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Cities

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Editorial
Science for the Globe
by David Baltimore

Cover
The Ginza area of Tokyo in 2006.
By 2030 the number of urban dwellers will have exploded to 4.8 billion people, roughly 60 percent of the projected world population, whereas only 13 percent lived in cities in 1900. The special section beginning on page 739 includes News stories, Reviews, and Perspectives that explore the ramifications of urban transformation.

Photo: Getty Images

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TOPLESS Mediates Auxin-Dependent Transcriptional Repression During Arabidopsis Embryogenesis
H. Szemenyei, M. Hannon, J. A. Long

A transcriptional co-repressor is part of the protein complex that inhibits developmental gene activation in Arabidopsis until the growth hormone auxin triggers its degradation.

10.1126/science.1151461

**NEUROSCIENCE**

Synaptic Protein Degradation Underlies Destabilization of Retrieved Fear Memory
S.-H. Lee et al.

Upon recollection, mouse memories of fearful situations become labile, as postsynaptic proteins are degraded by proteosomes and are then reconsolidated via protein synthesis.

10.1126/science.1150541

**TECHNICAL COMMENT ABSTRACTS**

**MATHEMATICS**

Comment on “Clustering by Passing Messages Between Data Points”
M. J. Brusco and H.-F. Köhn

full text at www.sciencemag.org/cgi/content/full/319/5864/726c

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B. J. Frey and D. Dueck

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**BREVIA**

**PHYSIOLOGY**

Experienced Saxophonists Learn to Tune Their Vocal Tracts
J. M. Chen, J. Smith, J. Wolfe

To play the high range of the saxophone, players learn to tune the second resonance of their vocal tract to the desired note.

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**RESEARCH ARTICLES**

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Innate Immune Homeostasis by the Homeobox Gene Caudal and Commensal-Gut Mutualism in Drosophila
J.-H. Ryu et al.

A Drosophila gene important in development also inhibits the production of harmful antimicrobial peptides that could kill off beneficial gut microbes.

>> Perspective p. 734

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**PHYSICS**

Quantum Phase Extraction in Isospectral Electronic Nanostructures
C. R. Moon et al.

Surface electronic states with different shapes but the same spectrum, like two different drums with the same sound, provide an extra handle for extracting the quantum phase.

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**PHYSICS**

Observation of the Spin Hall Effect of Light via Weak Measurements

*O. Hosten and P. Kwiat*

Displacement of light at an air-glass interface depends on its polarization, showing that photons have a spin Hall effect comparable to that seen for electrons. >> Perspective p. 733

**CHEMISTRY**

Bond-Selective Control of a Heterogeneously Catalyzed Reaction

*D. R. Killelea, V. L. Campbell, N. S. Shuman, A. L. Utz*

Exciting the CH bond in CHD₃ just before it collides with a nickel surface minimizes dissipation of the collision energy throughout the molecule, allowing selective bond scission. >> Perspective p. 736

**MATERIALS SCIENCE**

Colossal Positive and Negative Thermal Expansion in the Framework Material Ag₃[Co(CN)₆]₃

*A. L. Goodwin et al.*

Like a lattice fence, a silver-based framework material expands greatly in one direction upon heating, while contracting even more in the orthogonal direction.

**GEOPHYSICS**

Elastic Anisotropy of Earth’s Inner Core

*A. Belonoshko et al.*

Simulations show that at high pressures sound waves travel through the body-centered cubic structure of iron faster in one direction, explaining seismic data on the inner core.

**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 reflects variable atmospheric circulation, complicating understanding of anthropogenic changes.

**ECOLOGY**

Direct and Indirect Effects of Resource Quality on Food Web Structure

*T. Bukovinszky, F. J. F. van Veen, Y. Jongema, M. Dicke*

Food webs that contain either Brussels sprouts or a wild Brassica relative have surprisingly large differences in structure and complexity, extending to three trophic levels.

**BIOPHYSICS**

Biomechanical Energy Harvesting: Generating Electricity During Walking with Minimal User Effort

*J. M. Donelan et al.*

A knee-mounted device can generate several watts of power at the end of each leg swing in a process similar to regenerative braking in hybrid cars.

**BIOCHEMISTRY**

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-nanometer lateral and 50-nanometer axial resolution, without scanning.

**GENETICS**

An Association Between the Kinship and Fertility of Human Couples

*A. Helgason et al.*

The extensive genealogies of the Icelandic people show that couples who are 3rd or 4th cousins have more children and grandchildren than couples whose relationships are more or less distant.

**GENETICS**

Mutations in the Pericentrin (PCNT) Gene Cause Primordial Dwarfism

*A. Rauch et al.*

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Reciprocal Binding of PARP-1 and Histone H1 at Promoters Specifies Transcriptional Outcomes

*R. Krishnakumar et al.*

At certain genes regulated by the nucleosome-binding protein PARP-1, the presence of a linker histone at the promoter prevents PARP-1 binding, inhibiting gene activation.

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Repression of the Transcription Factor Th-POK by Runx Complexes in Cytotoxic T Cell Development

*R. Setoguchi et al.*

A key cell-fate decision—to become a cytotoxic rather than a helper T cell—is controlled by repression of the helper T cell transcription factor by a second transcription factor.

**MEDICINE**

A Heme Export Protein Is Required for Red Blood Cell Differentiation and Iron Homeostasis

*S. B. Keel et al.*

A mouse cell-surface protein exports excess heme, which is toxic when free in the cytoplasm, ensuring normal red blood cell maturation and systemic iron balance.
SCIENCE NOW

www.sciencenow.org  DAILY NEWS COVERAGE

Team Uncovers New Evidence of Recent Human Evolution
Adaptation to disparate environments resulted in mutations related to obesity and diabetes.

Don’t It Make Your Brown Eyes Blue?
Researchers locate genetic change that leads to baby blues, and it’s not where they expected.

Move Over Beavers, Here Come Salmon
The big fish don’t just swim upstream—they shape the stream.

Exosomes spread inflammatory signals.

SCIENCE SIGNALING

www.stke.org  THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

PERSPECTIVE: Novel Roles for the NF-κB Signaling Pathway in Regulating Neuronal Function
M. C. Boersma and M. K. Meffert
Components of the NF-κB pathway may use multiple mechanisms to influence synaptic plasticity, learning, and memory.

PERSPECTIVE: Exosomes Secreted by Bacterially Infected Macrophages Are Proinflammatory
H. C. O’Neill and B. J. C. Quah
The release of bacterial components in vesicles secreted by infected macrophages helps promote inflammation.

SCIENCE CAREERS

www.sciencecareers.org  CAREER RESOURCES FOR SCIENTISTS

Special Feature: Mentoring
E. Pain
What makes mentoring relationships successful?

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S. Webb
An industry mentor helped physicist Joan Hoffmann navigate graduate school and launch her career.

Mentoring Opposites
C. Wald
A mentor and student turned their differences into strengths as they became scientific collaborators.

From the Archives: The Commandments of Cover Letter Creation
P. Fiske
A good cover letter highlights your qualifications and guides readers through the most important parts of your work history.

SCIENCE PODCAST

Download the 8 February Science Podcast to hear about greenhouse emissions from biofuel-dedicated land, the 2009 U.S. science budget, good mentoring relationships, reproducing in cities, and more.

www.sciencemag.org/about/podcast.dtl

SCIENCE ONLINE FEATURE

VIDEO: Cities
An accompaniment to this week’s special section exploring the benefits and challenges of urbanization.

www.sciencemag.org/cities

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