

## References

### Afrika

#### FULLER 2013

Dorian Q. Fuller & Elisabeth Hildebrand, *Domesticating Plants in Africa*. In: PETER MITCHELL & PAUL LANE (Hrsg.), *The Oxford Handbook of African Archaeology*. (Oxford 2013), 507–525.

Amid this diversity of plants, environments, and pathways to food production, Africa's five centres of origin offer intriguing grounds for comparison with more than a dozen centres on other continents (Purugganan and Fuller 2009). In some regions of the world, such as southwestern Asia, permanent settlement and plant cultivation were the first steps away from hunting and gathering, followed by use of pottery and domestic animals (Fuller 2007). Elsewhere—New Guinea, tropical America, and parts of South Asia—the first food production consisted of shifting cultivation and mobile settlement and was not accompanied by pottery.

The African archaeological record shows points of similarity and contrast to prehistoric sequences of economic change on other continents. The Sahara, the Sahel, and the Nile Valley, like eastern Asia but unlike many other regions of the world, witnessed the use of ceramic technology before food production of any kind (cf. Barich, di Lernia, Haaland and Haaland, Chs 31, 36, 37 this volume). Northern portions of Africa are similar to highland South America and parts of Asia, in that animal husbandry was the first form of food production (cf. di Lernia, Ch. 36 below). In many parts of Africa, the mobility required for herding may have prevented humans from exercising steady selection necessary to induce morphological change in plant populations, such that plant domestication occurred later in Africa than in most of the world.

#### GIFFORD-GONZALEZ 2013

Diane Gifford-Gonzalez & Olivier Hanotte, *Domesticating Animals in Africa*. In: PETER MITCHELL & PAUL LANE (Hrsg.), *The Oxford Handbook of African Archaeology*. (Oxford 2013), 491–505.

African domesticates, whether or not originally derived from foreign ancestors, have adapted to disease challenges throughout their range, reflecting local selective pressures under human management. Adaptations include dwarfing and associated increases in fecundity, tick resistance, and resistance or tolerance to several mortal infectious diseases. The genetics of these traits are yet to be fully explored, but reflect the animal side of the close co-evolution between humans and domestic animals in Africa. To fixate upon whether or not cattle were independently domesticated from wild African ancestors, or to dismiss chickens' successful spread through Africa because they were introduced from Asia, ignores the more interesting and relevant questions of how domestic species adapted to the demands of African environments and how African people integrated them into their lives, and how entire landscapes also required 'domestication' for these mutual relationships to be sustained.

Genetic analysis does not supplant archaeological evidences but rather produces new questions about human agency and cultural contact that can only be investigated through further archaeological research. In turn, animal geneticists benefit

from interacting with archaeologists to formulate new research agendas concerning the species they study. If mindful of the mutual benefits reaped by frequent consultation and collaboration, especially in the nascent field of ancient DNA analysis, both sets of practitioners can emulate the mutualism that characterizes the intertwined lives of people and the animals that live with them.

## Aktuell

FUDENBERG 2017

Drew Fudenberg, Kevin He & Lorenz A. Imhof, *Bayesian posteriors for arbitrarily rare events*. [PNAS 114 \(2017\), 4925–4929](#).

We study how much data a Bayesian observer needs to correctly infer the relative likelihoods of two events when both events are arbitrarily rare. Each period, either a blue die or a red die is tossed. The two dice land on side 1 with unknown probabilities  $p_1$  and  $q_1$ , which can be arbitrarily low. Given a data-generating process where  $p_1 \geq cq_1$ , we are interested in how much data are required to guarantee that with high probability the observer's Bayesian posterior mean for  $p_1$  exceeds  $(1-d)c$  times that for  $q_1$ . If the prior densities for the two dice are positive on the interior of the parameter space and behave like power functions at the boundary, then for every  $\epsilon > 0$ ; there exists a finite  $N$  so that the observer obtains such an inference after  $n$  periods with probability at least  $1 - \epsilon$ —whenever  $np_1 \leq N$ . The condition on  $n$  and  $p_1$  is the best possible. The result can fail if one of the prior densities converges to zero exponentially fast at the boundary.

Keywords: rare event | Bayes estimate | uniform consistency | multinomial distribution | signaling game

Significance: Many decision problems in contexts ranging from drug safety tests to game-theoretic learning models require Bayesian comparisons between the likelihoods of two events. When both events are arbitrarily rare, a large data set is needed to reach the correct decision with high probability. The best result in previous work requires the data size to grow so quickly with rarity that the expectation of the number of observations of the rare event explodes. We show for a large class of priors that it is enough that this expectation exceeds a priordependent constant. However, without some restrictions on the prior the result fails, and our condition on the data size is the weakest possible.

LI 2017

Hao Li, Xing-xing Wang, Bin Wang, Lei Fu, Guan Liu, Yu Lu, Min Cao, Hairong Huang & Babak Javid, *Latently and uninfected healthcare workers exposed to TB make protective antibodies against Mycobacterium tuberculosis*. [PNAS 114 \(2017\), 5023–5028](#).

The role of Igs in natural protection against infection by Mycobacterium tuberculosis (Mtb), the causative agent of TB, is controversial. Although passive immunization with mAbs generated against mycobacterial antigens has shown protective efficacy in murine models of infection, studies in B cell-depleted animals only showed modest phenotypes. We do not know if humans make protective antibody responses. Here, we investigated whether healthcare workers in a Beijing TB hospital—who, although exposed to suprainfectious doses of pathogenic Mtb, remain healthy—make antibody responses that are effective in protecting against infection by Mtb. We tested antibodies isolated from 48 healthcare workers and compared these with 12 patients with active TB. We found that antibodies from 7 of 48 healthcare workers but none from active TB patients showed moderate protection against Mtb in an aerosol mouse challenge model. Intriguingly, three

of seven healthcare workers who made protective antibody responses had no evidence of prior TB infection by IFN- $\gamma$  release assay. There was also good correlation between protection observed in vivo and neutralization of Mtb in an in vitro human whole-blood assay. Antibodies mediating protection were directed against the surface of Mtb and depended on both immune complexes and CD4+ T cells for efficacy. Our results indicate that certain individuals make protective antibodies against Mtb and challenge paradigms about the nature of an effective immune response to TB.

**Keywords:** TB | antibodies | immune complex | humoral immunity | TB restrictors

**Significance:** It is not known whether natural immunity to TB exists or whether antibodies play an important role in immunity against infection by *Mycobacterium tuberculosis* (Mtb), the causative agent of TB. Here, we identify that a significant minority of healthcare workers who are exposed to high doses of Mtb make protective antibodies against infection as measured in both mouse infection and in vitro models. Some of these individuals had no prior evidence of latent TB infection, suggesting that they may represent a subset of “restrictors” who can control infection by Mtb. These results have important implications in the rational development of both protective and therapeutic vaccines against TB.

## WILLIAMS 2017

Randolph T. Williams, Laurel B. Goodwin, Warren D. Sharp & Peter S. Mozley, *Reading a 400,000-year record of earthquake frequency for an intraplate fault*. *PNAS* **114** (2017), 4893–4898.

Our understanding of the frequency of large earthquakes at timescales longer than instrumental and historical records is based mostly on paleoseismic studies of fast-moving plate-boundary faults. Similar study of intraplate faults has been limited until now, because intraplate earthquake recurrence intervals are generally long (10s to 100s of thousands of years) relative to conventional paleoseismic records determined by trenching. Long-term variations in the earthquake recurrence intervals of intraplate faults therefore are poorly understood. Longer paleoseismic records for intraplate faults are required both to better quantify their earthquake recurrence intervals and to test competing models of earthquake frequency (e.g., time-dependent, time-independent, and clustered). We present the results of U-Th dating of calcite veins in the Loma Blanca normal fault zone, Rio Grande rift, New Mexico, United States, that constrain earthquake recurrence intervals over much of the past  $\approx 550$  ka—the longest direct record of seismic frequency documented for any fault to date. The 13 distinct seismic events delineated by this effort demonstrate that for  $>400$  ka, the Loma Blanca fault produced periodic large earthquakes, consistent with a time-dependent model of earthquake recurrence. However, this time-dependent series was interrupted by a cluster of earthquakes at  $\approx 430$  ka. The carbon isotope composition of calcite formed during this seismic cluster records rapid degassing of CO<sub>2</sub>, suggesting an interval of anomalous fluid source. In concert with U-Th dates recording decreased recurrence intervals, we infer seismicity during this interval records faultvalve behavior. These data provide insight into the long-term seismic behavior of the Loma Blanca fault and, by inference, other intraplate faults.

**Keywords:** earthquake | fault | geochronology | seismic | hazard

**Significance:** U-Th dating of coseismic calcite veins in the Loma Blanca fault, New Mexico, quantifies an earthquake history spanning more than 400,000 years, the longest paleoseismic record ever documented for any fault. Data show that earthquakes on the Loma Blanca fault generally occurred at regular intervals, rather than aperiodically as previously hypothesized for faults in similar tectonic

environments. However, periodic earthquake slip was interrupted by a relatively brief interval of increased earthquake frequency. Stable isotope data indicative of rapid CO<sub>2</sub> degassing suggest this interval was associated with elevated pore-fluid pressure. The Loma Blanca fault thus provides a record of “naturally induced” seismicity during which fault-valve behavior is inferred to have reduced earthquake recurrence intervals.

#### WRIGHT 2017

Erik S. Wright, *Getting my feet wet*. [science](#) **356** (2017), 106.

In my view, we do our students a disservice when we prepare them for only one domain of expertise. Graduate students in bioinformatics should know not only how to program, but also how to pipette. Similarly, students in the biological sciences should augment their expertise with programming, chemistry, statistics, or other complementary fields. They may not need to master every topic, but solid experience in different areas can serve them well as they develop their careers.

## Altpaläolithikum

#### LEPPARD 2017

Thomas P. Leppard & Curtis Runnels, *Maritime hominin dispersals in the Pleistocene, Advancing the debate*. [Antiquity](#) **91** (2017), 510–519.

Did seas and oceans inhibit the spread of our genus around the planet, as has generally been assumed? Or did they instead enable the dispersal of hominins during the Early and Middle Pleistocene? There is much at stake here. The answer will have major implications for our understanding of the spatial and temporal structure of early human dispersal. If large expanses of open water inhibited archaic hominin movement, we can continue to rely upon the still dominant terrestrial model in understanding the peopling of Eurasia, and rule out contact of archaic hominins with insular Quaternary landmasses such as Australia/Sahul, Oceania and beyond to the Americas (recognising that, Pitulko et al. (2016) notwithstanding, Beringia remained too far north to constitute an effective land bridge until late in the Pleistocene). Conversely, if it is demonstrated that open seacrossings enabled archaic hominin dispersals between landmasses, this would revolutionise our understanding of the human diaspora across the globe.

The implications are not limited to dispersal. Intrinsic to our current understanding of the structure of the spread of our genus in spatial and temporal terms is an assumption that this structure in part derives from the ability, incrementally increasing through evolutionary time, of *Homo* to overcome certain types of environmental restriction: that is, of more complex neurocognitive architecture allowing increasingly flexible behavioural responses to otherwise hostile environments (e.g. Davidson & Noble 1992; Davidson 2010, 2013; Leppard 2015b; Howitt-Marshall & Runnels 2016). If, in fact, there is no reason to suppose that the capacity to access and exploit challenging niches is related to cognitive evolution, and archaic *Homo* was undertaking long-distance dispersal in the Early and Middle Pleistocene, then discussions of ‘behavioural modernity’ will require substantial revision. In this sense, many archaeologists—working in diverse research contexts—are stakeholders in this debate. All the more reason for urging caution, clarity of expression and intellectual openness as we pursue the research agenda sketched here.

## Bibel

DEVER 2017

William G. Dever, *Whom Do You Believe — The Bible or Archaeology?* *Biblical Archaeology Review* **43** (2017), iii, 43–47, 56, 57.

There is also the issue of motivation: Many of the previous generation wanted to construct history as the indispensable ground of faith. Most Biblicists by now have become secularists—thus factual history is no longer so important. As a consequence, the current fad in Biblical studies is something called “cultural memory.” That is, the question is no longer “What actually happened in history?” but rather “How was the story transmitted and transformed into ‘cultural meaning’?”

“Cultural memory” would eclipse history writing as most practicing historians (and some archaeologists) have traditionally seen it. It’s a cop-out, in my opinion, a counsel of despair. If that view were to prevail, only a few evangelicals would write any new histories of Israel in the future. (That discounts fundamentalist “histories,” which are little more than paraphrases of the Hebrew Bible.) For their part, many archaeologists simply do not see themselves as historians, and almost none has any training in the discipline of history.

HERRING 2016

Stephen L. Herring & Garth Gilmour, *The Image of God in Bible and Archaeology*. In: ROBERT D. MILLER II (Hrsg.), *Between Israelite Religion and Old Testament Theology, Essays on Archaeology, History, and Hermeneutics*. Contributions to Biblical Exegesis and Theology (2016), 63–86.

In ancient Israel/Judah, YHWH did have cultic representations that functioned in the same way that cultic representations functioned elsewhere in the ancient Near East: they were thought to manifest the divine presence. Whether as standing stones, stylized trees, various theriomorphic images or the ark, YHWH had a “body,” through which his presence was manifested. Admittedly, this conclusion rests in large part on the assumption that the, likely widespread, use of iconic and aniconic cultic imagery implies similar conceptualizations as are found elsewhere in the ancient Near East. As we have seen, this assumption is furthered by the conceptual parallels that indicate that the biblical authors were very familiar with the function of cultic images to manifest the presence of deity. If there is a difference between ancient Israel/Judah and other Near Eastern culture then it likely exists on the level of form and not function. But even if we allow that assumption, caution is needed. The traditional stance that YHWH was never represented by an anthropomorphic image is being slowly undermined by a number of recent investigations, both archaeological and textual. The more we find, the better our understanding.

## Datierung

BONNEAU 2017

Adelphine Bonneau, David Pearce, Peter Mitchell, Richard Staff, Charles Arthur, Lara Mallen, Fiona Brock & Tom Higham, *The earliest directly dated rock paintings from southern Africa, New AMS radiocarbon dates*. *Antiquity* **91** (2017), 322–333.

Rock art worldwide has proved extremely difficult to date directly. Here, the first radiocarbon dates for rock paintings in Botswana and Lesotho are presented,

along with additional dates for Later Stone Age rock art in South Africa. The samples selected for dating were identified as carbon-blacks from short-lived organic materials, meaning that the sampled pigments and the paintings that they were used to produce must be of similar age. The results reveal that southern African hunter-gatherers were creating paintings on rockshelter walls as long ago as 5723-4420 cal BP in south-eastern Botswana: the oldest such evidence yet found in southern Africa.

Keywords: South Africa | Lesotho | Botswana | Later Stone Age | rock art | AMS radiocarbon dating

## DOUKA 2017

Katerina Douka, Nikos Efstratiou, Mette Marie Hald, Peter Steen Henriksen & Alexandra Karetsou, *Dating Knossos and the arrival of the earliest Neolithic in the southern Aegean*. *Antiquity* **91** (2017), 304–321.

Knossos, on Crete, has long been famous both for its Minoan period remains and for the presence, at the base of the stratigraphy, of an early Neolithic settlement. The chronology and development of the Neolithic settlement, however, have hitherto been unclear. New light is now thrown on this formative period by combining new and older radiocarbon dates with contextual information in a Bayesian modelling framework. The results from Crete and western Anatolia suggest that an earlier, small-scale Aceramic colonisation preceded the later Neolithic reoccupation of Knossos.

Keywords: Aegean | Knossos | Neolithic | early farmers | sea-faring | radiocarbon dating

## Energie

### LI 2017

Shao-Meng Li et al., *Differences between measured and reported volatile organic compound emissions from oil sands facilities in Alberta, Canada*. *PNAS* **114** (2017), E3756–E3765.

Shao-Meng Li, Amy Leithead, Samar G. Moussa, John Liggio, Michael D. Moran, Daniel Wang, Katherine Hayden, Andrea Darlington, Mark Gordon, Ralf Staebler, Paul A. Makar, Craig A. Stroud, Robert McLaren, Peter S.K. Liu, Jason O'Brien, Richard L. Mittermeier, Junhua Zhang, George Marson, Stewart G. Cober, Mengistu Wolde & Jeremy J.B. Wentzell

Large-scale oil production from oil sands deposits in Alberta, Canada has raised concerns about environmental impacts, such as the magnitude of air pollution emissions. This paper reports compound emission rates (E) for 69–89 nonbiogenic volatile organic compounds (VOCs) for each of four surface mining facilities, determined with a top-down approach using aircraft measurements in the summer of 2013. The aggregate emission rate (aE) of the nonbiogenic VOCs ranged from  $50 \pm 14$  to  $70 \pm$

$22$  t/d depending on the facility. In comparison, equivalent VOC emission rates reported to the Canadian National Pollutant Release Inventory (NPRI) using accepted estimation methods were lower than the aE values by factors of  $2.0 \pm 0.6$ ,  $3.1 \pm 1.1$ ,  $4.5 \pm 1.5$ , and  $4.1 \pm 1.6$  for the four facilities, indicating underestimation in the reported VOC emissions. For 11 of the combined 93 VOC species reported by all four facilities, the reported emission rate and E were similar; but for the other 82 species, the reported emission rate was lower than E. The median ratio of E to that reported for all species by a facility ranged from 4.5 to 375 depending

on the facility. Moreover, between 9 and 53 VOCs, for which there are existing reporting requirements to the NPRI, were not included in the facility emission reports. The comparisons between the emission reports and measurement-based emission rates indicate that improvements to VOC emission estimation methods would enhance the accuracy and completeness of emission estimates and their applicability to environmental impact assessments of oil sands developments.

**Keywords:** volatile organic compounds | emissions | emission inventory validation | oil sands | aircraft measurements

**Significance:** Validation of volatile organic compound (VOC) emission reports, especially from large industrial facilities, is rarely attempted. Given uncertainties in emission reports, their evaluation and validation will build confidence in emission inventories. It is shown that a top-down approach can provide measurement-based emission rates for such emission validation. Comparisons with emission reports from Alberta oil sands surface mining facilities revealed significant differences in VOC emissions between top-down emissions rates and reports. Comparison with VOC species emission reports using currently accepted estimation methods indicates that emissions were underestimated in the reports for most species. This exercise shows that improvements in the accuracy and completeness of emissions estimates from complex facilities would enhance their application to assessing the impacts of such emissions.

## QIN 2017

Yue Qin, Fabian Wagner, Noah Scovronick, Wei Peng, Junnan Yang, Tong Zhu, Kirk R. Smith & Denise L. Mauzerall, *Air quality, health, and climate implications of China's synthetic natural gas development*. [PNAS 114 \(2017\), 4887–4892](#).

Facing severe air pollution and growing dependence on natural gas imports, the Chinese government plans to increase coal-based synthetic natural gas (SNG) production. Although displacement of coal with SNG benefits air quality, it increases CO<sub>2</sub> emissions. Due to variations in air pollutant and CO<sub>2</sub> emission factors and energy efficiencies across sectors, coal replacement with SNG results in varying degrees of air quality benefits and climate penalties. We estimate air quality, human health, and climate impacts of SNG substitution strategies in 2020. Using all production of SNG in the residential sector results in an annual decrease of  $\approx 32,000$  (20,000 to 41,000) outdoor-air-pollution-associated premature deaths, with ranges determined by the low and high estimates of the health risks. If changes in indoor/household air pollution were also included, the decrease would be far larger. SNG deployment in the residential sector results in nearly 10 and 60 times greater reduction in premature mortality than if it is deployed in the industrial or power sectors, respectively. Due to inefficiencies in current household coal use, utilization of SNG in the residential sector results in only 20 to 30% of the carbon penalty compared with using it in the industrial or power sectors. Even if carbon capture and storage is used in SNG production with today's technology, SNG emits 22 to 40% more CO<sub>2</sub> than the same amount of conventional gas. Among the SNG deployment strategies we evaluate, allocating currently planned SNG to households provides the largest air quality and health benefits with the smallest carbon penalties.

**Keywords:** coal | PM<sub>2.5</sub> | premature mortality | residential sector | carbon capture and storage

**Significance:** China's coal-based synthetic natural gas (SNG) projects can reduce air pollution and associated premature mortality by substituting for direct coal use in power, industry, and households. These benefits, however, come with increased CO<sub>2</sub> emissions unless carbon capture and storage (CCS) is applied in SNG produc-

tion. Even with CCS, SNG has higher CO<sub>2</sub> emissions than conventional natural gas. In the United States, increases in natural gas supplies have been primarily deployed to the power sector. In China, however, due to inefficient and uncontrolled coal combustion in households, we find that allocating currently available SNG to the residential sector provides the largest air quality and health benefits and smallest climate penalties compared with allocation to the power or industrial sectors.

## Judentum

KESSLER 2011

Christa Müller-Kessler, *The Linguistic Heritage of Qumran Aramaic*. In: ARMIN LANGE, EMANUEL TOV, MATTHIAS WEIGOLD & BENNIE H. REYNOLDS III (Hrsg.), *The Dead Sea Scrolls in Context, Integrating the Dead Sea Scrolls in the Study of Ancient Texts, Languages, and Cultures*. Vetus Testamentum Supplements 140 (Leiden 2011), 215–259.

In light of the presented linguistic features (graphemes, phonemes, morphemes, and syntagms) it is now obvious that Tg. Onq. and Tg. Jon. belong to the dialect geography of Babylonia in the style of a traditional “Gelehrtensprache.” Although Targumic Aramaic still preserves features of Qumran Aramaic, it is already far more developed than the latter. Therefore its placement within the group of Middle Aramaic has to be reconsidered. The occurring Eastern features cannot be simply adduced to redactional corrections after the transfer of Tg. Onq. and Tg. Jon. to Babylonia by a rabbinic group of the Academies of Nehardea, and later Sura and Pumbeditha. That true eastern features surface in Targum Aramaic of Babylonia is quite natural. Thus it is not only eastern Targum Aramaic that shows these specific traits but also SLBA in magic bowl texts, the Aramaic parts of the Babylonian Talmud, and even later the Aramaic of Geonic responsa. Standard Literary Aramaic of Babylonia can be taken as the true heir of Qumran Aramaic. Qumran Aramaic, however, was never a unified Aramaic dialect, but represents diverse literary dialects from text sources of obscure backgrounds. With such a small Aramaic text basis, surviving mostly in fragmentary states, it is impossible to establish where the Vorlagen or originals were composed and compiled, despite convincing arguments by experts of Qumran text criticism. Therefore the diversity in the linguistic elements of Qumran Aramaic presents a non-homogenous language style that differs from text to text.

The linguistic succession of Qumran Aramaic is expected in the Western Aramaic dialect group of Christian Palestinian, Galilean, and Samaritan Aramaic, not in the eastern literary Aramaic group. Also, the Judean legal documents do not seem to have been written in a linguistic style that continued in Western Aramaic.

ZAPATA-MEZA 2017

Marcela Zapata-Meza & Rosaura Sanz-Rincón, *Excavating Mary Magdalene’s Hometown*. *Biblical Archaeology Review* 43 (2017), iii, 37–42.

Somewhat surprisingly, only one synagogue has been discovered at Magdala that apparently served the entire city. For this time and place, there should be more than just one synagogue in Magdala.

Torah reading Table? The stone most likely supported Torah scrolls. It was found buried under a thick layer of dirt in the center of the synagogue, with a

column on top as if for protection. Magdala's ritual baths were found similarly protected—measures evidently taken by Magdaleans to prevent desecration by the approaching Roman troops in 67 C.E.

## Klima

### BOLCH 2017

Tobias Bolch, *Asian glaciers are a reliable water source*. [nature 545 \(2017\), 161–162](#).

The people, economies and agriculture of central Asia and parts of south Asia rely on water from mountains. Modelling suggests that glacier melt, in particular, is a key water source during dry periods in some of these regions.

However, if glaciers continue to shrink, their contribution will eventually start to decrease. Current estimates suggest with high confidence that most Asian glaciers will significantly retreat until the end of this century (see ref. 8, for example; no projections are available beyond 2100). But some regions, such as the Karakoram mountain range, have relatively high ice volumes<sup>9</sup>, and glaciers in central Karakoram have been fairly stable since at least the 1970s (ref. 10). Hence, glacier run-off in several catchments of the upper Indus located in Karakoram (Fig. 1) will probably not decline by much, even in the long term. Run-off projections for rivers originating in the Himalayas and Karakoram indicate that river flows will increase until at least the middle of the twenty-first century<sup>11</sup>. By contrast, projections for arid central Asia suggest that river discharge will start to decline in the next few decades.

### MEDHAUG 2017

Iselin Medhaug, Martin B. Stolpe, Erich M. Fischer & Reto Knutti, *Reconciling controversies about the 'global warming hiatus'*. [nature 545 \(2017\), 41–47](#).

Between about 1998 and 2012, a time that coincided with political negotiations for preventing climate change, the surface of Earth seemed hardly to warm. This phenomenon, often termed the 'global warming hiatus', caused doubt in the public mind about how well anthropogenic climate change and natural variability are understood. Here we show that apparently contradictory conclusions stem from different definitions of 'hiatus' and from different datasets. A combination of changes in forcing, uptake of heat by the oceans, natural variability and incomplete observational coverage reconciles models and data. Combined with stronger recent warming trends in newer datasets, we are now more confident than ever that human influence is dominant in long-term warming.

### PRITCHARD 2017

Hamish D. Pritchard, *Asia's glaciers are a regionally important buffer against drought*. [nature 545 \(2017\), 169–174](#).

The high mountains of Asia—encompassing the Himalayas, the Hindu Kush, Karakoram, Pamir Alai, Kunlun Shan, and Tian Shan mountains—have the highest concentration of glaciers globally, and 800 million people depend in part on meltwater from them. Water stress makes this region vulnerable economically and socially to drought, but glaciers are a uniquely drought-resilient source of water. Here I show that these glaciers provide summer meltwater to rivers and aquifers that is sufficient for the basic needs of 136 million people, or most of the annual municipal and industrial needs of Pakistan, Tajikistan, Turkmenistan, Uzbekistan and Kyrgyzstan. During drought summers, meltwater dominates water inputs to

the upper Indus and Aral river basins. Uncertainties in mountain precipitation are poorly known, but, given the magnitude of this water supply, predicted glacier loss would add considerably to drought-related water stress. Such additional water stress increases the risk of social instability, conflict and sudden, uncontrolled population migrations triggered by water scarcity, which is already associated with the large and rapidly growing populations and hydroeconomies of these basins.

## Kultur

### DIAMOND 2017

Jared Diamond, *Of rats and resilience*. [nature 545 \(2017\), 32–33](#).

A revised timeline for the arrival of settlers on Mangaia island in Polynesia reveals the resilience of this population, which overcame an environmental crisis through bold measures to support a sustainable society.

How rapid were the landbird extinctions following the arrival of Polynesians? The authors' data show that the birds were gone within 500 years, but the time-resolution of these data is coarse. Only additional dating of bird bones, together with species identification, will provide the answer. I'll bet that the extinctions took only a few decades.

The islanders switched from slash-and-burn agriculture to high-yield irrigated agriculture in flat swamplands, fertilized by soil eroded from the slopes. They also had the good luck to obtain the South American sweet potato, which is a much more productive crop than taro. Pigs disappeared from the archaeological record on Mangaia, which was probably the consequence of a courageous decision to kill all the pigs, as occurred on the Pacific island of Tikopia. By eating taro themselves instead of feeding it to the pigs, the Mangaiaians gained ten times more calories. For protein, they developed sustainable methods of harvesting freshwater fish, eels and ducks from ponds.

This study of the Mangaiaians illustrates how ancient people developed a sustainable society, changed their expectations about what type of food to eat, and thereby escaped from their population and resource trap. Will our society follow their example of adaptive flexibility, or will we instead vanish like the populations of Pitcairn and Henderson islands?

## Methoden

### HEYD 2017

Volker Heyd, *Kossinna's smile*. [Antiquity 91 \(2017\), 348–359](#).

Two recent palaeogenetic studies have identified a movement of Yamnaya peoples from the Eurasian steppe to Central Europe in the third millennium BC. Their findings are reminiscent of Gustaf Kossinna's equation of ethnic identification with archaeological culture. Rather than a single genetic transmission from Yamnaya to the Central European Corded Ware Culture, there is considerable evidence for centuries of connections and interactions across the continent, as far as Iberia. The author concludes that although genetics has much to offer archaeology, there is also much to be learned in the other direction. This article should be read in conjunction with that by Kristiansen et al. (2017), also in this issue.

### SMITH 2017

Michael E. Smith, *Social science and archaeological enquiry*. [Antiquity 91 \(2017\), 520–528](#).

Many archaeologists reject the notion that archaeology is, can be or should be a science. Others assume that archaeology is indeed a science and get on with their work, not worrying much about epistemology or definitions of science. Still others pursue decidedly non-scientific goals yet borrow scientific techniques from other disciplines and call it ‘archaeological science’.

One reason for the confusion and debate over the ‘scientific’ status of archaeology is that few archaeologists have considered the social sciences as fields akin to archaeology. I was taught explicitly in graduate school that disciplines such as sociology and economics had little to contribute to archaeology. Failure to recognise the potential of the social sciences for archaeological research has had two negative effects on archaeological epistemology and theory. First, considerations of whether archaeology is or should be a ‘science’ have employed outdated and inappropriate concepts such as the ‘covering law’ method of Carl Hempel (1965) and the logical positivists (Johnson 2010; MartínónTorres & Killick 2013).

For these authors, ‘scientific archaeology’ describes the bad guys—New Archaeologists, behavioural archaeologists and evolutionary archaeologists—all of whom are accused of being neo-positivists under the spell of Hempel and the logical positivists. I do not want to speak for those three approaches, but the work of Martínón-Torres and Killick—and that of Johnson, and Jones—employs an outmoded scientific epistemology that excludes or ignores the kind of social-scientific approach I am promoting here.

## Neolithikum

KRISTIANSEN 2017

Kristian Kristiansen et al., *Re-theorising mobility and the formation of culture and language among the Corded Ware Culture in Europe*. *Antiquity* **91** (2017), 334–347.

Kristian Kristiansen, Morten E. Allentoft, Karin M. Frei, Rune Iversen, Niels N. Johannsen, Guus Kroonen, Łukasz Pospieszny, T. Douglas Price, Simon Rasmussen, Karl-Göran Sjögren, Martin Sikora & Eske Willerslev

Recent genetic, isotopic and linguistic research has dramatically changed our understanding of how the Corded Ware Culture in Europe was formed. Here the authors explain it in terms of local adaptations and interactions between migrant Yamnaya people from the Pontic-Caspian steppe and indigenous North European Neolithic cultures. The original herding economy of the Yamnaya migrants gradually gave way to new practices of crop cultivation, which led to the adoption of new words for those crops. The result of this hybridisation process was the formation of a new material culture, the Corded Ware Culture, and of a new dialect, Proto-Germanic. Despite a degree of hostility between expanding Corded Ware groups and indigenous Neolithic groups, stable isotope data suggest that exogamy provided a mechanism facilitating their integration. This article should be read in conjunction with that by Heyd (2017, in this issue).

## Religion

SCHWARTZ 2017

J. H. Schwartz, F. D. Houghton, L. Bondioli & R. Macchiarelli, *Two tales of one city, Data, inference and Carthaginian infant sacrifice*. *Antiquity* **91** (2017), 442–454.

Recent issues of *Antiquity* have seen much discussion on the topic of Carthaginian infant sacrifice: was it a Graeco-Roman fiction or did it really happen? There are strongly held opinions on both sides of the argument, with much resting on the age profile of the children interred at the cemetery known as the Carthage Tophet. Here, the authors respond to claims by Smith et al. (2011, 2013) that their ageing of the infants and children was incorrect, and so also by extension was their interpretation that not all interments at the Tophet were the result of sacrifice.

Keywords: Carthage | Tophet | sacrifice | cremation | osteological analysis

## Story or Book

BAS 2017

*Ancient Atheism*. [Biblical Archaeology Review](#) **43** (2017), iii, 55.

*Battling the Gods* demonstrates that for as long as humans have believed in gods, some have doubted them.

*Battling the Gods: Atheism in the Ancient World*. By Tim Whitmarsh. (New York: Alfred A. Knopf, 2016), 304 pp., \$27.95 (hardcover); \$16.95 (paperback)