Liste erstellt am 2015-08-07

# References

## Aktuell


Anthes 2015

Emily Anthes, *The trouble with Checklists*. nature **523** (2015), 516–518.

An easy method that promised to save lives in hospitals worldwide may not be so simple after all.

The clear lesson for hospital leaders is that they cannot just dump a stack of checklists in an operating room — they must observe them being used. Are team members all present? Are they rushing, or skipping steps? If so, then the lapses should be discussed and addressed.

Implementation researchers say that the checklist story may hold lessons for the introduction of other programmes in fields including medicine, education and social work. "We have this massive influx of money to develop innovations," says Dean Fixsen, who co-founded the US National Implementation Research Network at the University of North Carolina at Chapel Hill. "But the track record of getting that science into practice where it actually produces the kinds of outcomes that we want to see — that track record is abysmal." Over the past few decades, researchers have published countless papers on evidence-based literacy programmes and teaching strategies. And yet literacy rates for US nine-year-olds, for instance, have barely budged.

Bennett 2015

K. D. Bennett, *Comment on "Sedimentary DNA from a submerged site reveals wheat in the British Isles 8000 years ago"*. science **349** (2015), 247.

Smith et al. (Reports, 27 February 2015, p. 998) identify wheat DNA from an 8000-calendaryearsbefore-the-present archaeological site in southern England and conclude that wheat was traded to Britain 2000 years before the arrival of agriculture. The DNA samples are not dated, either directly or from circumstantial evidence, so there is no chronological evidence to support the claim.

The claim that wheat was being traded to Britain at 8000 cal yr B.P. has substantial implications for understanding of the archaeology of northwest Europe in the early postglacial period. Such a claim can be readily substantiated by dating the sediment matrix of the samples directly. A claim based on undated samples, lacking any incontrovertible link to dated samples, is insufficient to overturn current understanding.

Callaway 2015

Ewen Callaway, *Neanderthals had outsize effect on human biology*. nature **523** (2015), 512–513.

From skin disorders to the immune system, sex with archaic species changed Homo sapiens.

El-Dib 2015

Mohamed El-Dib & Penny Glass, *Does exposure of premature infants to repetitive recorded mother sounds improve neurodevelopmental outcome?* PNAS **112** (2015), E4166.

Although this study has presented intersecting findings, it raises important questions: Is this specific increase in one area a benefit for the infant? Does this redundant form of intervention improve neurodevelopmental outcome?

Flynn 2015

Charles Robb Flynn et al., *Bile diversion to the distal small intestine has comparable metabolic benefits to bariatric surgery.* Nature Communications **6** (2015), 7715. DOI:10.1038/ncomms8715.

NatComm06-7715-Supplement.pdf

Charles Robb Flynn, Vance L. Albaugh, Steven Cai, Joyce Cheung-Flynn, Phillip E. Williams, Robert M. Brucker, Seth R. Bordenstein, Yan Guo, David H. Wasserman & Naji N. Abumrad

Roux-en-Y gastric bypass (RYGB) is highly effective in reversing obesity and associated diabetes. Recent observations in humans suggest a contributing role of increased circulating bile acids in mediating such effects. Here we use a diet-induced obesity (DIO) mouse model and compare metabolic remission when bile flow is diverted through a gallbladder anastomosis to jejunum, ileum or duodenum (sham control). We find that only bile diversion to the ileum results in physiologic changes similar to RYGB, including sustained improvements in weight, glucose tolerance and hepatic steatosis despite differential effects on hepatic gene expression. Circulating free fatty acids and triglycerides decrease while bile acids increase, particularly conjugated tauro-b-muricholic acid, an FXR antagonist. Activity of the hepatic FXR/FGF15 signalling axis is reduced and associated with altered gut microbiota. Thus bile diversion, independent of surgical rearrangement of the gastrointestinal tract, imparts significant weight loss accompanied by improved glucose and lipid homeostasis that are hallmarks of RYGB.

Lahav 2015

Amir Lahav, *Neuroplasticity in the auditory cortex in premature newborns exposed to recorded maternal sounds*, *Reply to El-Dib and Glass.* PNAS **112** (2015), E4167.

Finally, whether the accelerated cortical growth in the auditory cortex observed in our study is sufficient to set the brain on the right developmental track is still a matter of speculation. Further studies are needed to determine the functional implications of these results and their predictive value of long-term hearing and language outcomes.

Larson 2015

Susan G. Larson, *Humeral torsion and throwing proficiency in early human evolution.* Journal of Human Evolution **85** (2015), 198–205.

As illustrated in Figs. 3–5, in modern humans humeral torsion changes during development, and among adults varies between the right and left arms of an individual, between males and females of a single population, and in average values for different populations, but little is understood about the factors underlying this variation. Krahl (1947) suggested that the development of increasing humeral torsion during ontogeny reflects the influence of opposing muscular forces for internal and external rotation at the shoulder (see also Cowgill, 2007). Yet, comparisons of different modern human populations indicate that nonwestern populations with

presumably higher activity levels often display lower average torsion values than western populations (Churchill, 1994; Larson, 2007). Our inclination is to functionally interpret differences in humeral torsion in terms of alterations in glenohumeral rotational ranges of motion, but torsion is also affected by the elbow carrying angle (Hernigou et al., 2002) and perhaps other subtle influences on scapular position.

The three known early H. erectus humeri are included in Figs. 3–5 to demonstrate that, despite the considerable variability observed in modern humans, humeral torsion is markedly lower in these fossils. Unfortunately, the only behavior that has a documented functional connection to variation in humeral torsion is the overhead throwing motion, and, as the saying goes, when the only tool you have is a hammer, everything starts to look like a nail. There is little doubt that this unique ability has contributed to the success of the human lineage, but even if low humeral torsion is good (in this regard), it doesn't necessarily mean that even lower torsion is better. I contend that the distinctively low torsion observed in early H. erectus does not support the conclusion that the capacity for high speed throwing dates back nearly two million years.

## Roach 2015

Neil T. Roach & Brian G. Richmond, *Humeral torsion does not dictate shoulder position, but does influence throwing speed.* Journal of Human Evolution **85** (2015), 206–211.

Larson (2015: 204) states that very low humeral torsion does not support the capacity for high-speed throwing in H. erectus, noting that "even if low humeral torsion is good (in this regard), it doesn't necessarily mean that even lower torsion is better." We disagree. Many studies have shown that torsion levels are lower in the dominant, throwing arm (Pieper,1998; Crockett et al., 2002; Osbahr et al., 2002; Reagan et al., 2002; Whiteley et al., 2006; Rhodes, 2007; Myers et al., 2009, 2011; Roach et al., 2012). Individuals with lower torsion store more elastic energy in the soft tissues of their shoulder and use that stored energy to produce faster throws (Roach et al., 2013; Roach and Lieberman, 2014; Fig. 5). This is especially true of the lowest torsion individuals (who fall within the H. erectus range), who store the most elastic energy and produce the fastest throws. Thus, the link between low torsion, including very low torsion, and throwing performance is theoretically sound and well supported.

We do not hypothesize that the capacity to produce high-speed throws rests on humeral torsion alone. We have proposed, and functionally tested, three critical aspects of upper body anatomy that enable high-speed throwing behavior to occur (i.e., a mobile waist, caudally rotated scapula, and low humeral torsion; Roach, 2012; Roach et al., 2013; Roach and Lieberman, 2014). According to current fossil data, these features first appear together in H. erectus (Roach, 2012; Roach et al., 2013). We have been careful to argue that this simply shows that the capacity for high-speed throwing appeared at this time. While we do not claim that low torsion is an adaptation for high-speed throwing, it is logical that the very low torsion in earlier hominins could be co-opted for throwing in Homo. Once the caudal rotation of the glenoid in Homo made elastic energy storage at the shoulder (and thus, high-speed throwing) possible, low humeral torsion could be exapted to improve throwing performance.

In sum, our reconstruction of the H. erectus shoulder as modern human-like is the best-supported hypothesis. Our study of clavicular proportions in the Daasanach and how such proportions affect throwing performance supports this reconstruction. We have argued that high-speed throwing is an important behavior in human evolution (Roach, 2012; Roach et al., 2013; Roach and Richmond, 2015).

The current fossil and biomechanical data suggest the capacity for high-speed throwing first appears nearly 2 million years ago (Roach, 2012; Roach et al., 2013). Therefore, the case for a modern human-like shoulder and throwing performance in H. erectus remains strong and unchanged.

Scher 2015

Howie D. Scher, Joanne M. Whittaker, Simon E. Williams, Jennifer C. Latimer, Wendy E. C. Kordesch & Margaret L. Delane, *Onset of Antarctic Circumpolar Current 30 million years ago as Tasmanian Gateway aligned with westerlies*. nature **523** (2015), 580–583.

Earth's mightiest ocean current, the Antarctic Circumpolar Current (ACC), regulates the exchange of heat and carbon between the ocean and the atmosphere1, and influences vertical ocean structure, deep-water production2 and the global distribution of nutrients and chemical tracers3. The eastward-flowing ACC occupies a unique circumglobal pathway in the Southern Ocean that was enabled by the tectonic opening of key oceanic gateways during the break-up of Gondwana (for example, by the opening of the Tasmanian Gateway, which connects the Indian and Pacific oceans). Although the ACC is a key component of Earth's present and past climate system1, the timing of the appearance of diagnostic features of the ACC (for example, low zonal gradients in water-mass tracer fields4–7) is poorly known and represents a fundamental gap in our understanding of Earth history. Here we show, using geophysically determined positions of continent–ocean boundaries8, that the deep Tasmanian Gateway opened 33.561.5 million years ago (the errors indicate uncertainty in the boundary positions). Following this opening, sediments from Indian and Pacific cores recorded Pacific-type neodymium isotope ratios, revealing deep westward flow equivalent to the present-day Antarctic Slope Current. We observe onset of the ACC at around 30 million years ago, when Southern Ocean neodymium isotopes record a permanent shift to modern Indian–Atlantic ratios. Our reconstructions of ocean circulation show that massive reorganization and homogenization of Southern Ocean water masses coincided with migration of the northern margin of the Tasmanian Gateway into the mid-latitude westerly wind band, which we reconstruct at 646 S, near to the northern margin. Onset of the ACC about 30 million years ago coincided with major changes in global ocean circulation9 and probably contributed to the lower atmospheric carbon dioxide levels that appear after this time10.

Schramski 2015

John R. Schramski, David K. Gattie & James H. Brown, *Human domination of the biosphere, Rapid discharge of the earth-space battery foretells the future of humankind*. PNAS **112** (2015), 9511–9517.

Earth is a chemical battery where, over evolutionary time with a trickle-charge of photosynthesis using solar energy, billions of tons of living biomass were stored in forests and other ecosystems and in vast reserves of fossil fuels. In just the last few hundred years, humans extracted exploitable energy from these living and fossilized biomass fuels to build the modern industrial-technological-informational economy, to grow our population to more than 7 billion, and to transform the biogeochemical cycles and biodiversity of the earth. This rapid discharge of the earth's store of organic energy fuels the human domination of the biosphere, including conversion of natural habitats to agricultural fields and the resulting loss of native species, emission of carbon dioxide and the resulting climate and sea level change, and use of supplemental nuclear, hydro, wind, and solar energy sources.The laws of thermodynamics governing the trickle-charge and rapid discharge of the earth's

battery are universal and absolute; the earth is only temporarily poised a quantifiable distance from the thermodynamic equilibrium of outer space. Although this distance from equilibrium is comprised of all energy types, most critical for humans is the store of living biomass. With the rapid depletion of this chemical energy, the earth is shifting back toward the inhospitable equilibrium of outer space with fundamental ramifications for the biosphere and humanity. Because there is no substitute or replacement energy for living biomass, the remaining distance from equilibrium that will be required to support human life is unknown.

Keywords: energy | evolutionary biology | earth-space battery | sustainability | thermodynamics

Smith 2015

Oliver Smith, Garry Momber, Richard Bates, Paul Garwood, Simon Fitch, Mark Pallen, Vincent Gaffney & Robin G. Allaby, *"Sedimentary DNA from a submerged site reveals wheat in the British Isles 8000 years ago", Response to Comment*. science **349** (2015), 247.

Bennett questions the rigor of the dating of our sample from which sedimentary ancient DNA was obtained and the reliability of the taxonomic identification of wheat. We present a further radiocarbon date from S308 that confirms the lateral consistency of the palaeosol age. The suggestion of taxonomic false positives in our data illustrates a misinterpretation of the phylogenetic intersection analysis.

## Altpaläolithikum

Kraft 2015

Thomas S. Kraft & Vivek V. Venkataraman, *Could plant extracts have enabled hominins to acquire honey before the control of fire?* Journal of Human Evolution **85** (2015), 65–74.

Honey is increasingly recognized as an important food item in human evolution, but it remains unclear whether extinct hominins could have overcome the formidable collective stinging defenses of honey bees during honey acquisition. The utility of smoke for this purpose is widely recognized, but little research has explored alternative methods of sting deterrence such as the use of plant secondary compounds. To consider whether hominins could have used plant extracts as a precursor or alternative to smoke, we review the ethnographic, ethnobotanical, and plant chemical ecology literature to examine how humans use plants in combination with, and independently of, smoke during honey collection. Plant secondary compounds are diverse in their physiological and behavioral effects on bees and differ fundamentally from those of smoke. Plants containing these chemicals are widespread and prove to be remarkably effective in facilitating honey collection by honey hunters and beekeepers worldwide. While smoke may be superior as a deterrent to bees, plant extracts represent a plausible precursor or alternative to the use of smoke during honey collection by hominins. Smoke is a sufficient but not necessary condition for acquiring honey in amounts exceeding those typically obtained by chimpanzees, suggesting that significant honey consumption could have predated the control of fire.

Keywords: Honey bee | Zoopharmacognosy | Ethnobiology | Apis

## Anthropologie

### Grabowski 2015

Mark Grabowski & Charles C. Roseman, *Complex and changing patterns of natural selection explain the evolution of the human hip.* Journal of Human Evolution **85** (2015), 94–110.

JHumEvo085-0094-Supplement1.pdf, JHumEvo085-0094-Supplement2.xls

Causal explanations for the dramatic changes that occurred during the evolution of the human hip focus largely on selection for bipedal function and locomotor efficiency. These hypotheses rest on two critical assumptions. The first—that these anatomical changes served functional roles in bipedalism—has been supported in numerous analyses showing how postcranial changes likely affected locomotion. The second—that morphological changes that did play functional roles in bipedalism were the result of selection for that behavior—has not been previously explored and represents a major gap in our understanding of hominin hip evolution. Here we use evolutionary quantitative genetic models to test the hypothesis that strong directional selection on many individual aspects of morphology was responsible for the large differences observed across a sample of fossil hominin hips spanning the Plio-Pleistocene. Our approach uses covariance among traits and the differences between relatively complete fossils to estimate the net selection pressures that drove the major transitions in hominin hip evolution. Our findings show a complex and changing pattern of natural selection drove hominin hip evolution, and that many, but not all, traits hypothesized to play functional roles in bipedalism evolved as a direct result of natural selection. While the rate of evolutionary change for all transitions explored here does not exceed the amount expected if evolutionwas occurring solely through neutral processes, it was far above rates of evolution for morphological traits in other mammalian groups. Given that stasis is the norm in the mammalian fossil record, our results suggest that large shifts in the adaptive landscape drove hominin evolution.

Keywords: Hominin evolution | Bipedalism | Selection | Correlated evolution

### Heyes 2015

Peter Heyes & Katharine MacDonald, *Neandertal energetics, Uncertainty in body mass estimation limits comparisons with Homo sapiens.* Journal of Human Evolution **85** (2015), 193–197.

Energy requirements potentially provide insights into aspects of Neandertal morphology and behaviour, the outcome of Neandertal competition with AMH, and a quantitative approach to understanding subsistence patterns. While Neandertals may have had higher energy expenditures than AMH, the differences in predicted energy expenditures are not statistically significant. This lack of significant difference is based on the substantial error involved in estimating body mass, a problem which applies broadly to different approaches and datasets, and the equally substantial errors involved in estimating BMR and DEE. Differences in DEE between climate zones could be useful in understanding subsistence behaviours in northwest Europe and southwest Asia but are sensitive to estimation of PAL. Variation in DEE makes it difficult to demonstrate significant effects of factors such as locomotor differences between AMH and Neandertals. The impact of error in BM estimation for studying changes in BMR, DEE, and locomotor costs for earlier hominins has also probably been underestimated and is likely to strongly affect comparisons between species.

Marchi 2015

Damiano Marchi, *Using the morphology of the hominoid distal fibula to interpret arboreality in Australopithecus afarensis*. Journal of Human Evolution **85** (2015), 136–148.

JHumEvo085-0136-Supplement.pdf

The fibula has rarely been considered in anthropological studies. However differences in morphology d and inferred function d of the fibula between human and non-human apes have been noted in the past and related to differences in locomotor behavior. Recent studies have pointed out the correlation between diaphyseal rigidity of the fibula and tibia and locomotor behavior in living hominids, and its possible application for inferring early hominin locomotor behavior. The problem with the application of the method proposed in these studies is the extreme rarity of associated early hominin fibula and tibia. Additionally, previous studies investigating morphological traits of fibulotalar articular facets to infer the degree of arboreality in fossil australopiths were often qualitative. In the present study, articular measurements of the distal fibula of living great apes and humans (Pongo, Gorilla, Pan and Homo) are quantified and compared to Australopithecus afarensis distal fibulae. Quantitative analysis is carried out for articular areas and breadths of the fibulotalar articular facets, for the angles formed by the fibulotalar articular facets and the longitudinal axis of the fibula, and for the angle between the proximal fibulotalar articular facet and the subcutaneous triangular area. Results show that the fibula of A. afarensis bears some traits consistent with modern terrestrial bipedalism, like a more laterally facing lateral malleolus, in association with more ape-like traits, like the smaller distal fibulotalar articular facet area and the more inferiorly oriented fibulotalar articular facets, consistent with A. afarensis being a terrestrial hominin adapted for some form of arboreality.

Keywords: Early hominins | Articular properties | Locomotion | Ankle joint

Rimfeld 2015

Kaili Rimfeld, Yulia Kovas, Philip S. Dale & Robert Plomin, *Pleiotropy across academic subjects at the end of compulsory education*. Scientific Reports **5** (2015), 11713. DOI:10.1038/srep11713.

SciRep05-11713-Supplement.pdf

Research has shown that genes play an important role in educational achievement. A key question is the extent to which the same genes affect different academic subjects before and after controlling for general intelligence. The present study investigated genetic and environmental influences on, and links between, the various subjects of the age-16 UK-wide standardized GCSE (General Certiicate of secondary education) examination results for 12,632 twins. Using the twin method that compares identical and non-identical twins, we found that all GCse subjects were substantially heritable, and that various academic subjects correlated substantially both phenotypically and genetically, even after controlling for intelligence. Further evidence for pleiotropy in academic achievement was found using a method based directly on DNA from unrelated individuals. We conclude that performance differences for all subjects are highly heritable at the end of compulsory education and that many of the same genes affect different subjects independent of intelligence.

## Biologie

DeFries 2015

Ruth DeFries, Jessica Fanzo, Roseline Remans, Cheryl Palm, Stephen

Wood & Tal L. Anderman, *Metrics for land-scarce agriculture*, *Nutrient content must be better integrated into planning.* science **349** (2015), 238–240.

s349-0238-Supplement1.pdf, s349-0238-Supplement2.zip

Analyses of trade-offs and synergies between ecosystem services and food production at local ( 8) and global scales generally use crop yield or calories as a metric to compare strategies for fulfilling food demand. But nutritional needs for a wide range of essential nutrients in the human diet have generally not been included in considerations of sustainable intensification. Access to food with high nutritional quality is a primary concern, particularly for 2 to 3 billion people who are undernourished, overweight, or obese or deficient in micronutrients.

However, because the proportion of maize diverted for feed remained fairly stable over the time period, the change in the mix of cereal types had an even larger effect on reducing the nutritional content of the global, directly consumed cereal supply than the diversion to feed (table S1 and fig. S4). In other words, the amount of cereals that a person would need to consume to fulfill the daily dietary reference intake (DRI) has increased for protein, iron, and zinc, based on a mix of cereals in proportion to the production of each type. In 1961, 533, 821, and 735 g of cereals were needed to satisfy requirements for protein, iron, and zinc, respectively. By 2011, the amount required increased to 556, 1013, and 777 g. Grams required to satisfy energy requirements remained nearly unchanged at 625 to 623 g over this time period.

With growing pressures on land resources, food systems will be called upon to use land efficiently. At the same time, scarce land resources need to provide adequate nutrition for the world's population and alleviate micronutrient deficiencies. This confluence of imperatives calls for new alliances, metrics, and analyses for incorporating human nutrition as a primary consideration for sustainable agriculture.

## Fraser 2015

Lauchlan H. Fraser et al., *Worldwide evidence of a unimodal relationship between productivity and plant species richness.* science **349** (2015), 302–305.

s349-0302-Supplement.pdf

Lauchlan H. Fraser, Jason Pither, Anke Jentsch, Marcelo Sternberg, Martin Zobel, Diana Askarizadeh, Sandor Bartha, Carl Beierkuhnlein, Jonathan A. Bennett, Alex Bittel, Bazartseren Boldgiv, Ilsi I. Boldrini, Edward Bork, Leslie Brown, Marcelo Cabido, James Cahill, Cameron N. Carlyle, Giandiego Campetella, Stefano Chelli, Ofer Cohen, Anna-Maria Csergo, Sandra Díaz, Lucas Enrico, David Ensing, Alessandra Fidelis, Jason D. Fridley, Bryan Foster, Heath Garris, Jacob R. Goheen, Hugh A. L. Henry, Maria Hohn, Mohammad Hassan Jouri, John Klironomos, Kadri Koorem, Rachael Lawrence-Lodge, Ruijun Long, Pete Manning, Randall Mitchell, Mari Moora, Sandra C. Müller, Carlos Nabinger, Kamal Naseri, Gerhard E. Overbeck, Todd M. Palmer, Sheena Parsons, Mari Pesek, Valério D. Pillar, Robert M. Pringle, Kathy Roccaforte, Amanda Schmidt, Zhanhuan Shang, Reinhold Stahlmann, Gisela C. Stotz, Shu-ichi Sugiyama, Szilárd Szentes, Don Thompson, Radnaakhand Tungalag, Sainbileg Undrakhbold, Margaretha van Rooyen, Camilla Wellstein, J. Bastow Wilson & Talita Zupo

The search for predictions of species diversity across environmental gradients has challenged ecologists for decades. The humped-back model (HBM) suggests that plant diversity peaks at intermediate productivity; at low productivity few species can tolerate the environmental stresses, and at high productivity a few highly competitive species dominate. Over time the HBM has become increasingly

controversial, and recent studies claim to have refuted it. Here, by using data from coordinated surveys conducted throughout grasslands worldwide and comprising a wide range of site productivities, we provide evidence in support of the HBM pattern at both global and regional extents. The relationships described here provide a foundation for further research into the local, landscape, and historical factors that maintain biodiversity.

Sokolow 2015

Susanne H. Sokolow et al., *Reduced transmission of human schistosomiasis after restoration of a native river prawn that preys on the snail intermediate host.* PNAS **112** (2015), 9650–9655.

Susanne H. Sokolow, Elizabeth Huttinger, Nicolas Jouanard, Michael H. Hsieh, Kevin D. Lafferty, Armand M. Kuris, Gilles Riveau, Simon Senghor, Cheikh Thiam, Alassane N'Diaye, Djibril Sarr Faye & Giulio A. De Leo

Eliminating human parasitic disease often requires interrupting complex transmission pathways. Even when drugs to treat people are available, disease control can be difficult if the parasite can persist in nonhuman hosts. Here, we show that restoration of a natural predator of a parasite's intermediate hosts may enhance drug-based schistosomiasis control. Our study site was the Senegal River Basin, where villagers suffered a massive outbreak and persistent epidemic after the 1986 completion of the Diama Dam. The dam blocked the annual migration of native river prawns (Macrobrachium vollenhoveni) that are voracious predators of the snail intermediate hosts for schistosomiasis. We tested schistosomiasis control by reintroduced river prawns in a before-after-control-impact field experiment that tracked parasitism in snails and people at two matched villages after prawns were stocked at one village's river access point. The abundance of infected snails was 80 % lower at that village, presumably because prawn predation reduced the abundance and average life span of latently infected snails. As expected from a reduction in infected snails, human schistosomiasis prevalence was $18 \pm 5$ % lower and egg burden was $50 \pm 8$ % lower at the prawn-stocking village compared with the control village. In a mathematical model of the system, stocking prawns, coupled with infrequent mass drug treatment, eliminates schistosomiasis from high-transmission sites. We conclude that restoring river prawns could be a novel contribution to controlling, or eliminating, schistosomiasis.

Keywords: disease | ecology | control | elimination | neglected tropical disease

Significance: Reinfection after treatment is a problem that plagues efforts to control parasites with complex transmission pathways, such as schistosomiasis, which affects at least 220 million people worldwide and requires an obligate snail intermediate host. Our study highlights a potential ecological solution to this global health problem:We showthat a species of river prawn indigenous to the west coast of Africa, Macrobrachium vollenhovenii, could offer a low-cost, sustainable form of snail control that, when used in synergy with existing drug distribution campaigns, could reduce or locally eliminate the parasite. Biological conservation does not always benefit human health, but our results show that where it does, it could provide a win-win outcome for humans and nature.

Technau 1974

Gerhard Technau, *Bilharziose—ein lösbares Problem.* Naturwissenschaften **61** (1974), 111–116.

Bilharzia or schistosomiasis is continually spreading due to the expansion of new irrigation systems. The World Health Organisation has carried out many successful pilot projects to test the suitability of molluscicides and various clinical treatments. A German-Egyptian joint project affecting one million people living in the Fayoum

Oasis was able to eliminate the danger of infection from the local irrigation system. This encouraging experience should iustify a worldwide campaign to control this desease, which affects more than 200 million people in the tropical and subtropical areas of the earth.

## Datierung

Graven 2015

Heather D. Graven, *Impact of fossil fuel emissions on atmospheric radiocarbon and various applications of radiocarbon over this century*. PNAS **112** (2015), 9542–9545.

Radiocarbon analyses are commonly used in a broad range of fields, including earth science, archaeology, forgery detection, isotope forensics, and physiology. Many applications are sensitive to the radiocarbon (14C) content of atmospheric CO2, which has varied since 1890 as a result of nuclear weapons testing, fossil fuel emissions, and CO2 cycling between atmospheric, oceanic, and terrestrial carbon reservoirs. Over this century, the ratio 14C/C in atmospheric CO2 (D14CO2) will be determined by the amount of fossil fuel combustion, which decreases D14CO2 because fossil fuels have lost all 14C from radioactive decay. Simulations of D14CO2 using the emission scenarios from the Intergovernmental Panel on Climate Change Fifth Assessment Report, the Representative Concentration Pathways, indicate that ambitious emission reductions could sustain D14CO2 near the preindustrial level of 0 ‰ through 2100, whereas "business-as-usual" emissions will reduce D14CO2 to .250 ‰, equivalent to the depletion expected from over 2,000 y of radioactive decay. Given current emissions trends, fossil fuel emission-driven artificial "aging" of the atmosphere is likely to occur much faster and with a larger magnitude than previously expected. This finding has strong and as yet unrecognized implications for many applications of radiocarbon in various fields, and it implies that radiocarbon dating may no longer provide definitive ages for samples up to 2,000 y old.

Keywords: fossil fuel emissions | radiocarbon | atmospheric CO2 | 14C dating | isotope forensics

Significance: A wide array of scientific disciplines and industries use radiocarbon analyses; for example, it is used in dating of archaeological specimens and in forensic identification of human and wildlife tissues, including traded ivory. Over the next century, fossil fuel emissions will produce a large amount of CO2 with no 14C because fossil fuels have lost all 14C over millions of years of radioactive decay. Atmospheric CO2, and therefore newly produced organic material, will appear as though it has "aged," or lost 14C by decay. By 2050, fresh organic material could have the same 14C/C ratio as samples from 1050, and thus be indistinguishable by radiocarbon dating. Some current applications for 14C may cease to be viable, and other applications will be strongly affected.

## Energie

Shi 2015

Norman Nan Shi, Cheng-Chia Tsai, Fernando Camino, Gary D. Bernard, Nanfang Yu & Rüdiger Wehner, *Keeping cool, Enhanced optical reflection and radiative heat dissipation in Saharan silver ants*. science **349** (2015), 298–301.

s349-0298-Supplement1.pdf, s349-0298-Supplement2.mov

Saharan silver ants, Cataglyphis bombycina, forage under extreme temperature conditions in the African desert. We show that the ants' conspicuous silvery appearance is created by a dense array of triangular hairs with two thermoregulatory effects. They enhance not only the reflectivity of the ant's body surface in the visible and near-infrared range of the spectrum, where solar radiation culminates, but also the emissivity of the ant in the mid-infrared. The latter effect enables the animals to efficiently dissipate heat back to the surroundings via blackbody radiation under full daylight conditions. This biological solution for a thermoregulatory problem may lead to the development of biomimetic coatings for passive radiative cooling of objects.

## Klima

Sigl 2015

M. Sigl et al., *Timing and climate forcing of volcanic eruptions for the past 2,500 years*. nature **523** (2015), 543–549.

n523-0543-Supplement1.pdf, n523-0543-Supplement2.xlsx, n523-0543-Supplement3.pdf, n523-0543-Supplement4.xlsx, n523-0543-Supplement5.xlsx, n523-0543-Supplement6.xlsx

M. Sigl, M. Winstrup, J. R. McConnell, K. C. Welten, G. Plunkett, F. Ludlow, U. Büntgen, M. Caffee, N. Chellman, D. Dahl-Jensen, H. Fischer, S. Kipfstuhl, C. Kostick, O. J. Maselli, F. Mekhaldi, R. Mulvaney, R. Muscheler, D. R. Pasteris, J. R. Pilcher, M. Salzer, S. Schüpbach, J. P. Steffensen, B. M. Vinther & T. E. Woodruff

Volcanic eruptions contribute to climate variability, but quantifying these contributions has been limited by inconsistencies in the timing of atmospheric volcanic aerosol loading determined from ice cores and subsequent cooling from climate proxies such as tree rings. Here we resolve these inconsistencies and show that large eruptions in the tropics and high latitudes were primary drivers of interannual-to-decadal temperature variability in the Northern Hemisphere during the past 2,500 years. Our results are based on new records of atmospheric aerosol loading developed from high-resolution, multi-parameter measurements from an array of Greenland and Antarctic ice cores as well as distinctive age markers to constrain chronologies. Overall, cooling was proportional to the magnitude of volcanic forcing and persisted for up to ten years after some of the largest eruptive episodes. Our revised timescale more firmly implicates volcanic eruptions as catalysts in the major sixth-century pandemics, famines, and socioeconomic disruptions in Eurasia and Mesoamerica while allowing multi-millennium quantification of climate response to volcanic forcing.

## Kultur

Wengrow 2015

David Wengrow & David Graeber, *Farewell to the 'childhood of man', Ritual, seasonality, and the origins of inequality*. Journal of the Royal Anthropological Institute (2015), preprint, 1–23. DOI:10.1111/1467-9655.12247.

Evidence of grand burials and monumental construction is a striking feature in the archaeological record of the Upper Palaeolithic period, between 40 and 10 kya (thousand years ago). Archaeologists often interpret such finds as indicators of rank and hierarchy among Pleistocene hunter-gatherers. Interpretations of this

kind are difficult to reconcile with the view, still common in sociobiology, that pre-agricultural societies were typically egalitarian in orientation. Here we develop an alternative model of 'Palaeolithic politics', which emphasizes the ability of hunter-gatherers to alternate – consciously and deliberately – between contrasting modes of political organization, including a variety of hierarchical and egalitarian possibilities. We propose that alternations of this sort were an emergent property of human societies in the highly seasonal environments of the last Ice Age. We further consider some implications of the model for received concepts of social evolution, with particular attention to the distinction between 'simple' and 'complex' hunter-gatherers.

## Mittelpaläolithikum

### Schmidt 2015

Patrick Schmidt et al., *A previously undescribed organic residue sheds light on heat treatment in the Middle Stone Age*. Journal of Human Evolution **85** (2015), 22–34.

JHumEvo085-0022-Supplement.pdf

Patrick Schmidt, Guillaume Porraz, Ludovic Bellot-Gurlet, Edmund February, Bertrand Ligouis, Céline Paris, Pierre-Jean Texier, John E. Parkington, Christopher E. Miller, Klaus G. Nickel & Nicholas J. Conard

South Africa has in recent years gained increasing importance for our understanding of the evolution of 'modern human behaviour' during the Middle Stone Age (MSA). A key element in the suite of behaviours linked with modern humans is heat treatment of materials such as ochre for ritual purposes and stone prior to tool production. Until now, there has been no direct archaeological evidence for the exact procedure used in the heat treatment of silcrete. Through the analysis of heat-treated artefacts from the Howiesons Poort of Diepkloof Rock Shelter, we identified a hitherto unknown type of organic residue – a tempering-residue – that sheds light on the processes used for heat treatment in the MSA. This black film on the silcrete surface is an organic tar that contains microscopic fragments of charcoal and formed as a residue during the direct contact of the artefacts with hot embers of green wood. Our results suggest that heat treatment of silcrete was conducted directly using an open fire, similar to those likely used for cooking. These findings add to the discussion about the complexity of MSA behaviour and appear to contradict previous studies that had suggested that heat treatment of silcrete was a complex (i.e., requiring a large number of steps for its realization) and resource-consuming procedure.

Keywords: Modern behaviour | Silcrete heat treatment | Residue analysis | Transformative technology

## Neolithikum

### Ullah 2015

Isaac I. T. Ullah, Ian Kuijt & Jacob Freeman, *Toward a theory of punctuated subsistence change*. PNAS **112** (2015), 9579–9584.

Discourse on the origins and spread of domesticated species focuses on universal causal explanations or unique regional or temporal trajectories. Despite new data as to the context and physical processes of early domestication, researchers still do not understand the types of system-level reorganizations required to transition from foraging to farming. Drawing upon dynamical systems theory and the

concepts of attractors and repellors, we develop an understanding of subsistence transition and a description of variation in, and emergence of, human subsistence systems. The overlooked role of attractors and repellors in these systems helps explain why the origins of agriculture occurred quickly in some times and places, but slowly in others. A deeper understanding of the interactions of a limited set of variables that control the size of attractors (a proxy for resilience), such as population size, number of dry months, net primary productivity, and settlement fixity, provides new insights into the origin and spread of domesticated species in human economies.

Keywords: complex adaptive systems | subsistence change | origins of agriculture | social-ecological systems

Significance: The questions of how, when, and why humans transitioned from hunting and gathering to food production are important to understand the evolution and sustainability of agricultural economies. We explore cross-cultural data on human subsistence with multivariate techniques and interpret the results from the perspective of human societies as complex adaptive systems. We gain insight into several controlling variables that may inordinately influence the possibilities for subsistence change and into why the forager–farmer transition occurred quickly in some cases and more gradually in others.

## Politik

Abramson 2015

Bruce Abramson, *The Decline—and Fall?—of Religious Freedom in America. America's "first freedom" is under attack from an ascendant cultural secularism. Christians are its first target, but Jews and Judaism may not be far behind.* Mosaic Monthly Essays **2015**, Aug. 3.

In so doing, the opponents of religious freedom, properly understood, explicitly reject the foundational liberal value of tolerance. They are wrong. In this debate, the Jewish answer, the traditional American answer, and the answer that RFRA embodies—vive la différence—remains the right one. Freedom of religion falls when we refuse to allow people to align their lives, their families, and their businesses with the dictates of their faith. And if freedom of religion falls, so do all of our other rights. In an irony of epic proportions, the attack on religious freedom is an opportunity for America's Jews to help America's Christians secure the Christian nature of their community as a necessary step toward securing the Jewish nature of their own.

## Story or Book

Butterworth 2015

Jon Butterworth, *What If?* nature **523** (2015), 530.

What If?: Serious Scientific Answers to Absurd Hypothetical Questions. Randall Munroe. John Murray: 2014.

Each chapter takes a daft-but-tractable question such as those above, and applies science, reason and critical thinking to find a rational answer. Chapter lengths vary according to the question and the relentlessness with which it is pursued. Randall Munroe — author of popular webcomic xkcd — is a genius. His book lets the analytical, problem-solving bits of your mind play cleverly with stupid stuff, while the rest of you relaxes.

Harris 2015

Michael Harris, *How Not to Be Wrong*. nature **523** (2015), 529.

How Not to Be Wrong: The Hidden Maths of Everyday Life. Jordan Ellenberg. Penguin: 2014.

He will guide readers through mathematical ideas that are "simple and profound", which require no special techniques but reveal deep insights into our world and minds.

Ellenberg breathes life into his theme of the perils of misunderstood statistics through clear storytelling and by drawing diverse and unexpected connections. He delivers a thorough history of statistics — including digressions about taxes, basketball, lotteries and the US Supreme Court — as well as high points of the discipline such as prime numbers, information theory, geometry, logic and calculus.

The book quietly initiates the reader into thinking like a mathematician. I would call it one of the most intelligent books written about mathematics, and possibly the most entertaining.