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References

Aktuell

Boyd 2019

Philip Boyd & Chris Vivian, *Should we fertilize oceans or seed clouds? No one knows.* nature **570** (2019), 155–157.

Gather scientific evidence on the feasibility and risks of marine geoengineering to guide regulation of research, advise Philip Boyd and Chris Vivian.

Evans 2019

Mathew Evans, *Ozone mystery laid to rest.* nature **570** (2019), 167–168.

Measurements of atmospheric ozone levels taken during the nineteenth century cast doubt on the computational models used today to simulate the atmosphere. An independent proxy of past ozone levels offers reassurance.

Habermehl 2018

Anne Habermehl, *A creationist view of Göbekli Tepe, Timeline and other considerations.* In: J. H. Whitmore (Hrsg.), *In Proceedings of the Eighth International Conference on Creationism.* (Pittsburgh 2018), 7–13.

Göbekli Tepe is a prehistoric archaeological site in SE Turkey that has captured the attention of the world by how advanced it is for its age, an astounding 12,000 years old on the conventional timeline. This has required conventional scholars to readjust their thinking about the capabilities of ancient people because, according to their worldview, humans should not have been able to produce carved stone monuments like these that far back in time. Creationists do not find this difficult to accept because they believe that early man was a capable being, as created by God. In addition, because the creationist timeline is far shorter than the conventional one, Göbekli Tepe was not built as long ago as conventional scholars believe. In this paper we discuss the conventional versus biblical timelines and show the enormous telescoping of the conventional timeline in historical times that is necessary to correlate it to the two slightly variant biblical timelines (Masoretic and Septuagint). Using the end of the Neanderthals, the end of the Pleistocene, the Nile Delta formation, and Abraham's visit to Egypt, it is proposed here that Göbekli Tepe was most likely founded somewhat more than one hundred years before Abraham's visit to Egypt (Masoretic timeline) or, alternatively, around two hundred and fifty years before Abraham's visit to Egypt (Septuagint timeline). It is postulated that geological events at the end of the Ice Age may have caused the builders of Göbekli Tepe to first migrate to the site, and then later abandon it.

Keywords: Göbekli Tepe | archaeology | conventional timeline | biblical timeline | prehistory | Ice Age | Neanderthals.

Minev 2019

Z. K. Minev et al., *To catch and reverse a quantum jump mid-flight.* nature **570** (2019), 200–204.

n570-0200-Supplement.pdf

Z. K. Minev, S. O. Mundhada, S. Shankar, P. Reinhold, R. Gutiérrez-Jáuregui, R. J. Schoelkopf, M. Mirrahimi, H. J. Carmichael & M. H. Devoret

In conclusion, these experiments, revealing the coherence of the jump, promote the view that a single quantum system under efficient, continuous observation is characterized by a time-dependent state vector inferred from the record of previous measurement outcomes, and whose meaning is that of an objective, generalized degree of freedom. The knowledge of the system on short timescales is not incompatible with unpredictable switching behaviour on long timescales. The excellent agreement between experiment and theory including known experimental imperfections (Supplementary Information section IIIA) thus provides support to the modern quantum trajectory theory and its reliability for predicting the performance of real-time intervention techniques in the control of single quantum systems.

In quantum physics, measurements can fundamentally yield discrete and random results. Emblematic of this feature is Bohr's 1913 proposal of quantum jumps between two discrete energy levels of an atom1. Experimentally, quantum jumps were first observed in an atomic ion driven by a weak deterministic force while under strong continuous energy measurement2–4. The times at which the discontinuous jump transitions occur are reputed to be fundamentally unpredictable. Despite the non-deterministic character of quantum physics, is it possible to know if a quantum jump is about to occur? Here we answer this question affirmatively: we experimentally demonstrate that the jump from the ground state to an excited state of a superconducting artificial three-level atom can be tracked as it follows a predictable 'flight', by monitoring the population of an auxiliary energy level coupled to the ground state. The experimental results demonstrate that the evolution of each completed jump is continuous, coherent and deterministic. We exploit these features, using real-time monitoring and feedback, to catch and reverse quantum jumps mid-flight—thus deterministically preventing their completion. Our findings, which agree with theoretical predictions essentially without adjustable parameters, support the modern quantum trajectory theory5–9 and should provide new ground for the exploration of realtime intervention techniques in the control of quantum systems, such as the early detection of error syndromes in quantum error correction.

Penner 2019

Joyce E. Penner, *Three ways through the soot, sulfates and dust.* nature **570** (2019), 158–159.

How much have aerosol particles slowed warming? Joyce Penner sets out priorities for a coordinated campaign of observations and modelling.

Schroeder 2019

Stephanie Schroeder, *Advocacy starts from within.* science **364** (2019), 798.

This site visit would determine whether the funding for the center where I worked would be renewed. It was critical that we do well—for the center and for my job as education director. But as the panelists asked their questions, all I could think was, "I have multiple sclerosis." I had been diagnosed a couple weeks prior and was in a state of shock. For months I had noticed my body behaving strangely, for example when my ankle stopped working after I walked a few kilometers. I had known what the symptoms might mean—my mother was diagnosed with multiple sclerosis (MS) in the '90s. But I had ignored them. I was not prepared to deal with my own battle.

Sokol 2019

Joshua Sokol, *Troubled Treasure.* science **364** (2019), 722–729.

Mined in a conflict zone and sold for profit, fossils in Burmese amber offer an exquisite view of the Cretaceous—and an ethical quandary.

YEUNG 2019

Laurence Y. Yeung et al., *Isotopic constraint on the twentieth-century increase in tropospheric ozone*. nature **570** (2019), 224–227.

Laurence Y. Yeung, Lee. T. Murray, Patricia Martinerie, Emmanuel Witrant, Huanting Hu, Asmita Banerjee, Anaïs Orsi & Jérôme Chappellaz

Tropospheric ozone (O3) is a key component of air pollution and an important anthropogenic greenhouse gas1. During the twentieth century, the proliferation of the internal combustion engine, rapid industrialization and land-use change led to a global-scale increase in O3 concentrations2,3; however, the magnitude of this increase is uncertain. Atmospheric chemistry models typically predict4–7 an increase in the tropospheric O3 burden of between 25 and 50 per cent since 1900, whereas direct measurements made in the late nineteenth century indicate that surface O3 mixing ratios increased by up to 300 per cent8–10 over that time period. However, the accuracy and diagnostic power of these measurements remains controversial2. Here we use a record of the clumped-isotope composition of molecular oxygen (18O18O in O2) trapped in polar firn and ice from 1590 to 2016 ad, as well as atmospheric chemistry model simulations, to constrain changes in tropospheric O3 concentrations. We find that during the second half of the twentieth century, the proportion of 18O18O in O2 decreased by 0.03 ± 0.02 parts per thousand (95 per cent confidence interval) below its 1590–1958 ad mean, which implies that tropospheric O3 increased by less than 40 per cent during that time. These results corroborate model predictions of global-scale increases in surface pollution and vegetative stress caused by increasing anthropogenic emissions of O3 precursors4,5,11. We also estimate that the radiative forcing of tropospheric O3 since 1850 ad is probably less than +0.4 watts per square metre, consistent with results from recent climate modelling studies12.

Anthropologie

BRAUN 2019

David R. Braun et al., *Earliest known Oldowan artifacts at >2.58 Ma from Ledi-Geraru, Ethiopia, highlight early technological diversity*. PNAS **116** (2019), 11712–11717.

pnas116-11712-Supplement.pdf

David R. Braun, Vera Aldeias, Will Archer, J. Ramon Arrowsmith, Niguss Baraki, Christopher J. Campisano, Alan L. Deino, Erin N. DiMaggio, Guillaume Dupont-Nivet, Blade Engda, David A. Feary, Dominique I. Garello, Zenash Kerfelew, Shannon P. McPherron, David B. Patterson, Jonathan S. Reeves, Jessica C. Thompson & Kaye E. Reed

The manufacture of flaked stone artifacts represents a major milestone in the technology of the human lineage. Although the earliest production of primitive stone tools, predating the genus Homo and emphasizing percussive activities, has been reported at 3.3 million years ago (Ma) from Lomekwi, Kenya, the systematic production of sharp-edged stone tools is unknown before the 2.58–2.55 Ma Oldowan assemblages from Gona, Ethiopia. The organized production of Oldowan stone artifacts is part of a suite of characteristics that is often associated with the adaptive grade shift linked to the genus Homo. Recent discoveries from Ledi-Geraru (LG), Ethiopia, place the first occurrence of Homo ≈250 thousand years earlier than the Oldowan at Gona. Here, we describe a substantial assemblage of

systematically flaked stone tools excavated in situ from a stratigraphically constrained context [Bokol Dora 1, (BD 1) hereafter] at LG bracketed between 2.61 and 2.58 Ma. Although perhaps more primitive in some respects, quantitative analysis suggests the BD 1 assemblage fits more closely with the variability previously described for the Oldowan than with the earlier Lomekwian or with stone tools produced by modern nonhuman primates. These differences suggest that hominin technology is distinctly different from generalized tool use that may be a shared feature of much of the primate lineage. The BD 1 assemblage, near the origin of our genus, provides a link between behavioral adaptations—in the form of flaked stone artifacts—and the biological evolution of our ancestors.

Keywords: Oldowan | stone tools | Homo | cultural evolution | paleoanthropology

Significance: Humans are distinguished from all other primates by their reliance on tool use. When this uniquely human feature began is debated. Evidence of tool use in human ancestors now extends almost 3.3 Ma and becomes prevalent only after 2.6 Ma with the Oldowan. Here, we report a new Oldowan locality (BD 1) that dates prior to 2.6 Ma. These earliest Oldowan tools are distinctive from the 3.3 Ma assemblage and from materials that modern nonhuman primates produce. So, although tool production and use represent a generalized trait of many primates, including human ancestors, the production of Oldowan stone artifacts appears to mark a systematic shift in tool manufacture that occurs at a time of major environmental changes.

Flegontov 2019

Pavel Flegontov, David Reich & & Stephan Schiffels et al., *Palaeo-Eskimo genetic ancestry and the peopling of Chukotka and North America.* nature **570** (2019), 236–240.

n570-0236-Supplement.pdf

Pavel Flegontov, N. Ezgi Altýný³ýk, Piya Changmai, Nadin Rohland, Swapan Mallick, Nicole Adamski, Deborah A. Bolnick, Nasreen Broomandkhoshbacht, Francesca Candilio, Brendan J. Culleton, Olga Flegontova, T. Max Friesen, Choongwon Jeong, Thomas K. Harper, Denise Keating, Douglas J. Kennett, Alexander M. Kim, Thiseas C. Lamnidis, Ann Marie Lawson, Iñigo Olalde, Jonas Oppenheimer, Ben A. Potter, Jennifer Raff, Robert A. Sattler, Pontus Skoglund, Kristin Stewardson, Edward J. Vajda, Sergey Vasilyev, Elizaveta Veselovskaya, M. Geoffrey Hayes, Dennis H. O'Rourke, Johannes Krause, Ron Pinhasi, David Reich, & Stephan Schiffels

Much of the American Arctic was first settled 5,000 years ago, by groups of people known as Palaeo-Eskimos. They were subsequently joined and largely displaced around 1,000 years ago by ancestors of the present-day Inuit and Yup'ik1–3. The genetic relationship between Palaeo-Eskimos and Native American, Inuit, Yup'ik and Aleut populations remains uncertain4–6. Here we present genomic data for 48 ancient individuals from Chukotka, East Siberia, the Aleutian Islands, Alaska, and the Canadian Arctic. We co-analyse these data with data from present-day Alaskan Iñupiat and West Siberian populations and published genomes. Using methods based on rare-allele and haplotype sharing, as well as established techniques4,7–9, we show that Palaeo-Eskimo-related ancestry is ubiquitous among people who speak Na-Dene and Eskimo–Aleut languages. We develop a comprehensive model for the Holocene peopling events of Chukotka and North America, and show that Na-Dene-speaking peoples, people of the Aleutian Islands, and Yup'ik and Inuit across the Arctic region all share ancestry from a single Palaeo-Eskimo-related Siberian source.

Sikora 2019

Martin Sikora, David J. Meltzer & Eske Willerslev et al., *The population history of northeastern Siberia since the Pleistocene*. nature **570** (2019), 182–188.

n570-0182-Supplement1.pdf, n570-0182-Supplement2.xlsx

Martin Sikora, Vladimir V. Pitulko, Vitor C. Sousa, Morten E. Allentoft, Lasse Vinner, Simon Rasmussen, Ashot Margaryan, Peter De Barros Damgaard, Constanza De La Fuente, Gabriel Renaud, Melinda A. Yang, Qiaomei Fu, Isabelle Dupanloup, Konstantinos Giampoudakis, David Nogués-Bravo, Carsten Rahbek, Guus Kroonen, Michaël Peyrot, Hugh Mccoll, Sergey V. Vasilyev, Elizaveta Veselovskaya, Margarita Gerasimova, Elena Y. Pavlova, Vyacheslav G. Chasnyk, Pavel A. Nikolskiy, Andrei V. Gromov, Valeriy I. Khartanovich, Vyacheslav Moiseyev, Pavel S. Grebenyuk, Alexander Yu. Fedorchenko, Alexander I. Lebedintsev, Sergey B. Slobodin, Boris A. Malyarchuk, Rui Martiniano, Morten Meldgaard, Laura Arppe, Jukka U. Palo, Tarja Sundell, Kristiina Mannermaa, Mikko Putkonen, Verner Alexandersen, Charlotte Primeau, Nurbol Baimukhanov, Ripan S. Malhi, Karl-Göran Sjögren, Kristian Kristiansen, Anna Wessman, Antti Sajantila, Marta Mirazon Lahr, Richard Durbin, Rasmus Nielsen, David J. Meltzer, Laurent Excoffier & Eske Willerslev

Northeastern Siberia has been inhabited by humans for more than 40,000 years but its deep population history remains poorly understood. Here we investigate the late Pleistocene population history of northeastern Siberia through analyses of 34 newly recovered ancient genomes that date to between 31,000 and 600 years ago. We document complex population dynamics during this period, including at least three major migration events: an initial peopling by a previously unknown Palaeolithic population of 'Ancient North Siberians' who are distantly related to early West Eurasian hunter-gatherers; the arrival of East Asian-related peoples, which gave rise to 'Ancient Palaeo-Siberians' who are closely related to contemporary communities from far-northeastern Siberia (such as the Koryaks), as well as Native Americans; and a Holocene migration of other East Asian-related peoples, who we name 'Neo-Siberians', and from whom many contemporary Siberians are descended. Each of these population expansions largely replaced the earlier inhabitants, and ultimately generated the mosaic genetic make-up of contemporary peoples who inhabit a vast area across northern Eurasia and the Americas.

Stone 2019

Anne C. Stone, *Human lineages in the far north*. nature **570** (2019), 170–172.

Humans reached the Americas from northeastern Siberia during the last ice age. Genomic analyses of ancient and modern individuals reveal the history of the peoples who have populated these regions.

de la Torre 2019

Ignacio de la Torre, *Searching for the emergence of stone tool making in eastern Africa*. PNAS **116** (2019), 11567–11569.

Braun et al. [...] do not necessarily challenge the scenario associating climate change with speciation and cultural responses. Accepting the validity of archaeological evidence at ≈3.4 Ma, however, changes substantially the scenario and decouples such association, as no significant climate changes have been detected in that particular time span, and hominins in both the Dikika (Australopithecus afarensis) and Lomekwi (Kenyanthropus platyops) areas are less derived than early Homo.

Bibel

Schorch 2019

Stefan Schorch, *The so-called Gerizim Commandment in the Samaritan Pentateuch*. In: Michael Langlois (Hrsg.), *The Samaritan Pentateuch and the Dead Sea Scrolls*. (Leuven 2019), 77–97.

The Gerizim composition found in the Samaritan text of the Ten commandments in Exod 20 and Deut 5, according to medieval manuscripts, presents a deliberate scribal attempt to stress some main points of Pentateuchal hermeneutics, completely in line with the hermeneutics and the literary techniques attested in the pre-Samaritan textual layer. Nothing in the Gerizim composition itself, or in its insertion at these points of the Pentateuch narrative, is specifically "Samaritan." Rather, the authors of this insertion seem to have been part of the scribal culture shared by followers of both the Jerusalem and Gerizim sanctuary.

Klima

Voosen 2019

Paul Voosen, *Project traces 500 million years of roller-coaster climate*. science **364** (2019), 716–717.

Sharp temperature swings pose warning for humanity.

Some 450 million years ago, ocean waters averaged 35°C to 40°C, more than 20°C warmer than today. Yet marine life thrived, even diversified. "It's unsettling for the biologists, these warm temperatures we're proposing," Grossman says. "These are extreme for modern organisms."

Kultur

Hua 2019

Xia Hua, Simon J. Greenhill, Marcel Cardillo, Hilde Schneemann & Lindell Bromham, *The ecological drivers of variation in global language diversity*. Nature Communications **10** (2019), 2047, 1–10. DOI:10.1038/s41467-019-09842-2.

NatComm10-a02047-Supplement.pdf

Language diversity is distributed unevenly over the globe. Intriguingly, patterns of language diversity resemble biodiversity patterns, leading to suggestions that similar mechanisms may underlie both linguistic and biological diversification. Here we present the first global analysis of language diversity that compares the relative importance of two key ecological mechanisms – isolation and ecological risk – after correcting for spatial autocorrelation and phylogenetic non-independence. We find significant effects of climate on language diversity, consistent with the ecological risk hypothesis that areas of high year-round productivity lead to more languages by supporting human cultural groups with smaller distributions. Climate has a much stronger effect on language diversity than landscape features, such as altitudinal range and river density, which might contribute to isolation of cultural groups. The association between biodiversity and language diversity appears to be an incidental effect of their covariation with climate, rather than a causal link between the two.

Methoden

Cheng 2019

Yangyang Cheng, Sneha Dharwadkar, Vera Sheridan, Clarissa Rios Rojas, Tatsuya Amano, Montserrat Bosch Grau & Michael Gordin, *Science's language barrier*. nature **570** (2019), 265–267.

Non-native speakers of English can face challenges that detract from their research.

The Chinese language is rich and beautiful, but it still lacks much of the vocabulary that's needed to describe physical science. I don't even know how I would give a talk about my work in Chinese. It would take a lot of effort.

Many academics assume that students come to them fully formed, but every student has to learn the culture of their discipline. For those who don't speak English as a first language, the challenge is especially daunting. They can't do it alone. It requires a partnership with their mentor and their institution. Mentors need to spend more time helping students to understand the conventions of scientific writing and the expectations of various journals. There's an art to turning a PhD thesis into a journal article. Without guidance, a student will just cobble something together that has no chance of being accepted.

In my experience, people who grow up speaking a language other than English are at a real competitive disadvantage when it comes to science. And it's not only because they will struggle to read and write scientific papers. Many haven't been exposed to the process and culture of science.

We found that 36 % were published in a language other than English, which makes that information much less accessible to the wider world. We need to embrace linguistic diversity and to make a concerted effort to dig up scientific knowledge in languages other than English.

[S]peaking at conferences, writing papers and asking for fellowships in English is harder and demands more energy when you're not a native speaker. You need to fight with the language. We need to improve English-language education before and during university.

Having a single global language of science makes the whole endeavour more efficient. There are around 6,000 languages in the world, today. If science were being conducted in all of them, a lot of knowledge would be lost. In the 1700s and 1800s, scientists in Europe often had to learn French, German and Latin to keep up with their fields. We've gained a lot by lowering the burden to just one language. But there's also a lack of fairness. In countries where English isn't spoken, you shut out everyone but the well-educated. Over the centuries, scientists worldwide have adapted to using English, but the language has also adapted to science. English has acquired a vocabulary for concepts and processes. When a new field emerges, its terminology piggybacks on the existing vocabulary.

Rubel 2019

Alexander Rubel, *Quo Vadis Altertumswissenschaft? The Command of Foreign Languages and the Future of Classical Studies*. Classical World **112** (2019), 193–223.

This paper discusses the question of whether the "internationalization" of science means that students of Classics in the broadest sense, who have long been multilingual, must now in the twenty-first century are obligated to write in English, even if not all of us can adequately express our thoughts in the language of Shakespeare. In order to be noticed at all in the Anglo-American world, scientific publications increasingly have to appear in English, regardless of the language

skills of the authors. Native English speakers, on the other hand, no longer consider it necessary to read in other languages and they thus run the risk of reinventing the wheel. In addition, criticism is levelled at national research policies in European countries that carelessly abandon their own languages in favor of the dominant tongue (not always used with complete accuracy). This paper argues in favor of multilingualism.