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References

Aktuell

Briggs 2016

Winslow R. Briggs, *How do sunflowers follow the Sun—and to what end?* science **353** (2016), 541–542.

Solar tracking may provide sunflowers with an unexpected evolutionary benefit.

Cho 2016

Adrian Cho, *The Storyteller*. science **353** (2016), 532–537.

With Rainer Weiss, gravitational wave hunter and likely Nobel laureate, there's the story—and there's the subtext.

Fortes 2016

Gloria G. Fortes et al., *Ancient DNA reveals differences in behaviour and sociality between brown bears and extinct cave bears*. Molecular Ecology (2016), preprint, 1–31. DOI:10.1111/mec.13800.

Gloria G. Fortes, Aurora Grandal-d'Anglade, Ben Kolbe, Daniel Fernandes, Ioana N. Meleg, Ana García-Vázquez, Ana C. Pinto-Llona, Silviu Constantin, Trino J. de Torres, Jose E. Ortiz, Christine Frischauf, Gernot Rabeder, Michael Hofreiter & Axel Barlow

Ancient DNA studies have revolutionised the study of extinct species and populations, providing insights on phylogeny, phylogeography, admixture and demographic history. However, inferences on behaviour and sociality have been far less frequent. Here, we investigate the complete mitochondrial genomes of extinct Late Pleistocene cave bears and middle Holocene brown bears that each inhabited multiple geographically proximate caves in northern Spain. In cave bears, we find that, although most caves were occupied simultaneously, each cave almost exclusively contains a unique lineage of closely related haplotypes. This remarkable pattern suggests extreme fidelity to their birth site in cave bears, best described as homing behaviour, and that cave bears formed stable maternal social groups at least for hibernation. In contrast, brown bears do not show any strong association of mitochondrial lineage and cave, suggesting that these two closely related species differed in aspects of their behaviour and sociality. This difference is likely to have contributed to cave bear extinction, which occurred at a time in which competition for caves between bears and humans was likely intense and the ability to rapidly colonise new hibernation sites would have been crucial for the survival of a species so dependent on caves for hibernation as cave bears. Our study demonstrates the potential of ancient DNA to uncover patterns of behaviour and sociality in ancient species and populations, even those that went extinct many tens of thousands of years ago.

Lennen 2016

Rebecca M. Lennen, *Benefits of selective feeding*. science **353** (2016), 542–543.

Microbes engineered to digest unusual nutrients outcompete contaminants in chemicals production.

McElroy 2016

Todd McElroy, David L. Dickinson, Nathan Stroh & Christopher A. Dickinson, *The physical sacrifice of thinking, Investigating the relationship between thinking and physical activity in everyday life*. Journal of Health Psychology **21** (2016), 1750–1757.

Physical activity level is an important contributor to overall human health and obesity. Research has shown that humans possess a number of traits that influence their physical activity level including social cognition. We examined whether the trait of "need for cognition" was associated with daily physical activity levels. We recruited individuals who were high or low in need for cognition and measured their physical activity level in 30-second epochs over a 1-week period. The overall findings showed that low-need-for-cognition individuals were more physically active, but this difference was most pronounced during the 5-day work week and lessened during the weekend.

Keywords: cognition | decision | obesity | physical activity | risk

Pavličev 2016

Mihaela Pavličev & Günter Wagner, *The Evolutionary Origin of Female Orgasm*. Journal of Experimental Zoology B (2016), preprint, 1–12. DOI:10.1002/jez.b.22690.

The evolutionary explanation of female orgasm has been difficult to come by. The orgasm in women does not obviously contribute to the reproductive success, and surprisingly unreliably accompanies heterosexual intercourse. Two types of explanations have been proposed: one insisting on extant adaptive roles in reproduction, another explaining female orgasm as a byproduct of selection on male orgasm, which is crucial for sperm transfer. We emphasize that these explanations tend to focus on evidence from human biology and thus address the modification of a trait rather than its evolutionary origin. To trace the trait through evolution requires identifying its homologue in other species, which may have limited similarity with the human trait. Human female orgasm is associated with an endocrine surge similar to the copulatory surges in species with induced ovulation. We suggest that the homolog of human orgasm is the reflex that, ancestrally, induced ovulation. This reflex became superfluous with the evolution of spontaneous ovulation, potentially freeing female orgasm for other roles. This is supported by phylogenetic evidence showing that induced ovulation is ancestral, while spontaneous ovulation is derived within eutherians. In addition, the comparative anatomy of female reproductive tract shows that evolution of spontaneous ovulation is correlated with increasing distance of clitoris from the copulatory canal. In summary, we suggest that the female orgasm-like trait may have been adaptive, however for a different role, namely for inducing ovulation. With the evolution of spontaneous ovulation, orgasm was freed to gain secondary roles, which may explain its maintenance, but not its origin.

Till 2016

Benedikt Till, Florence Truong, Raymond A. Mar & Thomas Niederkrotenthaler, *Blurred world view, A study on the relationship between television viewing and the perception of the justice system*. Death Studies (2016), preprint, 1–9. DOI:10.1080/07481187.2016.1186761.

Previous studies suggest that distorted representations of reality on television can lead to distorted perceptions of reality among viewers. In this study, 322 individuals in Austria reported their weekly television consumption and whether they believe that there is active practice of capital punishment in Austria, which

has been abolished since 1968. The more television participants watched, the more likely they mistakenly believed that there is, or recently was, capital punishment in Austria, even when controlling for participants' age and education. It seems that television has the potential to influence viewers' perception and knowledge of core aspects of society.

The findings of the present study also add to the ongoing public debate on the lack of domestic television being produced in Austria. Our data highlight the importance of studying this possibility in the hopes of learning how to correct it.

Xiao 2016

Huahua Xiao, Michael J. Gollner & Elaine S. Oran, *From fire whirls to blue whirls and combustion with reduced pollution*. PNAS **113** (2016), 9457–9462.

pnas113-09457-Supplement1.mov, pnas113-09457-Supplement2.mov

Fire whirls are powerful, spinning disasters for people and surroundings when they occur in large urban and wildland fires. Whereas fire whirls have been studied for fire-safety applications, previous research has yet to harness their potential burning efficiency for enhanced combustion. This article presents laboratory studies of fire whirls initiated as pool fires, but where the fuel sits on a water surface, suggesting the idea of exploiting the high efficiency of fire whirls for oil-spill remediation. We show the transition from a pool fire, to a fire whirl, and then to a previously unobserved state, a "blue whirl." A bluewhirl is smaller, very stable, and burns completely blue as a hydrocarbon flame, indicating sootfree burning. The combination of fast mixing, intense swirl, and the water–surface boundary creates the conditions leading to nearly soot-free combustion. With the worldwide need to reduce emissions from both wanted and unwanted combustion, discovery of this state points to possible new pathways for reduced-emission combustion and fuel-spill cleanup. Because current methods to generate a stable vortex are difficult, we also propose that the blue whirl may serve as a research platform for fundamental studies of vortices and vortex breakdown in fluid mechanics.

Keywords: fire whirl | blue whirl | vortex breakdown | combustion | soot free

Significance: The growing worldwide demand to reduce emissions from combustion calls for development of alternative technologies for high-efficiency and low-emission combustion. Whereas fire whirls are known for their intense and disastrous threat to life and surrounding environments, their swirl properties and thus higher combustion efficiency imply an unexploited potential for highly efficient, low-emission combustion. In studying fire whirls over water for oil-spill cleanup, we discovered a beautiful, swirling flame phenomenon, the "blue whirl," which evolves from a fire whirl and burns with nearly soot-free combustion. Understanding and control of the blue whirl and its predecessor, the fire whirl, will suggest new ways for fuel-spill remediation, reduced-pollution combustion, and fluid mechanics research.

Anthropologie

Collard 2016

Mark Collard, Lia Tarle, Dennis Sandgathe & Alexander Allan, *Faunal evidence for a difference in clothing use between Neanderthals and early modern humans in Europe*. Journal of Anthropological Archaeology (2016), preprint, 1–12. DOI:10.1016/j.jaa.2016.07.010.

In this paper we report a study designed to shed light on the possibility that clothing differences played a role in the replacement of the Neanderthals by early

modern humans. There is general agreement that early modern humans in Europe utilized specialized cold weather clothing, but the nature of the clothing used by Neanderthals is debated. Some researchers contend that they did not use clothes. Others argue that they were limited to cape-like clothing. Still others aver that their clothing was not substantively different in terms of thermal effectiveness from that of early modern humans. To test among these hypotheses, we employed a novel line of evidence—the bones of animals whose skins may have been made into clothing. We used an ethnographic database to identify mammalian families that were used to create cold weather clothing in the recent past. We then compared the frequency of occurrence of these families in European archaeological deposits associated with early modern humans and Neanderthals. We obtained two main results. One is that mammalian families used for cold weather clothing occur in both early modern human- and Neanderthal-associated strata. The other is that three of the families—leporids, canids, and mustelids—occur more frequently in early modern human strata than in Neanderthal strata. There is reason to believe that the greater frequency of canid and mustelid remains in early modern human strata reflects the use of garments with fur trim. Thus, these findings are most consistent with the hypothesis that Neanderthals employed only cape-like clothing while early modern humans used specialized cold weather clothing. We end by discussing the implications of this hypothesis for the debate about the replacement of the Neanderthals by early modern humans.

Keywords: Neanderthals | Early modern humans | Oxygen Isotope Stage 3 | Specialized cold weather clothing | Cape-like clothing | Mustelidae | Canidae | Mousterian | Aurignacian | Gravettian

Savell 2016

Kristen R. R. Savell, Benjamin M. Auerbach & Charles C. Roseman, *Constraint, natural selection, and the evolution of human body form.* PNAS **113** (2016), 9492–9497.

Variation in body form among human groups is structured by a blend of natural selection driven by local climatic conditions and random genetic drift. However, attempts to test ecogeographic hypotheses have not distinguished between adaptive traits (i.e., those that evolved as a result of selection) and those that evolved as a correlated response to selection on other traits (i.e., nonadaptive traits), complicating our understanding of the relationship between climate and morphological distinctions among populations. Here, we use evolutionary quantitative methods to test if traits previously identified as supporting ecogeographic hypotheses were actually adaptive by estimating the force of selection on individual traits needed to drive among-group differentiation. Our results show that not all associations between trait means and latitude were caused by selection acting directly on each individual trait. Although radial and tibial length and biiliac and femoral head breadth show signs of responses to directional selection matching ecogeographic hypotheses, the femur was subject to little or no directional selection despite having shorter values by latitude. Additionally, in contradiction to ecogeographic hypotheses, the humerus was under directional selection for longer values by latitude. Responses to directional selection in the tibia and radius induced a nonadaptive correlated response in the humerus that overwhelmed its own trait-specific response to selection. This result emphasizes that mean differences between groups are not good indicators of which traits are adaptations in the absence of information about covariation among characteristics.

Keywords: natural selection | ecogeographic variation | Bergmann's rule | Allen's rule | evolutionary constraints

Significance: Human morphological variation is thought to have been partially shaped by natural selection associated with environmental factors like climate. Patterns of variation in body form correspond with latitude, but evolutionary processes that yielded this variation are not yet established. Examining the traits used in these studies (e.g., limb lengths) independently ignores their genetic covariation, which affects their responses to evolutionary forces. To address this relationship, we estimated the directional selection necessary to evolve correlated traits reflecting body shape across latitudes and examined trait-specific responses. Although most traits appear to be under directional selection, their response is constrained by between-trait covariance. This finding suggests that trait differences among human groups may not directly reflect the forces of selection that shaped them.

Bibel

Young 2005

Ian Young, *Biblical texts cannot be dated linguistically*. Hebrew Studies **46** (2005), 341–351.

Linguistic evidence alone is not able to date biblical texts. Among the arguments challenged in this paper are that the archaic linguistic forms of Archaic Biblical Hebrew poems such as the Song of Moses in Exodus 15 demonstrate the great antiquity of those texts; that Standard Biblical Hebrew, such as the prose of the book of Samuel, is a phenomenon restricted to the pre-exilic or monarchic period of Israelite history; and that biblical texts which share the features of Late Biblical Hebrew as it is exemplified in works such as the book of Chronicles could only have been written in the post-exilic period. Modern text critical research indicates that we cannot be certain that the linguistic profile of the text we have is that of the original author. Nor, even if it is original, is any aspect of linguistic evidence necessarily indicative of only one chronological period of the Hebrew language.

Klima

Abram 2016

Nerilie J. Abram et al., *Early onset of industrial-era warming across the oceans and continents*. nature **536** (2016), 411–418.

n536-0411-Supplement1.pdf, n536-0411-Supplement2.xlsx, n536-0411-Supplement3.mov

Nerilie J. Abram, Helen V. McGregor, Jessica E. Tierney, Michael N. Evans, Nicholas P. McKay, Darrell S. Kaufman & the P. A. G. E. S. 2k Consortium

The evolution of industrial-era warming across the continents and oceans provides a context for future climate change and is important for determining climate sensitivity and the processes that control regional warming. Here we use postAD 1500 palaeoclimate records to show that sustained industrial-era warming of the tropical oceans first developed during the mid-nineteenth century and was nearly synchronous with Northern Hemisphere continental warming. The early onset of sustained, significant warming in palaeoclimate records and model simulations suggests that greenhouse forcing of industrial-era warming commenced as early as the mid-nineteenth century and included an enhanced equatorial ocean response mechanism. The development of Southern Hemisphere warming is delayed in reconstructions, but this apparent delay is not reproduced in climate simulations. Our findings imply that instrumental records are too short to comprehensively assess anthropogenic climate change and that, in some regions, about 180

years of industrial-era warming has already caused surface temperatures to emerge above pre-industrial values, even when taking natural variability into account.

Neolithikum

Hedges 2008

R. Hedges, A. Saville & T. O'Connell, *Characterizing the Diet of Individuals at the Neolithic Chambered Tomb of Hazleton North, Gloucestershire, England, Using Stable Isotopic Analysis*. Archaeometry **50** (2008), 114–128.

Stable carbon and nitrogen isotope compositions were measured on human and faunal bones, sampled from the Neolithic chambered tomb of Hazleton North, Gloucestershire, UK. The values were used to characterize the diet of the burial community as a whole. Humans were higher in d15N by 4.5–5.0 ‰ relative to animal d15N, from which we conclude that, based on currently accepted interpretations of isotopic data, the humans consumed a diet that was very high in meat or animal products (75 % by weight of protein). Comparison was also possible between cortical and cancellous femoral collagen, with the results showing no significant difference for the adult humans. The sample of human isotopic values showed little variability, in contrast to that found in the domestic and wild animals from the site (including cattle, pigs, sheep and deer). We suggest that this is due to local environmental differences, rather than to environmental change over time or physiological differences between individual animals, and that this pattern is likely to hold for many other archaeological sites when analysed with sufficient statistical weight.

Keywords: Stable Isotope | Bone | Palaeodiet | Carbon | Nitrogen | Neolithic

Ostasien

Montgomery 2016

David R. Montgomery, *Emperor Yu's Great Flood*. science **353** (2016), 538–539.

Geological data provide support for a legendary flood in China ≈4000 years ago.

Wu 2016

Qinglong Wu et al., *Outburst flood at 1920 BCE supports historicity of China's Great Flood and the Xia dynasty*. science **353** (2016), 579–582.

s353-0579-Supplement.pdf

Qinglong Wu, Zhijun Zhao, Li Liu, Darryl E. Granger, Hui Wang, David J. Cohen, Xiaohong Wu, Maolin Ye, Ofer Bar-Yosef, Bin Lu, Jin Zhang, Peizhen Zhang,§ Daoyang Yuan, Wuyun Qi, Linhai Cai & Shibiao Bai

China's historiographical traditions tell of the successful control of a Great Flood leading to the establishment of the Xia dynasty and the beginning of civilization. However, the historicity of the flood and Xia remain controversial. Here, we reconstruct an earthquakeinduced landslide dam outburst flood on the Yellow River about 1920 BCE that ranks as one of the largest freshwater floods of the Holocene and could account for the Great Flood. This would place the beginning of Xia at ≈1900 BCE, several centuries later than traditionally thought. This date coincides with the major transition from the Neolithic to Bronze Age in the Yellow River valley and supports hypotheses that the primary state-level society of the Erlitou culture is an archaeological manifestation of the Xia dynasty.