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

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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

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J. V. Morgan
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Cavity Optomechanics: Back-Action at the Mesoscale
T. J. Kippenberg and K. J. Vahala

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Magmatically Triggered Slow Slip at Kiluaea Volcano, Hawaii
B. A. Brooks et al.
Satellite radar and global positioning data show that intrusion of a dike into Kiluaea volcano in June 2007 triggered slip but no earthquakes along a fault 15 to 20 hours later.

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

BREVIA CONTINUED...
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Bang! Month-Scale Eruption Triggering at Santorini Volcano
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
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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

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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

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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.
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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Hydrodefluorination of Perfluoroalkyl Groups Using Silylum-Carbonare Catalysts
C. Douvris and O. V. Ozerox

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 Paleosmorphism Predictions for the Mesozooic
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.
Foul wind.

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The SDB Meeting, Philadelphia.

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B. Benderly
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C. Wald
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S. Webb
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