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References

Afrika

Niespolo 2021

Elizabeth M. Niespolo, Warren D. Sharp, Graham Avery & Todd E. Dawson, *Early, intensive marine resource exploitation by Middle Stone Age humans at Ysterfontein 1 rockshelter, South Africa*. PNAS **118** (2021), e2020042118.

pnas118-e2020042118-Supplement1.pdf, pnas118-e2020042118-Supplement2.xlsx

Modern human behavioral innovations from the Middle Stone Age (MSA) include the earliest indicators of full coastal adaptation evidenced by shell middens, yet many MSA middens remain poorly dated. We apply 230Th/U burial dating to ostrich eggshells (OES) from Ysterfontein 1 (YFT1, Western Cape, South Africa), a stratified MSA shell midden. 230Th/U burial ages of YFT1 OES are relatively precise (median ¡À 2.7 %), consistent with other age constraints, and preserve stratigraphic principles. Bayesian age–depth modeling indicates YFT1 was deposited between 119.9 to 113.1 thousand years ago (ka) (95 % CI of model ages), and the entire 3.8 m thick midden may have accumulated within ≈2,300 y. Stable carbon, nitrogen, and oxygen isotopes of OES indicate that during occupation the local environment was dominated by C3 vegetation and was initially significantly wetter than at present but became drier and cooler with time. Integrating archaeological evidence with OES 230Th/U ages and stable isotopes shows the following: 1) YFT1 is the oldest shell midden known, providing minimum constraints on full coastal adaptation by ≈120 ka; 2) despite rapid sea-level drop and other climatic changes during occupation, relative shellfish proportions and sizes remain similar, suggesting adaptive foraging along a changing coastline; 3) the YFT1 lithic technocomplex is similar to other west coast assemblages but distinct from potentially synchronous industries along the southern African coast, suggesting human populations were fragmented between seasonal rainfall zones; and 4) accumulation rates (up to 1.8 m/ka) are much higher than previously observed for dated, stratified MSA middens, implying more intense site occupation akin to Later Stone Age middens.

Keywords: geochronology | Middle Stone Age | Southern Africa | shell middens | stable isotopes

Significance: Novel 230Th/U burial dating of ostrich eggshells complements other dating methods applicable to archaeological materials beyond the range of radiocarbon dating. New ages for the Ysterfontein 1 (YFT1) shell midden show it accumulated rapidly between ≈120 to 113 ka closely following the Last Interglacial sea-level highstand. The ages show the great antiquity of intensive human coastal adaptation, date a distinctive lithic industry, and show that teeth from YFT1 are among the oldest H. sapiens fossils recovered in southern Africa. Stable isotopes of ostrich eggshells indicate rapid cooling and drying during site occupation. Despite rapid sea-level drop and increasing aridity, the site's occupants maintained a consistent diet, which may not indicate a stable paleoenvironment but rather results from systematic, selective foraging.

Aktuell

Hanage 2021

William P. Hanage & Colin A. Russell, *Partial immunity and SARS-CoV-2 mutations*. science **372** (2021), 354. DOI:10.1126/science.abi4727.

We do not advocate for delayed dosing strategies without further clinical evidence, and it is important to consider the issues raised by Saad-Roy et al., which will depend on the properties of the vaccines involved. However, anxiety about the potential of vaccination to increase the emergence rate of immune-escape variants should be tempered by the low probability of the confluence of mutation, selection, and transmission as well as the enormous public health benefits of widespread vaccination.

Ledford 2021

Heidi Ledford, *Covid Vaccines and Blood Clots, Five Key Questions*. nature **592** (2021), 495–496.

As safety concerns delay the use of two COVID-19 vaccines, Nature looks at the questions that scientists want answered.

Early reports suggested that relatively young women who received the vaccines were most likely to experience clots, but the European Medicines Agency reported that it could not identify any particularly high-risk groups from its data on the AstraZeneca vaccine. The apparent bias towards women could be the result of many countries prioritizing vaccination for healthcare workers, who are predominantly female.

Pekar 2021

Jonathan Pekar, Michael Worobey, Niema Moshiri, Konrad Scheffler & Joel O. Wertheim, *Timing the SARS-CoV-2 index case in Hubei province*. science **372** (2021), 412–417. DOI:10.1126/science.abf8003.

s372-0412-Supplement.pdf

Understanding when severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged is critical to evaluating our current approach to monitoring novel zoonotic pathogens and understanding the failure of early containment and mitigation efforts for COVID-19. We used a coalescent framework to combine retrospective molecular clock inference with forward epidemiological simulations to determine how long SARS-CoV-2 could have circulated before the time of the most recent common ancestor of all sequenced SARS-CoV-2 genomes. Our results define the period between mid-October and midNovember 2019 as the plausible interval when the first case of SARS-CoV-2 emerged in Hubei province, China. By characterizing the likely dynamics of the virus before it was discovered, we show that more than two-thirds of SARS-CoV-2–like zoonotic events would be self-limited, dying out without igniting a pandemic. Our findings highlight the shortcomings of zoonosis surveillance approaches for detecting highly contagious pathogens with moderate mortality rates.

Saad-Roy 2021

Chadi M. Saad-Roy et al., *Partial immunity and SARS-CoV-2 mutations, Response*. science **372** (2021), 354–355. DOI:10.1126/science.abi6719.

The other major source of uncertainties is in epidemiological outcomes. In their Letter, Hanage and Russell emphasize the likely epidemiological importance of

widespread vaccine deployment. This echoes a conclusion of our Research Article, wherein we stress that short-term dose sparing deployment of a vaccine reduces infections and buys much time in public health planning. However, we also stressed the range of uncertainties that may modulate the longer-term outcomes of this strategy; in particular, less robust immunity could lead to more complex epidemiological and evolutionary outcomes.

Saad-Roy 2021

Chadi M. Saad-Roy et al., *Epidemiological and evolutionary considerations of SARS-CoV-2 vaccine dosing regimes.* science **372** (2021), 363–370. DOI:10.1126/science.abg8663.

s372-0363-Supplement.pdf, s372-0363-Comment1.pdf, s372-0363-Reply1.pdf

Given vaccine dose shortages and logistical challenges, various deployment strategies are being proposed to increase population immunity levels to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Two critical issues arise: How timing of delivery of the second dose will affect infection dynamics and how it will affect prospects for the evolution of viral immune escape via a buildup of partially immune individuals. Both hinge on the robustness of the immune response elicited by a single dose as compared with natural and two-dose immunity. Building on an existing immuno-epidemiological model, we find that in the short term, focusing on one dose generally decreases infections, but that longer-term outcomes depend on this relative immune robustness. We then explore three scenarios of selection and find that a one-dose policy may increase the potential for antigenic evolution under certain conditions of partial population immunity. We highlight the critical need to test viral loads and quantify immune responses after one vaccine dose and to ramp up vaccination efforts globally.

Chadi M. Saad-Roy, Sinead E. Morris, C. Jessica E. Metcalf, Michael J. Mina, Rachel E. Baker, Jeremy Farrar, Edward C. Holmes, Oliver G. Pybus, Andrea L. Graham, Simon A. Levin, Bryan T. Grenfell & Caroline E. Wagner

Wang 2021

Zijun Wang et al., *mRNA vaccine-elicited antibodies to SARS-CoV-2 and circulating variants.* nature **592** (2021), 616–622. DOI:10.1038/s41586-021-03324-6.

Here we report on the antibody and memory B cell responses of a cohort of 20 volunteers who received the Moderna (mRNA-1273) or Pfizer–BioNTech (BNT162b2) vaccine against SARS-CoV-21–4. Eight weeks after the second injection of vaccine, volunteers showed high levels of IgM and IgG anti-SARS-CoV-2 spike protein (S) and receptor-binding-domain (RBD) binding titre. Moreover, the plasma neutralizing activity and relative numbers of RBD-specific memory B cells of vaccinated volunteers were equivalent to those of individuals who had recovered from natural infection5,6. However, activity against SARS-CoV-2 variants that encode E484K-, N501Y- or K417N/E484K/N501-mutant S was reduced by a small—but significant—margin. The monoclonal antibodies elicited by the vaccines potently neutralize SARS-CoV-2, and target a number of different RBD epitopes in common with monoclonal antibodies isolated from infected donors5–8. However, neutralization by 14 of the 17 most-potent monoclonal antibodies that we tested was reduced or abolished by the K417N, E484K or N501Y mutation. Notably, these mutations were selected when we cultured recombinant vesicular stomatitis virus expressing SARS-CoV-2 S in the presence of the monoclonal antibodies elicited by the vaccines. Together, these results suggest that the monoclonal antibodies in clinical use should be tested against newly arising variants, and that

mRNA vaccines may need to be updated periodically to avoid a potential loss of clinical efficacy.

Zijun Wang, Fabian Schmidt, Yiska Weisblum, Frauke Muecksch, Christopher O. Barnes, Shlomo Finkin, Dennis Schaefer-Babajew, Melissa Cipolla, Christian Gaebler, Jenna A. Lieberman, Thiago Y. Oliveira, Zhi Yang, Morgan E. Abernathy, Kathryn E. Huey-Tubman, Arlene Hurley, Martina Turroja, Kamille A. West, Kristie Gordon, Katrina G. Millard, Victor Ramos, Justin Da Silva, Jianliang Xu, Robert A. Colbert, Roshni Patel, Juan Dizon, Cecille Unson-O'Brien, Irina Shimeliovich, Anna Gazumyan, Marina Caskey, Pamela J. Bjorkman, Rafael Casellas, Theodora Hatziioannou, Paul D. Bieniasz & Michel C. Nussenzweig

Yan 2021

Youpei Yan, Amyn A. Malik, Jude Bayham, Eli P. Fenichel, Chandra Couzens & Saad B. Omer, *Measuring voluntary and policy-induced social distancing behavior during the COVID-19 pandemic*. PNAS **118** (2021), e2008814118. DOI:10.1073/pnas.2008814118.

pnas118-e2008814118-Supplement.pdf

Staying home and avoiding unnecessary contact is an important part of the effort to contain COVID-19 and limit deaths. Every state in the United States enacted policies to encourage distancing and some mandated staying home. Understanding how these policies interact with individuals' voluntary responses to the COVID-19 epidemic is a critical initial step in understanding the role of these nonpharmaceutical interventions in transmission dynamics and assessing policy impacts. We use variation in policy responses along with smart device data that measures the amount of time Americans stayed home to disentangle the extent that observed shifts in staying home behavior are induced by policy. We find evidence that stay-at-home orders and voluntary response to locally reported COVID-19 cases and deaths led to behavioral change. For the median county, which implemented a stay-at-home order with about two cases, we find that the response to stay-at-home orders increased time at home as if the county had experienced 29 additional local cases. However, the relative effect of stay-at-home orders was much greater in select counties. On the one hand, the mandate can be viewed as displacing a voluntary response to this rise in cases. On the other hand, policy accelerated the response, which likely helped reduce spread in the early phase of the pandemic. It is important to be able to attribute the relative role of selfinterested behavior or policy mandates to understand the limits and opportunities for relying on voluntary behavior as opposed to imposing stay-at-home orders.

Keywords: COVID-19 | stay-at-home order | avoidance behavior | nonpharmaceutical interventions | social distancing

Significance: Early in the US COVID-19 epidemic, Americans spent substantially more time at home to reduce cases. Disentangling voluntary from policy-induced behavioral changes is critical for governments grappling with relaxing or renewing restrictions. We estimate the number of additional reported cases that would have been needed to elicit a voluntary behavioral response equivalent to the behavioral response to policy. A substantial share of the observed behavioral response was voluntary. Stay-at-home orders increased the time people spent at home by replacing voluntary actions that likely would have emerged as cases rose. Our analysis is an initial step in answering the critical policy question as to whether fast forwarding the response provides sufficient public health benefits to justify the mandates.

Anthropologie

Karakostis 2021

Fotios Alexandros Karakosti, Vangelis Tourlouki & Katerina Harvati et al., *Biomechanics of the human thumb and the evolution of dexterity*. Current Biology **31** (2021), 1317–1325.

CurrBiol31-1317-Supplement.mp4

Systematic tool production and use is one of humanity's defining characteristics, possibly originating as early as >3 million years ago.1–3 Although heightened manual dexterity is considered to be intrinsically intertwined with tool use and manufacture, and critical for human evolution, its role in the emergence of early culture remains unclear. Most previous research on this question exclusively relied on direct morphological comparisons between early hominin and modern human skeletal elements, assuming that the degree of a species' dexterity depends on its similarity with the modern human form. Here, we develop a new approach to investigate the efficiency of thumb opposition, a fundamental component ofmanual dexterity, in several species of fossil hominins. Our work for the first time takes into account soft tissue as well as bone anatomy, integrating virtual modeling of musculus opponens pollicis and its interaction with three-dimensional bone shape form. Results indicate that a fundamental aspect of efficient thumb opposition appeared approximately 2 million years ago, possibly associated with our own genus Homo, and did not characterize Australopithecus, the earliest proposed stone tool maker. This was true also of the late Australopithecus species, Australopithecus sediba, previously found to exhibit human-like thumb proportions. In contrast, later Homo species, including the small-brained Homo naledi, show high levels of thumb opposition dexterity, highlighting the increasing importance of cultural processes and manual dexterity in later human evolution.

Fotios Alexandros Karakosti, Daniel Haeufl, Ioanna Anastopoulo, Konstantinos Moraiti, Gerhard Hot, Vangelis Tourlouki & Katerina Harvati

Stansfield 2021

Ekaterina Stansfield, Krishna Kumar, Philipp Mitteroecker & Nicole D. S. Grunstra, *Biomechanical trade-offs in the pelvic floor constrain the evolution of the human birth canal*. PNAS **118** (2021), e2022159118.

pnas118-e2022159118-Supplement.pdf

Compared with most other primates, humans are characterized by a tight fit between the maternal birth canal and the fetal head, leading to a relatively high risk of neonatal and maternal mortality and morbidities. Obstetric selection is thought to favor a spacious birth canal, whereas the source for opposing selection is frequently assumed to relate to bipedal locomotion. Another, yet underinvestigated, hypothesis is that a more expansive birth canal suspends the soft tissue of the pelvic floor across a larger area, which is disadvantageous for continence and support of the weight of the inner organs and fetus. To test this "pelvic floor hypothesis," we generated a finite element model of the human female pelvic floor and varied its radial size and thickness while keeping all else constant. This allowed us to study the effect of pelvic geometry on pelvic floor deflection (i.e., the amount of bending from the original position) and tissue stresses and stretches. Deflection grew disproportionately fast with increasing radial size, and stresses and stretches also increased. By contrast, an increase in thickness increased pelvic floor stiffness (i.e., the resistance to deformation), which reduced deflection but was unable to fully compensate for the effect of increasing radial size. Moreover, larger thicknesses increase the intra-abdominal pressure necessary for childbirth. Our Results

support the pelvic floor hypothesis and evince functional trade-offs affecting not only the size of the birth canal but also the thickness and stiffness of the pelvic floor.

Keywords: pelvic floor | human birth canal | biomechanics | evolutionary trade-off | finite element modeling

Significance: The relatively small human birth canal has arisen from an evolutionary trade-off between multiple antagonistic selective forces. We present evidence that a large pelvic floor is disadvantageous for maintaining continence and supporting the weight of the inner organs and the fetus through multiple finite element analyses of pelvic floor models varying in size and thickness. An increase in pelvic floor size led to a disproportionately large deflection as well as higher tissue stretches and stresses. Increased pelvic floor thickness considerably reduced deflection by increasing stiffness. However, as a side effect, it increases the intra-abdominal pressure necessary for childbirth, thus reflecting another evolutionary trade-off affecting not only the size but also the thickness of the pelvic floor.

Bibel

Adler 2021

Yonatan Adler, *Watertight and Rock Solid, Stepped Pools and Chalk Vessels as Expressions of Jewish Ritual Purity*. Biblical Archaeology Review **47** (2021), i, 44–51.

The case for associating stepped pools and chalk vessels with Jewish ritual purity practices is an extraordinarily solid one. Both stepped pools and chalk vessels are without any doubt Jewish phenomena, most likely linked to ritual purity observance. None of the other posited interpretations explains satisfactorily why Jews—and only Jews—constructed stepped pools and produced chalk vessels, and none of them considers the manner in which the distribution pattern of these phenomena is laid out starkly along ethnic lines. The case for associating stepped pools and chalk vessels with Jewish purity concerns couldn't be more watertight and rock solid!

Clines 2021

David J. A. Clines, *Genesis 1, A Critique*. unknown (2021), preprint, 1–15. .

Critiquing our texts, as I have attempted to do in this paper, is not a total novelty in biblical studies; but it is not a skill much taught to embryonic biblical scholars, and most of us can feel our way into practising it only gingerly. And I wouldn't like to suggest that it is the responsibility of every biblical scholar to embark on such a programme. Not everyone of us needs to be experts in deconstruction or Qumran or cognitive linguistics—nor in critiquing texts. But, if among the whole international horde of biblical scholars there were no more than a few who could encourage us into a quizzical perspective on the claims of our texts, it might look a bit suspicious. As indeed it does, right now, when the vast majority of biblical critics have (openly or secretly) a religious commitment to the truth of the Bible, however they may define that truth. I imagine a British university system in which all the staff of politics departments were either open or else closet adherents of the Conservative Party. Would that be acceptable?

McGrath 2021

James F. McGrath, *The Writing on the Floor*. Biblical Archaeology Review **47** (2021), i, 72–74.

Throughout rabbinic writings, the Pharisees were famous for trying to avoid the death penalty whenever possible. If they were testing Jesus, perhaps it was to see whether they could find a loophole to avoid her execution.

No one involved wanted this young girl to die, and so this was the problem they brought to Jesus. When Jesus lowered his finger to the dust, perhaps Jesus was asking, why not subject the girl to the sotah ritual? However unpleasant that practice might seem, it was preferable to stoning.

Jesus's action makes sense when considered in its context—not only the historical, cultural, and geographical context, but the architectural context as well. His action has puzzled readers because interpreters failed to observe the things to which archaeologists dedicate so much of their professional attention. We failed to notice the floor, even when Jesus's finger was pointing directly to it the entire time.

Klima

Duan 2021

Hongbo Duan et al., *Assessing China's efforts to pursue the 1.5°C warming limit.* science **372** (2021), 378–385.

s372-0378-Supplement.pdf

Given the increasing interest in keeping global warming below 1.5°C, a key question is what this would mean for China's emission pathway, energy restructuring, and decarbonization. By conducting a multimodel study, we find that the 1.5°C-consistent goal would require China to reduce its carbon emissions and energy consumption by more than 90 and 39 %, respectively, compared with the "no policy" case. Negative emission technologies play an important role in achieving near-zero emissions, with captured carbon accounting on average for 20 % of the total reductions in 2050. Our multimodel comparisons reveal large differences in necessary emission reductions across sectors, whereas what is consistent is that the power sector is required to achieve full decarbonization by 2050. The crossmodel averages indicate that China's accumulated policy costs may amount to 2.8 to 5.7 % of its gross domestic product by 2050, given the 1.5°C warming limit.

Hongbo Duan, Sheng Zhou, Kejun Jiang, Christoph Bertram, Mathijs Harmsen, Elmar Kriegler, Detlef P. van Vuuren, Shouyang Wang, Shinichiro Fujimori, Massimo Tavoni, Xi Ming, Kimon Keramidas, Gokul Iyer & James Edmonds

Kultur

Masclans 2021

Alba Masclans, Caroline Hamon, Christian Jeunesse & Penny Bickle, *A sexual division of labour at the start of agriculture? A multi-proxy comparison through grave good stone tool technological and use-wear analysis.* PLoS ONE **16** (2021), e249130. DOI:10.1371/journal.pone.0249130.

This work demonstrates the importance of integrating sexual division of labour into the research of the transition to the Neolithic and its social implications. During the spread of the Neolithic in Europe, when migration led to the dispersal of domesticated plants and animals, novel tasks and tools, appear in the archaeological record. By examining the use-wear traces from over 400 stone tools from funerary contexts of the earliest Neolithic in central Europe we provide insights into what tasks could have been carried out by women and men. The results of

this analysis are then examined for statistically significant correlations with the osteological, isotopic and other grave good data, informing on sexed-based differences in diet, mobility and symbolism. Our data demonstrate males were buried with stone tools used for woodwork, and butchery, hunting or interpersonal violence, while women with those for the working of animal skins, expanding the range of tasks known to have been carried out. The results also show variation along an east-west cline from Slovakia to eastern France, suggesting that the sexual division of labour (or at least its representation in death) changed as farming spread westwards.

Methoden

Sailer 2002

Steve Sailor, *Name game – 'Inuit' or 'Eskimo'?* United Press International **2002**, June 20. <http://www.upi.com/Odd_News/2002/06/20/Feature-Name-game-Inuit-or-Eskimo/43191024597290/> (2021-04-26).

"San" was actually the insulting word that the herding Khoi people called the Bushmen. Harpending noted, "Bushmen kids are graduating from school, reading the academic literature, and are outraged that we call them 'San.'" "I knew very well," he said, "That one did not call someone a San to his face. I continued to use Bushman, and I was publicly corrected several times by the righteous. It quickly became a badge among Western academics: If you say 'San' and I say 'San,' then we signal each other that we are on the fashionable side, politically. It had nothing to do with respect. I think most politically correct talk follows these dynamics."

Ozeanien

Choin 2021

Jeremy Choin, Javier Mendoza-Revilla, Lara R. Arauna, Etienne Patin & Lluis Quintana-Murci et al., *Genomic insights into population history and biological adaptation in Oceania*. nature **592** (2021), 583–589.

n592-0583-Supplement1.pdf, n592-0583-Supplement2.xlsx

The Pacific region is of major importance for addressing questions regarding human dispersals, interactions with archaic hominins and natural selection processes1. However, the demographic and adaptive history of Oceanian populations remains largely uncharacterized. Here we report high-coverage genomes of 317 individuals from 20 populations from the Pacific region. We find that the ancestors of Papuan-related ('Near Oceanian') groups underwent a strong bottleneck before the settlement of the region, and separated around 20,000–40,000 years ago. We infer that the East Asian ancestors of Pacific populations may have diverged from Taiwanese Indigenous peoples before the Neolithic expansion, which is thought to have started from Taiwan around 5,000 years ago2–4. Additionally, this dispersal was not followed by an immediate, single admixture event with Near Oceanian populations, but involved recurrent episodes of genetic interactions. Our analyses reveal marked differences in the proportion and nature of Denisovan heritage among Pacific groups, suggesting that independent interbreeding with highly structured archaic populations occurred. Furthermore, whereas introgression of Neanderthal genetic information facilitated the adaptation of modern humans related to multiple phenotypes (for example, metabolism, pigmentation and neuronal

development), Denisovan introgression was primarily beneficial for immune-related functions. Finally, we report evidence of selective sweeps and polygenic adaptation associated with pathogen exposure and lipid metabolism in the Pacific region, increasing our understanding of the mechanisms of biological adaptation to island environments.

Jeremy Choin, Javier Mendoza-Revilla, Lara R. Arauna, Sebastian Cuadros-Espinoza, Olivier Cassar, Maximilian Larena, Albert Min-Shan Ko, Christine Harmant, Romain Laurent, Paul Verdu, Guillaume Laval, Anne Boland, Robert Olaso, Jean-François Deleuze, Frédérique Valentin, Ying-Chin Ko, Mattias Jakobsson, Antoine Gessain, Laurent Excoffier, Mark Stoneking, Etienne Patin & Lluis Quintana-Murci