

SPECIAL SECTION

## Stem Cells

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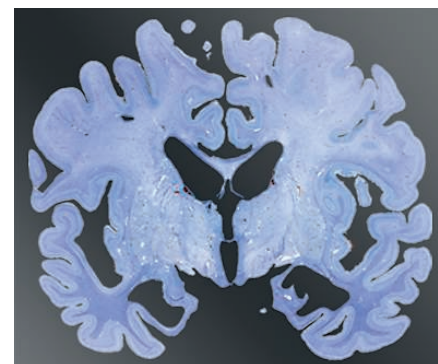
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1655 Rate Control and Reaction Engineering

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### COVER

Colonies of human embryonic stem cells with differentiating cells at their edges, growing on mouse feeder cells. Cell nuclei are stained in blue, nuclear lamina in red, and cytoplasm in green (overlapping blue and red areas appear purple). The self-renewal capacity and pluripotency of human stem cells make them valuable for modeling human disease. These cells also display potential for transplantation medicine. See the special section beginning on page 1661.

Image: Oded Kopper and Nissim Benvenisty, The Hebrew University of Jerusalem

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## REVIEW

- 1679 **Competitive Interactions Between Cells: Death, Growth, and Geography**  
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## BREVIA

- 1683 **Elevated CO<sub>2</sub> Enhances Otolith Growth in Young Fish**  
D. M. Checkley Jr. et al.  
Acidification of the oceans may have unexpected effects on the development of bony structures in fish larvae.

## RESEARCH ARTICLE

- 1684 **Auxin-Dependent Patterning and Gamete Specification in the *Arabidopsis* Female Gametophyte**  
G. C. Pagnussat et al.  
An auxin gradient is involved in cell fate specification of the female sex cells in flowering plants.  
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## REPORTS

- 1689 **Extending Universal Nodal Excitations Optimizes Superconductivity in Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>8+δ</sub>**  
A. Pushp et al.  
Scanning tunneling spectroscopy reveals strong electronic correlations in the insulating state of a cuprate superconductor.
- 1693 **High-Resolution NMR in Magnetic Fields with Unknown Spatiotemporal Variations**  
P. Pelupessy et al.  
A coherence transfer method overcomes disruptions to nuclear magnetic resonance spectra by magnetic field fluctuations.
- 1697 **White Phosphorus Is Air-Stable Within a Self-Assembled Tetrahedral Capsule**  
P. Mal et al.  
A molecular cage keeps phosphorus from igniting in air, yet releases it easily for reactions when benzene is added.
- 1699 **Trapping Molecules on a Chip**  
S. A. Meek et al.  
Trapping a beam of carbon monoxide molecules onto a chip should enable fundamental studies of chemical dynamics.
- 1702 **Amplified Trace Gas Removal in the Troposphere**  
A. Hofzumahaus et al.  
A yet undescribed pathway for hydroxyl radical production is needed to account for reaction rates of highly polluted air.

- 1705 **Postmating Sexual Selection Favors Males That Sire Offspring with Low Fitness**  
T. Bilde et al.

Multiple mating in beetles may not benefit females, as sexually antagonistic evolution may be at work.

- 1707 **Dynamic Signaling Network for the Specification of Embryonic Pancreas and Liver Progenitors**  
E. Wandzioch and K. S. Zaret  
During mammalian development, networks of signals coordinate cell-type programming into specific organs.  
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- 1710 **MicroRNA-92a Controls Angiogenesis and Functional Recovery of Ischemic Tissues in Mice**  
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Inhibition of a microRNA that represses blood vessel growth enhances the recovery of tissue damaged by an inadequate blood supply.

- 1713 **Mitochondrial STAT3 Supports Ras-Dependent Oncogenic Transformation**  
D. J. Gough et al.

A transcription factor promotes the transformation of cells by the Ras oncogene only when present in the mitochondrion.

- 1716 **Synthetic Heterochromatin Bypasses RNAi and Centromeric Repeats to Establish Functional Centromeres**  
A. Kagansky et al.

A tethered methyltransferase induces the tight-packing of DNA, the formation of a kinetochore, and chromosome segregation.

- 1720 **Diversity and Complexity in DNA Recognition by Transcription Factors**  
G. Badis et al.

A broad survey of transcription factors reveals that related proteins can have multiple and differing DNA binding specificities.

- 1724 **Genomic Footprints of a Cryptic Plastid Endosymbiosis in Diatoms**  
A. Moustafa et al.

The genomes of early plant representatives are composites, with a substantial number of foreign genes from red and green algae.  
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- 1726 **Solution Nuclear Magnetic Resonance Structure of Membrane-Integral Diacylglycerol Kinase**  
W. D. Van Horn et al.

Mutations reveal the distribution of sequence changes that alter folding and affect function in a membrane-bound enzyme.

- 1729 **Germline P Granules Are Liquid Droplets That Localize by Controlled Dissolution/Condensation**  
C. P. Brangwynne et al.

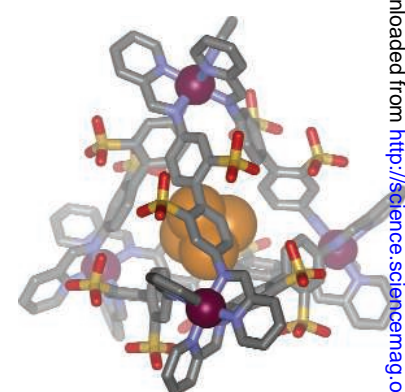
Localization of RNA and protein-rich germ-cell granules occurs by controlled dissolution and condensation.  
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- 1732 **Ventral Tegmental Area BDNF Induces an Opiate-Dependent-Like Reward State in Naïve Rats**  
H. Vargas-Perez et al.

A growth factor involved in neuronal plasticity alters neurons in a specific area of the brain after chronic exposure to opioid drugs.



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## SCIENCEONLINE

## SCIENCEEXPRESS

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

**String Theory, Quantum Phase Transitions, and the Emergent Fermi Liquid**

*M. Čubrović et al.*

Mathematical methods developed in string theory to describe gravity are applied to complex condensed matter systems.

10.1126/science.1174962

**Measuring the Cosmic Ray Acceleration Efficiency of a Supernova Remnant**

*E. A. Helder et al.*

The pressure induced by cosmic rays produced by the explosion of a star exceeds the thermal pressure behind the shock wave.

10.1126/science.1173383

**A Gene Network Regulating Lysosomal Biogenesis and Function**

*M. Sardiello et al.*

Coordination of the genes that regulate lysosomal biogenesis occurs via a shared sequence motif and one transcription factor.

10.1126/science.1174447

**An ER-Mitochondria Tethering Complex Revealed by a Synthetic Biology Screen**

*B. Kornmann et al.*

A protein complex zippers mitochondria to endoplasmic reticulum for phospholipid transfer.

10.1126/science.1175088

**DICER1 Mutations in Familial Pleuropulmonary Blastoma**

*D. A. Hill et al.*

A rare form of lung cancer in children is associated with mutational disruption of an enzyme that generates small noncoding RNAs.

10.1126/science.1174334

## SCIENCENOW

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

Highlights From Our Daily News Coverage

**Atoms Speeding From the Moon**

Scientists probing the outer reaches of our solar system have hit upon an unusual phenomenon much closer to home.

**Tracking Killers of the Sea**

Researchers borrow forensic geographic profiling methods to study how sharks hunt.

**Fish Throws Away Its Genes as It Grows**

Lamprey sheds one-fifth of its genome, but no one's sure why.

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**RESEARCH ARTICLE: The Kinesin Protein Kif7 Is a Critical Regulator of Gli Transcription Factors in Mammalian Hedgehog Signaling**

*H. O.-L. Cheung et al.*

Kif7 may be the functional equivalent of the *Drosophila* kinesin-like protein Costal2.

**RESEARCH ARTICLE: PKC- $\theta$  Modulates the Strength of T Cell Responses by Targeting Cbl-b for Ubiquitination and Degradation**

*T. Gruber et al.*

**PERSPECTIVE: Activation of T Cells: Releasing the Brakes by Proteolytic Elimination of Cbl-b**

*M. L. Schmitz*

Degradation of the ubiquitin E3 ligase Cbl-b in response to T cell costimulation depends on PKC- $\theta$ .

## PODCAST

*A. Levchenko and A. M. VanHook*

A microfluidic device enables high-throughput analysis of signaling in individual cells.

## SCIENCE CAREERS

[www.sciencereaders.org/career\\_magazine](http://www.sciencereaders.org/career_magazine)

Free Career Resources for Scientists

**Career Renewal for Established Scientists**

*E. Pain*

Staying engaged, motivated, and productive after tenure can be challenging.

**Rejuvenation Tips for Tenured Faculty**

*E. Pain*

Here are ways to rekindle a passion for science and inject new life into your research.

**Revising Best-Laid Plans**

*S. Carpenter*

Tenured scientists tell stories about how they managed to restart their research careers.

## SCIENCEPODCAST

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