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Literatur

Aktuell

Bailey 2012

Drew H. Bailey, Richard A. Lippa, Marco Del Giudice, Raymond Hames & Dave C. Geary, *Sex differences in spatial abilities: Methodological problems in Hoffman et al.* PNAS **109** (2012), E583.

Daly 2012

Michael Daly, *Importance of accurately measuring spatial abilities.* PNAS **109** (2012), E584.

de Mel 2012

Suresh de Mel, David McKenzie & Christopher Woodruff, *One-Time Transfers of Cash or Capital Have Long-Lasting Effects on Microenterprises in Sri Lanka.* science **335** (2012), 962–966.

s335-0962-Supplement.pdf

Standard economic theory suggests that one-time business grants can have at most temporary effects, and accordingly, policies to increase incomes of the self-employed in developing countries typically rely on sustained engagement. In contrast, we found long-lasting impacts from one-time grants given in a randomized experiment to subsistence firms. Five years after we gave $100 or 200$ to 115 of 197 male and 100 of 190 female Sri Lankan microenterprise owners, we found 10-percentage-point-higher enterprise survival rates, and $8 - to - 12$-per-month-higher profits for male-owned businesses that received the grants. Female-owned businesses showed no long-term (or short-term) impacts. Our follow-up investigation interviewed 94 % of the original sample and collected survivorship data from the remaining 6 %, demonstrating that tracking long-term outcomes is both feasible and worthwhile. The results suggest that one-off grants may have lasting impacts on some types of subsistence firms, challenging the view that sustained engagement is always required.

Evans 2009

Gary W. Evans & Michelle A. Schamberg, *Childhood poverty, chronic stress, and adult working memory.* PNAS **106** (2009), 6545–6549.

The income-achievement gap is a formidable societal problem, but little is known about either neurocognitive or biological mechanisms that might account for income-related deficits in academic achievement. We show that childhood poverty is inversely related to working memory in young adults. Furthermore, this prospective relationship is mediated by elevated chronic stress during childhood. Chronic stress is measured by allostatic load, a biological marker of cumulative wear and tear on the body that is caused by the mobilization of multiple physiological systems in response to chronic environmental demands.

Hoffman 2012

Moshe Hoffman, Uri Gneezy & John A. List, *Reply to Bailey et al. and Daly: Indigenous societies enable identification of nurture but require nonstandard measures.* PNAS **109** (2012), E585–E587.

Katok 2012

Kseniia V. Katok et al., *Hyperstoichiometric Interaction Between Silver and Mercury at the Nanoscale*. Angewandte Chemie Int. Ed. (2012) preprint, 1–5. DOI:10.1002/anie.201106776.

AngChIE2012-preprint-Supplement.pdf

Kseniia V. Katok, Raymond L. D. Whitby, Takahiro Fukuda, Toru Maekawa, Igor Bezverkhyy, Sergey V. Mikhalovsky and Andrew B. Cundy

Amalgam formation between silver and mercury has long been exploited on behalf of the silver, whether in facilitation of mining the precious metal, shaping it into jewelry, or embedding it in decayed teeth. More recently, however, there's been something of a role reversal under way, as silver particles are applied to the removal of toxic mercury contaminants from water sources. Katok et al. have explored the impact of silver particle size on the nature and efficiency of this process. Bulk metallic silver is known to reduce mercuric ions, with concomitant release of silver ions in a 1:2 stoichiometry. Using a range of sensitive analytical techniques, the authors found that very small (≈11-nm-diameter) silver particles supported on a reduced silica substrate removed mercuric ions from aqueous solution in a ratio exceeding 1:1. The mechanism underlying this hyperstoichiometric process remains somewhat uncertain, as does the precise lattice structure of the Hg-Ag composite produced. The authors posit a catalytic role for silver ions that may be readsorbed and reduced back to the elemental state by counterions in the solution.

Lawler 2012

Andrew Lawler, *Uncovering Civilization's Roots*. science **335** (2012), 790–793.

What sparked the first cities? Digs in Kuwait and Syria are reshaping how archaeologists see the first stirrings of urban life

Data from both sites contradict the old assumption that Ubaid culture was spread by precocious southern Mesopotamians who colonized their more primitive neighbors-a harbinger of the militaristic Mesopotamian empires to come. Instead, these and a handful of other sites suggest that a loose network of local peoples from the Mediterranean Sea to the Persian Gulf helped shape a way of life that eventually spawned cities. "It's almost like the European Union," he says. People shared a common identity but retained their own local traditions. That view puts a radically different spin on civilization's emergence. The identity of Bahra's inhabitants, however, remains in dispute. Oates thinks they were Mesopotamians seeking fish, pearls, and other resources. She adds that the settlers likely brought their own fine serving ware but made the crude red clay pots for cooking. Bielinski, however, suspects that the Bahra people were locals participating in the wider Ubaid culture. He notes the use of parallel stone slab construction, a method that works well for oval-shaped houses typical of Neolithic Arabia but makes less sense for the rectangular structures of Mesopotamia. The structures, he concludes, likely were not built by experienced Mesopotamian masons but by locals seeking to emulate the fashion. As for the red ware, "it's as if the local people saw the Ubaid pottery and said, 'That's a good idea,' " Stein says.

But further exploration of the deeply buried Ubaid sites in Iraq will not be easy. Sectarian turmoil in Syria has halted the excavations at Tell Zeidan, preventing Stein's access to what he calls "archaeological heaven." And Iran remains off-limits to foreigners. Such constraints suggest that the Ubaid peoples will retain some of their ancient mystery for years to come.

Lederbogen 2011

Florian Lederbogen et al., *City living and urban upbringing affect neural social stress processing in humans*. nature **474** (2011), 498–501.

n474-0498-Supplement.pdf
Florian Lederbogen, Peter Kirsch, Leila Haddad, Fabian Streit, Heike Tost, Philipp Schuch, Stefan Wüst, Jens C. Pruessner, Marcella Rietschel, Michael Deuschle & Andreas Meyer-Lindenberg
More than half of the world's population now lives in cities, making the creation of a healthy urban environment amajor policy priority1. Cities have both health risks and benefits1, but mental health is negatively affected: mood and anxiety disorders are more prevalent in city dwellers2 and the incidence of schizophrenia is strongly increased in people born and raised in cities3-6. Although these findings have been widely attributed to the urban social environment2,3,7,8, the neural processes that could mediate such associations are unknown. Here we show, using functional magnetic resonance imaging in three independent experiments, that urban upbringing and city living have dissociable impacts on social evaluative stress processing in humans. Current city living was associated with increased amygdala activity, whereas urban upbringing affected the perigenual anterior cingulate cortex, a key region for regulation of amygdala activity, negative affect9 and stress10. These findings were regionally and behaviourally specific, as no other brain structures were affected and no urbanicity effect was seen during control experiments invoking cognitive processing without stress. Our results identify distinct neural mechanisms for an established environmental risk factor, link the urban environment for the first time to social stress processing, suggest that brain regions differ in vulnerability to this risk factor across the lifespan, and indicate that experimental interrogation of epidemiological associations is a promising strategy in social neuroscience.

Lustig 2012

Robert H. Lustig, Laura A. Schmidt & Claire D. Brindis, *The toxic truth about sugar.* nature **482** (2012), 27–29.
Added sweeteners pose dangers to health that justify controlling them like alcohol, argue Robert H. Lustig, Laura A. Schmidt and Claire D. Brindis.
Now, let's consider toxicity. A growing body of epidemiological and mechanistic evidence argues that excessive sugar consumption affects human health beyond simply adding calories4. Importantly, sugar induces all of the diseases associated with metabolic syndrome1,5. This includes: hypertension (fructose increases uric acid, which raises blood pressure); high triglycerides and insulin resistance through synthesis of fat in the liver; diabetes from increased liver glucose production combined with insulin resistance; and the ageing process, caused by damage to lipids, proteins and DNA through nonenzymatic binding of fructose to these molecules. It can also be argued that fructose exerts toxic effects on the liver that are similar to those of alcohol1. This is no surprise, because alcohol is derived from the fermentation of sugar.
Sugar also has clear potential for abuse. Like tobacco and alcohol, it acts on the brain to encourage subsequent intake. There are now numerous studies examining the dependence-producing properties of sugar in humans6. Specifically, sugar dampens the suppression of the hormone ghrelin, which signals hunger to the brain. It also interferes with the normal transport and signalling of the hormone leptin, which helps to produce the feeling of satiety. And it reduces dopamine signalling in the brain's reward centre, thereby decreasing the pleasure derived from food and compelling the individual to consume more.

Misra 2012

Sambuddha Misra & Philip N. Froelich, *Lithium Isotope History of Cenozoic Seawater: Changes in Silicate Weathering and Reverse Weathering.* science **335** (2012), 818–823.
s335-0818-Supplement.pdf, s335-0818-Supplement.xlsx
Weathering of uplifted continental rocks consumes carbon dioxide and transports cations to the oceans, thereby playing a critical role in controlling both seawater chemistry

and climate. However, there are few archives of seawater chemical change that reveal shifts in global tectonic forces connecting Earth ocean-climate processes. We present a 68-million-year record of lithium isotopes in seawater (d7LiSW) reconstructed from planktonic foraminifera. From the Paleocene (60 million years ago) to the present, d7LiSW rose by 9 per mil (‰), requiring large changes in continental weathering and seafloor reverse weathering that are consistent with increased tectonic uplift, more rapid continental denudation, increasingly incongruent continental weathering (lower chemical weathering intensity), and more rapid CO2 drawdown. A 5‰ drop in d7LiSW across the Cretaceous-Paleogene boundary cannot be produced by an impactor or by Deccan trap volcanism, suggesting large-scale continental denudation.

Paytan 2012

Adina Paytan, *Mountains, Weathering, and Climate*. science **335** (2012), 810–811.

s335-0810-Supplement.pdf

Changes in the lithium isotope composition of seawater over the past 70 million years elucidate the links between weathering and climate.

Powell 2012

Kendall Powell, *Billboard science*. nature **483** (2012), 113–115.

Posters are a chance to show off work and to network with colleagues, but only if the design is easy on the eye.

Props can also serve as ice-breakers and attract viewers. “No one’s ever taken me up on this suggestion, but why not have a pitcher of beer and cups at your poster?” says Simon.

Robinson 2012

Andrew Robinson, *A clash of symbols*. nature **483** (2012), 27–28.

Andrew Robinson pieces together the story of who deserves the credit for deciphering the hieroglyphs.

Rudzik 2012

Alanna E. F. Rudzik, *The Experience and Determinants of First-Time Breast-Feeding Duration among Low-Income Women from São Paulo, Brazil*. Current Anthropology **53** (2012), 108–117.

While the ability to breast-feed is virtually universal among women, the experience of breast-feeding is particular to each woman and is influenced by her social, economic, and personal circumstances. This paper explores quantitative and experience-focused ethnographic data on the experiences of low-income women from the eastern periphery of the city of São Paulo, Brazil, who were breast-feeding for the first time. The prospective, longitudinal data collection method involved repeated in-depth interviews with a group of 65 women, from the end of pregnancy through the first 12 weeks postpartum. Multivariate statistical analyses of the quantitative data revealed that older age, lower interpersonal satisfaction, and unplanned pregnancy shortened the period of exclusive breast-feeding and increased women’s likelihood of having begun supplementation by 12 weeks postpartum. Ethnographic data analysis exposed the meanings of breast-feeding and motherhood for women who had experienced unplanned pregnancy and helped to shed light on the dramatic influence of unplanned pregnancy on women’s breast-feeding practice.

Secord 2012

Ross Secord et al., *Evolution of the Earliest Horses Driven by Climate Change in the Paleocene-Eocene Thermal Maximum*. science **335** (2012), 959–962.

s335-0959-Supplement.pdf
Ross Secord, Jonathan I. Bloch, Stephen G. B. Chester, Doug M. Boyer, Aaron R. Wood, Scott L. Wing, Mary J. Kraus, Francesca A. McInerney & John Krigbaum
Body size plays a critical role in mammalian ecology and physiology. Previous research has shown that many mammals became smaller during the Paleocene-Eocene Thermal Maximum (PETM), but the timing and magnitude of that change relative to climate change have been unclear. A high-resolution record of continental climate and equid body size change shows a directional size decrease of ≈30 % over the first ≈130,000 years of the PETM, followed by a ≈76 % increase in the recovery phase of the PETM. These size changes are negatively correlated with temperature inferred from oxygen isotopes in mammal teeth and were probably driven by shifts in temperature and possibly high atmospheric CO2 concentrations. These findings could be important for understanding mammalian evolutionary responses to future global warming.

Smith 2012

Felisa A. Smith, *Some Like It Hot*. science **335** (2012), 924–925.
A study of horse evolution illustrates the connection between environmental temperature and mammal body size.

Wang 2012

Li Wang & Yi Jiang, *Life motion signals lengthen perceived temporal duration*. PNAS **109** (2012), 4043.
pnas109-04043-Fulltext.pdf
Point-light biological motions, conveying various different attributes of biological entities, have particular spatiotemporal properties that enable them to be processed with remarkable efficiency in the human visual system. Here we demonstrate that such signals automatically lengthen their perceived temporal duration independent of global configuration and without observers' subjective awareness of their biological nature. By using a duration discrimination paradigm, we showed that an upright biological motion sequence was perceived significantly longer than an inverted but otherwise identical sequence of the same duration. Furthermore, this temporal dilation effect could be extended to spatially scrambled biological motion signals, whose global configurations were completely disrupted, regardless of whether observerswere aware of the nature of the stimuli. However, such an effect completely disappeared when critical biological characteristics were removed. Taken together, our findings suggest a special mechanism of time perception tuned to life motion signals and shed new light on the temporal encoding of biological motion.
point-light walker | temporal expansion | psychometric function

Anthropologie

Curnoe 2012

Darren Curnoe et al., *Human Remains from the Pleistocene-Holocene Transition of Southwest China Suggest a Complex Evolutionary History for East Asians*. PLoS ONE **7** (2012), e31918. DOI:.
Darren Curnoe, Ji Xueping, Andy I. R. Herries, Bai Kanning, Paul S. C. Taçon, Bao Zhende, David Fink, Zhu Yunsheng, John Hellstrom, Luo Yun, Gerasimos Cassis, Su Bing, Stephen Wroe, Hong Shi, William C. H. Parr, Huang Shengmin & Natalie Rogers
Background: Later Pleistocene human evolution in East Asia remains poorly understood owing to a scarcity of well described, reliably classified and accurately dated fossils. Southwest China has been identified from genetic research as a hotspot of human diversity, containing ancient mtDNA and Y-DNA lineages, and has yielded a number of human remains thought to derive from Pleistocene deposits. We have prepared, reconstructed,

described and dated a new partial skull from a consolidated sediment block collected in 1979 from the site of Longlin Cave (Guangxi Province). We also undertook new excavations at Maludong (Yunnan Province) to clarify the stratigraphy and dating of a large sample of mostly undescribed human remains from the site.
Methodology/Principal Findings: We undertook a detailed comparison of cranial, including a virtual endocast for the Maludong calotte, mandibular and dental remains from these two localities. Both samples probably derive from the same population, exhibiting an unusual mixture of modern human traits, characters probably plesiomorphic for later Homo, and some unusual features. We dated charcoal with AMS radiocarbon dating and speleothem with the Uranium-series technique and the results show both samples to be from the Pleistocene-Holocene transition: ≈14.3-11.5 ka.
Conclusions/Significance: Our analysis suggests two plausible explanations for the morphology sampled at Longlin Cave and Maludong. First, it may represent a late-surviving archaic population, perhaps paralleling the situation seen in North Africa as indicated by remains from Dar-es-Soltane and Temara, and maybe also in southern China at Zhirendong. Alternatively, East Asia may have been colonised during multiple waves during the Pleistocene, with the Longlin-Maludong morphology possibly reflecting deep population substructure in Africa prior to modern humans dispersing into Eurasia.

Takahashi 2012

Hidehiko Takahashi, *Honesty mediates the relationship between serotonin and reaction to unfairness*. PNAS **109** (2012), 4281–4284.
Hidehiko Takahashi, Harumasa Takano, Colin F. Camerer, Takashi Ideno, Shigetaka Okubo, Hiroshi Matsui, Yuki Tamari, Kazuhisa Takemura, Ryosuke Arakawa, Fumitoshi Kodaka, Makiko Yamada, Yoko Eguchi, Toshiya Murai, Yoshiro Okubo, Motoichiro Kato, Hiroshi Ito and Tetsuya Suhara
How does one deal with unfair behaviors? This subject has long been investigated by various disciplines including philosophy, psychology, economics, and biology. However, our reactions to unfairness differ from one individual to another. Experimental economics studies using the ultimatum game (UG), in which players must decide whether to accept or reject fair or unfair offers, have also shown that there are substantial individual differences in reaction to unfairness. However, little is known about psychological as well as neurobiological mechanisms of this observation. We combined a molecular imaging technique, an economics game, and a personality inventory to elucidate the neurobiological mechanism of heterogeneous reactions to unfairness. Contrary to the common belief that aggressive personalities (impulsivity or hostility) are related to the high rejection rate of unfair offers in UG, we found that individuals with apparently peaceful personalities (straightforwardness and trust) rejected more often and were engaged in personally costly forms of retaliation. Furthermore, individuals with a low level of serotonin transporters in the dorsal raphe nucleus (DRN) are honest and trustful, and thus cannot tolerate unfairness, being candid in expressing their frustrations. In other words, higher central serotonin transmission might allow us to behave adroitly and opportunistically, being good at playing games while pursuing self-interest. We provide unique neurobiological evidence to account for individual differences of reaction to unfairness.
positron emission tomography | decision-making | fairness

Biologie

Chen 2010

Liwei Chen et al., *Reducing Consumption of Sugar-Sweetened Beverages Is Associated With Reduced Blood Pressure: A Prospective Study Among United States Adults*. Circulation **121** (2010), 2398–2406.

Liwei Chen, Benjamin Caballero, Diane C. Mitchell, Catherine Loria, Pao-Hwa Lin, Catherine M. Champagne, Patricia J. Elmer, Jamy D. Ard, Bryan C. Batch, Cheryl A.M. Anderson and Lawrence J. Appel

Background – Increased consumption of sugar-sweetened beverages (SSBs) has been associated with an elevated risk of obesity, metabolic syndrome, and type II diabetes mellitus. However, the effects of SSB consumption on blood pressure (BP) are uncertain. The objective of this study was to determine the relationship between changes in SSB consumption and changes in BP among adults.

Methods and Results – This was a prospective analysis of 810 adults who participated in the PREMIER Study (an 18-month behavioral intervention trial). BP and dietary intake (by two 24-hour recalls) were measured at baseline and at 6 and 18 months. Mixed-effects models were applied to estimate the changes in BP in responding to changes in SSB consumption. At baseline, mean SSB intake was 0.9±1.0 servings per day (10.5±11.9 fl oz/d), and mean systolic BP/diastolic BP was 134.9±9.6/84.8±4.2 mm Hg. After potential confounders were controlled for, a reduction in SSB of 1 serving per day was associated with a 1.8-mm Hg (95 % confidence interval, 1.2 to 2.4) reduction in systolic BP and 1.1-mm Hg (95 % confidence interval, 0.7 to 1.4) reduction in diastolic BP over 18 months. After additional adjustment for weight change over the same period, a reduction in SSB intake was still significantly associated with reductions in systolic and diastolic BPs ($P<0.05$). Reduced intake of sugars was also significantly associated with reduced BP. No association was found for diet beverage consumption or caffeine intake and BP. These findings suggest that sugars may be the nutrients that contribute to the observed association between SSB and BP.

Conclusions – Reduced consumption of SSB and sugars was significantly associated with reduced BP. Reducing SSB and sugar consumption may be an important dietary strategy to lower BP.

Key Words: blood pressure | diet | follow-up studies | hypertension

Evans 2012

Alistair R. Evans et al., *The maximum rate of mammal evolution.* PNAS **109** (2012), 4187–4190.

Alistair R. Evans, David Jones, Alison G. Boyer, James H. Brown, Daniel P. Costa, S. K. Morgan Ernest, Erich M. G. Fitzgerald, Mikael Fortelius, John L. Gittleman, Marcus J. Hamilton, Larisa E. Harding, Kari Lintulaakso, S. Kathleen Lyons, Jordan G. Okie, Juha J. Saarinen, Richard M. Sibly, Felisa A. Smith, Patrick R. Stephens, Jessica M. Theodor and Mark D. Uhen

How fast can a mammal evolve from the size of a mouse to the size of an elephant? Achieving such a large transformation calls for major biological reorganization. Thus, the speed at which this occurs has important implications for extensive faunal changes, including adaptive radiations and recovery from mass extinctions. To quantify the pace of large-scale evolution we developed a metric, clade maximum rate, which represents the maximum evolutionary rate of a trait within a clade. We applied this metric to body mass evolution in mammals over the last 70 million years, during which multiple large evolutionary transitions occurred in oceans and on continents and islands. Our computations suggest that it took a minimum of 1.6, 5.1, and 10 million generations for terrestrial mammal mass to increase 100-, and 1,000-, and 5,000-fold, respectively. Values for whales were down to half the length (i.e., 1.1, 3, and 5 million generations), perhaps due to the reduced mechanical constraints of living in an aquatic environment. When differences in generation time are considered, we find an exponential increase in maximum mammal body mass during the 35 million years following the Cretaceous-Paleogene (K-Pg) extinction event. Our results also indicate a basic asymmetry in macroevolution: very large decreases (such as extreme insular dwarfism) can happen at more than 10 times the rate of increases. Our findings allow more rigorous comparisons of microevolutionary and macroevolutionary patterns and processes.

haldanes | biological time | scaling | pedomorphosis

Polly 2012

P. David Polly, *Measuring the evolution of body size in mammals.* PNAS **109** (2012), 4027–4028.

Evans et al. found that, in terrestrial mammals, it takes approximately 1.6 million generations for a 100-fold increase in size, approximately 5.1 million generations for a 1,000-fold increase and approximately 10 million generations for a 5,000-fold increase. Rates of maximum size evolution in whales, the largest of mammals, were approximately twice as fast. The latter finding was expected because the remarkably rapid increase in size in early whales has long been noted (5), but less expected was the finding that maximum body size decreases occur, on average, much faster than increases: 10 times faster, in fact.

Klima

Altaweel 2012

Mark Altaweel & Chikako E. Watanabe, *Assessing the resilience of irrigation agriculture: applying a social-ecological model for understanding the mitigation of salinization.* Journal of Archaeological Science **39** (2012), 1160–1171.

This paper creates and applies a computational model of irrigation agriculture in order to study the effects of salinization in Mesopotamia, with the model developed applicable to cases beyond that studied here. Scholars have long suspected that central and southern Mesopotamia present environments which limited agricultural production over the long-term. In regions such as central Mesopotamia, where salinization likely affected settlement and agriculture in different periods but was more manageable than in more southern regions, fallowing regimes, natural and engineered leaching, and decisions made on when to crop were strategies applied in order to limit the effects of salinization. In this paper, we assess the effectiveness of these coping strategies by incorporating projected climate, soil, and landscape conditions with agricultural practices. The simulation results not only demonstrate the effectiveness and limitations of inhibiting progressive salinization, but they can be compared with the archaeological record in order to determine if the results could reasonably be matched with past events and help to interpret settlement history.

Keywords: Salinization | Environment | Mesopotamia | Landscape | Social-ecological modeling | Agent-based modeling | Agriculture

Kaniewski 2012

David Kaniewski, Elise Van Campo & Harvey Weiss, *Drought is a recurring challenge in the Middle East.* PNAS **109** (2012), 3862–3867.

Climate change and water availability in the Middle East are important in understanding human adaptive capacities in the face of long-termenvironmental changes. The key role ofwater availability for sedentary and nomad populations in these arid to semiarid landscapes is understood, but the millennium-scale influence of hydrologic instability on vegetation dynamics, human occupation, and historic land use are unknown, which has led to a stochastic view of population responses and adaptive capacities to precipitation anomalies. Within the time-frame of the last two global climate events, the Medieval Climate Anomaly and the Little Ice Age, we report hydrologic instability reconstructed from pollen-derived climate proxies recovered near Tell Leilan, at the Wadi Jarrah in the Khabur Plains of northeastern Syria, at the heart of ancient northern Mesopotamia. By coupling climate proxies with archaeological-historical data and a pollen-based record of agriculture, this integrative study suggests that variability in precipitation is a key factor on crop yields, productivity, and economic systems. It may also have been one of the

main parameters controlling human settlement and population migrations at the century to millennial timescales in the arid to semiarid areas of the Middle East. An abrupt shift to drier conditions at ca. AD 1400 is contemporaneous with a change from sedentary village life to regional desertion and nomadization (sheep/camel pastoralists) during the preindustrial era in formerly Ottoman realms, and thereby adds climate change to the multiple causes for Ottoman Empire "decline."

Medina-Elizalde 2012

Martín Medina-Elizalde & Eelco J. Rohling, *Collapse of Classic Maya Civilization Related to Modest Reduction in Precipitation*. science **335** (2012), 956–959.

s335-0956-Supplement.pdf

The disintegration of the Classic Maya civilization in the Yucatán Peninsula and Central America was a complex process that occurred over an approximately 200-year interval and involved a catastrophic depopulation of the region. Although it is well established that the civilization collapse coincided with widespread episodes of drought, their nature and severity remain enigmatic. We present a quantitative analysis that offers a coherent interpretation of four of the most detailed paleoclimate records of the event. We conclude that the droughts occurring during the disintegration of the Maya civilization represented up to a 40 % reduction in annual precipitation, probably due to a reduction in summer season tropical storm frequency and intensity.

Kultur

Butzer 2012

Karl W. Butzer, *Collapse, environment, and society*. PNAS **109** (2012), 3632–3639.

Historical collapse of ancient states poses intriguing social-ecological questions, as well as potential applications to global change and contemporary strategies for sustainability. Five Old World case studies are developed to identify interactive inputs, triggers, and feedbacks in devolution. Collapse is multicausal and rarely abrupt. Political simplification undermines traditional structures of authority to favor militarization, whereas disintegration is preconditioned or triggered by acute stress (insecurity, environmental or economic crises, famine), with breakdown accompanied or followed by demographic decline. Undue attention to stressors risks underestimating the intricate interplay of environmental, political, and sociocultural resilience in limiting the damages of collapse or in facilitating reconstruction. The conceptual model emphasizes resilience, as well as the historical roles of leaders, elites, and ideology. However, a historical model cannot simply be applied to contemporary problems of sustainability without adjustment for cumulative information and increasing possibilities for popular participation. Between the 14th and 18th centuries, Western Europe responded to environmental crises by innovation and intensification; such modernization was decentralized, protracted, flexible, and broadly based. Much of the current alarmist literature that claims to draw from historical experience is poorly focused, simplistic, and unhelpful. It fails to appreciate that resilience and readaptation depend on identified options, improved understanding, cultural solidarity, enlightened leadership, and opportunities for participation and fresh ideas.

historical disasters | Egypt | Mesopotamia | Fayum Oasis | Ethiopia

Butzer 2012

Karl W. Butzer & Georgina H. Endfield, *Critical perspectives on historical collapse*. PNAS **109** (2012), 3628–3631.

Historical collapse of ancient states or civilizations has raised new awareness about its possible relevance to current issues of sustainability, in the context of global change. This Special Feature examines 12 case studies of societies under stress, of which seven suffered severe transformation. Outcomes were complex and unpredictable. Five others overcame breakdown through environmental, political, or socio-cultural resilience, which deserves as much attention as the identification of stressors. Response to environmental crises of the last millennium varied greatly according to place and time but drew from traditional knowledge to evaluate new information or experiment with increasing flexibility, even if modernization or intensification were decentralized and protracted. Longer-term diachronic experience offers insight into how societies have dealt with acute stress, a more instructive perspective for the future than is offered by apocalyptic scenarios.
complexity | social-ecological resilience | multicausality

Dugmore 2012

Andrew J. Dugmore, Thomas H. McGovern, Orri Vésteinsson, Jette Arneborg, Richard Streeter & Christian Keller, *Cultural adaptation, compounding vulnerabilities and conjunctures in Norse Greenland*. PNAS **109** (2012), 3658–3663.

Norse Greenland has been seen as a classic case ofmaladaptation by an inflexible temperate zone society extending into the arctic and collapse driven by climate change. This paper, however, recognizes the successful arctic adaptation achieved in Norse Greenland and argues that, although climate change had impacts, the end of Norse settlement can only be truly understood as a complex socioenvironmental system that includes local and interregional interactions operating at different geographic and temporal scales and recognizes the cultural limits to adaptation of traditional ecological knowledge. This paper is not focused on a single discovery and its implications, an approach that can encourage monocausal and environmentally deterministic emphasis to explanation, but it is the product of sustained international interdisciplinary investigations in Greenland and the rest of the North Atlantic. It is based on data acquisitions, reinterpretation of established knowledge, and a somewhat different philosophical approach to the question of collapse. We argue that the Norse Greenlanders created a flexible and successful subsistence system that responded effectively to major environmental challenges but probably fell victim to a combination of conjunctures of large-scale historic processes and vulnerabilities created by their successful prior response to climate change. Their failure was an inability to anticipate an unknowable future, an inability to broaden their traditional ecological knowledge base, and a case of being too specialized, too small, and too isolated to be able to capitalize on and compete in the new protoworld system extending into the North Atlantic in the early 15th century.
Vikings | marine mammals | Little Ice Age | rigidity trap

Dunning 2012

Nicholas P. Dunning Timothy P. Beach & Sheryl Luzzadder-Beach, *Kax and kol: Collapse and resilience in lowland Maya civilization*. PNAS **109** (2012), 3652–3657.

Episodes of population loss and cultural change, including the famous Classic Collapse, punctuated the long course of Maya civilization. In many cases, these downturns in the fortunes of individual sites and entire regions included significant environmental components such as droughts or anthropogenic environmental degradation. Some afflicted areas remained depopulated for long periods, whereas others recovered more quickly. We examine the dynamics of growth and decline in several areas in the Maya Lowlands in terms of both environmental and cultural resilience and with a focus on downturns that occurred in the Terminal Preclassic (second century Common Era) and Terminal Classic

(9th and 10th centuries CE) periods. This examination of available data indicates that the elevated interior areas of the Yucatán Peninsula were more susceptible to system collapse and less suitable for resilient recovery than adjacent lower-lying areas.
Mesoamerica | archaeology | climate change | deforestation

ENDFIELD 2012

Georgina H. Endfield, *The resilience and adaptive capacity of social-environmental systems in colonial Mexico*. PNAS **109** (2012), 3676–3681.
Civilization collapse scenarios highlight what for some are worrying parallels between past case studies and societies under threat from apparently unprecedented global environmental and climate change today. Archive-based studies of socio-economic responses to climate variability in colonial Mexico suggest that the complex interactions between environment and society influence the degree to which regional livelihoods may be vulnerable or resilient to disruption and also illustrate that vulnerability to change can lead to improved understanding of risk and increased adaptive capacity. In this paper, I draw on examples to argue that experience of climate variability, extreme weather events, or weather-related events and crises can challenge societal resilience, but can also increase opportunities for learning and innovation, extending the repertoire of adaptive responses. The historical examples selected might help inform the degree to which societies can develop strategies to deal with environmental perturbations at different scales and highlight that social breakdown and collapse are not an inevitable result of transformation.

GÄCHTER 2012

Simon Gächter, *Carrot or stick?* nature **483** (2012), 39–40.
Rewards and punishments can cajole people into cooperating, but they are costly to implement. A theoretical study finds that, when participation in group activities is optional, punishing uncooperative behaviour is the cheaper method.

HARRIS 2012

Sarah E. Harris, *Cyprus as a degraded landscape or resilient environment in the wake of colonial intrusion*. PNAS **109** (2012), 3670–3675.
Concerns about global warming, degradation of fragile ecosystems, and environmental and societal collapse have increased interest for lessons and/or solutions for today's environmental issues. Popular writers have turned to a classic degradation thesis of deforestation and presumed desertification within the Eastern Mediterranean as a cautionary tale of how past societies have committed ecological suicide. However, degradation and/or collapse is far more complex than the thesis permits, and uncritical adoption of such simplified stories encourages continued use of inaccurate assumptions about human-environment interaction. In Cyprus, such a degradation story materialized 150 y ago, and its promoters aimed to impress on readers their responsibility to reverse past environmental mistakes. Both the British Colonial authorities (1878-1960) and the post-Independence Cypriot government used it to justify their environmental policies. Unfortunately, this thesis was formed around several misunderstandings about Cypriot environments and society: (i) judgment of degradation without appropriate consideration of the difference between degradation and change; (ii) oversimplified representation of ruling powers and those people ruled; and (iii) denigration of the shepherd lifestyle and its presumed environmental impact. A multimethod approach using archival and field research offers a more nuanced understanding of the complexity of human-environment interaction, the underappreciated environmental and societal resilience of areas classified as degraded, and the importance of placing events within changing socioeconomic and political contexts. This study of natural resource management and environmental resilience illustrates that the practices that the colonial government viewed as unsustainable likely were sustainable.
colonial policies | goats | Mediterranean degradation

Luzzadder-Beach 2012

Sheryl Luzzadder-Beach, Timothy P. Beach & Nicholas P. Dunning, *Wetland fields as mirrors of drought and the Maya abandonment*. PNAS **109** (2012), 3646–3651.

Getting at the Maya Collapse has both temporal and geographic dimensions, because it occurred over centuries and great distances. This requires a wide range of research sites and proxy records, ranging from lake cores to geomorphic evidence, such as stratigraphy and speleothems. This article synthesizes these lines of evidence, together with previously undescribed findings on Maya wetland formation and use in a key region near the heart of the central Maya Lowlands. Growing lines of evidence point to dryer periods in Maya history, which correlate to major periods of transition. The main line of evidence in this paper comes from wetland use and formation studies, which show evidence for both largescale environmental change and human adaptation or response. Based on multiproxy studies, Maya wetland fields had a long and varied history, but most evidence indicates the start of disuse during or shortly after the Maya Terminal Classic. Hence, the pervasiveness of collapse extended into a range of wetlands, including perennial wetlands, which should have been less responsive to drought as a driver of disuse. A synthesis of the lines of evidence for canal infilling shows no attempts to reclaim them after the Classic Period.

Mesoamerica | proxies | wetland agriculture

Piff 2012

Paul K. Piff, Daniel M. Stancato, Stéphane Côté, Rodolfo Mendoza-Denton & Dacher Keltner, *Higher social class predicts increased unethical behavior*. PNAS **109** (2012), 4086–4091.

Seven studies using experimental and naturalistic methods reveal that upper-class individuals behave more unethically than lowerclass individuals. In studies 1 and 2, upper-class individuals were more likely to break the law while driving, relative to lower-class individuals. In follow-up laboratory studies, upper-class individuals were more likely to exhibit unethical decision-making tendencies (study 3), take valued goods fromothers (study 4), lie in a negotiation (study 5), cheat to increase their chances of winning a prize (study 6), and endorse unethical behavior at work (study 7) than were lowerclass individuals. Mediator and moderator data demonstrated that upper-class individuals' unethical tendencies are accounted for, in part, by their more favorable attitudes toward greed.

socioeconomic status | immoral action | ethical judgment | self-interest

Rosen 2012

Arlene M. Rosen & Isabel Rivera-Collazo, *Climate change, adaptive cycles, and the persistence of foraging economies during the late Pleistocene/Holocene transition in the Levant*. PNAS **109** (2012), 3640–3645.

Climatic forcing during the Younger Dryas (≈12.9–11.5 ky B.P.) event has become the theoretical basis to explain the origins of agricultural lifestyles in the Levant by suggesting a failure of foraging societies to adjust. This explanation however, does not fit the scarcity of data for predomestication cultivation in the Natufian Period. The resilience of Younger Dryas foragers is better illustrated by a concept of adaptive cycles within a theory of adaptive change (resilience theory). Such cycles consist of four phases: release/collapse (Ω); reorganization (α), when the system restructures itself after a catastrophic stimulus through innovation and social memory—a period of greater resilience and less vulnerability; exploitation (r); and conservation (K), representing an increasingly rigid system that loses exibility to change. The Kebarans and Late Natufians had similar responses to cold and dry conditions vs. Early Natufians and the Pre-Pottery Neolithic A responses to warm and wet climates. Kebarans and Late Natufians (α-phase) shifted

to a broader-based diet and increased their mobility. Early Natufian and Pre-Pottery Neolithic A populations (r- and K-phases) had a growing investment in more narrowly focused, high-yield plant resources, but they maintained the broad range of hunted animals because of increased sedentism. These human adaptive cycles interlocked with plant and animal cycles. Forest and grassland vegetation responded to late Pleistocene and early Holocene climatic fluctuations, but prey animal cycles reflected the impact of human hunting pressure. The combination of these three adaptive cycles results in a model of human adaptation, showing potential for great sustainability of Levantine foraging systems even under adverse climatic conditions.
agricultural origins | Epipaleolithic | hunter-gatherers | Israel

Streeter 2012

Richard Streeter, Andrew J. Dugmore & Orri Vésteinsson, *Plague and landscape resilience in premodern Iceland*. PNAS **109** (2012), 3664–3669.
In debates on societal collapse, Iceland occupies a position of precarious survival, defined by not becoming extinct, like Norse Greenland, but having endured, sometimes by the narrowest of margins. Classic decline narratives for late medieval to early modern Iceland stress compounding adversities, where climate, trade, political domination, unsustainable practices, and environmental degradation conspire with epidemics and volcanism to depress the Icelanders and turn the once-proud Vikings and Saga writers into one of Europe's poorest nations. A mainstay of this narrative is the impact of incidental setbacks such as plague and volcanism, which are seen to have compounded and exacerbated underlying structural problems. This research shows that this view is not correct. We present a study of landscape change that uses 15 precisely dated tephra layers spanning the whole 1,200-y period of human settlement in Iceland. These tephras have provided 2,625 horizons of known age within 200 stratigraphic sections to form a high-resolution spatial and temporal record of change. This finding shows short-term (50 y) declines in geomorphological activity after two major plagues in A.D. 15th century, variations that probably mirrored variations in the population. In the longer term, the geomorphological impact of climate changes from the 14th century on is delayed, and landscapes (as well as Icelandic society) exhibit resilience over decade to century timescales. This finding is not a simple consequence of depopulation but a reflection of how Icelandic society responded with a scaling back of their economy, conservation of core functionality, and entrenchment of the established order.
tephrochronology | soil erosion | human impact

Neolithikum

Yang 2012

Xiaoyan Yang et al., *Early millet use in northern China*. PNAS **109** (2012), 3726–3730.
Xiaoyan Yang, Zhiwei Wan, Linda Perry, Houyuan Lu, Qiang Wang, Chaohong Zhao, Jun Li, Fei Xie, Jincheng Yu, Tianxing Cui, Tao Wangb, Mingqi Li and Quansheng Ge
It is generally understood that foxtail millet and broomcorn millet were initiallydomesticated inNorthern Chinawhere they eventually became the dominant plant food crops. The rarity of older archaeological sites and archaeobotanical work in the region, however, renders both the origins of these plants and their processes of domestication poorly understood. Here we present ancient starch grain assemblages recovered from cultural deposits, including carbonized residues adhering to an early pottery sherd as well as grinding stone tools excavated from the sites of Nanzhuangtou (11.5-11.0 cal kyBP) and Donghulin (11.0-9.5 cal kyBP) in the North China Plain. Our data extend the record of millet use in China by nearly 1,000 y, and the record of foxtail millet in the region

by at least two millennia. The patterning of starch residueswithin the samples allow for the formulation of the hypothesis that foxtail millets were cultivated for an extended period of twomillennia, duringwhich this crop plant appears to have been undergoing domestication. Future research in the region will help clarify the processes in place.
starch grain analysis | agriculture origins | early Neolithic | millet domestication | East Asia

Religion

Ross 2012

Lee D. Ross, Yphtach Lelkes & Alexandra G. Russell, *How Christians reconcile their personal political views and the teachings of their faith: Projection as a means of dissonance reduction*. PNAS **109** (2012), 3616–3622.

The present study explores the dramatic projection of one's own views onto those of Jesus among conservative and liberal American Christians. In a large-scale survey, the relevant views that each group attributed to a contemporary Jesus differed almost as much as their own views. Despite such dissonance-reducing projection, however, conservatives acknowledged the relevant discrepancy with regard to "fellowship" issues (e.g., taxation to reduce economic inequality and treatment of immigrants) and liberals acknowledged the relevant discrepancy with regard to "morality" issues (e.g., abortion and gay marriage). However, conservatives also claimed that a contemporary Jesus would be even more conservative than themselves on the former issues whereas liberals claimed that Jesus would be even more liberal than themselves on the latter issues. Further reducing potential dissonance, liberal and conservative Christians differed markedly in the types of issues they claimed to be more central to their faith. A concluding discussion considers the relationship between individual motivational processes and more social processes that may underlie the present findings, as well as implications for contemporary social and political conflict.

Story or Book

Marchant 2012

Jo Marchant, *Golden boy*. nature **483** (2012), 34–35.

Jo Marchant uncovers a mixed hoard in a history of Tutankhamun and the discovery of his tomb.

Tutankhamen: The Search for an Egyptian King. Joyce Tyldesley. Basic Books/Profile: 2012. 336 pp. $29.99/£18.99

Tyldesley's treatment of more recent analyses is disappointing. Scans in 2005 suggested that the boy king had a broken leg, and DNA tests in 2010 provided evidence that he was inbred, and died of malaria. These studies are the subject of intense debate among experts and are the only new scientific material in the book, yet they are skipped over in a few cursory paragraphs. After hundreds of books on this subject, the promise on the cover that Tyldesley is "shedding new light" on the boy king was always going to be hard to keep. But she is such a gifted storyteller that perhaps it doesn't matter. Her writing is crystal-clear and charmingly irreverent – she describes Akhenaten's revolutionary reign as "17 years of royal navel gazing" – and she shares intimate anecdotes, such as how Carter and his patron, Lord Carnarvon, broke into the burial chamber ahead of the official opening, covering up their entry point with a basket lid. She puts what little we know about Tutankhamun into context, giving a fascinating discussion of the discovery's social history.