Cover

Two direct detections of extrasolar planet candidates. Top: Keck Telescope colored infrared image of star HR 8799, for which the starlight is masked, showing three surrounding planets (red dots). Bottom: Superposed Hubble Space Telescope visible images from 2 years apart, tracing the orbit of a planet surrounding the star Fomalhaut. See pages 1345 and 1348.

Images: Christian Marois/NRC Herzberg Institute of Astrophysics, Canada; Paul Kalas/University of California, Berkeley

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AMPylation of Rho GTPases by Vibrio VopS Disrupts Effector Binding and Downstream Signaling
M. L. Yarbrough, Y. Li, L. N. Kinch, N. V. Grishin, H. L. Ball, K. Orth
A GI-active pathogen destroys intestinal cells, in part by improperly modifying a host signaling protein, causing loss of cell shape and contributing to cell death.
10.1126/science.1166382

PHYSICS
Universal Theory of Nonlinear Luttinger Liquids
A. Imambekov and L. I. Glazman
A theory of one-dimensional quantum liquids is generalized from linear interactions among particles to nonlinear ones, affecting, for example, predicted tunneling dynamics.
10.1126/science.1165403

RESEARCH ARTICLES
ASTRONOMY
Optical Images of an Exosolar Planet 25 Light-Years from Earth
P. Kalas et al.
Images from the Hubble Space Telescope reveal a Jupiter-sized planet, perhaps with a surrounding dust disk, orbiting about 115 astronomical units from a nearby main sequence star.
>> Perspective p. 1335

CELL BIOLOGY
Detection of GTP-Tubulin Conformation in Vivo Reveals a Role for GTP Remnants in Microtubule Rescues
A. Dimitrov et al.
GTP-bound tubulin is found at microtubule ends in living cells and also within microtubules, where it may promote repolymerization and avert microtubule collapse.

REPORTS
PHYSICS
Resolving Vacuum Fluctuations in an Electrical Circuit by Measuring the Lamb Shift
A. Fragner et al.
A solid-state qubit in an electrical circuit connected to a vacuum field shows a shift in its transition energy level, a classic quantum effect typically seen in isolated atoms.
CHEMISTRY
A Cryptand-Encapsulated Germanium(II) Dication
P. A. Rupar, V. N. Staroverov, K. M. Baines
A cage-like molecule typically used to sequester hard metal cations such as Ca\(^{2+}\) in solution proves capable of capturing the softer, elusive free germanium ion Ge\(^{2+}\).  
>> Perspective p. 1333

GEOCHEMISTRY
Carbonatite Melts and Electrical Conductivity in the
Asthensosphere
F. Gaillard et al.
The electrical conductivity of molten carbonates is higher than that of silicate minerals; thus, minor amounts of carbonate melt could explain electrical signals of Earth’s mantle.  
>> Perspective p. 1338

BIOCHEMISTRY
Tight Regulation of Unstructured Proteins: From Transcript Synthesis to Protein Degradation
J. Gsponer et al.
Yeasts proteins with unstructured regions tend to be highly regulated, consistent with the idea that these regions may mediate critical regulatory protein-protein interactions.  
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BIOCHEMISTRY
Structural Evidence for Common Ancestry of the Nuclear Pore Complex and Vesicle Coats
S. G. Brahawn et al.
The protein complex that controls entry and exit from the cell nucleus shares a structural element with vesicle coat proteins, suggesting that it is built around a lattice-like scaffold.

ECOLOGY
The Widespread Threat of Calcium Decline in Fresh Waters
A. Jeziorski et al.
As calcium levels decline in Canadian lakes, populations of a keystone prey crustacean are being depleted, with likely consequences for freshwater food webs.

MEDICINE
Genomic Analysis of the Clonal Origins of Relapsed Acute Lymphoblastic Leukemia
C. G. Mullighan et al.
The cells responsible for relapse of a particular type of leukemia are often not the same cells that gave rise to the original disease.

MOLECULAR BIOLOGY
Chromosome Alignment and Transvection Are Antagonized by Condensin II
T. A. Hartl, H. F. Smith, G. Bosco
A Drosophila protein required for dissolution of homologous chromosome bundles independently prevents long-distance effects of one allele on the transcription of its homolog.

MOLECULAR BIOLOGY
An Epigenetic Role for Maternally Inherited piRNAs in Transposon Silencing
J. Brennecke et al.
In Drosophila, small RNAs derived from transposons are inherited from the mother and directly inhibit activation of these potentially detrimental transposons in offspring.  
>> Science Podcast

MICROBIOLOGY
PA-824 Kills Nonreplicating Mycobacterium tuberculosis by Intracellular NO Release
R. Singh et al.
An unusual drug candidate for resistant tuberculosis generates nitrous acid and thus acts as an intracellular nitric oxide donor, augmenting the innate immune system.

CELL BIOLOGY
Absence of the SRC-2 Coactivator Results in a Glycogenopathy Resembling Von Gierke’s Disease
A. R. Chopra et al.
In mice, a coactivator binds to a nuclear orphan receptor and regulates glucose-6-phosphatase transcription and thus glucose homeostasis.
HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

Did Icebergs Warm the World?
Errant ice might have driven ancient surges of carbon dioxide.

Scientists Untangle Woolly Mammoth Genome
New data give clues to creature’s evolution and hardiness.

When a Flood Beats a Trickle
Old-fashioned irrigation saves water.

PERSPECTIVE: An All-Purpose Tool for Axon Guidance
L. C. Schecterson and M. Bothwell
The p75 neurotrophin receptor functions as a co-receptor in three distinct systems that mediate repellant signals.

PERSPECTIVE: Dynein-Independent Functions of DYNLL1(LC8)—Redox State Sensing and Transcriptional Control
S. M. King
Stimuli that alter the dimerization state of the dynein light chain DYNLL1 influence its regulatory functions.

PODCAST
P. May and A. M. VanHook
Petra May discusses new findings about a role for LRP1 in inhibiting inflammation.

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