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References

Aktuell

Boos 2016

William R. Boos & Trude Storelvmo, *Linear scaling for monsoons based on well-verified balance between adiabatic cooling and latent heat release*, *Reply to Levermann et al.:* PNAS **113** (2016), E2350–E2351.

The paleorecord may show that monsoons have changed abruptly in the past, but this does not mean that the moisture advection feedback of the ref. 3 model caused those changes. We showed that a global climate model (GCM) failed to produce abrupt monsoon changes in response to a wide range of forcings, and this comprehensive model should be capable of representing the moisture advection feedback of the ref. 3 model if it exists. However, Levermann et al. make no comment on this part of our study. Our GCM results suggest that, if abrupt changes in tropical monsoons occurred in the past, they may have been caused not by atmospheric dynamics but by other components of the climate system, such as vegetation feedbacks or abrupt changes in the forcings themselves.

Castelvecchi 2016

Davide Castelvecchi, *Controversial dark-matter claim faces ultimate test.* nature **532** (2016), 14–15.

Multiple teams finally have the material they need to repeat enigmatic experiment.

Leite 2016

Yuri L. R. Leite et al., *The "Atlantis Forest hypothesis" adds a new dimension to Atlantic Forest biogeography*, *Reply to Raposo do Amaral et al.* PNAS **113** (2016), E2099–E2100.

Yuri L. R. Leite, Leonora P. Costa, Ana Carolina Loss, Rita G. Rocha, Henrique Batalha-Filho, Alex C. Bastos, Valéria S. Quaresma, Valéria Fagundes, Roberta Paresque, Marcelo Passamani & Renata Pardini

Levermann 2016

Anders Levermann, Vladimir Petoukhov, Jacob Schewe & Hans Joachim Schellnhuber, *Abrupt monsoon transitions as seen in paleorecords can be explained by moisture-advection feedback.* PNAS **113** (2016), E2348–E2349.

Mitchell 2016

Aaron P. Mitchell, *Fungus produces a toxic surprise.* nature **532** (2016), 41–42.

A protein fragment released by filaments of the fungus Candida albicans destroys host cells. This is the first demonstration that human fungal pathogens other than moulds can release toxic peptides.

Moyes 2016

David L. Moyes et al., *Candidalysin is a fungal peptide toxin critical for mucosal infection*. nature **532** (2016), 64–68.

n532-0064-Supplement1.pdf, n532-0064-Supplement2.xlsx

David L. Moyes, Duncan Wilson2, Jonathan P. Richardson, Selene Mogavero, Shirley X. Tang, Julia Wernecke, Sarah Höfs, Remi L. Gratacap, Jon Robbins, Manohursingh Runglall, Celia Murciano, Mariana Blagojevic, Selvam Thavaraj, Toni M. Förster, Betty Hebecker, Lydia Kasper, Gema Vizcay, Simona I. Iancu, Nessim Kichik, Antje Häder, Oliver Kurzai, Ting Luo, Thomas Krüger, Olaf Kniemeyer, Ernesto Cota, Oliver Bader, Robert T. Wheeler, Thomas Gutsmann, Bernhard Hube & Julian R. Naglik

Cytolytic proteins and peptide toxins are classical virulence factors of several bacterial pathogens which disrupt epithelial barrier function, damage cells and activate or modulate host immune responses. Such toxins have not been identified previously in human pathogenic fungi. Here we identify the first, to our knowledge, fungal cytolytic peptide toxin in the opportunistic pathogen Candida albicans. This secreted toxin directly damages epithelial membranes, triggers a danger response signalling pathway and activates epithelial immunity. Membrane permeabilization is enhanced by a positive charge at the carboxy terminus of the peptide, which triggers an inward current concomitant with calcium influx. C. albicans strains lacking this toxin do not activate or damage epithelial cells and are avirulent in animal models of mucosal infection. We propose the name 'Candidalysin' for this cytolytic peptide toxin; a newly identified, critical molecular determinant of epithelial damage and host recognition of the clinically important fungus, C. albicans.

Raposo do Amaral 2016

Fabio Raposo do Amaral et al., *The "Atlantis Forest hypothesis" does not explain Atlantic Forest phylogeography*. PNAS **113** (2016), E2097–E2098.

Fabio Raposo do Amaral, Scott V. Edwards, Marcio R. Pie, W. Bryan Jennings, Maria Svensson-Coelho, Fernando M. d'Horta, C. Jonathan Schmitt & Marcos Maldonado-Coelho

Vikbladh 2016

Oliver Vikbladh, *Identity theft*. science **352** (2016), 46.

Inspired by true events, a new play explores a controversial case of gender reassignment

Amerika

Goldberg 2016

Amy Goldberg, Alexis M. Mychajliw1 & Elizabeth A. Hadly, *Post-invasion demography of prehistoric humans in South America*. nature **532** (2016), 232–235.

n532-0232-Supplement.xlsx

As the last habitable continent colonized by humans, the site of multiple domestication hotspots, and the location of the largest Pleistocene megafaunal extinction, South America is central to human prehistory1–7. Yet remarkably little is known about human population dynamics during colonization, subsequent expansions,

and domestication2–5. Here we reconstruct the spatiotemporal patterns of human population growth in South America using a newly aggregated database of 1,147 archaeological sites and 5,464 calibrated radiocarbon dates spanning fourteen thousand to two thousand years ago (ka). We demonstrate that, rather than a steady exponential expansion, the demographic history of South Americans is characterized by two distinct phases. First, humans spread rapidly throughout the continent, but remained at low population sizes for 8,000 years, including a 4,000-year period of 'boom-and-bust' oscillations with no net growth. Supplementation of hunting with domesticated crops and animals4,8 had a minimal impact on population carrying capacity. Only with widespread sedentism, beginning .5 ka4,8, did a second demographic phase begin, with evidence for exponential population growth in cultural hotspots, characteristic of the Neolithic transition worldwide9. The unique extent of humanity's ability to modify its environment to markedly increase carrying capacity in South America is therefore an unexpectedly recent phenomenon.

Anthropologie

Brown 2016

Samantha Brown et al., *Identification of a new hominin bone from Denisova Cave, Siberia using collagen fingerprinting and mitochondrial DNA analysis.* Scientific Reports **6** (2016), 23559. DOI:10.1038/srep23559.

SciRep06-23559-Supplement1.pdf, SciRep06-23559-Supplement2.xls

Samantha Brown, Thomas Higham, Viviane Slon, Svante Pääbo, Matthias Meyer, Katerina Douka, Fiona Brock, Daniel Comeskey, Noemi Procopio, Michael Shunkov, Anatoly Derevianko & Michael Buckley

DNA sequencing has revolutionised our understanding of archaic humans during the Middle and Upper Palaeolithic. Unfortunately, while many Palaeolithic sites contain large numbers of bones, the majority of these lack the diagnostic features necessary for traditional morphological identiication. As a result the recovery of Pleistocene-age human remains is extremely rare. To circumvent this problem we have applied a method of collagen ingerprinting to more than 2000 fragmented bones from the site of Denisova Cave, Russia, in order to facilitate the discovery of human remains. As a result of our analysis a single hominin bone (Denisova 11) was identiied, supported through in-depth peptide sequencing analysis, and found to carry mitochondrial DNA of the Neandertal type. Subsequent radiocarbon dating revealed the bone to be >50,000 years old. Here we demonstrate the huge potential collagen ingerprinting has for identifying hominin remains in highly fragmentary archaeological assemblages, improving the resources available for wider studies into human evolution.

Hublin 2009

Jean-Jacques Hublin & Michael P. Richards (Hrsg.), *The Evolution of Hominin Diets, Integrating Approaches to the Study of Palaeolithic Subsistence.* Vertebrate Paleobiology and Paleoanthropology (Nederlands 2010).

This volume brings together new and important research from the top experts in hominid diets across multiple fields. The objective of the volume is to explore if there is a consensus between the different methods, allowing us to better understand the nature of hominin dietary strategies through time. Contributions focus

on modern studies, faunal studies, physical anthropology, archaeological studies, and isotopic studies, all aimed at answering the major questions of the evolution of hominid diets, such as: meat-eating emergence, hunting vs. scavenging, hunting technologies, and resource intensification in later humans.

Konner 2010

Melvin Konner & S. Boyd Eaton, *Paleolithic Nutrition, Twenty-Five Years Later*. Nutrition in Clinical Practice **25** (2010), 594–602.

A quarter century has passed since the first publication of the evolutionary discordance hypothesis, according to which departures from the nutrition and activity patterns of our hunter-gatherer ancestors have contributed greatly and in specifically definable ways to the endemic chronic diseases of modern civilization. Refinements of the model have changed it in some respects, but anthropological evidence continues to indicate that ancestral human diets prevalent during our evolution were characterized by much lower levels of refined carbohydrates and sodium, much higher levels of fiber and protein, and comparable levels of fat (primarily unsaturated fat) and cholesterol. Physical activity levels were also much higher than current levels, resulting in higher energy throughput. We said at the outset that such evidence could only suggest testable hypotheses and that recommendations must ultimately rest on more conventional epidemiological, clinical, and laboratory studies. Such studies have multiplied and have supported many aspects of our model, to the extent that in some respects, official recommendations today have targets closer to those prevalent among hunter-gatherers than did comparable recommendations 25 years ago. Furthermore, doubts have been raised about the necessity for very low levels of protein, fat, and cholesterol intake common in official recommendations. Most impressively, randomized controlled trials have begun to confirm the value of hunter-gatherer diets in some high-risk groups, even as compared with routinely recommended diets. Much more research needs to be done, but the past quarter century has proven the interest and heuristic value, if not yet the ultimate validity, of the model. (Nutr Clin Pract. 2010;25:594-602)

Keywords: Paleolithic diet | hunter-gatherers | ancestral diet

Lindeberg 2009

Staffan Lindeberg, *Modern Human Physiology with Respect to Evolutionary Adaptations that Relate to Diet in the Past*. In: Jean-Jacques Hublin & Michael P. Richards (Hrsg.), *The Evolution of Hominin Diets, Integrating Approaches to the Study of Palaeolithic Subsistence*. Vertebrate Paleobiology and Paleoanthropology (Nederlands 2010), 43–57.

This paper reviews evidence from human physiology as to which foods may have been typically consumed by the hominin ancestral lineage up to the advent of anatomically modern humans. Considerable evidence suggests that many common diseases can be prevented by hunter-gatherer diets. Apparently, human nutritional metabolism is not perfectly fine-tuned for recently introduced staple foods, such as cereals, dairy products, added salt, and refined fats and sugar. It is much more uncertain if human physiology can provide direct evidence of which animal and plant foods were regularly consumed during human evolution, and in what proportions. The requirements of ascorbic acid can easily be met by organ meats from large animals, as well as by plant foods. Vitamin B12 is absent in plant foods and must be supplied from meat, fish, shellfish, or insects, but the required amounts are apparently small.

Since iodized salt and dairy products were not available before the advent of agriculture, only those ancestors with highly regular access to fish or shellfish

would be expected to have reached the currently recommended intake of iodine. However, there is insufficient data to suggest that humans, by way of natural selection, would have become completely dependent on marine food sources. Therefore, it is highly possible that human requirements for iodine are currently increased by some dietary factors. These theoretically include goitrogens in certain roots, vegetables, beans, and seeds. The notion that humans are strictly dependent on marine foods to meet requirements of long-chain omega-3 fatty acids still awaits solid evidence.

Shifting the focus from general human characteristics to ethnic differences, persistent lactase activity in adulthood is obviously not the only characteristic to have emerged under nutritional selection pressure. Other examples are a relative resistance against diseases of affluence in northern Europeans and a relatively low prevalence of gluten intolerance in populations with a long history of wheat consumption.

In conclusion, humans are well adapted for lean meat, fish, insects and highly diverse plant foods without being clearly dependent on any particular proportions of plants versus meat.

Keywords: Human physiology | evolutionary medicine | nutrition

Orschiedt 2015

Jörg Orschiedt, *Spuren von Gewalt an menschlichen Skelettresten des Paläolithikums*. In: Harald Meller & Michael Schefzik (Hrsg.), *Krieg – Eine Archäologische Spurensuche*, *Begleitband zur Sonderausstellung im Landesmuseum für Vorgeschichte Halle (Saale), 6. November 2015 bis 22. Mai 2016*. (Halle 2015), 83–88.

Neben der Problematik, dass die Erhaltung und die Lückenhaftigkeit der Überlieferung die Möglichkeit der Erkennung und zahlenmäßigen Bewertung der Fälle einschränken, ist die Tatsache von Bedeutung, dass bei Verletzungen, die als solche erkannt werden, nicht immer deutlich differenzierbar ist, ob sie durch einen Unfall oder durch zwischenmenschliche Gewalt hervorgerufen wurden.

Trotz aller oben genannten Einwände lässt sich bereits jetzt feststellen, dass Gewalt bei Neandertalern nicht signifikant häufiger auftritt als bei rezenten Jägern und Sammlern oder bei nomadisierenden Gruppen, bei denen zwischenmenschliche Gewalt einen Teil ihrer Existenz darstellt (Estabrook / Frayer 2o14). Diese Aussage dürfte jedoch nicht nur für die Neandertaler gelten. So ist nach Meinung von Trinkaus (2o12) hinsichtlich der Verletzungsmuster kein Unterschied zwischen Neandertalern und den anatomisch modernen Menschen des Paläolithikums zu erkennen. Diese Aussage trifft wahrscheinlich auch auf frühere Menschenformen zu.

Archäologie

van Gijn 2010

Annelou van Gijn, *Flint in Focus*, *Lithic Biographies in the Neolithic and Bronze Age*. (Leiden 2010).

Weisgerber 1980

Gerd Weisgerber (Hrsg.), *5000 Jahre Feuersteinbergbau – Die Suche nach dem Stahl der Steinzeit*, *Ausstellung im Deutschen Bergbau-Museum Bochum vom 24. Oktober 1980 bis 31. Januar 1981*. Veröffentlichungen aus dem Deutschen Bergbau-Museum Bochum 77 (Bochum ^{3}1999).

Bibel

Faigenbaum-Golovin 2016

Shira Faigenbaum-Golovin et al., *Algorithmic handwriting analysis of Judah's military correspondence sheds light on composition of biblical texts*. PNAS **113** (2016), 4664–4669.

Shira Faigenbaum-Golovin, Arie Shaus, Barak Sober, David Levin, Nadav Na'aman, Benjamin Sass, Eli Turkel, Eli Piasetzky & Israel Finkelstein

The relationship between the expansion of literacy in Judah and composition of biblical texts has attracted scholarly attention for over a century. Information on this issue can be deduced from Hebrew inscriptions from the final phase of the first Temple period. We report our investigation of 16 inscriptions from the Judahite desert fortress of Arad, dated ca. 600 BCE—the eve of Nebuchadnezzar's destruction of Jerusalem. The inquiry is based on new methods for image processing and document analysis, as well as machine learning algorithms. These techniques enable identification of the minimal number of authors in a given group of inscriptions. Our algorithmic analysis, complemented by the textual information, reveals a minimum of six authors within the examined inscriptions. The results indicate that in this remote fort literacy had spread throughout the military hierarchy, down to the quartermaster and probably even below that rank. This implies that an educational infrastructure that could support the composition of literary texts in Judah already existed before the destruction of the first Temple. A similar level of literacy in this area is attested again only 400 y later, ca. 200 BCE.

Keywords: biblical exegesis | literacy level | Arad ostraca | document analysis | machine learning

Significance: Scholars debate whether the first major phase of compilation of biblical texts took place before or after the destruction of Jerusalem in 586 BCE. Proliferation of literacy is considered a precondition for the creation of such texts. Ancient inscriptions provide important evidence of the proliferation of literacy. This paper focuses on 16 ink inscriptions found in the desert fortress of Arad, written ca. 600 BCE. By using novel image processing and machine learning algorithms we deduce the presence of at least six authors in this corpus. This indicates a high degree of literacy in the Judahite administrative apparatus and provides a possible stage setting for compilation of biblical texts. After the kingdom's demise, a similar literacy level reemerges only ca. 200 BCE.

Biologie

Groenewoud 2016

Frank Groenewoud, Joachim Gerhard Frommen, Dario Josi, Hirokazu Tanaka, Arne Jungwirth & Michael Taborsky, *Predation risk drives social complexity in cooperative breeders*. PNAS **113** (2016), 4104–4109.

Predation risk is a major ecological factor selecting for group living. It is largely ignored, however, as an evolutionary driver of social complexity and cooperative breeding, which is attributed mainly to a combination of habitat saturation and enhanced relatedness levels. Social cichlids neither suffer from habitat saturation, nor are their groups composed primarily of relatives. This demands alternative ecological explanations for the evolution of advanced social organization. To address this question, we compared the ecology of eight populations of Neolamprologus

pulcher, a cichlid fish arguably representing the pinnacle of social evolution in poikilothermic vertebrates. Results show that variation in social organization and behavior of these fish is primarily explained by predation risk and related ecological factors. Remarkably, ecology affects group structure more strongly than group size, with predation inversely affecting small and large group members. High predation and shelter limitation leads to groups containing few small but many large members, which is an effect enhanced at low population densities. Apparently, enhanced safety from predators by cooperative defense and shelter construction are the primary benefits of sociality. This finding suggests that predation risk can be fundamental for the transition toward complex social organization, which is generally undervalued.

Keywords: social evolution | social complexity | predation risk | ecological constraints | cooperative breeding

Significance: It is widely accepted that high predation risk may select for group living, but predation is not regarded as a primary driver of social complexity. This view neglects the important effect of predation on dispersal and offspring survival, which may require cooperation among group members. The significance of predation for the evolution of social complexity can be well illustrated by behavioral and morphological adaptations of highly social animals showing division of labor, such as eusocial insects and cooperatively breeding fishes. By examining the diversity of social organization in a cooperative cichlid in relation to ecological variation, we show that predation risk has the greatest explanatory power of social complexity. This stresses the significance of predation for social evolution.

Biologie Kultur

Chou 2016

Ming-Yi Chou et al., *Social conflict resolution regulated by two dorsal habenular subregions in zebrafish.* science **352** (2016), 87–90.

Ming-Yi Chou, Ryunosuke Amo, Masae Kinoshita, Bor-Wei Cherng, Hideaki Shimazaki, Masakazu Agetsuma, Toshiyuki Shiraki, Tazu Aoki, Mikako Takahoko, Masako Yamazaki, Shin-ichi Higashijima & Hitoshi Okamoto

When animals encounter conflict they initiate and escalate aggression to establish and maintain a social hierarchy. The neural mechanisms by which animals resolve fighting behaviors to determine such social hierarchies remain unknown. We identified two subregions of the dorsal habenula (dHb) in zebrafish that antagonistically regulate the outcome of conflict. The losing experience reduced neural transmission in the lateral subregion of dHb (dHbL)–dorsal/intermediate interpeduncular nucleus (d/iIPN) circuit. Silencing of the dHbL or medial subregion of dHb (dHbM) caused a stronger predisposition to lose or win a fight, respectively. These results demonstrate that the dHbL and dHbM comprise a dual control system for conflict resolution of social aggression.

Desban 2016

Laura Desban & Claire Wyart, *A brain conditioned for social defeat.* science **352** (2016), 42–43.

A brain circuit in vertebrates determines who wins or loses a fight

Aggression is common in the animal kingdom, even though agonistic behaviors can lead to chronic stress or pain. So how does aggression remain conserved evolutionarily?

To survive with limited resources, individuals express aggressive behaviors against competitors to pass on their genes. For social animals, dominance hier-

archies establish rapidly, avoiding the cost of recurrent fighting within the group. Hierarchy formation and maintenance rely on the ef ect of prior experience.

Datierung

Quiles 2016

Anita Quiles et al., *A high-precision chronological model for the decorated Upper Paleolithic cave of Chauvet-Pont d'Arc, Ardèche, France.* PNAS **113** (2016), 4670–4675.

Anita Quiles, Hélène Valladas, Hervé Bocherens, Emmanuelle Delqé-Količ, Evelyne Kaltnecker, Johannes van der Plicht, Jean-Jacques Delannoy, Valérie Feruglio, Carole Fritz, Julien Monney, Michel Philippe, Gilles Tosello, Jean Clottes & Jean-Michel Geneste

Radiocarbon dates for the ancient drawings in the Chauvet-Pont d'Arc Cave revealed ages much older than expected. These early ages and nature of this Paleolithic artmake this United Nations Educational, Scientific and Cultural Organization (UNESCO) site indisputably unique. A large, multidisciplinary dating program has recently mapped the anthropological evolution associated with the cave. More than 350 dates (by 14C, U-Th, TL and 36Cl)were obtained over the last 15 y. They include 259 radiocarbon dates, mainly related to the rock art and human activity in the cave. We present heremore than 80 previously unpublished dates. All of the dates were integrated into a high-precision Bayesian model based on archaeological evidence to securely reconstruct the complete history of the Chauvet-Pont d'Arc Cave on an absolute timescale. It shows that there were two distinct periods of human activity in the cave, one from 37 to 33,500 y ago, and the other from 31 to 28,000 y ago. Cave bears also took refuge in the cave until 33,000 y ago.

Keywords: Chauvet-Pont d'Arc cave | radiocarbon dating | Upper Paleolithic | Bayesian modeling

Significance: We compiled a set of more than 250 radiocarbon dates related to the rock art, human activities, and bone remains in the ChauvetPont d'Arc Cave (Ardèche, France) and derive a modeled absolute chronology of the human and cave bear occupations of this site, presented here in calendar years. It provides an insightful framework for the successive events that occurred in the cave during the Paleolithic period.

Sutikna 2016

Thomas Sutikna et al., *Revised stratigraphy and chronology for Homo floresiensis at Liang Bua in Indonesia.* nature **532** (2016), 366–369.

n532-0366-Supplement1.pdf, n532-0366-Supplement2.wmv

Thomas Sutikna, Matthew W. Tocheri, Michael J. Morwood, E. Wahyu Saptomo, Jatmiko, Rokus Due Awe, Sri Wasisto, Kira E. Westaway, Maxime Aubert, Bo Li, Jian-xin Zhao, Michael Storey, Brent V. Alloway, Mike W. Morley, Hanneke J. M. Meijer, Gerrit D. van den Bergh, Rainer Grün, Anthony Dosseto, Adam Brumm, William L. Jungers & Richard G. Roberts

Homo floresiensis, a primitive hominin species discovered in Late Pleistocene sediments at Liang Bua (Flores, Indonesia)1–3, has generated wide interest and scientific debate. A major reason this taxon is controversial is because the H. floresiensis-bearing deposits, which include associated stone artefacts2–4 and remains of other extinct endemic fauna5,6, were dated to between about 95 and 12 thousand calendar years (kyr) ago2,3,7. These ages suggested that H. floresiensis survived until long after modern humans reached Australia by .50 kyr ago8–10.

Here we report new stratigraphic and chronological evidence from Liang Bua that does not support the ages inferred previously for the H. floresiensis holotype (LB1), .18 thousand calibrated radiocarbon years before present (kyr cal. bp), or the time of last appearance of this species (about 17 or 13–11 kyr cal. bp)1–3,7,11. Instead, the skeletal remains of H. floresiensis and the deposits containing them are dated to between about 100 and 60 kyr ago, whereas stone artefacts attributable to this species range from about 190 to 50 kyr in age. Whether H. floresiensis survived after 50 kyr ago—potentially encountering modern humans on Flores or other hominins dispersing through southeast Asia, such as Denisovans12,13—is an open question.

Grabung

Becker 2012

Cornelia Becker, Silviane Scharl & Tanja Zerl, *Ippesheim – Interdisziplinäre Untersuchungen in einer mittelneolithischen Siedlung mit Kreisgrabenanlage*. Prähistorische Zeitschrift **87** (2012), 236–260.

Der Forschungsstand zum mittelneolithischen Siedlungswesen ist äußerst lückenhaft. Für viele Regionen liegen kaum Daten vor, die Auskunft darüber geben könnten, wie die Siedlungen strukturiert waren oder wie die Wirtschaftsweise ihrer Bewohner zu rekonstruieren ist. Noch weniger Informationen existieren zu mittelneolithischen Siedlungen mit Kreisgrabenanlage. Am nordwestbayerischen Fundort Ippesheim konnten nun durch geomagnetische Prospektion, Grabungen, archäozoologische sowie archäobotanische Analysen erste Ergebnisse zu den genannten Aspekten gewonnen werden.

Keywords: Mittelneolithikum | Nordwestbayern | Ippesheim | mittelneolithisches Siedlungswesen | Siedlung mit Kreisgrabenanlage | Umfassungsgraben | archäozoologische und archäobotanische Analysen.

Judentum

Haas 1996

Peter J. Haas, *Responsa, Literary History of a Rabbinic Genre*. Society of Biblical Literature Semeia Studies (Atlanta 1996).

Klima

Hartman 2016

Gideon Hartman, Ofer Bar-Yosef, Alex Brittingham, Leore Grosman & Natalie D. Munro, *Hunted gazelles evidence cooling, but not drying, during the Younger Dryas in the southern Levant*. PNAS **113** (2016), 3997–4002.

The climatic downturn known globally as the Younger Dryas (YD; ≈12,900-11,500 BP) has frequently been cited as a prime mover of agricultural origins and has thus inspired enthusiastic debate over its local impact. This study presents seasonal climatic data from the southern Levant obtained from the sequential sampling of gazelle tooth carbonates from the Early and Late Natufian archaeological sites of Hayonim and Hilazon Tachtit Caves (western Galilee, Israel). Our results challenge the entrenched model that assumes that warm temperatures and

high precipitation are synonymous with climatic amelioration and cold and wet conditions are combined in climatic downturns. Enamel carbon isotope values from teeth of human-hunted gazelle dating before and during the YD provide a proxy measure for water availability during plant growth. They reveal that although the YD was cooler, it was not drier than the preceding Bølling-Allerød. In addition, the magnitude of the seasonal curve constructed from oxygen isotopes is significantly dampened during the YD, indicating that cooling was most pronounced in the growing season. Cool temperatures likely affected the productivity of staple wild cereal resources. We hypothesize that human groups responded by shifting settlement strategies—increasing population mobility and perhaps moving to the warmer Jordan Valley where wild cereals were more productive and stable.

Keywords: paleoclimate | stable isotopes | d13C | d18O | Natufian

Höflmayer 2015

Felix Höflmayer, *The southern Levant, Egypt, and the 4.2 ka BP event.* In: Harald Meller, Helge Wolfgang Arz, Reinhard Jung & Roberto Risch (Hrsg.), *2200 BC – Ein Klimasturz als Ursache für den Zerfall der Alten Welt? 7. Mitteldeutscher Archäologentag vom 23. bis 26. Oktober 2014 in Halle (Saale).* Tagungen des Landesmuseums für Vorgeschichte Halle 12 (Halle 2015), 113–130.

The late Early Bronze Age saw one of the biggest transformations of the Ancient Near East – the collapse of the Akkadian Empire in Upper Mesopotamia; the end of the first urbanised period (the Early Bronze Age II–III) as well as the advent of the agro-pastoral Early Bronze Age IV (also called the Intermediate Bronze Age) in the southern Levant, the end of the Old Kingdom, and the beginning of the First Intermediate Period in Egypt. Many reasons for the apparent collapse and demise of empires, urban societies and states have been put forward, including internal failure (societal deterioration), external forces (hostile incursions of other peoples), and climate change (the famous 4.2 ka BP event). For assessing these assumptions, a sound absolute chronology for these collapses is necessary, in order to check the assumed contemporaneity of these events as well as their duration. In recent years several chronology projects have used radiocarbon dating for this purpose, and while there is sound evidence that the Egyptian Old Kingdom did indeed collapse around 22oo BC, the end of the urbanised Early Bronze Age III in the southern and central Levant dates much earlier, to around 25oo BC.

Kirby 2016

Matthew E. Kirby, *Water's past revisited to predict its future.* nature **532** (2016), 44–45.

A reconstruction of 1,200 years of water's history in the Northern Hemisphere, based on proxy data, fuels the debate about whether anthropogenic climate change affected twentieth-century precipitation.

Ljungqvist et al. were, of course, constrained by the data available for analysis — indeed, their efforts reveal a shocking lack of data. For example, Figure 1 of their paper3 highlights the vast geographical gaps between proxy sites. Immense areas of the Northern Hemisphere still require exploration for proxy development, many in highly populated regions. The current analysis should therefore be revisited as proxy records from these regions become available.

Ljungqvist 2016

Fredrik Charpentier Ljungqvist, Paul J. Krusic, Hanna S. Sundqvist, Eduardo Zorita, Gudrun Brattström & David Frank, *Northern Hemi-*

sphere hydroclimate variability over the past twelve centuries. nature **532** (2016), 94–98.

n532-0094-Supplement.pdf

Accurate modelling and prediction of the local to continental-scale hydroclimate response to global warming is essential given the strong impact of hydroclimate on ecosystem functioning, crop yields, water resources, and economic security1–4. However, uncertainty in hydroclimate projections remains large5–7, in part due to the short length of instrumental measurements available with which to assess climate models. Here we present a spatial reconstruction of hydroclimate variability over the past twelve centuries across the Northern Hemisphere derived from a network of 196 at least millennium-long proxy records. We use this reconstruction to place recent hydrological changes8,9 and future precipitation scenarios7,10,11 in a long-term context of spatially resolved and temporally persistent hydroclimate patterns. We find a larger percentage of land area with relatively wetter conditions in the ninth to eleventh and the twentieth centuries, whereas drier conditions are more widespread between the twelfth and nineteenth centuries. Our reconstruction reveals that prominent seesaw patterns of alternating moisture regimes observed in instrumental data12–14 across the Mediterranean, western USA, and China have operated consistently over the past twelve centuries. Using an updated compilation of 128 temperature proxy records15, we assess the relationship between the reconstructed centennial-scale Northern Hemisphere hydroclimate and temperature variability. Even though dry and wet conditions occurred over extensive areas under both warm and cold climate regimes, a statistically significant co-variability of hydroclimate and temperature is evident for particular regions. We compare the reconstructed hydroclimate anomalies with coupled atmosphere– ocean general circulation model simulations and find reasonable agreement during pre-industrial times. However, the intensification of the twentieth-century-mean hydroclimate anomalies in the simulations, as compared to previous centuries, is not supported by our new multi-proxy reconstruction. This finding suggests that much work remains before we can model hydroclimate variability accurately, and highlights the importance of using palaeoclimate data to place recent and predicted hydroclimate changes in a millennium-long context16,17.

Meller 2015

Harald Meller, Helge Wolfgang Arz, Reinhard Jung & Roberto Risch (Hrsg.), *2200 BC – Ein Klimasturz als Ursache für den Zerfall der Alten Welt? 7. Mitteldeutscher Archäologentag vom 23. bis 26. Oktober 2014 in Halle (Saale).* Tagungen des Landesmuseums für Vorgeschichte Halle 12 (Halle 2015).

Müller 2015

Johannes Müller, *Crisis – what crisis? Innovation: different approaches to climatic change around 2200 BC.* In: Harald Meller, Helge Wolfgang Arz, Reinhard Jung & Roberto Risch (Hrsg.), *2200 BC – Ein Klimasturz als Ursache für den Zerfall der Alten Welt? 7. Mitteldeutscher Archäologentag vom 23. bis 26. Oktober 2014 in Halle (Saale).* Tagungen des Landesmuseums für Vorgeschichte Halle 12 (Halle 2015), 651–667.

By quantifying different aspects of material culture, phases of innovation could be identified for southern Scandinavia, Northern Germany, and Central Germany between 25oo BC and 15oo BC. These innovations – the introduction of tin bronze

technology and of sophisticated flint retouch techniques – took place at the end of societal busts and led to booms in productivity and changes in social practices. The influence of the 4.2 ka BP climatic event on economic and societal development is only postulated for Denmark; the climatic event did not exhibit any influence on the development in either Schleswig-Holstein or Central Germany.

Kultur

Kienlin 2016

Tobias L. Kienlin1, *Some thoughts on evolutionist notions in the Study of early Metallurgy*. In: Martin Bartelheim, Barbara Horejs & Raiko Krauss (Hrsg.), *Von Baden bis Troia – Ressourcennutzung, Metallurgie und Wissenstransfer, Jubiläumsschrift für Ernst Pernicka*. Oriental and European Archaeology 3 (Rahden 2016), 123–137.

In this contribution attention is drawn to some shortcomings of our conventional approach to early metalworking. It is argued that we employ notions of progress and evolution to account for long-term technological change that fall short of representing a more complex ancient reality. With the beneit of hindsight we see 'progress' and increasingly better solutions in terms of the working and properties of copper and copper alloys, whereas in fact there were alternative trajectories, and change towards the 'better' (in modern terms) was far from immediately apparent. As a result our approaches are often reductionist. We fail to understand adequately the technological choices taken through time by the countless individuals who depended on their local cultural background as much as they did on the laws of nature involved in the production and working of copper. A long-term perspective on the development of metallurgical knowledge is argued for that allows for contingency in technological choices and a context-speciic approach to early metalworking beyond our own modern science-based understanding of technological progress.

Keywords: Copper Age | Bronze Age | metallurgy | casting | forging | properties of copper and copper alloys | craft specialisation

Lucquin 2016

Alexandre Lucquin et al., *Ancient lipids document continuity in the use of early hunter–gatherer pottery through 9,000 years of Japanese prehistory*. PNAS **113** (2016), 3991–3996.

pnas113-03991-Supplement.zip

Alexandre Lucquin, Kevin Gibbs, Junzo Uchiyama, Hayley Saul, Mayumi Ajimoto, Yvette Eley, Anita Radini, Carl P. Heron, Shinya Shoda, Yastami Nishida, Jasmine Lundy, Peter Jordan, Sven Isaksson & Oliver E. Craig

The earliest pots in the world are from East Asia and date to the Late Pleistocene. However, ceramic vessels were only produced in large numbers during the warmer and more stable climatic conditions of the Holocene. It has long been assumed that the expansion of pottery was linked with increased sedentism and exploitation of new resources that became available with the ameliorated climate, but this hypothesis has never been tested. Through chemical analysis of their contents, we herein investigate the use of pottery across an exceptionally long 9,000-y sequence from the J »o mon site of Torihama inwestern Japan, intermittently occupied from the Late Pleistocene to the mid-Holocene. Molecular and isotopic analyses of lipids from 143 vessels provides clear evidence that pottery across this

sequence was predominantly used for cooking marine and freshwater resources, with evidence for diversification in the range of aquatic products processed during the Holocene. Conversely, there is little indication that ruminant animals or plants were processed in pottery, although it is evident from the faunal and macrobotanical remains that these foods were heavily exploited. Supported by other residue analysis data from Japan, our results show that the link between pottery and fishing was established in the Late Paleolithic and lasted well into the Holocene, despite environmental and socio-economic change. Cooking aquatic products in pottery represents an enduring social aspect of East Asian hunter–gatherers, a tradition based on a dependable technology for exploiting a sustainable resource in an uncertain and changing world.

Keywords: archaeology | ceramic | residue analysis | isotope | plant microfossil

Significance: Pottery has had a central role in human society for many millennia, but the reasons for the emergence and spread of this technology are poorly understood. First invented by groups of hunter–gatherers living in East Asia during the last glacial period, production only began to flourish with rising global temperatures in the Holocene, but the reasons for its uptake and spread are unknown. Through chemical analysis of their contents, we herein provide, to our knowledge, the first direct evidence of pottery use across this climatic transition. Contrary to expectations, ceramic vessels had a remarkably consistent use, predominantly for processing aquatic resources, indicating that cultural rather than environmental factors were most important for their widespread uptake.

Nakao 2016

Hisashi Nakao, Kohei Tamura, Yui Arimatsu, Tomomi Nakagawa, Naoko Matsumoto & Takehiko Matsugi, *Violence in the prehistoric period of Japan, The spatio-temporal pattern of skeletal evidence for violence in the Jomon period*. Biology Letters **12** (2016), 20160028.

Whether man is predisposed to lethal violence, ranging from homicide to warfare, and how that may have impacted human evolution, are among the most controversial topics of debate on human evolution. Although recent studies on the evolution of warfare have been based on various archaeological and ethnographic data, they have reported mixed results: it is unclear whether or notwarfare among prehistoric hunter–gathererswas common enough to be a component of human nature and a selective pressure for the evolution of human behaviour. This paper reports the mortality attributable to violence, and the spatio-temporal pattern of violence thus shown among ancient hunter–gatherers using skeletal evidence in prehistoric Japan (the Jomon period: 13 000 cal BC–800 cal BC). Our results suggest that the mortality due to violence was low and spatio-temporally highly restricted in the Jomon period, which implies that violence including warfare in prehistoric Japan was not common.

Vaesen 2016

Krist Vaesen, Mark Collard, Richard Cosgrove & Wil Roebroeks, *Population size does not explain past changes in cultural complexity*. PNAS **113** (2016), E2241–E2247.

Demography is increasingly being invoked to account for features of the archaeological record, such as the technological conservatism of the Lower and Middle Pleistocene, the Middle to Upper Paleolithic transition, and cultural loss in Holocene Tasmania. Such explanations are commonly justified in relation to population dynamic models developed by Henrich [Henrich J (2004) Am Antiq 69: 197–214] and Powell et al. [Powell A, et al. (2009) Science 324(5932): 1298–1301], which

appear to demonstrate that population size is the crucial determinant of cultural complexity. Here, we show that these models fail in two important respects. First, they only support a relationship between demography and culture in implausible conditions. Second, their predictions conflict with the available archaeological and ethnographic evidence. We conclude that new theoretical and empirical research is required to identify the factors that drove the changes in cultural complexity that are documented by the archaeological record.

Keywords: cultural evolution | demography | Upper Paleolithic transition | Tasmania | cultural complexity

Significance: Archaeologists have long tried to understand why cultural complexity often changed in prehistory. Recently, a series of highly influential formal models have suggested that demography is the key factor. According to these models, the size of a population determines its ability to invent and maintain cultural traits. In this paper, we demonstrate that the models in question are flawed in two important respects: They use questionable assumptions, and their predictions are not supported by the available archaeological and ethnographic evidence. As a consequence, little confidence can be invested in the idea that demography explains the changes in cultural complexity that have been identified by archaeologists. An alternative explanation is required.

Kupfer

Rosenstock 2016

Eva Rosenstock, Silviane Scharl & Wolfram Schier, *Ex Oriente Lux? Ein Diskussionsbeitrag zur Stellung der frühen Kupfermetallurgie Südosteuropas*. In: Martin Bartelheim, Barbara Horejs & Raiko Krauss (Hrsg.), *Von Baden bis Troia – Ressourcennutzung, Metallurgie und Wissenstransfer*, *Jubiläumsschrift für Ernst Pernicka*. Oriental and European Archaeology 3 (Rahden 2016), 59–122.

Im Verlauf der Forschungsgeschichte der letzten 100 Jahre bildete sich zwischen der Vorderasiatischen und Europäischen Prähistorischen Archäologie mehrmals die Hypothese einer zeitlichen Vorrangstellung der Kupfermetallurgie Vorderasiens gegenüber derjenigen Südosteuropas heraus. Ursache hierfür waren nicht der Fundstoff und seine absolute Datierung, sondern die unterschiedlichen Deinitionen des Begriffs der Kupferzeit in beiden Fächertraditionen, die irrige Ansprache einiger tatsächlich kaltgehämmerter Schlüsselfunde in Vorderasien als Hinweise auf Kupferguss und die weitgehende Nichtbeachtung neolithischer kaltgehämmerter Kupferartefakte Südosteuropas sowie die unterschiedlich verlaufene Einbeziehung von 14C-Daten und ihrer Kalibration anhand von Baumringkurven in beide Fächer. Aktuelle, Neudatierungen berücksichtigende Kartierungen der Kupferfunde Vorderasiens und Europas zeigen, dass kaltgehämmerte Kleingeräte und Schmuck nicht nur eine Erscheinung der Primären Neolithisierung ab dem 11. Jt. v. Chr. in Vorderasien sind, sondern auch als Bestandteil des “Neolithischen Pakets” im Zuge der Sekundären Neolithisierung um ca. 6000 v. Chr. bis nach Südosteuropa gelangten. Erste Hinweise auf Kupferschwergeräte und Kupferguss treten demnach ab ca. 5000 v. Chr. in einem archäologisch derzeit nicht feiner aufzugliedernden Horizont zeitgleich in einem von Südosteuropa bis Vorderasien reichenden Gebiet auf, so dass derzeit kein eindeutiges Ursprungsgebiet der frühen Kupfer-Metallurgie identiiziert werden kann. Allerdings legt das ungleich höhere Fundaufkommen in Südosteuropa nahe, dass diese Region eine Rolle als Innovationszentrum innehatte. Im weiteren Verlauf bis in die Mitte des 4. Jt. wird auch Mitteleuropa Teil der

Entwicklung, doch anstelle einer kontinuierlichen Ausbreitung zeigt sich bei chronologisch höher aufgelöster Betrachtung eher eine schrittweise Verlagerung von Funddichtezentren, die mit einem Rückgang in der Bedeutung älterer Zentren verbunden ist.

Keywords: Neolithikum | Chalkolithikum | Kupfermetallurgie | Innovationstransfer | Vorderasien | Europa

Mesolithikum

Orschiedt 2015

Jörg Orschiedt, *Die Grosse Ofnet-Höhle, Ein steinzeitliches Massaker?* In: Harald Meller & Michael Schefzik (Hrsg.), *Krieg – Eine Archäologische Spurensuche, Begleitband zur Sonderausstellung im Landesmuseum für Vorgeschichte Halle (Saale), 6. November 2015 bis 22. Mai 2016.* (Halle 2015), 99–102.

14C-Beschleunigerdaten aus Oxford an insgesamt fünf Schädeln weisen die Schädelnester der Ofnet-Höhle eindeutig einem Spätmesolithikum zwischen 6600 und 6000 v.Chr. zu.

Offen muss jedoch die Frage bleiben, ob die in der Großen Ofnet repräsentierten Personen sämtlich durch Gewalt ums Leben kamen. Derzeit muss auch die Frage offenbleiben, ob es sich bei der Niederlegung der Köpfe in der Großen Ofnet um ein Einzelereignis handelt. Falls mithilfe von hochauflösenden 14C-Daten und der Anwendung statistischer Verfahren ein solcher Nachweis gelingt, könnte die These eines spätmesolithischen Massakers, dem alle 34 Personen zum Opfer fielen, an Plausibilität gewinnen.

Metallzeiten

Bartelheim 2016

Martin Bartelheim, Barbara Horejs & Raiko Krauss (Hrsg.), *Von Baden bis Troia – Ressourcennutzung, Metallurgie und Wissenstransfer, Jubiläumsschrift für Ernst Pernicka.* Oriental and European Archaeology 3 (Rahden 2016).

Methoden

Baxter 2016

Mike Baxter, *Multivariate Analysis of Archaeometric Data, An Introduction.* (2016).

This book provides a brief introduction to the classical methods of multivariate analysis (MVA) most commonly used in archaeometric data analysis and their application. The background and rationale are explained in more detail in the Introduction; essentially the focus is on the ideas that underpin these methods, their practical application, and interpretation. The intended audience is archaeological scientists presumed to have a basic knowledge of mathematics and statistics but limited acquaintance with multivariate methods and their practical application.

Given that the ideas, if not the mathematics, are for the most part straightforward, and the power of modern computers and sophistication of the software, it's possible to carry out effective MVA without a deep knowledge of the underpinning

mathematics and theory (where it exists). Some of the mathematics is included in the text for completeness but highlighted as material that some readers may wish to omit without damage to their understanding. Methods, not widely used in the archaeometric literature, that have attracted my research interests, are discussed but similarly highlighted. Implemention of the methods of main concern, principal component analysis, cluster analysis and linear discriminant analysis, is rapid using the preferred software package R.

Herrmann 1990

B. Herrmann, G. Grupe, S. Hummel, H. Piepenbrink & H. Schutkowski, *Prähistorische Anthropologie*, *Leitfaden der Feld- und Labormethoden*. (Berlin 1990).

Neolithikum

Page 2016

Abigail E. Page, Sylvain Viguier, Mark Dyble, Daniel Smith, Nikhil Chaudhary, Gul Deniz Salali, James Thompson, Lucio Viniciu, *Reproductive trade-offs in extant hunter-gatherers suggest adaptive mechanism for the Neolithic expansion*. PNAS **113** (2016), 4694–4699.

The Neolithic demographic transition remains a paradox, because it is associated with both higher rates of population growth and increased morbidity and mortality rates. Here we reconcile the conflicting evidence by proposing that the spread of agriculture involved a life history quality–quantity trade-off whereby mothers traded offspring survival for increased fertility, achieving greater reproductive success despite deteriorating health. We test this hypothesis by investigating fertility, mortality, health, and overall reproductive success in Agta hunter-gatherers whose camps exhibit variable levels of sedentarization, mobility, and involvement in agricultural activities. We conducted blood composition tests in 345 Agta and found that viral and helminthic infections as well as child mortality rates were significantly increased with sedentarization. Nonetheless, both age-controlled fertility and overall reproductive successwere positively affected by sedentarization and participation in cultivation. Thus, we provide the first empirical evidence, to our knowledge, of an adaptive mechanism in foragers that reconciles the decline in health and child survival with the observed demographic expansion during the Neolithic.

Keywords: quality–quantity trade-off | epidemiological transition | hunter-gatherers | Neolithic revolution | Neolithic demographic transition

Significance: The rise of agriculture during the Neolithic period has paradoxically been associated with worldwide population growth despite increases in disease and mortality. We examine the effects of sedentarization and cultivation on disease load, mortality, and fertility among Agta foragers. We report increased disease and mortality rates associated with sedentarization alongside an even larger increase in fertility associated with both participation in cultivation and sedentarization. Thus, mothers who transition to agriculture have higher reproductive fitness. We provide the first empirical evidence, to our knowledge, of an adaptive mechanism behind the expansion of agriculture, explaining how we can reconcile the Neolithic increase in morbidity and mortality with the observed demographic expansion.

Religion

Watts 2016

Joseph Watts, Oliver Sheehan, Quentin D. Atkinson, Joseph Bulbulia & Russell D. Gray, *Ritual human sacrifice promoted and sustained the evolution of stratified societies.* nature **532** (2016), 228–231.

n532-0228-Supplement.pdf

Evidence for human sacrifice is found throughout the archaeological record of early civilizations1, the ethnographic records of indigenous world cultures2–5, and the texts of the most prolific contemporary religions6. According to the social control hypothesis2,7,8, human sacrifice legitimizes political authority and social class systems, functioning to stabilize such social stratification. Support for the social control hypothesis is largely limited to historical anecdotes of human sacrifice2,8, where the causal claims have not been subject to rigorous quantitative cross-cultural tests. Here we test the social control hypothesis by applying Bayesian phylogenetic methods to a geographically and socially diverse sample of 93 traditional Austronesian cultures. We find strong support for models in which human sacrifice stabilizes social stratification once stratification has arisen, and promotes a shift to strictly inherited class systems. Whilst evolutionary theories of religion have focused on the functionality of prosocial and moral beliefs9,10, our results reveal a darker link between religion and the evolution of modern hierarchical societies11,12.

Story or Book

Cook 2016

Jill Cook, *What Is Paleolithic Art?* nature **532** (2016), 310–311.

What Is Paleolithic Art?: Cave Paintings and the Dawn of Human Creativity. Jean Clottes (Translated by Oliver Y. Martin and Robert D. Martin). University of Chicago Press: 2016.

Clottes provides an overview of some of the varied beliefs and practices that he has researched, observed or been told about on visits to sites in Africa, Asia, Australasia and the Americas. He sees these "multiple realities" as part of the broad spectrum of spirituality focused in the landscape and nature.

Finally, Clottes shows how such anthropological insights enrich our ability to question the Palaeolithic record and construct interpretations of behaviours, actions and events in the deep past with a better-informed historical imagination. His view is that knowledge of present and historical rockart practices can be the key to interpreting the past. Older, less rigorous applications of this thinking were rejected for being simplistic. Clottes's approach is more cautious, and he readily admits that the significance of many more-recent rock-art sites may be unknown or reinterpreted by modern aboriginal descendants.

This is a thought-provoking book about complex societies that endeavoured to understand the world in their own various ways. For anyone interested in Ice Age art, Clottes's enthusiasm cannot fail to energize, inspire and provide caution to their own investigations.