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Literatur

Aktuell

Joppa 2013

Lucas N. Joppa, Greg McInerny, Richard Harper, Lara Salido, Kenji Takeda, Kenton O'Hara, David Gavaghan & Stephen Emmott, *Troubling Trends in Scientific Software Use*. science **340** (2013), 814–815.

s340-0814-Supplement1.pdf, s340-0814-Supplement2.xlsx

"Blind trust" is dangerous when choosing software to support research.
Given that scientists in general want to learn "enough" to do their science, our finding that an overwhelming majority of scientists wanted increased computational skills suggests something more. Perceived insufficient understanding of what the software is doing suggests that users fret over whether it is indeed doing what is expected. Formal training in statistics, computational methods, mathematics, and software engineering should be a core part of the science curriculum at undergraduate and research student levels.

Li 2013

Jun Z. Li et al., *Circadian patterns of gene expression in the human brain and disruption in major depressive disorder*. PNAS **110** (2013), 9950–9955.

Jun Z. Li, Blynn G. Bunney, Fan Meng, Megan H. Hagenauer, David M. Walsh, Marquis P. Vawter, Simon J. Evans, Prabhakara V. Choudary, Preston Cartagena, Jack D. Barchas, Alan F. Schatzberg, Edward G. Jones, Richard M. Myers, Stanley J. Watso, Jr., Huda Akil & William E. Bunney

A cardinal symptom of major depressive disorder (MDD) is the disruption of circadian patterns. However, to date, there is no direct evidence of circadian clock dysregulation in the brains of patients who have MDD. Circadian rhythmicity of gene expression has been observed in animals and peripheral human tissues, but its presence and variability in the human brain were difficult to characterize. Here, we applied time-of-death analysis to gene expression data from high-quality postmortem brains, examining 24-h cyclic patterns in six cortical and limbic regions of 55 subjects with no history of psychiatric or neurological illnesses ("controls") and 34 patients with MDD. Our dataset covered ≈12,000 transcripts in the dorsolateral prefrontal cortex, anterior cingulate cortex, hippocampus, amygdala, nucleus accumbens, and cerebellum. Several hundred transcripts in each region showed 24-h cyclic patterns in controls, and >100 transcripts exhibited consistent rhythmicity and phase synchrony across regions. Among the top-ranked rhythmic genes were the canonical clock genes BMAL1(ARNTL), PER1-2-3, NR1D1 (REV-ERBa), DBP, BHLHE40 (DEC1), and BHLHE41(DEC2). The phasing of known circadian genes was consistent with data derived from other diurnal mammals. Cyclic patterns were much weaker in the brains of patients with MDD due to shifted peak timing and potentially disrupted phase relationships between individual circadian genes. This transcriptome-wide analysis of the human brain demonstrates a rhythmic rise and fall of gene expression in regions outside of the suprachiasmatic nucleus in control subjects. The description of its breakdown in MDD suggests potentially important molecular targets for treatment of mood disorders.

circadian rhythms | depression | microarray

Anthropologie

Alt 2013

Kurt W. Alt et al., *Earliest Evidence for Social Endogamy in the 9,000-Year-Old-Population of Basta, Jordan*. PLoS ONE **8** (2013), vi, e65649. DOI:10.1371/journal.pone.0065649.

pone08.6-e65649-Supplement1.tif, pone08.6-e65649-Supplement2.tif, pone08.6-e65649-Supplement3.tif, pone08.6-e65649-Supplement4.tif, pone08.6-e65649-Supplement5.tif, pone08.6-e65649-Supplement6.tif, pone08.6-e65649-Supplement7.doc, pone08.6-e65649-Supplement8.doc

Kurt W. Alt, Marion Benz, Wolfgang Müller, Margit E. Berner, Michael Schultz, Tyede H. Schmidt-Schultz, Corina Knipper, Hans-Georg K. Gebel, Hans J. Nissen & Werner Vach

The transition from mobile to sedentary life was one of the greatest social challenges of the human past. Yet little is known about the impact of this fundamental change on social interactions amongst early Neolithic communities, which are best recorded in the Near East. The importance of social processes associated with these economic and ecological changes has long been underestimated. However, ethnographic observations demonstrate that generalized reciprocity – such as open access to resources and land – had to be reduced to a circumscribed group before regular farming and herding could be successfully established. Our aim was thus to investigate the role of familial relationships as one possible factor within this process of segregation as recorded directly in the skeletal remains, rather than based on hypothetical correlations such as house types and social units. Here we present the revealing results of the systematically recorded epigenetic characteristics of teeth and skulls of the late Pre-Pottery Neolithic community of Basta in Southern Jordan (Figure S1). Additionally, mobility was reconstructed via a systematic strontium (Sr) isotope analysis of tooth enamel of the Basta individuals. The frequency of congenitally missing maxillary lateral incisors in the 9,000-year-old community of Basta is exceptionally high (35.7 %). Genetic studies and a worldwide comparison of the general rate of this dental anomaly in modern and historic populations show that the enhanced frequency can only be explained by close familial relationships akin to endogamy. This is supported by strontium isotope analyses of teeth, indicating a local origin of almost all investigated individuals. Yet, the accompanying archaeological finds document far-reaching economic exchange with neighboring groups and a population density hitherto unparalleled. We thus conclude that endogamy in the early Neolithic village of Basta was not due to geographic isolation or a lack of exogamous mating partners but a socio-cultural choice.

Shea 2010

John J. Shea, *Neanderthals and Early Homo sapiens in the Levant*. In: Elena A. A. Garcea (Hrsg.), *South-Eastern Mediterranean Peoples Between 130,000 and 10,000 Years Ago*. (Oxford 2010), 126–143.

The same forces that shape the writing of history affect writing prehistory. In the Levant, prehistory has long been infl uenced by European scholarship. Prehistoric research began in Europe, and many of the assumptions about European Neanderthals and early Homo sapiens were exported to the Levant by prehistorians trained in Europe. In Europe, the MP period is generally seen as a period of stasis, the "Age of Neanderthal Man". Apart from some minor shifts in fl int knapping strategies and changes in which particular large mammals were on the menu, not much

happened. The MP of the Levant, in contrast, was a period of dynamic evolutionary change and dramatic reversals of fortune for both Neanderthals and Homo sapiens. The exact nature of Neanderthal-Homo sapiens interactions during this period (if indeed they interacted at all) will probably never be known with great certainty. Nevertheless, it must have been an exciting time and place in which to have lived.
In explaining the course of human evolution during the MP and UP periods, Levantine prehistorians and foreign scientists who work there have shown a persistent prefer ence for models that invoke evolutionary continuity, favouring co-existence and assimilation of some kind over competition, extinction, and replacement. This preference for continuity as the default model for human origins in the Levant refl ects a misunderstanding about the fundamental processes of evolution and a tacit understanding of the politics of contemporary human origins research. That is, it is far better for one's career to present one's fossil, archaeological site, or chosen region of geographic expertise as central to the main narrative of human evolution than it is to realistically assess the actual improbability of it having such a central role.
Competition, extinction, and replacement in prehistory are often confl ated with recent historical colonial encounters. Few of us take pride in having ancestors (recent or Pleistocene) with others' blood on their hands, but all our ancestors do. There is today an exceptional convergence of geochronometric, archaeological, fossil, genetic, and even linguistic evidence that point unambiguously to Africa, specifi cally sub-Saharan eastern Africa, as the place where our species fi rst evolved and from which it dispersed to the Levant and elsewhere (Ehret et al. 2004; Trinkaus 2005; Mellars 2006b; Grine et al. 2007; Shea 2007a; Fleagle et al. 2008). These fi ndings do not diminish the value of Levantine prehistory for human origins research, but they do mean that the Levantine record has to be put in a broader evolutionary context. It is not merely an appendix to European prehistory, nor a suburb of "Greater Africa", but a unique region whose prehistoric record differs fundamentally from the two continents it joins together.

Shea 2011
John J. Shea, *Refuting a Myth About Human Origins, Homo sapiens emerged once, not as modern-looking people first and as modern-behaving people later*. American Scientist **99** (2011), 128–135.
Dividing Homo sapiens into modern and archaic or premodern categories and invoking the evolution of behavioral modernity to explain the difference has never been a good idea. Like the now-discredited scientific concept of race, it reflects hierarchical and typological thinking about human variability that has no place in a truly scientific anthropology. Indeed, the concept of behavioral modernity can be said to be worse than wrong, because it is an obstacle to understanding. Time, energy and research funds that could have been spent investigating the sources of variability in particular behavioral strategies and testing hypotheses about them have been wasted arguing about behavioral modernity.

Energie

Abdulla 2013
Ahmed Abdulla, Inês Lima Azevedo & M. Granger Morgan, *Expert assessments of the cost of light water small modular reactors*. PNAS **110** (2013), 9686–9691.

Analysts and decision makers frequently want estimates of the cost of technologies that have yet to be developed or deployed. Small modular reactors (SMRs), which could become part of a portfolio of carbon-free energy sources, are one such technology. Existing estimates of likely SMR costs rely on problematic topdown approaches or bottom-up assessments that are proprietary. When done properly, expert elicitations can complement these approaches. We developed detailed technical descriptions of two SMR designs and then conduced elicitation interviews in which we obtained probabilistic judgments from 16 experts who are involved in, or have access to, engineering-economic assessments of SMR projects. Here, we report estimates of the overnight cost and construction duration for five reactor-deployment scenarios that involve a large reactor and two light water SMRs. Consistent with the uncertainty introduced by past cost overruns and construction delays, median estimates of the cost of new large plants vary by more than a factor of 2.5. Expert judgments about likely SMR costs display an even wider range. Median estimates for a 45 megawattselectric (MWe) SMR range from $ 4,000 to $ 16,300/kWe and from $ 3,200 to $ 7,100/kWe for a 225-MWe SMR. Sources of disagreement are highlighted, exposing the thought processes of experts involved with SMR design. There was consensus that SMRs could be built and brought online about 2 y faster than large reactors. Experts identify more affordable unit cost, factory fabrication, and shorter construction schedules as factors that may make light water SMRs economically viable.
nuclear power economics | technology assessment

Vidic 2013

R. D. Vidic, S. L. Brantley, J. M. Vandenbossche, D. Yoxtheimer & J. D. Abad, *Impact of Shale Gas Development on Regional Water Quality*. science **340** (2013), 826.

Unconventional natural gas resources offer an opportunity to access a relatively clean fossil fuel that could potentially lead to energy independence for some countries. Horizontal drilling and hydraulic fracturing make the extraction of tightly bound natural gas from shale formations economically feasible. These technologies are not free from environmental risks, however, especially those related to regional water quality, such as gas migration, contaminant transport through induced and natural fractures, wastewater discharge, and accidental spills. We review the current understanding of environmental issues associated with unconventional gas extraction. Improved understanding of the fate and transport of contaminants of concern and increased long-term monitoring and data dissemination will help manage these water-quality risks today and in the future.
Since the advent of hydraulic fracturing, more than 1million hydraulic fracturing treatments have been conducted, with perhaps only one documented case of direct groundwater pollution resulting from injection of hydraulic fracturing chemicals used for shale gas extraction. Impacts from casing leakage, well blowouts, and spills of contaminated fluids are more prevalent but have generally been quickly mitigated. However, confidentiality requirements dictated by legal investigations, combined with the expedited rate of development and the limited funding for research, are substantial impediments to peer-reviewed research into environmental impacts. Furthermore, gas wells are often spaced closely within small areas and could result in cumulative impacts that develop so slowly that they are hard to measure.

Grundlagen

Richter 2013

Jürgen Richter, *Was hat das Micoquien mit dem Jabrudien zu tun? Bemerkungen zu einem Kongreß in Haifa.* Quartär **53** (2013), 109–114.

For many decades of research, certain technological and typological similarities seemed to indicate a cultural relationship between "Yabroudian" and "Micoquian" – two principal cultural units of the Palaeotithic. In fact, such a relationship never existed. Both terms owe their existence to a single kind of academic error: They were understood as complete cultural entities, but, in reality, they are fragments (mere partitions) of much larger cultural entities. These entities are the "Micoquian/M.M.O." of Central Europe and the "Mugharan" of the Near East. "Micoquian/M.M.O." and "Mugharan" are clearly seperated from each other by space and time.

Klima

Asmerom 2013

Yemane Asmerom, Victor J. Polyak, Jessica B. T. Rasmussen, Stephen J. Burns & Matthew Lachniet, *Multidecadal to multicentury scale collapses of Northern Hemisphere monsoons over the past millennium.* PNAS **110** (2013), 9651–9656.

Late Holocene climate in western North America was punctuated by periods of extended aridity called megadroughts. These droughts have been linked to cool eastern tropical Pacific sea surface temperatures (SSTs). Here, we show both short-term and long-termclimate variability over the last 1,500 y from annual band thickness and stable isotope speleothem data. Several megadroughts are evident, including a multicentury one, AD 1350–1650, herein referred to as Super Drought, which corresponds to the coldest period of the Little Ice Age. Synchronicity between southwestern North American, Chinese, and West African monsoon precipitation suggests the megadroughts were hemispheric in scale. Northern Hemisphere monsoon strength over the last millennium is positively correlated with Northern Hemisphere temperature and North Atlantic SST. The megadroughts are associated with cooler than average SST and Northern Hemisphere temperatures. Furthermore, the megadroughts, including the SuperDrought, coincidewith solar insolation minima, suggesting that solar forcing of sea surface and atmospheric temperatures may generate variations in the strength of Northern Hemisphere monsoons. Our findings seem to suggest stronger (wetter) Northern Hemisphere monsoons with increased warming.

climate change | global warming | uranium series

La Farge 2013

Catherine La Farge, Krista H. Williams & John H. England, *Regeneration of Little Ice Age bryophytes emerging from a polar glacier with implications of totipotency in extreme environments.* PNAS **110** (2013), 9839–9844.

Across the Canadian Arctic Archipelago, widespread ice retreat during the 20th century has sharply accelerated since 2004. In Sverdrup Pass, central Ellesmere Island, rapid glacier retreat is exposing intact plant communities whose radiocarbon dates demonstrate entombment during the Little Ice Age (1550–1850 AD). The exhumed bryophyte assemblages have exceptional structural integrity (i.e.,

setae, stem structures, leaf hair points) and have remarkable species richness (60 of 144 extant taxa in Sverdrup Pass). Although the populations are often discolored (blackened), some have developed green stem apices or lateral branches suggesting in vivo regrowth. To test their biological viability, Little Ice Age populations emerging from the ice margin were collected for in vitro growth experiments. Our results include a unique successful regeneration of subglacial bryophytes following 400 y of ice entombment. This finding demonstrates the totipotent capacity of bryophytes, the ability of a cell to dedifferentiate into a meristematic state (analogous to stem cells) and develop a new plant. In polar ecosystems, regrowth of bryophyte tissue buried by ice for 400 y significantly expands our understanding of their role in recolonization of polar landscapes (past or present). Regeneration of subglacial bryophytes broadens the concept of Ice Age refugia, traditionally confined to survival of land plants to sites above and beyond glacier margins. Our results emphasize the unrecognized resilience of bryophytes, which are commonly overlooked vis-a-vis their contribution to the establishment, colonization, and maintenance of polar terrestrial ecosystems.
cryopreservation | subglacial ecosystems

Thompson 2013

L. G. Thompson, E. Mosley-Thompson, M. E. Davis, V. S. Zagorodnov, I. M. Howat, V. N. Mikhalenko & P.-N. Lin, *Annually Resolved Ice Core Records of Tropical Climate Variability over the Past ≈1800 Years*. science **340** (2013), 945–950.
s340-0945-Supplement1.pdf
Ice cores from low latitudes can provide a wealth of unique information about past climate in the tropics, but they are difficult to recover and few exist. Here, we report annually resolved ice core records from the Quelccaya ice cap (5670 meters above sea level) in Peru that extend back ≈1800 years and provide a high-resolution record of climate variability there. Oxygen isotopic ratios (d18O) are linked to sea surface temperatures in the tropical eastern Pacific, whereas concentrations of ammonium and nitrate document the dominant role played by the migration of the Intertropical Convergence Zone in the region of the tropical Andes. Quelccaya continues to retreat and thin. Radiocarbon dates on wetland plants exposed along its retreating margins indicate that it has not been smaller for at least six millennia.

Xu 2013

Deke Xu, Houyuan Lu, Naiqin Wu, Zhenxia Liu, Tiegang Li, Caiming Shen & Luo Wang, *Asynchronous marine-terrestrial signals of the last deglacial warming in East Asia associated with low- and high-latitude climate changes*. PNAS **110** (2013), 9657–9662.
pnas110-09657-Supplement1.doc, pnas110-09657-Supplement2.doc, pnas110-09657-Supplement3.doc
A high-resolution multiproxy record, including pollen, foraminifera, and alkenone paleothermometry, obtained from a single core (DG9603) from the Okinawa Trough, East China Sea (ECS), provided unambiguous evidence for asynchronous climate change between the land and ocean over the past 40 ka. On land, the deglacial stage was characterized by rapid warming, as reflected by paleovegetation, and it began ca. 15 kaBP, consistent with the timing of the last deglacial warming in Greenland. However, sea surface temperature estimates from foraminifera and alkenone paleothermometry increased around 20–19 kaBP, as in the Western Pacific Warm Pool (WPWP). Sea surface temperatures in the Okinawa Trough were influenced mainly by heat transport fromt he tropical western Pacific

Ocean by the Kuroshio Current, but the epicontinental vegetation of the ECS was influenced by atmospheric circulation linked to the northern high-latitude climate. Asynchronous terrestrial and marine signals of the last deglacial warming in East Asia were thus clearly related to ocean currents and atmospheric circulation.Weargue that (i) early warming seawater of the WPWP, driven by low-latitude insolation and trade winds, moved northward via the Kuroshio Current and triggered marine warming along the ECS around 20–19 kaBP similar to that in the WPWP, and (ii) an almost complete shutdown of the Atlantic Meridional Overturning Circulation ca. 18–15 kaBP was associated with cold Heinrich stadial-1 and delayed terrestrial warming during the last deglacial warming until ca. 15 kaBP at northern high latitudes, and hence in East Asia. Terrestrial deglacial warming therefore lagged behind marine changes by ca. 3–4 ka.
asynchrony | East Asian monsoon | land-sea correlation | low- and highlatitude interplay | thermohaline circulation

Mathematik

Morton 2013

Richard A. Morton, Jonathan R. Stone & Rama S. Singh, *Mate Choice and the Origin of Menopause*. PLoS Computational Biology **9** (2013), vi, e1003092. DOI:10.1371/journal.pcbi.1003092.
Human menopause is an unsolved evolutionary puzzle, and relationships among the factors that produced it remain understood poorly. Classic theory, involving a one-sex (female) model of human demography, suggests that genes imparting deleterious effects on post-reproductive survival will accumulate. Thus, a 'death barrier' should emerge beyond the maximum age for female reproduction. Under this scenario, few women would experience menopause (decreased fertility with continued survival) because few would survive much longer than they reproduced. However, no death barrier is observed in human populations. Subsequent theoretical research has shown that two-sex models, including male fertility at older ages, avoid the death barrier. Here we use a stochastic, two-sex computational model implemented by computer simulation to show how male mating preference for younger females could lead to the accumulation of mutations deleterious to female fertility and thus produce a menopausal period. Our model requires neither the initial assumption of a decline in older female fertility nor the effects of inclusive fitness through which older, non-reproducing women assist in the reproductive efforts of younger women. Our model helps to explain why such effects, observed in many societies, may be insufficient factors in elucidating the origin of menopause.

Zhang 2013

Menghan Zhang & Tao Gong, *Principles of parametric estimation in modeling language competition*. PNAS **110** (2013), 9698–9703.
It is generally difficult to define reasonable parameters and interpret their values in mathematical models of social phenomena. Rather than directly fitting abstract parameters against empirical data, we should define some concrete parameters to denote the sociocultural factors relevant for particular phenomena, and compute the values of these parameters based upon the corresponding empirical data. Taking the example of modeling studies of language competition, we propose a language diffusion principle and two language inheritance principles to compute two critical parameters, namely the impacts and inheritance rates of competing languages, in our language competition model derived from the Lotka–Volterra

competition model in evolutionary biology. These principles assign explicit sociolinguistic meanings to those parameters and calculate their values from the relevant data of population censuses and language surveys. Using four examples of language competition, we illustrate that our language competition model with thus-estimated parameter values can reliably replicate and predict the dynamics of language competition, and it is especially useful in cases lacking direct competition data.
prestige | Fourier's law of heat conduction | Hardy-Weinberg genetic inheritance principle | logistic curve | lexical diffusion dynamics

Religion

Miner 1956

Horace Miner, *Body Ritual among the Nacirema*. American Anthropologist **58** (1956), 503–507.

Our review of the ritual life of the Nacirema has certainly shown them to be a magic-ridden people. It is hard to understand how they have managed to exist so long under the burdens which they have imposed upon themselves. But even such exotic customs as these take on real meaning when they are viewed with the insight provided by Malinowski when he wrote (1948:70):

Looking from far and above, from our high places of safety in the developed civilization, it is easy to see all the crudity and irrelevance of magic. But without its power and guidance early man could not have mastered his practical difficulties as he has done, nor could man have advanced to the higher stages of civilization.