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## COVER

False-colored electron micrograph of the rough endoplasmic reticulum (ER, light green), which consists of elongated membrane structures studded with ribosomes (dark green dots) and is adjacent to the nuclear envelope (dark green, right). The ER is the entry portal for newly synthesized membrane and secretory proteins (circular mitochondrion: ~0.49 micrometers wide). Two Reviews (pages 1081 and 1086) describe the ER's role in protein quality control. A News package (beginning on page 1046) discusses a number of fundamental mysteries in cell biology.

Image: MedImage/Photo Researchers, Inc.

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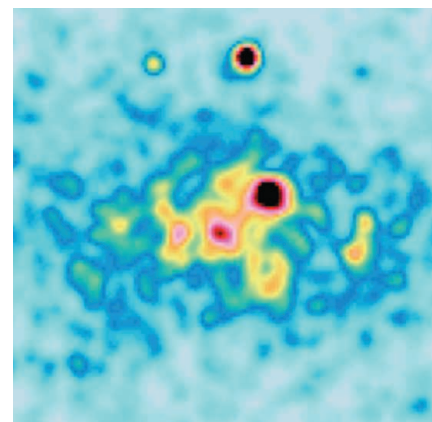
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*D. H. Erwin et al.*  
Major animal clades evolved tens of millions of years before the widespread appearance of animal fossils.
- 1097 **A Potent and Broad Neutralizing Antibody Recognizes and Penetrates the HIV Glycan Shield**  
*R. Pejchal et al.*  
An HIV antibody achieves potency and breadth by binding simultaneously to two conserved glycans on the viral envelope protein.

## REPORTS

- 1103 **A Cocoon of Freshly Accelerated Cosmic Rays Detected by Fermi in the Cygnus Superbubble**  
*M. Ackermann et al.*  
Cosmic rays can be accelerated in the cavities carved by the stellar winds created by clusters of massive stars.  
>> *Perspective p. 1071*
- 1107 **Fermi Detection of a Luminous  $\gamma$ -Ray Pulsar in a Globular Cluster**  
*The Fermi LAT Collaboration*  
Contrary to expectations, the  $\gamma$ -rays from a distant cluster of stars are dominated by emission from a single neutron star.
- 1110 **A Homonuclear Molecule with a Permanent Electric Dipole Moment**  
*W. Li et al.*  
Two rubidium atoms, one in its ground state and the other with a highly excited electron, form a metastable polar molecule.
- 1114 **Discovery of an  $\alpha$ -Amino C–H Arylation Reaction Using the Strategy of Accelerated Serendipity**  
*A. McNally et al.*  
An unanticipated photocatalytic carbon-carbon bond-forming reaction emerged from screening many unusual reagent combinations.
- 1117 **Pelagic Fishing at 42,000 Years Before the Present and the Maritime Skills of Modern Humans**  
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- 1121 **Phanerozoic Earth System Evolution and Marine Biodiversity**  
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*E. Macke et al.*  
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- 1144 **Postfertilization Autophagy of Sperm Organelles Prevents Paternal Mitochondrial DNA Transmission**  
*S. Al Rawi et al.*  
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>> *Perspective p. 1069*
- 1148 **Deep Human Genealogies Reveal a Selective Advantage to Be on an Expanding Wave Front**  
*C. Moreau et al.*  
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J. H. Williams et al.

Reducing greenhouse gas emissions to 80% below 1990 levels by 2050 requires widespread electrification of transportation and other sectors.

10.1126/science.1208365

>> [Science Podcast](#)

### Climate Sensitivity Estimated from Temperature Reconstructions of the Last Glacial Maximum

A. Schmittner et al.

Last Glacial Maximum temperature reconstructions and model simulations can constrain the equilibrium climate sensitivity.

10.1126/science.1203513

### Using the Past to Predict the Future?

G. C. Hegerl and T. Russon

10.1126/science.1214828

### Molecular Mimicry Regulates ABA Signaling by SnRK2 Kinases and PP2C Phosphatases

F.-F. Soon et al.

Two players and one chair regulate this plant hormone signaling cascade.

10.1126/science.1215106

### Direct Redox Regulation of F-Actin Assembly and Disassembly by Mical

R.-J. Hung et al.

A protein involved in redox signaling disassembles actin filaments and alters their reassembly.

10.1126/science.1211956

### Mouse B-Type Lamins Are Required for Proper Organogenesis But Not by Embryonic Stem Cells

Y. Kim et al.

Mice lacking critical structural components of the nucleus, lamin-B intermediate filament proteins, remain viable until birth.

10.1126/science.1211222

## TECHNICALCOMMENTS

### Comment on "Hydrogen Mapping of the Lunar South Pole Using the LRO Neutron Detector Experiment LEND"

D. J. Lawrence et al.

Full text at [www.sciencemag.org/cgi/content/full/334/6059/1058-c](http://www.sciencemag.org/cgi/content/full/334/6059/1058-c)

### Response to Comment on "Hydrogen Mapping of the Lunar South Pole Using the LRO Neutron Detector Experiment LEND"

I. G. Mitrofanov et al.

Full text at [www.sciencemag.org/cgi/content/full/334/6059/1058-d](http://www.sciencemag.org/cgi/content/full/334/6059/1058-d)

## SCIENCENOW

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

Highlights From Our Daily News Coverage

### Eruptions Swept Life From Land and Sea Volcanic activity at the end of the Permian period struck a devastating blow to life.

<http://scim.ag/VolcanicEruptions>

### Earth's 'Time Capsules' May Be Flawed Minerals found within ancient crystals may have been chemically altered.

<http://scim.ag/zircon>

### Particle Smasher Hints at Physics Breakthrough

This result might help explain why the universe is full of matter, not antimatter.

<http://scim.ag/PhysicsBreakthrough>

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

22 November issue: <http://scim.ag/ss112211>

### EDITORIAL GUIDE: Focus Issue—Fine Tuning Hedgehog Signaling in Development and Disease

A. M. VanHook

The Hedgehog signaling cascade is regulated by a complex and diverse set of mechanisms.

### PERSPECTIVE: Barcoding Hedgehog for Intracellular Transport

T. B. Kornberg

Cholesterol modification may influence where Hedgehog is released.

### PRESENTATION: Sonic Hedgehog Activates the GTPases Rac1 and RhoA in a Gli-Independent Manner Through Coupling of Smoothed to G<sub>i</sub> Proteins

A. H. Polizio et al.

Smoothed signals through small G proteins in one type of noncanonical Hedgehog signaling.

### PRESENTATION: Direct Delivery Mechanisms of Morphogen Dispersion

S. Roy and T. B. Kornberg

Cytosomes transfer signaling proteins from producing to receiving cells.

### PRESENTATION: Hedgehog Signaling and the Gli Code in Stem Cells, Cancer, and Metastases

A. Ruiz i Altaba

The balance between activator and repressor functions of Gli transcription factors influences stem cell-like behavior and metastasis.

### RESEARCH ARTICLE: Agonist-Driven Maturation and Plasma Membrane Insertion of Calcium-Sensing Receptors Dynamically Control Signal Amplitude

M. P. Grant et al.

Activation of a G protein-coupled receptor increases its own surface abundance to enhance its signaling.

### RESEARCH ARTICLE: Ric-8 Proteins Are Molecular Chaperones That Direct Nascent G Protein $\alpha$ Subunit Membrane Association

M. Gabay et al.

Control of the insertion of G protein  $\alpha$  subunits into endomembranes by Ric-8 proteins regulates the abundance and function of heterotrimeric G proteins.

### RESEARCH ARTICLE: Ric-8 Proteins Are Molecular Chaperones That Direct Nascent G Protein $\alpha$ Subunit Membrane Association

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M. Gabay et al.

### FOCUS: Glowing Tumors Make for Better Detection and Resection

M. Bouvet and R. M. Hoffman

Topical fluorescent probes make tumors selectively fluorescent and may improve cancer detection and removal.

### RESEARCH ARTICLE: Rapid Cancer Detection by Topically Spraying a $\gamma$ -Glutamyltranspeptidase-Activated Fluorescent Probe

Y. Urano et al.

A small-molecule imaging probe that fluoresces upon cleavage by a cancer-specific enzyme may improve surgical removal procedures of tumors.

### RESEARCH ARTICLE: Bactericidal/Permeability-Increasing Protein (rBPI21) and Fluoroquinolone Mitigate Radiation-Induced Bone Marrow Aplasia and Death

E. C. Guinan et al.

An endotoxin-neutralizing protein fragment plus a fluoroquinolone antibiotic improve survival and hematopoietic recovery in mice after lethal radiation.

## SCIENCE CAREERS

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

Free Career Resources for Scientists

### Perspective: The STEM Job Market

J. Austin

Recent reports on the scientific and technical workforce draw widely divergent conclusions.

<http://scim.ag/STEMJobsPerspective>

### Experimental Error: Thanks 10<sup>6</sup>

A. Ruben

When you carve the turkey, don't forget to thank science.

[http://scim.ag/EE\\_GivingThanks](http://scim.ag/EE_GivingThanks)

### Networking Your Way to a Job

E. Pain

Biologist Mary-Rose Hoja has forged a career in strategic networking, social media, and mingling.

[http://scim.ag/Hoja\\_Profile](http://scim.ag/Hoja_Profile)

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