Finite element method simulation of an Arabidopsis shoot apical meristem where two cells have been laser-ablated. The color map indicates the von Mises stress (a measure of distortional stress); the white lines mark the directions of maximal principal stress, which are circumferential around the ablated cells, in agreement with experimentally determined microtubule orientations. See page 1650.

Image: Pawel Krupinski/Lund University

**LETTERS**

Testing the Limits of “Concrete” and “Generic” 1632

J.-C. Mourat

“Concrete” Examples a Fraction Too Abstract

L. J. Cutrona Jr.

Concrete Examples Must Jibe with Experience S. K. Reed

Response J. A. Kaminski et al.

Gene Regulation in Evolution: A History J. W. Grula

**BOOKS ET AL.**

Autism’s False Prophets Bad Science, Risky Medicine, and the Search for a Cure P. A. Offit, reviewed by C. Lord 1635

The Fundamentals of Brain Development Integrating Nature and Nurture J. Stiles, reviewed by M. Sur 1636

**POLICY FORUM**

Bracing for Islamic Creationism S. Hameed 1637

**PERSPECTIVES**

Stringing Together a Solid State S. Hartnoll 1639

Chaperone Puts the Brakes On

V. Lukacs-Kornek and S. J. Turley 1640

>> Report p. 1705

Why Can’t We Test Our Way to Absolute Food Safety? S. Kennedy 1641

On Growth and Force

B. Mulder 1643

>> Research Article p. 1650

An Almost-Complete Movie G. Diallinas 1644

>> Research Article p. 1655

Clutch Dynamics

Y. Aratyn-Schaus and M. L. Gardel 1646

>> Report p. 1687

Pressing Levers or Pulling Strings? L. A. Amos 1647

>> Report p. 1691
PHYSICS
Quantum Criticality in the Electrical Resistivity of La$_{2-x}$Sr$_x$CuO$_4$
R. A. Cooper et al.
High magnetic fields can strip away the superconducting regime of a cuprate superconductor, revealing the presence of an enigmatic quantum critical point.

10.1126/science.1165015

CHEMISTRY
Femtosecond XANES Study of the Light-Induced Spin Crossover Dynamics in an Iron(II) Complex
Ch. Bressler et al.
X-ray absorption spectroscopy resolves the dynamics of spin-state interconversions, which take place in less than a picosecond, in a well-studied class of iron compounds.

10.1126/science.1165733

MOLECULAR BIOLOGY
Chromatin-Associated Periodicity in Genetic Variation Downstream of Transcriptional Start Sites
S. Sasaki et al.
The periodic wrapping of DNA around nucleosomes in chromatin determines a periodic variation in mutation type and frequency around transcription start sites in a fish.

10.1126/science.1163183

TECHNICAL COMMENT ABSTRACTS
GENETICS
Comment on “An Association Between the Kinship and Fertility of Human Couples”
R. Labouriau and A. Amorim
full text at www.sciencemag.org/cgi/content/full/322/5908/1634b
Response to Comment on “An Association Between the Kinship and Fertility of Human Couples”
A. Helgason et al.
full text at www.sciencemag.org/cgi/content/full/322/5908/1634c

BREVIA
ECOLOGY
Compromised Survivorship in Zoo Elephants
R. Clubb, M. Rowcliffe, P. Lee, K. U. Mar, C. Moss, G. J. Mason
Data from over 4500 elephants show that wild elephants live for approximately twice as long as those kept in European zoos.

>> Science Podcast

RESEARCH ARTICLES
PLANT SCIENCE
Developing Patterning by Mechanical Signals in Arabidopsis
O. Hamant et al.
The growth pattern of plant meristem, the group of stem cells at the tip of a growing shoot, is controlled by a microtubule-based mechanical feedback loop.

>> Perspective p. 1643

DEVELOPMENTAL BIOLOGY
The Sphingolipid Transporter Spns2 Functions in Migration of Zebrafish Myocardial Precursors
A. Kawahara et al.
Normal heart development in zebrafish requires the function of a lipid transporter in a membrane surrounding the yolk, a tissue outside of the embryo proper.

10.1126/science.1167449

GENETICS
A Single Gene Causes Both Male Sterility and Segregation Distortion in Drosophila Hybrids
N. Phadnis and H. A. Orr
A Drosophila gene that causes sterility in the offspring of two species and may be important for speciation causes increased transmission of itself to progeny.

10.1126/science.1163934

GENETICS
A Mouse Speciation Gene Encodes a Meiotic Histone H3 Methyltransferase
O. Mihola et al.
A gene responsible for sterility in the offspring of two mouse species, and therefore important in speciation, regulates gene expression via methylation in chromatin.

10.1126/science.1163601

BIOCHEMISTRY
A Competitive Inhibitor Traps LeuT in an Open-to-Out Conformation
S. K. Singh, C. L. Piscitelli, A. Yamashita, E. Gouaux
A bacterial protein similar to mammalian neurotransmitter transporters is blocked when a competitive inhibitor prevents the formation of the normal intermediate state.

>> Perspective p. 1644

CHEMISTRY
Collective Reactivity of Molecular Chains Self-Assembled on a Surface
The paired sulfur bonds in dimethylsulfide molecules, which assemble in long chains on gold surfaces, can be rearranged by injecting an electron into the end of the chain.

CHEMISTRY
Mechanism of Threading a Polymer Through a Macrocyclic Ring
A. B. C. Deutman et al.
A polymer threads through a large ring-shaped molecule faster when it is long enough to bind to the outside of the ring first, but not too long that it cannot easily loop into the hole.

CLIMATE CHANGE
A Dynamic Marine Calcium Cycle During the Past 28 Million Years
The isotopic composition of calcium in marine carbonates indicates that the calcium cycle has been dynamic over the past 28 million years and closely linked to climate.

10.1126/science.1163601
REPORTS CONTINUED...

GEOLGY
Earthquake Supercycles Inferred from Sea-Level Changes Recorded in the Corals of West Sumatra
K. Sieh et al.
Uplift records from corals imply that the Sumatra plate boundary ruptured in the 1300s, 1500s, and in 1797 and 1833; a 2007 temblor may mark the initiation of a next series of quakes.

GEOCHEMISTRY
Shock Metamorphism of Bosumtwi Impact Crater Rocks, Shock Attenuation, and Uplift Formation
L. Ferrière, C. Koebel, B. A. Ivanov, W. U. Reimold
Microscale deformation features in a drill core through an impact crater and a model of the impact history show that the central uplift in the crater was produced by brittle faults.

SOCIOLGY
The Spreading of Disorder
K. Keizer, S. Lindenberg, L. Steg
Upon observing signs of social disorder (such as littering or graffiti), individuals are more likely to disobey a variety of social rules, including prohibitions against theft.

DEVELOPMENTAL BIOLOGY
Germ Cell—Intrinsic and—Extrinsic Factors Govern Meiotic Initiation in Mouse Embryos
Y. Lin, M. E. Gill, J. Koubova, D. C. Page
Mouse germ cells begin meiosis for sperm or egg production only when they both are stimulated by the hormone retinoic acid and express a particular RNA-binding protein.

BIOPHYSICS
Traction Dynamics of Filopodia on Compliant Substrates
C. E. Chan and D. J. Odde
A model that predicts that substrate/surface stiffness acts through a cellular motor-clutch mechanism to alter retrograde flow rates and traction is confirmed in chick neurons. >> Perspective p. 1646

BIOCHEMISTRY
Structure and Functional Role of Dynein’s Microtubule-Binding Domain
A. P. Carter et al.
ATP hydrolysis by the molecular motor dynein transmits a structural change to its microtubule-binding domain, determining movement direction along the microtubule. >> Perspective p. 1647

MEDICINE
Genomic Loss of microRNA-101 Leads to Overexpression of Histone Methyltransferase EZH2 in Cancer
S. Varambally et al.
In some human prostate cancers, a genomic deletion eliminates a key regulatory microRNA, which results in disruption of gene-silencing mechanisms.

NEUROSCIENCE
Modafinil Shifts Human Locus Coeruleus to Low-Tonic, High-Phasic Activity During Functional MRI
M. J. Minzenberg et al.
Brain images of humans treated with a cognitive enhancing drug show increased task-oriented activity in a brainstem nucleus and confirm that this region controls cognition.

IMMUNOLOGY
Regulation of Dendritic Cell Migration by CD74, the MHC Class II–Associated Invariant Chain
G. Faure-André et al.
By binding to a myosin, an immune-specific protein known to control antigen processing also regulates the migration of dendritic cells, possibly coordinating the two functions. >> Perspective p. 1640

CELL BIOLOGY
A Role for the ESCRT System in Cell Division in Archaea
R. Y. Samson, T. Obita, S. M. Freund, R. L. Williams, S. D. Bell
A class of proteins required for membrane trafficking and cytokinesis in eukaryotes is also unexpectedly required in some Archaea for cell division.

CELL BIOLOGY
De Novo Formation of a Subnuclear Body
T. E. Kaiser, R. V. Intine, M. Dundr
The Cajal body, a nuclear structure for small ribonucleoprotein metabolism, can self-assemble from any one of its components immobilized on a substrate.

MOLECULAR BIOLOGY
The Air Noncoding RNA Epigenetically Silences Transcription by Targeting G9a to Chromatin
N. Nagano et al.
Air, a large noncoding RNA, interacts with chromatin at a particular promoter, recruiting a histone methyltransferase to silence gene expression in an allele-specific manner.
Re: Grouping microarray expression data into metagenes, followed by organization of these gene clusters into self-organizing maps, reveals distinct stages of kidney organogenesis.

**Perspective: Intercellular Peptide Signals Regulate Plant Meristematic Cell Fate Decisions**

J. E. Gray, S. Casson, L. Hunt

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