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References

Aktuell

Caginalp 2018

Carey Caginalp & Gunduz Caginalp, *Valuation, liquidity price, and stability of cryptocurrencies*. PNAS **115** (2018), 1131–1134.

If there is a small supply of an asset and many buyers, it is only the opinion of those at the fringe of the bell-shaped curve (who may be mistaken) that will determine the price. The middle (and perhaps wiser) part of the distribution has no role in it.

Chandra 2017

Shekhar Chandra, *My second-chance Ph.D.* science **358** (2017), 1658.

I thought that attending a top-ranked university in the West, and especially the United States, would be a guaranteed ticket to success. I was also eager to help the world by studying the impact of pollution on the global environment. As a child growing up in a remote village in India, I had seen some of these effects myself, such as how indoor air pollution from cooking leads to health problems and how changing weather patterns affect farmers' crops. I hoped that the atmospheric science research I planned to pursue could help improve the lives of my family and friends back home and the many others in similar situations. So, when I arrived in the United States in 2007 to start my Ph.D., I was ready to put my head down and get to work.

Ferraro 2018

Joseph V. Ferraro, Katie M. Binetti, Logan A. Wiest, Donald Esker, Lori E. Baker & Steven L. Forman, *Contesting early archaeology in California*. nature **554** (2018), E1–E2.

The lack of discarded formal tools and diagnostic lithic debitage is noteworthy, and is unusual relative to most archaeological assemblages that purport hominin processing of proboscidean remains (although see Haynes4). We also note that upslope of the site there are numerous alluvial fans, with clastic material a common occurrence. The cobbles and pebbles at the CM site can be derived from modest alluvial fan input with fines subsequently winnowed with lower energy fluvial erosion. Crucially, none of the criteria that Holen et al.3 use to define stone artefacts either requires prehistoric hominin involvement or meets the accepted criteria for falsifying natural 'geofacts'.

The extraordinary claim by Holen et al.3 of prehistoric hominin involvement at the CM site should not be contingent on evidence that is open to multiple, contrasting interpretations. Until unambiguous evidence of hominin activities can be presented, such as formal stone tools or an abundance of percussion pits, caution requires us to set aside the claims of Holen et al.3 of prehistoric hominin activities at the CM site.

Holen 2018

Steven R. Holen et al., *Holen et al. reply*. nature **554** (2018), E3.

Steven R. Holen, Thomas A. Deméré, Daniel C. Fisher, Richard Fullagar, James B. Paces, George T. Jefferson, Jared M. Beeton, Richard A. Cerutti, Adam N. Rountrey, Lawrence Vescera & Kathleen A. Holen

By overlooking the most important bone evidence, which includes impact features such as cone flakes, bulbs of percussion and a large impact notch with associated negative flake scar, as well as bone distribution patterns, bone refits and missing femoral diaphysis pieces, Ferraro et al.2 did not consider precisely those features that are individually and collectively most likely to have been caused by cultural processes. They have not offered a cogent alternative site formation hypothesis that accounts for all evidence presented.

Waller 2018

William H. Waller, *My second life as a teacher*. science **359** (2018), 246.

For most of my educational and professional life, I pursued a fairly standard trajectory. A bachelor's degree in physics and astronomy, a master's in optical physics, and a Ph.D. in astronomy prepared me for a postdoctoral fellowship and subsequent work as a scientist at NASA's Goddard Space Flight Center. I moved on to a visiting professorship and then a research professorship at Tufts University. I thought I was well on my way to a stable career as an astronomer. Then it stalled, and my second life beckoned.

Zepeda 2018

Lydia Zepeda, *The harassment tax*. science **359** (2018), 126.

A senior faculty member asked me into his office. I assumed it was to talk about agricultural data. It was the fall of 1991 and I was untenured, 32 years old, and 7 months pregnant. He was in his 60s and one of many men who were going to vote on my tenure. He showed me the recent issue of Vanity Fair with Demi Moore on the cover, pregnant and nude. "She reminds me of you," he said as he tried to catch my eye. I looked at the floor, stunned. I mumbled something and backed out of his office, wondering whether I would ever feel clean again.

Anthropologie

Burger 2018

Joseph R. Burger & Trevor S. Fristoe, *Hunter-gatherer populations inform modern ecology*. PNAS **115** (2018), 1137–1139.

Many of the regions that supported the highest densities of hunter-gatherers still host some of the largest populations today. Many regions where high disease burdens previously limited hunter-gatherers to low densities (e.g., equatorial Africa, India, and eastern China) are now some of the most densely populated areas on the planet. Human population expansion and increased standards of living in mid and high latitudes suggest that overcoming low environmental productivity may be easier than combating diseases.

Meindl 2018

Richard S. Meindl, Morgan E. Chaney & C. Owen Lovejoy, *Early hominids may have been weed species*. PNAS **115** (2018), 1244–1249.

Panid, gorillid, and hominid social structures appear to have diverged as dramatically as did their locomotor patterns as they emerged from a late Miocene last common ancestor (LCA). Despite their elimination of the sectorial canine complex and adoption of bipedality with its attendant removal of their ready access

to the arboreal canopy, Australopithecus was able to easily invade novel habitats after florescence from its likely ancestral genus, Ardipithecus sp. Other hominoids, unable to sustain sufficient population growth, began an inexorable decline, culminating in their restriction to modern refugia. Success similar to that of earliest hominids also characterizes several species of macaques, often termed "weed species." We here review their most salient demographic features and find that a key element is irregularly elevated female survival. It is reasonable to conclude that a similar feature characterized early hominids, most likely made possible by the adoption of social monogamy. Reduced female mortality is a more probable key to early hominid success than a reduction in birth space, which would have been physiologically more difficult.

Keywords: Australopithecus | macaques | chimpanzee | hominin | primate biodemography

Significance: Earliest hominids demonstrate major differences from fundamental behaviors typical of other primates. These included upright walking, a reduction in canine dimorphism, and unusual demographic success. All three were likely parts of a comprehensive adaptive complex that was also unlike that of any other primate and likely reflect a novel social structure. When primate "weed species," such as some macaques, are examined for those key behavioral features most responsible for their unusual great demographic success, an irregular but robust elevation of female survivorship emerges as key. It is likely that a similar adaptation characterized earliest hominids such as Australopithecus.

Raghanti 2018

Mary Ann Raghanti et al., *A neurochemical hypothesis for the origin of hominids*. PNAS **115** (2018), E1108–E1116.

Mary Ann Raghanti, Melissa K. Edler, Alexa R. Stephenson, Emily L. Munger, Bob Jacobs, Patrick R. Hof, Chet C. Sherwood, Ralph L. Holloway & C. Owen Lovejoy

It has always been difficult to account for the evolution of certain human characters such as language, empathy, and altruism via individual reproductive success. However, the striatum, a subcortical region originally thought to be exclusively motor, is now known to contribute to social behaviors and "personality styles" that may link such complexities with natural selection. We here report that the human striatum exhibits a unique neurochemical profile that differs dramatically from those of other primates. The human signature of elevated striatal dopamine, serotonin, and neuropeptide Y, coupled with lowered acetylcholine, systematically favors externally driven behavior and greatly amplifies sensitivity to social cues that promote social conformity, empathy, and altruism. We propose that selection induced an initial form of this profile in early hominids, which increased their affiliative behavior, and that this shift either preceded or accompanied the adoption of bipedality and elimination of the sectorial canine. We further hypothesize that these changes were critical for increased individual fitness and promoted the adoption of social monogamy, which progressively increased cooperation as well as a dependence on tradition-based cultural transmission. These eventually facilitated the acquisition of language by elevating the reproductive advantage afforded those most sensitive to social cues.

Keywords: basal ganglia | neurotransmitter | Ardipithecus | hominin | dopamine

Significance: Two factors vital to the human clade are our unique demographic success and our social facilities including language, empathy, and altruism. These have always been difficult to reconcile with individual reproductive success. However, the striatum, a region of the basal ganglia, modulates social behavior and exhibits a unique neurochemical profile in humans. The human signature amplifies sensitivity to social cues that encourage social conformity and affiliative behavior

and could have favored provisioning and monogamy in emergent hominids, consilient with the simultaneous origin of upright walking and elimination of the sectorial canine. Such exceptional neurochemistry would have favored individuals especially sensitive to social cues throughout later human evolution and may account for cerebral cortical expansion and the emergence of language.

Tallavaara 2018

Miikka Tallavaara, Jussi T. Eronen & Miska Luoto, *Productivity, biodiversity, and pathogens influence the global hunter-gatherer population density*. PNAS **115** (2018), 1232–1237.

The environmental drivers of species distributions and abundances are at the core of ecological research. However, the effects of these drivers on human abundance are not well-known. Here, we report how net primary productivity, biodiversity, and pathogen stress affect human population density using global ethnographic hunter-gatherer data. Our results show that productivity has significant effects on population density globally. The most important direct drivers, however, depend on environmental conditions: biodiversity influences population density exclusively in lowproductivity regions, whereas pathogen stress does so in high-productivity regions. Our results also indicate that subtropical and temperate forest biomes provide the highest carrying capacity for hunter-gatherer populations. These findings document that environmental factors play a key role in shaping global population density patterns of preagricultural humans.

Keywords: hunter-gatherers | population density | pathogens | human ecology | structural equation modeling

Significance: Because of complex cumulative culture, human populations are often considered to be divorced from the environment and not be under the same ecological forcing as other species. However, this study shows that key environmental parameters net primary productivity, biodiversity, and environmental pathogen stress have strong influence on the global pattern of hunter-gatherer population density. Productivity and biodiversity exert the strongest influence in high and midlatitudes, whereas pathogens become more important in tropics. The most suitable conditions for preagricultural humans are found in temperate and subtropical biomes. Our results show that cultural evolution has not freed human hunter-gatherers from strong biotic and abiotic forcing.

Biologie

Dean 2018

Katharine R. Dean et al., *Human ectoparasites and the spread of plague in Europe during the Second Pandemic*. PNAS **115** (2018), 1304–1309.

Katharine R. Dean, Fabienne Krauer, Lars Walløe, Ole Christian Lingjærde, Barbara Bramanti, Nils Chr. Stenseth & Boris V. Schmid

Plague, caused by the bacterium Yersinia pestis, can spread through human populations by multiple transmission pathways. Today, most human plague cases are bubonic, caused by spillover of infected fleas from rodent epizootics, or pneumonic, caused by inhalation of infectious droplets. However, little is known about the historical spread of plague in Europe during the Second Pandemic (14–19th centuries), including the Black Death, which led to high mortality and recurrent epidemics for hundreds of years. Several studies have suggested that human ectoparasite vectors, such as human fleas (Pulex irritans) or body lice (Pediculus humanus humanus), caused the rapidly spreading epidemics. Here, we describe

a compartmental model for plague transmission by a human ectoparasite vector. Using Bayesian inference, we found that this model fits mortality curves from nine outbreaks in Europe better than models for pneumonic or rodent transmission. Our results support that human ectoparasites were primary vectors for plague during the Second Pandemic, including the Black Death (1346–1353), ultimately challenging the assumption that plague in Europe was predominantly spread by rats.

Keywords: Yersinia pestis | Black Death | SIR modeling | Bayesian analysis | Monte Carlo Markov chain

Significance: Plague is infamous as the cause of the Black Death (1347–1353) and later Second Pandemic (14th to 19th centuries CE), when devastating epidemics occurred throughout Europe, the Middle East, and North Africa. Despite the historical significance of the disease, the mechanisms underlying the spread of plague in Europe are poorly understood. While it is commonly assumed that rats and their fleas spread plague during the Second Pandemic, there is little historical and archaeological support for such a claim. Here, we show that human ectoparasites, like body lice and human fleas, might be more likely than rats to have caused the rapidly developing epidemics in pre-Industrial Europe. Such an alternative transmission route explains many of the notable epidemiological differences between historical and modern plague epidemics.

Klima

Voosen 2017

Paul Voosen, *Deep Pacific cooled by 'little ice age' waters*. science **358** (2017), 1515–1516.

Cold waters from centuries ago may still be taking up modern heat.

That means the deep waters of the Pacific, unlike the relatively young Atlantic depths, should reflect surface temperatures from hundreds of years ago. "From 1350 to the present day [those depths are] expected to be cooling," says Jake Gebbie, a physical oceanographer at the Woods Hole Oceanographic Institution in Massachusetts, who presented the work. "Cooling—despite the fact that the surface is warming."

If real, this slow drop in deep ocean temperatures is a boon to a warming planet. If the little ice age hadn't cooled the oceans, they'd likely be absorbing less heat from the atmosphere today, and surface warming would be much worse than it already is. "It's buying us time," Rosenthal says. "It's buying us time."

Kultur

Algaze 2018

Guillermo Algaze, *Entropic Cities, The Paradox of Urbanism in Ancient Mesopotamia*. Current Anthropology **59** (2018), 23–54.

The growth of cities in antiquity is paradoxical: before modern health and sanitation standards, early urban dwellers suffered high mortality as a result of epidemics and chronic diseases arising, respectively, from propinquity and poor sanitation. At the same time, lower-status individuals within those cities would have endured depressed birth rates because, typically, many toiled in partially or fully dependent occupations not conducive to early marriage or stable families. The interplay between these compounding forces implies that early cities would not have been viable over the long term and could not have grown without a continual flow of

immigrants. The early cities of Mesopotamia were no exception. In an earlier publication, I argued that the growth of the first centers that emerged in the alluvial lowlands of the Tigris and Euphrates Rivers during the fourth millennium BC was predicated on migratory inflows that took place, in part, in the context of self-amplifying cycles whereby the replacement of imported commodities with locally made, mass-produced substitutes catalyzed increases in specialization, employment, market size, and trade (Smithian growth). In this article, I expand on these ideas, explore their applicability to later periods of Mesopotamian history, and consider further iterations of substitution-fueled growth cycles in those periods.

Comments by: Geoff Emberling, Marcella Frangipane, Robert C. Hunt, Justin Jennings, Augusta McMahon, Piotr Michalowski, Michael E. Smith & José Lobo and Piotr Steinkeller

Lawler 2017

Andrew Lawler, *Were nomads the world's first traders?* science **358** (2017), 1518–1519.

Researchers spar over whether pastoralists sparked the rise of urban civilization.

If nomads weren't the long-distance traders of the ancient world, most goods must have moved by other means—and discoveries in the past decade suggest one possibility. Archaeologists have found that cities and towns were far more common in the Bronze Age Middle East than once thought. That would have allowed trade to be sustained through social networks, created by royal marriages and traveling merchants, rather than nomads, Potts says.

Kupfer

Nezafati 2006

Nima Nezafati, Ernst Pernicka & Morteza Momenzadeh, *Ancient tin, Old question and a new answer.* Antiquity **80** (2006), nezafati_et_al. <http://antiquity.ac.uk/projgall/nezafati%20et%20al/>.

We investigated the newly discovered ancient copper-tin mine at Deh Hosein. The ancient mine at Deh Hosein (Figure 2) is located c. 45 km southwest of Arak city in the eastern part of the central Zagros Mountains which form the north-eastern border of Luristan.

Thus we have found several indications that Deh Hosein may have been a major supplier of tin for ancient civilisations of Iran and Mesopotamia and perhaps even further west beginning in the third millennium BCE: In summary:
i) The lead isotope compatibility of ores from Deh Hosein with many bronze artefacts from Bronze and Iron Age sites distributed from the southern Persian Gulf to the Aegean is good.
ii) This is combined with a good match for trace element patterns of ores and artefacts.
iii) Copper and tin occur within one mineralisation.
iv) Ancient textual references mention tin and bronze supply from regions east of Mesopotamia.
v) The dating of surface finds of pottery and charcoal finally supports our findings. At present Deh Hosein is the only tin occurrence close to Luristan and Mesopotamia. However, it is possible that further ancient tin mines may be discovered in the northern part of the Sanandaj-Sirjan zone, located in a similar geological environment.

Arnold 2018

Elizabeth Arnold, Haskel Greenfield, Gideon Hartman, Tina Greenfield, Itzhaq Shai, Parryss Carter-McGee & Aren Maeir, *Provisioning the Early Bronze Age City of Tell es-Safi/Gath, Israel, Isotopic Analyses of Domestic Livestock Management Patterns*. Open Quaternary **4** (2018), i, 1–12. DOI:10.5334/oq.35.

It is often assumed that domestic animals in early urban Near Eastern centres either are a reflection of the local pastoral economy, or were raised at a distance by pastoral specialists. In this paper, we test these assumptions through detailed isotopic analyses (carbon, oxygen and strontium) of caprines (sheep and goat) from Tell es-Safi/Gath, an Early Bronze Age urban centre in central Israel. The isotopic analyses demonstrate that the bulk of the caprines were raised within the general vicinity of the site, suggesting that the majority of food resources were largely produced at the local level, within the territory of the city-state, and not at a distance by specialised pastoralists. It is the rare specimen that comes from a great distance and would have entered the local system through long distance trade networks.

Keywords: tooth enamel carbonate | 87Sr/86Sr | d18O | d13C | archaeology | Levant | Early Bronze Age | zooarchaeology | pastoralism | herd management