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References

Aktuell

Davis 2020

L. G. Davis, L. Becerra-Valdivia, D. B. Madsen & T. Higham, *"Late Upper Paleolithic occupation at Cooper's Ferry, Idaho, USA, ≈ 16,000 years ago", Response to Comment*. science **368** (2020), eaaz6626.

Manning builds an inappropriate Bayesian age model to assert that the initial occupation at Cooper's Ferry began only ≈15,935 ± 75 to 15,130 ± 20 cal yr B.P., suggesting that our estimation of ≈16,560 to 15,280 cal yr B.P. is unsupported. However, this analysis both ignores evidence of human occupation from the earliest undated cultural deposits and reflects a misapplication of Bayesian age-modeling techniques. Consequently, his results are unreliable.

Flaxman 2020

Seth Flaxman et al., *Estimating the number of infections and the impact of nonpharmaceutical interventions on COVID-19 in 11 European countries*. Imperial College COVID-19 Response Team **2020**, Mar. 30. DOI:10.25561/77731.

During this early phase of control measures against the novel coronavirus in Europe, we analyze trends in numbers of deaths to assess the extent to which transmission is being reduced. Representing the COVID-19 infection process using a semi-mechanistic, joint, Bayesian hierarchical model, we can reproduce trends observed in the data on deaths and can forecast accurately over short time horizons.

We estimate that there have been many more infections than are currently reported. The high level of under-ascertainment of infections that we estimate here is likely due to the focus on testing in hospital settings rather than in the community. Despite this, only a small minority of individuals in each country have been infected, with an attack rate on average of 4.9 % [1.9 %-11 %] with considerable variation between countries (Table 1). Our estimates imply that the populations in Europe are not close to herd immunity (≈50-75 % if R0 is 2-4). Further, with Rt values dropping substantially, the rate of acquisition of herd immunity will slow down rapidly. This implies that the virus will be able to spread rapidly should interventions be lifted. Such estimates of the attack rate to date urgently need to be validated by newly developed antibody tests in representative population surveys, once these become available.

We estimate that major non-pharmaceutical interventions have had a substantial impact on the timevarying reproduction numbers in countries where there has been time to observe intervention effects on trends in deaths (Italy, Spain). If adherence in those countries has changed since that initial period, then our forecast of future deaths will be affected accordingly: increasing adherence over time will have resulted in fewer deaths and decreasing adherence in more deaths. Similarly, our estimates of the impact of interventions in other countries should be viewed with caution if the same interventions have achieved different levels of adherence than was initially the case in Italy and Spain.

Seth Flaxman, Swapnil Mishra, Axel Gandy, H. Juliette T. Unwi, Helen Couplan, Thomas A. Mella, Harrison Zh, Tresnia Bera, Jeffrey W. Eato, Pablo N. P. Guzma, Nora Schmi, Lucia Cillon, Kylie E. C. Ainsli, Marc Bagueli, Isobel

Blak, Adhiratha Boonyasir, Olivia Boy, Lorenzo Cattarin, Constanze Ciavarell, Laura Coope, Zulma Cucunub, Gina Cuomo-Dannenbur, Amy Digh, Bimandra Djaafar, Ilaria Dorigatt, Sabine van Elslan, Rich FitzJoh, Han F, Katy Gaythorp, Lily Geidelber, Nicholas Grassl, Will Gree, Timothy Halle, Arran Hamle, Wes Hinsle, Ben Jeffre, David Jorgense, Edward Knoc, Daniel Laydo, Gemma Nedjati-Gilan, Pierre Nouvelle, Kris Para, Igor Siveron, Hayley Thompso, Robert Verit, Erik Vol, Caroline Walter, Haowei Wan, Yuanrong Wan, Oliver Watso, Peter Winski, Xiaoyue X, Charles Whittake, Patrick G. T. Walke, Azra Ghan, Christl A. Donnell, Steven Rile, Lucy C. Oke, Michaela A. C. Vollme, Neil M. Ferguson & Samir Bhatt

Gronenborn 2020

Detlef Gronenborn & Rainer Schreg, *Die COVID-19 Pandemie, Teil 2: Kleine Geschichte der Erforschung von gesellschaftlichen Zyklen*. Online **2020**, Apr. 9. <http://archaeologik.blogspot.com/2020/04/> (2020-04-15).

Zyklen und Prozesse

Im Laufe unserer Forschungen am Römisch-Germanischen Zentralmuseum (RGZM) hat sich in den letzten zehn Jahren ein zyklenbasierter Ansatz als sehr hilfreich bei der Konzipierung von geschichtlichen Abläufen, oder vielleicht besser wiederkehrenden Prozessen, erwiesen (Gronenborn, Schreg 2011; Dotterweich 2011; Gronenborn u. a. 2014; Schreg 2011; Schreg 2020).

Leopoldina 2020

Leopoldina & Nationale Akademie der Wissenschaften, *Coronavirus-Pandemie – Die Krise nachhaltig überwinden, Dritte Ad-hoc-Stellungnahme*. Online **2020**, Apr. 13.

Voraussetzung für eine allmähliche Lockerung ist dabei, dass die Neuinfektionen sich auf niedrigem Niveau stabilisieren, das Gesundheitssystem nicht überlastet wird, Infizierte zunehmend identifiziert werden und die Schutzmaßnahmen (Hygienemaßnahmen, Mund-Nasen-Schutz, Distanzregeln) diszipliniert eingehalten werden. Die nachhaltige Bewältigung der Krise muss so bald wie möglich über die kurzfristigen Akutmaßnahmen hinaus die mittel- und vor allem langfristigen Konsequenzen mitbedenken.

Manning 2020

Sturt W. Manning, *Comment on "Late Upper Paleolithic occupation at Cooper's Ferry, Idaho, USA, ≈ 16,000 years ago"*. science **368** (2020), eaaz4695.

Davis et al. (Research Articles, 30 August 2019, p. 891) report human occupation at Cooper's Ferry, Idaho, USA, ≈16,000 years ago, well before Greenland Interstadial 1 (GI-1). Critical review suggests that this early date is not supported by the evidence. Human occupation might have begun in the mid-16th millennium before the present, but would have been more likely after ≈15,000 years ago, coeval with GI-1.

Servick 2020

Kelly Servick, *For survivors of severe COVID-19, beating the virus is just the beginning*. science **368** (2020), abc1486. DOI:10.1126/science.abc1486.

Many COVID-19 patients who need a ventilator never recover. Although survival rates vary across studies and countries, a report from London's Intensive Care National Audit & Research Centre found that 67 % of reported COVID-19 patients from England, Wales, and Northern Ireland receiving "advanced respiratory support" died. A study in a smaller patient group in China found that only 14 % survived after going on a ventilator.

Streeck 2020

Hendrik Streeck, Gunther Hartmann, Martin Exner & Matthias Schmid, *Preliminary result and conclusions of the COVID-19 case cluster study (Gangelt Municipality)*. Online **2020**, Apr. 9.

Anthropologie

Georgiou 2020

Leoni Georgiou et al., *Evidence for habitual climbing in a Pleistocene hominin in South Africa*. PNAS **117** (2020), 8416–8423.

pnas117-08416-Supplement.pdf

Bipedalism is a defining trait of the hominin lineage, associated with a transition from a more arboreal to a more terrestrial environment. While there is debate about when modern human-like bipedalism first appeared in hominins, all known South African hominins show morphological adaptations to bipedalism, suggesting that this was their predominant mode of locomotion. Here we present evidence that hominins preserved in the Sterkfontein Caves practiced two different locomotor repertoires. The trabecular structure of a proximal femur (StW 522) attributed to Australopithecus africanus exhibits a modern human-like bipedal locomotor pattern, while that of a geologically younger specimen (StW 311) attributed to either Homo sp. or Paranthropus robustus exhibits a pattern more similar to nonhuman apes, potentially suggesting regular bouts of both climbing and terrestrial bipedalism. Our results demonstrate distinct morphological differences, linked to behavioral differences between Australopithecus and later hominins in South Africa and contribute to the increasing evidence of locomotor diversity within the hominin clade.

Keywords: anthropology | human evolution | trabecular bone

Leoni Georgiou, Christopher J. Dunmore, Ameline Bardo, Laura T. Buck, Jean-Jacques Hublin, Dieter H. Pahr, Dominic Stratford, Alexander Synek, Tracy L. Kivell & Matthew M. Skinner

Significance: Here we present evidence of hominin locomotor behavior from the trabecular bone of the femur. We show evidence for habitual use of highly flexed hip postures, which could potentially indicate regular climbing in a South African hominin from Sterkfontein, which is either Paranthropus robustus or Homo. Second, we present evidence that Australopithecus africanus likely did not climb at the frequencies seen in extant non-human apes, and exhibits a modern, human-like pattern of loading at the hip joint. These results challenge the prevailing view of a single transition to bipedalism within the hominin clade by providing evidence of climbing in a more recent, non-Australopithecus South African hominin, and add to the increasing evidence for locomotor diversity in the hominin clade.

Bibel

Gadot 2015

Yuval Gadot, *In the Valley of the King, Jerusalem's Rural Hinterland in the 8th–4th Centuries BCE*. Tel Aviv: Archaeology **42** (2015), 3–26.

The author proposes that an unprecedented growth in the number of rural settlements around Jerusalem took place during the 7th century BCE and not, as has been broadly maintained, in the 8th century BCE. It also shows that the decrease in the number of sites in the transition to the Persian period is less dramatic than has previously been claimed. The author asserts that the large number of 7th century BCE sites around Jerusalem is the result of the devastation of the Shephelah wrought by Sennacherib and that a relatively large number of Iron Age sites survived into the Persian period due to the role played by Ramat Rahel, which replaced Jerusalem as the economic and political hub of the southern highlands.

Keywords: Jerusalem | Ramat Rahel | Nahal Soreq | Nahal Refa'im

Römer 2011

Thomas Römer, *How Many Books (teuchs), Pentateuch, Hexateuch, Deuteronomistic History, or Ennateuch?* In: Thomas Dozeman, Thomas Römer & Konrad Schmid (Hrsg.), *Pentateuch, Hexateuch, or Enneateuch? IdentifyingLiterary Works in Genesis through Kings*. Ancient Israel and its literature 8 (Atlanta 2011), 25–42.

Should we then be happy with Torah and Nebiim and give up the idea of other larger literary units? This option does not take into account that Torah and Nebiim both have forerunners that did not totally disappear after the publication of the Torah. The so-called "historical Psalms" and other historical summaries refer to a Pentateuch (Ps 95), a Hexateuch (Ps 105; Ps 114), maybe even a Tetrateuch (Ps 136),or an Enneateuch (Jer 32;Pss 78, 80, 106). As in any library, it would have been possible to take out or to combine all or only part of the scrolls of the Persian period temple library. And it was also possible to focus on different scrolls depending of the context in which they were used, edited and finally read.

Biologie

Bugmann 2020

Harald Bugmann, *Tree diversity reduced to the bare essentials*. science **368** (2020), 128–129.

Tropical forest dynamics can be explained by merely two functional trait axes.

The finding of Rüger et al. is notable for several reasons. The approach allows for the prediction of key functional aspects of forests (including biomass and composition) on the basis of a small set of attributes of functional diversity, which is in stark contrast to the large taxonomic diversity. This does not mean that most tree species in tropical forests would be redundant and thus not important, because they have multiple other roles beyond carbon and water cycling, of course. Yet, the rigorous definition and testing of PFTs provide the basis for representing tropical forest dynamics much more accurately in dynamic global vegetation models (10) that are often integrated in Earth system models (11).

Rüger 2020

Nadja Rüger et al., *Demographic trade-offs predict tropical forest dynamics*. science **368** (2020), 165–168.

s368-0165-Supplement.pdf

Understanding tropical forest dynamics and planning for their sustainable management require efficient, yet accurate, predictions of the joint dynamics of hundreds of tree species. With increasing information on tropical tree life histories, our predictive understanding is no longer limited by species data but by the ability of existing models to make use of it. Using a demographic forest model, we show that the basal area and compositional changes during forest succession in a neotropical forest can be accurately predicted by representing tropical tree diversity (hundreds of species) with only five functional groups spanning two essential trade-offs—the growth-survival and stature-recruitment trade-offs. This data-driven modeling framework substantially improves our ability to predict consequences of anthropogenic impacts on tropical forests.

Nadja Rüger, Richard Condit, Daisy H. Dent, Saara J. DeWalt, Stephen P. Hubbell, Jeremy W. Lichstein, Omar R. Lopez, Christian Wirth & Caroline E. Farrior

Datierung

Grün 2020

Rainer Grün & Chris Stringer et al., *Dating the skull from Broken Hill, Zambia, and its position in human evolution*. nature **580** (2020), 372–375.

n580-0372-Supplement.pdf

The cranium from Broken Hill (Kabwe) was recovered from cave deposits in 1921, during metal ore mining in what is now Zambia1. It is one of the best-preserved skulls of a fossil hominin, and was initially designated as the type specimen of Homo rhodesiensis, but recently it has often been included in the taxon Homo heidelbergensis2–4. However, the original site has since been completely quarried away, and—although the cranium is often estimated to be around 500 thousand years old5–7—its unsystematic recovery impedes its accurate dating and placement in human evolution. Here we carried out analyses directly on the skull and found a best age estimate of 299 ± 25 thousand years (mean ± 2σ). The result suggests that later Middle Pleistocene Africa contained multiple contemporaneous hominin lineages (that is, Homo sapiens8,9, H. heidelbergensis / H. rhodesiensis and Homo naledi10,11), similar to Eurasia, where Homo neanderthalensis, the Denisovans, Homo floresiensis, Homo luzonensis and perhaps also Homo heidelbergensis and Homo erectus12 were found contemporaneously. The age estimate also raises further questions about the mode of evolution of H. sapiens in Africa and whether H. heidelbergensis / H. rhodesiensis was a direct ancestor of our species13,14.

Rainer Grün, Alistair Pike, Frank McDermott, Stephen Eggins, Graham Mortimer, Maxime Aubert, Lesley Kinsley, Renaud Joannes-Boyau, Michael Rumsey, Christiane Denys, James Brink, Tara Clark & Chris Stringer

Manning 2020

Sturt W. Manning, Bernd Kromer, Mauro Cremaschi, Michael W. Dee, Ronny Friedrich, Carol Griggs & Carla S. Hadden, *Mediterranean radiocarbon offsets and calendar dates for prehistory*. Science Advances **6** (2020), eaaz1096. DOI:10.1126/sciadv.aaz1096.

SciAdv06-eaaz1096-Supplement.pdf

A single Northern Hemisphere calibration curve has formed the basis of radiocarbon dating in Europe and the Mediterranean for five decades, setting the

time frame for prehistory. However, as measurement precision increases, there is mounting evidence for some small but substantive regional (partly growing season) offsets in same-year radiocarbon levels. Controlling for interlaboratory variation, we compare radiocarbon data from Europe and the Mediterranean in the second to earlier first millennia BCE. Consistent with recent findings in the second millennium CE, these data suggest that some small, but critical, periods of variation for Mediterranean radiocarbon levels exist, especially associated with major reversals or plateaus in the atmospheric radiocarbon record. At high precision, these variations potentially affect calendar dates for prehistory by up to a few decades, including, for example, Egyptian history and the much-debated Thera/Santorini volcanic eruption.

Pearson 2020

Charlotte Pearson, Matthew Salzer, Lukas Wacker, Peter Brewer, Adam Sookdeo & Peter Kuniholm, *Securing timelines in the ancient Mediterranean using multiproxy annual tree-ring data*. PNAS **117** (2020), 8410–8415.

pnas117-08410-Supplement.pdf

Calendar-dated tree-ring sequences offer an unparalleled resource for high-resolution paleoenvironmental reconstruction. Where such records exist for a few limited geographic regions over the last 8,000 to 12,000 years, they have proved invaluable for creating precise and accurate timelines for past human and environmental interactions. To expand such records across new geographic territory or extend data for certain regions further backward in time, new applications must be developed to secure "floating" (not yet absolutely dated) tree-ring sequences, which cannot be assigned single-calendar year dates by standard dendrochronological techniques. This study develops two approaches to this problem for a critical floating tree-ring chronology from the East Mediterranean Bronze–Iron Age. The chronology is more closely fixed in time using annually resolved patterns of 14C, modulated by cosmic radiation, between 1700 and 1480 BC. This placement is then tested using an anticorrelation between calendar-dated tree-ring growth responses to climatically effective volcanism in North American bristlecone pine and the Mediterranean trees. Examination of the newly dated Mediterranean tree-ring sequence between 1630 and 1500 BC using X-ray fluorescence revealed an unusual calcium anomaly around 1560 BC. While requiring further replication and analysis, this anomaly merits exploration as a potential marker for the eruption of Thera.

Keywords: annual 14C | tree rings | Thera eruption | Mediterranean Bronze Age

Significance: This study demonstrates how different lines of evidence from tree rings in widely spread growth locations can combine to fix an approximately dated tree-ring record from the East Mediterranean Bronze–Iron Age to an exact calendardated range. This tree-ring record is of high importance for regional chronology and spans the time period in which the major volcanic eruption of Thera (Santorini) occurred. Exact dating of this eruption is important because it provides a prominent marker horizon through which ancient timelines of the East Mediterranean, Egypt, and the Levant can be synchronized. Chemical analysis of the dated tree-ring sequence identifies a chemical change in their growth environment around 1560 BC, which while requiring further substantiation, may be evidence of the Thera eruption.

Mittelpaläolithikum

Hardy 2020

B. L. Hardy, M.-H. Moncel, C. Kerfant, M. Lebon, L. Bellot-Gurlet

& N. Mélard, *Direct evidence of neanderthal fibre technology and its cognitive and behavioral implications*. Scientific Reports **10** (2020), 4889. DOI:10.1038/s41598-020-61839-w.

SciRep10-04889-Supplement.pdf

Neanderthals are often considered as less technologically advanced than modern humans. However, we typically only find faunal remains or stone tools at Paleolithic sites. Perishable materials, comprising the vast majority of material culture items, are typically missing. Individual twisted fibres on stone tools from the Abri du Maras led to the hypothesis of Neanderthal string production in the past, but conclusive evidence was lacking. Here we show direct evidence of fibre technology in the form of a 3-ply cord fragment made from inner bark fibres on a stone tool recovered in situ from the same site. Twisted fibres provide the basis for clothing, rope, bags, nets, mats, boats, etc. which, once discovered, would have become an indispensable part of daily life. Understanding and use of twisted fibres implies the use of complex multi-component technology as well as a mathematical understanding of pairs, sets, and numbers. Added to recent evidence of birch bark tar, art, and shell beads, the idea that Neanderthals were cognitively inferior to modern humans is becoming increasingly untenable.

Physik

Pascoli 2020

Silvia Pascoli & Jessica Turner, *Matter–antimatter symmetry violated*. nature **580** (2020), 323–324.

In a mirror world, antiparticles should behave in the same way as particles. But it emerges that leptons — neutrinos, electrons and their more exotic cousins — might not obey this expected pattern.

As suggested4 by Andrei Sakharov in 1967, CP violation is one of the key ingredients needed to explain why there is a small excess of matter over antimatter in the Universe. This imbalance, at a level of a few particles per 10 billion photons5, is ultimately responsible for the existence of Earth, planets, stars and ourselves: if there were equal amounts of matter and antimatter, they would have destroyed each other in the early Universe and annihilated into photons. No matter would have remained.

The amount of CP violation observed in quarks is not enough to cause it6, so scientists have looked at leptonic CP violation in a well-studied mechanism called leptogenesis7. In models introduced to explain the observed neutrino masses, hypothetical heavy partners to neutrinos would have been copiously present in the early Universe and subsequently decayed. In the presence of CP violation, these decays could have generated the observed matter–antimatter asymmetry.

T2K-Collaboration 2020

The T2K Collaboration, *Constraint on the matter–antimatter symmetry-violating phase in neutrino oscillations*. nature **580** (2020), 339–344.

The charge-conjugation and parity-reversal (CP) symmetry of fundamental particles is a symmetry between matter and antimatter. Violation of this CP symmetry was first observed in 19641, and CP violation in the weak interactions of quarks was soon established2. Sakharov proposed3 that CP violation is necessary to explain the observed imbalance of matter and antimatter abundance in the Universe. However, CP violation in quarks is too small to support this explanation. So far, CP violation has not been observed in non-quark elementary

particle systems. It has been shown that CP violation in leptons could generate the matter–antimatter disparity through a process called leptogenesis4. Leptonic mixing, which appears in the standard model's charged current interactions5,6, provides a potential source of CP violation through a complex phase äCP, which is required by some theoretical models of leptogenesis7–9. This CP violation can be measured in muon neutrino to electron neutrino oscillations and the corresponding antineutrino oscillations, which are experimentally accessible using accelerator-produced beams as established by the Tokai-to-Kamioka (T2K) and NOvA experiments10,11. Until now, the value of äCP has not been substantially constrained by neutrino oscillation experiments. Here we report a measurement using long-baseline neutrino and antineutrino oscillations observed by the T2K experiment that shows a large increase in the neutrino oscillation probability, excluding values of äCP that result in a large increase in the observed antineutrino oscillation probability at three standard deviations (3ó). The 3ó confidence interval for äCP, which is cyclic and repeats every 2≡, is [.3.41, .0.03] for the so-called normal mass ordering and [.2.54, .0.32] for the inverted mass ordering. Our results indicate CP violation in leptons and our method enables sensitive searches for matter– antimatter asymmetry in neutrino oscillations using accelerator-produced neutrino beams. Future measurements with larger datasets will test whether leptonic CP violation is larger than the CP violation in quarks.