

## Literatur

### Aktuell

BALTER 2011

Michael Balter, *Dating Duo Illuminates Modern Humans' Journey, Profile: Zenobia Jacobs and Richard Roberts*. [science](#) **332** (2011), 658–661.

By improving a powerful dating technique, a professional and personal couple fills in the blanks of human evolution.

Although the pair now work as a team, Jacobs, 34, and Roberts, 51, come from very different backgrounds and followed divergent career paths. And yet they sometimes ended up at the same place at different times.

OSL can be used to date the sediments themselves, in caves or now-buried open-air sites, back to at least 200,000 years ago. And a series of OSL dates can reveal whether sediments at a site have been mixed or perturbed. That's crucial for archaeologists, geologists, and paleoecologists—anyone studying ancient worlds, Higham says. The principle behind OSL dating is fairly simple. The quartz grains serve as natural clocks, because the longer they are buried the more natural radiation they absorb from their surroundings. The energy of this radiation is stored in electrons in the quartz crystals and released again in the form of a detectable light signal when a laser shines on the grains.

GIBBONS 2011

Ann Gibbons, *Paleoanthropology Society & American Assoc. of Physical Anthropologists, 12–16 April 2011 | Minneapolis, MN*. [science](#) **332** (2011), 534–535.

A New Ancestor for Homo?

Ancient Footprints Tell Tales of Travel

Finding Homo's hips.

All in the wrist.

Three new wrist bones from a second individual of the diminutive “Hobbit” from the Indonesian island of Flores confirm that the hand was too primitive to belong to a member of our species.

JOHNSTONE 2011

Rufus A. Johnstone & Andrea Manica, *Evolution of personality differences in leadership*. [PNAS](#) **108** (2011), 8373–8378.

When members of a group differ in their preferred course of action, coordination poses a challenge. Leadership offers one way to resolve this difficulty, but the evolution of leaders and followers is itself poorly understood. Existing discussions have frequently attributed leadership to differences in information or need among individuals. Here, however, we show that in an n-player, repeated coordination game, selection leads to evolutionary branching and diversification in intrinsic leadership among the members of a population even in the absence of any variation in state. When individuals interact in pairs, repeated branching is possible; when individuals interact in larger groups, the typical outcome is a single branching event leading to a dimorphism featuring extreme intrinsic leaders and followers. These personality types emerge and are maintained by frequency-dependent selection, because leaders gain by imposing their preferences on followers, but fail to coordinate effectively when interacting with other leaders. The fraction of intrinsic leaders in the population increases with the degree of conflict among

group members, with both types common only at intermediate levels of conflict; when conflict is weak, most individuals are intrinsic followers, and groups achieve high levels of coordination by randomly converging on one individual's preferred option, whereas when conflict is strong, most individuals are intrinsic leaders, and coordination breaks down because members of a group are rarely willing to follow another.  
boldness | collective decision

#### KEAN 2011

Sam Kean, *Red in Tooth and Claw Among the Literati*. [science 332 \(2011\), 654–656](#).

Upset by the isolation of their field, some critics are trying to bring Darwin's ideas and recent science to the study of literature. They haven't been popular. If fiction does reinforce cooperative and egalitarian behavior, and if that behavior did ensure the survival of hunter-gatherers, then perhaps the ability to create and understand literature gave our ancestors a survival advantage; it is what evolutionary scientists call adaptive. It's an appealing theory—it makes literature essential to life—but it has proved contentious.

Evolutionary biologist Geoffrey Miller of the University of New Mexico, Albuquerque, has argued instead that literature and other arts arose through sexual selection. In brief, in his view, a talent for storytelling provided evidence of a big brain and language skills, which make someone a more attractive mate. Literature was our peacock tail.

Gottschall says the resistance to Darwinian lit crit among literary scholars reminds him of resistance among religious groups to evolution itself. "There's the fear that if you were able to explain the arts and their power scientifically, you'd explain them away," he says. "Humanities are the last bastion of magic."

#### MILLER 2011

Greg Miller, *Using the Psychology of Evil To Do Good*. [science 332 \(2011\), 530–532](#).

Forty years after the infamous Stanford Prison Experiment, Phil Zimbardo thinks he can apply its lessons to teach ordinary people to be heroes.

In a contrived setup in which volunteers had a chance to notify the university's committee on human subjects of an unethical experiment, only 6% blew the whistle. Now the team is investigating what personality traits and motivations distinguish the whistleblowers. "There's almost no research on any of these questions," Zimbardo says.

#### PEARCE 2011

Fred Pearce, *Dubious assumptions*. [nature 473 \(2011\), 125](#).

The United Nations says there could be 10 billion people on Earth by the end of the century. Fred Pearce finds problems in its analysis.

#### PINSKY 2011

Malin L. Pinsky, Olaf P. Jensen, Daniel Ricard & Stephen R. Palumbi, *Unexpected patterns of fisheries collapse in the world's oceans*. [PNAS 108 \(2011\), 8317–8322](#).

[pnas108-08317-Supplement.pdf](#), [pnas108-08317-Supplement1.doc](#), [pnas108-08317-Supplement2.doc](#), [pnas108-08317-Supplement3.doc](#)

Understanding which species are most vulnerable to human impacts is a prerequisite for designing effective conservation strategies. Surveys of terrestrial species have suggested that large-bodied species and top predators are the most at risk, and it is commonly assumed that such patterns also apply in the ocean. However, there has been no global test of this hypothesis in the sea. We analyzed two fisheries datasets (stock assessments and

landings) to determine the life-history traits of species that have suffered dramatic population collapses. Contrary to expectations, our data suggest that up to twice as many fisheries for small, low trophic-level species have collapsed compared with those for large predators. These patterns contrast with those on land, suggesting fundamental differences in the ways that industrial fisheries and land conversion affect natural communities. Even temporary collapses of small, low trophic-level fishes can have ecosystem-wide impacts by reducing food supply to larger fish, seabirds, and marine mammals.  
body size | ecosystem-based management | food webs | life-history theory | marine conservation

## Energie

OSBORN 2011

Stephen G. Osborn, Avner Vengosh, Nathaniel R. Warner & Robert B. Jackson, *Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing*. *PNAS* **108** (2011), 8172–8176.

[pnas108-08172-Supplement.pdf](#)

Directional drilling and hydraulic-fracturing technologies are dramatically increasing natural-gas extraction. In aquifers overlying the Marcellus and Utica shale formations of northeastern Pennsylvania and upstate New York, we document systematic evidence for methane contamination of drinking water associated with shalegas extraction. In active gas-extraction areas (one or more gas wells within 1 km), average and maximum methane concentrations in drinking-water wells increased with proximity to the nearest gas well and were 19.2 and 64 mg CH<sub>4</sub> L<sup>-1</sup> (n = 26), a potential explosion hazard; in contrast, dissolved methane samples in neighboring nonextraction sites (no gas wells within 1 km) within similar geologic formations and hydrogeologic regimes averaged only 1.1 mgL<sup>-1</sup> (P < 0.05; n = 34). Average δ<sup>13</sup>C-CH<sub>4</sub> values of dissolved methane in shallow groundwater were significantly less negative for active than for nonactive sites (37 ± 7‰ and 54 ± 11‰, respectively; P < 0.0001). These δ<sup>13</sup>C-CH<sub>4</sub> data, coupled with the ratios of methane-to-higher-chain hydrocarbons, and δ<sup>2</sup>H-CH<sub>4</sub> values, are consistent with deeper thermogenic methane sources such as the Marcellus and Utica shales at the active sites and matched gas geochemistry from gas wells nearby. In contrast, lower-concentration samples from shallow groundwater at nonactive sites had isotopic signatures reflecting a more biogenic or mixed biogenic/ thermogenic methane source. We found no evidence for contamination of drinking-water samples with deep saline brines or fracturing fluids. We conclude that greater stewardship, data, and—possibly—regulation are needed to ensure the sustainable future of shale-gas extraction and to improve public confidence in its use.  
groundwater | organic-rich shale | isotopes | formation waters | water chemistry

## Klima

BOUSQUET 2011

P. Bousquet et al., *Source attribution of the changes in atmospheric methane for 2006-2008*. *Atmospheric Chemistry and Physics* **11** (2011), 3689–3700.

<http://dx.doi.org/10.5194/acp-11-3689-2011>.

P. Bousquet, B. Ringeval, I. Pison, E. J. Dlugokencky, E.-G. Brunke, C. Carouge, F. Chevallier, A. Fortems-Cheiney, C. Frankenberg, D. A. Hauglustaine, P. B. Krummel, R. L. Langenfelds, M. Ramonet, M. Schmidt, L. P. Steele, S. Szopa, C. Yver, N. Viovy and P. Ciais

Abstract. The recent increase of atmospheric methane is investigated by using two atmospheric inversions to quantify the distribution of sources and sinks for the 2006-2008

period, and a process-based model of methane emissions by natural wetland ecosystems. Methane emissions derived from the two inversions are consistent at a global scale: emissions are decreased in 2006 (-7 Tg) and increased in 2007 (+21 Tg) and 2008 (+18 Tg), as compared to the 1999-2006 period. The agreement on the latitudinal partition of the flux anomalies for the two inversions is fair in 2006, good in 2007, and not good in 2008. In 2007, a positive anomaly of tropical emissions is found to be the main contributor to the global emission anomalies ( $\approx 60\text{-}80\%$ ) for both inversions, with a dominant share attributed to natural wetlands ( $\approx 2/3$ ), and a significant contribution from high latitudes ( $\approx 25\%$ ). The wetland ecosystem model produces smaller and more balanced positive emission anomalies between the tropics and the high latitudes for 2006, 2007 and 2008, mainly due to precipitation changes during these years. At a global scale, the agreement between the ecosystem model and the inversions is good in 2008 but not satisfying in 2006 and 2007. Tropical South America and Boreal Eurasia appear to be major contributors to variations in methane emissions consistently in the inversions and the ecosystem model. Finally, changes in OH radicals during 2006-2008 are found to be less than 1% in inversions, with only a small impact on the inferred methane emissions.

#### BURROUGHS 2005

William James Burroughs, *Climate Change in Prehistory, The End of the Reign of Chaos*. ([Cambridge 2005](#)).

#### HOLM 2011

Hans J. Holm, *Archäoklimatologie des Holozäns, Ein durchgreifender Vergleich der „Wuchshomogenität“ mit der Sonnenaktivität und anderen Klimaanzeigern („Proxies“)*. [Archäologisches Korrespondenzblatt 41 \(2011\), i, 119–132](#).

Bisherige Ansätze zur Validität sowohl der Wuchshomogenität mitteleuropäischer Eichenstandorte als auch verschiedener Anzeiger der Sonnenaktivität halten einem durchgreifenden Vergleich nicht stand. Dies gilt vor allem hinsichtlich behaupteter klimatischer Aussagen, z.B. zum Niederschlag. Bessere Übereinstimmungen scheinen dagegen über die letzten 9000 Jahre zwischen der Wuchshomogenität und den Baumgrenzen der Alpen als auch Temperaturaussagen des NGRIP-Eiskerns erkennbar zu sein.

## Neolithikum

#### BARKER 2011

Graeme Barker, *The cost of cultivation*. [nature 473 \(2011\), 163–164](#).

There were probably many reasons for the adoption of agriculture by prehistoric human societies. A fresh perspective comes from a quantitative estimate of the relative productivity of farming and foraging.

#### HANOTTE 2002

Olivier Hanotte, Daniel G. Bradley, Joel W. Ochieng, Yasmin Verjee Emmeline W. Hill & J. Edward O. Rege, *African Pastoralism: Genetic Imprints of Origins and Migrations*. [science 296 \(2002\), 336–339](#).

[s296-0336-Supplement.pdf](#)

The genetic history of African cattle pastoralism is controversial and poorly understood. We reveal the genetic signatures of its origins, secondary movements, and differentiation through the study of 15 microsatellite loci in 50 indigenous cattle breeds spanning the present cattle distribution in Africa. The earliest cattle originated within the African continent, but Near East and European genetic influences are also identified. The initial

expansion of African *Bos taurus* was likely from a single region of origin. It reached the southern part of the continent by following an eastern route rather than a western one. The *B. indicus* genetic influence shows a major entry point through the Horn and the East Coast of Africa and two modes of introgression into the continent.

#### MARSHALL 2002

Fiona Marshall & Elisabeth Hildebrand, *Cattle Before Crops: The Beginnings of Food Production in Africa*. [Journal of World Prehistory](#) **16** (2002), 99–143.

In many areas of the world, current theories for agricultural origins emphasize yield as a major concern during intensification. In Africa, however, the need for scheduled consumption shaped the development of food production. African cattle were domesticated during the tenth millennium BP by delayed-return Saharan hunter-gatherers in unstable, marginal environments where predictable access to resources was a more significant problem than absolute abundance. Pastoralism spread patchily across the continent according to regional variations in the relative predictability of herding versus hunting and gathering. Domestication of African plants was late (after 4000 BP) because of the high mobility of herders, and risk associated with cultivation in arid environments. Renewed attention to predictability may contribute to understanding the circumstances that led to domestication in other regions of the world.

KEY WORDS: archaeology; Africa; predictability; cattle domestication.

#### MOLINA 2011

Jeanmaire Molina et al., *Molecular evidence for a single evolutionary origin of domesticated rice*. [PNAS](#) **108** (2011), 8351–8356.

[pnas108-08351-Supplement.pdf](#)

Jeanmaire Molina, Martin Sikora, Nandita Garud, Jonathan M. Flowers, Samara Rubinstein, Andy Reynolds, Pu Huang, Scott Jackson, Barbara A. Schaal, Carlos D. Bustamante, Adam R. Boyko and Michael D. Purugganan

Asian rice, *Oryza sativa*, is one of world's oldest and most important crop species. Rice is believed to have been domesticated  $\approx 9,000$  y ago, although debate on its origin remains contentious. A single-origin model suggests that two main subspecies of Asian rice, *indica* and *japonica*, were domesticated from the wild rice *O. rufipogon*. In contrast, the multiple independent domestication model proposes that these two major rice types were domesticated separately and in different parts of the species range of wild rice. This latter view has gained much support from the observation of strong genetic differentiation between *indica* and *japonica* as well as several phylogenetic studies of rice domestication. We reexamine the evolutionary history of domesticated rice by resequencing 630 gene fragments on chromosomes 8, 10, and 12 from a diverse set of wild and domesticated rice accessions. Using patterns of SNPs, we identify 20 putative selective sweeps on these chromosomes in cultivated rice. Demographic modeling based on these SNP data and a diffusion-based approach provide the strongest support for a single domestication origin of rice. Bayesian phylogenetic analyses implementing the multispecies coalescent and using previously published phylogenetic sequence datasets also point to a single origin of Asian domesticated rice. Finally, we date the origin of domestication at  $\approx 8,200$ – $13,500$  y ago, depending on the molecular clock estimate that is used, which is consistent with known archaeological data that suggests rice was first cultivated at around this time in the Yangtze Valley of China.

## Story or Book

#### HAND 2011

Kevin Hand, *Popcorn and Petri dishes*. [nature](#) **473** (2011), 150–151.

Cinemas are today's scientific lecture halls, finds Kevin Hand in a book probing how research enriches film.

Lab Coats in Hollywood: Science, Scientists, and Cinema. David A. Kirby. MIT Press: 2011. 264 pp. \$27.95

Granted, should we some day discover life on Europa, it will dwarf the impact of any Hollywood movie. But we won't get a chance to search for that life unless the tax-paying millions that watch films care enough about our potential discoveries to invest their dollars in them. From supercolliders to NASA missions, big science is going extinct, in part because politicians and public are missing the relevance; the story isn't there. Science stands to benefit from a symbiotic relationship with those who know how to tell stories, notably film-makers.

## MACIVER 2011

Malcolm A. MacIver, *Fitting Science and Screen*. [science 332 \(2011\), 665](#).

Lab Coats in Hollywood; Science, Scientists, and Cinema; by David A. Kirby; MIT Press, Cambridge, MA, 2011. 279 pp. \$27.95, £20.95. ISBN 9780262014786.

In the book, Kirby balances thoughtful analysis with a wealth of well-researched anecdotes that reveal a previously hidden but important part of the culture of science. These stories will appeal not just to those involved in science and cinema, but to anyone who is curious about the ways scientists have contributed to popular culture.

Perhaps the most intriguing point Kirby makes is that science consultants should choose their battles more wisely than they have in the past. He suggests focusing less on transgressions of scientific accuracy and more on the cultural meanings of science conveyed by the work. Seeing movies as a vehicle for improving science literacy, he claims, is a lost cause. There are too many ways in which scientific accuracy (particularly in the realm of expert science) has to give way to storytelling expediency. However, as Kirby illustrates with a number of cases, the cultural meaning of science offers an area where the science consultant has the potential to powerfully influence writers or directors. Showing scientists as creative people, or its process of inquiry as our most effective approach to understanding nature, for example, can have far more impact than ensuring that a particular dinosaur is depicted with the correct body shape.