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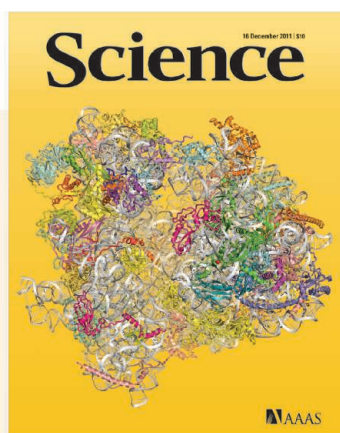
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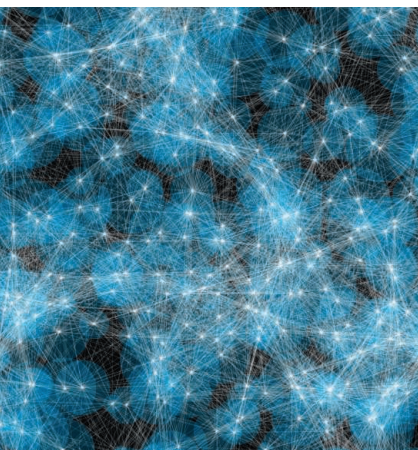
## COVER

Crystal structure of the 80S ribosome from the yeast *Saccharomyces cerevisiae*. Ribosomes are responsible for protein synthesis in all cells. The eukaryotic ribosome, which consists of four RNA chains (gray) and 79 different proteins (colored ribbons), is more intricate and 40% larger than its bacterial counterpart. With an atomic mass of 3.3 megadaltons, this is the largest asymmetrical structure resolved by x-ray crystallography to date. See page 1524.

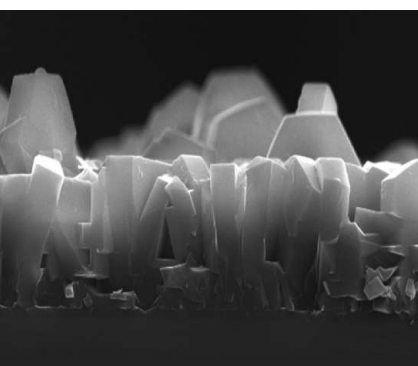
*Image: Sergey Melnikov, Nicolas Garreau de Loubresse, Adam Ben-Shem, Lasse Jenner, Gulnara Yusupova, Marat Yusupov/Institut de Génétique et de Biologie Moléculaire et Cellulaire, Université de Strasbourg*

## DEPARTMENTS

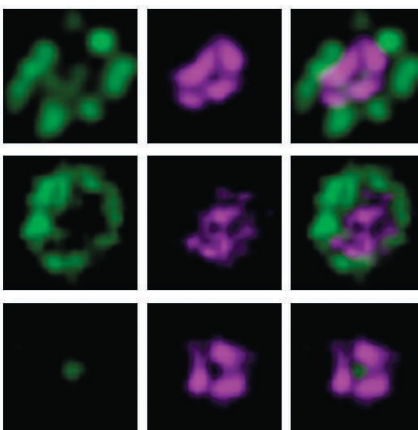
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## REVIEW

- 1512 Cause and Effect in Biology Revisited: Is Mayr's Proximate-Ultimate Dichotomy Still Useful?  
K. N. Laland et al.

## BREVIA

- 1517 A Natural Deletion of the *HoxC* Cluster in Elasmobranch Fishes  
B. L. King et al.  
Sequence analysis shows that sharks and batoids lack one of four *Hox* gene clusters once thought necessary for development.

## RESEARCH ARTICLES

- 1518 Detecting Novel Associations in Large Data Sets  
D. N. Reshef et al.  
A statistical method reveals relationships among variables in complex data sets.  
>> *Perspective p. 1502; Science Podcast*
- 1524 The Structure of the Eukaryotic Ribosome at 3.0 Å Resolution  
A. Ben-Shem et al.  
A close-up view of the ribosome's 79 proteins and 5500 RNA nucleotides.

## REPORTS

- 1530 Peak External Photocurrent Quantum Efficiency Exceeding 100% via MEG in a Quantum Dot Solar Cell  
O. E. Semonin et al.  
An experimental solar cell productively uses an extra fraction of high-energy light typically lost as heat.  
>> *Report p. 1541*
- 1533 Growth of Uniformly Oriented Silica MFI and BEA Zeolite Films on Substrates  
T. C. T. Pham et al.  
Precise control over synthetic conditions eliminates misalignment of pore channels during the growth of zeolite films.
- 1538 Revealing Atom-Radical Reactivity at Low Temperature Through the N + OH Reaction  
J. Daranlot et al.  
Rates have been measured for a chemical transformation of interstellar interest in which both reagents are unstable.  
>> *Perspective p. 1506*
- 1541 Observing the Multiexciton State in Singlet Fission and Ensuing Ultrafast Multielectron Transfer  
W.-L. Chan et al.  
Photoelectron detection reveals a previously elusive, short-lived paired carrier state of interest in solar light harvesting.  
>> *Report p. 1530*
- 1545 A Coherent Signature of Anthropogenic Nitrogen Deposition to Remote Watersheds of the Northern Hemisphere  
G. W. Holtgrieve et al.  
Deposition of reactive nitrogen from human activities occurred in the preindustrial era.  
>> *Perspective p. 1504*

- 1548 High Relatedness Is Necessary and Sufficient to Maintain Multicellularity in *Dictyostelium*  
J. J. Kuzdzal-Fick et al.  
Experimental evolution shows that the cooperation of cells in multicellular organisms degrades under low relatedness.
- 1551 The Tricarboxylic Acid Cycle in Cyanobacteria  
S. Zhang and D. A. Bryant  
Contrary to expectations, many photosynthetic cyanobacteria maintain a metabolic flexibility that works in the dark.  
>> *Perspective p. 1508*
- 1553 Host Proteasomal Degradation Generates Amino Acids Essential for Intracellular Bacterial Growth  
C. T. D. Price et al.  
The bacterial pathogen *Legionella pneumophila* ensures amino acid supplies by promoting degradation of target host proteins.
- 1557 The Molecular Basis of Acid Insensitivity in the African Naked Mole-Rat  
E. St. John Smith et al.  
Life in a high-carbon dioxide environment has eliminated acid-evoked pain in the naked mole-rat.  
>> *Science Podcast*
- 1561 Natural Aryl Hydrocarbon Receptor Ligands Control Organogenesis of Intestinal Lymphoid Follicles  
E. A. Kiss et al.  
Nutrients can shape immune system development function through aryl hydrocarbon receptor signaling.
- 1565 RIM-Binding Protein, a Central Part of the Active Zone, Is Essential for Neurotransmitter Release  
K. S. Y. Liu et al.  
Transmitter release at the fly neuromuscular junction is abolished in the absence of a scaffold protein.
- 1569 Inhibitory Plasticity Balances Excitation and Inhibition in Sensory Pathways and Memory Networks  
T. P. Vogels et al.  
Plasticity at inhibitory synapses maintains balanced excitatory and inhibitory synaptic inputs at cortical neurons.  
>> *Perspective p. 1507*
- 1573 Autophagy-Dependent Anticancer Immune Responses Induced by Chemotherapeutic Agents in Mice  
M. Michaud et al.  
The release of adenosine triphosphate through autophagy can promote antitumor immune responses.  
>> *Perspective p. 1501*
- 1578 Uninformed Individuals Promote Democratic Consensus in Animal Groups  
I. D. Couzin et al.  
Uninformed individuals inhibit extremism and enforce fair representation during collective decision-making.  
>> *Perspective p. 1503*

## SCIENCEONLINE

## SCIENCEEXPRESS

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

### The Southern Ocean's Role in Carbon Exchange During the Last Deglaciation

A. Burke and L. F. Robinson

Radiocarbon measurements of deep-sea corals reveal the presence of old, carbon-rich water in the Southern Ocean.

10.1126/science.1208163

### Asymmetry and Aging of Mycobacterial Cells Lead to Variable Growth and Antibiotic Susceptibility

B. B. Aldridge et al.

The growing pole of the tuberculosis-causing bacterium is inherited by only one offspring, which can then elongate faster.

10.1126/science.1216166

### Asymmetric B Cell Division in the Germinal Center Reaction

B. E. Barnett et al.

Germinal center B cells undergo asymmetric cell division.

10.1126/science.1213495

### Equilibrative Nucleoside Transporter 3 Deficiency Perturbs Lysosome Function and Macrophage Homeostasis

C.-L. Hsu et al.

Lack of the transporter critical for recycling of nucleosides after phagocytosis results in a fatal expansion of macrophages.

10.1126/science.1213682

### Fitness Trade-Offs and Environmentally Induced Mutation Buffering in Isogenic *C. elegans*

M. O. Casanueva et al.

Stochastic variation in a cellular stress response pathway can predict the outcome of mutations in individuals.

10.1126/science.1213491

### Guiding Limited Use of Chimpanzees in Research

B. M. Altevogt et al.

10.1126/science.1217521

>> *News story p. 1484*

## SCIENCENOW

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

Highlights From Our Daily News Coverage

### An 'Arms Race' Between Snakes and Humans

A new analysis suggests that these two kinds of animals have played a large role in each other's evolutionary history.

<http://scim.ag/Snakes-Humans>

### How the 'Thermal Grill' Illusion Tricks the Mind

A strange burning sensation may provide clues to how the brain registers pain.

[http://scim.ag/Thermal\\_Grill](http://scim.ag/Thermal_Grill)

### 'Vocal Fry' Creeping Into U.S. Speech

Young women end sentences with a gravelly buzz in what could be a catching trend.

[http://scim.ag/Vocal\\_Fry](http://scim.ag/Vocal_Fry)

## SCIENCE SIGNALING

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

The Signal Transduction Knowledge Environment

**13 December issue:** <http://scim.ag/ss121311>

### RESEARCH ARTICLE: H<sub>2</sub>S-Induced Sulfhydrylation of the Phosphatase PTP1B and Its Role in the Endoplasmic Reticulum Stress Response

N. Krishnan et al.

Reversible inactivation by sulfhydrylation of the protein tyrosine phosphatase PTP1B activates the kinase PERK to promote the ER stress response.

### RESEARCH ARTICLE: Triggering Actin Comets Versus Membrane Ruffles—Distinctive Effects of Phosphoinositides on Actin Reorganization

T. Ueno et al.

The ability of phosphoinositides to produce functionally diverse effects may depend on the relative concentrations of different species.

### PERSPECTIVE: Is the Regulation of Insulin Signaling Multi-Organismal?

A. E. Douglas

Gut microbiota in *Drosophila* promote metabolic signaling pathways, resulting in increased growth and development rates.

### PROTOCOL: A Method to Separate Nuclear, Cytosolic, and Membrane-Associated Signaling Molecules in Cultured Cells

X. Liu and F. Fagotto

A semipermeabilization step and a specific Percoll gradient composition enable effective cellular fractionation.

## GLOSSARY

Find out what FLP, sAC, and CR3 mean in the world of cell signaling.

## SCIENCE TRANSLATIONAL MEDICINE

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

Integrating Medicine and Science

**14 December issue:** <http://scim.ag/stm121411>

### COMMENTARY: dbGaP Data Access Requests—A Call for Greater Transparency

L. Walker et al.

Mandatory data sharing offers scientific advantages, but more transparency around data use is needed.

### PERSPECTIVE: Receptor Antibodies as Novel Therapeutics for Diabetes

S. Ussar et al.

### RESEARCH ARTICLE: Amelioration of Type 2 Diabetes by Antibody-Mediated Activation of Fibroblast Growth Factor Receptor 1

A.-L. Wu et al.

Designer antibodies that mimic hormone activity provide new approaches to treating diabetes.

### RESEARCH ARTICLE: An NKG2D-Mediated Human Lymphoid Stress Surveillance Response with High Interindividual Variation

S. Shafi et al.

The stress surveillance response to cell damage varies among humans, perhaps explaining differences in transplant rejection.

### RESEARCH ARTICLE: Pathogenesis of Lethal Cardiac Arrhythmias in *Mecp2* Mutant Mice—Implication for Therapy in Rett Syndrome

M. D. McCauley et al.

Lethal ventricular arrhythmias in a mouse model of Rett syndrome can be prevented.

## SCIENCE CAREERS

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

Free Career Resources for Scientists

### It Doesn't Add Up

R. Kaufman

A study confirms that girls have as much innate math ability as boys, so where are the women mathematicians?

<http://scim.ag/DoesntAddUp>

### Translating Scientific Expertise Into Publishing Success

S. Carpenter

Evelyn Jabri's career transitions are eased by pragmatic optimism and fueled by an insatiable appetite for learning.

<http://scim.ag/EvelynJabri>

### Tooling Up: Inflection Points

D. Jensen

From dramatic changes arise new opportunities.

[http://scim.ag/TU\\_Inflection](http://scim.ag/TU_Inflection)

## SCIENCE PODCAST

[www.sciencemag.org/multimedia/podcast](http://www.sciencemag.org/multimedia/podcast)

Free Weekly Show

On the 16 December *Science* Podcast: the hardy naked mole-rat, finding patterns in large data sets, a new shot at a tuberculosis vaccine, and more.

## SCIENCE INSIDER

[news.sciencemag.org/scienceinsider](http://news.sciencemag.org/scienceinsider)

Science Policy News and Analysis

**SCIENCE** (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals Mail postage (publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2011 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): \$149 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$990; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$85. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #R1254 88122. Publications Mail Agreement Number 1069624. Printed in the U.S.A.

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**334 (6062)**

*Science* **334** (6062), 1471-1581.

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