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References

Aktuell

Citron 2015

Daniel T. Citron & Paul Ginsparg, *Patterns of text reuse in a scientific corpus*. PNAS **112** (2015), 25–30.

We consider the incidence of text "reuse" by researchers via a systematic pairwise comparison of the text content of all articles deposited to arXiv.org from 1991 to 2012. We measure the global frequencies of three classes of text reuse and measure how chronic text reuse is distributed among authors in the dataset. We infer a baseline for accepted practice, perhaps surprisingly permissive compared with other societal contexts, and a clearly delineated set of aberrant authors. We find a negative correlation between the amount of reused text in an article and its influence, as measured by subsequent citations. Finally, we consider the distribution of countries of origin of articles containing large amounts of reused text.

arXiv | plagiarism | text mining | n-grams

Hendy 2015

Ingrid L. Hendy, *Ironing out carbon export to the deep ocean*. PNAS **112** (2015), 306–307.

In PNAS, Lopes et al. (1) present a novel approach to quantifying the efficiency of the biological carbon pump as Earth's climate warmed from the ice bound glacial episode (26,000–18,000 y before present) to the equable climate of the present interglacial (10,000 y BP until present).

Artificially increasing POC export efficiency through directly intervening in the Fe biogeochemical cycle may provide a mechanism to remove greenhouse gases from the atmosphere in the future.

Lesk 2015

Michael Lesk, *How many scientific papers are not original?* PNAS **112** (2015), 6–7.

Mistaken research was highlighted in an important study by Begley and Ellis, who found that it was impossible to replicate 47 of 53 oncology studies that they attempted to repeat.

The h-index is the modern equivalent of the old saying "Deans can't read, they can only count." In some countries, having a paper accepted in a top journal can mean a cash bonus, with Zhejiang University offering a $ 30,000 payment to an author who publishes in Science or Nature.

Perhaps it is not surprising that the Hainan conference included several papers that had come from the SCIGen chatterbot or some similar program. Here is a sentence from one abstract (since removed from IEEE Xplore): "Furthermore, it explored a pervasive tool for enabling pasteurization, which is used to show that context-free grammar and B-trees are largely compatible."

Anthropologie

Carrigan 2015

Matthew A. Carrigan et al., *Hominids adapted to metabolize ethanol long before human-directed fermentation*. PNAS **112** (2015), 458–463.

pnas112-00458-Supplement.docx

Matthew A. Carrigan, Oleg Uryasev, Carole B. Frye, Blair L. Eckman, Candace R. Myers, Thomas D. Hurley & Steven A. Benner

Paleogenetics is an emerging field that resurrects ancestral proteins from now-extinct organisms to test, in the laboratory, models of protein function based on natural history and Darwinian evolution. Here, we resurrect digestive alcohol dehydrogenases (ADH4) from our primate ancestors to explore the history of primate–ethanol interactions. The evolving catalytic properties of these resurrected enzymes show that our ape ancestors gained a digestive dehydrogenase enzyme capable of metabolizing ethanol near the time that they began using the forest floor, about 10 million y ago. The ADH4 enzyme in our more ancient and arboreal ancestors did not efficiently oxidize ethanol. This change suggests that exposure to dietary sources of ethanol increased in hominids during the early stages of our adaptation to a terrestrial lifestyle. Because fruit collected from the forest floor is expected to contain higher concentrations of fermenting yeast and ethanol than similar fruits hanging on trees, this transition may also be the first time our ancestors were exposed to (and adapted to) substantial amounts of dietary ethanol.

experimental paleogenetics | alcohol dehydrogenase | ethanol | primates | evolution

Dominy 2015

Nathaniel J. Dominy, *Ferment in the family tree*. PNAS **112** (2015), 308–309.

In any case, S. cerevisiae is a species complex that diversified into several strains approximately 12,000 y ago. The two oldest strains—those involved with grape and rice wine—show evidence of domestication, suggesting that the antiquity of directed fermentation is coincident with the early Neolithic, if not much earlier.

Kim 2014

Hie Lim Kim, Aakrosh Ratan, George H. Perry, Alvaro Montenegro, Webb Miller & Stephan C. Schuster, *Khoisan hunter-gatherers have been the largest population throughout most of modern-human demographic history*. Nature Communications **5** (2014), 5692. DOI:10.1038/ncomms6692.

NatComm05-5692-Supplement.pdf

The Khoisan people from Southern Africa maintained ancient lifestyles as hunter-gatherers or pastoralists up to modern times, though little else is known about their early history. Here we infer early demographic histories of modern humans using whole-genome sequences of five Khoisan individuals and one Bantu speaker. Comparison with a 420 K SNP data set from worldwide individuals demonstrates that two of the Khoisan genomes from the Ju/'hoansi population contain exclusive Khoisan ancestry. Coalescent analysis shows that the Khoisan and their ancestors have been the largest populations since their split with the non-Khoisan population ≈100–150 kyr ago. In contrast, the ancestors of the non-Khoisan groups, including Bantu-speakers and non-Africans, experienced population declines after the split and lost more than half of their genetic diversity.

Paleoclimate records indicate that the precipitation in southern Africa increased ≈80–100 kyr ago while west-central Africa became drier. We hypothesize that these climate differences might be related to the divergent-ancient histories among human populations.

Ryan 2015

Timothy M. Ryan & Colin N. Shaw, *Gracility of the modern Homo sapiens skeleton is the result of decreased biomechanical loading*. PNAS **112** (2015), 372–377.

The postcranial skeleton of modern Homo sapiens is relatively gracile compared with other hominoids and earlier hominins. This gracility predisposes contemporary humans to osteoporosis and increased fracture risk. Explanations for this gracility include reduced levels of physical activity, the dissipation of load through enlarged joint surfaces, and selection for systemic physiological characteristics that differentiate modern humans from other primates. This study considered the skeletal remains of four behaviorally diverse recent human populations and a large sample of extant primates to assess variation in trabecular bone structure in the human hip joint. Proximal femur trabecular bone structure was quantified from microCT data for 229 individuals from 31 extant primate taxa and 59 individuals from four distinct archaeological human populations representing sedentary agriculturalists and mobile foragers. Analyses of mass-corrected trabecular bone variables reveal that the forager populations had significantly higher bone volume fraction, thicker trabeculae, and consequently lower relative bone surface area compared with the two agriculturalist groups. There were no significant differences between the agriculturalist and forager populations for trabecular spacing, number, or degree of anisotropy. These results reveal a correspondence between human behavior and bone structure in the proximal femur, indicating that more highly mobile human populations have trabecular bone structure similar to what would be expected for wild nonhuman primates of the same body mass. These results strongly emphasize the importance of physical activity and exercise for bone health and the attenuation of age-related bone loss.

trabecular bone | gracilization | human evolution | biomechanics | mobility

Biologie

Root-Bernstein 2015

Meredith Root-Bernstein & Robert Root-Bernstein, *The ribosome as a missing link in the evolution of life*. Journal of Theoretical Biology **367** (2015), 130–158.

Many steps in the evolution of cellular life are still mysterious. We suggest that the ribosome may represent one important missing link between compositional (or metabolism-first), RNA-world (or genes-first) and cellular (last universal common ancestor) approaches to the evolution of cells. We present evidence that the entire set of transfer RNAs for all twenty amino acids are encoded in both the 16S and 23S rRNAs of Escherichia coli K12; that nucleotide sequences that could encode key fragments of ribosomal proteins, polymerases, ligases, synthetases, and phosphatases are to be found in each of the six possible reading frames of the 16S and 23S rRNAs; and that every sequence of bases in rRNA has information encoding more than one of these functions in addition to acting as a structural component of the ribosome. Ribosomal RNA, in short, is not just a structural scaffold for proteins, but the vestigial remnant of a primordial genome thatmay have encoded a

selforganizing, self-replicating, auto-catalytic intermediary between macromolecules and cellular life.

Keywords: Ribosomal RNA | Transfer RNA | Messenger RNA | Protein synthesis | RNA world

Datierung

Weninger 2014

Bernhard Weninger & Donald Easton, *The Early Bronze Age Chronology of Troy (Periods I—III), Pottery Seriation, Radiocarbon Dating and the Gap*. In: Barbara Horejs & Mathias Mehofer (Hrsg.), *Western Anatolia before Troy: Proto-Urbanisation in the 4th Millennium BC? Proceedings of the International Symposium held at the Kunsthistorisches Museum Wien, Vienna, Austria, 21–24 November, 2012*. Oriental and European Archaeology 1 (Wien 2014), 157–199.

Detailed re-analysis of N=76 previously published 14C-ages from Early Bronze Age (EBA) Troy (northwestern Anatolia) provides an absolute chronology for periods I.III with dating precision ± 30 yrs (68 % conidence). As shown by pottery seriation (Correspondence Analysis: CA) of Blegen vessel shapes for periods I.V, there are indications for an extended (multi-phase) gap in the EBA-sequence between periods III and IV. A similar gap can be recognized in the 14C-dates from Troy IV and V. As it appears, following desertion at the end of Troy III around 2150 calBC, the site was abandoned for some (estimated) 100.200 years. However, we were unable to identify the gap in the pottery data of Schliemann. The possibility of a break in the Troy EBA-sequence deserves further studies.

Keywords: Turkey, northwestern Anatolia, Troy, Early Bronze Age, radiocarbon, chronology

Weninger 2014

Bernhard Weninger, Lee Clare, Fokke Gerritsen, Barbara Horejs, Raiko Krauß, Jörg Linstädter, Rana Özbal & Eelco J. Rohling, *Neolithisation of the Aegean and Southeast Europe during the 6600-6000 calBC period of Rapid Climate Change*. Documenta Praehistorica **41** (2014), 1–31.

In extension of the recently established 'Rapid Climate Change (RCC) Neolithisation Model' (Clare 2013), in the present paper we demonstrate the existence of a remarkable coincidence between the exact (decadal-scale) entry and departure dates of the Neolithic into/from the Aegean (≈6600/6050 calBC) with begin/end of RCC-conditions.

Keywords: Neolithisation; radiocarbon chronology; Rapid Climate Change

Energie

Normile 2014

Dennis Normile, *The trouble with tritium*. science **346** (2014), 1278.

Japan searches for a way to cleanse contaminated water from the damaged Fukushima plant.

Kurion has modified a process called combined electrolysis catalytic exchange. It starts by splitting the contaminated water molecules into gaseous oxygen and a

mixed gas of hydrogen and tritium. The hydrogen mixture flows into the bottom of a column filled with a platinum catalyst while water trickles in from the top. The catalyst triggers a swap in which a hydrogen atom in the water trades places with a tritium atom in the gas. Clean hydrogen flows out the top of the column; water containing a higher concentration of tritium collects at the bottom.

Isotope

Martin 2015

Jeremy E. Martin, Derek Vance & Vincent Balter, *Magnesium stable isotope ecology using mammal tooth enamel*. PNAS **112** (2015), 430–435.

Geochemical inferences on ancient diet using bone and enamel apatite rely mainly on carbon isotope ratios (d13C) and to a lesser extent on strontium/calcium (Sr/Ca) and barium/calcium (Ba/Ca) elemental ratios. Recent developments in nontraditional stable isotopes provide an unprecedented opportunity to use additional paleodietary proxies to disentangle complex diets such as omnivory. Of particular relevance for paleodietary reconstruction are metals present in large quantity in bone and enamel apatite, providing that biologically mediated fractionation processes are constrained. Calcium isotope ratios (d44Ca) meet these criteria but exhibit complex ecological patterning. Stable magnesium isotope ratios (d26Mg) also meet these criteria but a comprehensive understanding of its variability awaits new isotopic data. Here, 11 extant mammal species of known ecology from a single locality in equatorial Africa were sampled for tooth enamel and, together with vegetation and feces, analyzed for d26Mg, d13C, Sr/Ca, and Ba/Ca ratios. The results demonstrate that d26Mg incorporated in tooth enamel becomes heavier from strict herbivores to omnivores/ faunivores. Using data from experimentally raised sheep, we suggest that this 26Mg enrichment up the trophic chain is due to a 26Mg enrichment in muscle relative to bone. Notably, it is possible to distinguish omnivores from herbivores, using d26Mg coupled to Ba/Ca ratios. The potential effects of metabolic and dietary changes on the enamel d26Mg composition remain to be explored but, in the future, multiproxy approaches would permit a substantial refinement of dietary behaviors or enable accurate trophic reconstruction despite specimen-limited sampling, as is often the case for fossil assemblages.

stable isotopes | magnesium | carbon | equatorial mammals | paleoecology Reconstructing

Jungpaläolithikum

Moreau 2015

Luc Moreau, Boštjan Odar, Tom Higham, Aleksander Horvat, Darja Pirkmajer & Peter Turk, *Reassessing the Aurignacian of Slovenia, Techno-economic behaviour and direct dating of osseous projectile points*. Journal of Human Evolution **78** (2015), 158–180.

The Palaeolithic of southern Central Europe has a long history of archaeological research. Particularly, the presence of numerous osseous projectile points in many early Upper Palaeolithic (EUP) assemblages in this region has attracted the attention of the international research community. However, the scarcity of properly identified and well-dated Aurignacian contexts represents an obstacle for investigation of the nature and timing of the Middle to Upper Palaeolithic transition.

In this context, the question of whether Neandertals made Aurignacian osseous projectile points, either on their own or as a consequence of cultural interaction with anatomically modern humans (AMH), still remains an open issue. Here we reassess the EUP record of Slovenia by evaluating the Aurignacian character of the assemblages from Potocka zijalka, Mokriska jama and Divje babe I in the light of their suggested roots in the local Mousterian. We provide a comprehensive description of the lithic industry from Potocka zijalka, which represents one of the rare EUP assemblages of southern Central Europe with a representative number of lithic artefacts to be analysed from the perspective of lithic technology and raw material economy. Our re-analysis of the Slovenian assemblages is backed by a series of 11 new ultrafiltered collagen 14C dates obtained directly on associated osseous projectile points from the studied assemblages. The Aurignacian of Potocka zijalka underlines the remarkable consistency of the Early Aurignacian with low typotechnological variability across Europe, resulting from a marked dependence on transported toolkits and raw material conservation. The new radiocarbon determinations for the Aurignacian of Slovenia appear to post-date the 34–32 ka BP (thousands of years before present) threshold for the last Neandertals in the region. Although not falsified, the hypothesis of Aurignacian bone tools in southern Central Europe as a product of late Neandertals is not supported by our re-examination of the EUP record of Slovenia.

Keywords: Middle to Upper Palaeolithic transition | Southern Central Europe | Lithic technology | Raw material economy | Organic points | AMS dating

Klima

Lopes 2015

Cristina Lopes, Michal Kucera & Alan C. Mix, *Climate change decouples oceanic primary and export productivity and organic carbon burial*. PNAS **112** (2015), 332–335.

pnas112-00332-Supplement1.xlsx, pnas112-00332-Supplement2.xlsx, pnas112-00332-Supplement3.xlsx, pnas112-00332-Supplement4.xlsx, pnas112-00332-Supplement5.docx, pnas112-00332-Supplement6.docx, pnas112-00332-Supplement7.xlsx

Understanding responses of oceanic primary productivity, carbon export, and burial to climate change is essential for model-based projection of biological feedbacks in a high-CO2 world. Here we compare estimates of productivity based on the composition of fossil diatom floras with organic carbon burial off Oregon in the Northeast Pacific across a large climatic transition at the last glacial termination. Although estimated primary productivity was highest during the Last Glacial Maximum, carbon burial was lowest, reflecting reduced preservation linked to low sedimentation rates. A diatom size index further points to a glacial decrease (and deglacial increase) in the fraction of fixed carbon that was exported, inferred to reflect expansion, and contraction, of subpolar ecosystems that today favor smaller plankton. Thus, in contrast to models that link remineralization of carbon to temperature, in the Northeast Pacific, we find dominant ecosystem and sea floor control such that intervals of warming climate had more efficient carbon export and higher carbon burial despite falling primary productivity.

organic carbon | export productivity | glacial-interglacial | diatoms | biological pump

Schimel 2015

David Schimel, Britton B. Stephens & Joshua B. Fisher, *Effect of increasing CO2 on the terrestrial carbon cycle*. PNAS **112** (2015), 436–441.

Feedbacks from the terrestrial carbon cycle significantly affect future climate change. The CO2 concentration dependence of global terrestrial carbon storage is one of the largest and most uncertain feedbacks. Theory predicts the CO2 effect should have a tropical maximum, but a large terrestrial sink has been contradicted by analyses of atmospheric CO2 that do not show large tropical uptake. Our results, however, show significant tropical uptake and, combining tropical and extratropical fluxes, suggest that up to 60 % of the present-day terrestrial sink is caused by increasing atmospheric CO2. This conclusion is consistent with a validated subset of atmospheric analyses, but uncertainty remains. Improved model diagnostics and new space-based observations can reduce the uncertainty of tropical and temperate zone carbon flux estimates. This analysis supports a significant feedback to future atmospheric CO2 concentrations from carbon uptake in terrestrial ecosystems caused by rising atmospheric CO2 concentrations. This feedback will have substantial tropical contributions, but the magnitude of future carbon uptake by tropical forests also depends on how they respond to climate change and requires their protection from deforestation.

climate feedback | carbon budget | tropics | atmospheric transport

Kultur

Glowacki 2015

Luke Glowacki & Richard Wrangham, *Warfare and reproductive success in a tribal population*. PNAS **112** (2015), 348–353.

Intergroup conflict is a persistent feature of many human societies yet little is known about why individuals participate when doing so imposes a mortality risk. To evaluate whether participation in warfare is associated with reproductive benefits, we present data on participation in small-scale livestock raids among the Nyangatom, a group of nomadic pastoralists in East Africa. Nyangatom marriages require the exchange of a significant amount of bridewealth in the form of livestock. Raids are usually intended to capture livestock, which raises the question of whether and how these livestock are converted into reproductive opportunities. Over the short term, raiders do not have a greater number of wives or children than nonraiders. However, elders who were identified as prolific raiders in their youth have more wives and children than other elders. Raiders were not more likely to come from families with fewer older maternal sisters or a greater number of older maternal brothers. Our results suggest that in this cultural context raiding provides opportunities for increased reproductive success over the lifetime.

warfare | human behavioral ecology | reproductive success | pastoralists | status

Mittelpaläolithikum

Smith 2015

Geoff M. Smith, *Neanderthal megafaunal exploitation in Western Europe and its dietary implications, A contextual reassessment of La Cotte de St Brelade (Jersey)*. Journal of Human Evolution **78** (2015), 181–201.

The recurrent presence at Middle Palaeolithic sites of megafaunal remains, such as mammoth, elephant and rhinoceros, together with isotope analyses signalling meat as a prominent protein source, have been used to argue that these species played a central role in Neanderthal diet. Key to this model are the bone heap horizons from La Cotte de St Brelade (Jersey), which were previously interpreted as game drive debris resulting from systematic Neanderthal hunting. However, this hypothesis has never been rigorously tested, neither at a site-scale, incorporating taphonomic and contextual data, nor at a wider European scale. First, this paper provides a contextual reassessment of the faunal remains from La Cotte to fully understand Neanderthal behaviour at the site. Second, a comparative database of 30 well-published Middle Palaeolithic sites with megafauna permits a data-driven, broader spatial (European) and diachronic assessment of the role of megafauna in Neanderthal subsistence behaviour. Results suggest initial Neanderthal occupation at La Cotte was intensive although through time site visits became more infrequent, as highlighted by a reduction in cultural debris concurrent with a rise in carnivore presence. While mammoths, just as other large mammals and occasionally carnivores, were clearly butchered at this locality, their acquisition and role in Neanderthal diet remains ambiguous. Broader comparisons across Western Europe indicate a main focus on a range of large herbivores, with only a minor, opportunistic, role for megafauna. Whilst stable isotope analysis suggests that Neanderthal diet was meatoriented, zooarchaeological data do not support the inference that megafauna were the major contributor of meat.

Keywords: Middle Palaeolithic | Subsistence behaviour | Faunal taphonomy

Yravedra 2015

José Yravedra & Lucía Cobo-Sánchez, *Neanderthal exploitation of ibex and chamois in southwestern Europe*. Journal of Human Evolution **78** (2015), 12–32.

JHumEvo078-0012-Supplement.xls

There is increasing evidence that Neanderthals had a diverse and flexible diet. They exploited a wide range of resources from large proboscideans to small animals like turtles, rabbits, and marine species. Here, we discuss the importance of ibex and chamois in Neanderthal hunting strategies. The exploitation of both animals has traditionally been regarded as typical of Homo sapiens hunting behavior but was not a feature of Neanderthal behavior, which was thought to have focused on other kinds of game like deer, horses or large bovids. Our analysis of an extensive sample of Middle Paleolithic sites with faunal remains in the Iberian Peninsula reveals that Iberian ibex and chamois were frequently present throughout this period. Statistical analyses allowed us to assess the conditions that might have favored the presence or absence of these animals in the sites, while the taphonomic analyses enabled us to address the issue of whether ibex and chamois were indeed hunted by Neanderthals in the Iberian Peninsula. Our results indicate a better representation of both species in rocky and mountainous areas. The taphonomy of some sites reveals that chamois and ibex were hunted by Neanderthals, who showed great adaptive capacities to a wide variety of environments, including mountainous habitats. In contrast, other sites with favorable ecological conditions for ibex and chamois where these animals were not exploited by Neanderthals, who chose to hunt other species like deer, horses or aurochs, suggest behavioral complexity and large versatility.

Keywords: Iberia | Capra ibex | Rupicapra rupicapra | Mousterian | Hunting | Homo | Diet

Neolithikum

Chirchir 2015

Habiba Chirchir et al., *Recent origin of low trabecular bone density in modern humans*. PNAS **112** (2015), 366–371.

Habiba Chirchir, Tracy L. Kivell, Christopher B. Ruff, Jean-Jacques Hublin, Kristian J. Carlson, Bernhard Zipfel & Brian G. Richmond

Humans are unique, compared with our closest living relatives (chimpanzees) and early fossil hominins, in having an enlarged body size and lower limb joint surfaces in combination with a relatively gracile skeleton (i.e., lower bone mass for our body size). Some analyses have observed that in at least a few anatomical regions modern humans today appear to have relatively low trabecular density, but little is known about how that density varies throughout the human skeleton and across species or how and when the present trabecular patterns emerged over the course of human evolution. Here, we test the hypotheses that (i) recent modern humans have low trabecular density throughout the upper and lower limbs compared with other primate taxa and (ii) the reduction in trabecular density first occurred in early Homo erectus, consistent with the shift toward a modern human locomotor anatomy, or more recently in concert with diaphyseal gracilization in Holocene humans. We used peripheral quantitative CT and microtomography to measure trabecular bone of limb epiphyses (long bone articular ends) in modern humans and chimpanzees and in fossil hominins attributed to Australopithecus africanus, Paranthropus robustus/ early Homo from Swartkrans, Homo neanderthalensis, and early Homo sapiens. Results show that only recent modern humans have low trabecular density throughout the limb joints. Extinct hominins, including pre-Holocene Homo sapiens, retain the high levels seen in nonhuman primates. Thus, the low trabecular density of the recent modern human skeleton evolved late in our evolutionary history, potentially resulting from increased sedentism and reliance on technological and cultural innovations.

trabecular bone | human evolution | gracilization | Homo sapiens | sedentism

Özdoğan 2014

Mehmet Özdoğan, *A new look at the introduction of the Neolithic way of life in Southeastern Europe, Changing paradigms of the expansion of the Neolithic way of life*. Documenta Praehistorica **41** (2014), 33–49.

Questioning when, how and even why the Neolithic way of life appeared in Europe has been one of the most debated problems of European prehistory, leading to the formulation of various explanatory models, each providing evidence to support its point of view, but without convincing others. Conventional standpoints, one-tract thinking and considering the emergence of the Neolithic way of life as a short-term event have hampered consensus, bringing discussions almost to a deadlock. Recent evidence has made it clear that the Neolithisation process in Europe was a multifarious event that went on for more than a millennium; thus, all previous hypotheses were correct with regard to their specific cases. Analytic or synthetic explicative models such as migration, colonisation, segregated infiltration, the transfer of commodities and of know-how, acculturation, assimilation, and maritime expansion that are seemingly mutually contradictory actually took place simultaneously as distinct modalities.

Keywords: Neolithic dispersal; Neolithic package; segregated migration; Marmara region; Anatolia