Liste erstellt am 2012-02-08

Literatur

Aktuell

Alberts 2012

Bruce Alberts, *Trivializing Science Education*. science **335** (2012), 263.
When we teach children about aspects of science that the vast majority of them cannot yet grasp, then we have wasted valuable educational resources and produced nothing of lasting value. Perhaps less obvious, but to me at least as important, is the fact that we take all the enjoyment out of science when we do so.
For example, in an introductory biology class, students are often required to learn the names of the 10 enzymes that oxidize sugars in a process called glycolysis. But an obsession with such details can obscure any real understanding of the central issue, leaving students with the impression that science is impossibly dull.

Armstrong 2012

Christopher R. Armstrong, May Nyman, Tatiana Shvareva, Ginger E. Sigmon, Peter C. Burns & Alexandra Navrotsky, *Uranyl peroxide enhanced nuclear fuel corrosion in seawater*. PNAS **109** (2012), 1874–1877.
The Fukushima-Daiichi nuclear accident brought together compromised irradiated fuel and large amounts of seawater in a high radiation field. Based on newly acquired thermochemical data for a series of uranyl peroxide compounds containing charge-balancing alkali cations, here we show that nanoscale cage clusters containing as many as 60 uranyl ions, bonded through peroxide and hydroxide bridges, are likely to form in solution or as precipitates under such conditions. These species will enhance the corrosion of the damaged fuel and, being thermodynamically stable and kinetically persistent in the absence of peroxide, they can potentially transport uranium over long distances.
calorimetry | actinyl peroxide | actinide | uranium | spent fuel

Blundy 2012

Jon Blundy & Alison Rust, *Greek inflation circa 1600 BC*. nature **482** (2012), 38–39.
A petrology study of the Bronze Age 'Minoan' eruption on the Greek island of Santorini finds that the sub-volcanic magma reservoir was recharged in spurts during the decades to months that preceded the eruption. See Letter p.77
The most powerful volcanic eruptions release so much magma that a large surface depression, or caldera, forms above the evacuated underground magma reservoir. We know from geological records that caldera-forming eruptions can discharge hundreds or even thousands of cubic kilometres of magma. A period of volcanic unrest must precede these eruptions, but the nature and duration of the warning signs are unknown because this type of eruption is so infrequent. Druitt et al. show that igneous petrology, the study of once molten rocks, can help to elucidate the likely precursory activity for these large, catastrophic eruptions.

Bowman 2012

David Bowman, *Bring elephants to Australia?* nature **482** (2012), 30.
There's a solution to the continent's rampant fires and feral animals, says David Bowman – introduce large mammals and increase hunting pressure.

I think that another, more holistic approach can address Australia's ecological problems. Specifically, we must restabilize food webs (now out of balance because of the Pleistocene extinctions), the loss of the Aboriginal traditions of patch burning and hunting, and the ad hoc release of non-native animals and plants. We must introduce and manage predators to control the feral animals, and bring in herbivore species to graze the flammable grasses – which we can better control using small fires as 'über-herbivores'.

Carhart-Harris 2012

Robin L. Carhart-Harris et al., *Neural correlates of the psychedelic state as determined by fMRI studies with psilocybin*. PNAS **109** (2012), 2138–2143.

Robin L. Carhart-Harris, David Erritzoe, Tim Williams, James M. Stone, Laurence J. Reed, Alessandro Colasanti Robin J. Tyacke, Robert Leech, Andrea L. Malizia, Kevin Murphy, Peter Hobden, John Evans, Amanda Feilding Richard G. Wise and David J. Nutt

Psychedelic drugs have a long history of use in healing ceremonies, but despite renewed interest in their therapeutic potential, we continue to know very little about howthey work in the brain. Here we used psilocybin, a classic psychedelic found in magic mushrooms, and a task-free functional MRI (fMRI) protocol designed to capture the transition from normalwaking consciousness to the psychedelic state. Arterial spin labeling perfusion and blood-oxygen leveldependent (BOLD) fMRI were used to map cerebral blood flow and changes in venous oxygenation before and after intravenous infusions of placebo and psilocybin. Fifteen healthy volunteers were scanned with arterial spin labeling and a separate 15 with BOLD. As predicted, profound changes in consciousness were observed after psilocybin, but surprisingly, only decreases in cerebral blood flow and BOLD signal were seen, and these were maximal in hub regions, such as the thalamus and anterior and posterior cingulate cortex (ACC and PCC). Decreased activity in the ACC/medial prefrontal cortex (mPFC) was a consistent finding and the magnitude of this decrease predicted the intensity of the subjective effects. Based on these results, a seed-based pharmaco-physiological interaction/ functional connectivity analysis was performed using a medial prefrontal seed. Psilocybin caused a significant decrease in the positive coupling between the mPFC and PCC. These results strongly imply that the subjective effects of psychedelic drugs are caused by decreased activity and connectivity in the brain's key connector hubs, enabling a state of unconstrained cognition.

default mode network | hallucinogens | serotonin | depression | 5-HT2A receptor

Druitt 2012

T. H. Druitt, F. Costa, E. Deloule, M. Dungan & B. Scaillet, *Decadal to monthly timescales of magma transfer and reservoir growth at a caldera volcano*. nature **482** (2012), 77–80.

n482-0077-Supplement.pdf

Caldera-forming volcanic eruptions are low-frequency, highimpact events capable of discharging tens to thousands of cubic kilometres of magma explosively on timescales of hours to days, with devastating effects on local and global scales1. Because no such eruption has been monitored during its long build-up phase, the precursor phenomena are not well understood. Geophysical signals obtained during recent episodes of unrest at calderas such as Yellowstone, USA, and Campi Flegrei, Italy, are difficult to interpret, and the conditions necessary for large eruptions are poorly constrained2,3. Here we present a study of pre-eruptive magmatic processes and their timescales using chemically zoned crystals from the 'Minoan' caldera-formingeruption of Santorini volcano,Greece4, which occurred in the late 1600s BC. The results provide insights into how rapidly large silicic systems may pass from a quiescent state to one on the edge of eruption5,6. Despite the large volume of erupted magma4 (40-60 cubic kilometres), and the 18,000-year gestation period between the Minoan eruption and the previous major eruption, most crystals in

the Minoan magma record processes that occurred less than about 100 years before the eruption. Recharge of the magma reservoir by large volumes of silicic magma (and some mafic magma) occurred during the century before eruption, and mixing between different silicicmagmabatches was still taking place during the final months. Final assembly of large silicic magma reservoirs may occur on timescales that are geologically very short by comparison with the preceding repose period, with major growth phases immediately before eruption. These observations have implications for the monitoring of long-dormant, but potentially active, caldera systems.

Lee 2012

Hyeong-Min Lee & Bryan L. Roth, *Hallucinogen actions on human brain revealed*. PNAS **109** (2012), 1820–1821.

Overall, these findings are consistent with the hypothesis that psilocybin diminishes activity in key brain regions and networks implicated in hallucinogen actions. These provocative findings are important because they challenge many long-held models regarding hallucinogen actions that have focused mainly on their ability to enhance excitatory neurotransmission and overall brain activity.

Marchant 2012

Jo Marchant, *Hunt for the Ancient Mariner*. nature **481** (2012), 426–428.

Armed with high-tech methods, researchers are scouring the Aegean Sea for the world's oldest shipwrecks.

Foley had high hopes for the area because it had been a port for millennia and had never been surveyed by archaeologists. But the search came up empty handed. Close to shore, there was no hope of finding ancient wrecks because the sea floor was covered in a thick pile of sediments that had washed off the island. Farther out, the researchers found furrows left by trawl fishermen, who had scraped the sea floor clean, even in areas where trawling is supposedly forbidden.

Sasnett 2012

Peri Sasnett, Brent M. Goehring, Nicholas Christie-Blick & Joerg M. Schaefer, *Do phreatomagmatic eruptions at Ubehebe Crater (Death Valley, California) relate to a wetter than present hydro-climate?* Geophysical Research Letters **39** (2012), L02401. DOI:.

When magma encounters groundwater, distinctive explosions, such as those of Ubehebe, ensue. But how this could have happened in Death Valley, the driest area in North America, has been unclear. Brent Goehring at Purdue University in West Lafayette, Indiana, and his colleagues dated the crater using the rate of accumulation of beryllium-10 isotopes in rocks exposed by the eruption. They conclude that the crater probably appeared 800-2,100 years ago, during a period in which Death Valley underwent prolonged drought. The authors suggest that there may be enough permanent groundwater to drive further explosive eruptions in Death Valley.

Phreatomagmatic eruptions occur when rising magma encounters groundwater and/or surface water, causing a steam explosion and the ejection of country rock and pyroclastic material. The predominance of this type of activity at the Ubehebe volcanic field in northern Death Valley, California, is enigmatic owing to the extremely arid climate of the region. A novel application of 10Be surface exposure dating is presented to determine the timing of phreatomagmatic eruptions at Ubehebe Crater and to test the idea that volcanism may relate to a wetter than present hydro-climate. Twelve of the fifteen ages obtained lie between 0.8 and 2.1 ka, while three samples give older, mid-Holocene ages. The cluster between 0.8 and 2.1 ka is interpreted as encompassing the interval of volcanic activity during which Ubehebe Crater was formed. The remaining older ages are inferred

to date eruptions at the older neighboring craters. The main and most recent period of activity encompasses the Medieval Warm Period, an interval of prolonged drought in the American southwest, as well as slightly wetter conditions prior to the Medieval Warm Period. Phreatomagmatic activity under varied hydrologic conditions casts doubt on the idea that eruptive timing relates to a wetter hydro-climate. Instead, the presence of a relatively shallow modern water table suggests that sufficient groundwater was generally available for phreatomagmatic eruptions at the Ubehebe site, in spite of prevailing arid conditions. This and the youth of the most recent activity suggest that the Ubehebe volcanic field may constitute a more significant hazard than generally appreciated.

Vincent 1915
Stella B. Vincent, *The White Rat and the Maze Problem, IV. The number and distribution of errors – a comparative study.* Journal of Animal Behaviour **5** (1915), 367–374.

Young 1938
Paul Thomas Young, *Preferences and Demands of the White Rat for Food.* JCompPsy **26** (1938), 545–588.

Young 1965
Paul Thomas Young: Distinguished Scientific Contribution Award. American Psychologist **20** (1965), 1084–1088.

Anthropologie

Apicella 2012
Coren L. Apicella, Frank W. Marlowe, James H. Fowler & Nicholas A. Christakis, *Social networks and cooperation in hunter-gatherers.* nature **481** (2012), 497–501.
n481-0497-Supplement1.pdf, n481-0497-Supplement2.mov, n481-0497-Supplement3.mov
Social networks show striking structural regularities, and both theory and evidence suggest that networks may have facilitated the development of large-scale cooperation in humans. Here, we characterize the social networks of the Hadza, a population of hunter-gatherers in Tanzania. We show that Hadza networks have important properties also seen in modernized social networks, including a skewed degree distribution, degree assortativity, transitivity, reciprocity, geographic decay and homophily. We demonstrate that Hadza camps exhibit high between-group and low within-group variation in public goods game donations. Network ties are also more likely between people who give the same amount, and the similarity in cooperative behaviour extendsup to two degrees of separation. Social distance appears to be as important as genetic relatedness and physical proximity in explaining assortativity in cooperation. Our results suggest that certain elements of social network structure may have been present at an early point in human history. Also, early humans may have formed ties with both kin and non-kin, based in part on their tendency to cooperate. Social networks may thus have contributed to the emergence of cooperation.

Henrich 2012
Joseph Henrich, *Hunter-gatherer cooperation.* nature **481** (2012), 449–450.
A study of social networks in the hunter-gatherer Hadza people in Tanzania illuminates the evolutionary origins of humans' unique style of cooperation in groups.

How could natural selection favour actions that benefit others, or one's group, but that also incur a personal cost? Theorists generally agree that the solution to this core dilemma requires assortative interaction, such that cooperators benefit other cooperators more than non-cooperators. The challenge arises when one tries to delineate the processes that sustain such assortative inter actions against invasion by 'free-riders' – non-cooperators who siphon off collective benefits.
The most striking findings emerge when the variation in cooperative behaviours is partitioned within and among the 17 Hadza bands. There is substantially more variation among the bands, and substantially less variation within them, than would be expected by chance. Despite the fluidity of band membership, it seems that some combination of similarity-based association, social learning and sanctioning establishes differences in cooperative tendencies among different bands. This pattern is particularly interesting in light of experiments showing that larger Hadza bands evince more fairness in anonymous interactions. Consistent with this, Apicella and co-workers' data from both the campmate and gift networks suggest that high contributors associate with other high contributors, and low contributors choose other low contributors. In fact, the gift-network results indicate that this extends to friends of friends: if your friend's friend is highly cooperative, you are likely to cooperate more, too.

Raschle 2012

Nora Maria Raschle, Jennifer Zuk & Nadine Gaab, *Functional characteristics of developmental dyslexia in left-hemispheric posterior brain regions predate reading onset*. PNAS **109** (2012), 2156–2161.
Individuals with developmental dyslexia (DD) show a disruption in posterior left-hemispheric neural networks during phonological processing. Additionally, compensatory mechanisms in children and adults with DD have been located within frontal brain areas. However, it remains unclear when and how differences in posterior left-hemispheric networks manifest and whether compensatory mechanisms have already started to develop in the prereading brain. Here we investigate functional networks during phonological processing in 36 prereading children with a familial risk for DD (n = 18, average age = 66.50 mo) compared with age and IQ-matched controls (n = 18; average age = 65.61 mo). Functional neuroimaging results reveal reduced activation in prereading children with a family-history of DD (FHD+), compared with those without (FHD-), in bilateral occipitotemporal and left temporoparietal brain regions. This finding corresponds to previously identified hypoactivations in left hemispheric posterior brain regions for school-aged children and adults with a diagnosis of DD. Furthermore, left occipitotemporal and temporoparietal brain activity correlates positively with prereading skills in both groups. Our results suggest that differences in neural correlates of phonological processing in individuals with DD are not a result of reading failure, but are present before literacy acquisition starts. Additionally, no hyperactivation in frontal brain regions was observed, suggesting that compensatory mechanisms for reading failure are not yet present. Future longitudinal studies are needed to determine whether the identified differences may serve as neural premarkers for the early identification of children at risk for DD.
functional MRI | pediatric neuroimaging | reading disability | developmental disorder | learning disability

Energie

Murray 2012

James Murray & David King, *Oil's tipping point has passed*. nature **481** (2012), 433–435.

The economic pain of a flattening supply will trump the environment as a reason to curb the use of fossil fuels, say James Murray and David King.
Even while reserves are apparently increasing, the percentage available for production is going down. In the United States, for example, production as a percentage of reserves has steadily decreased from 9 % in 1980 to 6 % today. Production at existing oil fields around the world is declining at rates of about 4.5 % to 6.7 % per year. Only by adding in production from new wells is overall global production holding steady.
The solutions are not secret or mysterious. Globally we get 55 × 1018 joules of useful energy from 475 × 1018 joules of primary energy from fossil fuels, biomass and nuclear power plants. The difference is due to energy losses and inefficiencies in the conversion and transmission processes.

Mittelpaläolithikum

Roebroeks 2012

Wil Roebroeks et al., *Use of red ochre by early Neandertals.* PNAS **109** (2012), 1889–1894.

Wil Roebroeks, Mark J. Sier, Trine Kellberg Nielsen, Dimitri De Loecker, Josep Maria Parés, Charles E. S. Arps and Herman J. Mücher

The use of manganese and iron oxides by late Neandertals is well documented in Europe, especially for the period 60-40 kya. Such finds often have been interpreted as pigments even though their exact function is largely unknown. Here we report significantly older iron oxide finds that constitute the earliest documented use of red ochre by Neandertals. These finds were small concentrates of red material retrieved during excavations at Maastricht-Belvédère, The Netherlands. The excavations exposed a series of well-preserved flint artifact (and occasionally bone) scatters, formed in a river valley setting during a late Middle Pleistocene full interglacial period. Samples of the reddish material were submitted to various forms of analyses to study their physical properties. All analyses identified the red material as hematite. This is a nonlocal material that was imported to the site, possibly over dozens of kilometers. Identification of the Maastricht-Belvédère finds as hematite pushes the use of red ochre by (early) Neandertals back in time significantly, to minimally 200-250 kya (i.e., to the same time range as the early ochre use in the African record).

human evolution | paleolithic archeology | Middle Paleolithic | mineral pigments