoesan individuals in the University of Cape Town's Human Skeletal Repository. Cranial deformation and fracturing as a result of trauma was recorded as occurring ante-, peri- or postmortem based on the visible remodelling of bone. These data were analysed temporally and spatially. The sample was nearly equally distributed by sex and consisted primarily of middle-aged adults. Most individuals were of coastal origin, equally distributed between pre- and post-2000 BP. Peri- and antemortem trauma were found in 52% of the sample, mainly on the cranial vault, suggesting that conflict had occurred. Antemortem trauma was found in 19% of the sample with a significant increase post-2000 BP. Perimortem trauma was found in 39% of the sample affecting a significantly higher number of females. These results are discussed, and add to the increasing data that interpersonal violence was prevalent in the late Holocene Later Stone Age, contrasting with theories of a 'harmless people'.

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Should we equate languages, genes and subsistence? The appearance of herding in southern Africa

The combined use of linguistic, genetic and archaeological studies for establishing migration models is common in southern African research on pastoralism. According to some of these models, sheep would have diffused with Khoe-speaking people through southern Africa from

around 2000 years ago. In the literature, ‘Khoe people’ and ‘herders’ or ‘pastoralists’ are often used as synonyms. Many implications follow, creating inter-disciplinary models explaining the appearance of herding as a single process. In this presentation, the correlation made between language groups, gene signatures and economies of subsistence is debated, before turning to a re-evaluation of the broad archaeological context of the early herding phase.

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A closer look at the pots. Investigating the overall cuisine of the Urewe and Kalundu occupation facies of Lydenburg Heads, South Africa, using GC/MS and GC-c-IRMS.

Organic residue analysis (ORA) has been routinely used over the past three decades and is a well-established technique for identifying the cuisine and food processing within a society or group. This project applies ORA to Early Iron Age ceramics from Lydenburg Heads Site in South Africa, which was occupied by a Urewe Tradition farming community in the seventh century AD and then by a Kalundu Tradition farming community from the ninth to eleventh centuries AD. It aims to understand the dynamics of food consumption and identify possible temporal changes in diet, fill gaps within the understanding of pottery usage and give new insights into living habitats within and between cultural groups by combining lipid residue and isotope ratio analysis. Forty sherds were sampled to test the lipid preservation within Lydenburg pottery. This project represents the first ORA study ever conducted in this area and archaeological context.

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Organic residue analysis of Later Stone Age pottery from the Namaqualand coastal desert of South Africa

Organic residue analysis of archaeological pottery can provide vital insight into dietary decisions and preferences of past populations. This insight is particularly relevant for understanding the dietary choices of enigmatic Later Stone Age (LSA) herders living in the Namaqualand coastal desert of South Africa, a region with large temporal and spatial gaps in the archaeological record. In this study, a total of 78 potsherds were selected from four open-air LSA archaeological sites located in Namaqualand and analysed using gas chromatography (GC), gas chromatography-mass spectrometry (GC-MS) and gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS). The $\Delta^{13}\text{C}$ values from the sherds show a dominance of ruminant carcass product processing, except for the site SK2005/057A, where processing wild non-ruminants appears to be the main activity. These results provide the first direct evidence for how LSA herders living in Namaqualand incorporated sheep into their diet and what products they may have prioritized.

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A taxonomic and taphonomic study of the faunal remains from rain-control sites in the Shashe-Limpopo Confluence Area, South Africa

The rain-control sites of EH Hill, JC Hill, M3S and Ratho Kroonkop are located to the west of Mapungubwe in the Shashe-Limpopo Confluence Area (SLCA), Limpopo Province, South Africa. These sites are associated with hunter-gatherer and farmer interactions, between AD 700 and 1300. This interaction is supported by archaeological evidence excavated from the tops of these hills between 2004 and 2007. The purpose of this study is to investigate the cultural significance of the faunal remains from these rain-control sites within the ritual economy of the SLCA. The application of a comparative taxonomic and taphonomic analyses of >10,000 specimens, following the bovid size categories established by Brain (1974) and the identification methods established by Driver (1999), aims to identify species selection and utilisation by historical groups. This comprehensive study provides valuable insights into the significance of faunal remains in rain-control practices within the SLCA ritual landscape.

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Ephemeral archaeology of transhumance and change in the nineteenth-century Northern Cape Province, South Africa

The Northern Cape Province of South Africa has hosted frontier interactions in varying forms for the last two thousand years. In the mid-nineteenth century, the Orange River became an official border of British colonial territory and the pre-existing complexities of socio-political and economic interaction intensified and changed. The Bushmanland region of the wider Namaqualand area was one of the last places to see formal settlement and infrastructure in the historical period. Transhumant land use was a common and successful strategy used to balance resource scarcity and the erratic and low rainfall patterns characteristic of the region. However, such residence patterns rarely result in built structures or undisturbed stratified deposits. This presentation proposes a method for identifying the open-air ephemeral surface scatters produced by precolonial and historical-era transient peoples through the use of natural features and resources within a marginal arid landscape and discusses analytical methods, artefact assemblages and preliminary results from two historical scatters therein.

10. PREHISTORY AND PALAEOENVIRONMENTS OF CENTRAL AFRICA (Christopher KIAHTIPES, Karen Lupo and Dave SCHMITT)

Central African rain forests have long presented challenges to archaeological research. Densely vegetated landscapes, highly eroded surfaces, and disturbed acidic sediments obscure the visibility of archaeological materials and limit site preservation. Armed with an absence of evidence, many conventional portrayals cast rain forests as depauperate and vulnerable biomes where permanent human settlement requires food production and climatically or anthropogenically driven forest degradation. This stance is contradicted by a growing body of evidence supporting long-term human influence on global rain forests as well as on key African biomes. These interpretations influence management and conservation policy, which does not benefit from treating forests as homogeneous, either as relicts of past human impacts or true wilderness. Recent research has produced archaeological and palaeoecological proxy data that speak to the timing, context, and nature of human occupations of Africa's rain forests. From hunter-gatherer occupations to the spread of food production, metallurgy, and Bantu languages, this session brings together scholars from a variety of disciplines to present recent data on the archaeological and palaeoecological record of the Congo Basin. Together, the papers in this symposium outline the state of archaeological and paleoenvironmental knowledge in Central Africa's rain forests and define research questions for the future.

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An ethnoarchaeological analysis of fauna produced by Central African foragers and farmers

Zooarchaeological remains are one line of evidence used to identify forager-food producer economic interactions. Archaeologists lack an ethnoarchaeological framework where wild fauna are the main source of meat consumed, exchanged and sold. This paper presents comparative analyses of animal bone assemblages created by forest foragers and farmers. Analyses show significant differences between these assemblages in faunal abundances, diversity and part representation.

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Exploring peatland development in the central Congo Basin using palaeoecological proxies

A large area of previously unrecognised peatlands was discovered in the Congo Basin in 2015. This peatland complex is thought to be the largest in the tropics, with an area of *c.* 145,500 km². Here we present a high-resolution analysis of a 6-m-long peat and sediment core from the centre of a ~40 km² peatland near Ekolongouma, northern Republic of Congo. We combine palaeoecological and sedimentological proxy data to explore peatland initiation and development over the past *c.* 18,000 years. Vegetation and climate change have been reconstructed using pollen and isotope data. The fire history of the site has been reconstructed using micro- and macro-charcoal. Additional information comes from loss-on-ignition,

magnetic susceptibility, particle size, carbon/nitrogen ratios and inorganic geochemistry. The integration of these proxies allows a detailed synthesis to be constructed, capturing how the peatland has evolved over time from its initiation in the Late Pleistocene to the present day.

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Combining plot inventory and soil charcoal identification to unravel multi-timescale forest history in the Congo Basin

Uncertainty in Congo Basin forest responses impedes predicting the impacts of twenty-first-century climate and human-induced change. Most insights into the responses of tropical forests to climate depend on sub-annual records, yet short-term sensitivities do not necessarily translate into long-term responses. Furthermore, the persistent impact of (pre-)historical anthropogenic disturbances on present-day Congo Basin forest composition and dynamics is a matter of ongoing debate. We are therefore establishing a geographically integrated multi-timescale dataset to provide a long-term perspective of Congo Basin forest history. The data are geographically integrated by concentrating all scientific activities on permanent forest inventory plots. Furthermore, they span multiple time scales by combining two different archives: the repeated plot inventory data themselves (forest dynamics over the last three decades); and fossil charcoal assemblages from soil profiles near the plots (last six centuries). Here, we present the results of ~4000 charcoal identifications from 35 plots in the Kisangani area.

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Esquisse d'une paléohistoire holocène des formations boisées bordières du Lac Kivu (RD Congo – Rwanda)

Cette présentation décrit les caractéristiques environnementales et l'évolution holocène de la végétation dans les régions montagneuses du lac Kivu, de la R.D. Congo et du Rwanda. Les analyses palynologiques de neuf sites de carottage répartis entre 1450 m et 3030 m dans la région du Kivu et des Virunga sont utilisés pour décrire plus de 12 000 ans de changement de végétation. Ces enregistrements documentent des phases importantes des transformations des forêts montagnardes pendant la transition Pléistocène-Holocène à travers l'optimum humide de l'Holocène, *c.* 12,000 à 4000 ans BP. Des conditions plus sèches et des formations végétales ouvertes apparaissent après cette période, suivies de nouveau par des conditions humides à 2000 ans BP. Cette dernière phase montre des preuves d'impacts anthropiques, qui sont spatialement hétérogènes et apparaissent après environ 1000 ans BP. Cette étude démontre la sensibilité relative de ces environnements aux climats mondiaux et, plus récemment, à l'influence anthropique.

BREAK

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Multi-proxy records of Pleistocene-Holocene climate and vegetation change at Mai Ndombe, Democratic Republic of Congo

Pleistocene and Holocene climatic and ecological conditions in the Congo Basin are an important research topic with cross-disciplinary relevance. Relatively few studies exist from the Congo Basin itself and these conditions are inferred from records near the Atlantic coast. We present the first study of pollen, isotope geochemistry and charcoal abundances from Lake Mai Ndombe in the Democratic Republic of Congo. Sediment coring from two locations provides a truncated, but important, record of Pleistocene and Holocene climate and vegetation. Palaeovegetation and climate proxies from these records indicate that the region is sensitive to top-down climate forcing linked with coupled ocean-atmospheric systems, but vegetation responses signal resilience linked with hydrologic refugia as well as the influence of humans. This report demonstrates that the Mai Ndombe region is an important candidate for future research on the Pleistocene-Holocene record of climate change and anthropogenic influences in the forest zone.

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The stylus and the paddle: pottery traditions and people along the Congo River during the last 3000 years

Research on present and past pottery traditions along the northeastern bend of the Congo River have shown that the chrono-cultural sequence of the area can be divided in three main horizons according to pottery styles (Ancient, Middle and Late). Each is characterised by coexistent or successive stylistic variants confirming that the peopling of the area was a long and complex story. One particularly surprising fact is that while the two first phases showed apparent relationships, the emergence of the Late Horizon pottery styles constitutes a clear stylistic and technological break that remains to be explained. In this paper we add new data acquired during the first fieldwork of the BantuRivers Project and pan-out to consider these pottery events in a broader perspective, including pottery and archaeological evidence from other areas in the Congo Basin.

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On the Basin's rim: preliminary data on Middle and Late Holocene occupation of Nangara-Komba Shelter, Central African Republic

Excavations in Nangara-Komba Shelter along the northern margin of the Congo Basin recovered evidence for intermittent and at times intensive human visits dating to the middle and late Holocene. Numerous rock art panels adorn the shelter's walls and ceramics appear to have initially been brought to the site between 779 and 481 cal. BC, if not several hundred years earlier. Abundant quartzite artefacts occur throughout the deposits and mark the continuous use of flaked stone until the latest Holocene. Nangara-Komba is the only known site in the Sangha River Interval with stratified occupations spanning the past *c.* 7000 years. It is one of the few sites showing occupation by prehistoric hunter-gatherers in the northern Congo Basin.

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Les implantations humaines Holocènes du bassin de la Lokoundjé (Sud Cameroun)

Les travaux d'ordre archéologique effectués dans quelques localités du Cameroun (régions des Grassfields, du centre, du Septentrion et du littoral) ont permis de mettre en évidence une occupation de l'espace et une dynamique de la culture matérielle remontant à la fin du Pléistocène et qui a perduré jusqu'à l'époque actuelle. Jusqu'à la fin des années 1990, le bassin de la Lokoundjé, zone de transition entre le centre et le littoral camerounais, du fait de son couvert végétal ne figurait pas sur la carte archéologique du Cameroun. A la faveur des travaux d'aménagement et de quelques travaux de recherche, on en sait un peu plus sur la préhistoire de cette région. Cette communication présente les premiers résultats des recherches en cours dans cette zone de forêt. Les analyses radiométriques des vestiges ressortent trois phases de peuplement depuis 10,000 ans.

BREAK

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Networking at the riverbanks: multidisciplinary reflections on past and present cultural exchanges in the eastern Congo Basin

The Eastern Congo Basin is a cultural and linguistic crossroads. The linguistic map, including Central-Sudanic, Ubangi and Bantu languages, and the linguistic affiliations of hunter-gatherer communities suggest a complex history, with people arriving from different directions and bringing along diverse cultural backgrounds. Nevertheless, thus far little is known about the region's past. This paper zooms in on past and present cultural exchanges between the diverse people living along the region's many rivers, based on recent anthropological, linguistic and archaeological fieldwork (2019–2020). It focuses particularly on the riverbanks of the lower Lualaba, namely on present and past networks of the Mokpá (also known as Leka) and other peoples of the area. Results include ethnohistory, the current periodic market system, a classification of the linguistic subgroup Forest Central Bantu, linguistic contact phenomena (e.g. labiovelars) and preliminary results of the first archaeological excavations between Kisangani and Ubundu.

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A critical supra-regional assessment of radiocarbon dates and pottery groups offers new insights into the settlement history of Central African forests over the past three millennia

The Bantu Expansion is generally regarded as the most significant migration event in Sub-Saharan Africa, synchronous with the introduction of a sedentary lifestyle and characterised by the production of pottery. It is commonly assumed that the current-day geography of Bantu languages reflects the original migration of Bantu speech communities. We present here a critical analysis of archaeological data on a supra-regional scale which indicates that this is not always the case. We evaluate >1200 radiocarbon dates representing >700 archaeological sites and >100 well-described pottery groups from Central Africa. In combining a comprehensive supra-regional analysis with a critical assessment of all dates and a temporal as well as spatial analysis of pottery groups, we apply a unique approach to unravel the history of human activity in Central Africa. Our resulting reference chronology provides evidence for a 'spread-over-spread' migration model and has profound impacts on the interpretation of historical-linguistic, genetic and palaeoecological data.

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Comparative technological analysis of Lupemban lanceolate points from the Congo basin, central Africa: preliminary results and implications

The earliest persistent archaeological signature found across the Congo Basin is attributed to the MSA Lupemban industry. The heterogeneous Lupemban toolkit takes in Modes 2 (bifaces), 3 (prepared core technology) and 4 (blades), as well as conceptual Mode 5 technology (backed blades). Widespread disruption of Central African stratigraphies, however, creates problems for defining the makeup and variability of Stone Age industries and for building reliable chronological sequences. Establishing the nature of hominin palaeohabitat preferences and behavioural repertoires — key to understanding the Lupemban's evolutionary significance — remains a more significant challenge. For more than 50 years the Lupemban has been defined by bifacial lanceolate points, but reports from across the Congo Basin and its margins have never included their technological analysis. Here, I present interim results from the first

comparative study of Lupemban lanceolates from across the region and discuss their implications for our understanding of this enigmatic industry.

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Anthropological genetics insights into the history of the peopling of Central Africa

During the last 20 years, human population genetics approaches have brought extensive new insights into the largely unknown history of the peopling of the Congo Basin. They relied on a novel genetic and cultural anthropological interdisciplinary framework, rooted in joint fieldwork, that largely questioned and redefined the classical categorisation of Central African human populations into so-called “Pygmies” or “Bantus”. This paper presents the anthropological genetics paradigms and statistical methods employed to infer and reconstruct, from genetic and cultural anthropological data, the demographic history of Central Africa. It details the results thus obtained about ancient population divergences, effective population size changes, reproductive migrations and barriers to reproduction that gave birth to the genetic diversity patterns observed today throughout the Congo Basin. Finally, it discusses the limits of this approach and highlights some frequent misinterpretations that often emerge from the general lack of dialogue and need for interdisciplinarity among anthropologists.

Katharina V.M. Jungnickel – poster shown during breaks

Contact Archaeology in Central Africa

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Within the last decades, the archaeology of interaction between mobile hunter-gatherers and sedentary food-producing groups and subsistence transitions has gained much attention in Europe and internationally. While the importance of contact between local hunter-gatherers and incoming food-producing communities was emphasised for Eastern and Southern Africa, Central African contact archaeology is thus far non-existent. This poster presents the ongoing PhD project “An archaeological approach to early interactions between hunter-gatherers and sedentary food-producers in Western Central Africa”, combining literature studies, contact-oriented reanalysis of collections and selective surveys to develop new theories and gather evidence for prehistoric interaction between 5000 and 2000 years ago. Analyses on inventories of lithics and pottery are performed in collaboration with the RMCA Tervuren, University Tübingen and Kinshasa. The overall objective is to improve the archaeological visibility of interactions through the combined examination of materials that are traditionally studied separately.

11. SOUTHERN TANZANIA AND HUMAN ORIGINS: PAPERS IN HONOUR OF PAM WILLOUGHBY

(Katie BIITNER and Pastory BUSHOZI)

8th September

This honorary session offered to Professor Pamela Willoughby as she approaches retirement brings together past and present students and colleagues who have contributed to her examination of the archaeological and cultural heritage of southern Tanzania. For fifteen years

Prof. Willoughby has been the principal investigator of the Iringa Region Archaeological Project (IRAP) in the Iringa Region of south-central Tanzania and for decades before this worked in the Mbeya Region of south-western Tanzania. This session will focus on the archaeological record of southern Tanzania including a history of research, evidence for the origins of modern humans, lithic technologies in the Middle and Later Stone Ages, Iron Age production and subsistence practices, the ethnoarchaeology of Iringa baskets and cultural heritage and public outreach. The implications and outcomes of the research done to date and future directions for work in this critical region will be examined.

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15 Years of IRAP: tracking trends in research on modern human origins

This introduction to this session in honour of Professor Pamela Willoughby's contributions to Africanist archaeology looks at the major trends in researching modern human origins. Through reflecting upon the broader context of Stone Age archaeology in Tanzania and East Africa, it situates the events that led to the formation of the Iringa Region Archaeological Project (IRAP) and that have shaped the work members of IRAP have undertaken to this day. In concluding, this paper speculates on future directions for the project and its members (past, present, and future).

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Comparative analysis of Middle Stone Age Archaeological Record of Northern and Southern Tanzania

Northern and southern Tanzania are among the few key regions that have contributed significantly to the assessment of the behaviour and technological capability of Middle Stone Age (MSA) humans. Material culture from these regions sheds significant insight into the development of modern behaviour. Sites here contain a dense, stratified and continuous archaeological record spanning from the MSA to the historic period. The archaeological records of these regions provide an opportunity to investigate trends in technological change, past diet, symbolic aspects and other traits of cognitive thoughts. Specifically, they allow us to test hypotheses regarding the technology and behavioural capability of MSA people. It is also possible that the landscapes of northern and southern Tanzania remained habitable throughout the MSA and the ensuing Later Stone Age (LSA). This paper contributes to this debate through a formal assessment of the chronological frameworks, subsistence patterns and technological innovations during the MSA and LSA in northern and southern Tanzania.

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Strategies for community engagement in management and conservation of cultural resources at Mumba rock-shelter, Tanzania

Mumba rock-shelter and the surrounding landscapes are places where evidence for the evolution of modern humans (*Homo sapiens sapiens*) and their cultural practices has been uncovered. Deep and stratified archaeological deposits recorded at Mumba have shown unique distinctive technological and behavioural traits with possible connections between Middle Stone Age, Later Stone Age and Neolithic cultures. Currently, the shelter is used for ritual and other religious practices. Despite such connotations, Mumba rock-shelter lacks a reliable management plan. This paper therefore addresses the current challenges facing the site and proposes mitigation measures for creating a sustainable cultural heritage management and conservation plan for Mumba and other potential cultural heritage sites across the Lake Eyasi Basin. Recommendations from respondents insist on collective management approaches in which national heritage agencies, researchers and local communities may team-up to improve the national recognition, awareness and understanding of the global importance, benefits and threats facing cultural heritage resources in the region.

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Ethnoarchaeology of Iringa baskets

In the Iringa region of Tanzania basket weaving is a traditional practice of many peoples; the baskets produced, alongside the technology used in their production, have evolved and adapted over many generations. Our research into these baskets revealed the variation among and between the weaving styles of Iringa region's inhabitants, how the market in which these baskets are sold has shifted in response to globalisation, how Iringa basket weavers have altered their learned technologies in response to the economic and social climate and how basket weaving — via basket weaving collectives — is now, more than ever, being used as a source of income for families (see also Young, this session). The current paper focuses on the ethnoarchaeological approach used and the principal outcomes of our 2019 field season.

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Basket making technology in Iringa Region

The basket making technology of Iringa, Tanzania, is a hybrid of traditional practices joined with the contemporary to create a unique piece of material culture. There, traditional grasses (milulu), weaving styles and design variations employed in basketry are combined with such more recently adopted commercial artificial dyes and plastic basket weaving forms to craft a product that is sold into an increasingly global market. The fact that this industry is so vibrantly active in the present required an ethnoarchaeological approach for proper documentation, as the materials and artifacts are very much a lived everyday technology and technique. As such, we sought to capture the interplay of the traditional and contemporary practices that influence this

technology by using a community-based research approach. This research reveals the continuity of transhistorical material culture and offers insight into technological developments, making the research project in Iringa highly valuable to the archaeological community.

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Basketry as women's empowerment

Vikapu Bomba is a local women's basket-making collective in the Iringa region of Tanzania that uses social media as a tool with which to develop its brand and sell its produce in the global market. Its primary goals are to revitalise the practice and technology of basket weaving in the region, to empower local women financially and socially and to increase the market value of their product globally. Ususi na Ufinyanzi is another women's basket-making collective with the goal of financially and socially empowering women, but its focus lies in sales in local and national tourist markets. This paper reports on ethnographic research that explores how women use collectives as a form of resistance to current financial structures that favour men and how the ways in which the collectives work to enter the global economy and gain access to the tourist market can also work to develop tourism in the Iringa region.

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The Iron Age ceramic production in the Southern Highlands of Tanzania: a preliminary study

The current study presents analytical results of pottery from Iringa Region in southern Tanzania carried out under the Iringa Region Archaeological Project (IRAP). Such pottery was collected from the surface and excavation of test pits in 2018 and 2019 respectively. A total number of 124 diagnostic potsherds from 11 sites were analysed in an attempt to understand chronology, traditions and distributions. The results indicate that pottery in Iringa shows similarities to different traditions belonging to the Early Iron Age (EIA) or Later Iron Age (LIA). These traditions include: the EIA of Mwangia/Kamnama (third and fifth centuries A.D), Ivuna dating between AD 1200 and 1400 and Uvinza dating to the twelfth century AD. A few LIA potsherds of Swahili type were represented by arc-incised carinated vessels (c. AD 1700–1900). Such variability of traditions could also indicate aspects of trade and interactions over time with the coast and the southern region.

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Metals and Hehe society: archaeology, sociology and the technology of iron production in Kalenga-Iringa, Tanzania

Although Iringa is well known for its Stone Age cultures, it is important to note that Iron Age studies there, particularly on iron production, have received insufficient research attention. There are reasons for this inconsistency, including financial, technical, policy, research interest and geographical factors. The purpose of this paper is to unveil the archaeology, sociology and technology of iron production in the region. With archaeology, the paper examines available

archaeometallurgical remains, including furnaces, tuyères, slags and pottery. It is important to explore the social and technical implications of the archaeometallurgical remains. In the end, the aims of this paper are discussed in relation to the available literature in order to identify the uniqueness or similarity of iron production in Kalenga-Iringa compared to other places in Africa.

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Technology, behaviour, and environments during the MSA–LSA transition in East Africa: lessons from Professor Pamela Willoughby.

This paper examines the technological attributes of the Middle Stone Age (MSA) to Later Stone Age (LSA) transition period against the background of behavioural patterns and environmental confines experienced by early modern humans during the Late Pleistocene period in East Africa. It proposes that technological changes during this transition period triggered new forms of behaviour and environmental use patterns, opening up the region for enhanced mobility and exploitation of the environment by the early modern humans. A north-south movement and *vice versa* is discernible, especially in the materials from sites in the Central Rift Region of Kenya and those from northern Tanzania, which also have similarities with southern Tanzania. The paper borrows a lot from the important lessons learnt from Professor Pamela Willoughby under whose guidance materials from the Central Rift Region of Kenya were analysed to establish the interaction between early modern humans on the one hand and technology, behaviour and environment on the other. Against these interactions, innovative attributes on technology emerged which characterise the Late Pleistocene period in East Africa.

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An ESR dating mystery – solved?

Excavations at Magubike rockshelter, Tanzania, yielded bovid teeth and shells of the land snail *Achatina* sp. Both teeth and shells are good materials for ESR dating. However, the ESR ages for the Magubike teeth were significantly younger than those for the shells. At Mumba Cave the dates from shells and teeth agreed, so in principle these shells are suitable. Studies of the Magubike shells showed that they contained a silicate as well as calcium carbonate and that the conventional ESR spectral peak was overbroad. Contrastingly, the spectral peak for the Mumba shells was normal, suggesting an underlying interference at Magubike. When the Magubike spectra were remeasured at low power (0.01 mW vs. ‘normal’ 5 mW), the ‘dating’ peak narrowed and the ages decreased. However, the S/N ratio is high and so the uncertainties are large. Nonetheless, this is a promising start to obtaining reliable ESR dates from these shells.

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What we don't know and what we think we know: survey results from Iringa, Tanzania

The Iringa region archaeology project surveyed near the town of Iringa, southern Tanzania, in 2016 and 2018. This work helped to clarify our understanding of the culture-history of the region, but also raised further questions. This paper synthesises some of what we think we know and lays out some suggestions for future archaeological research in the area. What is clear is that Iringa features a long cultural sequence. Analysis has revealed patterns in lithic procurement, typology and technology that are thought to correspond to the Early Stone Age, Middle Stone Age and Later Stone Age. However, it is not yet certain what these patterns imply in terms of human behaviour and adaptation. More palaeoenvironmental and chronological information would be helpful in this regard. Additional comparative work is also important for situating the Iringa Stone Age in a larger Tanzanian context. Finally, the Iron Age and historic record requires further study.

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The Iringa Region Archaeological Project: concluding thoughts

The Iringa Region Archaeological Project (or IRAP) began in 2005 when I was shown a number of rockshelters in this part of the Southern Highlands of Tanzania. At that point, it was known to archaeologists only as the location of the Acheulean site of Iringa, and to historians as the nineteenth-century home of Chief Mkwawa and the centre of resistance to German colonialism. But Iringa has proven to contain much more. In seven field seasons, members of IRAP have identified numerous sites ranging in age from the Acheulean to modern times. Two rockshelters, Mlambalasi and Magubike, have produced a more-or-less continuous archaeological record from the Middle Stone Age (MSA) to present, along with MSA human teeth and ostrich eggshell beads. This paper summarises the research that has been done under the IRAP label. This includes cultural heritage research done in association with local communities.

12. LES ÉTATS SÉNÉGAMBIENS SOUS L'ÈRE ATLANTIQUE: LES DYNAMIQUES DE L'ÉCONOMIE MONDE DANS LA TRAITE ATLANTIQUE (Sidy NDOUR)

Cette session examine l'impact de la mise en place de l'économie monde sur les sociétés sénégambiennes sur la longue durée. Elle examine l'évolution des sociétés sénégambienne sous l'ère atlantique dans une perspective régionale (Sine et Saloum, Gaadjaga, Baol, Buundu, etc.) et sous-régionale (Sénégal, Gambie et Guinée). Également, elle étudie la manière dont les sociétés sénégambiennes et occidentales ont interagi dans le temps et l'espace.

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Senegambian tobacco pipes: trade networks and aesthetic connections

Within a half century of contact with the Americas, tobacco became a mainstay of West African life. Regional artisans began producing pipes giving rise to a new craft specialisation. Archaeologists have created detailed typologies of these objects noting regional styles. This paper brings together pipes from Senegambia and Guinea to assess aesthetic connections and exchange.

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Trading under the cover of transnationalism: structure and strategy of Transatlantic slave trading networks of nineteenth-century coastal Guinea

Historically, a majority of archaeological research of West African slave trading sites has focused large-scale coastal trading establishments, while secluded inland sites are more often left overlooked. This paper discusses archaeological excavations conducted in the Rio Pongo region of coastal Guinea where, as Britain pressured European and American imperial powers to join in anti-slave trading endeavours in the early portion of the nineteenth century, imperial surveillance was scarce and both the legal and contraband trade continued to succeed. In these situations, foreign traders were able to integrate themselves into local networks, gaining access to social and material capital and creating a new class of transnational trading families that would direct the evolution of local environmental, social and political landscapes.

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Impact of the Atlantic expansion at Baol (c. 1450–1900). The case of Lambaye: preliminary results

The arrival of Europeans on the West African coast in 1444 began a period of regular contact between northern Senegambia and Western Europe. According to historical Senegalese and Western sources, this contact favoured the establishment of a 'world economy' based on trade in European trafficking products with Senegambian trading products. This contact also gradually created social, political and economic upheavals in the Senegambian kingdoms and

favoured the centralisation of power in the Baol in the 1700s. Focusing on a multidisciplinary methodological approach, this paper examines the nature of the impact of Atlantic trade on population dynamics and on the process of political, cultural, social and economic evolution of the Baol.

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Excavating vocation: a new look at missionization in colonial Senegal

In the mid-nineteenth century, Senegal became the site of an entirely new model of colonial missionisation, one in which African women were not only regarded as prospective converts, but as missionaries themselves. In 1858, two Senegambian women entered into the religious life as founding members of the Daughters of the Holy Heart of Mary, the first Sub-Saharan African order of Catholic nuns. This paradigm shift in West African missionisation calls for an archaeology not simply of conversion, but of vocation. At St Joseph's Convent (Ngasobil), practices integral to the sisters' ministry included both the spiritual and the mundane. In particular, the practices of vocation most visible to neophytes and potential converts centred on hygiene and healthcare-related services provided by the sisters. Drawing on excavations at St Joseph's, this paper explores how medical and hygienic practices characterised the lived experience of vocation as a calling and as a source of care.

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L'archéologie sous-marine et l'histoire du commerce atlantique en Ségambie

L'étude du commerce atlantique en Ségambie connaît un sérieux handicap. Elle a longtemps privilégié les sources écrites pourtant insuffisantes et fragmentaires, et archéologiques (terrestres) autour des années 2000. Elle étend désormais son champ d'intérêt à l'archéologie sous-marine. Notre projet de recherche aborde la problématique de l'apport de l'archéologie sous-marine à l'étude de l'histoire des interactions culturelles atlantiques dans la presqu'île du Cap-Vert. En raison de leur capacité à traverser l'Atlantique avec une relative facilité, les navires négriers sont les principaux moyens de transport de personnes, de marchandises, des idées et des croyances au cours de la période historique. L'importance de leur rôle peut-être mieux démontrée par le fait que « *un navire était la machine la plus grande et la plus complexe produite* » (Muckelroy 1978: 3).

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Les bas fourneaux de Golmy : Histoire et archéologie d'une sidérurgie

Le village de Golmy se situe dans la Haute Vallée du fleuve Sénégal, dans l'ancienne province historique du Gajaaga. Durant notre recherche doctorale, les études archéologiques et les enquêtes ethno historiques que nous avons menées dans ce village, nous ont permis de localiser des sites archéométallurgiques. Il s'agit de sites caractérisés par des restes de bas-

fourneaux, des tuyères et des scories. Ces indices témoignent de la pratique ancienne de la sidérurgie. Notre étude part ainsi des données orales et archéologiques pour reconstituer l'histoire de la production ancienne du fer à Golmy. Les méthodes analytiques, telles que le XRF et le XRD sont aussi utilisées pour reconstruire les matières premières utilisées pour la production de fer dans cette région. Les datations de radiocarbone sur les échantillons de charbon font état d'une industrie sidérurgique entre le 16ème et 17ème siècle.

13. CHRONOLOGY AND DATING OF ROCK ART

(Adelphine BONNEAU and David PEARCE)

A long-term difficulty in studying rock art world-wide is the lack of chronology and absolute dating. This problem is, if anything, more acute in Africa. Without clear chronologies it is difficult to correlate rock art with other archaeological and historical sources and, indeed, to perform subtle temporal and spatial studies of the art itself. The last decade has seen developments of dating methods and a considerable increase in the number of ages available for rock art images. This session draws together papers dealing with new data obtained on rock art in Africa (whether with relative or absolute dating), new methods for the investigation of its age, and discussions on the methods and their results and implications for African archaeology.

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Rock arts in northern Ghana: issues of chronology and interpretation

Rock arts have been identified in many cultures in Africa that depicted aspects of their culture and environment. In Eastern, Northern and Central Africa, serious efforts have been made to research into their rock arts and their absolute dates. The story, however, is different from Ghana and other West Africa countries. The first rock art was discovered and published in 1964 in Tusik in northern Ghana during the boundary demarcation between Ghana and Togo, but has not been dated. Other rock arts were discovered and published in 1961, without corresponding dates as well as their locations. Recent discoveries within the Nakpaduuri Escarpment probably point to these unknown sites such as Naama-Tampiook, Gingana and Kpatiritinga. Efforts made to date these rock art sites, have not been successful. However, recent archaeological excavation at Naama-Tampiook produced an eighth-century date based on radiocarbon analysis of a charcoal sample. The rock arts themselves have not been dated due to a lack of professional expertise in this field of studies.

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A late Pleistocene painted rock art in southern Africa? New insights from Pomongwe Cave, Zimbabwe

Although regularly suggested, the existence of a Pleistocene painted rock art in southern Africa has yet to be archaeologically confirmed. Painted spalls have been mentioned by Nick Walker in post-Last Glacial Maximum levels at a few sites in Matobo (Zimbabwe), particularly at Pomongwe Cave. However, the implications of these remains — fragments of painted walls or palettes? — and coloured deposits — natural crusts or paint layers? — are still pending. Since 2017, the MATOBART programme has been studying this question through an interdisciplinary approach combining taphonomic and technological analysis of the decorated walls and coloured remains, new excavations and reassessment of archaeological collections. The first results now allow us to distinguish two different paint recipes within a wide range of natural deposits in the late Pleistocene levels that help to clarify the chronocultural sequence of occupations in the shelter as discussed in this presentation.

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Physicochemical and microbiological analyses on East African rock art. An integrated approach from the Borana zone (southern Ethiopia)

This paper presents preliminary results of a new project on rock art in southern Ethiopia, specifically the Borana zone. The area, scarcely investigated in the 1940s and 1990s, reveals an abundant presence of rock art sites, with an impressive density of paintings and a variety of subjects and styles. This evidence can contribute to radically modifying the traditional interpretation of Ethiopian rock art, suggesting new implications for local and inter-regional cultural connections and for the origin of pastoralism in the region. A multi-analytical approach combining archaeology and palaeoenvironmental studies with chemical, bio-chemical and microbiological investigations leads to the identification of the presence of complex processes acting on the rock surfaces depicting rock art and promoting their physical, chemical, and biological weathering. Preliminary results from field observation, characterisation of pigments and bacterial activities are discussed, as well as the effects of weathering processes in terms of the dating and conservation of rock art.

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Making history: integrating rock art and archaeological deposit datasets in the uKahlamba-Drakensberg, South Africa

The integration of knowledge derived from rock art and archaeological deposits is a primary challenge facing archaeologists who desire to construct historical narratives for Holocene

hunter-gatherers. A key challenge integrating these datasets has been the creation of an absolute chronology for the paintings to complement evidence from dated excavations. This is particularly evident in the uKhahlamba-Drakensberg, which has an abundance of rock paintings. In late 1980s and 1990s we began to obtain secure dates for the paintings. This included the recovery of a c. 1800-year old painted slab from an excavation, while AMS ¹⁴C dating of crusts associated with paintings showed that they dated back to around 3000 years ago and perhaps even earlier. This presentation will reflect on the dating of the rock art in the uKhahlamba-Drakensberg and its integration with knowledge obtained from excavations and on the need for more targeted dating programmes.

BREAK

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The contribution of radiocarbon dating to understanding Later Stone Age rock art

Most researchers would agree that having more direct dates on rock art is useful, yet what may be done with those dates is often less clear. This paper explores what may be done with a series of radiocarbon dates coupled to characterisation of the paintings, using examples from southern Africa. Direct radiocarbon dates open up the possibility of apprehending how panels of paintings were created: what seems like a unified scene at first look may in fact be the results of several additions, as found at RSA FRE4. This implies new ways of considering and interpreting rock images with respect to the creation, organisation and occupation of a painted site. Coupling data from several sites, this paper discusses how direct dates add to the understanding of change over time in the art (images and paint recipes) within a region.

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Plasma oxidation for AMS radiocarbon dating of rock art: past, present and future for African rock art

This presentation discusses the preliminary use of plasma oxidation for preparing samples from African rock paintings for AMS radiocarbon dating. The technique, developed nearly 30 years ago, provides a way of selectively oxidising organic carbon, either from black pigments or amorphous binding media, in the presence of carbonates and oxalates. The authors are part of an ongoing National Science Foundation-funded study to better understand the capabilities and limitations of this approach. Rock art from the Maclear district of the Eastern Cape Province, South Africa, and from the Metolong Catchment, Lesotho, were prepared for dating by both plasma oxidation and a chemical process. Results are coherent for samples dating from the historical period. However, they show slight discordances for older figures. Reasons for this are proposed and opportunities for future applications described.

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Some thoughts on rock art dating: pitfalls, limits and perspectives

The age of rock art, its determination and its interpretation are widely debated. A recent example is the number of articles and responses that followed the publication of dates for Spanish rock art that supposedly proved that Neanderthals created it. Being able to get a date is one thing, but having a reliable date and interpreting it correctly are not that simple. Indeed, there is often a gap between the creation of the paintings (the event that archaeologists want to date) and the age obtained, which reflects previous or posterior events. The aim of this presentation is to introduce the limits and pitfalls currently faced by scientists and archaeologists on rock art age determination and interpretation and to propose actions to avoid them based on southern African examples.

14. ARCHAEOLOGY AND PALAEOECOLOGY AT OPEN-AIR PREHISTORIC SITES

(Michael TOFFOLO, Kristen WROTH and Britt BOUSMAN)

14th September

The interpretation of the archaeological record at prehistoric sites depends primarily on its degree of preservation. In this regard, caves and rock shelters may offer long sequences of relatively undisturbed deposits that help the preservation of artefacts and sedimentary matrix. However, sheltered sites are not always available and often provide a biased view of some important human activities, such as foraging behaviours typical of hunter-gatherer groups that took place in the wider landscape. This information may be retrieved from open-air sites, although these are located within active sedimentary systems that may alter or obliterate traces of past occupations. Such gaps in our understanding hinder the interpretation of human-environmental interactions at key stages of human evolution. There is thus a need to better characterise the depositional and taphonomic contexts of open-air sites by looking at both macroscopic and microscopic records, especially where sediments are affected by the action of water. This session therefore aims at exploring geoarchaeological and palaeoecological approaches that can improve the assessment of the archaeological record at prehistoric sites in alluvial and lacustrine landscapes. Methods may include (but are not limited to) micromorphology, infrared spectroscopy, absolute dating, stable isotopes, phytoliths, pollens and high-resolution spatial analysis.

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Unravelling site formation at a multi-component Middle Stone Age/Later Stone Age scatter on the Doring River, South Africa

Persistent focus on rock shelters in the reconstruction of southern Africa's deep past creates biases at multiple spatial scales, distorting our understanding of human land use and demography. The focus is pragmatic, however, given problems associated with extracting behavioural information from open sites that are often deflated. Uitspankraal 7, located on the Doring River, South Africa, is an eroding dune site with surface-exposed material implying occupation from the Still Bay to the Neolithic. Using a combination of artefact mapping, random clast sampling, OSL dating and geochemistry, this paper explores the complex relationship between artefact distribution and site formation. Results suggest rapid but pulsed sediment accumulation over the last >50,000 years, with long periods of surface exposure that facilitated artefact redistribution. More recent erosion has erased younger deposits from part of the site, exposing the dune core and the more ancient material it preserves. The results caution against simplistic behavioural interpretation from spatial patterns in surface material.

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Palaeoenvironmental comparison of Oldowan sites from the Homa Peninsula, southwestern Kenya

The Homa Peninsula of southwestern Kenya has yielded three separate and extensive accumulations of Oldowan artefacts often associated with abundant faunal remains and a wide variety of geoarchaeological environmental indicators. The three localities, Kanjera South, Nyayanga and the Sare River, preserve a range of environmental settings and can potentially be used to assess the ecological adaptations of Oldowan hominins. Archaeological investigations show both similarities and differences in Oldowan hominin behaviour between the three localities. Here, we present sedimentological, geochemical, floral and faunal evidence of their palaeoenvironments within a temporal framework. This provides a background against which evidence of differences in hominin behaviour among the three localities may be evaluated.

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Formation processes and palaeoenvironments at the Cornelia-Uitzoek hominin site, Free State, South Africa

The Cornelia-Uitzoek fossil site has produced a large collection of bones, Acheulean artefacts and a *Homo* sp. tooth dated to ~1 million years ago. The faunal assemblage defines the Cornelian Land Mammal Age and is characterised by a number of extinct species of large mammals that reflect an open grassland environment. Previous studies established the absolute chronology of the site and a broad stratigraphic sequence. However, the sedimentary units identified in the field were not linked to specific formation processes, thus limiting the understanding of the depositional history of the site and its potential for reconstructing Pleistocene environments. Using a micro-geoarchaeological approach based on infrared spectroscopy and micromorphology of sediments, we were able to determine the formation and post-depositional processes of the entire stratigraphic sequence and to show that the site is characterised by alluvial sediments that accumulated under different river flow regimes.

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Lessons from a lakebed: unpicking human occupation and hydrological change in the southern African interior

New research from the Makgadikgadi salt pans, Botswana, formerly one of Africa's largest lakes, has used landform and archaeological site mapping, *décapage* excavations and sedimentological and OSL dating, together with lithic geochemical fingerprinting, to tease out the record of human landscape use in relation to changing environmental and hydrological conditions. These data suggest that the basin was used during seasonally dry periods when the mega-lake was ephemeral or absent at some time during the period 84–62 kya. *Chaîne opératoire* analyses on the lithic material suggest that some sites are remarkably well-preserved, having been buried during lake high stands and re-exposed by deflation. Integration of palaeoenvironmental archives with geoarchaeological data through interdisciplinary research such as this, is beginning address fundamental knowledge gaps in the narrative of human adaptation and environmental change in the southern African interior.

BREAK

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From wetland to terrestrial landscape: micromorphology and stable isotopes of open-air Middle Stone Age sites in Malawi

Both Mwanganda's Village and Bruce (Karonga District, Malawi) are archaeological sites located at the distal margins of an alluvial fan system. An episode of lagoonal deposition and wetland formation overlies early fluvial sediments. Palustrine-pedogenic carbonates from soil horizons in the top of the wetland deposits have been subjected to micromorphology, cathodoluminescence microscopy, stable oxygen and carbon isotope analysis and radiocarbon dating. The soil horizons reflect a slow, transitional period of seasonal dryness and episodic flooding. Optically stimulated luminescence indicates that archaeological assemblages at Mwanganda's Village date to ~26–15 ka, and to ~31–29 ka at Bruce, while palustrine carbonates from both site areas date to ~33–20 cal ka. Our results suggest that for millennia Middle Stone Age foragers utilised a mosaic landscape, with large pockets of forested wetland co-existing with drier, better drained, areas. This is quite different from the modern situation of active stream downcutting, erosion and open agricultural landscapes.

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The role of the Kalahari in hominin evolution: a perspective from the open-air sites of the Kathu Complex

The Kathu Complex refers to a group of extraordinarily rich Pleistocene archaeological localities in the area around the town of Kathu (Northern Cape Province, South Africa). Kathu Pan is a series of sites exposed by recent sinkhole activities that have yielded archaeological assemblages from the Early Stone Age (KP1, St4b), Fauresmith (KP1, St4a; KP6, Bed 12), Early Middle Stone Age (KP1, St.3; KP6, Bed 11), Howiesons Poort (KP6, Bed 9-10); and Later Stone Age (KP6, Bed 6). Kathu Townlands is an Acheulean site of extraordinary density. Bestwood 1 is an extensive Fauresmith locality located in a sand-filled valley to the east of Kathu. Exploring such a dense record of hominin activity in an open-air context presents unique challenges. This paper discusses issues related to determining age of occupation, aspects of site formation, the use of remote sensing and the protection of archaeological localities in the face of large-scale development. The Kathu complex also raises significant questions relevant to our understanding of group size in early genus *Homo* and the palaeoenvironment of the Kalahari Basin that are also briefly discussed.

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Revisiting Pniel 6, South Africa

The transition from the Early Stone Age (ESA) to the Middle Stone Age (MSA) in the central interior of South Africa is characterised by the first appearance of modern humans as well as by heterogeneous lithic assemblages, varying in raw material as well as in technological forms. With a very limited number of caves and rock-shelters in the region, the open-air sites along the lower Vaal River have been a crucial part of this debate. Pniel 6 is one such archaeological open-air site situated on the south bank of the lower Vaal River. We present results from four seasons (2017–2020) of archaeological fieldwork at Pniel 6, focusing on geoarchaeological and faunal aspects, including enamel stable isotope geochemistry. The results are discussed within the framework of the Pleistocene palaeoecology of the Northern Cape region and its reflection in transitional lithic assemblages.

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Allostratigraphy and archaeology: the alluvial record in the Modder Valley, South Africa

The application of allostratigraphic methods applied to geoarchaeological evidence in alluvial settings provides a valuable approach for understanding the general stratigraphic context of *in situ* Quaternary archaeological occurrences. Allostratigraphy relies on the identification of mappable unconformities that consistently separate sedimentary/soil units by integrating pedological, sedimentological and stratigraphic methods. The application of soil and

sedimentary stratigraphic approaches allows for a more precise contextual characterisation of archaeological materials and provides a more nuanced framework for determining coeval and asynchronous palaeoenvironmental and behavioural relationships in alluvial sediments. The identification of allostratigraphic units provides a direct method for the correlation and comparison of archaeological materials in sedimentary sequences. This approach is more informative than those using simple lithological units. In some cases, the distinctive nature of specific allostratigraphic units can be mapped and correlated over large areas. Examples are provided from the Stone Age site of Erfkroon and the Modder River terrace deposits.

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Palaeoecology of the Middle-to-Later Stone Age sites of Lovedale and Damvlei, Free State, South Africa

This paper presents the results of phytolith, FTIR and micromorphological analyses on sediment samples collected from the Middle Stone Age/Later Stone Age open-air sites of Lovedale and Damvlei, near Bloemfontein, South Africa. This combination of analyses allows us to understand the natural formation processes and changes that the sites underwent while providing insights into the past environment and plant communities in the area. This reconstruction gives a context for shifts in modern human behaviour (e.g. hunting/gathering strategies) during a not fully understood period of evolution. Such studies are important as they tackle areas that are understudied due to preservation concerns. Our analysis shows a rich phytolith record with shifts between drier and wetter periods. The geoarchaeological analysis provides information on local water sources, including a shifting river course and the appearance of seasonal lakes. Though often overlooked, the interior of South Africa and its open-air sites offers a wealth of environmental data when multiple techniques are integrated.

15. EXPLORING MOBILITY IN AFRICAN ARCHAEOLOGY

(ANNEKE JANZEN AND KATHERINE GRILLO)

15th or 16th September

From highly planned seasonal migrations to stochastic movements, mobility has allowed foragers and pastoralists to cope with environments characterised by marked seasonality and unpredictable resource distributions and at the same time to avoid various social and environmental threats. Exchange represents a different axis of mobility, reflecting social networks and connections within and among groups. Movement of material culture, animals and people across landscapes and social groups offers another way of understanding how social networks provide an avenue for negotiating shifting social and ecological landscapes. These kinds of mobility have been extensively documented ethnographically, but the ephemeral nature of most sites occupied by mobile populations poses some challenges for archaeological inquiry. Fortunately, exploring mobility in the past can be achieved through a range of methodologies including, but not limited to, elemental and stable isotope analyses. This session includes papers examining different aspects of mobility, including the mobility of individuals, movements of materials through exchange networks and the spread of ideas and technologies. It seeks to open up dialogues on the role of mobility in different contexts in African archaeology.

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Mobilities, notions of the past and the creation of identities in Zimbabwe from the Iron Age to the present

One of the most enduring questions in Zimbabwe today is that of the origins and identities of her different peoples and the making of communities since the Iron Age. There has been a general tendency among scholars to perceive ethnicity and religion as the most powerful primordial forces that create shared beliefs and practices. This paper seeks to argue that mobilities have not been adequately explored in unpacking the creation of identities, traditions and communities. The movement of people since the Iron Age has been motivated by a complex interplay of factors. Mobilities have not only led to shared experiences, but have also pervaded primordial identities and traditions by making them fragile and, thus, keeping them in a perpetual state of impermanence. As a result, the movement of people constantly shapes and reshapes the reality of who they are and how they relate to the past, sites, places and other environmental phenomena.

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Mobilité, transformations et interactions dans le pays Soninké

De par sa position géostratégique entre les limites naturelles dans l'ouest africain et de ses rapprochements aux mines d'or de Bambouck et de Buuré, le royaume de Gajaaga (du neuvième au dix-neuvième siècles) connut une instabilité sociopolitique, économique, religieuse, sanitaire et naturelle favorisant la mobilité des personnes, des objets, des transferts techniques et technologiques au cours des derniers siècles du second millénaire ap. J.-C. De ces

divers mouvements de populations, les groupes sociaux ont connu des transformations identitaires, sociopolitiques et économiques (système capitaliste) tout au long de leur trajectoire historique. Les mutations sociales résultant de ces migrations restent des questions peu documenter en archéologie et en anthropologie en général. Nous présenterons à travers cette communication quelques-uns des premiers résultats de nos recherches et à analyser des mutations intervenues dans le paysage de Moudery qui jusqu'à ici reste une zone inexplorée en archéologie.

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New radiocarbon dates for two Pastoral Neolithic sites in south-central Kenya

Evidence for the earliest pastoralist occupations of central and southern Kenya was recognised over four decades ago. By present-day standards, most such sites have limited numbers of conventional radiocarbon dates on charcoal and bone. This presentation reports new AMS radiocarbon determinations from Prolonged Drift (GrjI1), on the Nderit River floodplain in Kenya's Central Rift, and Vaave Makonge (GvJm44), at Lukenya Hill on the Athi-Kapiti Plains. These dates were run as part of Louise Le Meillour's project assessing the utility of ZooMS with Holocene East African zooarchaeological materials. Le Meillour *et al.* report on her wider ZooMS research results in another presentation at this conference, while this talk focuses on the implications of a more secure temporal context for these two sites, each of which displays unique features.

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Turkana pillar sites and early pastoralism revisited: considering mid-Holocene social and economic changes through the lens of mobility

Northwest Kenya saw dramatic environmental, economic, and social changes 5000–4000 BP: Lake Turkana shrank to half its former size, fishing gave way to herding and people began constructing monumental cemeteries with hundreds of burials. Previous research has built a chronology of these changes, assessed the degree of in-migration versus local innovation and examined variation among early pastoral mortuary sites. It is often assumed that the shift from fishing to herding required or accompanied increased mobility in a more arid climate regime. However, this assumption has never been properly evaluated and the causal relations between changes in mobility versus economic foci and social customs remain murky. This paper outlines our approach to tackling these questions in future research. In particular, we emphasise the distinction between 'material mobility' (movement of animals and objects) as opposed to 'personal mobility' (movement of individuals and groups) as herding took hold amidst rapid social and ecological change.

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Spectacle and secrecy: exploring the materiality of community memory and cremation practice in the Pastoral Neolithic of Kenya

Across Africa, funerary contexts linked to ancient herders have often shared the central similarity of stone architecture, ranging from cairns and circles to clusters of pillars. Built cemeteries are conspicuous points on otherwise ephemeral pastoralist landscapes and are considered to be places that aid in negotiating community identity, social networks and other factors of cultural investment. Less is known about hidden spaces in pastoralist funerary traditions, where overt commemorative architecture is absent. Cremation burial sites dating to the Pastoral Neolithic (~3000–1000 BP) in southern Kenya are found in rock-shelters and caves and, in one instance, a deliberately buried hillside crevice. Lacking in built structures, these sites nevertheless reflect significant social investment involving extensive collection of pyre fuel, crafting of grave goods and post-mortem alteration of bodies. The significance of hidden cemeteries on the pastoralist landscape is considered here through the lens of detailing community practice at several cremation sites.

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Donkey mobility in the Pastoral Neolithic: new isotopic results from Luxmanda

Donkeys (*Equus asinus*) are important in pastoral societies. As the primary pack animal in eastern Africa, they enable herders to make repeated and/or long-distance residential moves and are key to daily tasks such as transporting firewood and water. Today, donkeys are typically not consumed among pastoral populations and they also seem to be rare in archaeological sites. Luxmanda (Tanzania) is the largest and southernmost known Pastoral Neolithic site and its early date signals a rapid expansion of Pastoral Neolithic (PN) herders across the region. Luxmanda is one of the few PN sites to preserve donkey remains. We present here the first $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ data of sequentially sampled donkey teeth in eastern Africa. These data shed light on seasonal variation in diet and the environments in which donkeys were herded. Compared against extensive isotopic data from cattle and caprines, this dataset offers a new avenue through which to explore early pastoral mobility.

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Mobile Sedentism? Settlement and movement among the Marakwet of northwest Kenya

Much discussion of mobility in the African past has explicitly focused on cases of continuous, far-ranging nomadism, particularly amongst ‘hunter-gatherer’ and pastoralist populations. However, this paper argues that more constrained mobility is also an integral part of the history of more seemingly settled agriculturalist communities. It combines survey and oral historical data to chart the 300-year long history of Kacheseker, a Marakwet settlement on the Elgeyo

Escarpment, northwest Kenya. These data reveal a diversity of movements relating to both everyday life and the gradual shift of ‘villages’ across the landscape through time. Indeed, these settlements are perhaps best understood not as discrete ‘villages’ *per se*, but as flexible distributions of habitation attuned to both historical and ongoing changes in environment, land use and livelihood, as well as exemplars for the habitual and central importance of mobility within even geographically restricted histories of rural African settlement.

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Landscape and tangible evidence associated with exchanges along the caravan routes in the Transnational Reserve W (Bénin, Burkina Faso and Niger)

Park W is a transnational reserve shared between Bénin, Niger and Burkina Faso and its creation dates back to the 1950s by the colonial administration. The Niger part of the W was inscribed on the Unesco World Heritage list in 1996. The Bénin and Burkina Faso parts were inscribed in July 2017. Long before the choice and delimitation of the area that constitutes the reserve, several caravan routes existed that linked the various human settlements located in this park today, on the one hand, and connected them with localities far beyond, on the other. Completely abandoned with the creation of the reserve, some of these caravan routes were taken over by the forestry administration in monitoring the Park. This research, which combines documentary research and field investigation, aims to present the tangible witnesses and ideal traces associated with these channels of exchange.

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The Marine Isotope Stage 5 stone artefact record and the variability of human occupation in Contrebandiers Cave in northwest Morocco

The most recent excavations (2007–2010) of Contrebandiers Cave on the Atlantic coast of northwest Morocco revealed a rich and diverse material record of human presence in the region during Marine Isotope Stage (MIS) 5 and early MIS 3. Previous publications have reported on the stone technologies, subsistence patterns, use of marine resources, palaeoenvironmental conditions and absolute chronology of several Middle and Later Stone Age occupations during those stages. Here, we present the results of a new analysis of the stone artefact record of the MIS 5 occupations. The general techno-morphological aspects of these stone artefact aggregates were published previously. In this paper, we thus present the modelling of selection, flaking, exploitation, reuse and movement of stone using experimentally based inferential framework. Our results inform on temporal variations in human mobility and resource economy within and during the last interglacial period in this region.

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Monasticism and mobility: the case of Ghazali, Sudan

The monastic site of Ghazali, located within the Bayuda Desert of Sudan, was occupied for approximately 600 years from the late seventh into the thirteenth centuries AD. The desert location of Ghazali has brought forth questions about the potential for mobility of the monks coming to reside at the monastery, while uncertainty remains regarding the similar potential mobility of the inhabitants of the nearby lay settlement. To address these questions of mobility, a pilot study of oxygen ($\delta^{18}\text{O}_c$) and strontium ($^{87}\text{Sr}/^{86}\text{Sr}$) values from human dental enamel was undertaken for a subset of individuals buried within the four cemeteries associated with Ghazali: the proposed *ad sanctos* cemetery (n=4), the monastic cemetery (n=41), the lay settlement cemetery (n=4) and a cemetery of as yet unclear function (n=2). This study examines the implications of potentially local and non-local individuals residing within the environs of Ghazali.

16. COMPLEX SOCIETIES REVISITED

(Plan SHENJERE, Gilbert PWITI, Jorge de Torres RODRÍGUEZ, Elton SAGIYA and Shadreck CHIRIKURE)

17th September

This session re-visits and explores the development of complex societies, either states or other polities, in Africa and the wide array of interactions that framed the relationship between them and the stateless societies in contact with them, either outside or within their borders. The objective is to provide a richer and more accurate vision of the developmental frameworks, nature and character of pre-colonial African complex socio-political formations. This includes exploration of the economic, religious, ideological and political factors that evolved into spheres where groups with highly different political systems could interact, co-operate or even develop shared identities based on common interests and the manifold ways in which authority, legitimacy and control were achieved or contested. An understanding of these developments has direct relevance to societies today and in the future, particularly in those contexts where there are demonstrable historical and cultural links between the past and the present people. This session invites papers from archaeology and related disciplines in the form of reports on recent research, re-examinations of past approaches and theoretically based papers offering new paradigms for the investigation and understanding of the road to complexity on the African continent that cover: 1) interactions between African states and stateless societies in a broad sense (from Ancient Egypt to the twentieth century); 2) the role of minorities within African states; 3) strategies of statehood and state consolidation; and 4) strategies of dissent and resistance. Note that the session focuses on African complex systems (states) and does not examine the interactions between colonial European powers and African societies.

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From enemies to trading partners — the exchange between Hierakonpolis and the A-Group people of Lower Nubia (c. 3460–3100 BC)

The ancient state of Egypt emerged during the latter half of the fourth millennium BC. Hierakonpolis in southern Egypt was one of three centres where institutionalised political organization developed. From c. 3600 BC, the chieftains of Hierakonpolis launched well-organised military attack on the so-called A-Group people, an indigenous group in the northernmost part of Nubia. The A-Group people lacked centralised political organisation and were probably organised as corporate lineage groups. After several episodes of war whereby the A-Group people retreated southwards, an ethnic boundary was forced into existence around 3460 BC. This ethnic boundary structured the relationship and interaction between the two groups during the following centuries. This paper focuses on how trade became a common interest and examines how exchange influenced political and ideological developments both in the regional power of Hierakonpolis and among the A-Group people.

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Pottery, trade and diet in the archaeology of Surame, Nigeria

Key to many discussions of the paths to complexity in West Africa is the control of intermediate trade as a basis for the power exercised by Sahelian empires such as Ghana, Mali and Songhay. However, with the fall of the Songhay empire, and the subsequent decline of centralised power in the eastern Niger River Bend, political and economic power shifted to northern Nigeria, including the site of Surame. This political revolution in the early sixteenth century, which led to the emergence of the kingdom of Kebbi, was accompanied by the diversion of long-distance trade networks along the Niger Valley so that they converged on Surame. The research discussed in this paper includes a phase of archaeological surveys, excavation and analysis at the archaeological site of Surame, where extensive city walls and other structural features of a large capital city survive. It aims to recover information pertinent to reconstructing traditions of pottery, material exchanges and economic subsistence.

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State formation and urbanism in the Hausa Plains of northern Nigeria

This paper looks at aspects of state formation in Hausaland using Rano as a case study. Archaeologically, not much has been done on this subject and there is a dire lack of evidence from the region despite the availability of historical documents on state formation among the Hausa of northern Nigeria. Rano was one of the seven Hausa city-states which claim to be contemporaneous with the Hausa kingdom of Kano. The abandoned site of Rano provides us with concrete evidence for the evolution of state formation system and land-use patterns in Hausaland. The paper notes that push-pull factors were an inherent dynamic that shaped this frontier, forging in the process, new types of socio-political systems and orders. It concludes by recommending more in-depth research of the site to gain a better understanding of past state system on the plains of Hausaland.

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Accessing socio-economic organisation through ceramic technology: a case study from Ntuusi, western Uganda

This paper presents the results of new research on the early second millennium AD site of Ntuusi, Uganda, obtained through the archaeometric analysis of its ceramic material. The site, which emerged during a time of considerable socio-economic change in Africa's Great Lakes, currently provides the earliest dated evidence of the region's later ubiquitous rouletted pottery. Taking a technological approach using thin-section petrography and chemical characterisation, this study has drawn out evidence of social and economic organisation and identity by examining ceramic technological traditions, raw material provenance and pottery distribution. This paper suggests the vast possibilities of using this type of analysis for interpreting a significant period in African prehistory. Fundamentally, a greater understanding of the changing way of life at Ntuusi will provide vital comparative information for examining social and political changes taking place more broadly across the continent at this time.

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Miners, managers, and consumers — an isotopic perspective on the movement and consumption of copper metal in the second millennium AD of southern Africa

Some of the richest gold deposits on Earth are located in southern Africa and one of the major issues in southern African archaeology over the past two decades has been whether external demand for gold (from the Islamic world and India) stimulated the formation of the first states between the Zambezi and Limpopo Rivers. Neither side in this debate has yet paid much attention to the apparently parallel development of the Luba state in the Katanga province of southern Congo, which was clearly not connected to the Islamic trade networks of the Indian Ocean. The wealth of this state derived from its proximity to, and exploitation of, the Katangan/Zambian Copperbelt, the world's largest source of copper. Our presentation seeks to break new ground in southern African archaeology by focusing upon trading networks within the sub-continent, using the movement of copper as a proxy for trade. The focus is on links between copper deposits of this region — these are the Copperbelt to the north, the major mines of eastern Botswana and northern South Africa and smaller mines throughout Zimbabwe — and the sequence of states that rose and fell on and around the Zimbabwean plateau — Great Zimbabwe (c. 1100–1550), Butua/Torwa (c. 1450–1680), Mutapa (c. 1450–1760) and Rozwi (1680–1835).

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New light on death in Great Zimbabwe: wider implications for mortuary studies in African complexity

Despite advances in our knowledge of Great Zimbabwe's socio-political transformations and technological complexities during the second millennium AD, very little is known about the social information of the people associated with this ancient settlement in southern Africa. Archaeological human remains from the area are scarcely known, making the location of the settlement's burial grounds and ritual practices of death enigmatic. This paper, however,

presents a growing corpus of past human remains from areas surrounding Great Zimbabwe, suggesting the existence of a richer funerary landscape and mortuary practices through time than previously imagined. Consisting of varied burial sites, mortuary goods and different parts of human skeletons, some radiocarbon dated using teeth samples to the eleventh and twelfth centuries AD, this new evidence is highly significant. This paper raises the potential and wider implications of ancient human remains from Great Zimbabwe for learning about life, social status, genetics, health, diet, wealth, death and the afterlife in one of the earliest and largest societies associated with social complexity, urbanism and statehood in southern Africa.

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The origins and development of the Nambya state, northwestern Zimbabwe

The pre-colonial Nambya state of northwestern Zimbabwe is one of several complex socio-political formations that developed in southern Africa between the eleventh and eighteenth centuries AD and that are archaeologically associated with the drystone-walled buildings assigned to the Zimbabwe Culture. Compared to the other pre-colonial complex systems of this culture in southern Africa, however, such as the Mapungubwe, Great Zimbabwe and Torwa states, the Nambya state has not received much archaeological research attention. This paper presents the results of recent major archaeological research in northern Zimbabwe that sought to obtain archaeological insights and perspectives into the origins and development of the Nambya state system. The results of the archaeological surveys and excavations show that the political organisation of the state was much more complex than suggested by the oral narratives. Similarly, a systematic analysis of the architectural attributes of over twenty stone buildings associated with the state system in this area, as well as the archaeological dating obtained from the excavations, suggests that the hypothesis that the origins of the Nambya state system were a direct result of a migration from Great Zimbabwe (as indicated by the oral traditions) requires reconsideration. The archaeological work does not, however, necessarily contradict the Nambya oral traditions, but rather indicates that the history of the state is much older and more complex.

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A complex coincidence? Observations and reflections on the development of complexity in Sub-Saharan Africa during the second millennium AD

From the early part of the second millennium AD, many parts of Sub-Saharan Africa underwent fundamental changes in socio-economic and political organisation, changes that saw the development of complex socio-political formations commonly referred to as chiefdoms and state systems. Notable examples include the Interlacustrine region in East Africa, the Upemba Depression in Central Africa, and the Shashi-Limpopo basin, the Zimbabwe Plateau and the eastern margins of the Kalahari Desert in southern Africa. What is particularly striking is the chronological coincidence of these developments, a coincidence on which scholars have occasionally commented. This paper undertakes a survey of the different socio-political formations associated with this period and engages in a critical evaluation of the explanations that have been proposed for their development. As a point of departure, it examines the available

archaeological and other lines of evidence for the different systems and adopts a historical particularist approach. This is accompanied by the deployment of recent theoretical constructs that have been placed on the table in recent years, particularly in the context of the development of post-colonial archaeologies and indigenous approaches. In the final analysis, the paper seeks to address the major questions of how and why the development of complexity took place during this particular period across this vast part of the continent and whether it was a complex coincidence or the result of related causal factors, environmental, historical, economic or political.

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The emergence of societal complexity — a global phenomenon

In many regions across the globe, societies have emerged from simple hunting/gathering or farming economies to more complex structures, paralleled by an increase in socio-political complexity. Modelling indicates that this shift may indeed be inevitable. Case studies from North America, Temperate Europe, Asia and Africa are compared and common mechanisms leading to the process and its outcomes discussed.

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The complexities of managing complex archaeological heritage places in southern Africa: examples from Zimbabwe

Managing the past of complex societies and their material remains has a long history that cuts across Africa's pre-colonial, colonial and post-colonial epochs. In this paper, we critically examine the major challenges confronting the post-colonial management of archaeological heritage sites associated with complex state societies in southern Africa with special reference to Zimbabwe. This region is home to hundreds of monumental archaeological sites that bear witness to the existence of complex societies. Many of these archaeological heritage places are made up of numerous components that represent multiple meanings to different stakeholders and interest groups resulting in complexities in both interpretation and management. Using a combination of datasets, including archival records and the results of field research, we discuss the multiple layers of complexities in the management and governance of the archaeological heritage associated with complex societies. We conclude with suggestions on how some of the complex management and governance issues raised can be addressed.

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Towards decolonisation of heritage interpretation. The case of Tsindi, a dzimbahwe site in northeastern Zimbabwe

Political independence marked a departure from mundane narratives about African archaeology and other forms of cultural heritage. The *madzimbahwe* of southern Africa have been studied for about a century under the banner of the Zimbabwe tradition. Most of the interpretations available have tended to be autotuned voices by Western theories, hence the need to revisit the concept. Not until recently have some scholars challenged the grand narratives for their marginalisation of African views. This paper advocates the production of African knowledge based on the realities of everyday life and society. As argued here using an archaeological study of Tsindi, a dry-stone walled site near Marondera in northeastern Zimbabwe, this can yield more accurate results if the production process is done without force-marching African lifestyles into anthropological theories. Tsindi has tended to be viewed as a provincial capital of a Zimbabwe state based at the Great Zimbabwe site.

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Build on diversity: states and communities in medieval Somaliland

Between the eleventh and sixteenth centuries AD, the southeastern half of the Horn of Africa was home to a number of Muslim states which extended their authority over geographically and ethnically very diverse regions, providing stability for trade and challenging the powerful Christian kingdom of Abyssinia to the north. Based on the work of the Spanish Archaeological Mission in Somaliland, this paper analyses the archaeological evidence of the diverse ethnic groups, religions and lifestyles that inhabited these Muslim medieval kingdoms and the ways in which these communities interacted among themselves and with state structures. Using the example of nomads, urban dwellers and foreign merchants in medieval Somaliland, it presents an interpretation of how these interactions could have taken place and how they could generate a cohesive state superstructure that integrated significantly different communities, providing a remarkable stability for the region for more than three centuries.

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Redefining complexity in western Ethiopia.

Complexity has traditionally been used in archaeology as a shorthand for inequality. However, Africa offers many examples of complex societies without stratification or centralisation. This paper describes two examples of macro-settlements in Ethiopia that evince a considerable degree of social complexity without socio-political inequality. They emerged during the first half of the second millennium AD, in a period of strong social stress and conflict, yet instead of becoming centres of power, they developed as devices for stifling socio-political competition and buttressing equality. Our surveys and excavations provide interesting detail about the material mechanisms involved in the production of complexity without stratification.

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A first state in Sub-Saharan Africa at the end of the third millennium BC: the case of Kerma in Upper Nubia

Nubia, which extends south of Egypt in the Nile Valley, occupies a special position in Africa, because the research carried out there has long been dominated by Egyptologists. However, in the third millennium BC, it can be considered a Sahelian region within Sub-Saharan Africa that benefitted from the Nilotic corridor as a north-south communication axis. It is in this region that the first state formation in Sub-Saharan Africa, i.e. the kingdom of Kerma (2550–1500 BC) appeared. This paper analyses the conditions relating to the emergence of a highly hierarchical society during the period of the kingdom's formation of the kingdom between 2550 and 1950 BC, by studying the first stages of development of its main necropolis, located 4 km east of its capital in northern Sudan. Through the study of more than 400 tombs, it is possible to propose a model in which trade, wealth, social ties and violence were the main factors in the emergence of centralised power. Comparison with anthropological examples, such as the Shilluk kingdom, leads to the proposal of a model that may echo more recent historical situations in the Sahelian zone.

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Mamprugu before Gbewa: unearthing the voices of ancient ironworkers on social continuity and change at Nasia-Walewale in Ghana

Mamprugu was the earliest kingdom in Ghana, emerging within the savanna regions by the end of the fifteenth century and stimulating the formation of other kingdoms. Mamprugu in its prime covered a large portion of the savanna regions of Ghana and southern parts of Burkina Faso. Oral history recalls the arrival into the region of Naa Gbewa, whose descendants established the Mamprugu, Dagomba, and Namumba kingdoms. However, little is known about the socioeconomic engagements of people here before the arrival of Gbewa. Sites within Mamprugu nevertheless provide evidence of continued occupation from the Middle Stone Age period to the Middle and Late Iron Age. Research at Birimi provides evidence of ironworking at Mamprugu by the eleventh century, while my previous research at the Nasia iron smelting sites revealed an intensive smelting industry at the Nasia-Walewale-Janga region in Mamprugu before the fifteenth century. The Nasia sites show different types of smelting mounds across an area of about 40 km². My doctoral research assesses the affordances of iron production at Nasia and its implication for the rise of political centralisation in the region. It aims to provide insights into the mundane practices of ironworkers as well as the processes involved in the production and use of iron that regenerate social processes, thus maintaining and spurring social change.

17. IGBO-UKWU AT 50

(Susan McINTOSH and Akin OGUNDIRAN)

20th September

Fifty years after the landmark publication of excavations at Igbo Ukwu by Thurstan Shaw, the site remains one of the most iconic, enigmatic, and sumptuous sites ever documented in West Africa. Its astonishing corpus of 75 kg of copper and bronze artifacts, plus over 165,000 glass and carnelian beads, has generated debate for decades on the possible origins of these materials and their likely chronology, given radiocarbon dates with a 2-sigma range between the eighth and twelfth centuries AD. Celebrating the fiftieth anniversary of Shaw's publication, this session focuses on recent archaeological, archaeometric, radiometric and analytic studies that provide new evidence for understanding the context and connections of Igbo Ukwu, and new insights into its local and global intersections.

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Igbo Ukwu at 50: a need for further interrogation

Igbo-Ukwu remains a benchmark for archaeological research in Nigeria, indeed for the whole of West Africa. The thoroughness of the research work underscores its importance in studying metallurgy and complex societies in West Africa. This paper calls for further interrogation of the Igbo-Ukwu landscape considering the availability of a variety of equipment and facilities which were not available fifty years ago to Thurstan Shaw and his research team. Such interrogations could also be enhanced by a pluri-disciplinary team to be headed by an archaeologist who has a passion for paying attention to critical details. It would be a fitting tribute to the memory of Thurstan Shaw if the resource experts can be pooled from different universities across the world to examine such subsets as metallurgy, agricultural practices and ultimately the status of Igbo-Ukwu in the urban dynamics of West Africa.

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A contextual reintegration of Shaw's Igbo-Ukwu excavation sites

The excavation of three sites in the Igbo town of Igbo-Ukwu between 1959 and 1964 produced some remarkable discoveries. Their commendably full and rapid publication by Thurstan Shaw in 1970 nonetheless prompted much debate concerning the date, interpretation and cultural associations of the massive excavated assemblage of copper and iron items, bronzes, beads and broken pottery. However, there was relatively little subsequent discussion of the stylistic modalities of the excavated material and there was almost no consideration of how the disposition of the excavated areas and their buried materials affected interpretation. My research while based at Nsukka and subsequently, spanning the years 1981 to 1988, provided some re-assessment of both style and contexts, but provoked limited response from the scholarly community. The present paper reports upon the re-examination of the site contexts and, while doing so, stresses the importance of always being mindful of the basics of archaeological inference.

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Glass beads from Igbo-Ukwu: glass sources, regional and global connections

This paper presents new results from the compositional analysis of 24 blue glass beads from Igbo-Ukwu processed at the Field Museum in Chicago. It then combines these results with compositional data from 97 beads of various morphological types analysed earlier at MURR in order to examine Igbo-Ukwu's trading connections. This endeavour is facilitated by recent trace-element studies by Julian Henderson and others that may help to identify more precisely the Middle Eastern source(s) of much of the glass, while newly published glass compositional data from Nubia and parts of North Africa, as well as elsewhere in West Africa, may provide insights into the trading routes linking Igbo-Ukwu to the wider world. Our work complements the results of Fenn's isotopic studies of Igbo-Ukwu glass beads presented in this session.

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Isotopic analysis and sourcing of the Igbo Ukwu glass beads

Recent isotopic analyses of glass beads from Igbo-Ukwu have revealed new clues for identifying the potential raw material sources for the production of the raw glass and potentially also that of the beads traded to and deposited there. Elemental analyses initially identified several compositional groupings within the Igbo-Ukwu assemblage and these compositional groups suggested possible production regions. However, subsequent isotopic analyses have more clearly refined the potential source regions and identified potential regions where workshops may have been involved in producing the beads from raw glass. This paper discusses these findings, examines them within the site and the context of Nigerian glass bead production in general and then explores larger connections within Sub-Saharan Africa and beyond.

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Revisiting the provenance of the Igbo-Ukwu bronzes in the light of new lead isotope data

In 2006, Willett and Sayre published the article "Lead Isotopes in West African Copper Alloys" in the *Journal of African Archaeology* (4: 55–90). That article synthesised much of what was known about lead isotope analysis (LIA) results for West African copper-based objects, including the famous Igbo-Ukwu bronzes. Since that publication, new LIA data have been generated on copper-based metals, slags and ores from several other West African

archaeological sites contemporaneous with Igbo-Ukwu. This paper presents these new data, comparing them to the larger dataset published by Willett and Sayre and contextualising them within the site of Igbo-Ukwu and its bronzes. These new data are used to explore different interpretations as to where the metals originated that were used to produce the Igbo-Ukwu bronzes and to understand better the trade networks and connectivity of Igbo-Ukwu and the region in late first millennium AD.

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Working the metal: metallographic examination of the Igbo-Ukwu bronzes

Previous analytical and metallographic studies on the Igbo-Ukwu copper alloy objects have shown that there were all lost wax castings of bronze or leaded bronze. The present work concentrated on the previously unstudied very minor items such as wires, crotals etc. This has shown that while some of these very small items were also cast many of the wires had been expertly hammered to shape and annealed. Furthermore, the hammered items tended to be of unalloyed copper whereas the minor castings were of alloyed metal. This demonstrates that the Igbo smiths were fully aware of the properties of the metals they were using. The trace element composition of these pieces suggests that, like the larger castings already analysed, the vast majority of the metal is likely to have come from the nearby source at Abakaliki.

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Igbo Ukwu textiles: AMS dates and fibre analysis

This paper presents the results of new AMS dates on fabric fragments associated with Igbo Isaiah, the ceremonial repository at Igbo Ukwu. The dates previously available had large standard errors typical of conventional dates from the 1960s and 1970s. It is now possible to refine the chronology for the fabric well beyond the calibrated eighth- to twelfth-century range for the previous dates. In addition, the paper reports on the results of scanning electron microscope (SEM) studies that provide the first identification of fibres from the inner bark (bast), leaflet sheaths and young leaves of local African plants, which were extracted and processed for weaving the textiles. SEM imaging also revealed details about the present condition of the textile. We conclude with a discussion of the implications of these new data for interpretations of the site.

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Recent excavations at Igbo-Ukwu: new data and new potentials

This paper outlines preliminary results from a new archaeological programme carried out at Igbo-Ukwu. Two seasons of fieldwork conducted in 2019 and 2021 have yielded a new dataset

to help re-evaluate early cultural manifestations there. While local participation and public engagement are central to the project, the research aims at enhancing our understanding of the archaeological context that extends beyond Thurstan Shaw's pioneer investigations to provide greater insights into the history of the area's environment and soil development. Reflecting on the excavated data and their implications for a broader landscape interpretation, we introduce the growing material archive, discuss the new radiocarbon dates and present preliminary results of elemental analysis of pottery from our recent work alongside the previously excavated ceramics. This work illustrates that Igbo-Ukwu can still contribute meaningfully to debates on complex society, palaeoenvironmental studies, materiality and craft production. We argue that exploring other areas beyond the known sites would be a viable strategy to understand ancient Igbo-Ukwu.

18. THE PAGES LANDCOVER6K LAND USE GROUP

(Nadia KHALAF, Stefania MERLO and Leanne PHELPS)

It has been acknowledged that land-use and land-cover scenarios used for climate modelling are simplistic, limited and often incorrect, making them unrealistic. As such, the PAGES LandCover6k initiative aims to produce data-driven reconstructions of past land-cover and land-use at continental and global spatial scales. The LandCover6k working group seeks to create comprehensive maps of human land use for different time-slices. The classification system used is the result of several years of consultation and refinement at workshops and meetings across research groups. Several methodological and practical challenges of developing generalised land use categories have been discussed within regional chapters. Although the African chapter of the project has participated in several working group meetings, issues central to the creation of land-use maps in Africa have not been discussed within the broader community of Africanist archaeologists. This symposium seeks to engage participants in a discussion on how the LandCover6k classification fits (or does not fit) in Africa. The session aims, first, to exemplify some of the work done so far on classification systems and regional maps, and second, to dive into vivid case studies and perspectives that illustrate the benefits and drawbacks of global land use classification approaches, as well as the political implications behind existing forms of land use representation in Africa.

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Anthropogenic finger prints on global climate change: sites and radiocarbon dates from West Africa

This paper presents empirical data on land use systems from different parts of West Africa during the Holocene. The data derive mainly from several dated archaeological sites in Nigeria and other West African countries. Quite a large percentage of these data exist as unpublished excavation reports. In addition there is a catalogue of ‘hidden’ data emanating from agricultural, construction, mineral and oil exploration and exploitation activities within the region. The paper posits that information derived from these diverse sources can help throw considerable light on the very little known but complex interactions between anthropogenic activities and climate change in the West African sub-region. It concludes that the regional impact of these forces on global climate change would not only be better understood, but also be better able to contribute to ongoing efforts at mitigating global climate change challenges.

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Vegetation history along an altitudinal gradient in the Southern Ethiopian Rift Valley

Information on changes in vegetation cover throughout the Holocene is scarce for Africa in general and for Ethiopia in particular. On the other hand, sediment records suggest a millennia-long history of agriculture in Ethiopia’s highlands. Explicit research into altitudinal patterning in the evolution of both human activities and vegetation changes is also extremely limited despite Ethiopia’s exceptional relief within East Africa. In this project, several lakes and swamps are targeted as study sites along an altitudinal gradient, situated in the southern

Ethiopian Rift Valley (1100–3000 m a.s.l.). This work aims at obtaining a holistic understanding of long-term landscape evolution in the study area via the integration of palaeoecological proxies (pollen, charcoal) with archaeological, sedimentological (stable isotopes) and climatic data. Here, we present preliminary results of the pollen analysis from a wetland situated at 3000 m a.s.l.

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Reconstructing past land use in North Africa and the Sahara

Temporal and spatial knowledge of past human occupation in North Africa and the Sahara is patchy and unbalanced between better-known spots and almost unexplored areas. In recent years, different projects have aimed at the recompilation of radiocarbon date databases and inventories of archaeological sites, reorganising a vast amount of data dispersed across multiple sources. Drawing on this research, we present a first attempt to generate maps of land use in North Africa and the Sahara, based on the LandCover6k categories and formulated by an international and interdisciplinary research group dedicated to reconstructing human land use over the past 10,000 years. Here, we focus on the methodological and technical issues of mapping such a vast expanse, discussing also the outcomes and the potential of syntheses within the context of African archaeology.

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Towards a continent-wide past land-cover and land-use: contributions from East Africa

Over the years there have been attempts to develop comprehensive global or continental land use land cover maps at different spatial scales. Land-use land cover change is unique in the African continent because of the nature and trajectories associated with food production. How resources are distributed and the diverse subsistence systems present in East Africa mean that applying global classification system may present methodological challenges of developing generalised land use categories. This paper presents a current state of datasets from East Africa using the assemblages that have been analysed and have a reliable chronological control. It argues that by integrating new datasets to the existing data it is possible to reanalyse archaeological assemblages and engage other lines of supporting evidence, for example phytolith data. Its findings show that land use land cover changes in East Africa were multi-faceted and must therefore be reconstructed taking into consideration unique aspects such as variation in mobility patterns and diverse cultural and social considerations that could have impacted them. The challenges still present include a lack of ground-truthed geospatial data and the need for better chronological controls. It is hoped that the results will build into some of the work done so far on classification systems and regional maps and contribute to existing debates on the benefits and drawbacks of global land use classification approaches.

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Landuse 6k Southern Africa: results and reflection

The paper presents the results of our attempt to map land use in Southern Africa for the periods 6000 BP, 4000 BP, 2000 BP, AD 1500 and AD 1800. We reflect on the challenges and the opportunities that the exercise of mapping land use with archaeological and historical data presented.

19. LANDSCAPE PERSPECTIVES

(Carla KLEHM and Abigail STONE)

Landscape archaeology is a productive framework for contextualising spatial relationships over time with landscapes providing reference and context for human activity. Theoretical and methodological approaches vary widely, as do the temporal and spatial scales for research activities. Regardless of this, landscape archaeology is fundamentally about humans and their relationships with both the built and the ‘natural’ environment (with the recognition that the latter almost always has anthropogenic alterations, whether intentional or not). This session concerns landscape archaeology as it has been taken up by African archaeologists. With the longest record of human history, as well as having an enormously diverse range of environments and correspondingly varied human responses (social, economic, political) to their surroundings, Africa is a rich subject for landscape approaches to archaeology. Accordingly, this session includes papers from multiple places, periods, and perspectives. The papers consider how they use the concept of “landscape,” their corresponding research design and their contribution towards local and broader archaeological contexts. The session aims to build a set of present and emerging approaches that will collectively add value to our understanding of past and present human-environmental relationships in Africa.

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Further ethnoarchaeological studies of obsidian sources, ethnic boundaries and landscape use by contemporary southwest Ethiopian craftspeople

This paper expands and elaborates upon a previous study of southwest Ethiopian craftspeople who are probably the last people in the world systematically and regularly obtaining toolstone from specific sources. In this study we focus upon those ethnic groups who use obsidian to produce end scrapers of varying dimensions that are hafted onto wooden handles to scrape domestic animal hides. Using laboratory and field pXRF instruments, we analysed the elemental composition of over 1200 of these obsidian end scrapers, as well as incorporating, when possible, scraper data from other recent studies. The results indicate strong correlations between specific source(s), ethnicity and landscape use. Our concluding discussion considers how our research provides new perspectives on the economics of lithic production and trade, social boundaries, territoriality, land tenure and the construction of social landscapes in past and present complex societies.

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The indigenous architectural landscape at Old Buipe, Ghana, and the archaeological record

This paper discusses from a historical perspective the types of buildings, compound layouts, used and abandoned structures as well as constructional processes that were found in the contemporary settlement of Old Buipe, northern Ghana, in relation to the local environment and relevant historical, social and economic contexts. Drawing on archaeological, oral and written historical and ethnographic data, the attempt is made to argue that the built environment

in rural Ghana as found in Old Buipe is closely related to local ecological, social and economic circumstances. Temporal and spatial changes and continuity that may be found in constructional processes, the forms and styles of buildings, compound layout and architectural landscape in general are a function of people's demographic, social and economic situations. Thus, relics from the built environment that may be found in the archaeological record should reflect the above situations.

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Off-site archaeology and human adaptation in southern Africa: evidence from the Tankwa Karoo

The recognition of single artefacts rather than sites as a unit of spatial analysis was a key shift in approaches to landscape archaeology that remains relevant 40 years on from its inception. In this paper, off-site survey methods are applied to the study of an arid landscape in South Africa, the Tankwa Karoo, in order to gain insights into changes in human behaviour over the past million years. Surface surveys mapped the location of individual artefacts across the landscape, gaining information on lithic technology, raw material provisioning and site use. Stone artefacts can be dated on a relative techno-typological basis and used to track change through time and across environmental zones. This research identified clear temporal and spatial contrasts across the 100-km-long study area, highlighting novel forms of technological behaviour at open-air locations previously unrecognised by cave-oriented studies, which I propose are specific adaptations to this desert environment.

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Reconstructing a Late Pleistocene living environment: a landscape approach in the Eastern Desert of Egypt

Northeast Africa experienced several climate changes during the late Quaternary. It can be assumed that various humid periods provided windows of opportunity for human migration. To investigate this assumption further, a variety of climatic, geomorphological and archaeological data from the Late Pleistocene were compiled for a landscape approach that emphasised the natural and cultural aspects of the human environment. Our research area, Sodmein, provides a cave site with stratified human occupation debris dating from the Middle Stone Age up to the Neolithic, as well as remnants of Pleistocene surfaces with Middle Stone Age artefact concentrations. This landscape approach was not only about correlating the inside (cave archives) with the outside (open-air sites), but also about correlating data on human occupation with palaeoenvironmental data of different tempo-spatial scales. This paper attempts to reconstruct the former Pleistocene living environment and thus to obtain indications of possible human migration routes.

BREAK

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Bosutswe landscapes: social and environmental transformation along the edge of the Kalahari, c. 500–1700

During the first millennium AD, trade in gold and ivory linked Sub-Saharan Africa to a vast Indian Ocean exchange network. Research on this topic in Botswana has historically focused on regional trade centres and pastoral lifeways, but dispersed populations participating in agropastoralism were essential to supporting these centres materially and politically. The Bosutswe Landscapes Regional Survey (BosLand) Project focuses on the landscape surrounding the Iron Age polity of Bosutswe, located at the eastern edge of the Kalahari in Botswana. Inhabited for nearly 1000 years (c. AD 700–1650), Bosutswe is ideally situated to study how the rise of polities, states and globally linked trade networks shaped the strategies that past peoples employed to manage their resources in a semiarid climate. This paper combines results from remote sensing, excavations and palaeoenvironmental sampling to describe the consequences of Bosutswe's rise for the broader social and ecological landscape during a time of profound change.

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Ecological infrastructures: foraging landscapes and food-producing mosaics in the Sandawe homeland of central Tanzania

Transformations in forager societies and the relations between foragers and food producers have produced significant scholarly debate. Drawing on ethnography and history, Africanists have asserted that foragers survived through deliberate and mutual isolation in geographic or ecological refugia (frontier models) or through assimilation into complex societies as ritual specialists or producers of wild resources (symbiosis models). Recent archaeological work has shown that the spread of food production entailed complex processes of migration, technological diffusion and exchange, with considerable geographic and historical variation (political-economic mosaic models). This implies that ethnographically and historically derived models capture only a subset of cases and must be applied cautiously to archaeological contexts. This paper examines these models in relation to the results of regional survey in the Sandawe homeland of central Tanzania and considers how critical landscape studies could reconfigure several persistent problems in our understanding of past and present foraging communities of Africa.

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Spatial analysis of Daffo hilltop settlements, Jos Plateau, Nigeria

The Jos Plateau is characterised by rocky hills on most of which there is evidence of past human occupation. Daffo is located at the southwestern part of the plateau. Features identified on some

parts of the hill include circular house foundations, ritual areas, sitting arrangements, ceremonial centres and grinding hollows. With the aid of GIS technology, the spatial distribution of both cultural and natural features was analysed, excavations conducted and finds dated. Human occupation in the area dates back to the thirteenth century AD. People lived on hilltops for security and the identified features were made of materials sourced from their surroundings. Settlements were situated close to streams that run all-year-round and people cultivated the plains surrounding them. The environment therefore influenced their choices and they, in turn, modified it to meet their needs.

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Moving about the place: capturing Botatwe landscapes in central Zambia, sixth to sixteenth centuries AD

This paper discusses recent results from the Bantu Mobility Project in central Zambia, a multidisciplinary approach exploring the mobilities of Bantu-speakers as their language became dominant in a new place. Landscape archaeology, drawing on Crumley's discussions of landscape in historical ecology, is an important component of the project's approach, capturing the meanings that Botatwe speakers ascribed to their surroundings and the different patterns of activity and movement those meanings referenced and informed. Studying the landscape effectively draws on several of the project's disciplines: archaeological survey to identify where people were and what they did there; environmental archaeology to capture their impact on the environment; and historical linguistics to study the meanings they attributed to the built and natural world. Together, these datasets enable us to examine Botatwe speakers' experiences of a place they made their own and how those experiences connected to the broader historical developments of the Bantu expansions.

BREAK

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Were late Holocene foragers creating cemeteries along the coastal southwestern Cape, South Africa?

More than 150 intentional burials, dating primarily from 3000 to 1000 BP (uncalibrated), have been discovered in coastal sands of the southwestern Cape, South Africa. The discoveries have come from erosion, development and recreational activities; the extent of field documentation is variable. Certain spots along the coastline have yielded more burials. This may be linked to modern activities, but may also reflect evidence of preferences about where deceased community members were buried. We explore these patterns using calibrated radiocarbon dates from the focal areas of Lagoon Beach and Melkbosstrand and field data on the relative placement of bodies, informed by theory regarding what may have motivated mobile, immediate-return hunter-gatherers to create cemeteries. In at least some instances, body placements combined with dates suggest that prior burials had surface markings or were otherwise known to the community. The project demonstrates the challenge of deducing demographic information from this kind of archaeological evidence.

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Mapping the Earlier-Middle Stone Age transition: understanding Middle Pleistocene palaeolandscapes at Makapansgat and the eastern Waterberg, Limpopo, South Africa

Makapansgat is one of the most important palaeo-archaeological landscapes in South Africa. Recent work has used a combination of GIS, fieldwalking and drone imaging focusing on the Mogalakwena Valley in the eastern Waterberg. We have identified significant Early and Middle Stone Age deposits associated with calcrete pans along the margins of the Malmani Dolomites within which Makapansgat sits. Extensive lithic assemblages have been identified at loci over a north-south distance of some 5 km. Lithic artefacts intercalated within these calcretes appear to represent either primary or near-primary open-air deposits overlain by Kalahari sands. We argue that the Mogalakwena presents the largest geomorphologically stable corridor for archaic and modern humans through the Waterberg Mountains, linking the Kalahari with the Springbok Flats and Nyl River systems. Ongoing research presents a critical opportunity for understanding geographical, ecological and cultural variability of hominins across the ESA-MSA transition and the Pan-African emergence of *Homo sapiens*.

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Check: one, two...three, four? Examining and refining archaeological landscape chronologies using microbotanical data

Isolating the role of past human activities as formative processes in the development of archaeological landscape ecologies is a task fraught with conceptual difficulty. Worldwide, multi-proxy microbotanical analyses remain a largely untapped method for investigating poorly known archaeological contexts or time periods. A reconstruction of anthropogenic environments in the Kingwal catchment of western Kenya from c. 1500 BP to the present is presented, based on analyses of pollen, phytolith, microcharcoal and fungal assemblages recovered from sediment cores. These data, examined in concert, demonstrate how the role of human activities in the history and continual formative processes characterising anthropogenic landscapes, and the broader ecologies in which they are embedded, can be more confidently detected and isolated from the “background noise” of ongoing regional climatic/precipitation fluctuations. By cross-checking several lines of microfossil proxy evidence against existing archaeological and historical-linguistic data, archaeological sampling can be more productively targeted and regional chronologies more finely resolved.

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Cracking the Fra Mauro Code on Abassia Ethiopia

The mid-fifteenth-century Fra Mauro map provides a rare lens into a Eurocentric, medieval geographical worldview and mental landscapes. Scholars long considered the African portion

of the Fra Mauro map to be unreliable. By implementing an Afro-Arabian geographical framework, one can, through geo-referencing, connect identifiable geographical features from this map to physical landscapes. Untangling the region of *Abassia Ethiopia* requires interpreting the physical features and polities through the worldview of the informants from these respective regions: emissaries, pilgrims, merchants etc. Using remote sensing in conjunction with early maps has identified multiple sites of long-lost cities. Field-walking provides confirmation of substantial architecture and period-specific cultural materials. Continuing research traces patterns of land-use across landscapes, identifying phases of occupation and trade networks during Ethiopia's poorly understood early medieval periods.

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A women's history of urbanism on Zanzibar

This paper presents the results of fieldwork on Zanzibar as part of the Urban Ecology and Transitions project which is examining the relationship of Zanzibar's early urban sites with a broader landscape and set of resources. We focus particularly on the evidence for activities traditionally associated with women, including shellfish collecting and agricultural labour. We present evidence from the seventh to ninth-century site of Unguja Ukuu, which suggests that the transition to settled life here was based on key changes in the ways that the local landscape was used, notably in the establishment of agricultural landscapes near the site. We suggest that these were part of a reconfiguration of women's lives as part of the ways through which urbanism was created and experienced.

20. ON ISOTOPES AND OLD BONES: PAPERS IN HONOUR OF JULIA LEE-THORP (Michaela ECKER and Emma LOFTUS)

Julia Lee-Thorp has made wide-ranging and influential contributions to African archaeology and hominin studies, primarily through the development and application of stable isotope techniques. She is well known for her research on early hominin diet and African palaeoenvironments in deep time. Her foundational doctoral research has particularly influenced how we analyse fossil remains and has substantially contributed to the establishment of carbonate geochemistry as an invaluable method in the archaeological sciences. In celebration of her career, this session presents diverse examples of new research that illustrate this legacy, including topics on palaeoenvironmental and dietary reconstructions and novel applications and methodological innovations of biogeochemistry within African archaeology. A keynote talk provides an opportunity to reflect on how the field has developed over the last few decades.

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Sampling the archive: historical ecology and museum collections

This paper explores the results obtained from sampling animal tissues in museum collections for a range of biomolecular analyses. These analyses form part of a toolkit of methods that can be used to extract information from museum archives in order to reconstruct the historical ecologies of African mammals such as elephants. Faunal specimens, whether complete skeletons from historic big game hunting collections, or artefacts from archaeological excavations, are important and, arguably, underutilised, archives for understanding the historical ecology of a species. Combined with documentary records such as maps and hunting diaries, as well as archaeological contexts, to understand the use and trade of different animal species, isotope data gathered from sampling historic specimens can, and should, be integrated into contemporary wildlife conservation strategies.

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Bone collagen turnover from bomb ^{14}C signal

Reconstructions of life histories using stable light isotopes usually assume that bone collagen in adults represents an average of ‘adult diet’. This is untrue: Hedges *et al.* (2007) showed that the femoral mid-shaft retains throughout life a significant proportion of collagen formed during adolescence. Different skeletal elements (and parts thereof) are likely to have different rates of bone turnover, but we have very little quantitative data on this in healthy adults. The ‘bomb spike’, formed by $\Delta^{14}\text{CATMOSPHERE}$ over the past 70 years, enables the use of $^{14}\text{CCOLLAGEN}$ as a tracer for bone collagen turnover in individuals of known ages and dates of death. We have measured $\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and ^{14}C in collagen from multiple locations in the same skeletons, obtained from the University of Cape Town Medical School. These values enable us to estimate site-specific bone turnover rates, enabling higher-resolution isotope-based life history and forensic studies.

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Holocene shellfishing seasonality on the South African west coast

The arid west coast of South Africa features substantial archaeological deposits of shellfish remains in both open-air coastal middens and rock-shelters. These sites attest to the importance of coastal marine resources for foragers throughout the Holocene. Yet, the details of coastal exploitation by these groups are not well understood: for example, one influential model posits a seasonal round between the coastline (winter) and mountainous interior (summer), but multiple conflicting lines of evidence suggest a more complex scenario. This study presents high-resolution serial $\delta^{18}\text{O}$ analyses of *Cymbula granatina* limpet shells from the well-dated sequence at Elands Bay Cave and nearby sites in order to estimate season of collection. We examine the annual scheduling of hunter-gatherer shellfishing in the region and observe marked shifts across the period. We discuss these patterns with respect to the archaeological record, particularly changes in settlement patterning that occurred *c.* 3000 years ago and again *c.* 2000 years ago.

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Serial sampling of fossil teeth from a winter rainfall biome: further insights into the unravelling of seasonality

The Pleistocene site of Elandsfontein has yielded many fossils of large grazers. This is surprising given the scarcity of grass in the current winter rainfall fynbos biome. Hypotheses about mobility are not supported by $^{87}\text{Sr}/^{86}\text{Sr}$ analyses of fossil teeth. We have investigated Pleistocene seasonality by high resolution intra-tooth analyses of enamel $^{18}\text{O}/^{16}\text{O}$ on the same teeth in which $^{87}\text{Sr}/^{86}\text{Sr}$ was measured. The records extend over a period of at least one year, tracking annual variation in temperature/rainfall. $\delta^{13}\text{C}$ values remain consistent, but $\delta^{18}\text{O}$ varies considerably over the period of mineralisation: up to 7.7‰ in *Syncerus antiquus*, 8.6‰ in *Equus capensis* and a smaller range of 2.6‰ in *Loxodonta africana*. Comparative contemporary samples of ungulates from the same region have ranges of up to 4.5‰.

BREAK

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Isotopes in carnivores as an integrator of ecological change through time

The stable carbon isotope ratio of tooth enamel records the proportions of C₃ and C₄ diet resources contributing to diet. We studied a time sequence in the Omo-Turkana Basin, Kenya, from about 4 mya to the present, to understand long-term ecological changes in the region. Previous studies showed long-term diet changes in large herbivorous mammals (APP: Artiodactyla; Perissodactyla; Proboscidea) with more recent APP fauna having much a much higher component of C₄ diet resources earlier fauna. We studied carnivores through this time interval as integrators of diet resources. We find that carnivores at about 4 mya have average $\delta^{13}\text{C}$ values of about -7‰ and that $\delta^{13}\text{C}$ values increase in the younger deposits and reach -2‰ by about 1.5 mya. This agrees with the trends of the APP taxa and suggests that large carnivores may be a useful integrator of ecological change in the palaeontological record.

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High spatial resolution oxygen isotopes in Pleistocene enamel via SIMS: comparison with carbonate and phosphate oxygen isotopes

This paper reports comparative primate and herbivore enamel oxygen isotope ratios from phosphate ($\delta^{18}\text{O}_{\text{PO}_4}$), carbonate ($\delta^{18}\text{O}_{\text{CO}_3}$) and 293 spot (10 μm) samples obtained via secondary ion mass spectroscopy (SIMS). The teeth were excavated in South Africa at the early Pleistocene locality of Kromdraai B. The primates from Kromdraai B have higher $\delta^{18}\text{O}_{\text{PO}_4}$ and/or $\delta^{18}\text{O}_{\text{CO}_3}$ than co-occurring herbivores, consistent with higher $\delta^{18}\text{O}$ of dietary inputs in the primate population. As with modern rodents supplied with different water sources, $\delta^{18}\text{O}_{\text{PO}_4}$ differences between primates and herbivores were greater than those observed in co-occurring $\delta^{18}\text{O}_{\text{CO}_3}$. Secondary ion mass spectrometry $\delta^{18}\text{O}$ separates herbivores and primates to the extent seen with $\delta^{18}\text{O}_{\text{PO}_4}$ with suggestions of seasonal changes seen in some sampling transects. The complex nature of enamel does not obscure the differences seen in and between these faunal populations. Furthermore, both discrete areas and more global diagenetic alterations can be seen microscopically.

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Complicated human dietary dynamics throughout the Holocene in Kenya

Shifting environmental conditions during the Holocene in eastern Africa serve as the backdrop to changes in subsistence patterns, specifically, the adoption of herding. With the application

of new analytical techniques, our understanding of both the social and environmental aspects of this dietary transition is improving. Here, we present both a compilation of carbon and nitrogen stable isotope data of human teeth from archaeological sites across Kenya, with economic strategies ranging from fishing-hunting-gathering to herding. These data show pronounced regional dietary variability, even after herding took hold. Additionally, we present new isotopic profiles of four individuals obtained by laser ablation, highlighting the individual dietary variability among people of different economies. These data show individual-level dietary variability among both herders and fisher-hunter-gatherers and also demonstrate that the transition to new economies may not have accompanied a reliance on the same dietary resource.

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Isotopic evidence for dietary variability in fossil hominins

Over the last few decades, isotopic research has revealed much evidence for changes in hominin environments and diets. The expansion of C₄ vegetation across much of Africa since the late Miocene is well documented, as is the later extension of hominin diets to include C₄-derived foods, such as grasses, sedges and animals, during the Pliocene and Pleistocene. While studies have focused on variation between individuals and species, we are concerned with the diet flexibility of individuals over seasonal scales. We discuss approaches to intra-tooth isotopic analysis, particularly the laser ablation techniques used in this study. We present results of recent research on the evolution of diet variability among early hominins in Kenya and provide comparisons with previous findings on South African hominins and with similar records of diet variability from monkeys and ungulates.

BREAK

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KEYNOTE: Difficulties, distractions, and doggedness in isotopic archaeology: lessons from Cape Town and beyond

Stable isotope analysis is now a standard tool in the archaeologists'/palaeoanthropologists' toolkit, but its road to acceptance was marked by fits and starts. This paper traces this history emphasising some of the principal stumbling blocks, efforts to address them and the importance of synthetic work with other disciplines. Potential lessons from this history are discussed with regard to current problems in archaeometry. While the work of many early practitioners is highlighted, I emphasise the work of Julia Lee-Thorp and her colleagues at the University of Cape Town.

21. AFRICAN TIMELINES: WHICH GEOCHRONOLOGICAL PERSPECTIVES?

(Eslem BEN AROUS, Chantal TRIBOLO, Sallie BURROUGH, Simon ARMITAGE and Jean-Luc SCHWENNINGER)

The importance of absolute chronology for understanding the human past, including cultural and environmental changes, does not need to be demonstrated. Meanwhile, chronological tools (Radiocarbon, Luminescence, U-series/Electron Spin Resonance combined, AAR, Ar/Ar, K/Ar etc.) are constantly improved and these enhancements have benefited, among others, the study of the Palaeolithic in Africa. This session is dedicated to a non-specialist audience and will present these recent methodological improvements. Examples of their application to the African palaeolithic chronological framework throughout the Quaternary will be shown.

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Direct dating of African fossils, from the South African hominins to the early Homo sapiens of Jebel Irhoud Morocco

This paper looks back at the recent direct dating of key African fossils using Uranium series coupled to Electron Spin Resonance dating (US-ESR). It explores the new geochronological landscape of African human evolution using examples from recent research, from the dating of southern African hominins in the Cradle of Humankind (early *Homo* spp., *Paranthropus* and *Homo naledi*) to the dating of Broken Hill in Zambia (the Kabwe Skull) and finishing with the earliest *Homo sapiens* at Jebel Irhoud in Morocco.

Eslem Ben Arous, Christophe Falguères, Anne Philippe, Arnaud Lenoble, Qingfeng Shao, Olivier Tombret, Norbert Mercier, Maïlys Richard, Daniel Richter, Emmanuelle Stoetzel, Mohamed Abdeljalil El Hajraoui, Roland Nespoulet

Nothing new in the Northwest? Middle and Later Stone Age timelines in the light of multi-dating approaches

While there is continuous improvement in our dating tools, there are few multi-technique dating studies for Quaternary geochronology. Here, we present the contribution of such an approach on the El Harhoura 2 and El Mnasra caves (Rabat-Témara region, Northwest Africa). Known for having preserved Middle Stone Age (MSA) and Later Stone Age (LSA) occupations in caves, this region has been recognised for its interest in studying the evolution and dispersal of *Homo sapiens* at a regional scale. Current chronologies in both caves based on contradictory age models are debated. We address new chronological investigations through an integrative chronological approach (combined ESR/U-series, single-grain OSL and 14C). We discuss the new data and the questions they raise. Their methodological significance and archaeological interpretations of the timeline of MSA and LSA human occupations are discussed.

Peter Morrissey, Susan Mentzer and Sarah Wurz

A reinvestigation of the stratigraphy of the basal deposits in Caves 1, 1A and 1B at Klasies River Main site, South Africa

The Middle Stone Age deposits at Klasies River Main site are grouped into five or six lithostratigraphic members (and several sub-members). This system has proven vital for correlating the basal deposits across Caves 1, 1A and 1B, namely the Light Brown Sand, Rubble Brown Sand, and Shell and Sand Members/Sub-members. However, the publication of several (sometimes subtly) different interpretations of some stratigraphic relationships, usually based on unpublished or partially-published data, has led to uncertainty around some of these correlations. Furthermore, detailed examination of the literature calls into question the validity of the sedimentary definitions of some groupings. The results of new fieldwork presented here clarify the stratigraphy of different excavations and help to refine the existing stratigraphic system. An improved understanding of stratigraphic relationships across the site allows the evaluation of the potential contemporaneity of significant human fossils, which has implications for hypotheses on mortuary practices and human anatomical diversity.

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A new depositional member identified at Swartkrans Cave, Cradle of Humankind, South Africa

Swartkrans is a famous hominin-bearing cave site in the Cradle of Humankind, South Africa, which yielded palaeoanthropological remains of *Paranthropus* and early *Homo*, associated with fauna and lithic artifacts. Since 1948, the site has been excavated by several researchers and a stratigraphic sequence was built by C.K. Brain. Four Pleistocene members were identified. The oldest, the Member 1 Lower Bank, was dated between 2.25 and 1.7 mya with U/Pb and cosmogenic burial dating. A recent reappraisal of the stratigraphy, including study of the nature and geometry of the different members and the relationships between them led to the identification of a new breccia, stratigraphically below Member 1 and probably below the flowstone dated to *c.* 2.25 mya. The contact with the overlying Member 1 is characterised by a significant unconformity and eroded flowstone. As Member 1 was considered the oldest in the site, this pre-Member 1 deposit could yield the oldest fossils and artefacts recovered from Swartkrans.

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Developing archaeomagnetism in Sub-Saharan Africa: new data and perspectives

Archaeomagnetism is a powerful tool to date archaeological baked clays (kilns, fireplaces, ceramics, brick, etc.). The method requires a prior knowledge of the secular variation of the geomagnetic field. This is still not the case today in Sub-Saharan Africa in spite of a significant increase of the archaeomagnetic database in South and West Africa for the last ten years. After a short review of the state of the art, we present new data on iron furnaces from central Chad and Kenya dated by radiocarbon to the last six centuries. These studies are a further new step toward building a reliable global model of the geomagnetic field, which will enable archaeomagnetic dating at any place in Africa. The contribution to archaeology will be especially high in the first millennium BC, because the expected fast secular variation will address the problem of the radiocarbon plateaux that exist at this period.

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New advances in U-series dating: the contribution of imaging using femtosecond laser ablation coupled with high-resolution ICP-MS for direct dating of biominerals

U/Th dating is a well-known suitable method for the study of human remains, since it is applicable to a wide variety of archaeological materials (eggshells, shells, thin calcitic crusts, etc.) and covers a large chronological period (from a few thousand years ago to 500 kya). However, the conventional protocol implying the total dissolution of the sample with double spike is not suitable for small samples with very low uranium contents (ultra-trace levels) or those that are poorly preserved (open systems). Recently, we have developed a protocol adapted to U/Th dating of this type of samples using femtosecond laser ablation coupled with High Resolution ICPMS. The resulting isotope mappings allow rapid and direct dating of neglected materials up to now, with the selection of areas suitable for dating at the scale of a few μm , while miniaturising the sampling (1 mg or less). The potential applications of this new protocol on different archaeological remains are discussed.

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²³⁰Th/U Burial Dating of Ostrich Eggshell: A New Geochronometer for Pleistocene Archaeological Sites

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We have developed a novel protocol for $^{230}\text{Th}/\text{U}$ dating of ostrich eggshell, a common component of Pleistocene archaeological sequences in Africa, the Near East and Asia. $^{230}\text{Th}/\text{U}$ dating has a range of up to ~500 ka, encompassing the origin of *H. sapiens*, accelerated Middle Stone Age behavioural innovation and modern human expansion beyond Africa. Uranium in archaeological eggshells, typically at concentrations of tens to hundreds of ppb, is acquired after burial and exhibits a characteristic pattern controlled by visibly preserved primary eggshell structures. This contrasts with commonly targeted biogenic materials such as bone and dentine in which U uptake is associated with massive textural and mineralogic change. We show that ‘ $^{230}\text{Th}/\text{U}$ burial ages’ determined by applying a simple diffusion model to two or more ages measured along the U gradient of each eggshell are stratigraphically coherent and concordant with robust independent ages at multiple sites in eastern and southern Africa.

ROUNDTABLES

Cultural heritage management: the question of private collections and how to deal with them
(Friederike JESSE and Tilman LENSSEN-ERZ)

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When discussing cultural heritage management in Africa we should not forget about the many private collections existing in Europe, America and other places of the world. Many of them were established by travellers interested in Africa but nevertheless circumventing legal prescriptions and not considering that their behaviour is considered disrespectful by most Africans. At least some of these collections are comparatively well documented and curated. From time to time our institute gets requests about whether we are interested in such a private collection of archaeological artefacts. This is mainly the case when the original collector dies and his or her heirs are not interested in the collection. To deal with such requests is always a difficult task, not only because they are illicit but also because possibilities for curation at single institutes are limited and there is no central institution dealing with this question whom one could address. It is, however, a pressing issue since the first generation of collectors is passing away and more and more collections are being 'set free'. This roundtable offers an opportunity of discussing this matter with all interested colleagues to initiate a process for finding a solution suitable for all parties (e.g. a central institution that could either organise storage and exhibition space or ultimately help to arrange the handing over of such private collections to the country (or countries) from which the objects once came) or at least to get an idea of how this question has been dealt with (successfully or unsuccessfully) so far.