

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.

DEPARTMENTS

- 10 *Science Online*
- 11 *This Week in Science*
- 13 *Editors’ Choice*
- 14 *Contact Science*
- 15 *Random Samples*
- 17 *NewsMakers*
- 107 *New Products*
- 108 *Science Careers*

EDITORIAL

- 12 *Science and God in the Election*
by *Donald Kennedy*
>> *Special News Focus section p. 22*

SPECIAL SECTION

Cosmic Web

INTRODUCTION

Warp and Woof 46

NEWS

Untangling the Celestial Strings 47

PERSPECTIVES

The Cosmic Web in Our Own Backyard 50
R. A. Ibata and G. F. Lewis

Numerical Simulations Unravel the Cosmic Web 52
C.-A. Faucher-Giguère, A. Lidz, L. Hernquist

Missing Baryons and the Warm-Hot Intergalactic Medium 55
F. Nicastro, S. Mathur, M. Elvis



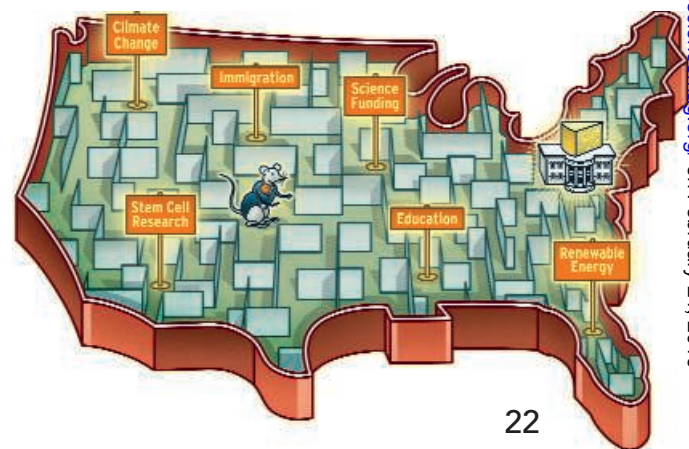
NEWS OF THE WEEK

Promising Year Ends Badly After Fiscal Showdown 18
Squeezes Science

The Elusive ALS Genes 20

Saturn’s Rings Look Ancient Again 21

SCIENCESCOPE 21



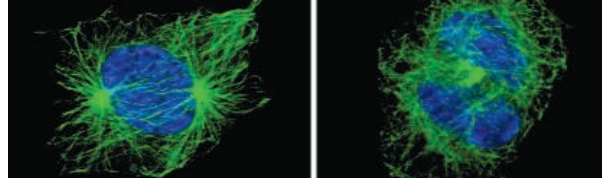
NEWS FOCUS

U.S. Presidential Candidates

Science and the Next U.S. President 22

- Hillary Clinton
- John Edwards
- Rudy Giuliani
- Mike Huckabee
- John McCain
- Barack Obama
- Bill Richardson
- Mitt Romney
- Fred Thompson

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BIOPHYSICS

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

LETTERS

In Search of Peer Reviewers *W. F. Perrin* 32

A Peer Review How-To *R. S. Zucker*

Climate Change Goals: Where to Begin? *B. D. Goldstein*
Response *C. Challen*

Beyond Bad Nets *T. F. McCutchan*

BOOKS ET AL.

The Jewel House Elizabethan London and the Scientific Revolution 34

D. E. Harkness, reviewed by N. S. Popper

Echo Objects The Cognitive Work of Images 35

B. M. Stafford, reviewed by C. A. Jones

POLICY FORUM

Revolutionizing China's Environmental Protection 37

J. Liu and J. Diamond

PERSPECTIVES

Rules of Plasticity 39

M. Brecht and D. Schmitz >> Report p. 101

Beyond Born-Oppenheimer 40

J. M. Bowman >> Report p. 72

A Phase Transition Hidden in Higher Dimensions 41

P. Coppens >> Report p. 69

Functionally Degenerate—Y Not So? 42

W. R. Rice and U. Friberg >> Report p. 91

How Green Are Biofuels? 43

J. P. W. Scharlemann and W. F. Laurance

Retrospective: Seymour Benzer (1921–2007) 45

Y.-N. Jan and L. Jan

TECHNICAL COMMENT ABSTRACTS

PALEONTOLOGY

Comment on "Protein Sequences from Mastodon and *Tyrannosaurus rex* Revealed by Mass Spectrometry" 33

M. Buckley et al.

full text at www.sciencemag.org/cgi/content/full/319/5859/33c

Response to Comment on "Protein Sequences from Mastodon and *Tyrannosaurus rex* Revealed by Mass Spectrometry"

J. M. Asara and M. H. Schweitzer

full text at www.sciencemag.org/cgi/content/full/319/5859/33d

BREVIA

EVOLUTION

Rarity of Males in Pea Aphids Results in Mutational Decay 58

J. A. Brisson and S. V. Nuzhdin

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 59

Regardless of Genotype

J. H. Malone and P. Michalak

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.

RESEARCH ARTICLES

PALEOCLIMATE

Reduced North Atlantic Deep Water Coeval with the 60

Glacial Lake Agassiz Freshwater Outburst

H. F. Kleiven et al.

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.

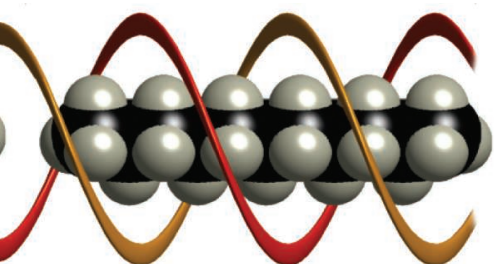
GENETICS

The *Physcomitrella* Genome Reveals Evolutionary 64

Insights into the Conquest of Land by Plants

S. A. Rensing et al.

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.



41 & 69

CONTENTS continued >>

REPORTS

CHEMISTRY

Hidden Degrees of Freedom in Aperiodic Materials 69

B. Toudic et al.

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*

CHEMISTRY

Nonadiabatic Interactions in the Cl + H₂ Reaction 72

E. Garand et al.

Comparison of high-resolution spectra with theoretical simulations reveals that electronically excited ions subtly participate in an elementary reaction. >> *Perspective p. 40*

GEOCHEMISTRY

Helium and Neon Abundances and Compositions in Cometary Matter 75

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 79

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 81

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? 85

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

A Mosaic of Chemical Coevolution in a Large Blue Butterfly 88

D. R. Nash, T. D. Als, R. Maile, G. R. Jones, J. J. Boomsma

Because they are coated with a specific chemical, the larvae of a butterfly are adopted and cared for by an ant species, a relationship that shows signs of ongoing coevolution.

EVOLUTION

Polymorphic Y Chromosomes Harbor Cryptic 91

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 94

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 97

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.

NEUROSCIENCE

Ongoing in Vivo Experience Triggers Synaptic 101

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.

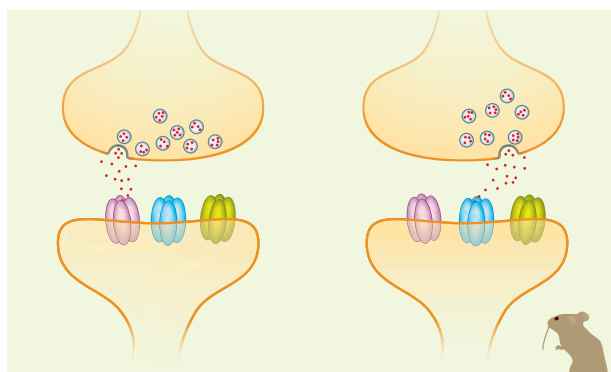
>> *Perspective p. 39*

NEUROSCIENCE 104

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.



39 & 101



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CONTENTS continued >>

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