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References

Aktuell

Seven Days 2016

Koch quits. nature **529** (2016), 443.

Koch has given millions of dollars to the museum, which named its dinosaur wing after him. But his presence on the board has been criticized by scientists and activists because the Koch family has also funded climate-change deniers.

Biologie

Jackson 2016

Nicholas J. Jackson et al., *Impact of adolescent marijuana use on intelligence, Results from two longitudinal twin studies*. PNAS **113** (2016), E500–E508.

Nicholas J. Jackson, Joshua D. Isen, Rubin Khoddam, Daniel Irons, Catherine Tuvblad, William G. Iacono, Matt McGue, Adrian Raine & Laura A. Baker

Marijuana is one of the most commonly used drugs in the United States, and use during adolescence—when the brain is still developing —has been proposed as a cause of poorer neurocognitive outcome. Nonetheless, research on this topic is scarce and often shows conflicting results, with some studies showing detrimental effects of marijuana use on cognitive functioning and others showing no significant long-term effects. The purpose of the present study was to examine the associations of marijuana use with changes in intellectual performance in two longitudinal studies of adolescent twins (n = 789 and n = 2,277). We used a quasi-experimental approach to adjust for participants' family background characteristics and genetic propensities, helping us to assess the causal nature of any potential associations. Standardized measures of intelligence were administered at ages 9–12 y, before marijuana involvement, and again at ages 17–20 y. Marijuana use was self-reported at the time of each cognitive assessment as well as during the intervening period. Marijuana users had lower test scores relative to nonusers and showed a significant decline in crystallized intelligence between preadolescence and late adolescence. However, there was no evidence of a dose–response relationship between frequency of use and intelligence quotient (IQ) change. Furthermore, marijuana-using twins failed to show significantly greater IQ decline relative to their abstinent siblings. Evidence from these two samples suggests that observed declines in measured IQ may not be a direct result of marijuana exposure but rather attributable to familial factors that underlie both marijuana initiation and low intellectual attainment.

Keywords: marijuana use | intelligence | adolescence | longitudinal | twins

Significance: Marijuana is the most commonly used recreational drug in the United States. Some studies suggest that marijuana use in adolescence is linked to declines in intellectual functioning. Because of the infeasibility of studying this phenomenon experimentally, it is unclear whether the association can be causally attributed to marijuana use itself or is instead the result of confounding factors. We approach this issue quasiexperimentally using longitudinal samples of adolescent twins. Among twin pairs discordant for marijuana use, we assessed intelligence

quotient (IQ) score changes while adjusting for the effects of genetic influences and other factors shared by members of the same twin pair. Results suggest that familial confounds underlie the association between adolescent marijuana use and declining IQ scores.

Datierung

Moseley 2016

Gina E. Moseley et al., *Reconciliation of the Devils Hole climate record with orbital forcing*. science **351** (2016), 165–168.

Gina E. Moseley, R. Lawrence Edwards, Kathleen A. Wendt, Hai Cheng, Yuri Dublyansky, Yanbin Lu, Ronny Boch & Christoph Spötl

The driving force behind Quaternary glacial-interglacial cycles and much associated climate change is widely considered to be orbital forcing. However, previous versions of the iconic Devils Hole (Nevada) subaqueous calcite record exhibit shifts to interglacial values ≈10,000 years before orbitally forced ice age terminations, and interglacial durations ≈10,000 years longer than other estimates. Our measurements from Devils Hole 2 replicate virtually all aspects of the past 204,000 years of earlier records, except for the timing during terminations, and they lower the age of the record near Termination II by ≈8000 years, removing both ≈10,000-year anomalies.The shift to interglacial values now broadly coincides with the rise in boreal summer insolation, the marine termination, and the rise in atmospheric CO2, which is consistent with mechanisms ultimately tied to orbital forcing.

Our chronologies from Devils Hole have demonstrated that there is a systematic offset in the age of calcite deposited at increasing depths in these open fractures across glacial terminations, thus helping to solve one of the great paleoclimate enigmas of the past three decades.

Jungpaläolithikum

Pitulko 2016

Vladimir V. Pitulko, Alexei N. Tikhonov, Elena Y. Pavlova, Pavel A. Nikolskiy, Konstantin E. Kuper & Roman N. Polozov, *Early human presence in the Arctic, Evidence from 45,000-year-old mammoth remains*. science **351** (2016), 260–263.

s351-0260-Supplement.pdf

Archaeological evidence for human dispersal through northern Eurasia before 40,000 years ago is rare. In west Siberia, the northernmost find of that age is located at 57°N. Elsewhere, the earliest presence of humans in the Arctic is commonly thought to be circa 35,000 to 30,000 years before the present. A mammoth kill site in the central Siberian Arctic, dated to 45,000 years before the present, expands the populated area to almost 72°N. The advancement of mammoth hunting probably allowed people to survive and spread widely across northernmost Arctic Siberia.

Klima

Costa 2016

K. M. Costa et al., *No iron fertilization in the equatorial Pacific Ocean during the last ice age*. nature **529** (2016), 519–522.

K. M. Costa, J. F. McManus, R. F. Anderson, H. Ren, D. M. Sigman, G. Winckler, M. Q. Fleisher, F. Marcantonio & A. C. Ravelo

The equatorial Pacific Ocean is one of the major high-nutrient, low-chlorophyll regions in the global ocean. In such regions, the consumption of the available macro-nutrients such as nitrate and phosphate is thought to be limited in part by the low abundance of the critical micro-nutrient iron1. Greater atmospheric dust deposition2 could have fertilized the equatorial Pacific with iron during the last ice age—the Last Glacial Period (LGP)—but the effect of increased ice-age dust fluxes on primary productivity in the equatorial Pacific remains uncertain3–6. Here we present meridional transects of dust (derived from the 232Th proxy), phytoplankton productivity (using opal, 231Pa/230Th and excess Ba), and the degree of nitrate consumption (using foraminifera-bound .15N) from six cores in the central equatorial Pacific for the Holocene (0–10,000 years ago) and the LGP (17,000–27,000 years ago). We find that, although dust deposition in the central equatorial Pacific was two to three times greater in the LGP than in the Holocene, productivity was the same or lower, and the degree of nitrate consumption was the same. These biogeochemical findings suggest that the relatively greater ice-age dust fluxes were not large enough to provide substantial iron fertilization to the central equatorial Pacific. This may have been because the absolute rate of dust deposition in the LGP (although greater than the Holocene rate) was very low. The lower productivity coupled with unchanged nitrate consumption suggests that the subsurface major nutrient concentrations were lower in the central equatorial Pacific during the LGP. As these nutrients are today dominantly sourced from the Subantarctic Zone of the Southern Ocean, we propose that the central equatorial Pacific data are consistent with more nutrient consumption in the Subantarctic Zone, possibly owing to iron fertilization as a result of higher absolute dust fluxes in this region7,8. Thus, ice-age iron fertilization in the Subantarctic Zone would have ultimately worked to lower, not raise, equatorial Pacific productivity.

Lin 2016

Hanzhi Lin, Fedor I. Kuzminov, Jisoo Park, SangHoon Lee, Paul G. Falkowski & Maxim Y. Gorbunov, *The fate of photons absorbed by phytoplankton in the global ocean.* science **351** (2016), 264–267.

s351-0264-Supplement.pdf

Solar radiation absorbed by marine phytoplankton can follow three possible paths. By simultaneously measuring the quantum yields of photochemistry and chlorophyll fluorescence in situ, we calculate that, on average, ≈60 % of absorbed photons are converted to heat, only 35 % are directed toward photochemical water splitting, and the rest are reemitted as fluorescence. The spatial pattern of fluorescence yields and lifetimes strongly suggests that photochemical energy conversion is physiologically limited by nutrients. Comparison of in situ fluorescence lifetimes with satellite retrievals of solar-induced fluorescence yields suggests that the mean values of the latter are generally representative of the photophysiological state of phytoplankton; however, the signal-to-noise ratio is unacceptably low in extremely oligotrophic regions, which constitute 30 % of the open ocean.

Metallzeiten

Sapir-Hen 2016

Lidar Sapir-Hen, Aharon Sasson, Assaf Kleiman & Israel Finkelstein, *Social Stratification in the Late Bronze and Early Iron Ages, An Intra-*

Site Investigation at Megiddo. Oxford Journal of Archaeology **35** (2016), 47–73.

The article presents an intra-site investigation of the Strata VIIA and VIA faunal remains at Megiddo, Israel, which date to the LB III and late Iron I respectively. We examined social disparity between the populations of two areas of the city. Our finds indicate a difference in social status and division of labour: a dichotomy between producer-consumers and consumers, who most probably interacted. Viewed in light of other types of remains at Megiddo, these findings reveal that the inhabitants of one sector engaged in agriculture and cottage industries, while the people in the other part of the city, close to the palace, were more affluent – related to the local ruler and administrators. Our study demonstrates the potential in intra-site investigation at large, multiperiod sites.

According to the conventional theory, the collapse of the Egypto-Canaanite system at the end of the LB III led to the creation of a less stratified, more 'egalitarian' or 'village' society in the following Iron I. Recent studies of the pottery and other finds of late Iron I Megiddo (e.g. Finkelstein 2003; Arie 2006; 2013a) have pointed to clear cultural continuity in the Iron I, despite the turbulence in the late twelfth century BC, and hence prove this assumption wrong. Our current analysis demonstrates similar patterns in the Late Bronze and Iron I, and thus suggests that late Iron I Megiddo represents a well-stratified society.

Methoden

Guiterman 2016

Christopher H. Guiterman, Thomas W. Swetnam & Jeffrey S. Dean, *Eleventh-century shift in timber procurement areas for the great houses of Chaco Canyon*. PNAS **113** (2016), 1186–1190.

pnas113-01186-Supplement.xls

An enduring mystery from the great houses of Chaco Canyon is the origin of more than 240,000 construction timbers. We evaluate probable timber procurement areas for seven great houses by applying tree-ring width-based sourcing to a set of 170 timbers. To our knowledge, this is the first use of tree rings to assess timber origins in the southwestern United States. We found that the Chuska and Zuni Mountains (>75 km distant) were the most likely sources, accounting for 70 % of timbers. Most notably, procurement areas changed through time. Before 1020 Common Era (CE) nearly all timbers originated from the Zunis (a previously unrecognized source), but by 1060 CE the Chuskas eclipsed the Zuni area in total wood imports. This shift occurred at the onset of Chaco florescence in the 11th century, a time with substantial expansion of existing great houses and the addition of seven new great houses in the Chaco Core area. It also coincides with the proliferation of Chuskan stone tools and pottery in the archaeological record of Chaco Canyon, further underscoring the link between land use and occupation in the Chuska area and the peak of great house construction. Our findings, based on the most temporally specific and replicated evidence of Chacoan resource procurement obtained to date, corroborate the long-standing but recently challenged interpretation that large numbers of timbers were harvested and transported from distant mountain ranges to build the great houses at Chaco Canyon.

Keywords: Ancestral Puebloans | archaeology | human–environment interactions | dendrochronology | timber origins

Significance: The iconic great houses of Chaco Canyon occupy a nearly treeless landscape and yet were some of the largest pre-Columbian structures in North America. This incongruity has sparked persistent debate over the origins of more

than 240,000 trees used in construction. We used tree-ring methods for determining timber origins for the first time to our knowledge in the south-western United States and show that 70 % of timbers likely originated over 75 km from Chaco. We found that a previously unrecognized timber source, the Zuni Mountains, supplied construction beams as early as the 850s in the Common Era. Further, we elucidate shifting dynamics of procurement that highlight the importance of a single landscape, the Chuska Mountains, in the florescence of the Chacoan system.