



COVER

A hot spring in Bali, Indonesia. The discovery of thriving microbial communities in such unexpected places has motivated investigation into the diversity and distribution of microbial life. The special issue beginning on page 1027 explores the microbial world.

Image: Sylvain Grandadam/Getty Images

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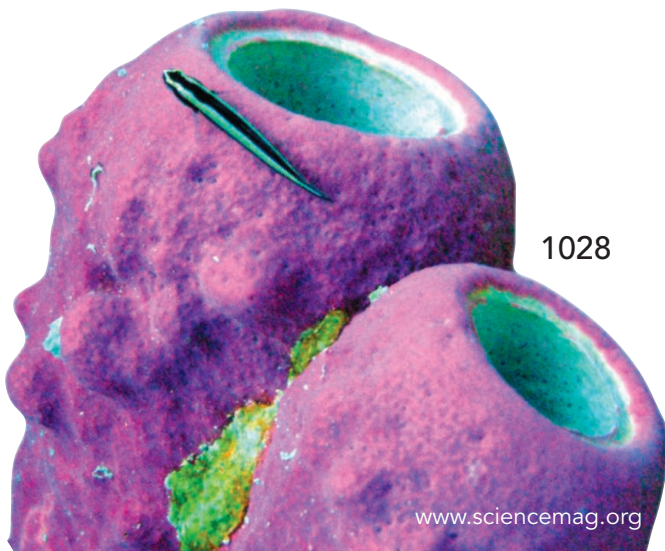
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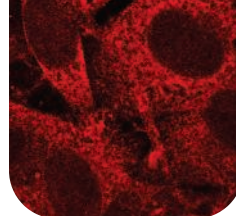
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SCIENCE EXPRESS

www.scienceexpress.org

CELL SIGNALING

The Rag GTPases Bind Raptor and Mediate Amino Acid Signaling to mTORC1

Y. Sancak et al.

Nutrients, specifically amino acids, are sensed by small guanosine triphosphatases, which bind to a signaling complex, moving it close to the nucleus where it initiates cell growth.

10.1126/science.1157535

MICROBIOLOGY

Evolution of Mammals and Their Gut Microbes

R. E. Ley et al.

Genomic sampling of the microbes in the feces of 60 mammals shows that herbivores harbor the most diversity and that individuals of the same species have the same flora.

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10.1126/science.1155725

CELL BIOLOGY

β -Arrestin-Mediated Localization of Smoothed to the Primary Cilium

J. J. Kovacs et al.

β -arrestin, which has several known roles in signaling systems, also links a key receptor to a motor protein so that the receptor can be transported to cilia for sensing environmental cues.

10.1126/science.1157983

CLIMATE CHANGE

Evidence for Upwelling of Corrosive "Acidified" Water onto the Continental Shelf

R. A. Feely et al.

As a result of anthropogenic CO₂ uptake, corrosive seawater undersaturated with calcium carbonate shoaled on the continental shelf of western North America in 2007.

10.1126/science.1155676

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C. Selman, S. Lingard, D. Gems, L. Partridge, D. J. Withers

full text at www.sciencemag.org/cgi/content/full/320/5879/1012b

Response to Comment on "Brain IRS2 Signaling Coordinates Life Span and Nutrient Homeostasis"

A. Taguchi and M. F. White

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MICROBIOLOGY

Extending the Sub-Sea-Floor Biosphere

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E. G. Roussel et al.

Prokaryotic cells and DNA from Archaea are present at depths greater than 1 kilometer in sediments below the ocean floor, where temperatures range up to 100° Celsius.

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Virus Population Dynamics and Acquired Virus Resistance in Natural Microbial Communities 1047
A. F. Andersson and J. F. Banfield

Fragments of viral genes found within Archaea and Bacteria genomes are part of an antiviral defense system and can be used to identify and track the viruses themselves.

BIOCHEMISTRY

Regulated Protein Denitrosylation by Cytosolic and Mitochondrial Thioredoxins 1050

M. Benhar, M. T. Forrester, D. T. Hess, J. S. Stamler

Thioredoxins—known to be antioxidants—also remove nitrosyl groups from a protease to activate it and may also function in this way in other cellular regulatory systems. >> *Perspective p. 1019*

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Structural Diversity of Sodium 1054
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Single-crystal diffraction data reveal that many crystalline phases of sodium, some quite complex, occur near its unusual minimum melting temperature at very high pressure.

MATERIALS SCIENCE

Inverse Temperature Dependence of Toughness in an Ultrafine Grain-Structure Steel 1057
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A network of fine, fibrous grains formed at high temperatures substantially improves the strength and ductility of a low-alloy steel at low temperatures, where it is typically brittle. >> *Perspective p. 1022*

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Dislocation-Driven Nanowire Growth and Eshelby Twist 1060

M. J. Bierman, Y. K. A. Lau, A. V. Kvit, A. L. Schmitt, S. Jin

A screw dislocation drives the growth of a nanowire pine tree, in which branches regularly extend from the trunk in a spiral, confirming Eshelby's theory of dislocations.

PLANETARY SCIENCE

Detection of Silica-Rich Deposits on Mars 1063
S. W. Squyres et al.

The rover Spirit has found opaline silica-rich soil and rocks on Mars, providing further evidence for extensive local mineralization by hydrothermal fluids at low pH.

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A classic amphitheater-shaped canyon in Idaho, similar to features seen on Mars, formed in a glacial megaflood, not through groundwater seepage at its head as was thought.

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Differential Rescue of Light- and Food-Entrainable Circadian Rhythms 1074

P. M. Fuller, J. Lu, C. B. Saper

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M. Ghildiyal et al.

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Resource Partitioning and Sympatric Differentiation Among Closely Related Bacterioplankton 1081

D. E. Hunt et al.

A model of a marine plankton population reveals that ecologically distinct subgroups undergo sympatric speciation fast enough to overcome horizontal gene flow.

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A Polymorphism Within the *G6PC2* Gene Is Associated with Fasting Plasma Glucose Levels 1085

N. Bouatia-Naji et al.

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CELL BIOLOGY

The Serine Protease TMPRSS6 Is Required to Sense Iron Deficiency 1088

X. Du et al.

A cell-surface enzyme that cleaves proteins is unexpectedly necessary for sensing when iron levels are low and thereby triggering compensatory absorption of iron from food.

PSYCHOLOGY

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M. Hsu, C. Anen, S. R. Quartz

A brain region linked to emotion-processing systems is activated as humans weigh fairness to an individual against benefit for a group.



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Genetically modified primates may be better than mice for studying neurological disorders.

Astronomers in a Spin About Mystery Pulsar

One of the universe's most extreme objects just got a bit stranger.

Catching a Climate Offender

New strategy could reduce CO₂ emissions from coal plants.



Telling the story of teamwork.

SCIENCE CAREERS

www.sciencereers.org/career_development

FREE CAREER RESOURCES FOR SCIENTISTS

MiSciNet: Family Trailblazers

S. Gaidos

Fitting in on a college faculty is harder when you are the first in your family to go to college.

Tooling Up: Transitioning to Teamwork

D. Jensen

How do you convince a recruiter that you can play well with others?

Mastering Your Ph.D.: Careers in Management Consulting

B. Noordam and P. Gosling

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From the Archives: How to Get a Job in Academia

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Search committees at different institutions look for different strengths in their faculty applicants.



An unhappy microbe-host interaction.

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Microbial Ecology

SCIENCE SIGNALING

www.sciencesignaling.org

THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

EDITORIAL GUIDE: Focus Issue—A Niche of One's Own

E. M. Adler and J. F. Foley

The nature of microbe-host relationships often depends on signaling pathways in the host.

PERSPECTIVE: Diversification of the Function of Cell-to-Cell Signaling in Regulation of Virulence Within Plant Pathogenic Xanthomonads

M. Dow

Different plant pathogens use similar signaling molecules in distinct ways.

PERSPECTIVE: Bacterial-Modulated Signaling Pathways in Gut Homeostasis

W.-J. Lee

Stimulation of the production of reactive oxygen species in gut epithelial cells by commensal bacteria dampens the host immune response.

PERSPECTIVE: ETosis—A Novel Cell Death Pathway

F. Wartha and B. Henriques-Normark

Pathogenic microbes are trapped and killed by mast cell- and neutrophil-derived extracellular traps.

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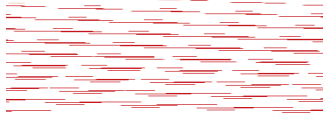
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Editor's Summary

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