

## Literatur

### Aktuell

#### BROAD 2011

Kevin D. Broad & Eric B. Keverne, *Placental protection of the fetal brain during short-term food deprivation*. [PNAS 108 \(2011\), 15237–15241](#).

[pnas108-15237-Supplement1.xlsx](#), [pnas108-15237-Supplement2.xlsx](#), [pnas108-15237-Supplement3.xlsx](#)

The fetal genome regulates maternal physiology and behavior via its placenta, which produces hormones that act on the maternal hypothalamus. At the same time, the fetus itself develops a hypothalamus. In this study we show that many of the genes that regulate placental development also regulate the developing hypothalamus, and in mouse the coexpression of these genes is particularly high on embryonic days 12 and 13 (days E12-13). Such synchronized expression is regulated, in part, by the maternally imprinted gene, paternally expressed gene 3 (Peg3), which also is developmentally coexpressed in the hypothalamus and placenta at days E12-13. We further show that challenging this genomic linkage of hypothalamus and placenta with 24-h food deprivation results in disruption to coexpressed genes, primarily by affecting placental gene expression. Food deprivation also produces a significant decrease in Peg3 gene expression in the placenta, with consequences similar to many of the placental gene changes induced by Peg3 mutation. Such genomic dysregulation does not occur in the hypothalamus, where Peg3 expression increases with food deprivation. Thus, changes in gene expression brought about by food deprivation are consistent with the fetal genome's maintaining hypothalamic development at a cost to its placenta. This biased change to gene dysregulation in the placenta is linked to autophagy and ribosomal turnover, which sustain, in the short term, nutrient supply for the developing hypothalamus. Thus, the fetus controls its own destiny in times of acute starvation by short-term sacrifice of the placenta to preserve brain development. [genomic imprinting | mother infant coadaptation](#)

#### CHANCE 2011

Zoë Chance, Michael I. Norton, Francesca Gino & Dan Ariely, *Temporal view of the costs and benefits of self-deception*. [PNAS 108 \(2011\), 15655–15659](#).

Researchers have documented many cases in which individuals rationalize their regrettable actions. Four experiments examine situations in which people go beyond merely explaining away their misconduct to actively deceiving themselves. We find that those who exploit opportunities to cheat on tests are likely to engage in self-deception, inferring that their elevated performance is a sign of intelligence. This short-term psychological benefit of self-deception, however, can come with longer-term costs: when predicting future performance, participants expect to perform equally well—a lack of awareness that persists even when these inflated expectations prove costly. We show that although people expect to cheat, they do not foresee self-deception, and that factors that reinforce the benefits of cheating enhance self-deception. More broadly, the findings of these experiments offer evidence that debates about the relative costs and benefits of self-deception are informed by adopting a temporal view that assesses the cumulative impact of self-deception over time.

[hindsight bias | lying | motivated reasoning | self-enhancement](#)

#### CHOICE 2011

*N to the Rescue*, *Editors' choice*. [science 333 \(2011\), 1202](#).

A simple swap of oxygen for protonated nitrogen (more specifically, lactate for alanine) by the bacteria at vancomycin's binding site is remarkably effective at disarming the drug's mechanism of action. Xie et al. fight back by introducing a compensatory swap of their own—NH for O at the complementary site on the vancomycin framework. This modification leads not only to high-affinity binding with a model of the resistant target, it also conserves impressive binding affinity with a model of the native target (just a factor of 2 shy of vancomycin itself).

#### ENSERINK 2011

Martin Enserink, *Dutch University Sacks Social Psychologist Over Faked Data*. [news.sciencemag.org](http://news.sciencemag.org/scienceinsider/2011/09/dutch-university-sacks-social.html) (2011). <<http://news.sciencemag.org/scienceinsider/2011/09/dutch-university-sacks-social.html>>.

Comment by Jaap van der Stel:

Science presupposes that the findings of researchers (independently) will be replicated. Replications have to be funded better. Journals have to be sceptic about everything they are receiving for publication. Perhaps, the rankings of scientists 'who is the best ...', has to be minimized. Good science is about arguments and experiments, not about a lot of publicity.

#### GLIMCHER 2011

Paul W. Glimcher, *Understanding dopamine and reinforcement learning: The dopamine reward prediction error hypothesis*. [PNAS 108 \(2011\), 15647–15654](#).

A number of recent advances have been achieved in the study of midbrain dopaminergic neurons. Understanding these advances and how they relate to one another requires a deep understanding of the computational models that serve as an explanatory framework and guide ongoing experimental inquiry. This intertwining of theory and experiment now suggests very clearly that the phasic activity of the midbrain dopamine neurons provides a global mechanism for synaptic modification. These synaptic modifications, in turn, provide the mechanistic underpinning for a specific class of reinforcement learning mechanisms that now seem to underlie much of human and animal behavior. This review describes both the critical empirical findings that are at the root of this conclusion and the fantastic theoretical advances from which this conclusion is drawn.

#### LEDFORD 2011

Heidi Ledford, *The 24/7 lab, Working weekends. Leaving at midnight. Friday evening meetings. Does science come out the winner?* [nature 477 \(2011\), 20–22](#).

"Only people with a certain type of personality would stay in a lab like this," says Guerrero-Cázares, who has worked there for four years. The night before I arrived, Quiñones-Hinojosa was checking his e-mail on his way home when he noticed a message from a medical student at Rosalind Franklin University of Medicine and Science in Chicago, Illinois, who wanted to work in the laboratory. Quiñones-Hinojosa receives several such enquiries a day, but something about this student — Joshua Bakhsheshian — caught his eye. He fired back a message: give me a number at which I can reach you at 6 a.m. It was midnight. A minute later he had his reply.

#### MAYROSE 2011

Itay Mayrose, Shing H. Zhan, Carl J. Rothfels, Karen Magnuson-Ford, Michael S. Barker, Loren H. Rieseberg & Sarah P. Otto, *Recently Formed Polyploid Plants Diversify at Lower Rates*. [science 333 \(2011\), 1257](#).

s333-1257-Supplement.pdf

Polyploidy (or whole-genome duplication) is a widespread feature of plant genomes, but its importance to evolution has long been debated. Polyploids have been postulated to be evolutionary dead ends because of the inefficiency of selection when genes are masked by multiple copies (1). However, most plant species have experienced at least one genome doubling early in their history (2), suggesting that rather than being an evolutionary dead end, polyploidy is a route to evolutionary success.

The lower diversification rates of polyploids may seemingly contradict evidence of ancient polyploidization events in the genomes of most angiosperms (2). Yet we find that the expected number of paleopolyploidization events is higher than would be observed if diversification rates were equal (4). Our results indicate that polyploidy is most often an evolutionary dead end, but the possibility remains that the expanded genomic potential of those polyploids that do persist drives longer-term evolutionary success.

#### MILNER 2011

Nicky Milner, Chantal Conneller, Ben Elliott, Hannah Koon, Ian Panter, Kirsty Penkman, Barry Taylor & Maisie Taylor, *From riches to rags: organic deterioration at Star Carr*. *Journal of Archaeological Science* **38** (2011), 2818–2832.

The 11,000-year old lake edge archaeological site of Star Carr in the Vale of Pickering of North Yorkshire is one of the most famous Mesolithic sites in Europe, and one of the earliest, dated to the period of climatic warming that immediately followed the final termination of the last ice age. One of the main reasons for this international importance is the richness of its organic artefacts, faunal assemblage and environmental data. However, recent investigations have demonstrated that these organic remains have severely deteriorated over the last 60 years due to the decay and acidification of the surrounding peat. This paper presents research into the effects on the bone (histological analysis using light and polarising microscopy, and Transmission Electron Microscopy, bulk collagen analysis, and amino acid analysis), antler (visual and metrical analysis, loss on ignition and Scanning Electron Microscopy) and wood (visual analysis, decay assessment tests and Scanning Electron Microscopy).

Keywords: Star Carr; Mesolithic; Organic; Deterioration; Wood; Antler; Bone

Conclusion: Our analyses presented in this paper reveal without a doubt that Star Carr no longer possesses the riches it did only 60 years ago, and that there is demonstrable destruction of the archaeological resource at Star Carr, especially of the bone, wood and antler since the 1980s.

Although this provides a depressing story for one of Britain's most important prehistoric sites, it is also clear that Star Carr requires drastic action, urgently. It is imperative to capture the fast dwindling archaeological information riches here, and to answer a number of questions about the Mesolithic context of this site on the shore of Lake Flixton. Given the continuing severe acidification of the sedimentary context and oxidation of the organic components of this site, there is little alternative that this will entail full excavation with extensive scientific analyses before what does survive is lost forever.

#### OSBORN 2011

Stephen G. Osborn, Avner Vengosh, Nathaniel R. Warner & Robert B. Jackson, *Methane contamination of drinking water accompanying gas well drilling and hydraulic fracturing, Reply to Saba and Orzechowski and Schon*. *PNAS* **108** (2011), E665–E666.

#### SABA 2011

Tarek Saba & Mark Orzechowski, *Lack of data to support a relationship*

between methane contamination of drinking water wells and hydraulic fracturing. [PNAS 108 \(2011\), E663](#).

SCHON 2011

Samuel C. Schon, *Hydraulic fracturing not responsible for methane migration*. [PNAS 108 \(2011\), E664](#).

SMITH 2011

Kerri Smith, *Taking aim at free will*. [nature 477 \(2011\), 23–25](#).

Scientists think they can prove that free will is an illusion. Philosophers are urging them to think again.

How can I call a will ‘mine’ if i don’t even know when it occurred and what it has decided to do?

That there are some physical factors that influence decision-making shouldn’t be a surprise.

XIE 2011

Jian Xie, Joshua G. Pierce, Robert C. James, Akinori Okano & Dale L. Boger, *A Redesigned Vancomycin Engineered for Dual D-Ala-D-Ala and D-Ala-D-Lac Binding Exhibits Potent Antimicrobial Activity Against Vancomycin-Resistant Bacteria*. [Journal of the American Chemical Society 133 \(2011\), 13946–13949](#).

[JAmChemSoc133-13946-Supplement.pdf](#)

The emergence of bacteria resistant to vancomycin, often the antibiotic of last resort, poses a major health problem. Vancomycin-resistant bacteria sense a glycopeptide antibiotic challenge and remodel their cell wall precursor peptidoglycan terminus from D-Ala-D-Ala to DAla-D-Lac, reducing the binding of vancomycin to its target 1000-fold and accounting for the loss in antimicrobial activity. Here, we report [ $\Psi$ [C(=NH)NH]Tpg4]vancomycin aglycon designed to exhibit the dual binding to D-Ala-D-Ala and D-Ala-D-Lac needed to reinstate activity against vancomycin-resistant bacteria. Its binding to a model D-Ala-D-Ala ligand was found to be only 2-fold less than vancomycin aglycon and this affinity was maintained with a model D-Ala-D-Lac ligand, representing a 600-fold increase relative to vancomycin aglycon. Accurately reflecting these binding characteristics, it exhibits potent antimicrobial activity against vancomycin-resistant bacteria (MIC = 0.31  $\mu$ g/mL, VanA VRE). Thus, a complementary single atom exchange in the vancomycin core structure (O $\rightarrow$ NH) to counter the single atom exchange in the cell wall precursors of resistant bacteria (NH $\rightarrow$ O) reinstates potent antimicrobial activity and charts a rational path forward for the development of antibiotics for the treatment of vancomycin-resistant bacterial infections.

## Anthropologie

BEAUMONT 2011

Peter B. Beaumont, *The Edge: More on Fire-Making by about 1.7 Million Years Ago at Wonderwerk Cave in South Africa*. [Current Anthropology 52 \(2011\), 585–595](#).

[CurrAnth52-585-Supplement.pdf](#)

Located close to the Kalahari in central South Africa is a large dolomitic cave called Wonderwerk, in the stratified sediments of which there is evidence for fire-making that ranges from the end of the Later Stone Age to the very base of the Acheulean. That discovery is seen to be in accord with findings from four other regional sites, which together

provide evidence that can be construed as support for fire-making over almost the same time span.

#### CURRAT 2011

Mathias Currat & Laurent Excoffier, *Strong reproductive isolation between humans and Neanderthals inferred from observed patterns of introgression*. [PNAS 108 \(2011\), 15129–15134](#).

Recent studies have revealed that 2-3% of the genome of non-Africans might come from Neanderthals, suggesting a more complex scenario of modern human evolution than previously anticipated. In this paper, we use a model of admixture during a spatial expansion to study the hybridization of Neanderthals with modern humans during their spread out of Africa. We find that observed low levels of Neanderthal ancestry in Eurasians are compatible with a very low rate of interbreeding (<2%), potentially attributable to a very strong avoidance of interspecific matings, a low fitness of hybrids, or both. These results suggesting the presence of very effective barriers to geneflow between the two species are robust to uncertainties about the exact demography of the Paleolithic populations, and they are also found to be compatible with the observed lack of mtDNA introgression. Our model additionally suggests that similarly low levels of introgression in Europe and Asia may result from distinct admixture events having occurred beyond the Middle East, after the split of Europeans and Asians. This hypothesis could be tested because it predicts that different components of Neanderthal ancestry should be present in Europeans and in Asians.

genetic introgression | simulation

#### HAMMER 2011

Michael F. Hammer, August E. Woerner, Fernando L. Mendez, Joseph C. Watkins & Jeffrey D. Wall, *Genetic evidence for archaic admixture in Africa*. [PNAS 108 \(2011\), 15123–15128](#).

A long-debated question concerns the fate of archaic forms of the genus *Homo*: did they go extinct without interbreeding with anatomically modern humans, or are their genes present in contemporary populations? This question is typically focused on the genetic contribution of archaic forms outside of Africa. Here we use DNA sequence data gathered from 61 noncoding autosomal regions in a sample of three sub-Saharan African populations (Mandenka, Biaka, and San) to test models of African archaic admixture. We use two complementary approximate-likelihood approaches and a model of human evolution that involves recent population structure, with and without gene flow from an archaic population. Extensive simulation results reject the null model of no admixture and allow us to infer that contemporary African populations contain a small proportion of genetic material ( $\approx 2\%$ ) that introgressed  $\approx 35$  kya from an archaic population that split from the ancestors of anatomically modern humans  $\approx 700$  kya. Three candidate regions showing deep haplotype divergence, unusual patterns of linkage disequilibrium, and small basal clade size are identified and the distributions of introgressive haplotypes surveyed in a sample of populations from across sub-Saharan Africa. One candidate locus with an unusual segment of DNA that extends for >31 kb on chromosome 4 seems to have introgressed into modern Africans from a now-extinct taxon that may have lived in central Africa. Taken together our results suggest that polymorphisms present in extant populations introgressed via relatively recent interbreeding with hominin forms that diverged from the ancestors of modern humans in the Lower-Middle Pleistocene.

H. sapiens | hybridization

#### LEPRE 2011

Christopher J. Lepre et al., *An earlier origin for the Acheulian*. [nature 477 \(2011\), 82–85](#).

n477-0082-Supplement.pdf

Christopher J. Lepre, H el ene Roche, Dennis V. Kent, Sonia Harmand, Rhonda L. Quinn, Jean-Philippe Brugal, Pierre-Jean Texier, Arnaud Lenoble & Craig S. Feibel

The Acheulian is one of the first defined prehistoric technocomplexes and is characterized by shaped bifacial stone tools<sup>1-3</sup>. It probably originated in Africa, spreading to Europe and Asia perhaps as early as 1 million years (Myr) ago<sup>4-6</sup>. The origin of the Acheulian is thought to have closely coincided with major changes in human brain evolution, allowing for further technological developments<sup>7,8</sup>. Nonetheless, the emergence of the Acheulian remains unclear because well-dated sites older than 1.4 Myr ago are scarce. Here we report on the lithic assemblage and geological context for the Kokiselei 4 archaeological site from the Nachukui formation (West Turkana, Kenya) that bears characteristic early Acheulian tools and pushes the first appearance datum for this stone-age technology back to 1.76 Myr ago. Moreover, co-occurrence of Oldowan and Acheulian artefacts at the Kokiselei site complex indicates that the two technologies are not mutually exclusive time-successive components of an evolving cultural lineage, and suggests that the Acheulian was either imported from another location yet to be identified or originated from Oldowan hominins at this vicinity. In either case, the Acheulian did not accompany the first human dispersal from Africa<sup>9,10</sup> despite being available at the time. This may indicate that multiple groups of hominins distinguished by separate stone-tool-making behaviours and dispersal strategies coexisted in Africa at 1.76 Myr ago.

PORR 2011

Martin Porr, *One Step Forward, Two Steps Back, The Issue of "Behavioral Modernity" Again: A Comment on Shea*. *Current Anthropology* **52** (2011), 581–582.

Similar claims have been made repeatedly in the past and more recently (e.g., Clark 2009; O'Connell 1995). They seem mostly as distant echoes of Binford's (1962) assertion that archaeology can be a productive part of anthropology only if it subscribes to the assumptions, rules, and methodologies of cultural or behavioral ecology. The limitations and inconsistencies of a behavioral ecological (cost-benefit) approach are apparent in Shea's inability to properly explain "symbolic behavior." While symbolic behavior is seen to characterize modern behavior, it can apparently be identified only through a contradiction of cost-benefit considerations.

SHEA 2011

John J. Shea, *Behavioral Modernity—Not Again, A Reply to Porr*. *Current Anthropology* **52** (2011), 583–584.

For human origins research, the truly interesting questions about symbolic/cultural behavior concern its evolutionary precursors, those strategies for using symbols in social contexts evolved uniquely among hominins but no longer extant among human societies. Paleolithic archaeologists' only recourse to discovering these precursors is strategic modeling using principles derived from behavioral ecological studies of humans and nonhuman species. To make the best use of such ethnographic and ethological data, Paleolithic archaeologists need to think about prehistoric hominin behavior strategically, in terms of costs and benefits.

## Biologie

DENG 2011

Tao Deng et al., *Out of Tibet: Pliocene Woolly Rhino Suggests High-Plateau Origin of Ice Age Megaherbivores*. *science* **333** (2011), 1285–1288.  
s333-1285-Supplement.pdf

Tao Deng, Xiaoming Wang, Mikael Fortelius, Qiang Li, Yang Wang, Zhijie J. Tseng, Gary T. Takeuchi, Joel E. Saylor, Laura K. Säilä & Guangpu Xie

Ice Age megafauna have long been known to be associated with global cooling during the Pleistocene, and their adaptations to cold environments, such as large body size, long hair, and snow-sweeping structures, are best exemplified by the woolly mammoths and woolly rhinos. These traits were assumed to have evolved as a response to the ice sheet expansion. We report a new Pliocene mammal assemblage from a high-altitude basin in the western Himalayas, including a primitive woolly rhino. These new Tibetan fossils suggest that some megaherbivores first evolved in Tibet before the beginning of the Ice Age. The cold winters in high Tibet served as a habituation ground for the megaherbivores, which became preadapted for the Ice Age, successfully expanding to the Eurasian mammoth steppe.

## Datierung

RIETH 2011

Timothy M. Rieth, Terry L. Hunt, Carl Lipo & Janet M. Wilmshurst, *The 13th century polynesian colonization of Hawai'i Island*. [Journal of Archaeological Science](#) **38** (2011), 2740–2749.

JArchSci38-2740-Supplement.doc

We assess 926 radiocarbon dates from Hawai'i Island, the largest assemblage of dates compiled from a single island in Oceania. Based on a classificatory approach that arranges the dates based on their reliability, accuracy, and precision, our results indicate that the most reliable estimate for the initial Polynesian colonization of Hawai'i Island is AD 1220–1261,  $\approx$  250 to 450 years later than the current consensus. This conclusion is strikingly convergent with recent estimates for the colonization of remote East Polynesia. Our analysis highlights the need for wood charcoal identification to insure selection of short-lived plants/plant parts for radiocarbon dating, and that a reliance on dating unidentified wood charcoal is a waste of resources that only serves to retard progress in refining the settlement chronology of Hawai'i Island and other locations.

Keywords: Hawai'i; East Polynesia; Radiocarbon dating; Colonization

## Energie

MORINO 2011

Yu Morino, Toshimasa Ohara & Masato Nishizawa, *Atmospheric behavior, deposition, and budget of radioactive materials from the Fukushima Daiichi nuclear power plant in March 2011*. [Geophysical Research Letters](#) (2011) preprint, 1–20. <<http://dx.doi.org/10.1029/2011GL048689>>.

To understand the atmospheric behavior of radioactive materials emitted from the Fukushima Daiichi nuclear power plant after the nuclear accident that accompanied the great Tohoku earthquake and tsunami on 11 March 2011, we simulated the transport and deposition of iodine-131 and cesium-137 using a chemical transport model. The model roughly reproduced the observed temporal and spatial variations of deposition rates over 15 Japanese prefectures (60–400 km from the plant), including Tokyo, although there were some discrepancies between the simulated and observed rates. These discrepancies were likely due to uncertainties in the simulation of emission, transport, and deposition processes in the model. A budget analysis indicated that approximately 13% of iodine-131 and 22% of cesium-137 were deposited over land in Japan, and the rest was deposited over the ocean or transported out of the model domain (700 x 700 km<sup>2</sup>). Radioactivity budgets are sensitive to temporal emission patterns. Accurate estimation of emissions to

the air is important for estimation of the atmospheric behavior of radionuclides and their subsequent behavior in land water, soil, vegetation, and the ocean.

Keywords: radioactive materials, chemical transport model, Fukushima nuclear accident

## Grundlagen

EREN 2011

Metin I. Eren, Stephen J. Lycett, Christopher I. Roos & C. Garth Sampson, *Toolstone constraints on knapping skill: Levallois reduction with two different raw materials*. [Journal of Archaeological Science](#) **38** (2011), 2731–2739. JArchSci38-2731-Supplement.doc

Lithic raw material constraints are widely assumed to be a determining factor of flaked stone tool morphology, but this assumption remains largely untested. We conducted a controlled experiment to determine whether a knapper's growing replication skills would be hindered if the toolstone used was switched from large flakes of an easily worked chert to nodules of less tractable one. Two batches of Preferential Levallois cores were knapped, an earlier series made from standardised large flakes of sediments dominated by chalcedonic quartz followed by a more challenging one using variably-shaped, cortical nodules of microcrystalline quartz that varies in the completeness of quartz replacement of calcite and dolomite. Skill level markers were designed to measure the knapper's ability to achieve a series of set goals. These were quantified and subjected to statistical testing. In all but one test, significant increases in skill could be detected from the earlier to the later batch of reductions, despite the drop in toolstone quality. Significant improvements in the consistency of the knapper's output could also be detected. However, the switch to a more challenging, nodular chert did require extra shaping, which resulted in more waste. This masked visible progress towards producing a less costly core. Overall, our results do not support the assumed primacy of toolstone constraints over other factors in influencing the morphology of flaked stone tools.

Keywords: Lithic raw material constraints; Experimental archaeology; Middle Paleolithic; Flintknapping skill; Preferential Levallois

RAVIELE 2011

Maria E. Raviele, *Experimental assessment of maize phytolith and starch taphonomy in carbonized cooking residues*. [Journal of Archaeological Science](#) **38** (2011), 2708–2713.

Many taphonomic studies of plant microfossils, specifically phytoliths and starch, are concerned with post-depositional movement, contamination, and morphological changes due to environmental fluctuations or plant processing. Additionally, the identification of phytoliths and starches archaeologically are based on their presence or absence. This paper examines whether it is possible to identify maize (*Zea mays* ssp. *mays*) phytolith and starch abundance associated with different processing behaviors as replicated through experimentally produced cooking residues. If successful, identification of likely associated processing and taphonomy of these microfossils will allow for a more refined interpretation of plant use as it relates to timing and plant form and processing.

Keywords: *Zea mays*; Maize; Phytoliths; Starch; Residues; Taphonomy; Eastern North America

Conclusion: Results from the experimental residues demonstrate that identification of the percentage of cooked maize may not be possible based upon the abundance of maize microbotanical indicators identified in a residue. However the experiments resulted in the identification of those maize forms most likely to result in the incorporation of phytoliths and/or starches into residues, as well as probable processing behaviors associated with the presence of maize phytoliths and starches. Given the issues concerning initial maize



use and the debate over ritual use of maize early in its adoption within eastern North America, further clarification on maize form and processing will be invaluable.

## Isotope

### FRASER 2011

Rebecca A. Fraser et al., *Manuring and stable nitrogen isotope ratios in cereals and pulses: towards a new archaeobotanical approach to the inference of land use and dietary practices*. [Journal of Archaeological Science](#) **38** (2011), 2790–2804.

Rebecca A. Fraser, Amy Bogaard, Tim Heaton, Michael Charles, Glynis Jones, Bent T. Christensen, Paul Halstead, Ines Merbach, Paul R. Poulton, Debbie Sparkes & Amy K. Styring

This paper explores the impact of animal manure application on the d15N values of a broad range of crops (cereals and pulses), under a range of manuring levels/regimes and at a series of locations extending from northwest Europe to the eastern Mediterranean. We included both agricultural field experiments and areas where ‘traditional’ farming is practised. Our aim is to ground-truth interpretation of d15N values in archaeobotanical crop remains as evidence of past growing conditions and husbandry practices. The results confirm the potentially radical impact of manuring on d15N values in cereals, depending on manuring level, but indicate only a slight effect on pulses, which can fix atmospheric nitrogen. The expected geographical trend towards greater d15N with increasing climatic aridity is not apparent, probably because the growing conditions for crops are ‘buffered’ through crop management. Each of these observations has fundamental implications for archaeobotanical interpretation of d15N values as evidence of land use practices and (together with analysis of bone collagen/tooth enamel in potential consumers) palaeodiet. Keywords: Nitrogen; Stable isotopes; Manuring; Neolithic; Crop husbandry; Palaeodiet

### LOVIS 2011

William A. Lovis, Gerald R. Urquhart, Maria E. Raviele & John P. Hart, *Hardwood ash nixtamalization may lead to false negatives for the presence of maize by depleting bulk  $\delta^{13}\text{C}$  in carbonized residues*. [Journal of Archaeological Science](#) **38** (2011), 2726–2730.

Among the multiple proxies for detecting maize in precontact economies is the use of d13C analysis of carbonized residues from ceramic cooking vessels. Although maize horticulture was widely established in Eastern North America (ENA) by A.D. 1000, there are carbonized residues from ceramic assemblages after this date that lack the elevated d13C values indicative of the presence of maize. This may be due to the true absence of maize, or other factors including the masking of maize. Prior experimental research by Hart et al. demonstrated that the addition of C3 plants or consumers to two part mixes with maize can mask maize presence even when maize is the dominant ingredient. Here we investigate the effect of alkali processing of maize (nixtamalization) on d13C using the widespread ENA process of boiling maize kernels with wood ash, a C3 product, to create hominy. Our experiments test whether or not the process of hardwood ash nixtamalization can mask the presence of maize in adhering carbonized residues by depleting d13C values, and whether there is a reciprocal d13C enrichment effect on the hardwood ash employed in nixtamalization. Overall, there is substantial d13C depletion of residues when maize is cooked with hardwood ash, and hardwood ash cooked with maize shows the reciprocal enrichment. Therefore, the depleted values after the adoption of maize may be false negatives due to the nixtamalization process.

Keywords: Alkali processing; Hominy; Pottery residue; Bulk d13C; Maize histories; Prehistoric cooking techniques

## Kultur

JORGE 2011

María del Carmen Jorge, Barbara J. Williams, C. E. Garza-Hume & Arturo Olvera, *Mathematical accuracy of Aztec land surveys assessed from records in the Codex Vergara*. [PNAS 108 \(2011\), 15053–15057](#).

[pnas108-15053-Supplement.mov](#)

Land surveying in ancient states is documented not only for Eurasia but also for the Americas, amply attested by two Acolhua–Aztec pictorial manuscripts from the Valley of Mexico. The Codex Vergara and the Códice de Santa María Asunción consist of hundreds of drawings of agricultural fields that uniquely record surface areas as well as perimeter measurements. A previous study of the Codex Vergara examines how Acolhua–Aztecs determined field area by reconstructing their calculation procedures. Here we evaluate the accuracy of their area values using modern mathematics. The findings verify the overall mathematical validity of the codex records. Three-quarters of the areas are within 5% of the maximum possible value, and 85% are within 10%, which compares well with reported errors by Western surveyors that postdate Aztec–Acolhua work by several centuries.

Aztec culture | ethnomathematics | Mexican codex | Bretschneider’s Formula | Surveyors’ Rule

SMITH 2011

Eric Alden Smith, Monique Borgerhoff Mulder, Samuel Bowles & Kim Hill, *Wealth Inequality in Foraging, Horticultural, Pastoral, and Agricultural Populations, A Reply to Caldararo*. [Current Anthropology 52 \(2011\), 579–580](#).

Against our model of wealth dynamics, Niccolo Caldararo (2011) proposes that contact with “certain dominant economic and political societies” accounts for the association we find between the heritability of different types of wealth and the extent of inequality. Caldararo is right to stress other possible influences on the evolution of inequality, particularly those coming from more powerful societies. However, he does not provide any evidence for his claim that external contact accounts for our results, nor does he provide any theoretically or empirically derived model for why such an association might be expected.

## Physik

KERR 2011

Richard A. Kerr, *Mystery Pioneer Anomaly Is Real But Still a Mystery*. [science 333 \(2011\), 1208](#).

For the first time, they also found that the anomaly was diminishing slightly with time. That would be consistent with heat emissions causing the slowing, because the RTGs cool as their radioactive fuel decays. Anderson is not happy with the heat explanation. As soon as the paper was published, he reanalyzed the new extended records, plotting the data against distance from the sun instead of time. He finds the anomaly shrinking as if the declining pressure of sunlight had not been properly calculated. If that’s correct, he says, the result “leaves me with a truly anomalous acceleration.” Heat emission is too small to explain the slowing, Anderson finds, so “it’s either new physics or old physics we haven’t discovered yet.” New physics could be a variation on Newton’s laws, whereas an example of as-yet-to-be-discovered old physics would be a cloud of dark matter trapped around the sun.

## TURYSHEV 2011

Slava G. Turyshev, Viktor T. Toth, Jordan Ellis & Craig B. Markwardt, *Support for Temporally Varying Behavior of the Pioneer Anomaly from the Extended Pioneer 10 and 11 Doppler Data Sets*. *Physical Review Letters* **107** (2011), 81103. <<http://dx.doi.org/10.1103/PhysRevLett.107.081103>>.

The Pioneer anomaly is a small sunward anomalous acceleration found in the trajectory analysis of the Pioneer 10 and 11 spacecraft. As part of the investigation of the effect, the analysis of recently recovered Doppler data for both spacecraft has been completed. The presence of a small anomalous acceleration is confirmed by using data spans more than twice as long as those that were previously analyzed. We examine the constancy and direction of the Pioneer anomaly and conclude that (i) the data favor a temporally decaying anomalous acceleration ( $\approx 2E11$  m/s<sup>2</sup>/yr) with an over 10% improvement in the residuals compared to a constant acceleration model, (ii) although the direction of the acceleration remains imprecisely determined, we find no support in favor of a Sun-pointing direction over the Earthpointing or along the spin-axis directions, and (iii) support for an early “onset” of the acceleration remains weak in the pre-Saturn Pioneer 11 tracking data. We present these new findings and discuss their implications for the nature of the Pioneer anomaly.

## Story or Book

## JOST 2011

John T. Jost, *That's Incredible!* *science* **333** (2011), 1222–1223.

*The Believing Brain. From Ghosts and Gods to Politics and Conspiracies—How We Construct Beliefs and Reinforce Them as Truths.* by Michael Shermer. Times Books (Henry Holt), New York, 2011. 400 pp. \$28, C\$32. ISBN 9780805091250.

In the book, Shermer seeks to advance “not just a theory to explain why people believe weird things” (been there, done that) but “a theory to explain why people believe things. Full stop.” This is a startlingly ambitious undertaking, requiring as it does an integrative mastery of evolutionary biology, social psychology, and cognitive neuroscience, as well as familiarity with anthropology, sociology, economics, political science, philosophy, history, and more. Truth be told, Shermer is not up to the task—but, then again, who would be? Nevertheless, many readers will learn something from the material that he has taken the time to actually digest. The challenge posed, both directly and indirectly, by this uneven book is to discern staunch self-confidence—whether it belongs to the author or the believers he is in search of—that is appropriate and justified from that which is not. In *The Believing Brain*, Shermer does not really try to explain why some people hold truer beliefs than others. But the difference between science and other human pursuits suggests that there may be more than one way of believing.

## LIFE 2011

Igor Teper, *A sentence to life, Pet project.* *nature* **477** (2011), 126.

“How do you interact, with people?”

“Come on our walk,” Rometa said, “and I’ll show you a thing or two about this prison called real life.”