CONTENTS

CONTENTS continued >>

DEPARTMENTS
887 Science Online
888 This Week in Science
892 Editors’ Choice
894 Contact Science
895 Random Samples
897 Newsmakers
981 New Products
982 Science Careers

EDITORIAL
891 Dying for Science?
by M. R. C. Greenwood, Gordon Ringold, and Doug Kellogg

LETTERS
Reservations About Dam Findings D. J. Bain et al. 910
What to Do About Those Dammed Streams P. Wilcock
Response R. C. Walter and D. J. Merritts
Looking for Familiar Faces L. Shamir
Response R. Jenkins and A. M. Burton

CORRECTIONS AND CLARIFICATIONS
912

BOOKS ET AL.
Lost Land of the Dodo
A. Cheke and J. Hume, reviewed by S. L. Olson 913
On Deep History and the Brain
D. L. Smail, reviewed by A. A. Ghazanfar 914

POLICY FORUM
Research Alone Is Not Enough
L. M. Branscomb 915

PERSPECTIVES
Neutrophil Soldiers or Trojan Horses?
B. John and C. A. Hunter >> Report p. 970
Halogen Versus Hydrogen
P. Metrangolo and G. Resnati 918
Directing Self-Assembly Toward Perfection
R. A. Segalman >> Reports pp. 936 and 939
The Elusive Onset of Geomagnetic Substorms
A. A. Petrukovich >> Research Article p. 931
Secret Weapon
R. F. Young III >> Report p. 960
Ironing Out Ocean Chemistry at the Dawn of Animal Life
T. W. Lyons >> Report p. 949
Retrospective: Victor A. McKusick (1921–2008)
F. S. Collins 925

NEWS OF THE WEEK
Full-Genome Sequencing Paved the Way From Spores to a Suspect 898
Seasonal-Climate Forecasts Improving Ever So Slowly 900

SCIESCSCOPE
901
Treatment and Prevention Exchange Vows at International Conference

NEWS FOCUS
Going Deeper Into the Grotte Chauvet 904
>> Science Podcast
Olivera Finn: Directing a Life in Science 906
Science Scholarships Go Begging 908
Climate Change Hot Spots Mapped Across the United States 909

www.sciencemag.org  SCIENCE  VOL 321  15 AUGUST 2008  881
Published by AAAS

COVER
A dynamic aurora borealis during a storm over Canada. Energy from the Sun’s extended atmosphere is stored at Earth’s magnetic field and is released explosively, powering the aurorae. Previously stable aurorae brighten, filament, expand poleward, and cover the sky within 1 to 2 minutes. The energy release starts at an altitude of 130,000 kilometers, at the magnetic equator, near local midnight. See page 931.

Image: Norbert Rosing/National Geographic/Getty Images
COMPUTER SCIENCE
reCAPTCHA: Human-Based Character Recognition via Web Security Measures
L. von Ahn, B. Maurer, C. McMillen, D. Abraham, M. Blum
A security system that relies on the superior performance of humans in comparison to computers in reading distorted text can be harnessed for digitized scanned documents.
10.1126/science.1160379

MATERIALS SCIENCE
Polymer Pen Lithography
F. Huo et al.
An array that can support millions of thin, flexible polymer pens can be used to deposit tiny molecular ink dots of variable size over large areas.
10.1126/science.1162193

PHYSICS
Transient Electronic Structure and Melting of a Charge Density Wave in TbTe₃
F. Schmitt et al.
Photoemission spectroscopy is extended to reveal the dynamics of correlated electronic phase transitions, showing how ordered electrons “melt” upon heating of TbTe₃.
10.1126/science.1160778

TECHNICAL COMMENT ABSTRACTS
COMPUTER SCIENCE
Comment on “100% Accuracy in Automatic Face Recognition”
W. Deng, J. Guo, J. Hu, H. Zhang
Response to Comment on “100% Accuracy in Automatic Face Recognition”
R. Jenkins and A. M. Burton

REVIEW
ECOLOGY
Spreading Dead Zones and Consequences for Marine Ecosystems
R. J. Diaz and R. Rosenberg

BREVIA
APPLIED PHYSICS
Optical Negative Refraction in Bulk Metamaterials
J. Yao et al.
An array of silver nanowires placed in a porous alumina matrix forms a three-dimensional material that negatively refracts visible light.
>> News story p. 900

RESEARCH ARTICLE
ATMOSPHERIC SCIENCE
Tail Reconnection Triggering Substorm Onset
V. Angelopoulos et al.
Satellite and ground-based data show that reconnection of magnetic field lines in Earth’s magnetotail precedes dramatic aurora displays and is the source of magnetic substorms. >> Perspective p. 920

REPORTS
MATERIALS SCIENCE
Density Multiplication and Improved Lithography by Directed Block Copolymer Assembly
R. Ruiz et al.
An appropriate substrate pattern can direct an even finer pattern of a block copolymer, improving the resolution for lithography by a factor of four, beyond the usual limits. >> Perspective p. 919

MATERIALS SCIENCE
Graphoepitaxy of Self-Assembled Block Copolymers on Two-Dimensional Periodic Patterned Templates
I. Bita et al.
A substrate patterned with a sparse array of nanoscale posts can direct the self-assembly of block copolymers to create a finely ordered lithographic array, even over a large area. >> Perspective p. 919
mounts a microRNA-mediated innate immune defense, which is inhibited by proteins of the bacteria, allowing other infections.

Upon bacterial infection, L. Navarro, F. Jay, K. Nomura, S. Y. He, O. Voinnet

Effector Proteins Suppression of the MicroRNA Pathway by Bacterial MOLECULAR BIOLOGY


Some bacterial genomes contain remnant sequences from previous viral infections, which are transcribed into RNA to guide inactivation of the virus in subsequent infections. >> Perspective p. 922

MOLECULAR BIOLOGY


After a pathogen invades a plant, a protein, usually kept in a multimeric state by S-nitrosylation, is dissociated by thioredoxin, freeing the monomers for defense responses.

MOLECULAR BIOLOGY


Low sulfur input caused the deeper ocean to become anoxic and rich in ferrous iron 750 million years ago, a reversal from the more oxidizing conditions of the previous 1 billion years. >> Perspective p. 923

PLANT SCIENCE

Plant Immunity Requires Conformational Charges of NPR1 via S-Nitrosylation and Thioredoxins Y. Tada et al.

After a pathogen invades a plant, a protein, usually kept in a multimeric state by S-nitrosylation, is dissociated by thioredoxin, freeing the monomers for defense responses.

MOLECULAR BIOLOGY


Shotgun sequencing of 27-base pair segments of messenger RNA from human kidney and immune cells identifies previously undescribed transcriptional units and splice functions.

MOLECULAR BIOLOGY


Some bacterial genomes contain remnant sequences from previous viral infections, which are transcribed into RNA to guide inactivation of the virus in subsequent infections. >> Perspective p. 922

MEDICINE

Tumor Regression in Cancer Patients by Very Low Doses of a T Cell–Engaging Antibody R. Bargou et al.

Tested in a small group of patients, a therapeutic antibody binds to both tumor cells and immune cells, increasing the local concentration and effectiveness of the immune cells.

NEUROSCIENCE


Only 100 synapses are required to accurately code for the animals’ velocity in the mouse cerebellum; the charge transfer into neurons is linearly related to acceleration.
NADP-binding produces an asymmetric dimer.

SCIENCE SIGNALING
www.sciencesignaling.org
THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

PERSPECTIVE: Dinucleotide-Sensing Proteins—Linking Signaling Networks and Regulating Transcription
H. K. Lamb, D. K. Stammers, A. R. Hawkins
Proteins that bind NAD(H) or NADP(H) may couple cellular redox state to transcription or other signaling pathways.

PERSPECTIVE: Great Times for Small Molecules—c-di-AMP, a Second Messenger Candidate in Bacteria and Archaea
U. Römling
The bacterial checkpoint protein DisA has diadenylate cyclase activity, suggesting that c-di-cAMP acts as a second messenger.

The basics of peer review.

SCIENCE CAREERS
www.scienc careers.org/career_development
FREE CAREER RESOURCES FOR SCIENTISTS

Learning the Ropes of Peer Reviewing
E. Pain
Peer review demands a blend of critical skills, honesty, and empathy.

If at First You Don’t Succeed, Cool Off, Revise, and Submit Again
L. Laursen
Rejection can be a constructive part of the publication process, really.

The Science Careers Web Log
Science Careers Staff
Here’s where to find information from around the Web on careers in science.

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