

## References

### Aktuell

GIBBONS 2017

Ann Gibbons, *Busting Myths of Origin*. [science](#) **356** (2017), 678–681.

Despite their tales of origin, most people are the mixed descendants of many migrations.

Maeir says he thinks that the Philistines soon intermarried with people already living in Canaan instead of going extinct. If so, the loathsome Philistines are part of the ancestral stock for both Palestinian Muslims and Israeli Jews. Those groups, so full of enmity today, are genetically closely related, according to a study in 2000 of the paternally inherited Y chromosomes of 119 Ashkenazi and Sephardic Jews and 143 Israeli and Palestinian Arabs. Seventy percent of the Jewish men and half of the Arab men inherited their Y chromosomes from the same set of paternal ancestors who lived in the Middle East within the last few thousand years.

HAMMER 2017

Tobin J. Hammer, Daniel H. Janzen, Winnifred Hallwachs, Samuel L. Jaffe & Noah Fierer, *Caterpillars lack a resident gut microbiome*. [bioRxiv](#) (2017), preprint, 1–26. DOI:10.1101/132522.

Many animals are inhabited by microbial symbionts that influence their hosts' development, physiology, ecological interactions, and evolutionary diversification. However, firm evidence for the existence and functional importance of resident microbiomes in larval Lepidoptera (caterpillars) is lacking, despite the fact that these insects are enormously diverse, major agricultural pests, and dominant herbivores in many ecosystems. Using 16S rRNA gene sequencing and quantitative PCR, we characterized the gut microbiomes of wild leaf-feeding caterpillars in the United States and Costa Rica, representing 124 species from 16 families. Compared with other insects and vertebrates assayed using the same methods, the microbes we detected in caterpillar guts were unusually low-density and highly variable among individuals. Furthermore, the abundance and composition of leaf-associated microbes were reflected in the feces of caterpillars consuming the same plants. Thus, microbes ingested with food are present (though possibly dead or dormant) in the caterpillar gut, but host-specific, resident symbionts are largely absent. To test whether transient microbes might still contribute to feeding and development, we conducted an experiment on field-collected caterpillars of the model species *Manduca sexta*. Antibiotic suppression of gut bacterial activity did not significantly affect caterpillar weight gain, development, or survival. The high pH, simple gut structure, and fast transit times that typify caterpillar digestive physiology may prevent microbial colonization. Moreover, host-encoded digestive and detoxification mechanisms likely render microbes unnecessary for caterpillar herbivory. Caterpillars illustrate the potential ecological and evolutionary benefits of independence from symbionts, a lifestyle which may be widespread among animals.

Keywords: insects | herbivory | Lepidoptera | symbiosis | mutualism

PINTO 2017

Paula de Tezanos Pinto, *The journey of a scientist mother*. [science](#) **356** (2017), 774.

I got pregnant at 38, not long after obtaining a permanent research position. Until that time, I had been a free and adventurous soul, working long hours and traveling frequently for my research on aquatic cyanobacteria. During the last 3 years of my Ph.D., I spent the summers in a lab in the United States, far from my home country of Argentina. I worked another full year in that U.S. lab during my postdoc. Along the way, I managed to find love, settle down, and start on the road to becoming a mother. My sister, who had a kid of her own, warned me that my priorities were about to change. She said that, when my child was born, it was possible that I would want to quit science and become a full-time mom. But I loved my work.

#### REESE 2017

April Reese, *Island extinctions weren't inevitable*. [science](#) **356** (2017), 674–675.

During the ice age, human colonizers often coexisted with vulnerable island fauna.

This emerging picture raises a new puzzle, however. On continents such as North America and Australia, ice age immigrants are blamed for widespread extinctions of ice age megafauna—think mammoths, giant sloths, and giant kangaroos. “If we cannot locate a definite Pleistocene megafaunal extinction on an island,” says Roberts, “then what does this mean for arguments on the continents?”

Generalizing from the studies so far is risky, researchers emphasized. Environmental conditions, the timing of settlement and extinctions, the technologies the new arrivals brought—all vary from island to island, and none of those factors is fully understood at any site.

#### ROSS 2017

Erin Ross, *The curious case of the caterpillar's missing microbes*. [nature](#) **2017**, May 18. DOI:10.1038/nature.2017.21955.

Certain insects, and perhaps some vertebrates, lack permanent microbial residents in their intestines.

Whitaker thinks that results like Hammer's might be more common than they seem in the literature. “I think there's some selection bias,” she says. Researchers might be reluctant to submit their negative results, and journals may be equally reluctant to publish them. It's a familiar story — when Whitaker first started looking at caterpillar gut bacteria, she was convinced there was something wrong with her data or her methods. Eventually, however, it became clear that there were no intestinal symbionts to find.

“As a discipline we're really ready to claim that everything is related to the microbiome and every organism has one,” says Whitaker. “It only takes one exception before all of that goes out the window.”

It's possible that some vertebrates lack gut microbiomes, too. “Anecdotally, I've heard from researchers having similar problems in birds and fish,” says Hammer. His study included data from several vertebrate species as controls. Some, such as goats, do harbour a gut microbiome. But when Hammer looked for gut microbes in faeces from geese and bats, he found none.

#### YAMAGISHI 2017

Toshio Yamagishi, Yoshie Matsumoto, Toko Kiyonari, Haruto Takagishi, Yang Li, Ryota Kanai & Masamichi Sakagami, *Response time in economic games reflects different types of decision conflict for prosocial and proself individuals*. [PNAS](#) **114** (2017), 6394–6399.

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Behavioral and neuroscientific studies explore two pathways through which internalized social norms promote prosocial behavior. One pathway involves internal control of impulsive selfishness, and the other involves emotion-based prosocial preferences that are translated into behavior when they evade cognitive control for pursuing self-interest. We measured 443 participants' overall prosocial behavior in four economic games. Participants' predispositions [social value orientation (SVO)] were more strongly reflected in their overall game behavior when they made decisions quickly than when they spent a longer time. Prosocially (or selfishly) predisposed participants behaved less prosocially (or less selfishly) when they spent more time in decision making, such that their SVO prosociality yielded limited effects in actual behavior in their slow decisions. The increase (or decrease) in slower decision makers was prominent among consistent prosocials (or proselfs) whose strong preference for prosocial (or proself) goals would make it less likely to experience conflict between prosocial and proself goals. The strong effect of RT on behavior in consistent prosocials (or proselfs) suggests that conflict between prosocial and selfish goals alone is not responsible for slow decisions. Specifically, we found that contemplation of the risk of being exploited by others (social risk aversion) was partly responsible for making consistent prosocials (but not consistent proselfs) spend longer time in decision making and behave less prosocially. Conflict between means rather than between goals (immediate versus strategic pursuit of self-interest) was suggested to be responsible for the time-related increase in consistent proselfs' prosocial behavior. The findings of this study are generally in favor of the intuitive cooperation model of prosocial behavior.

**Keywords:** prosocial behavior | economic game | social value orientation | decision time | heuristic cooperation

**Significance:** Prosocial and proself predispositions dictate economic game players' fast decisions but exert limited influence when game players take a longer time in making decisions. Prosocially predisposed individuals use the extended time to contemplate the risk of being exploited. Selfishly predisposed individuals are suggested to behave according to the immediate incentives of the games when they make decisions quickly and become behaviorally less selfish as they spend more time assessing the long-term strategic implications of always behaving according to immediate incentives. Different strategies are needed to promote prosocial behavior and to design institutions depending on the constitution of the population.

## Datierung

MOINE 2017

Olivier Moine et al., *The impact of Last Glacial climate variability in west-European loess revealed by radiocarbon dating of fossil earthworm granules*. [PNAS 114 \(2017\), 6209–6214](#).

Olivier Moine, Pierre Antoine, Christine Hatté, Amaëlle Landais, Jérôme Mathieu, Charlotte Prud'homme & Denis-Didier Rousseau

The characterization of Last Glacial millennial-timescale warming phases, known as interstadials or Dansgaard–Oeschger events, requires precise chronologies for the study of paleoclimate records. On the European continent, such chronologies are only available for several Last Glacial pollen and rare speleothem archives principally located in the Mediterranean domain. Farther north, in continental lowlands, numerous high-resolution records of loess and paleosols sequences show a consistent environmental response to stadial–interstadial cycles. However, the limited precision and accuracy of luminescence dating methods commonly used

in loess deposits preclude exact correlations of paleosol horizons with Greenland interstadials. To overcome this problem, a radiocarbon dating protocol has been developed to date earthworm calcite granules from the reference loess sequence of Nussloch (Germany). Its application yields a consistent radiocarbon chronology of all soil horizons formed between 47 and 20 ka and unambiguously shows the correlation of every Greenland interstadial identified in isotope records with specific soil horizons. Furthermore, eight additional minor soil horizons dated between 27.5 and 21 ka only correlate with minor decreases in Greenland dust records. This dating strategy reveals the high sensitivity of loess paleoenvironments to Northern Hemisphere climate changes. A connection between loess sedimentation rate, Fennoscandian ice sheet dynamics, and sea level changes is proposed. The chronological improvements enabled by the radiocarbon “earthworm clock” thus strongly enhance our understanding of loess records to a better perception of the impact of Last Glacial climate changes on European paleoenvironments.

**Keywords:** millennial-timescale climate change | radiocarbon dating | earthworm calcite granules | Last Glacial loess | Europe

**Significance:** Last Glacial millennial-timescale warming phases well-recorded in Greenland ice cores are relevant across the Northern Hemisphere. However, dating limitations in loess deposits inhibited characterizing their impact on the European Great Plain. Here, the radiocarbon dating of a large set of earthworm calcite granule samples from the Nussloch reference loess sequence (Rhine Valley, Germany) led to a straightforward chronological distinction of all soil horizons. Resulting correlations with Greenland interstadials between 50 and 20 ka also revealed more complex climate dynamics than interpreted from Greenland  $\delta^{18}O$  records. This study is a fundamental contribution to understanding links between mid- and high-latitude climate changes and their spatial and temporal impact on paleoenvironments and prehistoric population settlement in Europe.

## Isotope

TACAIL 2017

Théo Tacail, Béatrice Thivichon-Prince, Jeremy E. Martin, Cyril Charles, Laurent Viriot & Vincent Balter, *Assessing human weaning practices with calcium isotopes in tooth enamel*. [PNAS 114 \(2017\), 6268–6273](#).

[pnas114-06268-Supplement.xlsx](#)

Weaning practices differ among great apes and likely diverged during the course of human evolution, but behavioral inference from the fossil record is hampered by a lack of unambiguous biomarkers. Here, we show that early-life dietary transitions are recorded in human deciduous tooth enamel as marked variations in Ca isotope ratios ( $\delta^{44}/^{42}Ca$ ). Using a sequential microsampling method along the enamel growth axis, we collected more than 150 enamel microsamples from 51 deciduous teeth of 12 different modern human individuals of known dietary histories, as well as nine enamel samples from permanent third molars. We measured and reconstructed the evolution of  $^{44}Ca/^{42}Ca$  ratios in enamel from in utero development to first months of postnatal development. We show that the observed variations of  $\delta^{44}/^{42}Ca$  record a transition from placental nutrition to an adult-like diet and that Ca isotopes reflect the duration of the breastfeeding period experienced by each infant. Typically, the  $\delta^{44}/^{42}Ca$  values of individuals briefly or not breastfed show a systematic increase during the first 5–10 mo, whereas individuals with long breastfeeding histories display no measurable variation in  $\delta^{44}/^{42}Ca$  of enamel formed during this time. The use of Ca isotope analysis in tooth enamel allows

microsampling and offers an independent approach to tackle challenging questions related to past population dynamics and evolution of weaning practices in hominins.

**Keywords:** calcium isotopes | tooth enamel | dietary transitions | weaning | breast milk

**Significance:** The practice of weaning, the dietary transition from exclusive breastfeeding to exclusive nonmilk food, is a key aspect of development and evolution of hominins, but its study in the fossil record is hampered by a lack of unambiguous biomarkers. Ca stable isotope ratios of skeletal remains are expected to bear information about milk consumption. Here we demonstrate that modern human tooth enamel records a temporal variation of Ca isotope compositions, which is related to breastfeeding duration. Ca isotopes could be used as a biomarker for reconstruction of weaning practices in past human and fossil hominin species.

## Klima

### PAUSATA 2017

Francesco S. R. Pausata et al., *Tropical cyclone activity enhanced by Sahara greening and reduced dust emissions during the African Humid Period*. [PNAS 114 \(2017\), 6221–6226](#).

Francesco S. R. Pausata, Kerry A. Emanuel, Marc Chiacchio, Gulilat T. Diro, Qiong Zhang, Laxmi Sushama, J. Curt Stager & Jeffrey P. Donnelly

Tropical cyclones (TCs) can have devastating socioeconomic impacts. Understanding the nature and causes of their variability is of paramount importance for society. However, historical records of TCs are too short to fully characterize such changes and paleosediment archives of Holocene TC activity are temporally and geographically sparse. Thus, it is of interest to apply physical modeling to understanding TC variability under different climate conditions. Here we investigate global TC activity during a warm climate state (mid-Holocene, 6,000 yBP) characterized by increased boreal summer insolation, a vegetated Sahara, and reduced dust emissions. We analyze a set of sensitivity experiments in which not only solar insolation changes are varied but also vegetation and dust concentrations. Our results show that the greening of the Sahara and reduced dust loadings lead to more favorable conditions for tropical cyclone development compared with the orbital forcing alone. In particular, the strengthening of the West African Monsoon induced by the Sahara greening triggers a change in atmospheric circulation that affects the entire tropics. Furthermore, whereas previous studies suggest lower TC activity despite stronger summer insolation and warmer sea surface temperature in the Northern Hemisphere, accounting for the Sahara greening and reduced dust concentrations leads instead to an increase of TC activity in both hemispheres, particularly over the Caribbean basin and East Coast of North America. Our study highlights the importance of regional changes in land cover and dust concentrations in affecting the potential intensity and genesis of past TCs and suggests that both factors may have appreciable influence on TC activity in a future warmer climate.

**Keywords:** hurricanes | mid-Holocene | dust emissions | vegetation changes | land cover changes

**Significance:** Our modeling study shows the crucial role of vegetation cover over the Sahara and reduced dust emission in altering tropical cyclone activity during the mid-Holocene (6,000 yBP). Our results also demonstrate how these regional changes in land cover and dust emission are able to affect areas far afield through changes of large-scale atmospheric circulation. Our study strongly suggests that

an appropriate representation of land cover and dust emission is of paramount importance to be able to capture past—and potentially future—climate changes.

## Story or Book

SHAFER-ELLIOTT 2017

Cynthia Shafer-Elliott, *Ancient Cookware from the Levant, An Ethnoarchaeological Perspective*. [Bible History Daily 2017, June 14](#).

*Ancient Cookware from the Levant: An Ethnoarchaeological Perspective*. By Gloria London. (Sheffield, UK: Equinox, 2016), 334 pp., 68 figures and 2 maps, \$ 150 (hardcover)

Highlights of the book include the categorization and description of ceramics used in the preparation of food in ancient households. The six categories are cookware (deep pots and cooking jugs), bakeware (trays, plates, moulds and casseroles), kitchenware (bowls, jugs, jars and colanders), tableware (bowls and jugs), utilitarian clay containers for food processing and storage (vats, basins and jars), and ovens and stoves.

London's categories show that ancient food-preparation vessels were much more diverse in both form and function than is generally acknowledged. Another highlight of the book is the section "Cookware Through the Ages," in which the author provides a précis on the evolution of food preparation vessel categories from the Neolithic period (9000–4300 B.C.E.) to the Late Ottoman/Mandate period (1516–1918 C.E.).