SPECIAL SECTION

Forests in Flux

INTRODUCTION
The Future of Forests

NEWS
A Second Chance for Rainforest Biodiversity
Critical Time for African Rainforests
Letting 1000 Forests Bloom

REVIEW
Forests and Climate Change: Forcings, Feedbacks, and the Climate Benefits of Forests
G. B. Bonan

PERSPECTIVES
Forests of the Past: A Window to Future Changes
R. J. Petit, F. S. Hu, C. W. Dick
Predictive Models of Forest Dynamics
D. Purves and S. Pacala
Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation: Global Land-Use Implications
L. Miles and V. Kapos
Managing Forests for Climate Change Mitigation
J. G. Canadell and M. R. Raupach
Beyond Deforestation: Restoring Forests and Ecosystem Services on Degraded Lands
R. L. Chazdon
Changing Governance of the World’s Forests
A. Agrawal, A. Chhatre, R. Hardin

>> Editorial p. 1395; Science Careers articles p. 1514; for related online content, see p. 1391 or go to www.sciencemag.org/forests/
SCIENCE EXPRESS
www.scienceexpress.org

NEUROSCIENCE
The Spread of Ras Activity Triggered by Activation of a Single Dendritic Spine
C. D. Harvey, R. Yasuda, H. Zhong, K. Svoboda
When strengthened, individual synapses on dendritic spines contain an activated small regulatory protein that spreads to nearby spines, possibly altering their sensitivity.
10.1126/science.1159675

BIOCHEMISTRY
Micelles Protect Membrane Complexes from Solution to Vacuum
N. P. Barrera, N. Di Bartolo, P. J. Booth, C. V. Robinson
Gas-phase lipid micelles protect a large complex of membrane proteins, allowing its subunit composition and ligand binding to be assessed by mass spectrometry.
10.1126/science.1159292

ASTRONOMY
Supernova Shock Breakout from a Red Supergiant
K. Schawinski et al.
A burst of ultraviolet light reveals the initial expansion of a star leading to a supernova and identifies the star as a red supergiant.
10.1126/science.1160456

POLICY FORUM
Yucca Mountain Revisited
I. J. Winograd and E. H. Roseboom Jr.

PERSPECTIVES
How Enzymes Work
D. Ringe and G. A. Petsko

How Do Proteins Interact?
D. D. Boehr and P. E. Wright
>> Research Article p. 1471

Sex and Poison in the Dark
R. Fischer
>> Report p. 1504

Enceladus—Oasis or Ice Ball?
S. W. Kieffer and B. M. Jakosky

Unfolding Lipid Metabolism
J. D. Horton
>> Report p. 1492

RESEARCH ARTICLES

CELL BIOLOGY
An in Vivo Map of the Yeast Protein Interactome
K. Tarassov et al.
A method that identifies pairs of proteins that are 8 nanometers apart produces a map of interacting proteins in living yeast, finding known and previously unknown networks.

BIOCHEMISTRY
Recognition Dynamics Up to Microseconds Revealed from an RDC-Derived Ubiquitin Ensemble in Solution
O. F. Lange et al.
In solution, ubiquitin assumes all conformations seen in crystal structures of its complexes, indicating that it binds by conformational selection rather than induced fit. >> Perspective p. 1429

PLANT SCIENCE
Germination, Genetics, and Growth of an Ancient Date Seed
S. Sallon et al.
A 2000-year-old date seed—recovered from archaeological excavations near the Dead Sea in Israel—successfully germinated and grew. >> Science Podcast

BREVIA

SCIENCE VOL 320 13 JUNE 2008
Published by AAAS

www.sciencemag.org
Reports

Physics
Probing Cold Dense Nuclear Matter
R. Subedi et al.
Electron-beam experiments reveal that some neutrons within $^{22}$C nuclei tend to form close, dynamical pairs with protons but that pairs of the same particle type are rare.

Chemistry
Laser-Induced Electron Tunneling and Diffraction
M. Meckel et al.
Extracting electrons from O$_2$ and N$_2$ with a laser and redirecting some to diffract off the atoms reveals the geometry of electronic orbitals and maps the nuclei.

Chemistry
Electrical Resistance of Long Conjugated Molecular Wires
S. H. Choi, B. Kim, C. D. Frisbie
The stepwise synthesis of molecules of increasing length on a gold substrate reveals a change in electron transport from tunneling to hopping as molecule length increases.

Atmospheric Science
The Impact of Stratospheric Ozone Recovery on the Southern Hemisphere Westerly Jet
S.-W. Son et al.
Models show that as stratospheric ozone recovers, westerly tropospheric winds at high southern latitudes should weaken, not strengthen as was thought, affecting Antarctic climate.

Climate Change
Evidence for Upwelling of Corrosive "Acidified" Water onto the Continental Shelf
R. A. Feely et al.
As a result of anthropogenic CO$_2$ uptake, corrosive seawater undersaturated with calcium carbonate shoaled on the continental shelf of western North America in 2007.

Molecular Biology
Regulation of Hepatic Lipogenesis by the Transcription Factor XBP1
In mice, a transcription factor known to participate in secretion is also necessary for induction of lipid synthesis by carbohydrates in the liver. >> Perspective p. 1433

Cell Signaling
The Rag GTPases Bind Raptor and Mediate Amino Acid Signaling to mTORC1
Y. Sancak et al.
Nutrients, specifically amino acids, are sensed by small guanosine triphosphatases, which bind to a signaling complex, moving it close to the nucleus where it initiates cell growth.

Ecology
Animal Versus Wind Dispersal and the Robustness of Tree Species to Deforestation
D. Montoya, M. A. Zavala, M. A. Rodriguez, D. W. Purves
In Spanish forests, tree species with seeds that are dispersed by animals are more resilient in a fragmented forest than those with wind-dispersed seeds. >> Science Podcast

Developmental Biology
VelB/Vea/LaeA Complex Coordinates Light Signal with Fungal Development and Secondary Metabolism
Ò. Bayram et al.
The multiprotein velvet complex in the fungus Aspergillus nidulans coordinates light-responsive development and the generation of secondary metabolites such as antibiotics and toxins. >> Perspective p. 1430

Molecular Biology
Activation of the Cellular DNA Damage Response in the Absence of DNA Lesions
E. Soutoglou and T. Misteli
Protein complexes that usually assemble on and repair damaged DNA can form at undamaged sites to halt the cell cycle if several of the proteins are first tethered there.

Neuroscience
Transfer of Learning After Updating Training Mediated by the Striatum
E. Dahlén, A. S. Neely, A. Larsson, L. Bäckman, L. Nyberg
Individuals who become better at a letter recognition test through practice also improve at a different task, even without practice, when both tasks utilize the same brain region.

Special Feature
Careers in Forest Ecology
www.sciencemag.org/careers
Sustaining Forests in a Changing World
A Self-Made Climber
Measuring the Impact of Invasive Plants
An Adventurous Physicist
>> Forests in Flux section p. 1435; for related online content, see p. 1391 or go to www.sciencemag.org/forests/
Coral dissolve in acidic waters.

**SCIENCE NOW**

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

**HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE**

**A Volcanic Preview of Acidic Oceans**
Natural experiment predicts which species will win and which will lose from rising carbon dioxide levels.

**Say Goodbye to Wimpy Paper**
New nanopaper tougher than cast iron.

**To Stop a Seizure**
An acidic brain blocks convulsions in mice—but only if they have the right ion channel.

**SCIENCE SIGNALING**

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

**THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT**

**PERSPECTIVE: Intracellular Signaling by Akt—Bound to Be Specific**
T. F. Franke
Multiple interacting proteins modulate the activity of the serine/threonine kinase Akt.

**PERSPECTIVE: pVHL—A Multipurpose Adaptor Protein**
I. J. Frew and W. Krek
The von Hippel-Lindau tumor suppressor controls transcription-dependent and independent cellular processes.

**PODCAST**

E. M. Adler and A. M. VanHook
Microvesicles carrying an oncogenic form of the epidermal growth factor receptor provide a mechanism for lateral spread of the malignant phenotype.

**GLOSSARY**
Find out what ASC, ChIP, and SNS mean in the world of cell signaling.

**SPECIAL CONTENT**

**Forests in Flux**

**SCIENCE CAREERS**

[www.sciencecareers.org/career_development](http://www.sciencecareers.org/career_development)

**FREE CAREER RESOURCES FOR SCIENTISTS**

*Science* Careers Podcast: An Interview With Catherine Cardelús
K. Travis
The young rainforest ecologist talks about what it’s like to work in the forest canopy.

**SCIENCE ONLINE FEATURE**

**VIDEO: Forests in Flux**
An accompaniment to this week’s special section on the future of forests in light of climate change and human activity.

**SCIENCE PODCAST**

[www.sciencemag.org/about/podcast.dtl](http://www.sciencemag.org/about/podcast.dtl)

**FREE WEEKLY SHOW**

Download the 13 June special *Science* Podcast on forests to hear about seed dispersal and tree resilience, growth of an ancient date seed, preserving rainforest biodiversity, and more.

Separate individual or institutional subscriptions to these products may be required for full-text access.