

EDITORIAL

- 433 China's Science Funding
Richard N. Zare and Ernst-Ludwig Winnacker

NEWS OF THE WEEK

- 438 A roundup of the week's top stories

NEWS & ANALYSIS

- 441 Dismay, Confusion Greet Human Stem Cell Patent Ban
- 442 Dispute Over Tumor Suppressor Gene *Runx3* Boils Over
- 443 U.K. Scientific Papers Rank First in Citations
- 444 Iran's Alaei Brothers to Continue AIDS Work After Release From Prison

NEWS FOCUS

- 445 INERTIAL CONFINEMENT FUSION Fusion's Power Road Not Yet Taken
- 449 Step by Step, NIF Researchers Trek Toward the Light
>> Science Podcast

LETTERS

- 452 Cookie-Cutter Curriculum Is No Recipe for Success
D. M. Raben and J. S. Bond
- Turkish Science Seeks Freedom
C. Kizil
- Empirical Tests for NSF Classroom Programs
P. C. Cormas
- 453 CORRECTIONS AND CLARIFICATIONS
- 453 TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.

- 454 Fool Me Twice
S. L. Otto, reviewed by A. Pelish
- 455 Mother
C. Fauchere, Director

POLICY FORUM

- 456 Preparing for Resettlement Associated with Climate Change
A. de Sherbinin et al.

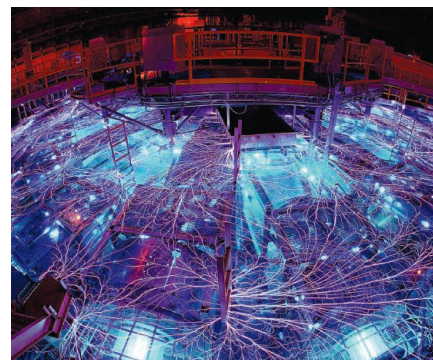
PERSPECTIVES

- 458 The Mammal Family Tree
K. M. Helgen
>> Report p. 521
- 459 BRCA1, Everything But the RING?
R. A. Greenberg
>> Report p. 525
- 460 Another Shot at a Malaria Vaccine
S. H. I. Kappe and S. A. Mikolajczak
>> Research Article p. 475
- 462 Getting the Farm Out of Pharma for Heparin Production
J. E. Turnbull
>> Report p. 498
- 463 Plasmonics Goes Quantum
Z. Jacob and V. M. Shalaev
- 464 How Proteins Fold
T. R. Sosnick and J. R. Hinshaw
>> Reports pp. 512 and 517
- 466 Retrospective: Ralph M. Steinman (1943–2011)
I. Mellman and M. Nussenzweig

SCIENCE PRIZE ESSAY

- 467 An Online Community for Students Who Love STEM
K. Birch et al.

CONTENTS continued >>



page 445



page 456

Downloaded from www.sciencemag.org on May 17, 2021



COVER

Asteroid 21 Lutetia, as seen by the Rosetta spacecraft from a distance of ~3500 kilometers in July 2010. Lutetia, 120 kilometers across, is a remnant planetesimal from the time of our solar system's formation and is one of the largest asteroids that have been visited by a spacecraft. A series of three Reports beginning on page 487 describe Rosetta's observations of Lutetia's surface, density, and composition.

Image: ESA 2011 MPS for OSIRIS Team MPS/UPD/LAM/IAA/RSSD/INTA/UPM/DASP/IDA

DEPARTMENTS

- 430 This Week in *Science*
- 434 Editors' Choice
- 436 *Science* Staff
- 469 AAAS News & Notes
- 532 New Products
- 533 *Science* Careers

BREVIA

- 474 **An Activating Mutation of *AKT2* and Human Hypoglycemia**
K. Hussain et al.
A key kinase in the insulin signaling pathway is constitutively activated in humans with a severe form of hypoglycemia.

RESEARCH ARTICLES

- 475 **Live Attenuated Malaria Vaccine Designed to Protect Through Hepatic CD8⁺ T Cell Immunity**
J. E. Epstein et al.
The efficacy of a sporozoite-based malaria vaccine is tested in humans, nonhuman primates, and mice.
>> *Perspective p. 460*
- 480 **Clonal Production and Organization of Inhibitory Interneurons in the Neocortex**
K. N. Brown et al.
Neocortical interneurons develop and migrate in the mouse brain to form spatially organized vertical and horizontal clusters.

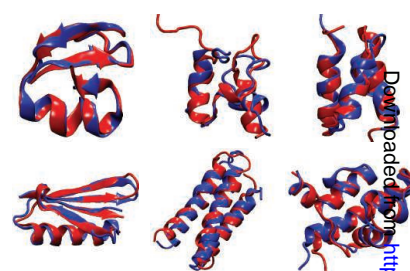
REPORTS

- 487 **Images of Asteroid 21 Lutetia: A Remnant Planetesimal from the Early Solar System**
H. Sierks et al.
- 491 **Asteroid 21 Lutetia: Low Mass, High Density**
M. Pätzold et al.
- 492 **The Surface Composition and Temperature of Asteroid 21 Lutetia As Observed by Rosetta/VIRTIS**
A. Coradini et al.
A spacecraft flyby of an asteroid reveals a high-density body that is more like a planetesimal than a rubble pile.
- 494 **Torsional Carbon Nanotube Artificial Muscles**
J. Foroughi et al.
Carbon nanotube yarns are used to make fast, multirotational torsional actuators.
- 498 **Chemoenzymatic Synthesis of Homogeneous Ultralow Molecular Weight Heparins**
Y. Xu et al.
An enzymatic synthesis may ultimately offer a more efficient means of producing an important class of anticoagulant drugs.
>> *Perspective p. 462*

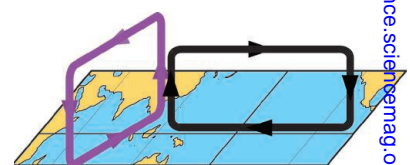
- 502 **Anthropogenic Aerosols and the Weakening of the South Asian Summer Monsoon**
M. A. Bollasina et al.
Changes in monsoon rainfall are caused by human-produced aerosols slowing the tropical atmospheric circulation.
- 505 **Increasing N Abundance in the Northwestern Pacific Ocean Due to Atmospheric Nitrogen Deposition**
T.-W. Kim et al.
Nitrogen deposition from the atmosphere has altered the nitrate:phosphorus ratio in the marginal seas of the northwestern Pacific Ocean.
- 509 **Time-Critical Social Mobilization**
G. Pickard et al.
Results from a competition allow an analysis of incentives for assembling teams of unrelated people to accomplish tasks.
- 512 **The Complex Folding Network of Single Calmodulin Molecules**
J. Stigler et al.
A multidimensional folding pathway can be observed online in single-molecule experiments.
- 517 **How Fast-Folding Proteins Fold**
K. Lindorff-Larsen et al.
Millisecond-scale molecular dynamics simulations of 12 proteins reveal a set of common principles for protein folding.
>> *Perspective p. 464*
- 521 **Impacts of the Cretaceous Terrestrial Revolution and KPg Extinction on Mammal Diversification**
R. W. Meredith et al.
Molecular phylogenetic analysis, calibrated with fossils, resolves the time frame of the mammalian radiation.
>> *Perspective p. 458*
- 525 **BRCA1 Tumor Suppression Depends on BRCT Phosphoprotein Binding, But Not Its E3 Ligase Activity**
R. Shakya et al.
The properties of breast cancer susceptibility protein required for tumor suppression have been explored.
>> *Perspective p. 459*
- 528 **Fatty Acids Identified in the Burmese Python Promote Beneficial Cardiac Growth**
C. A. Riquelme et al.
A specific set of circulating fatty acids triggers cardiac hypertrophy in snakes and mammals.
>> *Science Podcast*



pages 458 & 521



pages 464, 512, & 517



page 502

CONTENTS continued >>

SCIENCEONLINE

SCIENCEEXPRESS

www.scienceexpress.org

Functional Links Between A β Toxicity, Endocytic Trafficking, and Alzheimer's Disease Risk Factors in Yeast

S. Treusch et al.

The use of yeast as a model organism reveals cellular factors involved in β amyloid toxicity.

10.1126/science.1213210

Increasing the Potency and Breadth of an HIV Antibody by Using Structure-Based Rational Design

R. Diskin et al.

Structural analysis of an HIV antibody reveals residues important for neutralization breadth and potency.

10.1126/science.1213782

Pretreatment Mitochondrial Priming Correlates with Clinical Response to Cytotoxic Chemotherapy

T. Ni Chonghaile et al.

The mitochondrial state of a tumor cell prior to chemotherapy may help determine how well it responds to drug treatment.

10.1126/science.1206727

>> [Science Podcast](#)

Postfertilization Autophagy of Sperm Organelles Prevents Paternal Mitochondrial DNA Transmission

S. Al Rawi et al.

Maternal inheritance of mitochondrial DNA results from autophagy-dependent clearance of paternal mitochondria.

10.1126/science.1211878

A Perovskite Oxide Optimized for Oxygen Evolution Catalysis from Molecular Orbital Principles

J. Suntivich et al.

An electronic property of metal oxides was used to guide development of a catalyst for prospective use in energy applications.

10.1126/science.1212858

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.

10.1126/science.1214914

TECHNICALCOMMENTS

Comment on "Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping"

J. J. Mintzes et al.

Full text at www.sciencemag.org/cgi/content/full/334/6055/453-c

Response to Comment on "Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping"

Jeffrey D. Karpicke and J. R. Blunt

Full text at www.sciencemag.org/cgi/content/full/334/6055/453-d

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Bleak Prospects for Avoiding Dangerous Global Warming

Only the boldest action taken now is sure to head off the destructive effects of global warming.

<http://scim.ag/modelclimate>

Laundry Lint Pollutes the World's Oceans

Synthetic clothes release microscopic plastic fibers when washed.

<http://scim.ag/oceanlint>

Using Light to Flip a Tiny Mechanical Switch

An elegant device could provide memory for optical computers.

<http://scim.ag/light-switch>

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

25 October issue: <http://scim.ag/ss102511>

EDITORIAL GUIDE: Focus Issue—

Recruiting Players for a Game of ERK

N. R. Gough

The latest research continues to add to the components and functions of the ERK mitogen-activated protein kinase signaling cascade.

RESEARCH RESOURCE: Proteomic and Functional Genomic Landscape of Receptor Tyrosine Kinase and Ras to Extracellular Signal-Regulated Kinase Signaling

A. A. Friedman et al.

PODCAST

A. A. Friedman et al.

A combination of functional and proteomics approaches identifies regulators of ERK signaling in *Drosophila*.

RESEARCH RESOURCE: Large-Scale Discovery of ERK2 Substrates Identifies ERK-Mediated Transcriptional Regulation by ETV3

S. M. Carlson et al.

A chemical genetics strategy identified 67 previously unknown substrates of the kinase ERK2, including the transcriptional repressor ETV3.

REVIEW: Working Without Kinase Activity—Phosphotransfer-Independent Functions of Extracellular Signal-Regulated Kinases

J. Rodriguez and P. Crespo

ERK2 plays kinase-independent roles in chromatin remodeling, gene transcription, and cell cycle regulation.

RESEARCH ARTICLE: Regulation of Insulin-Like Growth Factor Signaling by Yap Governs Cardiomyocyte Proliferation and Embryonic Heart Size

M. Xin et al.

A transcriptional coactivator in the Hippo pathway promotes cardiac growth.

PROTOCOL: ANAT—A Tool for Constructing and Analyzing Functional Protein Networks

N. Yosef et al.

ANAT is software for network construction, supporting multiple algorithms, customizable parameters, and built-in data sets.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

26 October issue: <http://scim.ag/stm102611>

PERSPECTIVE: Unraveling How Probiotic Yogurt Works

J. E. Bisanz and G. Reid

RESEARCH ARTICLE: The Impact of a Consortium of Fermented Milk Strains on the Gut Microbiome of Gnotobiotic Mice and Monozygotic Twins

N. P. McNulty et al.

PODCAST

J. I. Gordon and O. M. Smith

Metagenomics reveals the effects of eating a popular fermented milk product on the microbiomes of mouse and man.

PERSPECTIVE: From DNA to Targeted Therapeutics—Bringing Synthetic Biology to the Clinic

Y. Y. Chen and C. D. Smolke

Recent advances in synthetic biology could address prevailing medical challenges.

RESEARCH ARTICLE: Splicing-Directed Therapy in a New Mouse Model of Human Accelerated Aging

F. G. Osorio et al.

Antisense oligonucleotides reverse premature aging and extend life span in a mouse model of progeria.

RESEARCH ARTICLE: Preclinical and Clinical Evaluation of Intraductally Administered Agents in Early Breast Cancer

V. Stearns et al.

Intraductal administration of chemotherapeutic agents may reduce new breast cancer formation and offer a less toxic treatment regimen than intravenous therapy.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Tips From the Top

M. Price

Recipients of the latest Nobel awards share advice for winning one of your own.

OMG, So Many Careers

A. Ruben

Our Experimental Error columnist surveys traditional and nontraditional careers.

Preparing for More Expensive Degrees in the U.K.

R. Pidcock

With English universities set to charge more, students should start to plan now.

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

On the 28 October *Science* Podcast: pythons as models for cardiac growth, NIF's path to nuclear fusion, mitochondrial priming and chemotherapy, and more.

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 #1254 88122. Publications Mail Agreement Number 1069624. Printed in the U.S.A.

Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: \$10.00 current issue, \$15.00 back issue prepaid includes surface postage; bulk rates on request. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that \$25.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.



ADVANCING SCIENCE. SERVING SOCIETY

Science

334 (6055)

Science **334** (6055), 430-532.

ARTICLE TOOLS

<http://science.sciencemag.org/content/334/6055>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.

Copyright © 2011 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.