



## COVER

A black-chinned hummingbird (*Archilochus alexandri*) drinks nectar from a flower of wild tobacco (*Nicotiana attenuata*). Nicotine in the nectar moderates its consumption by the hummingbird and protects against predators; the flower lip produces benzyl acetone, which attracts pollinators. Together, the repellent and attractant maximize the plant's reproductive fitness. See page 1200.

Photo: Danny Kessler

## DEPARTMENTS

- 1127 Science Online
- 1129 This Week in *Science*
- 1134 Editors' Choice
- 1136 Contact *Science*
- 1139 Random Samples
- 1141 Newsmakers
- 1171 AAAS News & Notes
- 1225 New Products
- 1226 Science Careers

## EDITORIAL

- 1133 Academies Active in Education  
by Jorge E. Allende

## NEWS OF THE WEEK

- NSF Budget Ills Send Big Chill Through Antarctic Program 1142
- Biologists Change One Cell Type Directly Into Another 1143
- Fraud Charges Cast Doubt on Claims of DNA Damage From Cell Phone Fields 1144
- Research Downturn 1144

## SCIENCE SCOPE

- Can Fasting Blunt Chemotherapy's Debilitating Side Effects? 1146
- First Gene for Severe Dry Macular Degeneration 1146

## NEWS FOCUS

- Ancient Earthmovers of the Amazon The Western Amazon's "Garden Cities" >> Report p. 1214; Science Podcast 1148
- Physiological Society Meeting Learning Under Anesthesia Testing a Taste Test for Depression 1153
- Zeng Yi: A Controversial Bid to Thwart the 'Cantonese Cancer' Mortality Survey Offers Mixed Message 1154



1148

## LETTERS

- China's Energy Policy Comes at a Price *Q. Wang* 1156  
Response *J. Pan* et al.
- From Darwinism to Evolutionary Biology *U. Kutschera*

## CORRECTIONS AND CLARIFICATIONS 1158

## BOOKS ET AL.

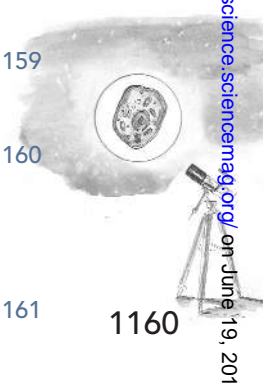
- Canada and the United States Differences That Count, 3rd ed. *D. M. Thomas and B. B. Torrey, Eds., reviewed by S. Randall* 1159
- Guesstimation Solving the World's Problems on the Back of a Cocktail Napkin *L. Weinstein and J. A. Adam, reviewed by S. Mertens* 1160

## EDUCATION FORUM

- Preschool Influences on Mathematics Achievement *E. C. Melhuish* et al. 1161

## PERSPECTIVES

- The "Invisible Hand" of Floral Chemistry *R. A. Raguso* >> Report p. 1200 1163
- Life After Death *A. Celotti* >> Report p. 1183 1164
- When Seamounts Subduct *R. von Huene* >> Report p. 1194 1165
- Opening the Molecular Floodgates *C. S. Gandhi and D. C. Rees* >> Research Article p. 1179; Report p. 1210 1166
- A Catalytic Foothold for Fluorocarbon Reactions *R. N. Perutz* >> Report p. 1188 1168
- Neuron Research Leaps Ahead *R. H. Brown Jr.* >> Report p. 1218 1169



1160

CONTENTS continued >>

## SCIENCE EXPRESS

www.scienceexpress.org

## MEDICINE

## Seeding and Propagation of Untransformed Mouse Mammary Cells in the Lung

K. Podsypanina et al.

In mice, normal mammary cells can colonize the lung, suggesting that metastases might arise from displaced normal cells acquiring genetic changes that confer malignancy.

10.1126/science.1161621

## APPLIED PHYSICS

## Time Reversal and Negative Refraction

J. B. Pendry

Optically active materials with nonlinear optical properties are predicted to mimic negatively refractive materials but without losses associated with true negative refraction.

10.1126/science.1162087



## EVOLUTION

## Natural Selection on a Major Armor Gene in Threespine Stickleback

R. D. H. Barrett, S. M. Rogers, D. Schluter

In stickleback fish transferred to fresh water, selection against the allele for the costly armor plating only partly explains the changes in allele frequencies over generations.

10.1126/science.1159978

## TECHNICAL COMMENT ABSTRACTS

## GEOCHEMISTRY

## Comment on "Determining Chondritic Impactor Size from the Marine Osmium Isotope Record" 1158

J. V. Morgan

full text at [www.sciencemag.org/cgi/content/ful/321/5893/1158a](http://www.sciencemag.org/cgi/content/ful/321/5893/1158a)

## Response to Comment on "Determining Chondritic Impactor Size from the Marine Osmium Isotope Record"

F. S. Paquay, G. E. Ravizza, T. K. Dalai, B. Peucker-Ehrenbrink

full text at [www.sciencemag.org/cgi/content/ful/321/5893/1158b](http://www.sciencemag.org/cgi/content/ful/321/5893/1158b)

## REVIEW

## APPLIED PHYSICS

## Cavity Optomechanics: Back-Action at the Mesoscale 1172

T. J. Kippenberg and K. J. Vahala

## BREVIA

## GEOPHYSICS

## Magmatically Triggered Slow Slip at Kilauea Volcano, Hawaii 1177

B. A. Brooks et al.

Satellite radar and global positioning data show that intrusion of a dike into Kilauea volcano in June 2007 triggered slip but no earthquakes along a fault 15 to 20 hours later.



1164 &amp; 1183

## BREVIA CONTINUED...

## GEOCHEMISTRY

## Bang! Month-Scale Eruption Triggering at Santorini Volcano 1178

V. M. Martin et al.

Modeling the diffusion of iron in crystals shows that the 1925 eruption of Santorini was triggered by intrusion of hotter magma just a few months earlier.

## RESEARCH ARTICLE

## STRUCTURAL BIOLOGY

The Structure of an Open Form of an *E. coli* Mechanosensitive Channel at 3.45 Å Resolution 1179

W. Wang et al.

Circularly arrayed transmembrane helices in the bacterial mechanosensitive ion channel, MscS, expand like the iris of a camera to open the channel and allow ion efflux.

>> Perspective p. 1166; Report p. 1210

## REPORTS

## ASTRONOMY

## Polarized Gamma-Ray Emission from the Crab 1183

A. J. Dean et al.

Detection of polarized gamma rays from the Crab Pulsar implies that electrons must be accelerated to extreme energies to emit radiation near the rapidly rotating star.

>> Perspective p. 1164

## ASTRONOMY

## The Metamorphosis of Supernova SN 2008D/XRF 080109: A Link Between Supernovae and GRBs/Hypernovae 1185

P. A. Mazzali et al.

The spectra of a recent supernova evolved from that of a more energetic event to that of a less energetic one, providing a link between previous observations.

CONTENTS continued &gt;&gt;

## REPORTS CONTINUED...

## CHEMISTRY

## Hydrodefluorination of Perfluoroalkyl Groups Using Silylium-Carborane Catalysts 1188

C. Douvris and O. V. Ozerov

A catalytic cycle using boron-carbon compounds efficiently converts C–F to C–H bonds and thus can destabilize environmentally persistent fluorocarbons. >> *Perspective p. 1168*

## CHEMISTRY

## Inverse Velocity Dependence of Vibrationally Promoted Electron Emission from a Metal Surface 1191

N. H. Nahler et al.

Vibrationally excited nitric oxide molecules unexpectedly ionize a surface more efficiently at slower approach velocities, apparently because there is more time for charge transfer.

## GEOPHYSICS

Weak Interplate Coupling by Seamounts and Repeating  $M \sim 7$  Earthquakes 1194

K. Mochizuki et al.

More earthquakes occur in front of a subducting seamount east of Japan than over and behind it, implying that the subducting and overriding plates are weakly coupled. >> *Perspective p. 1165*

## PALEOCLIMATE

Limits for Combustion in Low O<sub>2</sub> Redefine Paleoaerospheric Predictions for the Mesozoic 1197

C. M. Belcher and J. C. McElwain

Combustion experiments under realistic atmospheric conditions show that charcoal layers in Mesozoic rocks require a higher level of atmospheric oxygen than previously was thought.

## PLANT SCIENCE

## Field Experiments with Transformed Plants Reveal the Sense of Floral Scents 1200

D. Kessler, K. Gase, I. T. Baldwin

Genetic manipulation of wild tobacco plants balances the use of scent to attract pollinators and toxin to limit nectar consumption in order to optimize reproduction.

>> *Perspective p. 1163; Science Podcast*

## MICROBIOLOGY

## Redox-Active Antibiotics Control Gene Expression and Community Behavior in Divergent Bacteria 1203

L. E. P. Dietrich, T. K. Teal, A. Price-Whelan, D. K. Newman

In addition to an antiseptic function, phenazines—pigmented antibiotics made by bacteria—organize colony structure by activating a superoxidative stress regulator.

## STRUCTURAL BIOLOGY

## Solution Structure of the Integral Human Membrane Protein VDAC-1 in Detergent Micelles 1206

S. Hiller et al.

A channel that allows diffusion of metabolites across the mitochondrial outer membrane forms an unusual 19-stranded  $\beta$  barrel with a pore size of about 25 angstroms.

## BIOCHEMISTRY

## A Structural Mechanism for MscS Gating in Lipid Bilayers 1210

V. Vásquez et al.

Electron paramagnetic resonance measurements reveal that tilting of transmembrane helices facilitates the opening of a bacterial mechanosensitive channel in a lipid bilayer.

>> *Perspective p. 1166; Research Article p. 1179*

## ECOLOGY

## Pre-Columbian Urbanism, Anthropogenic Landscapes, and the Future of the Amazon 1214

M. J. Heckenberger et al.

Archaeology and remote sensing of an Amazon basin show that its pre-Columbian inhabitants lived in distributed towns, villages, and hamlets connected by roads. >> *News story p. 1151*

## DEVELOPMENTAL BIOLOGY

## Induced Pluripotent Stem Cells Generated from Patients with ALS Can Be Differentiated into Motor Neurons 1218

J. T. Dimos et al.

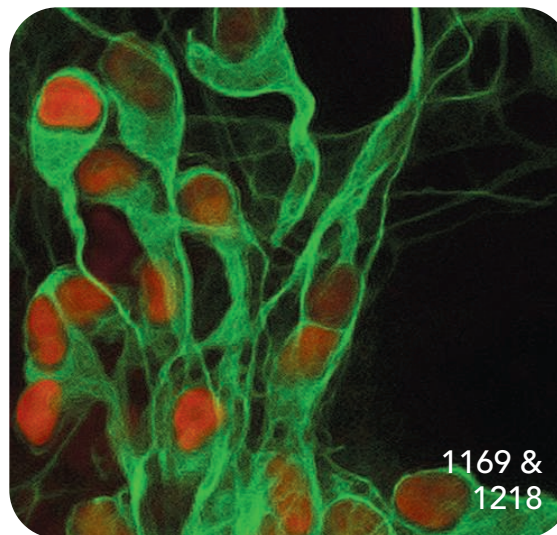
Skin cells from elderly individuals with a mutation that causes amyotrophic lateral sclerosis (ALS) were used to derive stem cells that could then be differentiated. >> *Perspective p. 1169*

## NEUROSCIENCE

Amyloid- $\beta$  Dynamics Correlate with Neurological Status in the Injured Human Brain 1221

D. L. Brody et al.

After brain injury of normal people, the amount of an Alzheimer's disease peptide decreases in the extracellular fluid of the brain, returning to normal with recovery. >> *Science Podcast*



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CONTENTS continued &gt;&gt;&gt;



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Veterans studying combat-related brain injuries.

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### Making a Scientific Impact

*S. Gaidos*

A team of military veterans at Harvard is investigating mechanical forces involved in traumatic brain injury.

### University of California Postdoc Union Wins Official Recognition

*B. Benderly*

California's employment board officially confirms unionizing the nation's largest group of postdocs.

### After Success Abroad, a Polish Scientist Returns Home

*C. Wald*

Agnieszka Dobrzyń has reaped the rewards of efforts to keep top young scientists in Poland.

### From the Archives: The Postbac—One or Two Years That Make Careers

*S. Webb*

A break from education after the bachelor's degree allows students to gain perspective and learn new skills before starting grad school.



The SDB Meeting, Philadelphia.

## SCIENCE SIGNALING

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

THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

### FORUM: Open Forum on Cell Signaling

*A. M. VanHook*

Read highlights from the 67th Annual Meeting of the Society for Developmental Biology (SDB).

### ST NETWATCH: Kinase.com

Kinase.com explores the functions, evolution, and diversity of protein kinases; in Protein Databases.

### PRIMARY RESEARCH

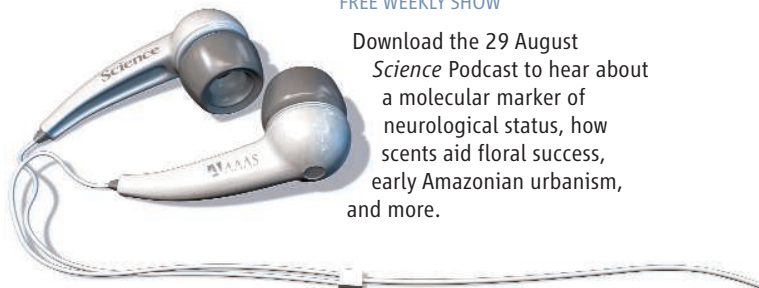
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