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References

Aktuell

Callaway 2014

Ewen Callaway, *Bone technique redrafts prehistory*. nature **512** (2014), 242.

Carbon-dating improvements show that Neanderthals disappeared from Europe much earlier than thought.

Others are more sceptical. Clive Finlayson, director of the heritage division at the Gibraltar Museum whose team dated the 28,000-year-old Neanderthal charcoal remains from the tip of Gibraltar4, questions the timeline's sweeping conclusions. Archaeologists are unlikely to ever find the last Neanderthal occupation, he argues, and the methods that Higham's team used to remove contamination do not work well for bones from warmer sites because collagen is not preserved as well there as in cooler sites. This would be the case in southern Iberia, where Finlayson believes the last Neanderthals lived. "I'm hugely worried that we're building a castle in the air here," he says.

Hanage 2014

William P. Hanage, *Microbiome science needs a healthy dose of scepticism*. nature **512** (2014), 247–248.

To guard against hype, those interpreting research on the body's microscopic communities should ask five questions, says William P. Hanage.

1. Can experiments detect differences that matter?
2. Does the study show causation or just correlation?
3. What is the mechanism?
4. How much do experiments reflect reality?
5. Could anything else explain the results?

Pennisi 2014

Elizabeth Pennisi, *In the battle for fitness, being smart doesn't always pay*. science **345** (2014), 609–610.

Studies of individual animals in the wild suggest that higher cognition has evolutionary trade-offs.

Mountain chickadees offer a similar story. Those living at higher elevations, where longer winters require more caches of food, show better spatial memory for retrieving stored seeds than do their peers living lower down. But chickadees with better memories also abandon their nests more frequently, according to a talk by behavioral ecologist Vladimir Pravosudov of the University of Nevada, Reno. And as has been seen in other species, smarter chickadees wind up subordinates in their flocks.

No one knows why these trade-offs exist, although researchers speculate that being smart correlates with other traits, such as being less aggressive socially.

Shen 2014

Hua-Wei Shen & Albert-László Barabási, *Collective credit allocation in science*. PNAS **111** (2014), 12325–12330.

Collaboration among researchers is an essential component of the modern scientific enterprise, playing a particularly important role in multidisciplinary research. However, we continue to wrestle with allocating credit to the coauthors of publications with multiple authors, because the relative contribution of each author is difficult to determine. At the same time, the scientific community runs an informal field-dependent credit allocation process that assigns credit in a collective fashion to each work. Here we develop a credit allocation algorithm that captures the coauthors' contribution to a publication as perceived by the scientific community, reproducing the informal collective credit allocation of science. We validate the method by identifying the authors of Nobel-winning papers that are credited for the discovery, independent of their positions in the author list. The method can also compare the relative impact of researchers working in the same field, even if they did not publish together. The ability to accurately measure the relative credit of researchers could affect many aspects of credit allocation in science, potentially impacting hiring, funding, and promotion decisions.

network science | scientific impact | team science

Turin 2014

Luca Turin, Efthimios M. C. Skoulakis & Andrew P. Horsfield, *Electron spin changes during general anesthesia in Drosophila*. PNAS **111** (2014), E3524–E3533.

We show that the general anesthetics xenon, sulfur hexafluoride, nitrous oxide, and chloroform cause rapid increases of different magnitude and time course in the electron spin content of Drosophila. With the exception of CHCl3, these changes are reversible. Anesthetic-resistant mutant strains of Drosophila exhibit a different pattern of spin responses to anesthetic. In two such mutants, the spin response to CHCl3 is absent. We propose that these spin changes are caused by perturbation of the electronic structure of proteins by general anesthetics. Using density functional theory, we show that general anesthetics perturb and extend the highest occupied molecular orbital of a nine-residue á-helix. The calculated perturbations are qualitatively in accord with the Meyer–Overton relationship and some of its exceptions. We conclude that there may be a connection between spin, electron currents in cells, and the functioning of the nervous system.

Zhang 2014

Shaojun Zhang, YeWu, Jingnan Hu, Ruikun Huang, Yu Zhou, Xiaofeng Bao, Lixin Fu & Jiming Hao, *Can Euro V heavy-duty diesel engines, diesel hybrid and alternative fuel technologies mitigate NO_x emissions? New evidence from on-road tests of buses in China*. Applied Energy **132** (2014), 118–126.

AppEn132-0118-Supplement.pdf

Nitrogen oxides (NOX) emissions are creating significant air quality challenges in China's megacities. Since Euro IV diesel buses equipped with selective catalyst reduction (SCR) systems failed to mitigate on-road NOX emissions as expected, real-world NOX emissions from newly introduced Euro V diesel buses, diesel hybrid and alternative fuel (e.g., natural gas) buses are of great concern to policymakers in China. In this study, NOX emissions from two Euro V diesel, two Euro IV diesel hybrid, nine compressed natural gas (CNG) and two liquefied natural gas (LNG) buses were measured on-road by using portable emission measurement systems (PEMS). The average NOX emission factor of the Euro V diesel buses was 7.5 ± 0.1 g km-1 for a typical driving cycle, 37 % lower than the Euro IV diesel buses. However, the average brake-specific emission factor still exceeded the Euro

V standard by 180 %. The diesel hybrid buses had an average NOX emission factor of 4.4 ± 1.1 g km-1, much lower than their conventional diesel counterparts. CNG and LNG buses also had lower NOX emission factors. The average NOX emission factor of the LNG buses was 3.2 ± 0.7 g km-1, due to the performance of the SCR systems under higher exhaust temperatures. Furthermore, real-world NOX emission factors for all tested vehicle categories except diesel hybrids were significantly sensitive to changes of average speed. Operation of air conditioning in the bus reduced average NOX emissions by 38 % for diesel hybrid buses although fuel consumption increased. These results suggest hybrid and CNG/LNG technologies are better options than the Euro V diesel engines to mitigate NOX emissions from urban buses.

Keywords: Diesel hybrid bus | Natural gas bus | NOX | Selective catalyst reduction | Operating condition

Altpaläolithikum

Wilkins 2014

Jayne Wilkins, Benjamin J. Schoville & Kyle S. Brown, *An Experimental Investigation of the Functional Hypothesis and Evolutionary Advantage of Stone-Tipped Spears*. PLoS ONE **9** (2014), e104514. DOI:10.1371/journal.pone.0104514.

pone09-e104514-Supplement1.pdf, pone09-e104514-Supplement2.zip

Stone-tipped weapons were a significant innovation for Middle Pleistocene hominins. Hafted hunting technology represents the development of new cognitive and social learning mechanisms within the genus Homo, and may have provided a foraging advantage over simpler forms of hunting technology, such as a sharpened wooden spear. However, the nature of this foraging advantage has not been confirmed. Experimental studies and ethnographic reports provide conflicting results regarding the relative importance of the functional, economic, and social roles of hafted hunting technology. The controlled experiment reported here was designed to test the functional hypothesis for stone-tipped weapons using spears and ballistics gelatin. It differs from previous investigations of this type because it includes a quantitative analysis of wound track profiles and focuses specifically on hand-delivered spear technology. Our results do not support the hypothesis that tipped spears penetrate deeper than untipped spears. However, tipped spears create a significantly larger inner wound cavity that widens distally. This inner wound cavity is analogous to the permanent wound cavity in ballistics research, which is considered the key variable affecting the relative 'stopping power' or 'killing power' of a penetrating weapon. Tipped spears conferred a functional advantage to Middle Pleistocene hominins, potentially affecting the frequency and regularity of hunting success with important implications for human adaptation and life history.

Amerika

Meltzer 2014

David J. Meltzer, *Clovis at the end of the world*. PNAS **111** (2014), 12276–12277.

El Fin del Mundo, Sanchez et al. suggest, raises an alternative possibility: its age, ≈13,390 calibrated radiocarbon years before present, puts it among the oldest Clovis sites in North America and thus supports the idea the Clovis culture originated far to the south. In this, they seem on solid chronological ground. Clovis sites

on the southern Plains and in the southwest tend to be older (often by centuries) than Clovis sites elsewhere in North America, essentially reversing the expected time-transgressive trend.

Bibel

Deutsch 2014

Robert Deutsch, *JPFs, More Questions than Answers.* Biblical Archaeology Review **40** (2014), v, 37–39.

The most popular suggestion, one embraced by Raz Kletter, is that they represent the goddess Asherah. Other suggestions include the goddesses Astarte and Anath. If any of these is the case, does this evidence the existence of a nonYahwistic cult operating in Jerusalem during the First Temple period?

And what was the function of these little igurines? At sites where they have been excavated, they tend to be found in every house. Are they fertility goddesses? Or nurturing goddesses? Or simply little goddesses to whom women could turn in the privacy of their homes? Or perhaps good-luck charms, as some have suggested? Others have speculated that they are simply popular toys.

The JPFs do seem to resemble the little gods identiied as teraphim that Rachel retrieved from her father, Laban, and then hid under her saddle when she led from Laban's house with her husband, Jacob (Genesis 31:19–35).

Friedman 2014

Richard Elliott Friedman, *Love Your Neighbor, Only Israelites or Everyone?* Biblical Archaeology Review **40** (2014), v, 49–52, 61.

"Love your neighbor as yourself" remains: Famous. Impressive. Fascinating. Inspiring. You can accept or challenge it. And you can decide whether you will follow it in your own life. But don't change what it means.

Levin 2014

Yigal Levin, *Ancient Israel Through a Social Scientific Lens.* Biblical Archaeology Review **40** (2014), v, 43–47, 66.

In conclusion, Faust charges some scholars with "inventing" a continuity of settlement between the end of the Iron Age (i.e., the destruction of the Kingdom of Judah) and the Persian and Hellenistic periods in order to show that the society of Babylonian and Persian-period Judah was capable of producing many of the texts of the Bible, which they date to this period. In Faust's opinion, this is simply impossible: Society in Judah was too depleted and too poor to have supported such a huge literary project. Bible scholars, he concludes, will have to take the reality that archaeologists present into account when developing their theories of how the Bible was produced.

Much of what Faust writes is controversial, and he, too, has an agenda—especially in The Archaeology of Desolation, in which he explicitly takes his opponents to task for using the archaeological data selectively in accordance with their preconceived views. But as long as he admits his agenda openly, as he does, this is legitimate. In both books, Faust takes the archaeological evidence and uses it to present his view of life in Israel and Judah in the periods of the monarchy. Others will undoubtedly argue for a different interpretation. As long as this is done in a way that is collegial and based on facts, this is exactly the way scholarship advances.

Energie

Licht 2014

Stuart Licht, Baochen Cui, Baohui Wang, Fang-Fang Li, Jason Lau & Shuzhi Liu, *Ammonia synthesis by N_2 and steam electrolysis in molten hydroxide suspensions of nanoscale Fe_2O_3.* science **345** (2014), 637–640.

s345-0637-Supplement.pdf

The Haber-Bosch process to produce ammonia for fertilizer currently relies on carbon-intensive steam reforming of methane as a hydrogen source. We present an electrochemical pathway in which ammonia is produced by electrolysis of air and steam in a molten hydroxide suspension of nano-Fe2O3. At 200°C in an electrolyte with a molar ratio of 0.5 NaOH/0.5 KOH, ammonia is produced at 1.2 volts (V) under 2 milliamperes per centimeter squared (mA cm-2) of applied current at coulombic efficiency of 35 % (35 % of the applied current results in the six-electron conversion of N2 and water to ammonia, and excess H2 is cogenerated with the ammonia). At 250°C and 25 bar of steam pressure, the electrolysis voltage necessary for 2 mA cm-2 current density decreased to 1.0 V.

Service 2014

Robert F. Service, *New recipe produces ammonia from air, water, and sunlight.* science **345** (2014), 610.

Catalytic approach could eliminate CO2 emissions from the key step in making fertilizer.

All told, 65 % of the electricity wound up stored in chemical bonds: 35 % in ammonia and 30 % in H2 molecules.

Turconi 2014

Roberto Turconi, Davide Tonini, Christian F. B. Nielsen, Christian G. Simonsen & Thomas Astrup, *Environmental impacts of future low-carbon electricity systems, Detailed life cycle assessment of a Danish case study.* Applied Energy **132** (2014), 66–73.

AppEn132-0066-Supplement.pdf

The need to reduce dependency on fossil resources and to decrease greenhouse gas (GHG) emissions is driving many countries towards the implementation of low-carbon electricity systems. In this study the environmental impact of a future (2030) possible low-carbon electricity system in Denmark was assessed and compared with the current situation (2010) and an alternative 2030 scenario using life cycle assessment (LCA). The influence on the final results of the modeling approach used for (i) electricity import, (ii) biomass resources, and (iii) the cogeneration of heat and power was discussed. The results showed that consumption of fossil resources and global warming impacts from the Danish electricity sector could be reduced significantly compared with 2010. Nevertheless, a reduction in GHG may be at the expense of other environmental impacts, such as the increased depletion of abiotic resources. Moreover, the results were very dependent upon biomass origin: when agricultural land was affected by biomass import, and land use changes and transportation were included, GHG emissions from imported biomass were comparable to those from fossil fuels. The results were significantly influenced by the modeling approach regarding the import of electricity, biomass provision, and the allocation between heat and power in cogeneration plants. As the importance of all three aspects is likely to increase in the future, transparency in LCA modeling is critical. Characterized impacts for Danish power plants in 2010 and 2030 (including corresponding electricity supply mixes) were provided, thus

enabling future LCA studies to include appropriately impacts from the Danish electricity sector.

Keywords: Life cycle assessment (LCA) | Energy modeling | Future scenario | CHP | Renewable energy system | Biomass to energy

Wei 2014

Haiqiao Wei, Dengquan Feng, Gequn Shu, Mingzhang Pan, Yubin Guo, Dongzhi Gao & Wei Li, *Experimental investigation on the combustion and emissions characteristics of 2-methylfuran gasoline blend fuel in spark-ignition engine*. Applied Energy **132** (2014), 317–324.

Currently, 2,5-dimethylfuran (DMF) has already been extensively studied as a novel potential gasoline substitute. With its improved reaction sequences, another main molecule transformed from fructose has also aroused worldwide interest, which is known as 2-methylfuran (MF). MF has similar energy density and knock suppression ability to DMF. However, little is known about its behavior in spark-ignition (SI) engines, especially when it is used as a gasoline additive. Therefore, focus was given on the combustion and emissions characteristics of 10 % volume fraction 2-methylfuran gasoline blend fuel (M10) in this work, which was investigated experimentally in a single-cylinder four-stroke SI engine at various engine speeds (800–1800 rpm in 200 rpm intervals) and wide open throttle (WOT). The in-cylinder combustion process as well as engine performance of M10 were compared with gasoline and the same proportion ethanol gasoline blend fuel (E10) under gasoline maximum brake torque (MBT) spark timing and stoichiometric air-fuel ratio. Results of engine tests show that M10 produces relatively high in-cylinder peak pressure and temperature, which is mainly attributed to its consistently shorter combustion duration. Compared with engine performance of E10, the output torque and brake power increase slightly with less brake specific fuel consumption when M10 is used. Lower regulated gas emissions of hydrocarbons (HC) and carbon monoxide (CO) can be found for both E10 and M10 blend. In addition, more nitrogen oxides (NOX) emissions are generated from M10 due to its higher combustion temperature.

Keywords: 2-Methylfuran | Ethanol | Blend fuel | Emissions | SI engines

Klima

Biehl 2009

Peter F. Biehl & Eva Rosenstock, *Von Çatalhöyük Ost nach Çatalhöyük West, Kulturelle Umbrüche an der Schwelle vom 7. zum 6. Jt. v. Chr. in Zentralanatolien*. In: Ralph Einicke, Stephan Lehmann, Henryk Löhr, Gundula Mehnert, Andreas Mehnert & Anja Slawisch (Hrsg.), *Zurück zum Gegenstand, Festschrift für Andreas E. Furtwängler, Band II*. (Langenweißbach 2009), 471–482.

Nach diesen Vorarbeiten kann in Verbindung mit den in früheren Projekten gewonnenen konvergierenden 14C-Daten, denen zufolge das LN des Osthügels um 6 000 v. Chr. endet und das EC des Westhügels zwischen ca. 6 000 und 5 800 v. Chr. datiert49, vermutet werden, dass in den tieferen Schichten von Çatalhöyük West an den Osthügel direkt anschließende bzw. sich sogar zeitlich mit ihm überlappende Besiedlungsphasen vorliegen. Besonders die ersten Ergebnisse der Keramikbearbeitung schließen die bisherige chronologische Lücke zwischen dem Späten Neolithikum und Frühen Chalkolithikum mit einem Übergangshorizont

von ritzverzierter Keramik, die sowohl auf dem Westhügel als auch dem Osthügel vorliegt (Taf. 3, 2).

Keywords: LN | EC | 8200 BP | cattle | milk | dairy | neolithic package

Coumou 2014

Dim Coumou, Vladimir Petoukhov, Stefan Rahmstorf, Stefan Petri & Hans Joachim Schellnhuber, *Quasi-resonant circulation regimes and hemispheric synchronization of extreme weather in boreal summer*. PNAS **111** (2014), 12331–12336.

The recent decade has seen an exceptional number of high-impact summer extremes in the Northern Hemisphere midlatitudes. Many of these events were associated with anomalous jet stream circulation patterns characterized by persistent high-amplitude quasi-stationary Rossby waves. Two mechanisms have recently been proposed that could provoke such patterns: (i) a weakening of the zonal mean jets and (ii) an amplification of quasi-stationary waves by resonance between free and forced waves in midlatitude waveguides. Based upon spectral analysis of the midtroposphere wind field, we show that the persistent jet stream patterns were, in the first place, due to an amplification of quasi-stationary waves with zonal wave numbers 6–8. However, we also detect a weakening of the zonal mean jet during these events; thus both mechanisms appear to be important. Furthermore, we demonstrate that the anomalous circulation regimes lead to persistent surface weather conditions and therefore to midlatitude synchronization of extreme heat and rainfall events on monthly timescales. The recent cluster of resonance events has resulted in a statistically significant increase in the frequency of high-amplitude quasi-stationary waves of wave numbers 7 and 8 in July and August. We show that this is a robust finding that holds for different pressure levels and reanalysis products. We argue that recent rapid warming in the Arctic and associated changes in the zonal mean zonal wind have created favorable conditions for double jet formation in the extratropics, which promotes the development of resonant flow regimes.

climate change | Arctic amplification | climate impact | planetary waves | midlatitude weather

Liu 2014

Zhengyu Liu et al., *The Holocene temperature conundrum*. PNAS **111** (2014), E3501–E3505.

Zhengyu Liu, Jiang Zhu, Yair Rosenthal, Xu Zhang, Bette L. Otto-Bliesner, Axel Timmermann, Robin S. Smith, Gerrit Lohmann, Weipeng Zheng & Oliver Elison Timm

A recent temperature reconstruction of global annual temperature shows Early Holocene warmth followed by a cooling trend through the Middle to Late Holocene [Marcott SA, et al., 2013, Science 339(6124):1198–1201]. This global cooling is puzzling because it is opposite from the expected and simulated global warming trend due to the retreating ice sheets and rising atmospheric greenhouse gases. Our critical reexamination of this contradiction between the reconstructed cooling and the simulated warming points to potentially significant biases in both the seasonality of the proxy reconstruction and the climate sensitivity of current climate models.

global temperature | Holocene temperature | model-data inconsistency

Riehl 2014

Simone Riehl, Konstantin E. Pustovoytov, Heike Weippert, Stefan Klett & Frank Hole, *Drought stress variability in ancient Near Eastern*

agricultural systems evidenced by $\delta^{13}C$ in barley grain. PNAS **111** (2014), 12348–12353.

The collapse and resilience of political systems in the ancient Near East and their relationship with agricultural development have been of wide interest in archaeology and anthropology. Despite attempts to link the archaeological evidence to local paleoclimate data, the precise role of environmental conditions in ancient agricultural production remains poorly understood. Recently, stable isotope analysis has been used for reconstructing site-specific ancient growing conditions for crop species in semiarid and arid landscapes. To open the discussion of the role of regional diversity in past agricultural production as a factor in societal development, we present 1.037 new stable carbon isotope measurements from 33 archaeological sites and modern fields in the geographic area of the Fertile Crescent, spanning the Aceramic Neolithic [10,000 calibrated years (cal) B.C.] to the later Iron Age (500 cal B.C.), alongside modern data from 13 locations. Our data show that drought stress was an issue in many agricultural settlements in the ancient Near East, particularly in correlation with the major Holocene climatic fluctuations, but its regional impact was diverse and influenced by geographic factors. Although cereals growing in the coastal areas of the northern Levant were relatively unaffected by Holocene climatic fluctuations, farmers of regions further inland had to apply irrigation to cope with increased water stress. However, inland agricultural strategies showed a high degree of variability. Our findings suggest that regional differences in climatic effects led to diversified strategies in ancient subsistence and economy even within spatially limited cultural units.

Holocene climate change | agricultural societies | aridity stress | Middle East | archaeobotanical crop species

Zhang 2014

Xu Zhang, Gerrit Lohmann, Gregor Knorr & Conor Purcell, *Abrupt glacial climate shifts controlled by ice sheet changes.* nature **512** (2014), 290–294.

During glacial periods of the Late Pleistocene, an abundance of proxy data demonstrates the existence of large and repeated millennial-scale warming episodes,knownasDansgaard–Oeschger (DO) events1.This ubiquitous feature of rapid glacial climate change can be extended back as far as 800,000 years before present (BP) in the ice core record2, and has drawn broad attention within the science and policy-making communities alike3.Many studies have been dedicated to investigating the underlying causes of these changes, but no coherent mechanism has yet been identified3–15. Here we show, by using a comprehensive fully coupled model16, that gradual changes inthe height of the Northern Hemisphere ice sheets (NHISs) can alter the coupled atmosphere–ocean system and cause rapid glacial climate shifts closely resembling DO events.The simulated global climate responses—including abrupt warming in the North Atlantic, a northward shift of the tropical rainbelts, and Southern Hemisphere cooling related to the bipolar seesaw— are generally consistent with empirical evidence1,3,17.As a result of the coexistence of two glacial ocean circulation states at intermediate heights of the ice sheets, minor changes in the height of the NHISs and the amount of atmospheric CO2 can trigger the rapid climate transitions via a local positive atmosphere–ocean–sea-ice feedback in the North Atlantic. Our results, although based on a single model, thus provide a coherent concept for understanding the recorded millennial-scale variability and abrupt climate changes in the coupled atmosphere-ocean system, as well as their linkages to the volume of the intermediate ice sheets during glacials.

Kultur

Koh 2014

Andrew J. Koh, Assaf Yasur-Landau & Eric H. Cline, *Characterizing a Middle Bronze Palatial Wine Cellar from Tel Kabri, Israel*. PLoS ONE **9** (2014), e106406. DOI:10.1371/journal.pone.0106406.

Scholars have for generations recognized the importance of wine production, distribution, and consumption in relation to second millennium BC palatial complexes in the Mediterranean and Near East. However, direct archaeological evidence has rarely been offered, despite the prominence of ancient viticulture in administrative clay tablets, visual media, and various forms of documentation. Tartaric and syringic acids, along with evidence for resination, have been identified in ancient ceramics, but until now the archaeological contexts behind these sporadic discoveries had been uneven and vague, precluding definitive conclusions about the nature of ancient viticulture. The situation has now changed. During the 2013 excavation season of the Kabri Archaeological Project, a rare opportunity materialized when forty large storage vessels were found in situ in an enclosed room located to the west of the central courtyard within the Middle Bronze Age Canaanite palace. A comprehensive program of organic residue analysis has now revealed that all of the relatively uniform jars contain evidence for wine. Furthermore, the enclosed context inherent to a singular intact wine cellar presented an unprecedented opportunity for a scientifically intensive study, allowing for the detection of subtle differences in the ingredients or additives within similar wine jars of apparently the same vintage. Additives seem to have included honey, storax resin, terebinth resin, cedar oil, cyperus, juniper, and perhaps even mint, myrtle, or cinnamon, all or most of which are attested in the 18th century BC Mari texts from Mesopotamia and the 15th century BC Ebers Papyrus from Egypt. These additives suggest a sophisticated understanding of the botanical landscape and the pharmacopeic skills necessary to produce a complex beverage that balanced preservation, palatability, and psychoactivity. This new study has resulted in insights unachievable in the past, which contribute to a greater understanding not only of ancient viticulture but also of Canaanite palatial economy.

Mittelpaläolithikum

Davies 2014

William Davies, *The time of the last Neanderthals*. nature **512** (2014), 260–261.

The application of improved radiocarbon-dating techniques to samples from archaeological sites ranging from Russia to Spain has redefined the timing of the final disappearance of Neanderthals from Europe.

Higham 2014

Tom Higham et al., *The timing and spatiotemporal patterning of Neanderthal disappearance*. nature **512** (2014), 306–309.

n512-0306-Supplement1.pdf, n512-0306-Supplement2.xls

Tom Higham, Katerina Douka, Rachel Wood, Christopher Bronk Ramsey, Fiona Brock, Laura Basell, Marta Camps, Alvaro Arrizabalaga, Javier Baena, Cecillio Barroso-Ruíz, Christopher Bergman, Coralie Boitard, Paolo Boscato, Miguel Caparrós, Nicholas J. Conard, Christelle Draily, Alain Froment, Bertila Galván, Paolo Gambassini, Alejandro Garcia-Moreno, Stefano Grimaldi, Paul Haesaerts, Brigitte

Holt, Maria-Jose Iriarte-Chiapusso, Arthur Jelinek, Jesús F. Jordá Pardo, José-Manuel Maíllo-Fernández, Anat Marom, Julià Maroto, Mario Menéndez, Laure Metz, Eugène Morin, Adriana Moroni, Fabio Negrino, Eleni Panagopoulou, Marco Peresani, Stéphane Pirson, Marco de la Rasilla, Julien Riel-Salvatore, Annamaria Ronchitelli, David Santamaria, Patrick Semal, Ludovic Slimak, Joaquim Soler, Narcís Soler, Aritza Villaluenga, Ron Pinhasi & Roger Jacobi

The timing of Neanderthal disappearance and the extent to which they overlapped with the earliest incoming anatomically modern humans (AMHs) in Eurasia are key questions in palaeoanthropology1,2. Determining the spatiotemporal relationship between the two populations is crucial if we are to understand the processes, timing and reasons leading to the disappearance of Neanderthals and the likelihood of cultural and genetic exchange. Serious technical challenges, however, have hindered reliable dating of the period, as the radiocarbon method reaches its limit at 50,000 years ago3. Here we apply improved accelerator mass spectrometry 14C techniques to construct robust chronologies from 40 key Mousterian and Neanderthal archaeological sites, ranging from Russia to Spain. Bayesian age modelling was used to generate probability distribution functions to determine the latest appearance date.We show that the Mousterian ended by 41,030–39,260 calibrated years BP (at 95.4 %probability) across Europe. We also demonstrate that succeeding 'transitional' archaeological industries, one of which has been linked with Neanderthals (Châtelperronian)4, end at a similar time. Our data indicate that the disappearance of Neanderthals occurred at different times in different regions.Comparing the data with results obtained from the earliest dated AMH sites in Europe, associated with the Uluzzian technocomplex5, allows us to quantify the temporal overlap between the two human groups. The results reveal a significant overlap of 2,600–5,400 years (at 95.4 % probability). This has important implications for models seeking to explain the cultural, technological and biological elements involved in the replacement of Neanderthals by AMHs. A mosaic of populations in Europe during the Middle to Upper Palaeolithic transition suggests that there was ample time for the transmission of cultural and symbolic behaviours, as well as possible genetic exchanges, between the two groups.

Neolithikum

Lemmen 2012

Carsten Lemmen & Kai W. Wirtz, *On the sensitivity of the simulated European Neolithic transition to climate extremes*. Journal of Archaeological Science (2012), preprint, 1–8. DOI:10.1016/j.jas.2012.10.023.

Was the spread of agropastoralism from the Fertile Crescent throughout Europe influenced by extreme climate events, or was it independent of climate? We here generate idealized climate events using palaeoclimate records. In a mathematical model of regional sociocultural development, these events disturb the subsistence base of simulated forager and farmer societies. We evaluate the regional simulated transition timings and durations against a published large set of radiocarbon dates for western Eurasia; the model is able to realistically hindcast much of the inhomogeneous space-time evolution of regional Neolithic transitions. Our study shows that the consideration of climate events improves the simulation of typical lags between cultural complexes, but that the overall difference to a model without climate events is not significant. Climate events may not have been as important for early sociocultural dynamics as endogenous factors.

Keywords: Europe | Climate events | Extreme events | Neolithic transition | Adaptation | Modeling

Ozeanien

Diamond 2014

Jared Diamond, *Human melting pots in southeast Asia*. nature **512** (2014), 262–263.

New genetic methods to analyse mixed human populations have extended existing, multidisciplinary evidence for the historical migrations and mixings of Austronesian peoples.

Lipson 2014

Mark Lipson, Po-Ru Loh, Nick Patterson, Priya Moorjani, Ying-Chin Ko, Mark Stoneking, Bonnie Berger & David Reich, *Reconstructing Austronesian population history in Island Southeast Asia*. Nature Communications **5** (2014), 4689. DOI:10.1038/ncomms5689.

NatComm05-4689-Supplement.pdf

Austronesian languages are spread across half the globe, from Easter Island to Madagascar. Evidence from linguistics and archaeology indicates that the 'Austronesian expansion,' which began 4,000–5,000 years ago, likely had roots in Taiwan, but the ancestry of present-day Austronesian-speaking populations remains controversial. Here, we analyse genome-wide data from 56 populations using new methods for tracing ancestral gene flow, focusing primarily on Island Southeast Asia. We show that all sampled Austronesian groups harbour ancestry that is more closely related to aboriginal Taiwanese than to any present-day mainland population. Surprisingly, western Island Southeast Asian populations have also inherited ancestry from a source nested within the variation of present-day populations speaking Austro-Asiatic languages, which have historically been nearly exclusive to the mainland. Thus, either there was once a substantial Austro-Asiatic presence in Island Southeast Asia, or Austronesian speakers migrated to and through the mainland, admixing there before continuing to western Indonesia.

Religion

Schmandt-Besserat 2003

Denise Schmandt-Besserat, *Stone Age Death Masks, A new interpretation of some of the world's earliest human images*. Archaeology Odyssey **6** (2003), ii, 18–27.

These skulls, at once so foreign and familiar, remind us of the power and durability of our symbols. Some English words can be traced back 5,000 years to what linguists call the Proto-Indo-European languages; and the letters of our alphabet are 3,500 years old. Many Christian symbols have been with us for 2,000 years, and they will remain with us until the last Christian is gone.

In making their plaster masks, our Neolithic ancestors may well have passed on what was already an age-old fascination with the human skull. And here we are, still moved, trying to reach back through history and prehistory to understand them.