

## References

### Aktuell

CALLAWAY 2015

Ewen Callaway, *Language origin debate rekindled*. [nature](#) **518** (2015), 284–285.

Eurasian steppe gains ground as Indo-European birthplace.

Atkinson says, however, that the analysis assumes that ancient languages such as Latin and Old Irish are direct ancestors of modern languages, instead of side-branches of a common ancestor. This makes it appear that these languages evolved faster than they did, he says, and would argue incorrectly for a more-recent common tongue.

Heggarty points out that Reich’s ancient DNA study is not the final word on the steppe hypothesis either. He suspects that the Yamnaya spoke a language that later developed into Slavic, Germanic and other northern European tongues, but he doubts that the group imported the predecessor of all Indo-European languages: “For me, these data look like the steppe population was speaking a branch of Indo-European.”

HUGHES 2015

Llewelyn Hughes & Austin Long, *Is There an Oil Weapon? Security Implications of Changes in the Structure of the International Oil Market*. [International Security](#) **39** (2015), iii, 152–189.

What does a supply-chain analysis of the potential for coercion in the international oil market reveal? In this article, we have argued that the fragmentation of the international oil market requires that the potential for coercion be understood at each stage of the supply chain. We adopted a narrow definition of the potential for coercion, focusing on whether an actor, or group of actors, can impose significant costs on others through a sustained reduction in the supply of oil. Theoretically, this approach is consistent with the approaches of other studies of the relationship between oil and coercion, even as policymakers and analysts have expanded the definition of energy security over time to include concerns such as the economic impact of price shocks. Empirically, it is consistent with studies suggesting that price shocks alone have largely failed to coerce other states.

We have offered a strategy for conceptualizing and measuring the potential for coercion across market segments and have provided evidence that the degree of market concentration varies by market segment and across time. In particular, we found that the United States dominates a key segment of the oil market: maritime transport. In this sense, the United States remains a dominant presence in the international oil market, although this dominance has shifted from production—where it was prior to World War II—to the midstream-maritime environment. As a result, the United States has substantial coercive capability against both major oil importers and major oil exporters that rely on maritime transport.

LETNIC 2015

Mike Letnic, Jonathan K. Webb, Tim S. Jessop & Tim Dempster, *Restricting access to invasion hubs enables sustained control of an*

*invasive vertebrate*. [Journal of Applied Ecology \(2015\), preprint, 1–7. DOI:10.1111/1365-2664.12390.](#)

1. Biological invasions often occur through expansion of satellite populations that become established at ‘invasion hubs’. Invasion hubs can result from random dispersal events, but frequently arise when invading individuals actively choose habitats using cues that signify high-quality environments where the fitness consequences are positive. Theoretical studies suggest that targeted control at invasion hubs can effectively suppress the populations and impacts of invaders.

2. In arid Australia, small dams that provide water for livestock function as invasion hubs by providing an invasive vertebrate, the cane toad *Rhinella marina*, with refuge from extreme aridity during the annual dry season. Toads are attracted to dams and use them as stepping stone habitats from which they disperse during rainy periods. Here, we ask whether sustained control of this invasive vertebrate can be achieved by converting invasion hubs into ecological traps. We did this by manipulating invasion hub habitats to induce a mismatch between toads’ habitat preference and the fitness consequences of their habitat choice to cause high mortality.

3. We constructed fences to exclude toads from dams and maintained these fences for 1 year. This period encompassed periods of dry and wet seasonal climatic conditions. Our manipulation did not alter the attractive cues for invading toads which died en masse while attempting to settle at fenced dams that prevented toads from reaching water. Toad populations at the fenced dams were suppressed by 1–2 orders of magnitude compared to unfenced controls and procedural controls. Toad populations remained suppressed for a year after exclusion.

4. By excluding toads from dams, we converted invasion hubs into ecological traps and effectively thwarted the reinvasion of cane toads. Our research suggests that water exclusion devices could be used to prevent toad invasion or to control cane toad populations in arid landscapes colonized by toads.

5. Synthesis and applications. Our study demonstrates that sustained control of invader populations can be achieved by restricting their access to invasion hubs. Control of invasive species via elimination of invasion hubs could be conducted reactively, to control established populations of invaders, or conducted strategically, by rendering invasion hubs unsuitable for colonization ahead of the invasion front to prevent further population spread.

**Keywords:** arid, artificial water, *Bufo marinus*, ecological trap, invasive species, metapopulation, *Rhinella marina*

## PÖPPE 2015

Christoph Pöppe, *Rechtswidrige Primzahlen und das Urheberrecht an Pi*. [Spektrum der Wissenschaft 2015, iii, 66–68.](#)

Kann eine Zahl Eigentum einer Person oder Firma sein? Im Prinzip ja – aber wenn sie nicht besonders groß ist, wird es schwierig.

## SCHLICHTING 2015

H. Joachim Schlichting, *Der grüne Blitz*. [Spektrum der Wissenschaft 2015, iii, 56–57.](#)

Für den Bruchteil einer Sekunde sendet das letzte Segment der untergehenden Sonne grünes Licht aus – wenn die atmosphärischen Bedingungen stimmen!

## UGLIETTI 2015

Chiara Uglietti, Paolo Gabrielli, Colin A. Cooke, Paul Vallelonga & Lonnie G. Thompson, *Widespread pollution of the South American*

*atmosphere predates the industrial revolution by 240 y.* [PNAS 112 \(2015\), 2349–2354.](#)

[pnas112-02349-Supplement1.xlsx](#), [pnas112-02349-Supplement2.xlsx](#), [pnas112-02349-Supplement3.xlsx](#)

In the Southern Hemisphere, evidence for preindustrial atmospheric pollution is restricted to a few geological archives of low temporal resolution that record trace element deposition originating from past mining and metallurgical operations in South America. Therefore, the timing and the spatial impact of these activities on the past atmosphere remain poorly constrained. Here we present an annually resolved ice core record (A.D. 793–1989) from the high-altitude drilling site of Quelccaya (Peru) that archives preindustrial and industrial variations in trace elements. During the precolonial period (i.e., pre-A.D. 1532), the deposition of trace elements was mainly dominated by the fallout of aeolian dust and of ash from occasional volcanic eruptions, indicating that metallurgic production during the Inca Empire (A.D. 1438–1532) had a negligible impact on the South American atmosphere. In contrast, a widespread anthropogenic signal is evident after around A.D. 1540, which corresponds with the beginning of colonial mining and metallurgy in Peru and Bolivia,  $\approx 240$  y before the Industrial Revolution. This shift was due to a major technological transition for silver extraction in South America (A.D. 1572), from lead-based smelting to mercury amalgamation, which precipitated a massive increase in mining activities. However, deposition of toxic trace metals during the Colonial era was still several factors lower than 20th century pollution that was unprecedented over the entirety of human history.

**Keywords:** paleoenvironment | ice cores | metallurgy | Colonial period | Anthropocene

WANG 2015

Tao Wang, Xiaodong Song & Han H. Xia, *Equatorial anisotropy in the inner part of Earth’s inner core from autocorrelation of earthquake coda.* [Nature Geoscience \(2015\), preprint, 1–4.](#)  
[DOI:10.1038/NGEO2354.](#)

[NatGeo2015-Wang-Supplement.pdf](#)

The Earth’s solid inner core exhibits strong anisotropy<sup>1–5</sup>, with wave velocity dependent on the direction of propagation due to the preferential alignment of iron crystals<sup>6</sup>. Variations in the anisotropic structure, laterally and with depth<sup>7–11</sup>, provide markers for measuring inner-core rotation<sup>12</sup> and offer clues into the formation and dynamics of the inner core<sup>13,14</sup>. Previous anisotropy models of the inner core have assumed a cylindrical anisotropy in which the symmetry axis is parallel to the Earth’s spin axis. An inner part of the inner core with a distinct form of anisotropy has been suggested<sup>15</sup>, but there is considerable uncertainty regarding its existence and characteristics<sup>16–19</sup>. Here we analyse the autocorrelation of earthquake coda measured by global broadband seismic arrays between 1992 and 2012, and find that the differential travel times of two types of core-penetrating waves vary at low latitudes by up to 10 s. Our findings are consistent with seismic anisotropy in the innermost inner core that has a fast axis near the equatorial plane through Central America and Southeast Asia, in contrast to the north–south alignment of anisotropy in the outer inner core. The different orientations and forms of anisotropy may represent a shift in the evolution of the inner core.

## Amerika

BOULANGER 2015

Matthew T. Boulanger & Metin I. Eren, *On the inferred age and origin of lithic bi-points from the eastern seaboard and their relevance to the pleistocene peopling of North America*. [American Antiquity](#) **80** (2015), 134–145.

[AmAnt80-134-Supplement1.pdf](#), [AmAnt80-134-Supplement2.xls](#)

Recently, advocates of an “older -than- Clovis” occupation of eastern North America have suggested that bi-pointed leafshaped lanceolate stone bifaces provide definitive evidence of human culture on the eastern seaboard prior to the Late Glacial Maximum. This argument hinges on two suppositions: first, that points of this form are exceedingly rare in the East and second, that all known occurrences of these point forms are from landforms or depositional environments dating to some time before the late Pleistocene. Neither of these suppositions is supported by the archaeological record. Bi-pointed leaf shaped blades have been recovered from throughout the Middle Atlantic and Northeast, where they have been repeatedly dated, either radiometrically or by association with diagnostic artifacts, to between the Late Archaic and the Early Woodland. Statistical analysis of supposed “older-than-Clovis” leaf-shaped blades demonstrates that there are no significant differences in morphology between them and unequivocally Middle Holocene leaf-shaped blades. Until such time as evidence demonstrates otherwise, there is no reason to accept that these leaf-shaped bifaces are diagnostic of a Pleistocene, much less pre-Late Glacial Maximum, occupation in eastern North America.

VANCE 2015

Erik Vance, *Wer regierte Teotihuacán?* [Spektrum der Wissenschaft](#) **2015**, iii, 70–76.

Die gewaltigen Tempelruinen von Teotihuacán ließen schon die Azteken staunen. Wohnten dort einst die Götter? Heute streiten Forscher darüber, ob dieses Reich von einem Monarchen oder einer gut organisierten Oligarchie regiert wurde.

## Anthropologie

DODDS 2015

Peter Sheridan Dodds et al., *Human language reveals a universal positivity bias*. [PNAS](#) **112** (2015), 2389–2394.

[pnas112-02389-Supplement.xlsx](#)

Peter Sheridan Dodds, Eric M. Clark, Suma Desu, Morgan R. Frank, Andrew J. Reagan, Jake Ryland Williams, Lewis Mitchell, Kameron Decker Harris, Isabel M. Kloumann, James P. Bagrow, Karine Megerdooomian, Matthew T. McMahon, Brian F. Tivnan & Christopher M. Danforth

Using human evaluation of 100,000 words spread across 24 corpora in 10 languages diverse in origin and culture, we present evidence of a deep imprint of human sociality in language, observing that (i) the words of natural human language possess a universal positivity bias, (ii) the estimated emotional content of words is consistent between languages under translation, and (iii) this positivity bias is strongly independent of frequency of word use. Alongside these general regularities, we describe interlanguage variations in the emotional spectrum of languages that allow us to rank corpora. We also show how our word evaluations can be used to construct physical-like instruments for both real-time and offline measurement of the emotional content of large-scale texts.

Keywords: language | social psychology | happiness | positivity

GU 2015

Xiaosi Gu et al., *Belief about nicotine selectively modulates value and reward prediction error signals in smokers*. [PNAS 112 \(2015\), 2539–2544](#).

Xiaosi Gu, Terry Lohrenz, Ramiro Salas, Philip R. Baldwin, Alireza Soltani, Ulrich Kirk, Paul M. Cinciripini & P. Read Montague

Little is known about how prior beliefs impact biophysically described processes in the presence of neuroactive drugs, which presents a profound challenge to the understanding of the mechanisms and treatments of addiction. We engineered smokers' prior beliefs about the presence of nicotine in a cigarette smoked before a functional magnetic resonance imaging session where subjects carried out a sequential choice task. Using a model-based approach, we show that smokers' beliefs about nicotine specifically modulated learning signals (value and reward prediction error) defined by a computational model of mesolimbic dopamine systems. Belief of "no nicotine in cigarette" (compared with "nicotine in cigarette") strongly diminished neural responses in the striatum to value and reward prediction errors and reduced the impact of both on smokers' choices. These effects of belief could not be explained by global changes in visual attention and were specific to value and reward prediction errors. Thus, by modulating the expression of computationally explicit signals important for valuation and choice, beliefs can override the physical presence of a potent neuroactive compound like nicotine. These selective effects of belief demonstrate that belief can modulate model-based parameters important for learning. The implications of these findings may be far ranging because belief-dependent effects on learning signals could impact a host of other behaviors in addiction as well as in other mental health problems.

Keywords: nicotine addiction | belief | reinforcement learning | dopamine | fMRI

TATTERSALL 2015

Ian Tattersall, *Gewinner der Evolutionslotterie*. [Spektrum der Wissenschaft 2015, iii, 58–64](#).

Die Entwicklung zum modernen Menschen verlief nicht gleichmäßig und stetig. Entscheidende Sprünge fanden in kleinen, isolierten Populationen statt. Der Auftritt des Homo sapiens hing dabei von etlichen Zufällen ab.

In kleinen Einheiten setzen sich genetische Mutationen unter einem entsprechenden Selektionsdruck manchmal rasch durch – jedenfalls viel leichter als in einer großen Population. Gleiches gilt für kulturelle Fortschritte.

VOLKOW 2015

Nora D. Volkow & Ruben Baler, *Beliefs modulate the effects of drugs on the human brain*. [PNAS 112 \(2015\), 2301–2302](#).

Our brains are optimized to predict future stimuli and mold our responses. Thus, in this respect, it is not surprising that learned responses play such an important role in drug-seeking behaviors. In the drug abuse field, such learning processes have been extensively investigated as they relate to conditioning to stimuli that predict a drug reward, in which dopamine is known to play a crucial role. The current findings extend the relevance of dopamine-guided learning processes to the experience of how drug intoxication influences the way the human brain works and orchestrates our behaviors. Gu et al. show that such learned responses can be manipulated, identifying a potential new target for developing therapeutic interventions for addiction.

Beliefs are powerful modulators of how humans experience the world and the differential value they ascribe to objectively identical objects or stimuli (12). Gu et al. open up an exciting window into the largely hidden mechanisms by which beliefs and dopaminedriven value-based learning influence each other.

Although the authors report seeing differences when placebo was used and the participants were told they would or wouldn't receive nicotine (belief while under the effects of placebo), these results were not compared with the magnitude of the effect of belief while under the effects of nicotine, which would have allowed them to determine whether the differences on the effects of expectation on brain response and behavioral choices differed between the nicotine and the placebo conditions. Further testing of this

## Bibel

### FAUST 2000

Avraham Faust, *A Note on Hezekiah's Tunnel and the Siloam Inscription*. [Journal for the Study of the Old Testament 90 \(2000\), 3–11.](#)

This paper is an attempt to solve the problems concerning Hezekiah's tunnel by suggesting that the tunnel was excavated mainly from the spring down. The workers worked down-stream until they reached a point where they realized that they could save precious time by working from both ends, and only then a second team started work. According to the presented scenario the meeting between the two groups of workers took place at the spot where the Siloam inscription, which describes this meeting, was inscribed. This scenario explains, among other things, the location and content of the inscription, the height of the ceiling at the lower part of the tunnel, the existence of two other rock tablets (without inscriptions) and their location. The markings on the tunnel wall, which according to the prevalent opinion indicate the location of the meeting place, should be seen as a result of a final 'finish' conducted only after the course was clear.

### KATZ 2014

Hayah Katz & Avraham Faust, *The Chronology of the Iron Age IIA in Judah in the Light of Tel 'Eton Tomb C3 and Other Assemblages*. [Bulletin of the American Schools of Oriental Research 371 \(2014\), 103–127.](#)

The chronology of Iron Age Israel in general, and that of the Iron Age IIA in Judah in particular, has received a great deal of scholarly attention over the last two decades, especially because of its implications for the debate on the historicity of the United Monarchy. The number of large and well-dated Iron IIA assemblages in Judah, however, is quite small, and in most cases the relevant assemblages are composed of sherds only. The authors of this article are currently preparing for publication a large assemblage of about 200 complete and intact vessels that were unearthed in 1968 by Trude Dothan in an Iron Age IIA tomb below Tel 'Eton. This, along with additional recently published "new" assemblages, warrants a reexamination of the chronology of Judah in this important era. The present article presents the ceramic finds from the tomb at Tel 'Eton and then analyzes the recently published assemblages from other sites in Judah. Those assemblages are then organized in relative sequence, from transitional Iron I–IIA assemblages, through early and late Iron IIA assemblages, and up to terminal Iron IIA (or even transitional Iron IIA–IIB) assemblages. Finally, we attempt to offer (approximate) absolute dates for those ceramic horizons.

## Biologie

### BONACHELA 2015

Juan A. Bonachela et al., *Termite mounds can increase the robustness of dryland ecosystems to climatic change*. [science](#) **347** (2015), 651–655.

s347-0651-Supplement1.mov, s347-0651-Supplement2.mov, s347-0651-Supplement3.pdf

Juan A. Bonachela, Robert M. Pringle, Efrat Sheffer, Tyler C. Coverdale, Jennifer A. Guyton, Kelly K. Caylor, Simon A. Levin & Corina E. Tarnita

Self-organized spatial vegetation patterning is widespread and has been described using models of scale-dependent feedback between plants and water on homogeneous substrates. As rainfall decreases, these models yield a characteristic sequence of patterns with increasingly sparse vegetation, followed by sudden collapse to desert. Thus, the final, spot-like pattern may provide early warning for such catastrophic shifts. In many arid ecosystems, however, termite nests impart substrate heterogeneity by altering soil properties, thereby enhancing plant growth. We show that termite-induced heterogeneity interacts with scale-dependent feedbacks to produce vegetation patterns at different spatial grains. Although the coarse-grained patterning resembles that created by scale-dependent feedback alone, it does not indicate imminent desertification. Rather, mound-field landscapes are more robust to aridity, suggesting that termites may help stabilize ecosystems under global change.

### HAURI 2013

Dimitri Hauri et al., *Domestic Radon Exposure and Risk of Childhood Cancer, A Prospective Census-Based Cohort Study*. [Environmental Health Perspectives](#) **121** (2013), 1239–1244.

EnvHlthPrsp121-1239-Supplement.pdf

Dimitri Hauri, Ben Spycher, Anke Huss, Frank Zimmermann, Michael Grotzer, Nicolas von der Weid, Damien Weber, Adrian Spoerri, Claudia E. Kuehni & Martin Rösli, for the Swiss National Cohort and the Swiss Paediatric Oncology Group (SPOG)

**BACKGROUND:** In contrast with established evidence linking high doses of ionizing radiation with childhood cancer, research on low-dose ionizing radiation and childhood cancer has produced inconsistent results.

**OBJECTIVE:** We investigated the association between domestic radon exposure and childhood cancers, particularly leukemia and central nervous system (CNS) tumors.

**METHODS:** We conducted a nationwide census-based cohort study including all children < 16 years of age living in Switzerland on 5 December 2000, the date of the 2000 census. Follow-up lasted until the date of diagnosis, death, emigration, a child's 16th birthday, or 31 December 2008. Domestic radon levels were estimated for each individual home address using a model developed and validated based on approximately 45,000 measurements taken throughout Switzerland. Data were analyzed with Cox proportional hazard models adjusted for child age, child sex, birth order, parents' socioeconomic status, environmental gamma radiation, and period effects.

**RESULTS:** In total, 997 childhood cancer cases were included in the study. Compared with children exposed to a radon concentration below the median (< 77.7 Bq/m<sup>3</sup>), adjusted hazard ratios for children with exposure ≥ the 90th percentile (≥ 139.9 Bq/m<sup>3</sup>) were 0.93 (95 % CI: 0.74, 1.16) for all cancers, 0.95 (95 % CI: 0.63, 1.43) for all leukemias, 0.90 (95 % CI: 0.56, 1.43) for acute lymphoblastic leukemia, and 1.05 (95 % CI: 0.68, 1.61) for CNS tumors.

**CONCLUSIONS:** We did not find evidence that domestic radon exposure is associated with childhood cancer, despite relatively high radon levels in Switzerland.

#### PENNISI 2015

Elizabeth Pennisi, *Africa's soil engineers: Termites*. [science](#) **347** (2015), 596–597.

Kenyan plots show that termite mounds promote ecological health and may slow desertification.

The work suggests that the savanna may lose resilience when it is transformed into farms. “When agriculture takes over, we lose the termites and their mounds,” Palmer explains. Cultivated lands are “likely to be much more vulnerable to climatic variability and much more likely to tip over into more permanently degraded landscapes.”

#### SPYCHER 2015

Ben D. Spycher et al., *Background Ionizing Radiation and the Risk of Childhood Cancer, A Census-Based Nationwide Cohort Study*. [Environmental Health Perspectives](#) (2015), preprint, 1–29. DOI:10.1289/ehp.1408548.

EnvHlthPrsp2015-Spycher-Supplement.pdf

Ben D. Spycher, Judith E. Lupatsch, Marcel Zwahlen, Martin Rössli, Felix Niggli, Michael A. Grotzer, Johannes Rischewski, Matthias Egger, & Claudia E. Kuehni for the Swiss Pediatric Oncology Group and the Swiss National Cohort Study Group

**Background:** Exposure to medium or high doses of ionizing radiation is a known risk factor for cancer in children. The extent to which low dose radiation from natural sources contributes to the risk of childhood cancer remains unclear.

**Objectives:** In a nationwide census-based cohort study, we investigated whether the incidence of childhood cancer was associated with background radiation from terrestrial gamma and cosmic rays.

**Methods:** Children aged <16 years in the Swiss National Censuses in 1990 and 2000 were included. The follow-up period lasted until 2008 and incident cancer cases were identified from the Swiss Childhood Cancer Registry. A radiation model was used to predict dose rates from terrestrial and cosmic radiation at locations of residence. Cox regression models were used to assess associations between cancer risk and dose rates and cumulative dose since birth.

**Results:** Among 2,093,660 children included at census, 1,782 incident cases of cancer were identified including 530 with leukemia, 328 with lymphoma, and 423 with a tumor of the central nervous system (CNS). Hazard ratios for each mSv increase in cumulative dose of external radiation were 1.03 (95% CI: 1.01, 1.05) for any cancer, 1.04 (1.00, 1.08) for leukemia, 1.01 (0.96, 1.05) for lymphoma, and 1.04 (1.00, 1.08) for CNS tumors. Adjustment for a range of potential confounders had little effect on the results.

**Conclusions:** Our study suggests that background radiation may contribute to the risk of cancer in children including leukemia and CNS tumors.

## Datierung

#### JACOBS 2015

Zenobia Jacobs, Bo Li, Nathan Jankowski & Marie Soressi, *Testing of a single grain OSL chronology across the Middle to Upper Palaeolithic*



*transition at Les Cottés (France)*. [Journal of Archaeological Science](#) **54** (2015), 110–122.

JAS054-0110-Supplement.pdf

The timing of the Middle Palaeolithic to Upper Palaeolithic transition in France is important to help understand when, where and how Neanderthals have been replaced by *Homo sapiens*. Radiocarbon dating has been the dating workhorse in constructing the chronological framework pertinent to these questions. In this study, we are testing whether single grain OSL dating has the accuracy and precision to be useful as a complementary dating method. The site of Les Cottés provides an ideal testing ground because of its stratigraphic integrity and reliable radiocarbon chronology. We applied single grain OSL dating of quartz to 19 samples and multi-aliquot MET-pIRIR dating of potassium-rich feldspar grains to 5 samples to explicitly test assumptions of pre-depositional resetting of the OSL signal and postdepositional exposure to variable beta dose rates. The good agreement between the single grain OSL and the multi-aliquot MET pIRIR ages suggest that the optical signals of both quartz and feldspar grains were reset prior to deposition and that much of the extra scatter observed in the equivalent dose distribution of quartz grains are likely due to the small-scale differences in beta dose delivered to individual grains. Both the quartz OSL and feldspar MET-pIRIR ages show great consistency with the  $^{14}\text{C}$  ages on bone collected from the same units. This gives confidence in the measurement and analytical approaches used to derive both the equivalent dose and dose rate, the numerator and denominator, respectively, of the luminescence age equation. These results suggest that a systematic and detailed single grain OSL dating study can have the accuracy and precision that is necessary to play a powerful role in the dating of the Middle and Upper Palaeolithic transition and other questions of importance in this time range and geographical area.

Keywords: OSL dating | Radiocarbon dating | Upper Palaeolithic | Aurignacian | Châtelperronian | Middle Palaeolithic | Mousterian | France

## Klima

COHEN 2015

Tim J. Cohen et al., *Hydrological transformation coincided with megafaunal extinction in central Australia*. [Geology](#) **43** (2015), 195–198.

Tim J. Cohen, John D. Jansen, Luke A. Gliganic, Joshua R. Larsen, Gerald C. Nanson, Jan-Hendrik May, Brian G. Jones & David M. Price

Central to the debate over the extinction of many of Australia’s last surviving megafauna is the question: Was climate changing significantly when humans arrived and megafauna went extinct? Here we present a new perspective on variations in climate and water resources over the last glacial cycle in arid Australia based on the study of the continent’s largest lake basin and its tributaries. By dating paleoshorelines and river deposits in the Lake Eyre basin, we show that major hydrological change caused previously overflowing megalakes to enter a final and catastrophic drying phase at  $48 \pm 2$  ka just as the giant bird, *Genyornis newtoni*, went extinct (50–45 ka). The disappearance of *Genyornis* and other megafauna has been previously attributed to “ecosystem collapse” coincident with the spread of fire-wielding humans. Our findings suggest a climate-driven hydrological transformation in the critical window of human arrival and megafaunal extinction, and the results call for a re-evaluation of a human-mediated cause for such extinctions in arid Australia.

## LANGE 2015

Gert Lange, *Permafrost – die große Unbekannte im Klimawandel*. [Spektrum der Wissenschaft 2015](#), iii, 79–89.

Die Erderwärmung lässt dauerhaft gefrorene Böden in der Arktis tauen. Weil die dadurch freigesetzten Treibhausgase den Klimawandel beschleunigen, befürchteten manche Umweltschützer einen verhängnisvollen Teufelskreis. Genauere Untersuchungen in jüngster Zeit bestätigen zwar den Effekt, sprechen aber gegen eine drohende Katastrophe.

Der nächste Klimaumschwung setzte mit der holozänen Warmzeit vor etwa 10 000 Jahren ein. Der Permafrost taute nun großflächig. Senken und Seen entstanden, in denen sich Wasser- und Sumpfpflanzen ausbreiteten. Die Erle kehrte zurück, und Birken erreichten sogar ihre normale Wuchshöhe. Im holozänen Klimaoptimum vor 9000 bis 8000 Jahren rückte die Baumgrenze bis ins Lenadelta vor. Dann kühlte die Region wieder ab, und die Landschaft nahm in etwa die heutige Gestalt an. Das ehemalige Flussdelta ist im östlichen Bereich weit auf den lachen Schelf der Laptewsee hinausgewachsen und besteht ausschließlich aus holozänen, inzwischen ebenfalls im Permafrost erstarrten Ablagerungen.

## MEYER 2015

Hanno Meyer, Thomas Opel, Thomas Laepple, Alexander Yu Dereviagin, Kirstin Hoffmann & Martin Werner, *Long-term winter warming trend in the Siberian Arctic during the mid- to late Holocene*. [Nature Geoscience 8 \(2015\)](#), 122–125.

[NatGeo08-122-Supplement.pdf](#)

Relative to the past 2,000 years, the Arctic region has warmed significantly over the past few decades. However, the evolution of Arctic temperatures during the rest of the Holocene is less clear. Proxy reconstructions, suggest a long-term cooling trend throughout the mid- to late Holocene, whereas climate model simulations show only minor changes or even warming. Here we present a record of the oxygen isotope composition of permafrost ice wedges from the Lena River Delta in the Siberian Arctic. The isotope values, which reflect winter season temperatures, became progressively more enriched over the past 7,000 years, reaching unprecedented levels in the past five decades. This warming trend during the mid- to late Holocene is in opposition to the cooling seen in other proxy records. However, most of these existing proxy records are biased towards summer temperatures. We argue that the opposing trends are related to the seasonally different orbital forcing over this interval. Furthermore, our reconstructed trend as well as the recent maximum are consistent with the greenhouse gas forcing and climate model simulations, thus reconciling differing estimates of Arctic and northern high-latitude temperature evolution during the Holocene.

## Kultur

## ORTMAN 2015

Scott G. Ortman, Andrew H. F. Cabaniss, Jennie O. Sturm & Luís M. A. Bettencourt, *Settlement scaling and increasing returns in an ancient society*. [Science Advances 1 \(2015\)](#), e1400066. [DOI:10.1126/sciadv.1400066](#).

[SciAdv01-e1400066-Supplement.pdf](#)

A key property of modern cities is increasing returns to scale—the finding that many socioeconomic outputs increase more rapidly than their population size.

Recent theoretical work proposes that this phenomenon is the result of general network effects typical of human social networks embedded in space and, thus, is not necessarily limited to modern settlements. We examine the extent to which increasing returns are apparent in archaeological settlement data from the pre-Hispanic Basin of Mexico. We review previous work on the quantitative relationship between population size and average settled area in this society and then present a general analysis of their patterns of monument construction and house sizes. Estimated scaling parameter values and residual statistics support the hypothesis that increasing returns to scale characterized various forms of socioeconomic production available in the archaeological record and are found to be consistent with key expectations from settlement scaling theory. As a consequence, these results provide evidence that the essential processes that lead to increasing returns in contemporary cities may have characterized human settlements throughout history, and demonstrate that increasing returns do not require modern forms of political or economic organization.

## Story or Book

### BEST 2015

Joel Best, *Breaking bad science*. [science](#) **347** (2015), 619.

A physician's quest to expose the many misuses of science in the media.

I Think You'll Find It's a Bit More Complicated Than That. Ben Goldacre. Fourth Estate, 2014. 496 pp.

Goldacre's goal is to explain to the general public how science works by showing how bad science falls short, and he has a lot of fun doing so. He doesn't dumb down his arguments, but he favors snarky phrasings and delights in skewering politicians, activists, reporters, and purveyors of snake oil.

These are relatively sophisticated critiques for a newspaper column but—as Goldacre's "bad" examples demonstrate—they are needed. If you've read and liked his earlier books, you'll probably enjoy this one, but if you aren't familiar with his work, I'd recommend starting with his earlier bestsellers.

### KOHLER 2015

Timothy A. Kohler, *From Prehistoric Villages to Cities*. [American Antiquity](#) **80** (2015), 210–211.

*From Prehistoric Villages to Cities: Settlement Aggregation and Community Transformation*. Jennifer Birch, editor. 2013. Routledge, New York. xiv + 225 pp. \$140.00 (cloth), ISBN-978-0-415-83661-6.

This small, elegant, outlandishly expensive volume contains eight substantive chapters. Many of the cases of aggregation described here can be viewed as examples of what Kowalewski and others have elsewhere called "coalescent" sites or communities. Thus, Düring suggests that Çatalhöyük was essentially "the contraction of a regional settlement system into a single site" (p. 36) that retained traces of its original constituent villages (some 27–53 of them, perhaps) in its organization into neighborhoods. Rautman suggests that the late prehispanic Salinas towns (Gran Quivira, for example) grew rapidly around A.D. 1350 by incorporating people from the smaller, earlier plaza pueblos abandoned around the same time. (Do these then constitute the plaza groups of the later towns?) Overall, I highly recommend this volume. Where it occasionally wears thin is in its authors' by-now highly ritualized rejection of neoevolutionary categories à la Service and Fried. We have been rejecting these for 30 years, and it has been fun and possibly unifying, but now it is time to look around and see what new evolutionary theory can help us to understand the patterns ably detailed here.

One useful concept may be the notion that some of the most important and difficult “work” done in social formations as they increase in size is monitoring for and suppression of free riding. Düring, for one, recognizes this and shows how the architectural organization of Çatalhöyük neighborhoods promoted dense internal interaction (facilitating identification of free riders), while effectively limiting entrance by non-residents.