COVER
The universe is filled with filamentary structures of dark and visible matter that make up the "cosmic web," as suggested in this artist's rendering of cosmic bubbles and connected clumps. A special section beginning on page 46 considers the latest research into the origins and evolution of the cosmic web.

Image: Shigemi Numazawa/Atlas Photo Bank/Photo Researchers Inc.

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**Three-Dimensional Super-Resolution Imaging by Stochastic Optical Reconstruction Microscopy**  
B. Huang, W. Wang, M. Bates, X. Zhuang  
Three-dimensional fluorescence images of cellular structures in fixed cells are realized at 20- to 30-nm lateral and 50-nm axial resolution, without scanning.  
10.1126/science.1153529

### BIOCHEMISTRY

**Direct Observation of Hierarchical Folding in Single Riboswitch Aptamers**  
W. J. Greenleaf et al.  
Optical trapping reveals that activation by adenine stabilizes the weakest helix in a riboswitch, after which secondary and tertiary structures are formed sequentially.  
10.1126/science.1151298

### GENETICS

**Mutations in the Pericentrin (PCNT) Gene Cause Primordial Dwarfism**  
A. Rauch et al.  
In humans, an inherited condition with small brain size and near-normal intelligence is caused by mutations that disrupt chromosome separation during cell division.  
10.1126/science.1151174

### CLIMATE CHANGE

**The Spatial Pattern and Mechanisms of Heat Content Change in the North Atlantic**  
M. S. Lozier et al.  
Warming and cooling in different parts of the North Atlantic since 1950 reflect variable atmospheric circulation, complicating our understanding of anthropogenic changes.  
10.1126/science.1146436

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Genes used preferentially by female pea aphids are under stronger selection than those used by males, probably because females mainly reproduce asexually.

**EVOLUTION**  
Physiological Sex Predicts Hybrid Sterility  
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An apparent violation of Haldane’s rule (in hybrid organisms the heterogametic sex tends to be sterile) in frogs can be explained by postulating that males have evolved faster.

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Data on deep water formation in the North Atlantic indicate that the sudden draining of a huge glacial lake south of Hudson Bay led to dramatic cooling 8200 years ago.

**GENETICS**  
The *Physcomitrella* Genome Reveals Evolutionary Insights into the Conquest of Land by Plants  
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Comparison of the moss genome sequence with those of other plants reveals hallmarks of colonization of land, including genes to manage terrestrial stresses such as dehydration.
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Neutron diffraction shows how a host-guest crystal can undergo a phase transition that affects only higher-dimensional parameters that relate two simple sublattices. >> Perspective p. 41

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Helium and Neon Abundances and Compositions in Cometary Matter
B. Marty et al.
The amount and isotopic composition of helium and neon in Stardust samples imply that comet Wild 2 acquired these gases in a high-energy environment near the young Sun.

PLANETARY SCIENCE
Temperature and Composition of Saturn’s Polar Hot Spots and Hexagon
L. N. Fletcher et al.
Cassini observations show that Saturn’s atmosphere has stable, unusually hot vortices around both poles, even though its north pole is shrouded in darkness.

PALEONTOLOGY
The Avalon Explosion: Evolution of Ediacara Morphospace
B. Shen, L. Dong, S. Xiao, M. Kowalewski
Earth’s first complex life 575 million years ago rapidly encompassed the full range of ediacara morphologies before declining, a pattern like that in the later Cambrian explosion.

GEOPHYSICS
Intermittent Plate Tectonics?
P. G. Silver and M. D. Behn
Subduction may have stopped at times in Earth’s past as supercontinents formed, thus slowing the planet’s heat loss.

EVOLUTION
Polymorphic Y Chromosomes Harbor Cryptic Variation with Manifold Functional Consequences
B. Lemos, L. O. Araripe, D. L. Hartl
Unexpectedly, the Y chromosome exerts strong regulatory effects on X-linked and autosomal genes in Drosophila. >> Perspective p. 42

MOLECULAR BIOLOGY
Heterochromatin and RNAi Are Required to Establish CENP-A Chromatin at Centromeres
H. D. Folco, A. L. Pidoux, T. Urano, R. C. Allshire
Formation of the centromere, the specialized region by which chromosomes are pulled apart during cell division, requires the presence of RNAi-induced heterochromatin.

CELL BIOLOGY
Assembly Mechanism of the Contractile Ring for Cytokinesis by Fission Yeast
D. Vavylonis et al.
The contractile ring of cell division is powered by myosin motors on the cell equator, which capture and pull actin filaments growing randomly from the equator. >> Perspective p. 39

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Ongoing in Vivo Experience Triggers Synaptic Metaplasticity in the Neocortex
R. L. Clem, T. Celikel, A. L. Barth
During continuous sensory stimulation, NMDA receptors in the mouse cortex switch from enhancing synaptic potentiation to opposing it.

NEUROSCIENCE
Small Circuits for Large Tasks: High-Speed Decision-Making in Archerfish
T. Schlegel and S. Schuster
Archerfish shoot their insect prey with a stream of water and then use sensory information and just a few neurons to calculate how to retrieve their food.
Editor's Summary

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