



16 July 2010 | \$10

Science

EDITORIAL

- 257 A Volunteer Army for Science
Donald G. Rea and Katherine M. Nielsen

NEWS OF THE WEEK

- 262 Familial DNA Testing Scores a Win in Serial Killer Case
- 263 Kidney Disease Is Parasite-Slaying Protein's Downside
>> *Science Express Report* by G. Genovese et al.
- 264 New Biosecurity Rules to Target the Riskiest Pathogens
- 264 U.S. Panel Weighs Guidelines for Synthetic Biology
- 265 Scientists Eulogize Center—And Prepare for Stiff Competition
- 266 Probing Culture's Secrets, From Capuchins to Children
- 267 From the *Science* Policy Blog
- 268 How a Little Fish Keeps Overfished Ecosystem Productive
>> *Report p. 333*
- 269 From *Science's* Online Daily News Site

NEWS FOCUS

- 270 From the Outside Looking In
>> *Science Podcast*
- 274 Confronting Anatomy's Nazi Past
The Dilemma of Pernkopf's Atlas

LETTERS

- 276 Funding Should Come to Those Who Wait
R. R. Swaisgood et al.
- Brazilian Law: Full Speed in Reverse?
J. P. Metzger et al.
- Sponsors of Traumatic Brain Injury Project
G. Manley
- Warming, Photoperiods, and Tree Phenology
I. Chuine et al.
- Response
C. Körner and D. Basler

- 277 TECHNICAL COMMENT ABSTRACTS
- 277 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 279 The Price of Altruism
O. Harman, reviewed by S. A. Frank
- 280 Image and Reality
A. J. Rocke, reviewed by P. J. Ramberg

EDUCATION FORUM

- 282 Performance-Based Data in the Study of STEM Ph.D. Education
D. F. Feldon et al.

PERSPECTIVES

- 284 Hiding in Plain Sight
M. I. Rosenberg and C. Desplan
>> *Report p. 336*
- 285 Reengineering Enzymes
S. Lutz
>> *Reports pp. 305 and 309*
- 287 Consumers Who Care
S. DellaVigna
>> *Report p. 325*
- 288 The Ongoing Mystery of Sea-Floor Methane
M. Alperin and T. Hoehler
- 290 When Still Waters Ran Deep
T. Kiefer
- 291 Sickle Cell Disease at 100 Years
S. H. Orkin and D. R. Higgs

BREVIA

- 293 Chromosome Size Differences May Affect Meiosis and Genome Size
J. Wang et al.
Deletions and insertions affect chromosome segregation in the worm *Caenorhabditis elegans*.

CONTENTS continued >>



page 270



page 279



COVER

A seedling carpet dominated by *Dipteryx oleifera* (almendro) in the forest understory of Barro Colorado Island, Panama. Seedlings here have a lower probability of surviving when surrounded by neighbors of their own species. However, rare species suffer more from the presence of like neighbors than do common species, suggesting a mechanism that shapes species abundances in diverse tropical forest communities. See page 330.

Photo: Christian Ziegler

DEPARTMENTS

- 254 This Week in *Science*
- 258 Editors' Choice
- 260 *Science* Staff
- 261 Random Samples
- 346 New Products
- 347 *Science* Careers

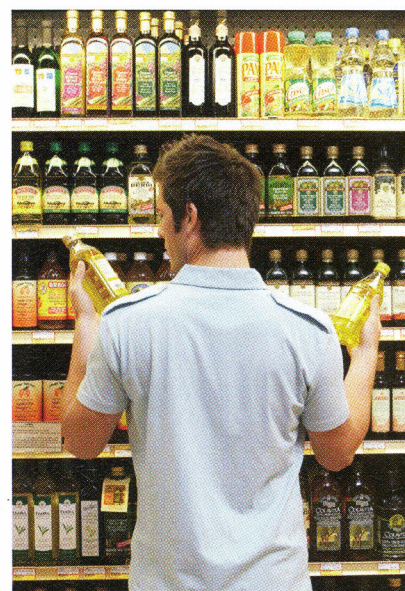
RESEARCH ARTICLE

- 294 ***Staphylococcus aureus* Nonribosomal Peptide Secondary Metabolites Regulate Virulence**
M. A. Wyatt et al.
Dipeptides produced by a major bacterial pathogen are essential for successful infection.

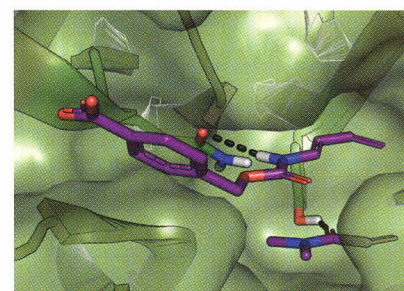
REPORTS

- 297 **Observation of the Magnon Hall Effect**
Y. Onose et al.
Spin excitations in an insulating ferromagnet exhibit an anomalous thermal Hall effect.
- 299 **Single-Crystal X-ray Structure of 1,3-Dimethylcyclobutadiene by Confinement in a Crystalline Matrix**
Y.-M. Legrand et al.
A normally unstable hydrocarbon has been trapped and structurally characterized within a host crystal.
- 303 **Disordering of an Organic Overlayer on a Metal Surface Upon Cooling**
A. Schöll et al.
Strengthening a surface bond of an organic molecule upon cooling leads to disordering between molecules.
- 305 **Biocatalytic Asymmetric Synthesis of Chiral Amines from Ketones Applied to Sitagliptin Manufacture**
C. K. Savile et al.
Strengthening of the bond of an organic molecule to a silver surface upon cooling disrupts intermolecular ordering.
>> *Perspective p. 285*
- 309 **Computational Design of an Enzyme Catalyst for a Stereoselective Bimolecular Diels-Alder Reaction**
J. B. Siegel et al.
Synthetic enzymes catalyze a carbon-carbon bond-forming reaction with high stereoselectivity and substrate specificity.
>> *Perspective p. 285*
- 313 **Meniscus-Confined Three-Dimensional Electrodeposition for Direct Writing of Wire Bonds**
J. Hu and M.-F. Yu
A micropipette helps guide the electrodeposition of copper and platinum wires for electronics connections.
- 316 **Cenozoic Tectonics of Western North America Controlled by Evolving Width of Farallon Slab**
W. P. Schellart et al.
The width of a descending slab is the primary control on the dynamics of subduction.

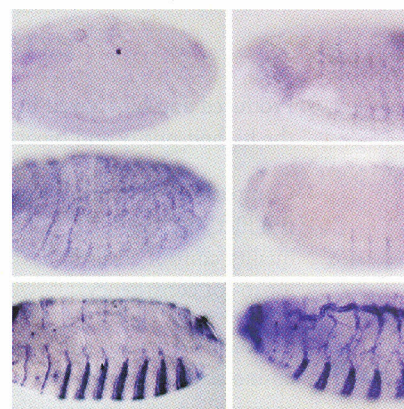
- 319 **Simulated Rapid Warming of Abyssal North Pacific Waters**
S. Masuda et al.
Computer simulations suggest a possible reason for the warming of North Pacific bottom water during the past four decades.
- 322 **Ocean Warming Slows Coral Growth in the Central Red Sea**
N. E. Cantin et al.
Rising summertime sea surface temperatures are slowing the rate of growth of healthy corals in the Red Sea.
- 325 **Shared Social Responsibility: A Field Experiment in Pay-What-You-Want Pricing and Charitable Giving**
A. Gneezy et al.
Exchanging goods for money ends up benefiting buyers, sellers, and charities.
>> *Perspective p. 287; Science Podcast*
- 327 **The Structure of *cbb₃* Cytochrome Oxidase Provides Insights into Proton Pumping**
S. Buschmann et al.
The third class of heme-copper oxidases reveals new structural solutions to achieve redox-driven proton translocation.
- 330 **Asymmetric Density Dependence Shapes Species Abundances in a Tropical Tree Community**
L. S. Comita et al.
Seedling survival in a tropical forest shows that species abundance is related to a species' sensitivity to conspecific neighbors.
- 333 **Trophic Structure and Community Stability in an Overfished Ecosystem**
A. C. Utne-Palm et al.
An endemic goby exploits jellyfish and microbial biomass, partially restoring the food chain in the Benguela ecosystem.
>> *News story p. 268*
- 336 **Small Peptides Switch the Transcriptional Activity of Shavenbaby During *Drosophila* Embryogenesis**
T. Kondo et al.
A conserved locus in insects encodes four small peptides that shift a transcription factor from repressor into activator.
>> *Perspective p. 284*
- 339 **Hedgehog Signaling Regulates Segment Formation in the Annelid *Platynereis***
N. Dray et al.
The processes that pattern body segmentation in annelids and arthropods both require the same signaling mechanism.
- 342 **Chemoattraction to Dimethylsulfoniopropionate Throughout the Marine Microbial Food Web**
J. R. Seymour et al.
A microfluidics device reveals a common response of bacterial plankton to sulfur compounds emitted by marine algae.



pages 287 & 325



page 309



page 336

CONTENTS continued >>

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

MESSANGER Observations of Extreme Loading and Unloading of Mercury's Magnetic Tail
J. A. Slavin et al.

Relative to Earth, Mercury's magnetospheric substorms are more intense and occur on shorter time scales.

10.1126/science.1188067

Evidence for Young Volcanism on Mercury from the Third MESSENGER Flyby
L. M. Prockter et al.

Volcanism and associated deformation on Mercury may have lasted well into the last half of the history of the solar system.

10.1126/science.1188186

Mercury's Complex Exosphere: Results from MESSENGER's Third Flyby
R. J. Vervack Jr. et al.

Mercury's exosphere is more varied and more intertwined with its magnetospheric environment than previously thought.

10.1126/science.1188572

Association of Trypanolytic ApoL1 Variants with Kidney Disease in African-Americans
G. Genovese et al.

Genetic variants associated with kidney disease in African-Americans may confer protection against trypanosomes.

10.1126/science.1193032

>> *News story p. 263; Science Podcast*

Astrocytes Control Breathing Through pH-dependent Release of ATP
A. V. Gourine et al.

Central nervous system glial cells are key players in the chemo-reflex essential for breathing.

10.1126/science.1190721

Induction of Broadly Neutralizing H1N1 Influenza Antibodies by Vaccination
C.-J. Wei et al.

An influenza virus vaccine elicits a broadly neutralizing, cross-protective antibody response in mice, ferrets, and nonhuman primates.

10.1126/science.1192517

Substrate Elasticity Regulates Skeletal Muscle Stem Cell Self-Renewal in Culture
P. M. Gilbert et al.

Muscle stem cells prefer a soft substrate.

10.1126/science.1191035

Signaling Kinase AMPK Activates Stress-Promoted Transcription via Histone H2B Phosphorylation
D. Bungard et al.

The energy sensor AMPK facilitates gene transcription by localizing to chromatin and phosphorylating histone H2B.

10.1126/science.1191241

TECHNICALCOMMENTS

Comment on "Observational and Model Evidence for Positive Low-Level Cloud Feedback"

A. J. Broccoli and S. A. Klein

Full text at www.sciencemag.org/cgi/content/full/329/5989/277-a

Response to Comment on "Observational and Model Evidence for Positive Low-Level Cloud Feedback"

A. C. Clement et al.

Full text at www.sciencemag.org/cgi/content/full/329/5989/277-b

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

Amazon Hit by Its Own Katrina

Severe storm mowed down vast swaths of rainforest.

The Vaccine That Came In From the Cold
Genes from Arctic bacteria turn mammalian pathogens into vaccines.

Keeping Insulin Hanging Around

Long-lasting insulin shot shows promise in animals.

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

RESEARCH ARTICLE: Regulation of Notch1 Signaling by Nrf2—Implications for Tissue Regeneration
N. Wakabayashi et al.

The cell survival pathway mediated by the transcription factor Nrf2 facilitates tissue regeneration by promoting Notch1 signaling.

RESEARCH ARTICLE: Signaling to Transcription Networks in the Neuronal Retrograde Injury Response

I. Michaelkevski et al.

Robustness in nerve injury responses results from control of axon-to-soma signaling networks by multiple regulatory components.

NETWATCH: MolecularMovies.org

Learn how to make 3D animations illustrating molecular and cellular events; in Educator Sites.

NETWATCH: Nuclear Receptor Resource (NRR)

Explore the nuclear hormone receptor superfamily through a collection of databases, interactive pathways, and graphics; in Protein Databases.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Veterinarian Scientists Bring Unique Perspectives to Translational Research

L. Chiu

D.V.M.-Ph.D.s are uniquely qualified to do research in animal models and translate findings across species, including humans.

Tooling Up: Integrate Yourself

D. Jensen

Being viewed as an outsider can happen to anyone, and it can have devastating career consequences.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

EDITORIAL: Something in Common

S. H. Friend

The first Sage Commons Congress took steps toward open sharing of data to drive therapeutic development.

COMMENTARY: The Demographic and Biomedical Case for Late-Life Interventions in Aging

M. J. Rae et al.

A global research agenda on aging has the potential to avert enormous economic, social, and human costs.

RESEARCH ARTICLE: Natural Immunization Against Malaria—Causal Prophylaxis with Antibiotics

J. Friesen et al.

Malaria-infected mice treated with antibiotics remain healthy and are protected against subsequent malaria infection.

RESEARCH ARTICLE: Quinone Oxidoreductase-2—Mediated Prodrug Cancer Therapy

M. R. Middleton et al.

An oxidoreductase enzyme, abundant in tumors, can be catalytically activated to a cytotoxic DNA binding species in human subjects.

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

Download the 16 July *Science* Podcast to hear about sharing social responsibility with companies, genetic variants associated with kidney disease, bringing science to Washington D.C. schools, and more.

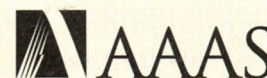
SCIENCE INSIDER

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 © 2010 by the American Association for the Advancement of Science. The title **SCIENCE** is a registered trademark of the AAAS. Domestic individual membership and subscription (\$1 issues): \$146 (\$74 allocated to subscription). Domestic institutional subscription (\$1 issues): \$910; 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 \$20.00 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