

References

Afrika

RADEMAKERS 2019

Frederik W. Rademakers, Nicolas Nikis, Thierry De Putter & Patrick Degryse, *Provenancing Central African copper croisettes, A first chemical and lead isotope characterisation of currencies in Central and Southern Africa*. [Journal of Archaeological Science](#) **111** (2019), 105010, 1–17.

[JAS111-a105010-Supplement.pdf](#)

The Copperbelt is one of the richest copper deposits in the world and has been an important primary metal source for Central African cultures for over a millennium. The technology underlying this exploitation and the trade networks through which copper was exchanged, however, have not yet received much attention in archaeological research. This paper presents the first geochemical dataset for archaeological copper currencies in Central and Southern Africa: croisette ingots. Chemical and lead isotope analysis have been carried out for 45 precolonial copper artefacts with the aim of illuminating their provenance and production technology. The Results show that highly pure copper with very low trace element content was produced, indicating the selection, beneficiation and smelting of specific Copperbelt ores. The variable croisette compositions and shapes reflected in burial assemblages support their suggested use as currencies over a large area. This study offers a highly novel contribution to provenance research in Central and Southern Africa, shedding new light on the broader trade networks associated with copper provisioning in these regions. The exploitation of a range of ore sources throughout the 2nd millennium CE has been identified, with a marked shift around the mid-15th century CE largely correlating to croisette typologies. Furthermore, these different geochemical copper signatures can be tentatively related to different Copperbelt zones. Combining these results with archaeological and historical evidence for regional copper production and consumption, this study provides a framework for the future study of copper production and exchange systems in the wider Central and Southern African region.

Keywords: Copper metallurgy | African archaeology | Provenancing/sourcing | Lead isotope analysis | Chemical analysis | Democratic Republic of Congo

Aktuell

CALLAWAY 2019

Ewen Callaway, *Carbon Dioxide-Eating Bacteria Offer Hope For Green Production*. [nature](#) **576** (2019), 19–20.

Lab workhorse *E. coli* engineered to make nutrients from greenhouse gas rather than from sugars.

Escherichia coli is on a diet. Researchers have created a strain of the model bacterium — known as *E. coli* for short — that grows by consuming carbon dioxide instead of sugars or other organic molecules.

ERB 2019

Tobias J. Erb, Philipp Keller & Julia A. Vorholt, *Escherichia coli in Auto(trophic) Mode*. *Cell* **179** (2019), 1244–1245.

It is challenging to convert a heterotrophic organism that loves sugars and other multicarbon compounds as energy and carbon sources into an autotroph that builds all biomass from carbon dioxide. In this issue, Gleizer et al. demonstrate how this can be achieved.

EREN 2019

Metin I. Eren, Michelle R. Bebber, James D. Norris, Alyssa Perrone, Ashley Rutkoski, Michael Wilson & Mary Ann Raghanti, *Experimental replication shows knives manufactured from frozen human feces do not work*. *Journal of Archaeological Science: Reports* **27** (2019), 102002, 1–3.

JASRep027-a102002-Supplement.pdf

The ethnographic account of an Inuit man manufacturing a knife from his own frozen feces to butcher and disarticulate a dog has permeated both the academic literature and popular culture. To evaluate the validity of this claim, we tested the basis of that account via experimental archaeology. Our experiments assessed the functionality of knives made from human feces in controlled conditions that provided optimal conditions for success. However, they were not functional. While much research has shown foragers to be technologically resourceful, innovative, and savvy, we suggest that this ethnographic account should no longer be used to support that narrative.

GLEIZER 2019

Shmuel Gleizer et al., *Conversion of Escherichia coli to Generate All Biomass Carbon from CO₂*. *Cell* **179** (2019), 1255–1263.

Cell179-1255-Supplement1.pdf, Cell179-1255-Supplement2.xlsx

Highlights:

- Conversion of obligate heterotroph to full autotrophy over laboratory timescales
- Non-native Calvin cycle operation generates biomass carbon from CO₂ in *E. coli*
- Formate is oxidized by heterologous formate dehydrogenase to provide reducing power
- Chemostat-based directed evolution led to complete trophic mode change in $z200$ days

The living world is largely divided into autotrophs that convert CO₂ into biomass and heterotrophs that consume organic compounds. In spite of widespread interest in renewable energy storage and more sustainable food production, the engineering of industrially relevant heterotrophic model organisms to use CO₂ as their sole carbon source has so far remained an outstanding challenge. Here, we report the achievement of this transformation on laboratory timescales. We constructed and evolved *Escherichia coli* to produce all its biomass carbon from CO₂. Reducing power and energy, but not carbon, are supplied via the one-carbon molecule formate, which can be produced electrochemically. Rubisco and phosphoribulokinase were co-expressed with formate dehydrogenase to enable CO₂ fixation and reduction via the Calvin-Benson-Bassham cycle. Autotrophic growth was achieved following several months of continuous laboratory evolution in a chemostat under intensifying organic carbon limitation and confirmed via isotopic labeling.

Shmuel Gleizer, Roe Ben-Nissan, Yinon M. Bar-On, Niv Antonovsky, Elad Noor, Yehudit Zohar, Ghil Jona, Eyal Krieger, Melina Shamshoum, Arren Bar-Even & Ron Milo

LIU 2019

Yan Liu et al., *Gut Microbiome Fermentation Determines the Efficacy of Exercise for Diabetes Prevention*. *Cell Metabolism* (2019), preprint, 1–15. DOI:10.1016/j.cmet.2019.11.001.

Highlights:

- A high variability in glycemic response to exercise in subjects with prediabetes exists
- Responders and non-responders exhibit differential alterations of the gut microbiota
- Gut microbiota from responders confers the metabolic benefits of exercise in mice
- Baseline microbiome features accurately predict personalized exercise responses

Exercise is an effective strategy for diabetes management but is limited by the phenomenon of exercise resistance (i.e., the lack of or the adverse response to exercise on metabolic health). Here, in 39 medication-naive men with prediabetes, we found that exercise-induced alterations in the gut microbiota correlated closely with improvements in glucose homeostasis and insulin sensitivity (clinicaltrials.gov entry NCT03240978). The microbiome of responders exhibited an enhanced capacity for biosynthesis of short-chain fatty acids and catabolism of branched-chain amino acids, whereas those of non-responders were characterized by increased production of metabolically detrimental compounds. Fecal microbial transplantation from responders, but not non-responders, mimicked the effects of exercise on alleviation of insulin resistance in obese mice. Furthermore, a machinelearning algorithm integrating baseline microbial signatures accurately predicted personalized glycemic response to exercise in an additional 30 subjects. These findings raise the possibility of maximizing the benefits of exercise by targeting the gut microbiota.

Context and Significance Exercise is the most cost-effective lifestyle intervention for the prevention and treatment of diabetes. However, its clinical implementation is hindered by the phenomenon of exercise resistance (i.e., non-response). Here, Aimin Xu and his colleagues show that the heterogeneous response to exercise in subjects with prediabetes with respect to changes in insulin sensitivity and glucose metabolism is linked to differential alterations of the gut microbiota. The microbiome of the responders exhibits enhanced capacity for the generation of short-chain fatty acids and increased breakdown of branched-chain amino acids, whereas the microbiome of non-responders is associated with an increased production of metabolically detrimental compounds. These results uncover the gut microbiota and their metabolites as important mediators of the benefits of exercise.

Yan Liu, Yao Wang, Yueqiong Ni, Cynthia K. Y. Cheung, Karen S. L. Lam, Yu Wang, Zhengyuan Xia, Dewei Ye, Jiao Guo, Michael Andrew Tse, Gianni Panagiotou, & Aimin Xu

MARSHALL 2019

Michael Marshall, *A Million Years of Triassic Rain*. *nature* **576** (2019), 26–28.

An extended bout of warm, wet weather 232 million years ago might have triggered the rise of the dinosaurs and completely altered the history of life on Earth.

PALMER 2019

Tim Palmer & Bjorn Stevens, *The scientific challenge of understanding and estimating climate change*. *PNAS* **116** (2019), 24390–24395.

The idea that the science of climate change is largely “settled,” common among policy makers and environmentalists but not among the climate science community, [...] For these and other broad brush strokes of the climate change picture,

we are also increasingly confident in our ability to usefully bound the magnitude of the effects. From this certainty stems the conviction that additional warming is best avoided by reducing or reversing emissions of long-lived greenhouse gases.

Given the slow unfolding of what may become catastrophic changes to Earth's climate, many are understandably distraught by failures of public policy to rise to the magnitude of the challenge. Few in the science community would think to question the scientific response to the unfolding changes. However, is the science community continuing to do its part to the best of its ability? In the domains where we can have the greatest influence, is the scientific community articulating a vision commensurate with the challenges posed by climate change? We think not.

Keywords: climate change | climate models | high resolution

Energie

HAN 2019

Xiaoye Han, Shui Yu, Jimi Tjong & Ming Zheng, *Study of an innovative three-pole igniter to improve efficiency and stability of gasoline combustion under charge dilution conditions*. [Applied Energy 257 \(2019\), 113999, 1–13](#).

Highlights:

- An innovative 3-pole igniter is examined on a production engine for the first time.
- Improvements in fuel economy and combustion stability under high charge dilution.
- The enlarged ignition volume offers faster flame kernel development and burning.
- The 3-pole igniter exhibits greater advantages under diluted combustion conditions.

A diluted cylinder charge helps in engine fuel efficiency but at the same time presents significant challenges to combustion stability. An innovative three-pole spark igniter is researched to explore multi-spot ignition technology and improve the burning process of high-efficiency combustion under diluted conditions. The unique design features three independent pairs of electrodes in a single spark plug and allows new approaches to apply novel ignition strategies. Optical combustion vessels and high-speed imaging techniques are employed to develop fundamental understandings of the multi-spot ignition process. A large number of tests are performed on instrumented combustion vessels to statistically quantify and demonstrate the effect of the three-pole igniter, in comparison with a conventional spark plug. Finally, the prototype three-pole igniter is implemented on a production engine to validate and demonstrate the improvements in engine combustion under low and high dilution conditions. As shown by test results, the three-pole igniter offers shorter ignition delay and faster burning, thereby improving combustion phasing and fuel economy. The three-pole igniter exhibits greater advantages for combustion stability under high dilution conditions that reduce pumping loss and thus gains fuel economy.

Keywords: 3-pole igniter | Multi-spot ignition | Innovative ignition method | High efficiency combustion | Diluted combustion | Flame kernel development

Islam

BRUNNER 2016

Rainer Brunner, *Die Schia*. In: RAINER BRUNNER (Hrsg.), *Islam, Einheit und Vielfalt einer Weltreligion*. (Stuttgart 2016), 310–337.

Der schiitische Islam hat ein eindeutiges PR-Problem. Das gilt nicht nur für die innerislamischen Konfessionsstreitigkeiten, von denen auf den folgenden Seiten des öfteren die Rede sein wird, und es gilt auch nicht erst seit 1979, als der Umsturz in Iran das Bild eines grimmig dreinblickenden Klerikers zur Revolutionsikone machte, in manchen Teilen der Welt beinahe so populär (respektive gefürchtet) wie in anderen Ché Guevara. Auch die westliche Wissenschaft hat sich lange Zeit schwer damit getan, die Schia anders denn als – implizit: unislamische – Sekte zu begreifen. Man sehe sich dazu nur die Wortwahl Ignaz Goldzihers (1850-1921) an, der sie in seinen Vorlesungen über den Islam als eine “sektiererische Bewegung” abkanzelte, einen “Nährboden für Absurditäten (...), geeignet, die Gotteslehre des Islam völlig zu zersetzen und aufzulösen.” Als er an anderer Stelle auf die schiitische Koraninterpretation – in seinen Augen nichts weiter als eine “sektiererische Tendenzexegese” – einging, pflichtete er dem polternden Theodor Nöldeke (1836-1930) bei. Dieser habe sie “nicht mit Unrecht als ‘elendes Gewebe von Lügen und Dummheiten’” charakterisiert, doch sei, so Goldziher, eher schmallippiges Fazit, “ihre historische Berücksichtigung (...) jedoch für die volle Kenntnis der religiösen Strömungen im Islam nicht zu umgehen.”

Isotope

COLANINNO 2019

Carol E. Colaninno et al., *Effects of exposure to nixtamalization liquid on bone collagen $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ and archaeological implications*. [Journal of Archaeological Science: Reports](#) **27** (2019), 101935, 1–7.

JASRep027-a101935-Supplement.xlsx

The use of stable isotopes in zooarchaeology is common; however, the effects of many cooking and post-depositional processes on the chemical composition of faunal remains are understood poorly. People of the Americas processed maize through nixtamalization, a method of preparing grains by soaking and cooking them in an alkaline solution. Once discarded, nixtamalization wastewater may have contacted other food waste, such as bone. We examine the effects of alkaline exposure on stable isotopes (d^{13}C and d^{15}N) in fish bone collagen. Bony structures of four modern shortnose gar (*Lepisosteus platostomus*), a commonly identified taxon in eastern North American zooarchaeological assemblages, were exposed to four treatments that varied in alkalinity and duration of exposure. No significant differences were observed between treated and untreated specimens in d^{13}C values. Prolonged exposure to a highly alkaline solution caused a shift in bone collagen d^{15}N values of approximately -0.44% . The extreme conditions required to cause this shift suggests that the byproduct of nixtamalization would have negligible effects on archaeological bone collagen d^{13}C and d^{15}N values.

Keywords: Carbon and nitrogen stable isotopes | Bone collagen | Nixtamalization | Bone collagen alkaline exposure

Carol E. Colaninno, Carla S. Hadden, Shana J. Springman, John H. Chick, Julia R. Allison, Maria S. Brauer, Courtney A. Camp, Alexander C. Huaylinos, Sarah A. Klush, Emily R. Lange, Jennifer M. McBride, Olivia A. Mullenax, Hunter C. Ridley & Patricia M. Umbricht

Klima

HILDEBRANDT-RADKE 2019

Iwona Hildebrandt-Radke et al., *Late Neolithic and Middle Bronze Age barrows in Bukivna, Western Ukraine as a source to understand soil*

evolution and its environmental significance. *Journal of Archaeological Science: Reports* **27** (2019), 101972, 1–11.

Barrows play an important role in paleoenvironmental studies. This research, conducted on macromorphology (descriptive), micromorphology (thin-section), physical and chemical properties of a burial mound necropolis located in the western part of Ukraine (near Bukivna village), aimed to reconstruct the climatic conditions and landscape of the area during the Late Neolithic and Middle Bronze Ages, when they were erected. The analysis of pedogenic and post-depositional processes has made it possible to determine the evolution of soils beginning around 4000 BP. Three phases of change in vegetation, climate, and soil conditions have been distinguished. Between 6000 and 4200 BP, the brown forest soil formed at the beginning of Subboreal period. Later, the formation of chernozems (Chernozems) took place between 4200 and 3300 BP, chernozems (Chernozems) formed, at an increasing rate as meadow and meadow-forest which led to the continental climate spread through the area, while in the Forecarpathians forest areas their transformation into gray forest soils (Luvic Phaeozems) is visible, and podzolized brown soils (Dystric or Haplic Cambisols) developed about 150 BP in a cooler and much more humid climate conditions than were present in the beginning of the Subboreal period. From the present study it was concluded that post-depositional processes, such as podzolization, lessivage, and illimerization, change the original properties of soils, while others, like the activity of fauna, result in krotovinas filled with original humus, and makes it easier to recognize fossil soils.

Keywords: Barrows | Soils | Palaeopedology | Micromorphology | Komarów culture | Ukraine | Forest-steppe area

Iwona Hildebrandt-Radke, Przemyslaw Makarowicz, Zhanna N. Matviishyna, Aleksandr Parkhomenko, Sergiy D. Lysenko & Igor T. Kochkin

Mesolithikum

SNIR 2019

Ainit Snir, Dani Nadel, Iris Groman-Yaroslavski, Yoel Melamed, Marcelo Sternberg, Ofer Bar-Yosef & Ehud Weiss, *The Origin of Cultivation and Proto-Weeds, Long Before Neolithic Farming*. *PLoS ONE* **10** (2019), e131422. DOI:10.1371/journal.pone.0131422.

pone10-e0131422-Supplement1.pdf, pone10-e0131422-Supplement2.pdf

Weeds are currently present in a wide range of ecosystems worldwide. Although the beginning of their evolution is largely unknown, researchers assumed that they developed in tandem with cultivation since the appearance of agricultural habitats some 12,000 years ago. These rapidly-evolving plants invaded the human disturbed areas and thrived in the new habitat. Here we present unprecedented new findings of the presence of “proto-weeds” and small-scale trial cultivation in Ohalo II, a 23,000-year-old hunter-gatherers’ sedentary camp on the shore of the Sea of Galilee, Israel. We examined the plant remains retrieved from the site (ca. 150,000 specimens), placing particular emphasis on the search for evidence of plant cultivation by Ohalo II people and the presence of weed species. The archaeobotanically rich plant assemblage demonstrates extensive human gathering of over 140 plant species and food preparation by grinding wild wheat and barley. Among these, we identified 13 well-known current weeds mixed with numerous seeds of wild emmer, barley, and oat. This collection provides the earliest evidence of a human-disturbed environment—at least 11 millennia before the onset of agriculture—that provided the conditions for the development of “proto-weeds”, a prerequisite for weed evolution. Finally, we suggest that their presence indicates

the earliest, small-scale attempt to cultivate wild cereals seen in the archaeological record.

Methoden

BIRCH-CHAPMAN 2019

Shannon Birch-Chapman & Emma Jenkins, *A Bayesian approach to calculating Pre-Pottery Neolithic structural contemporaneity for reconstructing population size*. [Journal of Archaeological Science](#) **112** (2019), 105033, 1–13.

JAS112-a105033-Supplement.zip

This paper details a more empirically robust method than currently exists for establishing site-specific structural contemporaneity values (i.e. the percentage of structures in contemporaneous use). In this research, structural contemporaneity values were reconstructed specifically for the purposes of estimating population size of central and southern Levantine PPN settlements. These settlements were selected for exploratory analysis as these represent a period of major demographic transition in which population aggregation is directly linked to the development of more complex social, economic, religious and political systems.

Population reconstructions must incorporate contemporaneity adjustments in order to make more meaningful conclusions about the relationships between demographic parameters and human socio-cultural developments. It is anticipated that the relative simplicity of the method presented will encourage routine application to settlements during the PPN and in other periods and regions, and encourage further development by researchers in future.

REYNOLDS 2019

N. Reynolds & C. Green, *Spatiotemporal modelling of radiocarbon dates using linear regression does not indicate a vector of demic dispersal associated with the earliest Gravettian assemblages in Europe*. [Journal of Archaeological Science: Reports](#) **27** (2019), 101958, 1–19.

First, it should be clear from this study that the uncritical use of radiocarbon date information from large databases should be avoided unless the risks of doing so are well understood and controlled for. There is no substitute for a detailed understanding of individual sites, particularly with respect to sample association and taphonomy.

We recommend that future studies using cost modelling include a comparison with results obtained using Euclidean values, so that the appropriateness of LCP techniques can be better weighed in the future.

In particular, we remain sceptical that the obtention of high r-values and low p-values necessarily indicates that a linear regression is a faithful representation of a vector of advance. The ease of obtaining probably spurious positive results in this study suggests that the method has definite limitations for hypothesis testing. We recommend that, at a minimum, positive results obtained using this approach are supported by publication of actual plots, not just r and p-values, and that residuals analyses are performed where appropriate.

The archaeologically recent example of the rapid replacement of the Dorset culture by the Thule in Arctic North America – which took place over at most a few hundred years – shows that demic and cultural replacement among hunter-gatherers can take place very quickly over very large areas.

The causes of major archaeological transitions during the Upper Palaeolithic, such as the Aurignacian-Gravettian transition, remain poorly understood. In an

effort to distinguish between demic and cultural diffusionary explanations for such transitions, analyses of radiocarbon and spatial data are sometimes employed. Here, we attempt to replicate a recent spatiotemporal study of the first appearance of Gravettian assemblages in Europe using linear regression analyses of radiocarbon dates and least-cost-path measurements of the distances between sites. We find that there are problems with the corpus of radiocarbon dates used and assemble two more appropriate sets of dates. We also find problems with the least-cost-path calculations and repeat these using a more appropriate method. We then repeat the regression analyses and use these as a case study to explore some of the problems with using linear regression analyses of radiocarbon and distance data for hypothesis testing where the total number of sites is very low. We conclude that this method is not capable of distinguishing the geographical origin of Gravettian traditions. We also find that this method frequently obtains false positive results, and that binning of sites may have a significant effect on the ease of obtaining positive results. Finally, we find that there is a negligible difference between the results of linear regression analyses obtained using least-cost-path measurements and those obtained using simple Euclidean distances, suggesting that the former adds little analytical value here despite its computational complexity.

Keywords: Chronology | GIS | Cost modelling | Least-cost-paths | Demography | Upper Palaeolithic | Replication

WENDT 2015

K. P. Wendt, J. Hilpert & A. Zimmermann, *Landschaftsarchäologie IV – Ein Modell zur Rekonstruktion von Landwirtschaftssystemen am Beispiel der Linearbandkeramik und der späten vorindustriellen Neuzeit*. [Berichte der Römisch-Germanischen Kommission 96 \(2015\), 9–218](#).

Es darf aber nicht übersehen werden, dass durch den Einsatz der Sammelpflanzen in unserem Modell für viele wichtige Nährstoffinhaltsstoffe (Calcium und die Vitamine A, B2, E und K) nur ein knapper Ausgleich zum Bedarf erreicht wird.

Der Umstand, dass das Gebiet der Aldenhovener Platte den bandkeramischen Siedlern vermutlich nicht deutlich mehr Nährstoffe in Form von Sammelpflanzen zur Verfügung stellen konnte, eröffnet Raum für weitere Überlegungen. Es wäre denkbar, hier einen Faktor zu sehen, der direkt auf die Populationsgröße und damit auf die Intensität der Landschaftsnutzung Einfluss genommen hat. Im Lauf der Bandkeramik ist zunächst ein Ansteigen der Bevölkerung und dann ein Stagnieren auf einem gewissen Niveau zu beobachten (z. B. Zimmermann u. a. 2009b b, Abb. 6). Inwieweit sich solche demographischen Entwicklungen aber mit einem begrenzten Zugang zu den notwendigen Vitaminen und Mineralstoffen verbinden lässt, kann an dieser Stelle nicht beantwortet werden.

Keywords: Mittelrhein | Niederrhein | Neolithikum | Bandkeramik | Neuzeit | diachroner Vergleich | Landschaftsarchäologie | Landwirtschaftslächen | Nahrungsmittelproduktion | Feldbau | Viehhaltung | Waldweide | Energie- und Nährstoffbedarf | Statistik | GIS | Sterbetafeln

A model of the agricultural system of the Linearbandkeramik in the Rhineland around 5100 BC is contrasted with food production and land requirements in the late pre-industrial modern period around 1820. In the case of the Linearbandkeramik, potential food sources known from archaeobotanical research are compared with the requirements of the local population of the time (Fig. 1), the size of which has been established in previous research (Zimmermann et al. 2004, 73; corrected Wendt et al. 2010, 311 and Tab. 32).

To calculate the ratio of supply and demand, the energy and nutrition requirements of modern humans are used, based on the uniformity principle. Allowance

is made for differences in the age and gender composition of the prehistoric population with the help of a series of mortality tables (Tab. 4). The average daily consumption thus arrived at is 2600 kcal. This maximum consumption is contrasted with a comparative calculation using a minimum consumption of 2000 kcal.

The area of cultivable land required by an average Linearbandkeramik household is determined mainly by grain yields. Winter-crop yields are potentially high, while summercrop yields are lower (p. 116–118), resulting in an area of cultivation per household of around either 1 or 4 ha (Tab. 35).

One variable which is hard to quantify is the proportion of the energy requirement provided by the ‘animal’ sector of the economy. In one scenario, a 20 % contribution of energy from meat, fat and milk is factored in, in order to be able to compare these values at a later stage with the agricultural system of the Iron Age. A smaller proportion of around 5 % is more likely, however (p. 29–31).

Nevertheless, woodland pasture and hunting require much larger areas of land than crop cultivation. At 5 %, around 20 ha are required per household; at 20 % this rises to over 70 ha (p. 110–116; Tab. 44). Even so, at the period of maximum population density on the Aldenhoven Platte (where the settlement system is almost completely documented), only three-quarters of the available area would have been used.

The considerations discussed hitherto have concentrated exclusively on energy requirements. Having deducted the usable areas discussed above, we obtain the size of the potential area for gathering of wild plants to supply the remaining vitamin and mineral requirements (p. 119–120; Tab. 48). Only for salt (NaCl) is there a deficit of around 0.6 g per person per day. This deficit remains even with a higher proportion of animal products making up the energy supply. The requirements for vitamins A to E are satisfied for a maximum population size, but owing to the uncertain sources it is not clear whether there is any excess margin.

Keywords: Middle Rhine | Lower Rhine | Neolithic | Linear Pottery | Modern Age | diachronic comparison | landscape archaeology | agricultural areas | foodstuff production | cultivation | livestock raising | forest pasture | energy and foodstuff requirements | statistics | GIS | mortality tables

Mittelpaläolithikum

KOZOWYK 2019

Paul R. B. Kozowyk & Johannes A. Poulis, *A new experimental methodology for assessing adhesive properties shows that Neandertals used the most suitable material available.* [Journal of Human Evolution 137 \(2019\), 102664, 1–12.](#)

The use of adhesives for hafting stone tools at least 191 ka was a major technological development. Stone tools could be more securely attached to handles, thus improving their efficiency and practicality. To produce functional adhesives required forethought and planning, as well as expertise and knowledge of the resources available in the landscape. This makes adhesives important in discussions about Neandertal and early modern human technological and mental capabilities. However, we currently know very little about how these early adhesive materials behaved under different circumstances, or why certain materials were used and others were not. Here we present the results of controlled laboratory bulk property tests (hardness, rheology and thermogravimetric analysis) on replica Paleolithic adhesives. We conclude that birch tar is more versatile, has better working properties, and is more reusable than pine resin, the most likely alternative material. Neandertals may therefore have invested more time and resources to produce birch

tar because it was the best material available, both functionally and economically, throughout the majority of Europe during the Middle to Late Pleistocene. Our results further demonstrate that Neandertals had high levels of technological expertise and knowledge of the natural resources available to them in their environment.

Keywords: Hafting | Birch tar | Resin | Paleolithic | Technology

Neolithikum

BOYD 2018

Brian Boyd, *Settled? Recent debates in the archaeology of the Epipalaeolithic and Pre-Pottery Neolithic of Southwest Asia*. [Asian Archaeology](#) **1** (2018), 63–73.

Visiting China for the first time in October 2016, at the kind invitation of Professor Feng Li, I was immediately struck by the scale and complexity of the Neolithic archaeology. During interesting discussions with Chinese colleagues it became clear that many aspects of the archaeological narratives developed for the origins of the Neolithic in China shared many of the same explanatory models and theoretical perspectives as its prehistoric counterpart in southwest Asia (modern-day Israel/Palestine, Jordan, Lebanon, Syria, Anatolia). I thought it therefore appropriate in my contribution to this issue of *Asian Archaeology* to offer a Summary of the history and development of “Neolithic transition” archaeology in southwest Asia. I hope this contribution will lead to further comparative discussions.

Keywords: Southwest Asia | Epipalaeolithic | Natufian | Pre-Pottery Neolithic | Origins | Domestication

FURHOLT 2017

Martin Furholt, *Das ägäische Neolithikum und Chalkolithikum, Transformationen sozialer Handlungsmuster in Anatolien und Griechenland zwischen 6500 und 4000 v. Chr.* *Universitätsforschungen zur prähistorischen Archäologie* 304 (Bonn 2017).

Das beschriebene Gesellschaftssystem des Nahen Ostens und Zentralanatoliens war das Ergebnis einer jahrtausendelangen historischen Entwicklung, die einen extremen Wandel der ehemals wildbeuterischen Gesellschaften hervorrief und in deren Verlauf Strategien der Subsistenz entwickelt wurden, die diese Gesellschaften zu ernähren in der Lage waren. Die frühesten sesshaften Gesellschaften Europas bzw. Nordwestanatoliens übernahmen diese Strategien der Subsistenz, die sogenannten founder crops und Haustierarten, wählten jedoch andere Strategien der sozialen Reproduktion. Das Element der Permanenz ist hier wesentlich geringer ausgeprägt. Soziale Beziehungen zwischen den Haushalten werden nicht durch permanente Strukturen fixiert, sondern unterliegen weiterhin einer ständigen Neuaushandlung. Zwar wird teilweise das Motiv der extremen Ortstreue übernommen, in deren Zuge Tellsiedlungen entstehen, baulich wird jedoch die Autonomie der Haushalte betont, auch sind die Siedlungspläne der aufeinandererrichteten Siedlungen in einem ständigen Wandel begriffen.

Ostasien

SUN 2019

Huiyi Sun, Jian-xin Zhao, Guanjun Shen, Bo Cao, Xiaochao Che & Dunyi Liu, *U-Th dating of a Paleolithic site in Guanyindong Cave,*

Guizhou Province, southwestern China. *Journal of Archaeological Science: Reports* **27** (2019), 101996, 1–11.

Guanyindong Cave in southwestern China has received considerable attention in the investigation of Paleolithic hominin origins and evolution in China, due to its rich archaeological finds composed of thousands of stone artifacts and a unique fauna with 23 species of mammalian fossils found. However, despite earlier extensive excavations and descriptive studies, debates still centre around the conflict between previous radiometric age data and evidence from biostratigraphic correlations. In this study, we carried out detailed field investigations and sampling, and obtained 35 U-Th dates on flowstone layers and other datable materials from the cave. The age results from materials in stratigraphic context provide a robust chronological framework of the cave. The data suggest that the deposition of Group B sediments and fossil assemblages widely distributed within the cave should have occurred after ≈ 370 ka but before ≈ 70 ka, with the bulk of the sediments and associated fossils laid down during 200–140 ka. Our new U-Th dates of in situ flowstone layers intercalated with one rhinoceros tooth and several other fossil fragments near the Hall at the centre of the cave constrain the deposition ages of these mammalian fossils to the period between $469 \pm$

37 and 336 ± 7 ka. Combined our U-Th data with recent OSL dates of Hu et al. (2019), we suggest that Group A sediments and associated fossils were likely deposited episodically from ca. 90 ka to <40 ka. Overall, our data indicate that the cave development started $>469 \pm 37$ ka ago, whilst the cave system framework took shape as we see today $>340 \pm 10$ ka ago. Subsequently, the cave might have experienced several flooding and washout events, resulting in recycling and mixing of older sediments and fossils into younger sequences, a hypothesis consistent with tight clustering of both U-Th ages of speleothems in this study and the OSL dates of clastic sediments (Hu et al., 2019). This would reconcile the contradiction between the great antiquity of mammalian fossils inferred from biostratigraphic correlation and the much younger radiometric dates of materials in stratigraphic context, and explain the lack of technological advance despite an apparently long presence of the “Guanyindong culture”, as well as the presence of the Levallois technologies. In this regard, our U/Th age data, combined with other recent studies, have resulted in an improved understanding of Paleolithic hominid evolution and stone technologies in south China.

Keywords: U-Th age | Guanyindong cave | Speleothem | Fossil | Paleolithic

Sprachlehre

JOOSTEN 1996

Jan Joosten, *The Syriac Language of the Peshitta and Old Syriac Versions of Matthew, Syntactic Structure, Inner-Syriac Developments and Translation Technique*. Studies in Semitic Languages and Linguistics 22 (Leiden 1996).

The present work is a slightly revised version of my doctoral dissertation submitted to the Senate of the Hebrew University in 1988. Several mistakes have been corrected and references to recent studies have been added in the footnotes. Although the presentation would have profited from a more thorough reworking, this would also have delayed publication considerably. I have decided, therefore, to publish it in the present form. For a substantial revision of some of the more important points included, the reader is referred to my articles listed in the bibliography.

Story or Book

LEPPARD 2019

Thomas P. Leppard et al., *Archaeological Perspectives on Scott's Against the Grain: A Deep History of the Earliest States, Review Symposium*. [Cambridge Archaeological Journal](#) **29** (2019), 691–721.

Thomas P. Leppard, Rod Campbell, Jade d'Alpoim Guedes, Terence N. D'Altroy, Robert D. Drennan, Timothy R. Pauketat, Susan Pollock, Adam T. Smith, Miriam T. Stark, Joshua Wright, Stephanie Wynne-Jones & James C. Scott
James C. Scott, *Against the Grain: A deep history of the earliest states*, 2017. London/New Haven: Yale University Press. ISBN 978-0-300-18291-0, \$ 26.00, xvii + 312 pp., 13 figures

Cultivars domesticated and organized people. Cereal grain-growing agriculturists—at least those lucky enough to live in floodplains—exploited others in order to sustain themselves. From such preconditions, states were born, the organizational fragilities of which routinely led to their dissolution, and to other sorts of social forms in peripheral locations. This is James Scott's *Against the Grain* in a nutshell.

Such agricultural processes, we are told, are the foundations of states, and these early chapters on pre-state villages and agriculture—along with Scott's own indomitable rationality—are the strengths of this book. And it is a good book.

Such a textured, loosely articulated and complex understanding of states—blurring the lines between a political 'structure' and a 'way' of life (both of which should now be understood as entangled configurations of beings, places, things and substances)—is not to be found in *Grain*. Scott's states are all stick—slavery, taxes, coercion—and no carrot—religion, returns, esprit de corps.

The behaviours of any one state organism, perhaps even our own, might be inferred from any other.