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

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

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

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

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.
Estimation 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
Life After Death A. Celotti >> Report p. 1183
When Seamounts Subduct R. von Huene >> Report p. 1194
Opening the Molecular Floodgates C. S. Gandhi and D. C. Rees >> Research Article p. 1179; Report p. 1210
A Catalytic Foothold for Fluorocarbon Reactions R. N. Perutz >> Report p. 1188

CONTENTS continued >>
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"
J. V. Morgan
full text at www.sciencemag.org/cgi/content/full/321/5893/1158a
Response to Comment on “Determining Chondritic Impactor Size from the Marine Osmium Isotope Record”
full text at www.sciencemag.org/cgi/content/full/321/5893/1158b

REVIEW
APPLIED PHYSICS
Cavity Optomechanics: Back-Action at the Mesoscale
T. J. Kippenberg and K. J. Vahala

BREVIAN
GEOPHYSICS
Magmatically Triggered Slow Slip at Kilauea Volcano, Hawaii
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.

RESEARCH ARTICLE
STRUCTURAL BIOLOGY
The Structure of an Open Form of an E. coli Mechanosensitive Channel at 3.45 Å Resolution
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
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
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.
REPORTS CONTINUED...

CHEMISTRY
Hydrodelfluorination of Perfluoroalkyl Groups Using Silylum-Carborane Catalysts
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
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 – 7 Earthquakes
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 O2 Redefine Paleotemispheric Predictions for the Mesozoic
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
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
In addition to an antiseptic function, phenazines—pigmented antibiotics made by bacteria—organize colony structure by activating a superoxide-stress regulator.

STRUCTURAL BIOLOGY
Solution Structure of the Integral Human Membrane Protein VDAC-1 in Detergent Micelles
S. Hiller et al.
A channel that allows diffusion of metabolites across the mitochondrial outer membrane forms an unusual 19-stranded β barrel with a pore size of about 25 angstroms.

BIOCHEMISTRY
A Structural Mechanism for MscS Gating in Lipid Bilayers
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
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
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-β Dynamics Correlate with Neurological Status in the Injured Human Brain
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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