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COVER

Orbulina universa, a planktonic foraminifera captured live from surface waters off Santa Catalina Island, California. Symbiotic dinoflagellates inhabit the calcite spines (length ~2.5 millimeters) radiating out from a spherical calcite shell (diameter ~0.5 millimeters). After four weeks, the shells sink to the sea floor and become part of the deep-sea microfossil assemblage. The geochemical compositions of these fossils are used to reconstruct past changes in seawater chemistry (see page 818).

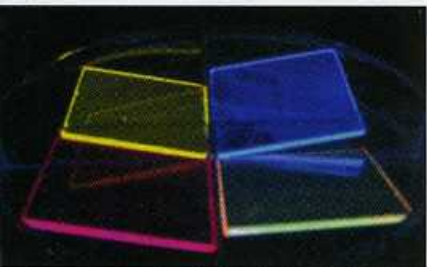
Photo: Howard J. Speer, University of California, Davis

DEPARTMENTS

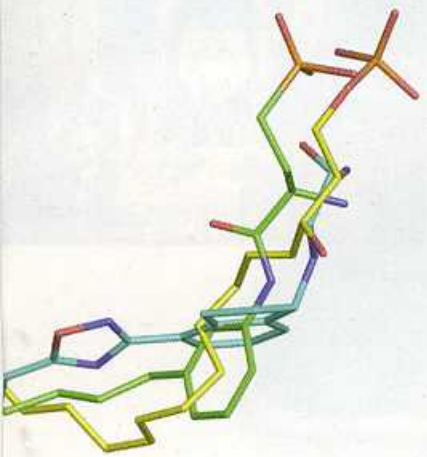
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T. Aida et al.

RESEARCH ARTICLES

- 818 **Lithium Isotope History of Cenozoic Seawater: Changes in Silicate Weathering and Reverse Weathering**
S. Misra and P. N. Froelich
Historical changes in the lithium isotope ratio in seawater imply episodes of tectonic uplift and carbon dioxide drawdown.
>> *Perspective p. 810*

- 823 **A Systematic Survey of Loss-of-Function Variants in Human Protein-Coding Genes**
D. G. MacArthur et al.
Validation of predicted nonfunctional alleles in the human genome affects the medical interpretation of genomic analyses.
>> *Perspective p. 806; Science Podcast*

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- 828 **Unraveling the Spin Polarization of the $\nu = 5/2$ Fractional Quantum Hall State**
L. Tiemann et al.
Nuclear magnetic resonance shows that an exotic state of matter may have the properties necessary for error-free quantum computing.

- 831 **A Logic-Gated Nanorobot for Targeted Transport of Molecular Payloads**
S. M. Douglas et al.
Cargoes stored in folded DNA origami are released when aptamers in the structure bind target protein molecules.

- 835 **Supported Iron Nanoparticles as Catalysts for Sustainable Production of Lower Olefins**
H. M. Torres Galvis et al.
A class of iron catalysts selectively transforms gasified biomass into the building blocks of common plastics.

- 838 **Plate Motions and Stresses from Global Dynamic Models**
A. Ghosh and W. E. Holt
Geodynamic modeling predicts where the mantle drives or resists the motion of overlying tectonic plates.

- 843 **Cyanophora paradoxa Genome Elucidates Origin of Photosynthesis in Algae and Plants**
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An ancient algal genome suggests a unique origin of the plastid in the ancestor to plants, algae, and glaucophytes.
>> *Perspective p. 809*

- 848 **RNA Editing Underlies Temperature Adaptation in K^+ Channels from Polar Octopuses**
S. Garrett and J. J. C. Rosenthal
Octopus potassium channels function efficiently at different temperatures due to RNA editing and not genetic differences.
>> *Perspective p. 805*

- 851 **Crystal Structure of a Lipid G Protein-Coupled Receptor**
M. A. Hanson et al.
A channel in a lipid-dependent G protein-coupled receptor allows a ligand to access its binding site from within the plasma membrane.

- 856 **Epithelial Nitration by a Peroxidase/NOX5 System Mediates Mosquito Antiplasmodial Immunity**
G. de Almeida Oliveira et al.
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- 859 **Structural Basis of TLR5-Flagellin Recognition and Signaling**
S. Yoon et al.
Bacterially derived flagellin binds to an innate immune receptor to form a tail-to-tail heterodimeric signaling complex.

- 864 **Survival Analysis of Faculty Retention in Science and Engineering by Gender**
D. Kaminski and C. Geisler
Individual assistant professors hired since 1990 at 14 U.S. universities were tracked from time of hire to time of departure.
>> *Science Podcast*