

## COVER

The surface of the Sun shows rapidly changing patterns due to convection, as well as global oscillations of very low amplitude. The CoRoT (Convection Rotation and Planetary Transits) satellite, launched in December 2006, has now measured both phenomena in other stars. See page 558.

*Image: Thomas Berger; ISP/Royal Swedish Academy of Sciences*

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by Mohamed H. A. Hassan

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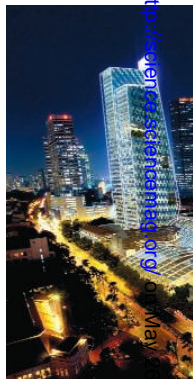
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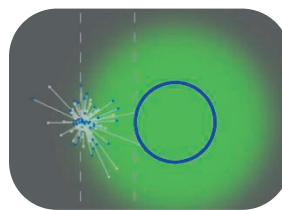
- A Global Perspective on Science and Technology 544
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## SCIENCE EXPRESS

[www.scienceexpress.org](http://www.scienceexpress.org)

### EVOLUTION

Variation in Evolutionary Patterns Across the Geographic Range of a Fossil Bivalve

*M. Grey, J. W. Haggart, P. L. Smith*

Within a fossil bivalve genus, evolution tended to occur as a random walk at the highest latitudes and to be in stasis mode in deep marine environments.

10.1126/science.1162046

### CELL BIOLOGY

De Novo Formation of a Subnuclear Body

*T. E. Kaiser, R. V. Intine, M. Dunder*

The Cajal body, a nuclear structure for small ribonucleoprotein metabolism, can self-assemble from any one of its components immobilized on a substrate.

10.1126/science.1165216

### CELL BIOLOGY

Regulation of Microtubule Dynamics by Reaction Cascades Around Chromosomes

*C. A. Athale, A. Dinarina, M. Mora-Coral, C. Pugieux, F. Nedelec, E. Karsenti*

A reaction-diffusion model involving regulatory molecules and a microtubule-stabilizing phosphoprotein predicts the spatial distribution of microtubules during cell division.

10.1126/science.1161820

### PLANETARY SCIENCE

Lack of Exposed Ice Inside Lunar South Pole Shackleton Crater

*J. Haruyama et al.*

A view into the permanently shaded Shackleton crater from the SELENE (KAGUYA) spacecraft now orbiting the Moon shows that it lacks large visible water-ice deposits.

10.1126/science.1164020

## BREVIA

### EVOLUTION

Genetic Compatibility Affects Queen and Worker Caste Determination 552

*T. Schwander and L. Keller*

Although environmental signals regulate whether female ants become sterile workers or queens, genetic interactions between their parental genomes also influence the phenotype.

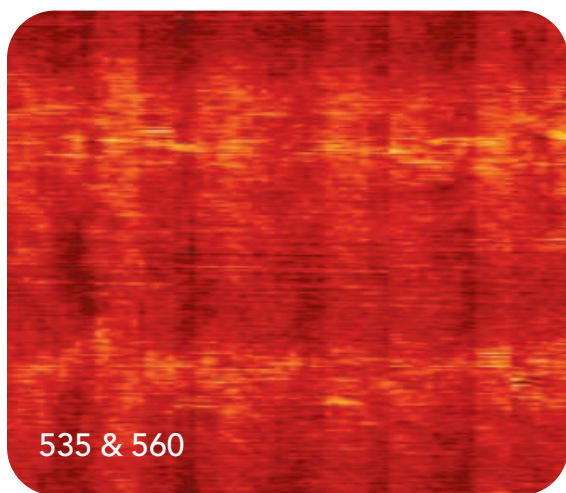
## RESEARCH ARTICLE

### BIOCHEMISTRY

The Structure of a Transcribing T7 RNA Polymerase in Transition from Initiation to Elongation 553

*K. J. Durniak, S. Bailey, T. A. Steitz*

In order to accommodate the elongating RNA transcript, a viral RNA polymerase rotates on its DNA binding promoter to expand the active site.



## REPORTS

### ASTROPHYSICS

CoRoT Measures Solar-Like Oscillations and Granulation in Stars Hotter Than the Sun 558

*E. Michel et al.*

Satellite measurements of pulsations in three stars similar to but hotter than the Sun show that they are oscillating more vigorously and have a finer-scale granulation.

>> *Perspective p. 536; Science Podcast*

### ASTROPHYSICS

A Large Excess in Apparent Solar Oblateness Due to Surface Magnetism 560

*M. D. Fivian, H. S. Hudson, R. P. Lin, H. J. Zahid*

Satellite measurements indicate that the Sun is more oblate than previous measurements suggested, a shape resulting from the combined effects of rotation and magnetism.

>> *Perspective p. 535*

### PHYSICS

Complete Characterization of Quantum-Optical Processes 563

*M. Lobino et al.*

A method requiring only the light from a laser as an input yields a full characterization of quantum optical processes by probing its effect on classical states.

### MATERIALS SCIENCE

Detection of First-Order Liquid/Liquid Phase Transitions in Yttrium Oxide–Aluminum Oxide Melts 566

*G. N. Greaves et al.*

Entropy changes induce a levitated oxide melt to undergo an unusual transition between two disordered liquid states in which atomic rearrangements reflect additional unmixing.

### CHEMISTRY

Direct Imaging of Reconstructed Atoms on TiO<sub>2</sub> (110) Surfaces 570

*N. Shibata et al.*

Profile views of titania, a widely used material, with a transmission electron microscope show that interstitial sites with a lower oxygen stoichiometry produce its reduced surface.

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**The Extent of Non-Born-Oppenheimer Coupling in the Reaction of Cl(<sup>2</sup>P) with *para*-H<sub>2</sub>** 573  
*X. Wang et al.*

The study of controlled collisions between chlorine atoms and molecular hydrogen clarifies that excited electronic states play only a minor role in the formation of hydrochloric acid.

### BIOCHEMISTRY

**Midbody Targeting of the ESCRT Machinery by a Noncanonical Coiled Coil in CEP55** 576  
*H. H. Lee et al.*

As daughter cells separate, final cleavage of the membranes requires a protein with a coiled coil built around an unusual charged core, which recruits other constituents.

### ECOLOGY

**Functional Traits and Niche-Based Tree Community Assembly in an Amazonian Forest** 580  
*N. J. B. Kraft, R. Valencia, D. D. Ackerly*

Even in a diverse Amazonian forest, trees show particular leaf characteristics that indicate that they are subtly specialized for habitat and growth strategy.

### CELL BIOLOGY

**White Fat Progenitor Cells Reside in the Adipose Vasculature** 583  
*W. Tang et al.*

Adipocytes (fat cells) originate from precursor cells that reside within the walls of the blood vessels that feed fat tissue.

>> *Perspective p. 542*

### MEDICINE

**H<sub>2</sub>S as a Physiologic Vasorelaxant: Hypertension in Mice with Deletion of Cystathionine  $\gamma$ -Lyase** 587  
*G. Yang et al.*

Hydrogen sulfide gas regulates blood pressure and blood vessel function in mice.

### CELL BIOLOGY

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A transmembrane protein induced in cytokine-treated bronchial epithelial cells seems to be a long-sought primary carrier of a voltage- and calcium-dependent chloride current.

>> *Perspective p. 534*

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**Receptor-Like Kinase ACR4 Restricts Formative Cell Divisions in the *Arabidopsis* Root** 594  
*I. De Smet et al.*

A membrane kinase regulates the number of stem cells in the main tip of the root, as well as the de novo generation of stem cells in new laterally projecting roots.

### MOLECULAR BIOLOGY

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*S. Nagai et al.*

The damaged regions of DNA are recruited to the periphery of the nucleus by a complex of nuclear-pore and ubiquitin-modifying proteins, where they are repaired.

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### PSYCHOLOGY

**Experiencing Physical Warmth Promotes Interpersonal Warmth** 606  
*L. E. Williams and J. A. Bargh*

When people are given a warm rather than a cold drink, they are more likely to show generous behavior toward others.

>> *Science Podcast*



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## SCIENCE NOW

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HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

### Hallucinogenic Hand-Me-Downs

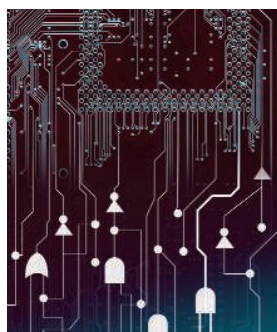
Ancient Caribbean families appeared to share drug paraphernalia across generations.

### Monster Tag Team

Gigantic black holes threw their weight around in the early universe.

### The Grunter Gets the Worm

Scientists think they have figured out why low-pitched sounds drive earthworms above.



Signaling networks as digital circuits.

## SCIENCE SIGNALING

[www.sciencesignaling.org](http://www.sciencesignaling.org)

THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

### EDITORIAL GUIDE: From Input to Output—Are All Paths Equal?

*N. R. Gough*

The consequences of various input signals must first be understood to gain a systems-level explanation of signaling networks.

### PERSPECTIVE: Systems- and Molecular-Level Elucidation of Signaling Processes Through Chemistry

*K. P. Chiang and T. W. Muir*

New techniques take advantage of chemistry to investigate signal transduction mechanisms in the cell.

### PERSPECTIVE: A Scaffold Makes the Switch

*H. G. Dohlman*

The location of a scaffolding protein determines whether activation of MAPK signaling in yeast will produce a graded or binary response.

### PERSPECTIVE: Probing Pathways Periodically

*T. C. Elston*

Monitoring the response to periodic input signals reveals dynamic properties of a MAPK pathway.

### RESEARCH ARTICLE: Fault Diagnosis Engineering of Digital Circuits Can Identify Vulnerable Molecules in Complex Cellular Pathways

*A. Abdi, M. B. Tahoori, E. S. Emamian*

An engineering approach reveals the weakest links in cellular signaling networks.



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## SCIENCE CAREERS

[www.sciencereers.org/career\\_development](http://www.sciencereers.org/career_development)

FREE CAREER RESOURCES FOR SCIENTISTS

### Tooling Up: Enhance Your Job Search Online

*D. Jensen*

Online professional networking Web sites can advance your job search.

### Social Networking Grows Up

*L. Laursen*

New resources lend a social dimension to online research and publishing tools.

### The Toilet Technologist

*A. Levine*

A Ph.D. chemist found a rewarding career designing toilets.

### From the Archives: Of Noble Descent

*D. van Vlooten*

There are ways of getting elite positions without being nobility or going to the "right" university.

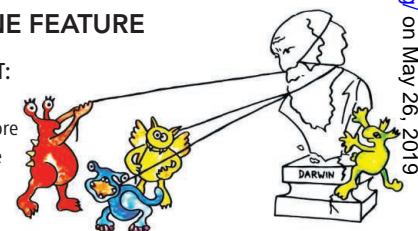
## SCIENCE ONLINE FEATURE

### THE GONZO SCIENTIST: Flunking Spore

An article and video explore the computer game Spore and how it scores on its scientific themes.

>> [News story p. 517](#)

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