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References

Aktuell

Enserink 2020

Martin Enserink & Kai Kupferschmidt, *With COVID-19, modeling takes on life and death importance*, *Epidemic simulations shape national responses*. science **367** (2020), 1414–1415.

In Hong Kong and Singapore, "It's 2 months already [of such measures], and people are really getting very tired," says University of Hong Kong modeler Gabriel Leung. Recent data suggest the virus may be spreading faster again in both cities, putting them on the brink of a major outbreak, he adds. Long lockdowns to slow a disease have catastrophic economic impacts and may devastate public health themselves. "It's a three-way tussle," Leung says, "between protecting health, protecting the economy, and protecting people's well-being and emotional health." The economic fallout isn't something epidemic models address, says Ira Longini, a modeler at the University of Florida—but that may have to change. "We should probably hook up with some economic modelers and try to factor that in," he says. |

FitzGerald 2020

Garret A. FitzGerald, *Misguided drug advice for COVID-19*. science **367** (2020), 1434.

However, until we have robust evidence, patients in chronic pain should continue to take their NSAIDs rather than turn to opiates.

A similar rationale should be applied to evidence that coronaviruses use the angiotensin converting enzyme (ACE) 2 as a receptor for cellular entry (10). There has been speculation, but no clinical evidence, that consumption of ACE inhibitors might worsen the consequences of infection (11). Patients on ACE inhibitors should continue to take them rather than risk complications, such as stroke.

Gronenborn 2020

Detlef Gronenborn, *Die COVID-19 Pandemie aus einer archäologischen Langfristperspektive*, *Teil 1: der Schock*. Online **2020**, Mar. 30. <http://archaeologik.blogspot.com/2020/03/> (2020-04-01).

Kupferschmidt 2020

Kai Kupferschmidt & Jon Cohen, *Race to find COVID-19 treatments accelerates*, *WHO launches megatrial to test repurposed drugs and experimental drug candidates*. science **367** (2020), 1412–1413.

Perlman says the smartest way to test the drugs is in people in early stages of disease who doctors think are most likely to get much worse. How would you determine that? "That is the key question," he says. Researchers might find a biomarker in blood that helps them predict disease course.

Saint-Maurice 2020

Pedro F. Saint-Maurice et al., *Association of Daily Step Count and Step Intensity With Mortality Among US Adults*. Journal of the American Medical Association **323** (2020), 1151–1160.

IMPORTANCE It is unclear whether the number of steps per day and the intensity of stepping are associated with lower mortality.

OBJECTIVE Describe the dose-response relationship between step count and intensity and mortality.

DESIGN, SETTING, AND PARTICIPANTS Representative sample of US adults aged at least 40 years in the National Health and Nutrition Examination Survey who wore an accelerometer for up to 7 days (from 2003-2006). Mortality was ascertained through December 2015.

EXPOSURES Accelerometer-measured number of steps per day and 3 step intensity measures (extended bout cadence, peak 30-minute cadence, and peak 1-minute cadence [steps/min]). Accelerometer data were based on measurements obtained during a 7-day period at baseline.

MAIN OUTCOMES AND MEASURES The primary outcomewas all-cause mortality. Secondary outcomes were cardiovascular disease (CVD) and cancer mortality. Hazard ratios (HRs), mortality rates, and 95 %CIs were estimated using cubic splines and quartile classifications adjusting for age; sex; race/ethnicity; education; diet; smoking status; body mass index; self-reported health; mobility limitations; and diagnoses of diabetes, stroke, heart disease, heart failure, cancer, chronic bronchitis, and emphysema.

RESULTS A total of 4840 participants (mean age, 56.8 years; 2435 [54 %] women; 1732 [36 %] individuals with obesity) wore accelerometers for a mean of 5.7 days for a mean of 14.4 hours per day. The mean number of steps per day was 9124. There were 1165 deaths over a mean 10.1 years of follow-up, including 406 CVD and 283 cancer deaths. The unadjusted incidence density for all-cause mortality was 76.7 per 1000 person-years (419 deaths) for the 655 individuals who took less than 4000 steps per day; 21.4 per 1000 person-years (488 deaths) for the 1727 individuals who took 4000 to 7999 steps per day; 6.9 per 1000 person-years (176 deaths) for the 1539 individuals who took 8000 to 11 999 steps per day; and 4.8 per 1000 person-years (82 deaths) for the 919 individuals who took at least 12 000 steps per day. Compared with taking 4000 steps per day, taking 8000 steps per day was associated with significantly lower all-cause mortality (HR, 0.49 [95 %CI, 0.44-0.55]), as was taking 12 000 steps per day (HR, 0.35 [95 %CI, 0.28-0.45]). Unadjusted incidence density for all-cause mortality by peak 30 cadence was 32.9 per 1000 person-years (406 deaths) for the 1080 individuals who took 18.5 to 56.0 steps per minute; 12.6 per 1000 person-years (207 deaths) for the 1153 individuals who took 56.1 to 69.2 steps per minute; 6.8 per 1000 person-years (124 deaths) for the 1074 individuals who took 69.3 to 82.8 steps per minute; and 5.3 per 1000 person-years (108 deaths) for the 1037 individuals who took 82.9 to 149.5 steps per minute. Greater step intensity was not significantly associated with lower mortality after adjustment for total steps per day (eg, highest vs lowest quartile of peak 30 cadence: HR, 0.90 [95 %CI, 0.65-1.27]; P value for trend = .34).

CONCLUSIONS AND RELEVANCE Based on a representative sample of US adults, a greater number of daily steps was significantly associated with lower all-cause mortality. There was no significant association between step intensity and mortality after adjusting for total steps per day.

Pedro F. Saint-Maurice, Richard P. Troiano, David R. Bassett Jr, Barry I. Graubard, Susan A. Carlson, Eric J. Shiroma, Janet E. Fulton, Charles E. Matthews

Archäologie

Shea 2014

John J. Shea, *Sink the Mousterian? Named stone tool industries*

(NASTIES) as obstacles to investigating hominin evolutionary relationships in the Later Middle Paleolithic Levant. Quaternary International **350** (2014), 169–179.

The Later Middle Paleolithic lithic archaeological record for the East Mediterranean Levant has been invoked to support competing and contradictory models for the evolutionary relationships between Homo sapiens and Homo neanderthalensis. The lithic evidence has not helped paleoanthropology achieve a conclusive resolution about this issue because archaeologists continue to structure inter-assemblage lithic variability in terms of stone tool industries such as the "Mousterian". This paper explores the problems that named stone tool industries (or "NASTIES") cause for Paleolithic archaeology, and it explores alternatives to them.

Bibel

Faust 2019

Avraham Faust, *A Social Archaeology of the Kingdom of Judah, Tenth–Sixth Centuries BCE.* In: Assaf Yasur-Landau, Eric H. Cline & Yorke M. Rowan (Hrsg.), *The Social Archaeology of the Levant, From Prehistory to the Present.* (Cambridge 2019), 337–353.

Faust 2019

Avraham Faust, *The World of P, The Material Realm of Priestly Writings.* Vetus Testamentum **69** (2019), 173–218.

The Priestly source (P) is a common designation in scholarship for significant parts of the Pentateuch, which are assumed to have been written in priestly circles. While the social circles and theological background of P are more agreed upon, its dating is hotly debated, and various textual, intertextual, linguistic and historical evidence were employed in an attempt to date its composition. The present paper aims to examine the material world that is assumed by a number of Priestly texts, and the landscape in which the writings are embedded, in order to shed new light on their dating. The paper concludes that much of the priestly writings (inclusive of some of the texts commonly attributed to the Holiness school) are quite intelligible on the background the late Iron Age, mainly the 8th-7th centuries BCE.

Keywords: Priestly source | holiness code | Pentateuch | archaeology | Landscape | israelite kinship

Gadot 2017

Yuval Gadot & Joe Uziel, *The Monumentality of Iron Age Jerusalem Prior to the 8th Century BCE.* Tel Aviv: Archaeology **44** (2017), 123–140.

The article reviews the chrono-stratigraphy of the City of David ridge—the site traditionally considered as the location of Bronze and Iron Age Jerusalem. Several scholars have recently challenged this conventional view, arguing that the southeastern hill became part of the city only in the 8th century BCE. Five stratigraphic anchors are discussed in detail, including the finds from Kenyon's Section A, remains surrounding the Gihon Spring and the stratigraphic sequence in Area E. These, as well as remains excavated in Area G and the 'Ophel', show

that at least three Iron II construction phases need to be taken into account, the earliest probably dating to before the middle of the 8th century BCE.

Keywords: Jerusalem | City of David | southeastern ridge | Middle Bronze Age | Iron Age | Gihon Spring

Biologie

Blom 2020

Tessel Blom, Daniel Feuerriegel, Philippa Johnson, Stefan Bode & Hinze Hogendoorn, *Predictions drive neural representations of visual events ahead of incoming sensory information*. PNAS **117** (2020), 7510–7515.

pnas117-07510-Supplement.pdf

The transmission of sensory information through the visual system takes time. As a result of these delays, the visual information available to the brain always lags behind the timing of events in the present moment. Compensating for these delays is crucial for functioning within dynamic environments, since interacting with a moving object (e.g., catching a ball) requires real-time localization of the object. One way the brain might achieve this is via prediction of anticipated events. Using time-resolved decoding of electroencephalographic (EEG) data, we demonstrate that the visual system represents the anticipated future position of a moving object, showing that predictive mechanisms activate the same neural representations as afferent sensory input. Importantly, this activation is evident before sensory input corresponding to the stimulus position is able to arrive. Finally, we demonstrate that, when predicted events do not eventuate, sensory information arrives too late to prevent the visual system from representing what was expected but never presented. Taken together, we demonstrate how the visual system can implement predictive mechanisms to preactivate sensory representations, and argue that this might allow it to compensate for its own temporal constraints, allowing us to interact with dynamic visual environments in real time.

Keywords: prediction | neural delays | time-resolved decoding | visual system

Significance: Visual information takes time to travel from the retina and through the visual system, such that the sensory information available to the brain lags behind events in the present moment. Prediction has long been considered a fundamental principle in neuroscience. Using time-resolved EEG decoding, we show that predictive mechanisms are sufficient to activate sensory-like neural representations of anticipated future events, and that these representations are activated before the arrival of afferent sensory information. This reveals that predictive neural mechanisms might allow the visual system to overcome its neural processing delays and interact with our environment in real time.

Klima

Galaasen 2020

Eirik Vinje Galaasen et al., *Interglacial instability of North Atlantic Deep Water ventilation*. science **367** (2020), 1485–1489.

s367-1485-Supplement.pdf

Disrupting North Atlantic Deep Water (NADW) ventilation is a key concern in climate projections. We use (sub)centennially resolved bottom water d13C records that span the interglacials of the last 0.5 million years to assess the frequency of and the climatic backgrounds capable of triggering large NADW reductions.

Episodes of reduced NADW in the deep Atlantic, similar in magnitude to glacial events, have been relatively common and occasionally long-lasting features of interglacials. NADW reductions were triggered across the range of recent interglacial climate backgrounds, which demonstrates that catastrophic freshwater outburst floods were not a prerequisite for large perturbations. Our results argue that large NADW disruptions are more easily achieved than previously appreciated and that they occurred in past climate conditions similar to those we may soon face.

Eirik Vinje Galaasen, Ulysses S. Ninnemann, Augustin Kessler, Nil Irvalý, Yair Rosenthal, Jerry Tjiputra, Nathaëlle Bouttes, Didier M. Roche, Helga F. Kleiven & David A. Hodell

Klages 2020

Johann P. Klages, Ulrich Salzmann, Torsten Bickert, Claus-Dieter Hillenbrand, Karsten Gohl & Gerhard Kuhn et al., *Temperate rainforests near the South Pole during peak Cretaceous warmth*. nature **580** (2020), 81–86.

n580-0081-Supplement.mov

The mid-Cretaceous period was one of the warmest intervals of the past 140 million years1–5, driven by atmospheric carbon dioxide levels of around 1,000 parts per million by volume6. In the near absence of proximal geological records from south of the Antarctic Circle, it is disputed whether polar ice could exist under such environmental conditions. Here we use a sedimentary sequence recovered from the West Antarctic shelf—the southernmost Cretaceous record reported so far—and show that a temperate lowland rainforest environment existed at a palaeolatitude of about 82° S during the Turonian–Santonian age (92 to 83 million years ago). This record contains an intact 3-metre-long network of in situ fossil roots embedded in a mudstone matrix containing diverse pollen and spores. A climate model simulation shows that the reconstructed temperate climate at this high latitude requires a combination of both atmospheric carbon dioxide concentrations of 1,120–1,680 parts per million by volume and a vegetated land surface without major Antarctic glaciation, highlighting the important cooling effect exerted by ice albedo under high levels of atmospheric carbon dioxide.

Johann P. Klages, Ulrich Salzmann, Torsten Bickert, Claus-Dieter Hillenbrand, Karsten Gohl, Gerhard Kuhn, Steven M. Bohaty, Jürgen Titschack, Juliane Müller, Thomas Frederichs, Thorsten Bauersachs, Werner Ehrmann, Tina van de Flierdt, Patric Simões Pereira, Robert D. Larter, Gerrit Lohmann, Igor Niezgodzki, Gabriele Uenzelmann-Neben, Maximilian Zundel, Cornelia Spiegel, Chris Mark, David Chew, Jane E. Francis, Gernot Nehrke, Florian Schwarz, James A. Smith, Tim Freudenthal, Oliver Esper, Heiko Pälike, Thomas A. Ronge, Ricarda Dziadek & the Science Team of Expedition PS104

Stocker 2020

Thomas F. Stocker, *Surprises for climate stability*, *An ocean sediment record reveals chaotic ocean circulation changes during warm climates*. science **367** (2020), 1425–1426.

That Galaasen et al. observed this during the interglacial periods suggests that this ocean circulation system may be much less stable than previously thought. In the Holocene (the present warm epoch), fluctuations in the carbon isotope ratio in deep-ocean sediments are small, except for a well-documented 8200-year cooling event. But in previous warm periods, most notably during Marine Isotope Stage 11c some 400,000 years ago, many century-scale fluctuations in deep-water mass characteristics are registered at site U1305 of the Eirik Drift.

Mittelpaläolithikum

Finlayson 2019

Clive Finlayson, *The Smart Neanderthal, Bird catching, cave art & the cognitive revolution.* (Oxford 2019).

All non-Africans today carry some Neanderthal genes. We have also discovered aspects of Neanderthal behaviour that indicate that they were not cognitively inferior to modern humans, as we once thought, and in fact had their own rituals and art. Finlayson, who is at the forefront of this research, recounts the discoveries of his team, providing evidence that Neanderthals caught birds of prey, and used their feathers for symbolic purposes. There is also evidence that Neanderthals practised other forms of art, as the recently discovered engravings in Gorham's Cave Gibraltar indicate.

Linking all the recent evidence, The Smart Neanderthal casts a new light on the Neanderthals and the "Cognitive Revolution". Finlayson argues that there was no revolution and, instead, modern behaviour arose gradually and independently among different populations of Modern Humans and Neanderthals. Some practices were even adopted by Modern Humans from the Neanderthals. Finlayson overturns classic narratives of human origins, and raises important questions about who we really are.

Will 2020

Manuel Will, *Neanderthal surf and turf, Did our closest ancestors adapt to the sea in the same way as early Homo sapiens?* science **367** (2020), 1422–1423.

After a century of studies in Europe and a much shorter research history in Africa, multifaceted differences in scale and magnitude remain between the two records, and these are hard to explain with preservation and ecology alone.

Zilhão 2020

J. Zilhão et al., *Last Interglacial Iberian Neandertals as fisher-hunter-gatherers.* science **367** (2020), 1443.

s367-1443-Supplement.pdf

Marine food–reliant subsistence systems such as those in the African Middle Stone Age (MSA) were not thought to exist in Europe until the much later Mesolithic. Whether this apparent lag reflects taphonomic biases or behavioral distinctions between archaic and modern humans remains much debated. Figueira Brava cave, in the Arrábida range (Portugal), provides an exceptionally well preserved record of Neandertal coastal resource exploitation on a comparable scale to the MSA and dated to ≈86 to 106 thousand years ago. The breadth of the subsistence base—pine nuts, marine invertebrates, fish, marine birds and mammals, tortoises, waterfowl, and hoofed game—exceeds that of regional early Holocene sites. Fisher-hunter-gatherer economies are not the preserve of anatomically modern people; by the Last Interglacial, they were in place across the Old World in the appropriate settings.

J. Zilhão, D. E. Angelucci, M. Araújo Igreja, L. J. Arnold, E. Badal, P. Callapez, J. L. Cardoso, F. d'Errico, J. Daura, M. Demuro, M. Deschamps, C. Dupont, S. Gabriel, D. L. Hoffmann, P. Legoinha, H. Matias, A. M. Monge Soares, M. Nabais, P. Portela, A. Queffelec, F. Rodrigues & P. Souto

Ostasien

Wilkin 2020

Shevan Wilkin et al., *Economic Diversification Supported the Growth of Mongolia's Nomadic Empires*. Scientific Reports **10** (2020), 3916. DOI:10.1038/s41598-020-60194-0.

SciRep10-03916-Supplement1.pdf, SciRep10-03916-Supplement2.csv, SciRep10-03916-Supplement3.xlsx, SciRep10-03916-Supplement4.xlsx, SciRep10-03916-Supplement5.xlsx, SciRep10-03916-Supplement6.xlsx

Populations in Mongolia from the late second millennium B.C.E. through the Mongol Empire are traditionally assumed, by archaeologists and historians, to have maintained a highly specialized horsefacilitated form of mobile pastoralism. Until recently, a dearth of direct evidence for prehistoric human diet and subsistence economies in Mongolia has rendered systematic testing of this view impossible. Here, we present stable carbon and nitrogen isotope measurements of human bone collagen, and stable carbon isotope analysis of human enamel bioapatite, from 137 well-dated ancient Mongolian individuals spanning the period c. 4400 B.C.E. to 1300 C.E. Our results demonstrate an increase in consumption of C4 plants beginning at c. 800 B.C.E., almost certainly indicative of millet consumption, an interpretation supported by archaeological evidence. The escalating scale of millet consumption on the eastern Eurasian steppe over time, and an expansion of isotopic niche widths, indicate that historic Mongolian empires were supported by a diversification of economic strategies rather than uniform, specialized pastoralism.

Shevan Wilkin, Alicia Ventresca Miller, Bryan K. Miller, Robert N. Spengler iii, William T. T. taylor, Ricardo fernandes, Richard W. Hagan, Madeleine Bleasdale, Jana Zech, S. Ulziibayar, Erdene Myagmar, Nicole Boivin & Patrick Roberts

Ozeanien

Shaw 2020

Ben Shaw, Judith H. Field & Glenn R. Summerhayes et al., *Emergence of a Neolithic in highland New Guinea by 5000 to 4000 years ago*. Science Advances **6** (2020), eaay4573. DOI:10.1126/sciadv.aay4573.

SciAdv06-eaay4573-Supplement.pdf

The emergence of agriculture was one of the most notable behavioral transformations in human history, driving innovations in technologies and settlement globally, referred to as the Neolithic. Wetland agriculture originated in the New Guinea highlands during the mid-Holocene (8000 to 4000 years ago), yet it is unclear if there was associated behavioral change. Here, we report the earliest figurative stone carving and formally manufactured pestles in Oceania, dating to 5050 to 4200 years ago. These discoveries, at the highland site of Waim, occur with the earliest planilateral axe-adzes in New Guinea, the first evidence for fibercraft, and interisland obsidian transfer. The combination of symbolic social systems, complex technologies, and highland agricultural intensification supports an independent emergence of a Neolithic ≈1000 years before the arrival of Neolithic migrants (Lapita) from Southeast Asia.

Ben Shaw, Judith H. Field, Glenn R. Summerhayes, Simon Coxe, Adelle C. F. Coster, Anne Ford, Jemina Haro, Henry Arifeae, Emily Hull, Geraldine Jacobsen, Richard Fullagar, Elspeth Hayes & Lisa Kealhofer

Physik

Blank 2020

Bertram Blank, *A broken nuclear mirror*. nature **580** (2020), 37–38.

The principle of mirror symmetry, which states that nuclear structure remains the same when protons are swapped for neutrons and vice versa, has been found to be broken in the lowest-energy forms of a mirror pair of nuclei.

Hoff 2020

D. E. M. Hoff & A. M. Rogers et al., *Mirror-symmetry violation in bound nuclear ground states*. nature **580** (2020), 52–55.

Conservation laws are deeply related to any symmetry present in a physical system1,2. Analogously to electrons in atoms exhibiting spin symmetries3, it is possible to consider neutrons and protons in the atomic nucleus as projections of a single fermion with an isobaric spin (isospin) of t = 1/2 (ref. 4). Every nuclear state is thus characterized by a total isobaric spin T and a projection Tz—two quantities that are largely conserved in nuclear reactions and decays5,6. A mirror symmetry emerges from this isobaric-spin formalism: nuclei with exchanged numbers of neutrons and protons, known as mirror nuclei, should have an identical set of states7, including their ground state, labelled by their total angular momentum | and parity ≡. Here we report evidence of mirror-symmetry violation in bound nuclear ground states within the mirror partners strontium-73 and bromine-73. We find that a | ≡ = 5/2. spin assignment is needed to explain the proton-emission pattern observed from the T = 3/2 isobaricanalogue state in rubidium-73, which is identical to the ground state of strontium-73. Therefore the ground state of strontium-73 must differ from its | ≡ = 1/2. mirror bromine-73. This observation offers insights into charge-symmetry-breaking forces acting in atomic nuclei.

D. E. M. Hoff, A. M. Rogers, S. M. Wang, P. C. Bender, K. Brandenburg, K. Childers, J. A. Clark, A. C. Dombos, E. R. Doucet, S. Jin, R. Lewis, S. N. Liddick, C. J. Lister, Z. Meisel, C. Morse, W. Nazarewicz, H. Schatz, K. Schmidt, D. Soltesz, S. K. Subedi & S. Waniganeththi

Story or Book

Robinson 2020

Andrew Robinson, *The World According to Physics*. nature **580** (2020), 24.

The World According to Physics Jim Al-Khalili Princeton Univ. Press (2020)

Quantum physicist, historian and science broadcaster, Jim Al-Khalili is well placed to summarize the past, present and future of physics for a lay audience, without using mathematics. After a tantalizing chapter on scale, he analyses space, time, energy, matter, quanta, thermodynamics and various attempts to unify the general theory of relativity with quantum field theory — although he never defines a black hole. On the debate between Niels Bohr and Albert Einstein, Al-Khalili sides with Einstein, who believed in an objective reality.