Liste erstellt am 2016-08-05

References

Aktuell

Blamey 2016

Nigel J. F. Blamey, Uwe Brand, John Parnell, Natalie Spear, Christophe Lécuyer, Kathleen Benison, Fanwei Meng & Pei Ni, *Paradigm shift in determining Neoproterozoic atmospheric oxygen*. Geology **44** (2016), 651–654.

We present a new and innovative way of determining the oxygen level of Earth's past atmosphere by directly measuring inclusion gases trapped in halite. After intensive screening using multiple depositional, textural/fabric, and geochemical parameters, we determined that tectonically undisturbed cumulate, chevron, and cornet halite inclusions may retain atmospheric gas during crystallization from shallow saline, lagoonal, and/or saltpan brine. These are the first measurements of inclusion gas for the Neoproterozoic obtained from 815 ± 15 m.y. old Browne Formation chevron halite of the Officer Basin, southwest Australia. The 31 gas measurements afford us a direct glimpse of the composition of the mid- to late Neoproterozoic atmosphere and register an average oxygen content of 10.9 %. The measured pO2 puts oxygenation of Earth's paleoatmosphere ≈100–200 m.y. ahead of current models and proxy studies. It also puts oxygenation of the Neoproterozoic atmosphere in agreement with time of diversification of eukaryotes and in advance of the emergence of marine animal life.

Ellis 2016

Erle C. Ellis, Peter J. Richerson, Alex Mesoudi, Jens-Christian Svenning, John Odling-Smee & William R. Burnside, *Evolving the human niche*. PNAS **113** (2016), E4436.

A human niche cannot be understood without integrating niche construction with cultural evolution and social change. Human alteration of ecology is inherently social: socially learned and socially enacted.

van der Elst 2016

Nicholas J. van der Elst, Andrew A. Delorey, David R. Shelly & Paul A. Johnson, *Fortnightly modulation of San Andreas tremor and low-frequency earthquakes*. PNAS **113** (2016), 8601–8605.

Earth tides modulate tremor and low-frequency earthquakes (LFEs) on faults in the vicinity of the brittle-ductile (seismic-aseismic) transition. The response to the tidal stress carries otherwise inaccessible information about fault strength and rheology. Here, we analyze the LFE response to the fortnightly tide, which modulates the amplitude of the daily tidal stress over a 14-d cycle. LFE rate is highest during the waxing fortnightly tide, with LFEs most strongly promoted when the daily stress exceeds the previous peak stress by the widest margin. This pattern implies a threshold failure process, with slip initiated when stress exceeds the local fault strength. Variations in sensitivity to the fortnightly modulation may reflect the degree of stress concentration on LFE-producing brittle asperities embedded within an otherwise aseismic fault.

Keywords: faults | low-frequency earthquakes | tidal triggering | fortnightly tides

Significance: The sun and moon exert a gravitational tug on Earth that stretches and compresses crustal rocks. This cyclic stressing can promote or inhibit fault slip, particularly at the deep roots of faults. The amplitude of the solid Earth tide varies over a fortnightly (2-wk) cycle, as the sun and moon change their relative positions in the sky. In this study, we show that deep, small earthquakes on the San Andreas Fault are most likely to occur during the waxing fortnightly tide—not when the tidal amplitude is highest, as might be expected, but when the tidal amplitude most exceeds its previous value. The response of faults to the tidal cycle opens a window into the workings of plate tectonics.

Erlandson 2016

Jon M. Erlandson et al., *Human niche construction and evolutionary theory*, *Reply to Ellis et al.* PNAS **113** (2016), E4437–E4438.

Jon M. Erlandson, Melinda A. Zeder, Nicole L. Boivin, Alison Crowther, Tim Denham, Dorian Q. Fuller, Greger Larson & Michael D. Petraglia

As our title indicates, however, our aim was to examine the ecological consequences of human niche construction as Homo sapiens spread around the world—not the complex evolutionary processes by which such behaviors developed.

Lewis 2016

Kim Lewis & Philip Strandwitz, *Antibiotics right under our nose.* nature **535** (2016), 501–502.

Bacteria that are normally resident in the body have many roles in supporting health. Researchers have now identified a bacterial resident of the nose that produces an antibiotic that is active against a pathogen.

Tan 2016

Huanshu Tan, Christian Diddens, Pengyu Lv, J. G. M. Kuerten, Xuehua Zhang & Detlef Lohse, *Evaporation-triggered microdroplet nucleation and the four life phases of an evaporating Ouzo drop.* PNAS **113** (2016), 8642–8647.

pnas113-08642-Supplement1.mp4, pnas113-08642-Supplement2.mp4, pnas113-08642-Supplement3.mp4, pnas113-08642-Supplement4.mp4, pnas113-08642-Supplement5.mp4, pnas113-08642-Supplement6.mp4

Evaporating liquid droplets are omnipresent in nature and technology, such as in inkjet printing, coating, deposition of materials, medical diagnostics, agriculture, the food industry, cosmetics, or spills of liquids. Whereas the evaporation of pure liquids, liquids with dispersed particles, or even liquid mixtures has intensively been studied over the past two decades, the evaporation of ternary mixtures of liquids with different volatilities and mutual solubilities has not yet been explored. Here we show that the evaporation of such ternary mixtures can trigger a phase transition and the nucleation of microdroplets of one of the components of the mixture. As a model system, we pick a sessile Ouzo droplet (as known from daily life—a transparent mixture of water, ethanol, and anise oil) and reveal and theoretically explain its four life phases: In phase I, the spherical cap-shaped droplet remains transparent while the more volatile ethanol is evaporating, preferentially at the rim of the drop because of the singularity there. This leads to a local ethanol concentration reduction and correspondingly to oil droplet nucleation there. This is the beginning of phase II, in which oil microdroplets quickly nucleate in the whole drop, leading to its milky color that typifies the so-called "Ouzo effect." Once all ethanol has evaporated, the drop, which now has a characteristic non-spherical cap shape, has become clear again, with a water drop sitting on an oil

ring (phase III), finalizing the phase inversion. Finally, in phase IV, all water has evaporated, leaving behind a tiny spherical cap-shaped oil drop.

Keywords: ternary droplet evaporation | Ouzo effect | sessile droplets | different volatilities | nucleation

Significance: The evaporation of an Ouzo droplet is a daily life phenomenon, but the outcome is amazingly rich and unexpected: Here we reveal the four different phases of its life with phase transitions in-between and the physics that govern this phenomenon. The Ouzo droplet may be seen as a model system for any ternary mixture of liquids with different volatilities and mutual solubilities. Our work may open up numerous applications in (medical) diagnostics and in technology, such as coating or for the controlled deposition of tiny amounts of liquids, printing of light-emitting diode (LED) or organic LED devices, or phase separation on a submicron scale.

ZIPPERER 2016

Alexander Zipperer et al., *Human commensals producing a novel antibiotic impair pathogen colonization*. nature **535** (2016), 511–516.

n535-0511-Supplement.pdf

Alexander Zipperer, Martin c. Konnerth, claudia laux, Anne Berscheid, Daniela janek, christopher Weidenmaier, Marc Burian, Nadine A. Schilling, christoph Slavetinsky, Matthias Marschal, Matthias Willmann, Hubert Kalbacher, Birgit Schittek, Heike Brötz-Oesterhelt, Stephanie Grond, Andreas Peschel & Bernhard Krismer

The vast majority of systemic bacterial infections are caused by facultative, often antibiotic-resistant, pathogens colonizing human body surfaces. Nasal carriage of Staphylococcus aureus predisposes to invasive infection, but the mechanisms that permit or interfere with pathogen colonization are largely unknown. Whereas soil microbes are known to compete by production of antibiotics, such processes have rarely been reported for human microbiota. We show that nasal Staphylococcus lugdunensis strains produce lugdunin, a novel thiazolidine-containing cyclic peptide antibiotic that prohibits colonization by S. aureus, and a rare example of a non-ribosomally synthesized bioactive compound from human-associated bacteria. Lugdunin is bactericidal against major pathogens, effective in animal models, and not prone to causing development of resistance in S. aureus. Notably, human nasal colonization by S. lugdunensis was associated with a significantly reduced S. aureus carriage rate, suggesting that lugdunin or lugdunin-producing commensal bacteria could be valuable for preventing staphylococcal infections. Moreover, human microbiota should be considered as a source for new antibiotics.

Anthropologie

JORDAN 2016

Jillian J. Jordan, Moshe Hoffman, Martin A. Nowak & David G. Rand, *Uncalculating cooperation is used to signal trustworthiness*. PNAS **113** (2016), 8658–8663.

Humans frequently cooperate without carefully weighing the costs and benefits. As a result, people may wind up cooperating when it is not worthwhile to do so. Why risk making costly mistakes? Here, we present experimental evidence that reputation concerns provide an answer: people cooperate in an uncalculating way to signal their trustworthiness to observers. We present two economic game experiments in which uncalculating versus calculating decisionmaking is operationalized by either a subject's choice of whether to reveal the precise costs of

cooperating (Exp. 1) or the time a subject spends considering these costs (Exp. 2). In both experiments, we find that participants are more likely to engage in uncalculating cooperation when their decision-making process is observable to others. Furthermore, we confirm that people who engage in uncalculating cooperation are perceived as, and actually are, more trustworthy than people who cooperate in a calculating way. Taken together, these data provide the first empirical evidence, to our knowledge, that uncalculating cooperation is used to signal trustworthiness, and is not merely an efficient decision-making strategy that reduces cognitive costs. Our results thus help to explain a range of puzzling behaviors, such as extreme altruism, the use of ethical principles, and romantic love.

Keywords: reputation | social evaluation | decision-making | experimental economics | moral psychology

Significance: Human prosociality presents an evolutionary puzzle, and reciprocity has emerged as a dominant explanation: cooperating today can bring benefits tomorrow. Reciprocity theories clearly predict that people should only cooperate when the benefits outweigh the costs, and thus that the decision to cooperate should always depend on a cost–benefit analysis. Yet human cooperation can be very uncalculating: good friends grant favors without asking questions, romantic love "blinds" us to the costs of devotion, and ethical principles make universal moral prescriptions. Here, we provide the first evidence, to our knowledge, that reputation effects drive uncalculating cooperation. We demonstrate, using economic game experiments, that people engage in uncalculating cooperation to signal that they can be relied upon to cooperate in the future.

Kultur

Ferrara 2016

Silvia Ferrara, *Writing away, Mobility and versatility of scribes at the end of the Bronze Age*. Oxford Journal of Archaeology **35** (2016), 227–245.

This paper considers the roles played by scribes on Cyprus towards the end of the Late Bronze Age and the organization of the scribal community and its activity, drawing a parallel with the class of scribes at Ugarit-Ras Shamra in Syria. A close analysis of the contexts of the undeciphered Cypro-Minoan inscriptions found at Ugarit, the Cypro-Minoan inscription from Cyprus, and the cuneiform Akkadian tablets from Alashiya found at Ugarit and at Tell el Amarna in Egypt guides the identification of the agents responsible for their creation and their mobility from site to site. It furthermore advances understanding of the relationship of mutual exchange of epigraphic services across cultures and languages, during centuries of lively interaction and multilingual communication at the crossroads of different societies.

Mathematik

Andersson 2016

Claes Andersson & Petter Törnberg, *Fidelity and the Speed of the Treadmill, The combined impact of population size, transmission fidelity, and selection on the accumulation of cultural complexity*. American Antiquity **81** (2016), 576–590.

AmAnt81-576-Supplement.pdf

Human culture signifies the emergence of an entirely new domain of existence: an event in natural history that is paralleled only by the Cambrian Explosion in terms of creativity and scope. The question of how human culture—as opposed to its animal counterparts—came to become open-endedly creative and cumulative is therefore one of wide and general scientific importance. Several causal factors have been proposed to date to explain this unique quality, including population size, transmission fidelity, pedagogy, and creativity. Inquiries, however, tend to focus exclusively on one factor at a time, leaving us blind to important issues regarding their relative roles and combined action. We here combine two models, one focusing on population size and the other on imitation fidelity, as constraints and enablers of evolutionary cumulativity. We explore how these factors interact to promote and inhibit evolutionary cumulativity and how the synthetic model compares to the original models individually and to empirical and experimental data. We report several findings that do not emerge in the models that we combine individually. For example, group size is found to be important for small but not for larger groups, an observation that moreover substantially improves agreement with data.

Metallzeiten

Sacchetti 2016

Federica Sacchetti, *Transport Amphorae in the West Hallstatt Zone, Reassessing socio-economic dynamics and longdistance Mediterranean exchange in western Central Europe in the early Iron Age*. Oxford Journal of Archaeology **35** (2016), 247–265.

Trade and cultural relations between western Central Europe and the Mediterranean world in the Early Iron Age remain a major topic of discussion. The products exchanged were mainly connected with the ritual preparation and social consumption of Mediterranean wine. This article examines the question through a comparative study of transport amphorae from the entire West Hallstatt zone. The systematic analysis is based on a specialized study carried out on the material itself. Typological analyses allow us to identify where amphorae originated; previously this was thought to have been just Massalia but this now needs to be expanded to the whole Mediterranean Basin. An analysis of the distribution of amphorae enables us to identify the trajectory these products followed. A comparison with amphora types attested in potential ports in southern France and northern Italy suggests possible trade routes for specific types. Finally, a new chronological scheme for amphorae provides insights into the economic reasons behind these imports and the social impact these products had, enabling us to identify broader socio-economic trends and long-distance exchange patterns in western Central Europe.