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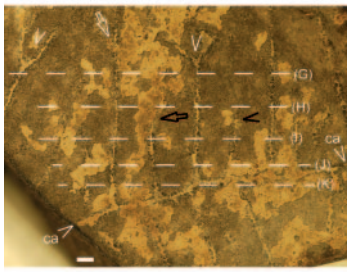
EVOLUTION, GEOLOGY

Uniquely preserved fossils expand view of Ediacaran biota

Shuhai Xiao *et al.* report on their unearthing of a previously uncharacterized Ediacaran fossil from the Dengying Formation (551–542 million years ago) in South China. The authors collected ≈20 specimens of this fossil, which was uniquely preserved *in situ* in limestone through calcite casting of decaying organic walls, making the fossils highly detailed. This fossil form is morphologically similar to the core biota of the Ediacaran period, the frondose vendobionts, in that it consists of tube-like quilts emerging biserially from a central axis. Unlike other vendobionts, however, this specimen appears to have had no smooth margins and had quilts that were open at the distal end. The *in situ* preservation of this specimen also indicates that these vendobionts likely lived horizontally at the water–sediment interface and had substrate competition with nearby organisms. The authors note that, though uncertainties remain in interpretations from these fossil samples, the Dengying fossils contribute to understanding the diversity, ecology, and fossilizing processes of this pre-Cambrian time period. — N.Z.



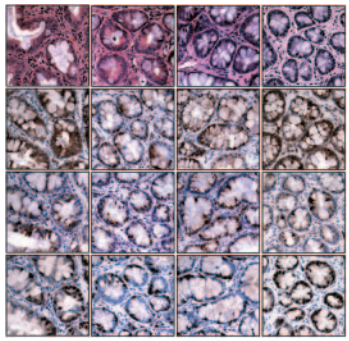
Ediacaran vendobiont fossil.

"A uniquely preserved Ediacaran fossil with direct evidence for a quilted bodyplan" by Shuhai Xiao, Bing Shen, Chuanming Zhou, Guwei Xie, and Xunlai Yuan (see pages 10227–10232)

GENETICS

How p85 modulates PI3K signaling in tumor formation

Ji Luo *et al.* examined the role of p85 on phosphoinositide 3-kinase (PI3K)-dependent tumor formation and found that p85 suppresses PI3K signaling in some tissues but enhances it in others. The class I_A PI3K signaling pathway is one of the most frequently mutated pathways in human cancers. Class I_A PI3Ks, heterodimers consisting of a p110 catalytic subunit and a p85 regulatory subunit, regulate proteins responsible for cell proliferation and survival and are themselves regulated by the tumor suppressor PTEN. Knowing that p85 has multiple isoforms encoded by three separate genes (α, β, γ), Luo *et al.* crossed $PTEN^{+/-}$ mice with $p85\alpha^{+/-}$ and $p85\beta^{+/-}$ mice to generate all the viable allele combinations of these genes. The loss of one p85α allele, whether alone or in combination with a loss of p85β, enhanced downstream PI3K signaling and led to a 2-fold increase in the incidence of intestinal epithelial polyps. In contrast, none of the p85 deletions altered the rates of prostate neoplasia, endometrial neoplasia, or T cell hyperplasia, though prostate neoplasia in $p85\beta^{-/-}$ mice had a smaller fraction of proliferating cells. — N.Z.



Intestinal polyps in $PTEN^{+/-}$ mice of varying p85 genotypes.

"Modulation of epithelial neoplasia and lymphoid hyperplasia in $PTEN^{+/-}$ mice by the p85 regulatory subunits of phosphoinositide 3-kinase" by Ji Luo, Cassandra L. Sobkiw, Nicole M. Logsdon, John M. Watt, Sabina Signoretti, Fionnuala O'Connell, Eyoung Shin, Youngju Shim, Lily Pao, Benjamin G. Neel, Massimo Loda, and Lewis C. Cantley (see pages 10238–10243)

MICROBIOLOGY

Lactobacillus plantarum mutant displays enhanced antiinflammatory capacity

Corinne Grangette *et al.* demonstrate the importance of lipoteichoic acid (LTA), a cell wall component, in the immunomodulatory properties of *Lactobacillus plantarum*. Intestinal lactobacilli play an important role in maintaining the health of the host, but the precise mechanisms by which these commensal bacteria exert their effects is unclear. The authors disrupted the *dlt* operon in a wild-type strain of *L. plantarum*, which reduced D-alanylation of LTA from 41% to 1% and decreased production of proinflammatory cytokines (TNF-α, IL-1β) by peripheral blood mononuclear cells *in vitro*. Concomitantly, the *dlt* mutation stimulated an increased production of the antiinflammatory cytokine IL-10. The Dlt$^-$ mutant also had an increased protective effect in a mouse model of colitis compared with wild type. These results highlight the importance of LTA composition in the immunomodulating properties of *L. plantarum*, which may explain why closely related bacteria produce varying inflammatory effects. The positive findings seen in the mouse model also point to the potential use of *Lactobacillus* cell wall mutants for probiotic treatment of intestinal inflammation. — N.Z.

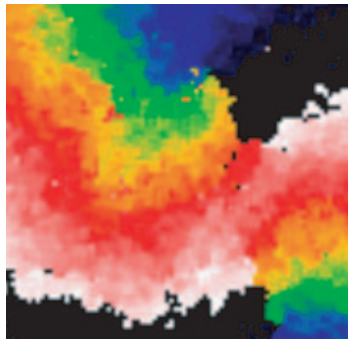
Colon section of colitis mouse model given Dlt$^-$ mutant *Lactobacillus plantarum*.

"Enhanced antiinflammatory capacity of a Lactobacillus plantarum *mutant synthesizing modified teichoic acids" by Corinne Grangette, Sophie Nutten, Emmanuelle Palumbo, Siegfried Morath, Corinna Hermann, Joelle Dewulf, Bruno Pot, Thomas Hartung, Pascal Hols, and Annick Mercenier* (see pages 10321–10326)

PHYSIOLOGY

Spiral waves in cardiac cells

Seong-min Hwang *et al.* report that dynamic spiral waves can spontaneously and stably arise in monolayer cultures of cardiac cells. Previous research has shown that spatiotemporal wave activities in excitable heart tissues underlie different forms of cardiac arrhythmias. The authors cultured neonatal rat ventricle cells and mapped contraction patterns of the cardiac tissue. They identified four distinct types of waves as the cells matured: P-1, P-2, and P-4 oscillations and aperiodic waveforms. The authors found that the transitions between different states were not driven by systematic parameter changes but rather originated from the dynamics of complex spiral wave tips. Hwang *et al.* observed that, whenever a spiral tip traveled along a different trajectory, a new pattern emerged in the local temporal activity. Absolute and partial conduction blocks—thin, line-shaped inhomogeneities of undetermined origin across which waves cannot propagate—altered the path of the spiral tip, resulting in the four wave types. The authors found that the P-1 to P-2 transition occurred from a symmetry breaking in the angular separation of a rotating pair of spiral tips, and that one spiral tip orbit splitting into two induced the P-2 to P-4 transition. — F.A.



Corotating spiral waves and tip orbits.

"Complex-periodic spiral waves in confluent cardiac cell cultures induced by localized inhomogeneities" by Seong-min Hwang, Tae Yun Kim, and Kyoung J. Lee (see pages 10363–10368)

PSYCHOLOGY

Hand movements suggest continuous language processing

Michael Spivey *et al.* explore the use of hand movements, recorded as a continuous response, to track the temporal dynamics of cognitive language processing. A classic, modular theory of language processing assumes that neural subsystems responsible for perception and cognition each wait until a stable, unique representation has been computed before passing that information to the next stage. An alternative model posits a continuous uptake of sensory input and then dynamic competition between simultaneously active representations. Spivey *et al.* recorded the streaming (x, y) coordinates of a cursor directed by a hand-controlled computer mouse during spoken language tasks. These data were reported to be of high temporal resolution and provided smooth curves even within individual trials, so that central tendencies of group data were fairly represented. The shapes of these trajectories gave a concrete, two-dimensional visualization of the dynamics involved in language processing, the authors say, and the results add further evidence for the continuous-uptake cognitive model. — R.N.

"Continuous attraction toward phonological competitors" by Michael J. Spivey, Marc Grosjean, and Günther Knoblich (see pages 10393–10398)