EDITORIAL
285 Common U.S. Math Standards
Philip Daro et al.

NEWS OF THE WEEK
290 Discovery of ‘Missing’ Element 117
Hints at Stable Isotopes to Come
291 Obama Picks Pragmatists for
New Bioethics Panel
293 Report Calls for Improvements
at Livermore’s Giant Laser
293 From Science’s Online Daily News Site
294 Sean Carroll and the Evolution
of an Education Maven
295 Biotech Crops Good for
Farmers and Environment, Academy Finds
295 From the Science Policy Blog
296 Telescopes for the People
>> Science Podcast
297 New Guidelines Aim to Improve Studies
of Traumatic Brain Injury

NEWS FOCUS
298 Chasing a Disease to the Vanishing Point
Screening Disease Away
>> Science Podcast
301 Besting Johnny Appleseed
304 Nanogenerators Tap Waste Energy
to Power Ultrasmall Electronics

LETTERS
307 Finding Animals for Research
A. W. Ra’anan
Promoting Scientific Standards
in Germany
R. T. Radulescu et al.
The Missing Link in
Biodiversity Conservation
A. Beattie and P. Ehrlich
Energy Efficiency Merits More
Than a Nudge
P. C. Stern et al.

TECHNICAL COMMENT ABSTRACTS

BOOKS ET AL.
310 Lost Sex
I. Schön et al., Eds., reviewed by J. M. Logsdon Jr.
311 Art + Science Now
S. Wilson, reviewed by D. Edwards

POLICY FORUM
312 Does REDD+ Threaten to Recentralize
Forest Governance?
J. Phelps et al.

PERSPECTIVES
314 Dicer’s Cut and Switch
Q. Liu and Z. Paroo
>> Research Article p. 327
315 In Pursuit of Water Oxidation Catalysts
for Solar Fuel Production
J. K. Hurst
>> Report p. 342
316 Tracking Earth’s Energy
K. E. Trenberth and J. T. Fasullo
318 Cooling Energy-Hungry Data Centers
G. I. Meijer
319 The Future of Metals
K. Lu

CONTENTS continued >>

COVER
Fluorescence microscopy image showing fragmentation of chromosomal DNA (green) during programmed cell death or apoptosis in a Caenorhabditis elegans embryo. Chromosomes are stained blue and nuclear envelopes red. During apoptosis, the ribonuclease Dicer, known for its role in gene silencing, is converted to a deoxyribonuclease and initiates this DNA fragmentation process. See page 327.

Image: Jay Parrish/University of Colorado
REVIEW
321  Extending Healthy Life Span—From Yeast to Humans
L. Fontana et al.

RESEARCH ARTICLE
327  Caspase-Dependent Conversion of Dicer Ribonuclease into a Death-Promoting Deoxyribonuclease
A. Nakagawa et al.
An enzyme that chops up RNA can be switched to DNA fragmentation and can trigger programmed cell death in worms.  
>> Perspective p. 314

REPORTS
334  Detection of a Large-Scale Structure of Intracluster Globular Clusters in the Virgo Cluster
M. G. Lee et al.
Extensive regions of mass have been located between the galaxies of the Virgo cluster.

337  Three-Dimensional Invisibility Cloak at Optical Wavelengths
T. Ergin et al.
A structured photonic crystal can be used to cloak an object at optical wavelengths and over a wide viewing angle.

339  Diliethioplumbole: A Lead-Bearing Aromatic Cyclopentadienyl Analog
M. Saito et al.
Lead can participate in the delocalized electron network of an aromatic carbon ring.

342  A Fast Soluble Carbon-Free Molecular Water Oxidation Catalyst Based on Abundant Metals
Q. Yin et al.
Bulky polytungstate ligands stabilize a cobalt-based catalyst highly active for splitting water.
>> Perspective p. 315

345  Oxoboryl Complexes: Boron–Oxygen Triple Bonds Stabilized in the Coordination Sphere of Platinum
H. Braunschweig et al.
A mild synthetic method yields a boron analog of the widely studied carbon monoxide ligand.

347  A Younger Age for ALH84001 and Its Geochemical Link to Shergottite Sources in Mars
T. J. Lapen et al.
The oldest known martian meteorite is younger than previously thought, precluding it from sampling primeval martian crust.

351  Evolution of an Expanded Sex-Determining Locus in Volvox
P. Ferris et al.
Mating loci among green algae show conserved gene order, but also have many unique features that may explain gamete size differences.

354  Resolving Mechanisms of Competitive Fertilization Success in Drosophila melanogaster
M. K. Manier et al.
Fluorescently labeled sperm allow direct visualization of their activity within the female reproductive tract of flies.

357  Structural Basis of Preexisting Immunity to the 2009 H1N1 Pandemic Influenza Virus
R. Xu et al.
An epitope conserved between the 1918 and 2009 pandemic flu viruses explains age-related immunity to the 2009 virus.

360  Divided Representation of Concurrent Goals in the Human Frontal Lobes
S. Charon and E. Koechlin
The human brain is limited to accurately negotiate the pursuit of two concurrent goals at the same time.
>> Science Podcast

363  Cbln1 Is a Ligand for an Orphan Glutamate Receptor δ2, a Bidirectional Synapse Organizer
K. Matsuda et al.
A signaling complex serves as a synapse organizer that acts bidirectionally on both pre- and postsynaptic components.

368  Rapid Diversification of Cell Signaling Phenotypes by Modular Domain Recombination
S. G. Peisajovich et al.
Systematic swapping of modular protein domains verifies a mechanism for generation of phenotypic diversity in yeast.

372  Protein Kinase C-θ Mediates Negative Feedback on Regulatory T Cell Function
A. Zanin-Zhorov et al.
Suppressive T cells repurpose inflammatory signaling pathways to promote their suppressive functions.

CONTENTS continued >>
Response to Comment on “Homeostatic Sleep Pressure and Responses to Sustained Attention in the Suprachiasmatic Area”
C. Schmidt et al.
full text at www.sciencemag.org/cgi/content/full/328/5976/309-c

SCIENCENOW
www.sciencenow.org
Highlights From Our Daily News Coverage
Earth-Like Planets May Abound In the Milky Way
Dying stars reveal the chemical signatures of rocky worlds.

Cholesterol Genetically Linked to Eye Disease
Scientists uncover connection between age-related macular degeneration and a gene that regulates good cholesterol.

When Social Fear Disappears, So Does Racism
Children with genetic disorder shed light on the roots of racial prejudice.

SCIENCE SIGNALING
www.sciencesignaling.org
The Signal Transduction Knowledge Environment

RESEARCH ARTICLE: Identification of the mir-106b–25 microRNA Cluster as a Proto-Oncogenic PTEN-Targeting Intron That Cooperates with its Host Gene MCM7 in Transformation
L. Poliseno et al.
A microRNA network regulates the tumor suppressor PTEN in prostate cancer.

PERPECTIVE: Not Lost in Space—Trafficking in the Hedgehog Signaling Pathway
L. Milenkovic and M. P. Scott
Protein kinase A orchestrates Hedgehog signaling from the base of the primary cilium.

SCIENCE CAREERS
www.sciencemag.org/career_magazine
Free Career Resources for Scientists

Conventions of Scientific Authorship
V. Venkatraman
The rules and conventions of authorship are ever-changing and rarely clear.

Adding Humanitarian Value to Mathematics
E. Pain
Begoña Vitoriano Villanueva uses her math skills to help aid organizations respond to disasters.

TOOLING UP: Clear and Succinct Rules the Day
D. Jensen
The job search is immeasurably aided by good, transparent writing.

SCIENCE INSIDER
news.sciencemag.org/scienceinsider
Science Policy News and Analysis

SCIENCE TRANSLATIONAL MEDICINE
www.sciencetranslationalmedicine.org
Integrating Medicine and Science

PERPECTIVE: Optimal Control of Blood Glucose—The Diabetic Patient or the Machine?
L. Brown and E. R. Edelman
Diabetic patients may benefit from a device that uses a computer algorithm to deliver proper amounts of insulin and glucagon.

PERPECTIVE: Challenges in Using Stem Cells for Cardiac Repair
C. L. Mummery et al.
Stem cell–derived cardiomyocytes offer promise for treating damage caused by heart attacks.

RESEARCH: A Bi-Hormonal Closed-Loop Artificial Pancreas for Type 1 Diabetes
F. H. El-Khatib et al.
An algorithm continuously delivers appropriate insulin and glucagon doses to diabetic patients, maintaining their blood glucose at normal values, even after high-carbohydrate meals.

T. Janowitz and D. K. Menon
The methods and devices used in the clinical management of neurological patients can provide data to facilitate progress in treating brain trauma.

SCIENCE PODCAST
www.sciencemag.org/multimedia/podcast
Free Weekly Show
Download the 16 April Science Podcast to hear about how the brain pursues concurrent goals, testing and treatment for rare genetic diseases, telescopes in rural Senegal, and more.

SCIENCE ONLINE FEATURE
www.sciencemag.org/sciext/gonzoscientist/
THE GONZO SCIENTIST
The Gonzo Scientist travels to Senegal with an astrophysicist to deliver the universe to remote villagers.

Paper: 16 APRIL 2010, VOL 328, ISSUE 5976