

## Literatur

### Aktuell

BALTER 2011

Michael Balter, *Paleoanthropologist Now Rides High On a New Fossil Tide. science* **333** (2011), 1373–1375.

After a career marked by controversy, Lee Berger hopes new hominin fossils will salvage his mixed scientific reputation.

CERLING 2011

Thure E. Cerling et al., *Outside the box, Reply to Godfrey et al.: PNAS* **108** (2011), E743.

Thure E. Cerling, Emma Mbua, Francis M. Kirera, Fredrick K. Manthi, Frederick E. Grine, Meave G. Leakey, Matt Sponheimer, Kevin T. Uno and Julia Lee-Thorp

As for *Hadropithecus*, it is possible that its moderately high  $\delta^{13}\text{C}$  values reflect consumption of CAM rather than C4 plants (which we suggest dominated *P. boisei* diets), because the former are highly abundant in the unique spiny forests of Madagascar.

In the meantime, we prefer to eschew inferring diet for one extinct species from the inferred but unknown diet of another fossil taxon, especially one that is very distantly related and inhabited a very different environment.

CLERY 2011

Daniel Clery, *Which Way to the Island? science* **333** (2011), 1377–1379.

As teams vie to create the next new addition to the periodic table, the best path forward for superheavy-element research remains unclear.

GEO 2011

*Kosmisches Kreiseln, Die Mehrzahl der Galaxien scheinen sich in dieselbe Richtung zu drehen – ein Hinweis auf die Existenz weiterer Universen? Geo* **2011**, x, 164. <<http://www.geo.de/GEO/natur/kosmos/69668.html>>.

Sieben Prozent mehr Galaxien drehen sich links- als rechtsherum. Bloß Zufall? Das hält Longo für “extrem unwahrscheinlich”.

Wenn es aber kein Zufall ist, was ist dann der Grund für die Anomalie in der Galaxienrotation? Etwas, so die Forscher, hat die Sternensinseln in Drehung versetzt, und zwar eher in die eine als in die andere Richtung: “Wahrscheinlich hatte der Urknall selbst einen Spin, der einen sich drehenden Kosmos entstehen ließ”, mutmaßt Longo. Im Sog der Rotation des Raumes hätten die Galaxien dann überwiegend dessen Drehmoment übernommen.

Wenn sich aber das Universum selbst dreht, muss es eine Drehachse geben und ein Raum existieren, auf den diese Bewegung bezogen ist. Die Vermutung der US-Astronomen: Unser Universum dreht sich in einem Hyperraum, relativ zu anderen Universen. Von jenen wiederum “drehen sich manche rechts-, andere linksherum”, sagt Longo. Sodass letztlich die Summe der Drehimpulse gleich null ist.

GERSON 2011

Alexander R. Gerson & Christopher G. Guglielmo, *Flight at Low Ambient Humidity Increases Protein Catabolism in Migratory Birds. science* **333** (2011), 1434–1434.

s333-1434-Supplement.pdf

Trading Protein for Water

Migrating birds fly for long periods of time without stopping and are fueled largely by the metabolism of fat; however, high levels of activity require more than just energy, and water is essential for prolonged flight. Migrating birds are known to lose both fat and lean mass, and it has been suggested that protein catabolism, which generates fivefold more water than fat metabolism, may provide endogenous water during extended flights. Gerson and Guglielmo tested this hypothesis in Swainson's thrushes within a flight tunnel and found that birds flying in dry conditions burn more lean mass than those flying in more humid conditions. Even in very dry conditions over extended flights the birds experienced no water stress, suggesting that they were indeed able to endogenously satisfy their water needs. This mechanism helps to explain why reductions in muscle and organ mass, which at first seem maladaptive, are commonly observed in migrating birds.

Abstract: Although fat is the primary fuel for migratory flight in birds, protein is also used. Catabolism of tissue protein yields five times as much water per kilojoule as fat, and so one proposed function of protein catabolism is to maintain water balance during nonstop flights. To test the protein-for-water hypothesis, we flew Swainson's thrushes (*Catharus ustulatus*) in a climatic wind tunnel under high- and low-humidity conditions at 18°C for up to 5 hours. Flight under dry conditions increased the rates of lean mass loss and endogenous water production and also increased plasma uric acid concentration. These data demonstrate that atmospheric humidity influences fuel composition in flight and suggest that protein deposition and catabolism during migration are, in part, a metabolic strategy to maintain osmotic homeostasis during flight.

#### GODFREY 2011

Laurie R. Godfrey, Brooke E. Crowley & Elizabeth R. Dumont, *Thinking outside the box: A lemur's take on hominin craniodental evolution*. *PNAS* **108** (2011), E742.

However, there are important ways in which the diets of *Paranthropus* and *Hadropithecus* likely converged. Both probably consumed large quantities of "low-quality" foods (i.e., foods that were relatively high in structural carbohydrates and poor in nutrients and required heavy repetitive trituration). Such conclusions may have important implications for the evolution of the craniodental features that these species share.

#### LEE 2011

Christine Lee & G. Richard Scott, *Two-Rooted Lower Canines — A European Trait and Sensitive Indicator of Admixture Across Eurasia*, *Brief Communication*. *American Journal of Physical Anthropology* (2011) preprint, 1–5. <<http://dx.doi.org/10.1002/ajpa.21585>>.

With the exception of Carabelli's trait, the European dentition is better known for the morphological traits that it does not exhibit rather than the ones that it does. One root trait, however, runs counter to the characterization of reduced and simplified European crowns and roots. Although a rare trait in general, two-rooted lower canines are much more common in Europeans than in any other regional grouping and, given adequate sample sizes, can be useful in evaluating gene flow between Europeans and neighboring groups. In European samples, two-rooted lower canines consistently exhibit frequencies of 5–8%. In our sample from northern Spain, the trait attains a frequency of almost 10%. In contrast, in Sub-Saharan Africans the trait is virtually unknown while in Asian and Asian-derived populations, it varies between 0.0 and 1.0%. Here we show that two-rooted canine frequencies for new migrants along the western frontiers of China and Mongolia ranged from 0–4%. These data suggest Europe-derived populations migrated into western China (Xinjiang Province) and Mongolia (Bayan Olgii Aimag) sometime during the late Bronze age (1000–400 BCE).

KEY WORDS: dental morphology; two-rooted lower canines; East Asia; migration

#### LONGO 2011

Michael J. Longo, *Detection of a dipole in the handedness of spiral galaxies with redshifts  $z \sim 0.04$* . *Physics Letters B* **699** (2011), 224–229.

PhysLettB699-224-Supplement.txt

A preference for spiral galaxies in one sector of the sky to be left-handed or right-handed spirals would indicate a parity violating asymmetry in the overall universe and a preferred axis. This study uses 15,158 spiral galaxies with redshifts  $< 0.085$  from the Sloan Digital Sky Survey. An unbinned analysis for a dipole component that made no prior assumptions for the dipole axis gives a dipole asymmetry of  $0.0408 \pm 0.011$  with a probability of occurring by chance of  $7.9E-4$ . A similar asymmetry is seen in the southern Galaxy spin catalog of Iye and Sugai. The axis of the dipole asymmetry lies at approx.  $(l, b) = (52^\circ, 68.5^\circ)$ , roughly along that of our Galaxy and close to alignments observed in the WMAP cosmic microwave background distributions. The observed spin correlation extends out to separations  $\approx 210$  Mpc/h, while spirals with separations  $< 20$  Mpc/h have smaller spin correlations.

#### PTASHNIK 2011

Igor V. Ptashnik, Robert A. McPheat, Keith P. Shine, Kevin M. Smith & R. Gary Williams, *Water vapor self-continuum absorption in near-infrared windows derived from laboratory measurements*. *Journal of Geophysical Research* **116** (2011), D16305. <http://dx.doi.org/10.1029/2011JD015603>.

In most near-infrared atmospheric windows, absorption of solar radiation is dominated by the water vapor self-continuum, and yet there is a paucity of measurements in these windows. We report new laboratory measurements of the self-continuum absorption at temperatures between 293 and 472 K and pressures from 0.015 to 5 atm in four near-infrared windows between 1 and 4 mm (10000–2500  $\text{cm}^{-1}$ ); the measurements are made over a wider range of wavenumbers, temperatures, and pressures than any previous measurements. They show that the self-continuum in these windows is typically one order of magnitude stronger than given in representations of the continuum widely used in climate and weather prediction models. These results are also not consistent with current theories attributing the self-continuum within windows to the far wings of strong spectral lines in the nearby water vapor absorption bands; we suggest that they are more consistent with water dimers being the major contributor to the continuum. The calculated global average clear-sky atmospheric absorption of solar radiation is increased by  $\approx 0.75$  W/m<sup>2</sup> (which is about 1% of the total clear-sky absorption) by using these new measurements as compared to calculations with the MT\_CKD-2.5 self-continuum model.

#### RUSCOE 2011

Wendy A. Ruscoe et al., *Unexpected consequences of control: competitive vs. predator release in a four-species assemblage of invasive mammals*. *Ecology Letters* **14** (2011), 1035–1042.

EcolLett14-1035-FigS1.doc, EcolLett14-1035-FigS2.doc, EcolLett14-1035-FigS3.doc, EcolLett14-1035-FigS4.doc, EcolLett14-1035-Supplement.doc

Wendy A. Ruscoe, David S. L. Ramsey, Roger P. Pech, Peter J. Sweetapple, Ivor Yockney, Mandy C. Barron, Mike Perry, Graham Nugent, Roger Carran, Rodney Warne, Chris Brausch and Richard P. Duncan

Invasive species are frequently the target of eradication or control programmes to mitigate their impacts. However, manipulating single species in isolation can lead to unexpected consequences for other species, with outcomes such as mesopredator release demonstrated both theoretically and empirically in vertebrate assemblages with at least two trophic

levels. Less is known about the consequences of species removal in more complex assemblages where a greater number of interacting invaders increases the potential for selective species removal to result in unexpected changes in community structure. Using a replicated Before-After Control-Impact field experiment with a four-species assemblage of invasive mammals we show that species interactions in the community are dominated by competition rather than predation. There was no measurable response of two meso-predators (rats and mice) following control of the top predator (stoats), but there was competitive release of rats following removal of a herbivore (possums), and competitive release of mice following removal of rats.

Keywords: Competition, food webs, mark recapture, Bayesian analysis, pest control, predation, trophic cascades.

#### SCHMIDT 2011

Anja Schmidt, Bart Ostro, Kenneth S. Carslaw, Marjorie Wilson, Thorvaldur Thordarson, Graham W. Mann & Adrian J. Simmons, *Excess mortality in Europe following a future Laki-style Icelandic eruption*. [PNAS 108 \(2011\), 15710–15715](#).

Historical records show that the A.D. 1783–1784 Laki eruption in Iceland caused severe environmental stress and posed a health hazard far beyond the borders of Iceland. Given the reasonable likelihood of such an event recurring, it is important to assess the scale on which a future eruption could impact society. We quantify the potential health effects caused by an increase in air pollution during a future Laki-style eruption using a global aerosol model together with concentration-response functions derived from current epidemiological studies. The concentration of particulate matter with diameters smaller than 2.5  $\mu\text{m}$  is predicted to double across central, western, and northern Europe during the first 3 mo of the eruption. Over land areas of Europe, the current World Health Organization 24-h air quality guideline for particulate matter with diameters smaller than 2.5  $\mu\text{m}$  is exceeded an additional 36 d on average over the course of the eruption. Based on the changes in particulate air pollution, we estimate that approximately 142,000 additional cardiopulmonary fatalities (with a 95% confidence interval of 52,000–228,000) could occur in Europe. In terms of air pollution, such a volcanic eruption would therefore be a severe health hazard, increasing excess mortality in Europe on a scale that likely exceeds excess mortality due to seasonal influenza.

volcanic air pollution | flood lava eruption | health risk | volcanism

#### SUCHOW 2011

Jordan Suchow, *NPG's policy on authorship, Important change to submission criteria*. [nature 477 \(2011\), 244](#).

Those who have been slow to adopt new technology are rightly concerned: their contribution to Nature had been dwindling well before the ban, and today constitutes less than 10% of published papers.

## Anthropologie

#### CARLSON 2011

Kristian J. Carlson, Dietrich Stout, Tea Jashashvili, Darryl J. de Ruiter, Paul Tafforeau, Keely Carlson & Lee R. Berger, *The Endocast of MH1, Australopithecus sediba*. [science 333 \(2011\), 1402–1407](#).

s333-1402-Supplement.pdf

The virtual endocast of MH1 (*Australopithecus sediba*), obtained from high-quality synchrotron scanning, reveals generally australopith-like convolutional patterns on the

frontal lobes but also some foreshadowing of features of the human frontal lobes, such as posterior repositioning of the olfactory bulbs. Principal component analysis of orbitofrontal dimensions on australopith endocasts (MH1, Sts 5, and Sts 60) indicates that among these, MH1 orbitofrontal shape and organization align most closely with human endocasts. These results are consistent with gradual neural reorganization of the orbitofrontal region in the transition from Australopithecus to Homo, but given the small volume of the MH1 endocast, they are not consistent with gradual brain enlargement before the transition.

#### GIBBONS 2011

Ann Gibbons, *Skeletons Present an Exquisite Paleo-Puzzle*. [science 333 \(2011\), 1370–1372](#).

Partial skeletons of 2-million-year-old hominin Australopithecus sediba leave researchers impressed by their completeness but scratching their heads over the implications for our family tree.

#### KIBII 2011

Job M. Kibii, Steven E. Churchill, Peter Schmid, Kristian J. Carlson, Nichelle D. Reed, Darryl J. de Ruiter & Lee R. Berger, *A Partial Pelvis of Australopithecus sediba*. [science 333 \(2011\), 1407–1411](#).

[s333-1407-Supplement.pdf](#)

The fossil record of the hominin pelvis reflects important evolutionary changes in locomotion and parturition. The partial pelvises of two individuals of Australopithecus sediba were reconstructed from previously reported finds and new material. These remains share some features with australopiths, such as large biacetabular diameter, small sacral and coxal joints, and long pubic rami. The specimens also share derived features with Homo, including more vertically oriented and sigmoid-shaped iliac blades, greater robusticity of the iliac body, sinusoidal anterior iliac borders, shortened ischia, and more superiorly oriented pubic rami. These derived features appear in a species with a small adult brain size, suggesting that the birthing of larger-brained babies was not driving the evolution of the pelvis at this time.

#### KIVELL 2011

Tracy L. Kivell, Job M. Kibii, Steven E. Churchill, Peter Schmid & Lee R. Berger, *Australopithecus sediba Hand Demonstrates Mosaic Evolution of Locomotor and Manipulative Abilities*. [science 333 \(2011\), 1411–1417](#).

[s333-1411-Supplement.pdf](#)

Hand bones from a single individual with a clear taxonomic affiliation are scarce in the hominin fossil record, which has hampered understanding the evolution of manipulative abilities in hominins. Here we describe and analyze a nearly complete wrist and hand of an adult female [Malapa Hominin 2 (MH2)] Australopithecus sediba from Malapa, South Africa (1.977 million years ago). The hand presents a suite of Australopithecus-like features, such as a strong flexor apparatus associated with arboreal locomotion, and Homo-like features, such as a long thumb and short fingers associated with precision gripping and possibly stone tool production. Comparisons to other fossil hominins suggest that there were at least two distinct hand morphotypes around the Plio-Pleistocene transition. The MH2 fossils suggest that Au. sediba may represent a basal condition associated with early stone tool use and production.

#### KRUGER 1999

Justin Kruger & David Dunning, *Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-*

*Assessments*. *Journal of Personality and Social Psychology* **77** (1999), 1121–1134.

People tend to hold overly favorable views of their abilities in many social and intellectual domains. The authors suggest that this overestimation occurs, in part, because people who are unskilled in these domains suffer a dual burden: Not only do these people reach erroneous conclusions and make unfortunate choices, but their incompetence robs them of the metacognitive ability to realize it. Across 4 studies, the authors found that participants scoring in the bottom quartile on tests of humor, grammar, and logic grossly overestimated their test performance and ability. Although their test scores put them in the 12th percentile, they estimated themselves to be in the 62nd. Several analyses linked this miscalibration to deficits in metacognitive skill, or the capacity to distinguish accuracy from error. Paradoxically, improving the skills of participants, and thus increasing their metacognitive competence, helped them recognize the limitations of their abilities.

#### PICKERING 2011

Robyn Pickering et al., *Australopithecus sediba at 1.977 Ma and Implications for the Origins of the Genus Homo*. *science* **333** (2011), 1421–1423.

s333-1421-Supplement.pdf

Robyn Pickering, Paul H. G. M. Dirks, Zubair Jinnah, Darryl J. de Ruiter, Steven E. Churchill, Andy I. R. Herries, Jon D. Woodhead, John C. Hellstrom & Lee R. Berger  
Newly exposed cave sediments at the Malapa site include a flowstone layer capping the sedimentary unit containing the *Australopithecus sediba* fossils. Uranium-lead dating of the flowstone, combined with paleomagnetic and stratigraphic analysis of the flowstone and underlying sediments, provides a tightly constrained date of  $1.977 \pm 0.002$  million years ago (Ma) for these fossils. This refined dating suggests that *Au. sediba* from Malapa predates the earliest uncontested evidence for *Homo* in Africa.

#### ZIPFEL 2011

Bernhard Zipfel, Jeremy M. DeSilva, Robert S. Kidd, Kristian J. Carlson, Steven E. Churchill & Lee R. Berger, *The Foot and Ankle of *Australopithecus sediba**. *science* **333** (2011), 1417–1420.

s333-1417-Supplement.pdf

A well-preserved and articulated partial foot and ankle of *Australopithecus sediba*, including an associated complete adult distal tibia, talus, and calcaneus, have been discovered at the Malapa site, South Africa, and reported in direct association with the female paratype Malapa Hominin 2. These fossils reveal a mosaic of primitive and derived features that are distinct from those seen in other hominins. The ankle (talocrural) joint is mostly humanlike in form and inferred function, and there is some evidence for a humanlike arch and Achilles tendon. However, *Au. sediba* is apelike in possessing a more gracile calcaneal body and a more robust medial malleolus than expected. These observations suggest, if present models of foot function are correct, that *Au. sediba* may have practiced a unique form of bipedalism and some degree of arboreality. Given the combination of features in the *Au. sediba* foot, as well as comparisons between *Au. sediba* and older hominins, homoplasy is implied in the acquisition of bipedal adaptations in the hominin foot.

## Biologie

#### SCHÜNEMANN 2011

Verena J. Schünemann et al., *Targeted enrichment of ancient pathogens yielding the pPCP1 plasmid of *Yersinia pestis* from victims of the Black Death*. *PNAS* **108** (2011), 15673–15674.

pnas108-15673-Fulltext.pdf

Verena J. Schünemann, Kirsten Bos, Sharon DeWitte, Sarah Schmedes, Joslyn Jamieson, Alissa Mittnik, Stephen Forrest, Brian K. Coombes, James W. Wood, David J. D. Earn, William White, Johannes Krause and Hendrik N. Poinar

Although investigations of medieval plague victims have identified *Yersinia pestis* as the putative etiologic agent of the pandemic, methodological limitations have prevented large-scale genomic investigations to evaluate changes in the pathogen's virulence over time. We screened over 100 skeletal remains from Black Death victims of the East Smithfield mass burial site (1348–1350, London, England). Recent methods of DNA enrichment coupled with high-throughput DNA sequencing subsequently permitted reconstruction of ten full human mitochondrial genomes (16 kb each) and the full pPCP1 (9.6 kb) virulence-associated plasmid at high coverage. Comparisons of molecular damage profiles between endogenous human and *Y. pestis* DNA confirmed its authenticity as an ancient pathogen, thus representing the longest contiguous genomic sequence for an ancient pathogen to date. Comparison of our reconstructed plasmid against modern *Y. pestis* shows identity with several isolates matching the Medievalis biovar; however, our chromosomal sequences indicate the victims were infected with a *Y. pestis* variant that has not been previously reported. Our data reveal that the Black Death in medieval Europe was caused by a variant of *Y. pestis* that may no longer exist, and genetic data carried on its pPCP1 plasmid were not responsible for the purported epidemiological differences between ancient and modern forms of *Y. pestis* infections.

ancient DNA | paleopathology

## Energie

### CALABRESE 2011

Edward J. Calabrese, *Muller's Nobel lecture on dose-response for ionizing radiation: ideology or science?* *Archives of Toxicology* (2011) preprint, 1–4. <<http://dx.doi.org/10.1007/s00204-011-0728-8>>.

In his Nobel Prize Lecture of December 12, 1946, Hermann J. Muller argued that the dose-response for radiation-induced germ cell mutations was linear and that there was “no escape from the conclusion that there is no threshold”. However, assessment of correspondence between Muller and Curt Stern 1 month prior to his Nobel Prize Lecture reveals that Muller knew the results and implications of a recently completed study at the University of Rochester under the direction of Stern, which directly contradicted his Nobel Prize Lecture. This finding is of historical importance since Muller's Nobel Lecture gained considerable international attention and is a turning point in the acceptance of the linearity model in risk assessment for germ cell mutations and carcinogens.

Keywords Linearity | Threshold | Hermann J. Muller | Nobel Prize | Risk assessment | X-rays | Ionizing radiation

### CALABRESE 2011

Edward J. Calabrese, *Key Studies Used to Support Cancer Risk Assessment-Questioned.* *Environmental and Molecular Mutagenesis* (2011) preprint, 1–12. <<http://dx.doi.org/10.1002/em.20662>>.

This paper reassessed studies conducted under the leadership of *Drosophila* geneticist Curt Stern which played a pivotal role in the acceptance of the linear dose-response model by the U.S. National Academy of Sciences Biological Effects of Atomic Radiation (BEAR) I Committee and the subsequent generalization of their recommendations on the linearity dose-response paradigm for ionizing radiation and chemically induced cancer. The analysis finds serious concerns and flaws in important aspects of these experiments, their assessment, and interpretation. Of particular concern was the failure of Stern's

group to provide the necessary and promised experimental documentation to support the findings of three critical summarized experiments published as a brief technical note in Science. While this analysis questions the validity of the reported findings and their interpretations, it raises an even more serious concern about the process by which leaders in the radiation genetics community accepted such findings without requiring the necessary documentation and then used this information to support the acceptance of the linear dose-response in public policy matters as affected by risk assessment practices that have continued to the present.

Key words: linearity; threshold; mutagenicity; ionizing radiation; risk assessment; dose-response

#### CASPARI 1948

Ernst Caspari & Curt Stern, *The influence of chronic irradiation with gamma-rays at low dosages on the mutation rate in Drosophila melanogaster*. *Genetics* **33** (1948), 75–95.

1. The rate of lethal sex-linked mutations in *Drosophila* exposed to gamma-rays of 2.5 r units per day through 21 days (total 52.5 r) was determined.
2. In a total material of 108,215 chromosomes tested, no significant difference between experimentals and controls was found.
3. The difference between experimentals and controls found in the present investigation is significantly different ( $P = 0.012$ ) from that found by Spencer and Stern with the same dose of X-rays given at once.
4. By comparison of the present results with those obtained by Spencer and Stern and by Raychaudhuri it is concluded that it is unlikely that the relative inactivity of the irradiation is due to wave length, temperature or glass containers.
5. As possible causes for the inactivity of irradiation in the present experiment, different sensitivity of sperm at different stages of aging, and dependence of induced mutation rate at low dosages on a time factor are considered.

#### CYRANOSKI 2011

David Cyranoski & Geoff Brumfiel, *Fukushima impact is still hazy*. *nature* **477** (2011), 139–140.

Chaos and bureaucracy hamper assessment of nuclear crisis.

The survey of 2,200 locations shows a roughly 35-kilometre-long strip northwest of the plant where levels of caesium-137 contamination seem to exceed 1,000 kilobecquerels per square metre. (After the 1986 Chernobyl disaster in Ukraine, areas with more than 1,480 kilo becquerels per square metre were permanently evacuated by the Soviet authorities. In Japan, the high-radiation strip extends beyond the original forced evacuation zone, but falls within a larger ‘planned evacuation zone’ that has not yet been completely cleared.)

#### DABIRI 2011

John O. Dabiri, *Potential order-of-magnitude enhancement of wind farm power density via counter-rotating vertical-axis wind turbine arrays*. *Journal of Renewable and Sustainable Energy* **3** (2011), 43104. <<http://dx.doi.org/10.1063/1.3608170>>.

Modern wind farms comprised of horizontal-axis wind turbines (HAWTs) require significant land resources to separate each wind turbine from the adjacent turbine wakes. This aerodynamic constraint limits the amount of power that can be extracted from a given wind farm footprint. The resulting inefficiency of HAWT farms is currently compensated by using taller wind turbines to access greater wind resources at high altitudes, but this solution comes at the expense of higher engineering costs and greater visual, acoustic,



radar, and environmental impacts. We investigated the use of counter-rotating vertical-axis wind turbines (VAWTs) in order to achieve higher power output per unit land area than existing wind farms consisting of HAWTs. Full-scale field tests of 10-m tall VAWTs in various counter-rotating configurations were conducted under natural wind conditions during summer 2010. Whereas modern wind farms consisting of HAWTs produce 2-3 W of power per square meter of land area, these field tests indicate that power densities an order of magnitude greater can potentially be achieved by arranging VAWTs in layouts that enable them to extract energy from adjacent wakes and from above the wind farm. Moreover, this improved performance does not require higher individual wind turbine efficiency, only closer wind turbine spacing and a sufficient vertical flux of turbulence kinetic energy from the atmospheric surface layer. The results suggest an alternative approach to wind farming that has the potential to concurrently reduce the cost, size, and environmental impacts of wind farms.

#### HOSODA 2011

Masahiro Hosoda et al., *The time variation of dose rate artificially increased by the Fukushima nuclear crisis*. *Scientific Reports* **1** (2011), 87. <<http://dx.doi.org/10.1038/srep00087>>.

Masahiro Hosoda, Shinji Tokonami, Atsuyuki Sorimachi, Satoru Monzen, Minoru Osanai, Masatoshi Yamada, Ikuo Kashiwakura & Suminori Akiba

A car-borne survey for dose rate in air was carried out in March and April 2011 along an expressway passing northwest of the Fukushima Dai-ichi Nuclear Power Station which released radionuclides starting after the Great East Japan Earthquake on March 11, 2011, and in an area closer to the Fukushima NPS which is known to have been strongly affected. Dose rates along the expressway, i. e. relatively far from the power station were higher after than before March 11, in some places by several orders of magnitude, implying that there were some additional releases from Fukushima NPS. The maximum dose rate in air within the high level contamination area was 36 mGy/h, and the estimated maximum cumulative external dose for evacuees who came from Namie Town to evacuation sites (e. g. Fukushima, Koriyama and Nihonmatsu Cities) was 68 mSv. The evacuation is justified from the viewpoint of radiation protection.

#### UPHOFF 1949

Delta E. Uphoff & Curt Stern, *The Genetic Effects of Low Intensity Irradiation*. *science* **109** (1949), 609–610.

The maximum likelihood calculation yields about 0.002% induced sex-linked mutations per r, which corresponds to an expected difference for the acute 50-r experiment of only 0.1000%. Viewing all experiments together, it appears that irradiation at low dosages, administered at low intensity, induces mutations in *Drosophila* sperm. There is no threshold below which radiation fails to induce mutations. A more detailed account of the work will be presented later.

#### WHITTLESEY 2011

Robert W. Whittlesey, Sebastian Liska & John O. Dabiri, *Fish schooling as a basis for vertical axis wind turbine farm design*. *Bioinspiration & Biomimetics* **5** (2011), 35005. <<http://dx.doi.org/10.1088/1748-3182/5/3/035005>>.

Most wind farms consist of horizontal axis wind turbines (HAWTs) due to the high power coefficient (mechanical power output divided by the power of the free-stream air through the turbine cross-sectional area) of an isolated turbine. However when in close proximity to neighboring turbines, HAWTs suffer from a reduced power coefficient. In contrast, previous research on vertical axis wind turbines (VAWTs) suggests that closely

spaced VAWTs may experience only small decreases (or even increases) in an individual turbine's power coefficient when placed in close proximity to neighbors, thus yielding much higher power outputs for a given area of land. A potential flow model of inter-VAWT interactions is developed to investigate the effect of changes in VAWT spatial arrangement on the array performance coefficient, which compares the expected average power coefficient of turbines in an array to a spatially isolated turbine. A geometric arrangement based on the configuration of shed vortices in the wake of schooling fish is shown to significantly increase the array performance coefficient based upon an array of 16 x 16 wind turbines. The results suggest increases in power output of over one order of magnitude for a given area of land as compared to HAWTs.

## Grundlagen

SPIEGELHALTER 2011

David Spiegelhalter, Mike Pearson & Ian Short, *Visualizing Uncertainty About the Future*. [science](#) **333** (2011), 1393–1400.  
s333-1393-Supplement.pdf

We are all faced with uncertainty about the future, but we can get the measure of some uncertainties in terms of probabilities. Probabilities are notoriously difficult to communicate effectively to lay audiences, and in this review we examine current practice for communicating uncertainties visually, using examples drawn from sport, weather, climate, health, economics, and politics. Despite the burgeoning interest in infographics, there is limited experimental evidence on how different types of visualizations are processed and understood, although the effectiveness of some graphics clearly depends on the relative numeracy of an audience. Fortunately, it is increasingly easy to present data in the form of interactive visualizations and in multiple types of representation that can be adjusted to user needs and capabilities. Nonetheless, communicating deeper uncertainties resulting from incomplete or disputed knowledge-or from essential indeterminacy about the future-remains a challenge.

## Kultur

FORSTER 2011

Peter Forster & Colin Renfrew, *Mother Tongue and Y Chromosomes*. [science](#) **333** (2011), 1390–1391.

A global picture is emerging of sex-specific transmission of language change in quite different regions and continents.

## Metallzeiten

WAGNER 2011

Mayke Wagner et al., *Radiocarbon-dated archaeological record of early first millennium B.C. mounted pastoralists in the Kunlun Mountains, China*. [PNAS](#) **108** (2011), 15733–15738.

Mayke Wagner, Xinhua Wu, Pavel Tarasov, Ailijiang Aisha, Christopher Bronk Ramsey, Michael Schultz, Tyede Schmidt-Schultz and Julia Gresky

Pastoral nomadism, as a successful economic and social system drawing on mobile herding, long-distance trade, and cavalry warfare, affected all polities of the Eurasian continent. The role that arid Inner Asia, particularly the areas of northwestern China, Kazakhstan, and Mongolia, played in the emergence of this phenomenon remains a fundamental

and still challenging question in prehistoric archaeology of the Eurasian steppes. The cemetery of Liushiu (Xinjiang, China) reveals burial features, bronze bridle bits, weaponry, adornment, horse skulls, and sheep/goat bones, which, together with paleopathological changes in human skeletons, indicate the presence of mobile pastoralists and their flocks at summer pastures in the Kunlun Mountains,  $\approx 2,850$  m above sea level. Radiocarbon dates place the onset of the burial activity between 1108 and 893 B.C. (95 % probability range) or most likely between 1017 and 926 B.C. (68 %). These data from the Kunlun Mountains show a wider frontier within the diversity of mobile pastoral economies of Inner Asia and support the concept of multiregional transitions toward Iron Age complex pastoralism and mounted warfare.

Bronze Age | horse-riding | climate change | socioeconomic models