

References

Aktuell

BACON 2015

Christine D. Bacon, Daniele Silvestro, Carlos Jaramillo, Brian Tilston Smith, Prosanta Chakrabarty & Alexandre Antonelli, *Biological evidence supports an early and complex emergence of the Isthmus of Panama*. [PNAS 112 \(2015\), 6110–6115](#).

The linking of North and South America by the Isthmus of Panama had major impacts on global climate, oceanic and atmospheric currents, and biodiversity, yet the timing of this critical event remains contentious. The Isthmus is traditionally understood to have fully closed by ca. 3.5 million years ago (Ma), and this date has been used as a benchmark for oceanographic, climatic, and evolutionary research, but recent evidence suggests a more complex geological formation. Here, we analyze both molecular and fossil data to evaluate the tempo of biotic exchange across the Americas in light of geological evidence. We demonstrate significant waves of dispersal of terrestrial organisms at approximately ca. 20 and 6 Ma and corresponding events separating marine organisms in the Atlantic and Pacific oceans at ca. 23 and 7 Ma. The direction of dispersal and their rates were symmetrical until the last ca. 6 Ma, when northern migration of South American lineages increased significantly. Variability among taxa in their timing of dispersal or vicariance across the Isthmus is not explained by the ecological factors tested in these analyses, including biome type, dispersal ability, and elevation preference. Migration was therefore not generally regulated by intrinsic traits but more likely reflects the presence of emergent terrain several millions of years earlier than commonly assumed. These results indicate that the dramatic biotic turnover associated with the Great American Biotic Interchange was a long and complex process that began as early as the Oligocene–Miocene transition.

Keywords: biogeography | evolution | neotropics | fossil | migration

BERNSTEIN 2015

Rachel Bernstein, *Women best men in study of tenure-track hiring*. [science 348 \(2015\), 269](#).

Female candidates twice as likely to get top rating.

Others note that obstacles may emerge later, after a woman is hired. “I think it’s fair to say that the women who have run the gauntlet and gotten advanced STEM degrees will find the labor market quite welcoming,” writes Jennifer Glass, a sociologist at the University of Texas, Austin, in an e-mail. “What happens once they are [hired] is another matter entirely.” She says studies suggest that women still have higher attrition rates in some STEM careers.

CASTELVECCHI 2015

Davide Castelvecchi, *Rogue antimatter found in clouds*. [nature 521 \(2015\), 135](#).

Aeroplane detects signature spike in thundercloud photons that does not fit any known source of antiparticles.

If Kirkby is right, and the cloud was smaller than Dwyer’s team estimates, that could imply that the positrons were annihilating only in the immediate vicinity

of the aircraft, or even on the craft itself. The wings could have become charged, producing extremely intense electric fields around them and initiating positron production, says Aleksandr Gurevich, an atmospheric physicist at the Lebedev Physical Institute in Moscow.

EDITORIAL 2015

Polls apart, The UK voter opinion polls show that an anomalous answer can be the correct one. [nature 521 \(2015\), 126.](#)

Britain's new Conservative government has barely settled into office, but already the results of last week's general election have got certain members of UK society fearing for their future. They are scorned by the tabloid press and social media; even serious observers are questioning whether the country has been in thrall to them for too long. An inquiry has already been announced.

Opinion pollsters, the media told everyone, were predicting the closest election for decades. Labour and the Conservatives were neck and neck; weeks of constitutional chaos would follow the election as mandarins and officials wrestled with competing and overlapping political claims to power. The small print says that opinion polls should always be taken with a decent pinch of salt. But who reads the small print when there is an election on and a 24-hour news cycle to fill?

It took a single poll of voters post-voting to reveal the truth, which was confirmed as the counted results flooded in: David Cameron's Conservative Party had grabbed 37% of the vote (see page 134). That was nearly seven percentage points ahead of Labour and, crucially, well outside the margins of error of all the previous deadlocked polls.

Amid the fallout, a single polling firm revealed that it had correctly predicted — and then buried — the result. Gathered the day before the election, its poll results seemed so out of line with what everyone else was saying that the firm did not dare to publish them. “I chickened out of publishing the figures,” confessed Damian Lyons Lowe, the chief executive of Survation in London. “Something I'm sure I'll always regret.”

Nature's readers can surely sympathize. The question of how to deal with anomalous data is a centrepiece of research, and the results can make or break careers — or launch scientific revolutions. From the discovery of the ozone hole over Antarctica to the observation that some people seemed unaffected by HIV infection, unusual results — data that make you go ‘hmmm’ — have led scientists to question their methods, their knowledge and, ultimately, their understanding of the world.

The importance of anomalies in science has spawned its own sub-field of research into how researchers respond to them. In the mid-1980s, psychologists supported by US military funds went as far as constructing a bespoke computer program to recreate how Hans Krebs reacted to surprising results during his discovery of the urea cycle in 1932. Others conduct in vivo studies by filming astronomers and physicists as they wrestle with unexpected findings.

The ultimate test of anomalous data is, of course, to repeat the experiment. But that demands that scientists have the courage and insight to treat such results seriously in the first place. How many potential discoveries lie in the waste-paper bin of history because the cautious chickened out?

GALBRAITH 2015

Josie A. Galbraith, Jacqueline R. Beggs, Darryl N. Jones & Margaret C. Stanley, *Supplementary feeding restructures urban bird communities.* [PNAS 112 \(2015\), E2648–E2657.](#)

Food availability is a primary driver of avian population regulation. However, few studies have considered the effects of what is essentially a massive supplementary feeding experiment: the practice of wild bird feeding. Bird feeding has been posited as an important factor influencing the structure of bird communities, especially in urban areas, although experimental evidence to support this is almost entirely lacking. We carried out an 18-mo experimental feeding study at 23 residential properties to investigate the effects of bird feeding on local urban avian assemblages. Our feeding regime was based on predominant urban feeding practices in our region. We used monthly bird surveys to compare avian community composition, species richness, and the densities of local species at feeding and nonfeeding properties. Avian community structure diverged at feeding properties and five of the commonest garden bird species were affected by the experimental feeding regime. Introduced birds particularly benefitted, with dramatic increases observed in the abundances of house sparrow (*Passer domesticus*) and spotted dove (*Streptopelia chinensis*) in particular. We also found evidence of a negative effect on the abundance of a native insectivore, the grey warbler (*Gerygone igata*). Almost all of the observed changes did not persist once feeding had ceased. Our study directly demonstrates that the human pastime of bird feeding substantially contributes to the structure of avian community in urban areas, potentially altering the balance between native and introduced species.

Keywords: avian ecology | community composition | garden birds | human interactions | wildlife feeding

Significance: Bird feeding is essentially a massive global supplementary feeding experiment, yet few studies have attempted to explore its ecological effects. In this study we use an in situ experimental approach to investigate the impacts of bird feeding on the structure of local bird assemblages. We present vital evidence that bird feeding contributes to the bird community patterns we observe in urban areas. In particular, the study demonstrates that common feeding practices can encourage higher densities of introduced birds, with potential negative consequences for native birds.

GERZHOY 2015

Gene Gerzhoy, *Alliance Coercion and Nuclear Restraint, How the United States Thwarted West Germany's Nuclear Ambitions*. [International Security](#) **39** (2015), iv, 91–129.

Although the empirical analysis in this article concentrates on West Germany, the article's logic extends to any militarily threatened state with the material capacity to produce nuclear arms, and it helps to explain historical variation in the effect of U.S. security guarantees on nuclear proliferation. For example, scholars have wondered why U.S. extended deterrence failed to keep France and the United Kingdom from acquiring nuclear weapons while seemingly inhibiting the ambitions of countries such as South Korea and Taiwan. The established view of security guarantees cannot explain this variation, because the United States was at least as committed to the defense of Western Europe as it was to East Asia. Resolving this puzzle requires investigating differences in the use of alliance coercion. Specifically, by the time the United States initiated efforts to keep its allies from acquiring nuclear weapons, both France and the United Kingdom had acquired a credible deterrent and could resist potential threats of abandonment. By contrast, in response to South Korean and Taiwanese ambitions, the United States threatened to withdraw its military commitments if either country sought nuclear weapons. Like West Germany, both countries were dependent on U.S. security guarantees, resulting in their compliance with U.S. nonproliferation demands despite lingering anxieties about the durability and credibility of U.S. protection.

GLOWACKI 2015

Luke Glowacki & Richard Wrangham, *Cultural institutions can provide adaptive benefits for costly cooperation, Reply to Zefferman et al.*

[PNAS 112 \(2015\), E2558.](#)

This type of high-risk conflict is exceedingly rare among nonpastoralist small-scale societies. Although “battles” do occur among such groups, the mortality rate for aggressors is usually low because warriors seek to minimize their risk. Stealth raids, in which a small group of warriors engages in low-risk attacks, are the most common pattern of small-scale warfare. Thus, the fact that we do not find a result for battle leaders tells us little about small-scale warfare generally.

A full understanding of human warfare will consider the role of cultural institutions, including the possibility that they may provide adaptive benefits for participants.

GRIGORYAN 2015

Arman Grigoryan, *Concessions or Coercion? How Governments Respond to Restive Ethnic Minorities.* [International Security 39 \(2015\), iv, 170–207.](#)

In this article, I have argued that not only minorities but also states have rational fears of exploitation, which may dramatically complicate the search for peaceful bargains. Offering concessions to settle disputes with minorities may make states vulnerable to still more demands or, worse, to separatist bids by minorities that have become empowered and emboldened by those very concessions. At the same time, the intensity of such fears is not constant. It varies depending on whether there are third parties likely to support minorities’ future secessionist aspirations as well as on the balance of power between the state, on the one hand, and the minority and the third party, on the other.

GWINN 2015

Jason D. Gwinn, Jamie Barden & Charles M. Judd, *Face recognition in the presence of angry expressions, A target-race effect rather than a cross-race effect.* [Journal of Experimental Social Psychology 58 \(2015\), 1–10.](#)

- We tested the effect of angry expressions on memory of White and Black faces.
- We used a new stimuli set, to account for possible stimulus issues in past work.
- We found that angry expressions impaired memory for Black faces, compared to neutral.
- We tested both a White and a Black participant sample, finding similar results.
- We propose a stereotype-congruency explanation for the findings.

Perceivers usually recognize the faces of members of their own racial group more accurately than the faces of other races — a difference which is called the cross-race effect (CRE). When showing this effect, research has typically used facial stimuli with neutral emotional expressions. A few studies have examined the effect with faces showing angry expressions (Ackerman et al., 2006; Krumhuber & Manstead, 2011; Young & Hugenberg, 2012), and these have generally shown enhanced recognition of outgroup angry faces, an effect that Ackerman et al. (2006) attributed to greater attention paid to threatening outgroup members. However, these studies suffer from stimulus confounds, in that the Black angry faces were particularly unusual, as revealed in our pretest data. Additionally, only White participants were used in these studies, raising the question of whether the reported effects are truly ingroup–outgroup effects. Reported here are two studies, using first White and then Black participants, that used a novel stimulus set that

avoided earlier confounds. Participants studied and later attempted to recognize White and Black faces, varying in their emotional expression (angry versus neutral) both at encoding and testing. Both experiments showed a pro-ingroup CRE. However, contrary to prior research, both participant races had relatively more difficulty recognizing angry Black faces, such that when the faces were angry, the pro-ingroup CRE was strengthened for White participants and weakened for Black participants. We discuss theoretical explanations for these results which substantially qualify past conclusions about the role of facial emotions in cross-race facial recognition.

Keywords: Cross-race effect | Own-race bias | Racial bias | Facial memory | Emotional expression | Anger

HOLMES 2015

David Holmes, *A disease of growth*. *nature* **521** (2015), Supplement, S2–S3.

Colorectal cancer occurs throughout the world but is most common in developed countries. As heavily populated countries such as China undergo rapid economic development, the incidence of the disease looks set to increase.

JEANDET 2015

Philippe Jeandet et al., *Chemical messages in 170-year-old champagne bottles from the Baltic Sea, Revealing tastes from the past*. *PNAS* **112** (2015), 5893–5898.

Philippe Jeandet, Silke S. Heinzmann, Chloé Roullier-Gall, Clara Cilindre, Alissa Aron, Marie Alice Deville, Franco Moritz, Thomas Karbowski, Dominique Demarville, Cyril Brun, Fabienne Moreau, Bernhard Michalke, Gérard Liger-Belair, Michael Witting, Marianna Lucio, Damien Steyer, Régis D. Gougeon & Philippe Schmitt-Kopplin

Archaeochemistry as the application of the most recent analytical techniques to ancient samples now provides an unprecedented understanding of human culture throughout history. In this paper, we report on a multiplatform analytical investigation of 170-y-old champagne bottles found in a shipwreck at the bottom of the Baltic Sea, which provides insight into winemaking practices used at the time. Organic spectroscopy-based nontargeted metabolomics and metallomics give access to the detailed composition of these wines, revealing, for instance, unexpected chemical characteristics in terms of small ion, sugar, and acid contents as well as markers of barrel aging and Maillard reaction products. The distinct aroma composition of these ancient champagne samples, first revealed during tasting sessions, was later confirmed using state-of-the-art aroma analysis techniques. After 170 y of deep sea aging in close-to-perfect conditions, these sleeping champagne bottles awoke to tell us a chapter of the story of winemaking and to reveal their extraordinary archaeometabolome and elemental diversity in the form of chemical signatures related to each individual step of champagne production.

Keywords: metabolomics | archaeochemistry | champagne | wine

KESSLER 2015

Sébastien C. Kessler et al., *Bees prefer foods containing neonicotinoid pesticides*. *nature* **521** (2015), 74–76.

Sébastien C. Kessler, Erin Jo Tiedeken, Kerry L. Simcock, Sophie Derveau, Jessica Mitchell, Samantha Softley, Jane C. Stout & Geraldine A. Wright

The impact of neonicotinoid insecticides on insect pollinators is highly controversial. Sublethal concentrations alter the behaviour of social bees and reduce

survival of entire colonies^{1–3}. However, critics argue that the reported negative effects only arise from neonicotinoid concentrations that are greater than those found in the nectar and pollen of pesticide-treated plants⁴. Furthermore, it has been suggested that bees could choose to forage on other available flowers and hence avoid or dilute exposure^{4,5}. Here, using a two-choice feeding assay, we show that the honeybee, *Apis mellifera*, and the buff-tailed bumblebee, *Bombus terrestris*, do not avoid nectar-relevant concentrations of three of the most commonly used neonicotinoids, imidacloprid (IMD), thiamethoxam (TMX), and clothianidin (CLO), in food. Moreover, bees of both species prefer to eat more of sucrose solutions laced with IMD or TMX than sucrose alone. Stimulation with IMD, TMX and CLO neither elicited spiking responses from gustatory neurons in the bees' mouthparts, nor inhibited the responses of sucrose-sensitive neurons. Our data indicate that bees cannot taste neonicotinoids and are not repelled by them. Instead, bees preferred solutions containing IMD or TMX, even though the consumption of these pesticides caused them to eat less food overall. This work shows that bees cannot control their exposure to neonicotinoids in food and implies that treating flowering crops with IMD and TMX presents a sizeable hazard to foraging bees.

PAOLO 2015

Fernando S. Paolo, Helen A. Fricker & Laurie Padman, *Volume loss from Antarctic ice shelves is accelerating.* [science](#) **348** (2015), 327–331. [s348-0327-Supplement1.pdf](#), [s348-0327-Supplement2.avi](#)

The floating ice shelves surrounding the Antarctic Ice Sheet restrain the grounded ice-sheet flow. Thinning of an ice shelf reduces this effect, leading to an increase in ice discharge to the ocean. Using 18 years of continuous satellite radar altimeter observations, we have computed decadal-scale changes in ice-shelf thickness around the Antarctic continent. Overall, average ice-shelf volume change accelerated from negligible loss at 25 ± 64 cubic kilometers per year for 1994–2003 to rapid loss of 310 ± 74 cubic kilometers per year for 2003–2012. West Antarctic losses increased by $\approx 70\%$ in the past decade, and earlier volume gain by East Antarctic ice shelves ceased. In the Amundsen and Bellingshausen regions, some ice shelves have lost up to 18% of their thickness in less than two decades.

PERKEL 2015

Jeffrey M. Perkel, *The trouble with reference rot.* [nature](#) **521** (2015), 111–112.

Computer scientists are trying to shore up broken links in the scholarly literature.

The scholarly literature is meant to be a permanent record of science. So it is an embarrassing state of affairs that many of the web references in research papers are broken: click on them, and there's a fair chance they will point nowhere or to a site that may have altered since the paper referred to it.

Another issue is that web-page owners who hold copyright over content can demand that archives remove copies of it. They can also disallow archiving of their sites by including a file or line of code that prevents computer programs from 'crawling' over or capturing content — and many do.

PETERS 2015

Joris Peters et al., *Questioning new answers regarding Holocene chicken domestication in China.* [PNAS](#) **112** (2015), E2415.

Joris Peters, Ophélie Lebrasseur, Julia Best, Holly Miller, Tyr Fothergill, Keith Dobney, Richard M. Thomas, Mark Maltby, Naomi Sykes, Olivier Hanotte, Terry O'Connor, Matthew J. Collins & Greger Larson

Firstly, their claim that chickens were domesticated on the North China plain is problematic because this region is currently climatically unsuitable for their wild ancestor (the red jungle fowl).

Secondly, identifying Galliform bones to genus on the basis of their morphology is straightforward. They include photographs of bones (without a scale) in their study, which reinforces concerns regarding the DNA identifications, because the bones on the bottom right of figure 1B in ref. 1 are not chickens but clearly canids, and likely dogs.

There are also numerous errors that undermine confidence in the study overall. The conclusions reported by Xiang et al. are unexpected and exciting and may be valid. Given the numerous concerns mentioned above, however, a robust re-appraisal of all of the available evidence is required before these conclusions can be fully accepted.

PETROFF 2015

E. Petroff et al., *Identifying the source of perytons at the Parkes radio telescope*. *arXiv* (2015), 1504.02165. <<http://arxiv.org/pdf/1504.02165>>.

E. Petroff, E. F. Keane, E. D. Barr, J. E. Reynolds, J. Sarkissian, P. G. Edwards, J. Stevens, C. Brem, A. Jameson, S. Burke-Spolaor, S. Johnston, N. D. R. Bhat, P. Chandra, S. Kudale & S. Bhandari

“Perytons” are millisecond-duration transients of terrestrial origin, whose frequency-swept emission mimics the dispersion of an astrophysical pulse that has propagated through tenuous cold plasma. In fact, their similarity to FRB 010724 had previously cast a shadow over the interpretation of “fast radio bursts,” which otherwise appear to be of extragalactic origin. Until now, the physical origin of the dispersionmimicking perytons had remained a mystery. We have identified strong out-of-band emission at 2.3–2.5 GHz associated with several peryton events. Subsequent tests revealed that a peryton can be generated at 1.4 GHz when a microwave oven door is opened prematurely and the telescope is at an appropriate relative angle. Radio emission escaping from microwave ovens during the magnetron shut-down phase neatly explain all of the observed properties of the peryton signals. Now that the peryton source has been identified, we furthermore demonstrate that the microwaves on site could not have caused FRB 010724. This and other distinct observational differences show that FRBs are excellent candidates for genuine extragalactic transients.

Keywords: surveys | methods: data analysis | site testing

RAINE 2015

Nigel E. Raine & Richard J. Gill, *Tasteless pesticides affect bees in the field*. *nature* **521** (2015), 38–40.

Two studies provide evidence that bees cannot taste or avoid neonicotinoid pesticides, and that exposure to treated crops affects reproduction in solitary bees as well as bumblebee colony growth and reproduction.

Although the two latest studies contribute to our understanding of the risk neonicotinoids pose to bees, knowledge gaps remain. For example, we need further evidence about how neonicotinoid exposure might affect social bee colonies over multiple seasons, how soil residues might affect ground-nesting bees and how neonicotinoid exposure interacts with other environmental stressors. We also need a greater understanding of how neonicotinoids affect other pollinators and natural enemies of crop pests, and of the persistence of these chemicals in soil and their take-up by untreated plants growing in or next to treated fields.

XIANG 2015

Hai Xiang, Jianqiang Gao, Baoquan Yu, Michael Hofreiter & Xingbo Zhao, *Further discussions confirm early Holocene chicken domestication in northern China, Reply to Peters et al.* [PNAS 112 \(2015\), E2416](#).

However, northern China was much warmer and more humid with much more extensive forest coverage during the early Holocene.

However, they overlook that mean read length is severalfold shorter than the longest fragments that can be amplified by PCR.

We are surprised to see that Peters et al. claim to be able to identify the bones as “clearly canids, and likely dogs” based on low-resolution pictures used for illustrative purpose. As these bones did not yield any chicken sequences, their identity has, in any case, no bearing on the conclusions drawn in ref. 1.

There indeed exist post-Neolithic deposits in both sites; however, the bones from Nanzhuangtou were excavated in 1986 and 1987, from squares with no post-Neolithic deposits. More importantly, the direct radiocarbon dating confirms the early Neolithic ages of the investigated bones (10,465–10,430 B.P. for Nanzhuangtou and 7,960–7,845 B.P. for Cishan).

XIE 2015

Yu Xie, Siwei Cheng & Xiang Zhou, *Assortative mating without assortative preference.* [PNAS 112 \(2015\), 5974–5978](#).

Assortative mating—marriage of a man and a woman with similar social characteristics—is a commonly observed phenomenon. In the existing literature in both sociology and economics, this phenomenon has mainly been attributed to individuals’ conscious preferences for assortative mating. In this paper, we show that patterns of assortative mating may arise from another structural source even if individuals do not have assortative preferences or possess complementary attributes: dynamic processes of marriages in a closed system. For a given cohort of youth in a finite population, as the percentage of married persons increases, unmarried persons who newly enter marriage are systematically different from those who married earlier, giving rise to the phenomenon of assortative mating. We use microsimulation methods to illustrate this dynamic process, using first the conventional deterministic Gale–Shapley model, then a probabilistic Gale–Shapley model, and then two versions of the encounter mating model.

Keywords: assortative mating | structural effect | Gale–Shapley model | encounter mating model | composition heterogeneity

ZEFFERMAN 2015

Matthew Ryan Zefferman, Ryan Baldini & Sarah Mathew, *Solving the puzzle of human warfare requires an explanation of battle raids and cultural institutions.* [PNAS 112 \(2015\), E2557](#).

Human warfare is an evolutionary puzzle because, unlike intergroup violence in any other organism, humans take great reproductive risks while cooperating in large groups of unrelated individuals. Our main concern with Glowacki and Wrangham’s (1) conclusions is that they show a correlation for stealth raids, not battle raids. Any general explanation of the uniquely human way of war needs to account for cooperation in battle raids. We agree with Glowacki and Wrangham that understanding these institutions is critical for understanding human warfare, and find that their analysis raises additional questions.

Biologie

GRIMM 2015

David Grimm, *Dawn of the Dog*. [science 348 \(2015\), 274–279](#).

An unprecedented collaboration may solve one of the greatest mysteries of domestication.

HALL 2015

Kathryn T. Hall, Joseph Loscalzo & Ted J. Kaptchuk, *Genetics and the placebo effect: the placebome*. [Trends in Molecular Medicine 21 \(2015\), 285–294](#).

Placebos are indispensable controls in randomized clinical trials (RCTs), and placebo responses significantly contribute to routine clinical outcomes. Recent neuro-physiological studies reveal neurotransmitter pathways that mediate placebo effects. Evidence that genetic variations in these pathways can modify placebo effects raises the possibility of using genetic screening to identify placebo responders and thereby increase RCT efficacy and improve therapeutic care. Furthermore, the possibility of interaction between placebo and drug molecular pathways warrants consideration in RCT design. The study of genomic effects on placebo response, ‘the placebome’, is in its infancy. Here, we review evidence from placebo studies and RCTs to identify putative genes in the placebome, examine evidence for placebo–drug interactions, and discuss implications for RCTs and clinical care.

MACLEAN 2015

Evan L. MacLean & Brian Hare, *Oxytocin facilitates social connections between humans and dogs*. [science 348 \(2015\), 280–281](#).

Dogs hijack the human bonding pathway.

From an evolutionary perspective, the challenge for dogs may simply have been to express a behavioral (and morphological) repertoire that mimicked the cues that elicit caregiving toward our own young. Indeed, these juvenile characteristics of dogs are known to carry a selective advantage with respect to human preferences. Once dogs were capable of eliciting such responses in humans, interspecific bonds could be maintained through the feedback loop, which originally evolved to promote bonding between mother and child. Recent brain imaging studies have also demonstrated that when human mothers view images of their child or their dog, a common network of brain areas related to emotion, reward, and affiliation is activated.

NAGASAWA 2015

Miho Nagasawa et al., *Oxytocin-gaze positive loop and the coevolution of human-dog bonds*. [science 348 \(2015\), 333–336](#).

s348-0333-Supplement.pdf, s348-0333-Supplement1.mov, s348-0333-Supplement2.mov, s348-0333-Supplement3.mov

Miho Nagasawa, Shouhei Mitsui, Shiori En, Nobuyo Ohtani, Mitsuaki Ohta, Yasuo Sakuma, Tatsushi Onaka, Kazutaka Mogi & Takefumi Kikusui

Human-like modes of communication, including mutual gaze, in dogs may have been acquired during domestication with humans. We show that gazing behavior from dogs, but not wolves, increased urinary oxytocin concentrations in owners, which consequently facilitated owners’ affiliation and increased oxytocin concentration in dogs. Further, nasally administered oxytocin increased gazing behavior in dogs, which in turn increased urinary oxytocin concentrations in owners. These findings support the existence of an interspecies oxytocin-mediated positive loop

facilitated and modulated by gazing, which may have supported the coevolution of human-dog bonding by engaging common modes of communicating social attachment.

Datierung

NUMRICH 2015

M. Numrich, W. Kutschera, P. Steier, J. H. Sterba & R. Golser, *On the effect of organic carbon on rehydroxylation (RHX) dating*. [Journal of Archaeological Science](#) **57** (2015), 92–97.

Scientific dating is an invaluable tool to understand the development of human civilizations from prehistoric to historic times. Ceramics is the most abundant material recovered from archaeological excavations, but a satisfactory scientific dating method is still lacking. So called rehydroxylation (RHX) dating promises precise age information, but the validity of the method still has to be proven. We have investigated one possible obstacle imposed by the presence of organic carbon in the samples. Such a contamination can lead to significant deviations of the dating result. The amount of CO₂ released from the following samples was determined: A medieval clay brick from Alkoven, Austria; two authentic archaeological samples from the Iron Age from Megiddo, Israel; a 1600 AD earthenware sherd from Enkhuizen, Netherlands, which had been successfully dated with RHX at another laboratory. We investigated several possibilities to remove such contamination.

Keywords: Ceramics | Pottery | Rehydroxylation | Dating | Non-refractory organic contamination

Energie

CAMPS 2015

Xavier Camps, Guillermo Velasco, Jordi de la Hoz & Helena Martín, *Contribution to the PV-to-inverter sizing ratio determination using a custom flexible experimental setup*. [Applied Energy](#) **149** (2015), 35–45.

- We present a novel approach to the experimental validation of the sizing ratio.
- The experimental and the simulation results show a good agreement.
- The experimental workbench has proved a useful tool.

This work presents a novel approach to the experimental validation of the optimal PV-to-inverter sizing ratio value for the energy yield maximization of a GCPVS by means the implementation of a custom workbench using a solar array simulator which has allowed to replicate a wide variety of technical configurations and environmental data. The compliance between the experimental setup and the mathematical model developed to simulate the optimal PV-to-inverter sizing ratio value was demonstrated by the specific tests carried out on its two main subsystems (the PV generator and the inverter), thus the subsequent simulations were made on a firm basis. Likewise, the evaluation of the overall system also showed a good agreement between the experimental and the simulated energy yield and optimal PV-to-inverter sizing ratio results, rendering relative errors below 3% for both magnitudes.

Keywords: PV-to-inverter sizing ratio | Grid connected PV systems | Inverter | Final energy yield factor | Renewable energy

HERTWICH 2015

Edgar G. Hertwich et al., *Integrated life-cycle assessment of electricity-supply scenarios confirms global environmental benefit of low-carbon technologies*. [PNAS **112** \(2015\), 6277–6282](#).

Edgar G. Hertwich, Thomas Gibon, Evert A. Bouman, Anders Arvesen, Sangwon Suh, Garvin A. Heath, Joseph D. Bergesen, Andrea Ramirez, Mabel I. Vega & Lei Shi

Decarbonization of electricity generation can support climatechange mitigation and presents an opportunity to address pollution resulting from fossil-fuel combustion. Generally, renewable technologies require higher initial investments in infrastructure than fossil-based power systems. To assess the tradeoffs of increased up-front emissions and reduced operational emissions, we present, to our knowledge, the first global, integrated life-cycle assessment (LCA) of long-term, wide-scale implementation of electricity generation from renewable sources (i.e., photovoltaic and solar thermal, wind, and hydropower) and of carbon dioxide capture and storage for fossil power generation. We compare emissions causing particulate matter exposure, freshwater ecotoxicity, freshwater eutrophication, and climate change for the climate-change-mitigation (BLUE Map) and business-as-usual (Baseline) scenarios of the International Energy Agency up to 2050. We use a vintage stock model to conduct an LCA of newly installed capacity year-by-year for each region, thus accounting for changes in the energy mix used to manufacture future power plants. Under the Baseline scenario, emissions of air and water pollutants more than double whereas the low-carbon technologies introduced in the BLUE Map scenario allow a doubling of electricity supply while stabilizing or even reducing pollution. Material requirements per unit generation for low-carbon technologies can be higher than for conventional fossil generation: 11–40 times more copper for photovoltaic systems and 6–14 times more iron for wind power plants. However, only two years of current global copper and one year of iron production will suffice to build a low-carbon energy system capable of supplying the world’s electricity needs in 2050.

Keywords: land use | climate-change mitigation | air pollution | multiregional input–output | CO2 capture and storage

Significance: Life-cycle assessments commonly used to analyze the environmental costs and benefits of climate-mitigation options are usually static in nature and address individual power plants. Our paper presents, to our knowledge, the first life-cycle assessment of the large-scale implementation of climate-mitigation technologies, addressing the feedback of the electricity system onto itself and using scenario-consistent assumptions of technical improvements in key energy and material production technologies.

LLEWELLYN 2015

Garth T. Llewellyn et al., *Evaluating a groundwater supply contamination incident attributed to Marcellus Shale gas development*. [PNAS **112** \(2015\), 6325–6330](#).

Garth T. Llewellyn, Frank Dorman, J. L. Westland, D. Yoxtheimer, Paul Grieve, Todd Sowers, E. Humston-Fulmer & Susan L. Brantley

High-volume hydraulic fracturing (HVHF) has revolutionized the oil and gas industry worldwide but has been accompanied by highly controversial incidents of reported water contamination. For example, groundwater contamination by stray natural gas and spillage of brine and other gas drilling-related fluids is known to occur. However, contamination of shallow potable aquifers by HVHF at depth has never been fully documented. We investigated a case where Marcellus Shale gas wells in Pennsylvania caused inundation of natural gas and foam in initially

potable groundwater used by several households. With comprehensive 2D gas chromatography coupled to time-of-flight mass spectrometry (GCxGC-TOFMS), an unresolved complex mixture of organic compounds was identified in the aquifer. Similar signatures were also observed in flowback from Marcellus Shale gas wells. A compound identified in flowback, 2-n-Butoxyethanol, was also positively identified in one of the foaming drinking water wells at nanogram-per-liter concentrations. The most likely explanation of the incident is that stray natural gas and drilling or HF compounds were driven $\approx 1\text{--}3$ km along shallow to intermediate depth fractures to the aquifer used as a potable water source. Part of the problem may have been wastewaters from a pit leak reported at the nearest gas well pad—the only nearby pad where wells were hydraulically fractured before the contamination incident. If samples of drilling, pit, and HVHF fluids had been available, GCxGC-TOFMS might have fingerprinted the contamination source. Such evaluations would contribute significantly to better management practices as the shale gas industry expands worldwide.

Keywords: high-volume hydraulic fracturing | shale gas | natural gas | water quality | Marcellus Shale

Significance: New techniques of high-volume hydraulic fracturing (HVHF) are now used to unlock oil and gas from rocks with very low permeability. Some members of the public protest against HVHF due to fears that associated compounds could migrate into aquifers. We report a case where natural gas and other contaminants migrated laterally through kilometers of rock at shallow to intermediate depths, impacting an aquifer used as a potable water source. The incident was attributed to Marcellus Shale gas development. The organic contaminants—likely derived from drilling or HVHF fluids—were detected using instrumentation not available in most commercial laboratories. More such incidents must be analyzed and data released publicly so that similar problems can be avoided through use of better management practices.

SAFDARNEJAD 2015

Seyed Mostafa Safdarnejad, John D. Hedengren & Larry L. Baxter, *Plant-level dynamic optimization of Cryogenic Carbon Capture with conventional and renewable power sources*. [Applied Energy 149 \(2015\), 354–366](#).

- Dynamic integration of the CCC process with plant-level power generation units.
- Application of the grid-level energy storage facilities for load management.
- Full utilization of wind power and optimizing its contribution to the grid.
- Minimization of the overproduction of electricity.
- Operational flexibility of the integrated energy system.

Increasing competitiveness of renewable power sources due to tightening restrictions on CO₂ emission from fossil fuel combustion is expected to cause a shift in power generation systems of the future. This investigation considers the impact of the Cryogenic Carbon Capture (CCC) process on transitional power generation. The CCC process consumes less energy than chemical and physical absorption processes and has an energy storage capability that shifts the parasitic loss of the CCC process away from peak hours. The CCC process responds rapidly to the variation of electricity demand and has a time constant that is consistent with the intermittent supply from renewable power sources. The hybrid system of conventional and renewable power generation units and the CCC process are optimized in this investigation. The system under consideration consists of load-following coal and gas-fired power units, a CCC process, and wind generation. The objective is to meet the residential and CCC plant electricity demands while maximizing the operating profit. The results demonstrate that an average profit of \$ 35 k/hr is

obtained from this hybrid system over the selected days. The total electricity demand is best met using a combination of coal, gas, and wind power with grid-scale energy storage.

Keywords: Cryogenic Carbon Capture | Fossil-fueled power production | Renewable energy generation | Dynamic optimization

VILARRASA 2015

Victor Vilarrasa & Jesus Carrera, *Geologic carbon storage is unlikely to trigger large earthquakes and reactivate faults through which CO₂ could leak*. [PNAS 112 \(2015\), 5938–5943](#).

Zoback and Gorelick [(2012) Proc Natl Acad Sci USA 109(26):10164–10168] have claimed that geologic carbon storage in deep saline formations is very likely to trigger large induced seismicity, which may damage the caprock and ruin the objective of keeping CO₂ stored deep underground. We argue that felt induced earthquakes due to geologic CO₂ storage are unlikely because (i) sedimentary formations, which are softer than the crystalline basement, are rarely critically stressed; (ii) the least stable situation occurs at the beginning of injection, which makes it easy to control; (iii) CO₂ dissolution into brine may help in reducing overpressure; and (iv) CO₂ will not flow across the caprock because of capillarity, but brine will, which will reduce overpressure further. The latter two mechanisms ensure that overpressures caused by CO₂ injection will dissipate in a moderate time after injection stops, hindering the occurrence of postinjection induced seismicity. Furthermore, even if microseismicity were induced, CO₂ leakage through fault reactivation would be unlikely because the high clay content of caprocks ensures a reduced permeability and increased entry pressure along the localized deformation zone. For these reasons, we contend that properly sited and managed geologic carbon storage in deep saline formations remains a safe option to mitigate anthropogenic climate change.

Keywords: carbon sequestration | induced seismicity | overpressure | climate change | CO₂ leakage

WANG 2015

Yong Wang & Lin Li, *Time-of-use electricity pricing for industrial customers, A survey of U.S. utilities*. [Applied Energy 149 \(2015\), 89–103](#).

- We survey 43 TOU programs offered by U.S. utilities targeting industrial customers.
- We interpret key pricing components and characteristics of TOU tariff sheets.
- Switching from flat to TOU rates results in savings ranging from -72.0% to +82.6%.
- Implications for customers, utilities, and regulatory agencies are discussed.

Time-of-use (TOU) pricing serves as a cost-effective way to realize electricity demand response, which aims at relieving peak demand. Customer participation is critical to the success of TOU pricing programs. To fulfill the potential of such programs, customers must be able to access electricity tariffs and understand their terms. This paper reports a survey of 43 TOU pricing programs targeting industrial customers offered by U.S. utilities. This work is inspired by and complements the Federal Energy Regulatory Commission survey of demand response in the electric power industry, highlighting the interpretation of key pricing components and specific characteristics of TOU tariff sheets collected from public sources. The case studies examine various industrial scenarios to predict electricity cost savings when customers are facing the transition from flat rates to TOU pricing. The analysis results show that the cost savings vary enormously, ranging from -72.0% to

+82.6%, depending on specific utility programs and switching strategies involved. Such information is useful for customers to determine whether to participate in a TOU pricing program. Key findings and implications for industrial customers, utilities, and regulatory agencies are also discussed.

Keywords: Time-of-use | Electricity pricing | Demand response | Customer education | Information transparency

Grundlagen

RICHTER 1997

JÜRGEN RICHTER (Hrsg.), *Geschichtlicher Atlas der Rheinlande, Beiheft II, Band 2: Neolithikum*. (Köln 1997).

Isotope

PASSEY 2015

Benjamin H. Passey, *Biogeochemical tales told by isotope clumps*. *science* **348** (2015), 394–395.

Molecules with two or more heavy isotopes provide insights into diverse biological and geological phenomena.

The clumped isotope anomalies will help place much-needed constraints on biogeochemical sources, sinks, and budgets of O₂ and CH₄, perhaps even over glacial-interglacial cycles from gases trapped in ice cores. Similar effects are possible in other biogenic gases like nitrous oxide and ethane.

PEARSON 2015

Jessica A. Pearson, Amy Bogaard, Mike Charles, Simon W. Hillson, Clark Spencer Larsen, Nerissa Russell & Katheryn Twiss, *Stable carbon and nitrogen isotope analysis at Neolithic Çatalhöyük, Evidence for human and animal diet and their relationship to households*. *Journal of Archaeological Science* **57** (2015), 69–79.

The long-term excavations at Çatalhöyük, a Neolithic site in central Turkey, have uncovered over 100 houses, which have been associated with at least 400 human skeletons and one million recorded animal bones. This large assemblage has enabled an extensive programme of stable carbon and nitrogen isotope analysis, which was designed to explore animal hunting and herding practices and how human diet varied according to age, sex, burial practice, location and over time. The isotope values for sheep and cattle show how both were herded in a range of locations which consisted of pure C₃ and also mixed C₃/ C₄ plant locations. We sampled animals from middens adjacent to the buildings where people were buried to provide house-by-house diet reconstruction. However, very few of the people buried in the houses demonstrate a clear dietary relationship to these associated middens. Similarly, people buried in the same house seem to have had different diets to one another. We argue that these data suggest diet at Neolithic Çatalhöyük was a carefully structured, long-lived and repetitious process and that houses may not have functioned as the simple domestic units that they are often assumed to be.

Keywords: Carbon isotopes | Nitrogen isotopes | Collagen | Diet | Çatalhöyük | Neolithic

WANG 2015

David T. Wang et al., *Nonequilibrium clumped isotope signals in microbial methane*. [science 348 \(2015\), 428–431](#).

s348-0428-Supplement.pdf

David T. Wang, Danielle S. Gruen, Barbara Sherwood Lollar, Kai-Uwe Hinrichs, Lucy C. Stewart, James F. Holden, Alexander N. Hristov, John W. Pohlman, Penny L. Morrill, Martin Könneke, Kyle B. Delwiche, Eoghan P. Reeves, Chelsea N. Sutcliffe, Daniel J. Ritter, Jeffrey S. Seewald, Jennifer C. McIntosh, Harold F. Hemond, Michael D. Kubo, Dawn Cardace, Tori M. Hoehler & Shuhei Ono

Methane is a key component in the global carbon cycle, with a wide range of anthropogenic and natural sources. Although isotopic compositions of methane have traditionally aided source identification, the abundance of its multiply substituted “clumped” isotopologues (for example, $^{13}\text{CH}_3\text{D}$) has recently emerged as a proxy for determining methane-formation temperatures. However, the effect of biological processes on methane’s clumped isotopologue signature is poorly constrained. We show that methanogenesis proceeding at relatively high rates in cattle, surface environments, and laboratory cultures exerts kinetic control on $^{13}\text{CH}_3\text{D}$ abundances and results in anomalously elevated formation-temperature estimates. We demonstrate quantitatively that H_2 availability accounts for this effect. Clumped methane thermometry can therefore provide constraints on the generation of methane in diverse settings, including continental serpentinization sites and ancient, deep groundwaters.

YEUNG 2015

Laurence Y. Yeun,² Jeanine L. As,¹ Edward D. Young, *Biological signatures in clumped isotopes of O_2* . [science 348 \(2015\), 431–434](#).

s348-0431-Supplement.pdf

The abundances of molecules containing more than one rare isotope have been applied broadly to determine formation temperatures of natural materials. These applications of “clumped” isotopes rely on the assumption that isotope-exchange equilibrium is reached, or at least approached, during the formation of those materials. In a closed-system terrarium experiment, we demonstrate that biological oxygen (O_2) cycling drives the clumped-isotope composition of O_2 away from isotopic equilibrium. Our model of the system suggests that unique biological signatures are present in clumped isotopes of O_2 —and not formation temperatures. Photosynthetic O_2 is depleted in $^{18}\text{O}^{18}\text{O}$ and $^{17}\text{O}^{18}\text{O}$ relative to a stochastic distribution of isotopes, unlike at equilibrium, where heavy-isotope pairs are enriched. Similar signatures may be widespread in nature, offering new tracers of biological and geochemical cycling.

Klima

COUMOU 2015

Dim Coumou, Jascha Lehmann & Johanna Beckmann, *The weakening summer circulation in the Northern Hemisphere mid-latitudes*. [science 348 \(2015\), 324–327](#).

s348-0324-Supplement.pdf

Rapid warming in the Arctic could influence mid-latitude circulation by reducing the poleward temperature gradient. The largest changes are generally expected in autumn or winter, but whether significant changes have occurred is debated. Here we report significant weakening of summer circulation detected in three key dynamical quantities: (i) the zonal-mean zonal wind, (ii) the eddy kinetic

energy (EKE), and (iii) the amplitude of fast-moving Rossby waves. Weakening of the zonal wind is explained by a reduction in the poleward temperature gradient. Changes in Rossby waves and EKE are consistent with regression analyses of climate model projections and changes over the seasonal cycle. Monthly heat extremes are associated with low EKE, and thus the observed weakening might have contributed to more persistent heat waves in recent summers.

MUNOZ 2015

Samuel E. Munoz, Kristine E. Gruley, Ashtin Massie, David A. Fike, Sissel Schroeder & John W. Williams, *Cahokia's emergence and decline coincided with shifts of flood frequency on the Mississippi River*. [PNAS **112** \(2015\), 6319–6324](#).

[pnas112-06319-Supplement.xlsx](#)

Here we establish the timing of major flood events of the central Mississippi River over the last 1,800 y, using floodwater sediments deposited in two floodplain lakes. Shifts in the frequency of high-magnitude floods are mediated by moisture availability over midcontinental North America and correspond to the emergence and decline of Cahokia—a major late prehistoric settlement in the Mississippi River floodplain. The absence of large floods from A.D. 600 to A.D. 1200 facilitated agricultural intensification, population growth, and settlement expansion across the floodplain that are associated with the emergence of Cahokia as a regional center around A.D. 1050. The return of large floods after A.D. 1200, driven by waning midcontinental aridity, marks the onset of sociopolitical reorganization and depopulation that culminate in the abandonment of Cahokia and the surrounding region by A.D. 1350. Shifts in the frequency and magnitude of flooding may be an underappreciated but critical factor in the formation and dissolution of social complexity in early agricultural societies.

Keywords: geoarchaeology | paleohydrology | Mississippi River | flooding | Cahokia

Significance: Our paper evaluates the role that flooding played in the emergence and decline of Cahokia—the largest prehistoric settlement in the Americas north of Mexico that emerged in the floodplain of the Mississippi River around A.D. 1050. We use sediment cores to examine the timing of major Mississippi River floods over the last 1,800 y. These data show that Cahokia emerged during a period of reduced megaflood frequency associated with heightened aridity across midcontinental North America, and that its decline and abandonment followed the return of large floods. We conclude that shifts in flood frequency and magnitude facilitated both the formation and the breakdown of Cahokia and may be important factors in the declines of other early agricultural societies.

Kultur

LIU 2015

Allison S. Liu, Arava Y. Kallai, Christian D. Schunn & Julie A. Fiez, *Using mental computation training to improve complex mathematical performance*. [Instructional Science \(2015\), preprint, 1–23](#). [DOI:10.1007/s11251-015-9350-0](#).

Mathematical fluency is important for academic and mathematical success. Fluency training programs have typically focused on fostering retrieval, which leads to math performance that does not reliably transfer to non-trained problems. More recent studies have focused on training number understanding and representational precision, but few have directly investigated whether training improvements

also transfer to more advanced mathematics. In one previous study, university undergraduates who extensively trained on mental computation demonstrated improvements on a complex mathematics test. These improvements were also associated with changes in number representation precision. Because such far transfer is both rare and educationally important, we investigated whether these transfer and precision effects would occur when using a more diverse population and after removing several features of the mental computation training that are difficult to implement in classrooms. Trained participants showed significant, robust improvements, suggesting that mental computation training can reliably lead to mathematical transfer and improvements in number representation precision.

Keywords: Mathematical fluency | Mental computation | Number representation | Number understanding | Transfer

Methoden

MAHAJAN 1998

Sanjoy Mahajan, *Order of Magnitude Physics, A Textbook*. Dissertation, California Institute of Technology ([Pasadena 1998](#)).

I develop tools to amplify our mental senses: our intuition and reasoning abilities. The first five chapters|based on the Order of Magnitude Physics class taught at Caltech by Peter Goldreich and Sterl Phinney|form part of a textbook on dimensional analysis, approximation, and physical reasoning. The text is a resource of intuitions, problem-solving methods, and physical interpretations. By avoiding mathematical complexity, order-of-magnitude techniques increase our physical understanding, and allow us to study otherwise difficult or intractable problems. The textbook covers: (1) simple estimations, (2) dimensional analysis, (3) mechanical properties of materials, (4) thermal properties of materials, and (5) water waves.

As an extended example of order-of-magnitude methods, I construct an analytic model for the flash sensitivity of a retinal rod.

The second example is an approximate model of primality, the square-root model.

MAHAJAN 2010

Sanjoy Mahajan, *Street-Fighting Mathematics, The Art of Educated Guessing and Opportunistic Problem Solving*. ([Cambridge 2010](#)).

Most of us took mathematics courses from mathematicians—Bad Idea!

Mathematicians see mathematics as an area of study in its own right. The rest of us use mathematics as a precise language for expressing relationships among quantities in the real world, and as a tool for deriving quantitative conclusions from these relationships. For that purpose, mathematics courses, as they are taught today, are seldom helpful and are often downright destructive.

As a student, I promised myself that if I ever became a teacher, I would never put a student through that kind of teaching. I have spent my life trying to find direct and transparent ways of seeing reality and trying to express these insights quantitatively, and I have never knowingly broken my promise.

With rare exceptions, the mathematics that I have found most useful was learned in science and engineering classes, on my own, or from this book. [Carver Mead]

MAHAJAN 2014

Sanjoy Mahajan, *The art of insight in science and engineering, Mastering complexity*. ([Cambridge 2014](#)).

In this book, Sanjoy Mahajan shows us that the way to master complexity is through insight rather than precision. Precision can overwhelm us with information, whereas insight connects seemingly disparate pieces of information into a simple picture. Unlike computers, humans depend on insight. Based on the author's fifteen years of teaching at MIT, Cambridge University, and Olin College, *The Art of Insight in Science and Engineering* shows us how to build insight and find understanding, giving readers tools to help them solve any problem in science and engineering. To master complexity, we can organize it or discard it. *The Art of Insight in Science and Engineering* first teaches the tools for organizing complexity, then distinguishes the two paths for discarding complexity: with and without loss of information. Questions and problems throughout the text help readers master and apply these groups of tools. Armed with this three-part toolchest, and without complicated mathematics, readers can estimate the flight range of birds and planes and the strength of chemical bonds, understand the physics of pianos and xylophones, and explain why skies are blue and sunsets are red.

Neolithikum

BOROWSKI 2015

Michał P. Borowski, Mirosław Furmanek, Krzysztof Czarniak & Piotr Gunia, *Steatite-tempered pottery of the Stroke Ornamented Ware culture from Silesia (SW Poland), A Neolithic innovation in ceramic technology*. [Journal of Archaeological Science](#) **57** (2015), 207–222.

This paper presents the results of petrographic and electron microprobe study of the steatite-tempered pottery of the Stroke Ornamented Ware culture from Silesia (SW Poland). The examination was performed with an emphasis on technofunctional aspects of ceramic production, nevertheless some preliminary data concerning provenance and distribution of the temper are also briefly discussed. Typological variability of investigated potsherds corresponds with distinguished fabric groups of steatite-tempered pottery. Fabric group A, linked to kettle-shaped vessels and thick-walled bowls, contains abundant admixture of microscopically observable steatite fragments (24–48 vol. %) and significant amounts of pulverized steatite in the clay groundmass. It may be supposed that the crushed talcose rock was added as a key-component in order to improve thermal properties of ceramic bodies. On the other hand, fabric group B, to which pear-shaped vessels and fine bowls belong, is characterized by minor quantities of steatite inclusions (usually less than 10 vol. %) accompanied by a variety of other nonplastics. Regardless of the widespread distribution of steatite-tempered pottery in Silesia, petrographic features of the steatite (talc-chlorite schist containing relics of antigorite) are very uniform at each of the investigated sites, indicating a specific source of raw material, most likely related to one of the Lower Silesian serpentinite massifs. The multigenerational persistence of this technological innovation sheds some new light on long-debated questions of cultural continuity at the regional level in the first half of the 5th millennium BC. The presented findings, viewed from a broader perspective, do not correspond with commonly held assumption considering the Neolithic pottery as produced from widely available raw materials and intended for own use.

Story or Book

GILBEY 2015

John Gilbey, *After the cataclysm*. [nature](#) **521** (2015), 159.

John Gilbey delights in a vast, technologically charged tale from a science-fiction supremo at the top of his game.

Sevener. Neal Stephenson. *William Morrow*: 2015.

This is hard sci-fi in a real and welcome sense, ruled by unremitting physical laws, unlike the negotiable rules of the action thriller. People die because their deaths are inevitable, and many pass unremarked because the disaster's scale is so vast. Their sacrifice is tied to the theme of engineering the survival of the human race. [...] Stephenson balances these aspects well, avoiding cookie-cutter scientists and the all-too-common characterization of technologists as brilliant but conflicted renegades.