

## References

### Aktuell

#### BAHCALL 2015

Neta A. Bahcall, *Hubble's Law and the expanding universe*. [PNAS 112 \(2015\), 3173–3175](#).

Hubble's discovery portrays an amazing scientific tale: his distances had a large systematic error by a factor of seven, his velocities came mostly from those measured by Slipher, he used a small sample of merely 24 nearby galaxies, and his interpretation of the results in terms of the then de Sitter kinematic model was wrong; yet, his main result of the velocity vs. distance relation changed the course of science by revealing the expanding universe. The Hubble Law, the Hubble Constant, the Hubble Time, and the more recent Hubble Space Telescope are but tributes to this awe-inspiring discovery.

#### KELLEY 2015

Colin P. Kelley, Shahrzad Mohtadi, Mark A. Cane, Richard Seager & Yochanan Kushnir, *Climate change in the Fertile Crescent and implications of the recent Syrian drought*. [PNAS 112 \(2015\), 3241–3246](#).

Before the Syrian uprising that began in 2011, the greater Fertile Crescent experienced the most severe drought in the instrumental record. For Syria, a country marked by poor governance and unsustainable agricultural and environmental policies, the drought had a catalytic effect, contributing to political unrest. We show that the recent decrease in Syrian precipitation is a combination of natural variability and a long-term drying trend, and the unusual severity of the observed drought is here shown to be highly unlikely without this trend. Precipitation changes in Syria are linked to rising mean sea-level pressure in the Eastern Mediterranean, which also shows a long-term trend. There has been also a long-term warming trend in the Eastern Mediterranean, adding to the drawdown of soil moisture. No natural cause is apparent for these trends, whereas the observed drying and warming are consistent with model studies of the response to increases in greenhouse gases. Furthermore, model studies show an increasingly drier and hotter future mean climate for the Eastern Mediterranean. Analyses of observations and model simulations indicate that a drought of the severity and duration of the recent Syrian drought, which is implicated in the current conflict, has become more than twice as likely as a consequence of human interference in the climate system.

**Keywords:** drought | Syria | climate change | unrest | conflict

**Significance:** There is evidence that the 2007-2010 drought contributed to the conflict in Syria. It was the worst drought in the instrumental record, causing widespread crop failure and a mass migration of farming families to urban centers. Century-long observed trends in precipitation, temperature, and sea-level pressure, supported by climate model results, strongly suggest that anthropogenic forcing has increased the probability of severe and persistent droughts in this region, and made the occurrence of a 3-year drought as severe as that of 2007–2010 2 to 3 times more likely than by natural variability alone. We conclude that human influences on the climate system are implicated in the current Syrian conflict.

## Anthropologie

HARRIS 2015

Kelley Harris, *Evidence for recent, population-specific evolution of the human mutation rate*. [PNAS 112 \(2015\), 3439–3444](#).

As humans dispersed out of Africa they adapted to new environmental challenges, including changes in exposure to mutagenic solar radiation. Humans in temperate latitudes have acquired light skin that is relatively transparent to UV light, and some evidence suggests that their DNA damage response pathways have also experienced local adaptation. This raises the possibility that different populations have experienced different selective pressures affecting genome integrity. Here, I present evidence that the rate of a particular mutation type has recently increased in the European population, rising in frequency by 50% during the 40,000–80,000 y since Europeans began diverging from Asians. A comparison of SNPs private to Africa, Asia, and Europe in the 1000 Genomes data reveals that private European variation is enriched for the transition 5'-TCC-3'-5'-TTC-3'. Although it is not clear whether UV played a causal role in changing the European mutational spectrum, 5'-TCC-3'-5'-TTC-3' is known to be the most common somatic mutation present in melanoma skin cancers, as well as the mutation most frequently induced in vitro by UV. Regardless of its causality, this change indicates that DNA replication fidelity has not remained stable even since the origin of modern humans and might have changed numerous times during our recent evolutionary history.

Keywords: mutation rate | molecular clock | human evolution | genetic variation | UV damage

## Biologie

BRENT 2015

Lauren J. N. Brent, Daniel W. Franks, Emma A. Foster, Kenneth C. Balcomb, Michael A. Cant & Darren P. Croft, *Ecological Knowledge, Leadership, and the Evolution of Menopause in Killer Whales*. [Current Biology 25 \(2015\), 746–750](#).

Classic life-history theory predicts that menopause should not occur because there should be no selection for survival after the cessation of reproduction [1]. Yet, human females routinely live 30 years after they have stopped reproducing [2]. Only two other species—killer whales (*Orcinus orca*) and short-finned pilot whales (*Globicephala macrorhynchus*) [3, 4]—have comparable postreproductive lifespans. In theory, menopause can evolve via inclusive fitness benefits [5, 6], but the mechanisms by which postreproductive females help their kin remain enigmatic. One hypothesis is that postreproductive females act as repositories of ecological knowledge and thereby buffer kin against environmental hardships [7, 8]. We provide the first test of this hypothesis using a unique long-term dataset on wild resident killer whales. We show three key results. First, postreproductively aged females lead groups during collective movement in salmon foraging grounds. Second, leadership by postreproductively aged females is especially prominent in difficult years when salmon abundance is low. This finding is critical because salmon abundance drives both mortality and reproductive success in resident killer whales [9, 10]. Third, females are more likely to lead their sons than they are to lead their daughters, supporting predictions of recent models [5] of the evolution of menopause based on kinship dynamics. Our results show that postreproductive females may boost the fitness of kin through the transfer of ecological knowledge. The

value gained from the wisdom of elders can help explain why female resident killer whales and humans continue to live long after they have stopped reproducing.

#### DU TOIT 2015

George Du Toit et al., *Randomized Trial of Peanut Consumption in Infants at Risk for Peanut Allergy*. [New England Journal of Medicine](#) **372** (2015), 803–813.

George Du Toit, M.B., B.Ch., Graham Roberts, D.M., Peter H. Sayre, M.D., Ph.D., Henry T. Bahnson, M.P.H., Suzana Radulovic, M.D., Alexandra F. Santos, M.D., Helen A. Brough, M.B., B.S., Deborah Phippard, Ph.D., Monica Basting, M.A., Mary Feeney, M.Sc., R.D., Victor Turcanu, M.D., Ph.D., Michelle L. Sever, M.S.P.H., Ph.D., Margarita Gomez Lorenzo, M.D., Marshall Plaut, M.D., and Gideon Lack, M.B., B.Ch., for the LEAP Study Team

**Background** The prevalence of peanut allergy among children in Western countries has doubled in the past 10 years, and peanut allergy is becoming apparent in Africa and Asia. We evaluated strategies of peanut consumption and avoidance to determine which strategy is most effective in preventing the development of peanut allergy in infants at high risk for the allergy.

**Methods** We randomly assigned 640 infants with severe eczema, egg allergy, or both to consume or avoid peanuts until 60 months of age. Participants, who were at least 4 months but younger than 11 months of age at randomization, were assigned to separate study cohorts on the basis of preexisting sensitivity to peanut extract, which was determined with the use of a skin-prick test — one consisting of participants with no measurable wheal after testing and the other consisting of those with a wheal measuring 1 to 4 mm in diameter. The primary outcome, which was assessed independently in each cohort, was the proportion of participants with peanut allergy at 60 months of age.

**Results** Among the 530 infants in the intention-to-treat population who initially had negative results on the skin-prick test, the prevalence of peanut allergy at 60 months of age was 13.7% in the avoidance group and 1.9% in the consumption group ( $P < 0.001$ ). Among the 98 participants in the intention-to-treat population who initially had positive test results, the prevalence of peanut allergy was 35.3% in the avoidance group and 10.6% in the consumption group ( $P = 0.004$ ). There was no significant between-group difference in the incidence of serious adverse events. Increases in levels of peanut-specific IgG4 antibody occurred predominantly in the consumption group; a greater percentage of participants in the avoidance group had elevated titers of peanut-specific IgE antibody. A larger wheal on the skin-prick test and a lower ratio of peanut-specific IgG4:IgE were associated with peanut allergy.

**Conclusions** The early introduction of peanuts significantly decreased the frequency of the development of peanut allergy among children at high risk for this allergy and modulated immune responses to peanuts.

#### KIRBY 2010

A. Kirby, A. Woodward, S. Jackson, Y. Wang & M. A. Crawford, *A double-blind, placebo-controlled study investigating the effects of omega-3 supplementation in children aged 8–10 years from a mainstream school population*. [Research in Developmental Disabilities](#) **31** (2010), 718–730.

Despite the increased interest in the effects of omega-3 supplementation on childrens' learning and behaviour, there are a lack of controlled studies of this kind

that have utilised a typically developing population. This study investigated the effects of omega-3 supplementation in 450 children aged 8–10 years old from a mainstream school population, using a randomised, double-blind, placebo-controlled design. Participants were supplemented with either active supplements (containing docosahexaenoic acid, DHA and eicosapentaenoic acid, EPA) or a placebo for 16 weeks. Cheek cell fatty acid levels were recorded pre- and post-supplementation and a range of cognitive tests and parent and teacher questionnaires were used as outcome measures. After supplementation, changes in the relationship between omega-6 and omega-3 were significant in the active group. Despite the wide range of cognitive and behavioural outcome measures employed, only three significant differences between groups were found after 16 weeks, one of which was in favour of the placebo condition. Exploring the associations between changes in fatty acid levels and changes in test and questionnaire scores also produced equivocal results. These findings are discussed in relation to previous findings with clinical populations and future implications for research.

**Keywords:** Omega-3 supplementation | Children | Behaviour | Cognition | Cheek cells

## WHITEHEAD 2015

Hal Whitehead, *Life History Evolution, What Does a Menopausal Killer Whale Do?* [Current Biology](#) **25** (2015), R225–R227.

Menopause evolved in humans and whales, presumably because older females can help their kin. But how do they help? New research shows that post-menopausal female killer whales lead foraging groups. This leadership is most significant when food is scarce.

## Klima

## TSONIS 2015

Anastasios A. Tsonis, Ethan R. Deyle, Robert M. May, George Sugihara, Kyle Swanson, Joshua D. Verbeten & Geli Wang, *Dynamical evidence for causality between galactic cosmic rays and interannual variation in global temperature*. [PNAS](#) **112** (2015), 3253–3256.

[pnas112-03253-Supplement1.mov](#), [pnas112-03253-Supplement2.mov](#), [pnas112-03253-Supplement3.mov](#)

As early as 1959, it was hypothesized that an indirect link between solar activity and climate could be mediated by mechanisms controlling the flux of galactic cosmic rays (CR) [Ney ER (1959) *Nature* 183:451–452]. Although the connection between CR and climate remains controversial, a significant body of laboratory evidence has emerged at the European Organization for Nuclear Research [Duplissy J, et al. (2010) *Atmos Chem Phys* 10:1635–1647; Kirkby J, et al. (2011) *Nature* 476(7361):429–433] and elsewhere [Svensmark H, Pedersen JOP, Marsh ND, Enghoff MB, Uggerhøj UI (2007) *Proc R Soc A* 463:385–396; Enghoff MB, Pedersen JOP, Uggerhøj UI, Paling SM, Svensmark H (2011) *Geophys Res Lett* 38:L09805], demonstrating the theoretical mechanism of this link. In this article, we present an analysis based on convergent cross mapping, which uses observational time series data to directly examine the causal link between CR and year-to-year changes in global temperature. Despite a gross correlation, we find no measurable evidence of a causal effect linking CR to the overall 20th-century warming trend. However, on short interannual timescales, we find a significant, although modest, causal effect between CR and short-term, year-to-year variability in global temperature that is consistent with the presence of nonlinearities

internal to the system. Thus, although CR do not contribute measurably to the 20th-century global warming trend, they do appear as a nontraditional forcing in the climate system on short interannual timescales.

**Keywords:** climate variability | cosmic rays | global temperature | causality | convergent cross mapping

**Significance:** Here we use newly available methods to examine the dynamical association between cosmic rays (CR) and global temperature (GT) in the 20th-century observational record. We find no measurable evidence of a causal effect linking CR to the overall 20th-century warming trend; however, on short interannual timescales, we find a significant, although modest, causal effect of CR on short-term, year-to-year variability in GT. Thus, although CR clearly do not contribute measurably to the 20th-century global warming trend, they do appear as a nontraditional forcing in the climate system on short interannual timescales, providing another interesting piece of the puzzle in our understanding of factors influencing climate variability.

## Neolithikum

LARSON 2015

Greger Larson, *How wheat came to Britain*. [science 347 \(2015\), 945–946](#).

Wheat reached Britain from the Near East at least 2000 years before the arrival of wheat farming.

SMITH 2015

Oliver Smith, Garry Momber, Richard Bates, Paul Garwood, Simon Fitch, Mark Pallen, Vincent Gaffney & Robin G. Allaby, *Sedimentary DNA from a submerged site reveals wheat in the British Isles 8000 years ago*. [science 347 \(2015\), 998–1001](#).

[s347-0998-Supplement.pdf](#)

The Mesolithic-to-Neolithic transition marked the time when a hunter-gatherer economy gave way to agriculture, coinciding with rising sea levels. BouldnorCliff, is a submarine archaeological site off the Isle of Wight in the United Kingdom that has a well-preserved Mesolithic paleosol dated to 8000 years before the present. We analyzed a core obtained from sealed sediments, combining evidence from microgeomorphology and microfossils with sedimentary ancient DNA (sedaDNA) analyses to reconstruct floral and faunal changes during the occupation of this site, before it was submerged. In agreement with palynological analyses, the sedaDNA sequences suggest a mixed habitat of oak forest and herbaceous plants. However, they also provide evidence of wheat 2000 years earlier than mainland Britain and 400 years earlier than proximate European sites. These results suggest that sophisticated social networks linked the Neolithic front in southern Europe to the Mesolithic peoples of northern Europe.

ZEDER 2015

Melinda A. Zeder, *Core questions in domestication research*. [PNAS 112 \(2015\), 3191–3198](#).

[pnas112-03191-Supplement1.pdf](#), [pnas112-03191-Supplement2.pdf](#)

The domestication of plants and animals is a key transition in human history, and its profound and continuing impacts are the focus of a broad range of transdisciplinary research spanning the physical, biological, and social sciences. Three

central aspects of domestication that cut across and unify this diverse array of research perspectives are addressed here. Domestication is defined as a distinctive coevolutionary, mutualistic relationship between domesticator and domesticate and distinguished from related but ultimately different processes of resource management and agriculture. The relative utility of genetic, phenotypic, plastic, and contextual markers of evolving domesticatory relationships is discussed. Causal factors are considered, and two leading explanatory frameworks for initial domestication of plants and animals, one grounded in optimal foraging theory and the other in niche-construction theory, are compared.

**Keywords:** domestication | mutualism | genetic impacts | ecophenotypic impacts | niche-construction theory

**Significance:** Domestication of plants and animals marks a major transition in human history that represents a vibrant area of interdisciplinary scientific inquiry. Consideration of three central questions about domestication—what it is, what it does, and why it happened—provide a unifying framework for diverse research on the topic. Domestication is defined in terms of a coevolutionary mutualism between domesticator and domesticate and is distinguished from related but ultimately different processes of management and agriculture. Domestication results in a range of genotypic, phenotypic, plastic, and contextual impacts that can be used as markers of evolving domesticatory relationships. A consideration of causal scenarios finds greater empirical support for explanatory frameworks grounded in niche-construction theory over those derived from optimal foraging theory.

## Politik

KRAMER 2014

Martin Kramer, Efraim Karsh & Benny Morris, *What Happened at Lydda*. [Mosaic Monthly Essays 2014, July 1](#).

In his celebrated new book, Ari Shavit claims that “Zionism” committed a massacre in July 1948. Can the claim withstand scrutiny?

“Zionism carries out a massacre” is a lapel-grabbing phrase, meant to excite and provoke. In comparing accounts of a battle, however, sober details make all the difference. As it happens, many of Shavit’s readers have praised his book for adding complexity to Israel’s story, thus replacing old “myths” with a more nuanced understanding. Shavit himself has proclaimed that Israel is “all about complexity. If you don’t see that, you don’t get it.” For anyone with a taste for complexity, what follows should constitute indispensable reading alongside the rather simpler tale entitled “Lydda, 1948.”

The other day, someone posted a video clip from Lod (Lydda). It shows a demonstration by Arab residents (who comprise about a quarter of the town’s population) and possibly some Jews, in Palmah Square, alongside the small mosque. The demonstrators, waving Palestinian flags, are protesting against “Protective Edge,” Israel’s operation in Gaza. They carry a large banner with this message: “Stop the massacre in Gaza.”

At the site of one presumed “massacre,” yet another is presumed. This is how myths evolve into a mythology. And that is why it’s so important to recognize that even in Lydda, supposed site of the “largest massacre” of 1948, we just can’t be certain there was a “massacre” at all.

## Religion

DAMISCH 2010

Lysann Damisch, Barbara Stoberock & Thomas Mussweiler, *Keep Your Fingers Crossed! How Superstition Improves Performance*. [Psychological Science](#) **21** (2010), 1014–1020.

Superstitions are typically seen as inconsequential creations of irrational minds. Nevertheless, many people rely on superstitious thoughts and practices in their daily routines in order to gain good luck. To date, little is known about the consequences and potential benefits of such superstitions. The present research closes this gap by demonstrating performance benefits of superstitions and identifying their underlying psychological mechanisms. Specifically, Experiments 1 through 4 show that activating good-luck-related superstitions via a common saying or action (e.g., “break a leg,” keeping one’s fingers crossed) or a lucky charm improves subsequent performance in golfing, motor dexterity, memory, and anagram games. Furthermore, Experiments 3 and 4 demonstrate that these performance benefits are produced by changes in perceived self-efficacy. Activating a superstition boosts participants’ confidence in mastering upcoming tasks, which in turn improves performance. Finally, Experiment 4 shows that increased task persistence constitutes one means by which self-efficacy, enhanced by superstition, improves performance.

Keywords: superstition, performance, self-efficacy