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# References

## Aktuell


Lovett 2014

Richard A. Lovett, *Rivers on the run*. nature **511** (2014), 521–523.

As the United States destroys its old dams, species are streaming back into the unfettered rivers.

Sovacool 2014

Benjamin K. Sovacool, *Energy studies need social science*. nature **511** (2014), 529–530.

A broader pool of expertise is needed to understand how human behaviour affects energy demand and the uptake of technologies, says Benjamin K. Sovacool.

Universities should develop courses focused on solving energy problems, granting agencies should prioritize and direct more money to behavioural work, and energy journals should broaden their scope. Already, there are promising examples of how inclusive and interdisciplinary energy research can encourage energy efficiency, and so address global environmental challenges such as climate change.

I examined the authorship and scope of 4,444 full-length articles over 15 years [...] I found four worrisome trends: an undervaluation of the influence of social dimensions on energy use; a bias towards science, engineering and economics over other social sciences and the humanities; a lack of interdisciplinary collaboration; and the under-representation of female authors or those from minority groups.

Whitehead 2014

Nadia Whitehead, *Proteins and a pregnancy woe*. science **345** (2014), 249.

Surprising insight into preeclampsia may offer early warning for at-risk women. The amount of clumped protein, as indicated by the intensity of the stain, predicted with an accuracy of 80 % or higher which women would require early delivery.


## Amerika


Piperno 1994

Dolores R. Piperno & Gayle J. Fritz, *On the Emergence of Agriculture in the New World, And Reply*. Current Anthropology **35** (1994), 637–643.

One wonders how she has the temerity to relegate every cultivated/domesticated plant of the tropical forest and adjacent forest margins (e.g., Sauer 1950, Hawkes 1989) to a food production system that began no earlier than mid-Hokic nt times. Many of these plants are notoriously difficult to document with the macrobotanical record because they do not carbonize well, the tropical climatic conditions quickly destroy plants deposited in habitation sites, and the sites themselves are difficult to locate and study with the traditional methods of field archaeology. Consequently, our knowledge of the history of a host of tropical crop plants is still frustratingly limited. However, placing the beginning of food production everywhere in

the Neotropics to after 5,500 B.P. seems injudicious and is in fact refuted by recent pollen and phytolith studies of perennially wet areas near former occupation sites.

All the other records of microfossil maize from lake sediments cited by Piperno postdate 5,500 B.P., even after dendrocalibration. [...] One final point requires clarification. It is true that a later date for domestication of maize, squashes, and beans brings the Mesoamerican transition to farming more in line with the Old World Levantine transition by beginning with less mobile populations. [...] Phytolith analysis has been ignored and criticized in spite of the brilliant methodological advances pioneered by Piperno and other colleagues. The integration of microfossil evidence into the archaeological record vastly improves our understanding of past vegetation, climate, and subsistence. Chronometry, however, is a serious weakness in some pollen and phytolith studies. Until dating procedures are tightened up-with AMS dating of lake cores and far more dates per core or sediment column being an immediate option-I cannot accept the claims for 7th- or early 6th-millennium B.P. microfossil maize.

## Energie

### Turconi 2014

R. Turconi, C. O'Dwyer, D. Flynn & T. Astrup, *Emissions from cycling of thermal power plants in electricity systems with high penetration of wind power*, *Life cycle assessment for Ireland*. Applied Energy **131** (2014), 1–8.

The increase of renewable sources in the power sector is an important step towards more sustainable electricity production. However, introducing high shares of variable renewables, such as wind and solar, cause dispatchable power plants to vary their output to fulfill the remaining electrical demand. The environmental impacts related to potential future energy systems in Ireland for 2025 with high shares of wind power were evaluated using life cycle assessment (LCA), focusing on cycling emissions (due to part-load operation and start-ups) from dispatchable generators. Part-load operations significantly affect the average power plant efficiency, with all units seeing an average yearly efficiency noticeably less than optimal. In particular, load following units, on average, saw an 11 % reduction. Given that production technologies are typically modeled assuming steady-state operation at full load, as part of LCA of electricity generation, the efficiency reduction would result in large underestimation of emissions, e.g. up to 65 % for an oil power plant. Overall, cycling emissions accounted for less than 7 % of lifecycle CO2, NOx and SO2 emissions in the five scenarios considered: while not overbalancing the benefits from increasing wind energy, cycling emissions are not negligible and should be systematically included (i.e. by using emission factors per unit of fuel input rather than per unit of power generated). As the ability to cycle is an additional service provided by a power plant, it is also recommended that only units with similar roles (load following, mid merit, or base load) should be compared. The results showed that cycling emissions increased with the installed wind capacity, but decreased with the addition of storage. The latter benefits can, however, only be obtained if base-load electricity production shifts to a cleaner source than coal. Finally, the present study indicates that, in terms of emission reductions, the priority for Ireland is to phase out coal-based power plants. While investing in new storage capacity reduces system operating costs at high wind penetrations and limits cycling, the emissions reductions are somewhat negated when coupled with base load coal.

Keywords: Life cycle assessment (LCA) | Energy modeling | Power plant cycling | Wind power | Renewable energy system | Emission factors

## Klima

Goldner 2014

A. Goldner, N. Herold & M. Huber, *Antarctic glaciation caused ocean circulation changes at the Eocene–Oligocene transition*. nature **511** (2014), 574–577.

Twomainhypotheses compete to explain global cooling and the abrupt growth of the Antarctic ice sheet across the Eocene–Oligocene transition about 34 million years ago: thermal isolation of Antarctica due to southern ocean gateway opening1–4, and declining atmospheric CO2 (refs 5, 6). Increases in ocean thermal stratification and circulation in proxies across the Eocene–Oligocene transition have been interpreted as a unique signature of gateway opening2,4, but at present both mechanisms remain possible.Here, using a coupled ocean–atmospheremodel, we show that the rise of Antarctic glaciation, rather than altered palaeogeography, is best able to explain the observed oceanographic changes. We find that growth of the Antarctic ice sheet caused enhanced northward transport of Antarctic intermediate water and invigorated the formation of Antarctic bottom water, fundamentally reorganizing ocean circulation. Conversely, gateway openings had much less impact on ocean thermal stratification and circulation. Our results support available evidence that CO2 drawdown—not gateway opening—caused Antarctic ice sheet growth, and further show that these feedbacks in turn altered ocean circulation. The precise timing and rate of glaciation, and thus its impacts on ocean circulation, reflect the balance between potentially positive feedbacks (increases in sea ice extent and enhanced primary productivity) and negative feedbacks (stronger southward heat transport and localized high-latitude warming). The Antarctic ice sheet had a complex, dynamic role in ocean circulation and heat fluxes during its initiation, and these processes are likely to operate in the future.

Lunt 2014

Dan Lunt, *Causes and effects of Antarctic ice*. nature **511** (2014), 536–537.

Some 34 million years ago, there was a rapid growth of ice on Antarctica. A modelling study indicates that the ultimate cause of this glaciation was a decrease in the concentration of atmospheric carbon dioxide.

Mokeddem 2014

Zohra Mokeddem, Jerry F. McManus & Delia W. Oppo, *Oceanographic dynamics and the end of the last interglacial in the subpolar North Atlantic*. PNAS **111** (2014), 11263–11268.

The last interglacial interval was terminated by the inception of a long, progressive glaciation that is attributed to astronomically influenced changes in the seasonal distribution of sunlight over the earth. However, the feedbacks, internal dynamics, and global teleconnections associated with declining northern summer insolation remain incompletely understood. Here we show that a crucial early step in glacial inception involves the weakening of the subpolar gyre (SPG) circulation of the North Atlantic Ocean. Detailed new records of microfossil foraminifera abundance and stable isotope ratios in deep sea sediments from Ocean Drilling Program site 984 south of Iceland reveal repeated, progressive cold water-mass

expansions into subpolar latitudes during the last peak interglacial interval, marine isotope substage 5e. These movements are expressed as a sequence of progressively extensive southward advances and subsequent retreats of a hydrographic boundary that may have been analogous to the modern Arctic front, and associated with rapid changes in the strength of the SPG. This persistent millennial-scale oceanographic oscillation accompanied a long-term cooling trend at a time of slowly declining northern summer insolation, providing an early link in the propagation of those insolation changes globally, and resulting in a rapid transition from extensive regional warmth to the dramatic instability of the subsequent ≈100 ka.

gyre systems | cold anomalies | frontal zone | ocean circulation

Pena 2014

Leopoldo D. Pena & Steven L. Goldstein, *Thermohaline circulation crisis and impacts during the mid-Pleistocene transition*. science **345** (2014), 318–322.

s345-0318-Supplement.pdf

The mid-Pleistocene transition (MPT) marked a fundamental change in glacial-interglacial periodicity, when it increased from ≈41-thousand-year to 100-thousand-year cycles and developed higher-amplitude climate variability without substantial changes in the Milankovitch forcing. Here, we document, by using Nd isotopes, a major disruption of the ocean thermohaline circulation (THC) system during the MPT between marine isotope stages (MISs) 25 and 21 at ≈950 to 860 thousand years ago, which effectively marks the first 100-thousand-year cycle, including an exceptional weakening through a critical interglacial (MIS 23) at ≈900 thousand years ago. Its recovery into the post-MPT 100-thousand-year world is characterized by continued weak glacial THC. The MPT ocean circulation crisis facilitated the coeval drawdown of atmospheric CO2 and high-latitude ice sheet growth, generating the conditions that stabilized 100-thousand-year cycles.

## Methoden

Byers 1994

Steven N. Byers, *On Stress and Stature in the "Osteological Paradox"*. Current Anthropology **35** (1994), 282–284.

Cohen 1994

Mark Nathan Cohen, James W. Wood & George R. Milner, *The Osteological Paradox Reconsidered, And Reply by Wood*. Current Anthropology **35** (1994), 629–637.

In fact, the sample of deaths in a population will always include both a selected and a random component. I suggest that under most circumstances the effects of selection will show up only as relatively minor statistical currents against the background of competing factors. I submit that, except under very extreme selective conditions, the actual death cohort for a population for any year will normally be a fairly good representation of the living population from which it came because of the random nature of the unselected deaths, with only a small bias for each of various slight selective advantages. In particular, most human deaths are probably only weakly related to the chronic illnesses that human skeletons display (or those pathologies make only a small percentage contribution to the probability of dying), and skeletons may therefore be a relatively random sample with regard to visible skeletal pathology in the population. (In fact, accidents and zoonotic diseases, significant causes of death among huntergatherers and early farmers which tend to

strike active adults, would arguably kill those who were otherwise the most fit and the least frail).

Goodman 1993

Alan H. Goodman, *On the Interpretation of Health from Skeletal Remains*. Current Anthropology **34** (1993), 281–288.

In conclusion, Wood et al. make a number of errors in their discussion of the significance of selective mortality and hidden heterogeneity in frailty. They grossly overstate the significance of hidden frailty because they fail to understand the diminished importance in the paleo-epidemiological agenda of individual-level analysis and of linking morbidity to mortality. Whereas they are correct in the notion that the dead are a select group, they fail to grasp the details of the process linking events in life to the chances of displaying a skeletal lesion at death. Their contribution to the literature is less than they assume. Their models ignore cultural processes, contradict known biological processes, leave out key information, and depend on false assumptions and ultimately prove mathematically possible but biologically highly improbable. Although it is useful to point out possible paradoxes and counterintuitive explanations, it is important to separate the probable from the suspect. Scientific snobbery is a poor substitute for a well-grounded critique.

Jackes 1993

Mary Jackes, *On Paradox and Osteology*. Current Anthropology **34** (1993), 434–439.

Konigsberg 1992

Lyle W. Konigsberg & Susan R. Frankenberg, *Estimation of Age Structure in Anthropological Demography*. American Journal of Physical Anthropology **89** (1992), 235–256.

The past decade has produced considerable debate over the feasibility of paleodemographic research, with much attention focusing on the question of reliability of age estimates. We show here that in cases where age is estimated rather than known, the traditional method of assigning individuals to age classes will produce biased estimates of age structure. We demonstrate the effect of this bias both mathematically and by computer simulation, and show how a more appropriate method from the fisheries literature (the "iterated age length key") can be used to estimate age structure. Because it is often the case that ages are also estimated for extant groups, we suggest that our results are relevant to the general field of anthropological demography, and that it is time for us to improve the statistical basis for age structure estimation. We further suggest that the oft noted paucity of older individuals in skeletal collections is a simple result of the use of inappropriate methods of age estimation, and that this problem can be rectified in the future by using maximum likelihood estimates of life table or hazard functions incorporating the uncertainty of age estimates.

Keywords: Paleodemography, Iterated age-length key, Computer simulation

Meindl 1985

Richard S. Meindl, C. Owen Lovejoy, Robert P. Mensforth & Lydia Don Carlos, *Accuracy and Direction of Error in the Sexing of the Skeleton, Implications for Paleodemography*. American Journal of Physical Anthropology **68** (1985), 79–85.

Determinations of sex by subjective assessment of the skulls from a skeletal series of known sex were compared to fully independent assessments based on pelves of the same specimens. Within-sex correlations of cranial and pelvic morphologies measured on an android-gynecoid scale were smaller than expected. Subjective assessment by means of the skull compared favorably to that of the linear discriminant functions of Giles and Elliot; however, the direction of error was similar for both procedures. Of course, estimations based on the pelves were generally superior to both in terms of frequency and overall bias of error. The bias of sex estimation for paleodemographic purposes is contingent upon completeness of skeletal remains.

Keywords: Forensic, Sex-determination, Sexing, Demography, Paleodemography

## Paine 2000

Richard R. Paine, *If a Population Crashes in Prehistory, and There Is No Paleodemographer There to Hear It, Does It Make a Sound?* American Journal of Physical Anthropology **112** (2000), 181–190.

Catastrophic episodes (e.g., epidemics, natural disasters) strike with only limited regard for age. A large percentage of catastrophic mortality in a population can lead to a death distribution that resembles the living distribution, which includes greater numbers of older children, adolescents, and young adults than typical mortality profiles. This paper examines both the population implications of a large catastrophic mortality event, based on the Black Death as it ravaged medieval Europe, and its long-term effects on age-at-death distributions. An increased prevalence of epidemic disease is a common feature of reconstructions of the shift to agriculture and the rise of urban centers. The model begins with a hypothetical Medieval living population. This population is stable and characterized by slow growth. It has fertility and mortality rates consistent with a natural-fertility, agrarian population. The effects of catastrophic episodes are simulated by projecting the model population and subjecting it to one large (30 % mortality) catastrophic episode as part of a 100-year population projection. A pair of Leslie matrices forms the basis of the projection. The catastrophic episode has important, long-term effects on both the living population and the cumulative distribution of death. The living population fails to recover from plague losses; at the end of the projection, population is still less than 75 % its pre-plague level. The age-at-death distribution takes on the juvenile-young adult-heavy profile characteristic of many archaeological samples. The cumulative death profile based on the projection differs from that produced by the stable model significantly (P , 0.05) for 25–50 years after the plague episode, depending on sample size.

Keywords: age-at-death distribution; population models; Leslie matrix

## Wood 1992

James W. Wood, George R. Milner, Henry C. Harpending & Kenneth M. Weiss, *The Osteological Paradox, Problems of Inferring Prehistoric Health from Skeletal Samples.* Current Anthropology **33** (1992), 343–370.

Comments by: Mark N. Cohen, Leslie E. Eisenberg, Dale L. Hutchinson, Rimantas Jankauskas, Gintautas Cesnys, Gintautas Èesnys, M. Anne Katzenberg, John R. Lukacs, Janet W. McGrath, Eric Abella Roth, Douglas H. Ubelaker and Richard G. Wilkinson

Paleodemography and paleopathology presuppose that direct relationships exist between statistics calculated from archaeological skeletal series (e.g., skeletal lesion frequencies and mean age at death) and the health status of the past populations

that gave rise to the series. However, three fundamental conceptual problems confound the interpretation of such statistics: demographic non-stationarity, selective mortality, and unmeasured, individual-level heterogeneity in the risks of disease and death. Using simple models of the relationship between individual "frailty" and the hazard of death at each age, this paper explores the implications of these problems for archaeological interpretation. One conclusion is that the skeletal evidence pertaining to the transition from hunting-and-gathering to settled agriculture is equally consistent with an improvement in health and a deterioration in health resulting from the transition.

## Physik

Tipler 2014

Frank J. Tipler, *Quantum nonlocality does not exist*. PNAS **111** (2014), 11281–11286.

Quantum nonlocality is shown to be an artifact of the Copenhagen interpretation, in which each observed quantity has exactly one value at any instant. In reality, all physical systems obey quantum mechanics, which obeys no such rule. Locality is restored if observed and observer are both assumed to obey quantum mechanics, as in the many-worlds interpretation (MWI). Using the MWI, I show that the quantum side of Bell's inequality, generally believed nonlocal, is really due to a series of three measurements (not two as in the standard, oversimplified analysis), all three of which have only local effects. Thus, experiments confirming "nonlocality" are actually confirming the MWI. The mistaken interpretation of nonlocality experiments depends crucially on a question-begging version of the Born interpretation, which makes sense only in "collapse" versions of quantum theory, about the meaning of the modulus of the wave function, so I use the interpretation based on the MWI, namely that the wave function is a world density amplitude, not a probability amplitude. This view allows the Born interpretation to be derived directly from the Schrödinger equation, by applying the Schrödinger equation to both the observed and the observer.

Bell's theorem | Einstein–Podolsky–Rosen experiment | multiverse | indistinguishability

## Story or Book

Batstone 2014

Aislinn Batstone, *One Out, One In, The greatest gift*. nature **511** (2014), 626.

A child! What would she do with a child? She only came across them every now and then, quiet little things surrounded by adults. Centenarians had taken over the playgrounds, whooping and swinging and sliding with their titanium hips and their fresh-grown organs.

Crawford 2014

Jeremy Chase Crawford, *Secrets in the Bones*. nature **511** (2014), 259.

Neanderthal Man. In Search of Lost Genomes. Svante Pääbo. Basic Books, 2014. 285 pp.

For perhaps his most celebrated finding—that there exists a "clearly discernible genetic contribution from Neanderthals to people outside Africa"—Pääbo would

settle for no fewer than three independent lines of statistical evidence before publishing. To non-scientists, this self-professed meticulousness may at times seem to border on neurotic. But in a time of frequent headlines about scientific fraud, his portrayal of the internal and external struggles that accompany a career in academia refreshingly illustrates the high standards required for a rigorous research program.