COVER
Steep terrain: To move a therapy from the research lab to the doctor’s office requires a huge investment in clinical trials, which are growing more costly and more complex every year. See the special section beginning on page 209.
Photo illustration: Kelly Buckheit Krause (images: Getty Images; Jupiter Images)

SPECIAL SECTION
Clinical Trials
INTRODUCTION
Lemons, Oranges, and Complexity

NEWS
Spiraling Costs Threaten Gridlock
>> Science Podcast
Allegations of Waste: The ‘Seeding’ Study
The Promise and Pitfalls of Clinical Trials Overseas
Making Clinical Data Widely Available
Women Abound in NIH Trials
Cholesterol Veers Off Script

For related online content, see page 159 or go to www.sciencemag.org/clinicaltrials/

DEPARTMENTS
159 Science Online
161 This Week in Science
167 Editors’ Choice
170 Contact Science
171 Random Samples
173 Newsmakers
279 New Products
280 Science Careers

EDITORIAL
165 The Misused Impact Factor
by Kai Simons

NEWS OF THE WEEK
HIV, HPV Researchers Honored, But One Scientist Is Left Out
Trio of Particle Theorists Lauded
Lights! Camera! Action! Zebrafish Embryos Caught on Film
>> Science Express report by P. J. Keller et al.

Pacific Northwest Sea Bird May Lose 'Threatened' Status

SCIENCESCOPE
Meeting of Research Leaders Spotlights African Development, Disaster Planning
Comprehensive Conservation Database Details Threats to Mammals
>> Research Article p. 225

Do Voter Surveys Underestimate the Impact of Racial Bias?
Tax Credit Extension Is Silver Lining for Science

NEWS FOCUS
Impacts Research Seen as Next Climate Frontier
From Remarkable Rescue to Restoration of Lost Habitat
Samurai Mathematician Set Japan Ablaze With Brief, Bright Light
Students Learn How, Not What, to Think About Difficult Issues
SCIENCE EXPRESS

www.sciencexpress.org

CHEMISTRY

Reaction-Driven Restructuring of Rh-Pd and Pt-Pd Core-Shell Nanoparticles
F. Tao et al.
Reducing or oxidizing conditions segregates rhenium or palladium at the surface of Rh-Pd (but not Pt-Pd) nanoparticles, facilitating the tuning of their catalytic properties. 10.1126/science.1164170

SOCIOLOGY

Multi-University Research Teams: Shifting Impact, Geography, and Stratification in Science
B. F. Jones, S. Wuchty, B. Uzzi
Over the past 30 years, scientific papers have become increasingly likely to be written by teams of authors from more than one of a small number of elite universities. 10.1126/science.1158357

LETTERS

Declines in NIH R01 Research Grant Funding
H. G. Mandel and E. S. Vesell

A Call to Action for Coral Reefs
R. E. Dodge et al.

Neutralizing the Impact Factor Culture
A. L. Notkins

Impact Factor Fever
P. Cherubini

Life in Science: Sounds of Atoms
P. S. Weiss and S. J. Stranick

BREVIA

PALEONTOLOGY

Collective Behavior in an Early Cambrian Arthropod
X.-G. Hou, D. J. Siveter, R. J. Aldridge, D. J. Siveter
Fossil arthropods in 525-million-year-old rocks in China are preserved in a long chain, implying that some Cambrian animals exhibited social behavior, unlike later arthropods.

ECOLOGY

The Status of the World’s Land and Marine Mammals: Diversity, Threat, and Knowledge
J. Schipper et al.
A comprehensive assessment of all of Earth’s mammals shows that primary productivity drives species richness on land and sea and that 20 to 25 percent of species are under threat. >> News story p. 178

PHYSICS

A High Phase-Space-Density Gas of Polar Molecules
K.-K. Ni et al.
Raman laser irradiation can cool a cloud of KRb molecules to ultralow translational, vibrational, and rotational temperatures, a step toward forming molecular condensates. >> Perspective p. 203

REPORTS

APPLIED PHYSICS

Cavity Optomechanics with a Bose-Einstein Condensate
F. Brennecke, S. Ritter, T. Donner, T. Esslinger
Coupling a Bose-Einstein condensate to an optical cavity holding a few trapped photons provides a sensitive probe of mechanical oscillations in the quantum regime.
**REPORTS CONTINUED...**

**MATERIALS SCIENCE**
Carbon Nanotube Arrays with Strong Shear Binding-On and Easy Normal Lifting-Off  
L. Q. L. Da, M. Stone, Z. Xia, Z. L. Wang  
Like gecko feet, a disordered array of carbon nanotubes with curly entangled tops can grip vertical surfaces without slipping but can also release and reattach easily.

**CHEMISTRY**
Base Sequence and Higher-Order Structure Induce the Complex Excited-State Dynamics in DNA  
N. K. Schwalb and F. Temps  
DNA dissipates ultraviolet light more effectively when it consists of a mixed sequence than when it is an extended run of the same nucleotide.

**GEOPHYSICS**
Implications of Magma Transfer Between Multiple Reservoirs on Eruption Cycling  
D. E. Alsworthy, G. Mattioli, J. Taron, B. Voight, R. Herd  
Data from the Soufrière Hills volcano reveal how connected shallow and deep magma chambers led to three eruption cycles over 12 years and imply that activity may end soon.

**CLIMATE CHANGE**
Northern Hemisphere Controls on Tropical Southeast African Climate During the Past 60,000 Years  
J. E. Tierney et al.  
Abrupt changes in precipitation and temperature resolved in a record spanning the past 60,000 years from Lake Tanganyika, East Africa, are coeval with Northern Hemisphere climate events.

**EVOLUTION**
Natural Selection on a Major Armor Gene in Threespine Stickleback  
R. D. H. Barrett, S. M. Rogers, D. Schlueter  
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.

**ECOLOGY**
Global Warming, Elevational Range Shifts, and Lowland Biotic Attrition in the Wet Tropics  
R. K. Colwell et al.  
Global warming threatens to cause species loss in the lowland tropics, as species that move upward from low elevations are not replaced and those on mountain tops die out.

ECOLOGY  
Impact of a Century of Climate Change on Small-Mammal Communities in Yosemite National Park, USA  
C. Moritz et al.  
Over the past 100 years, small mammals in Yosemite, California, show range contraction at high elevations and range expansion lower down, as well as rearranged communities.  
>> Perspective p. 206

**BIOCHEMISTRY**
Small Molecule–Induced Allosteric Activation of the *Vibrio cholerae* RTX Cysteine Protease Domain  
P. J. Lupardus, A. Shen, M. Bogoy, K. C. Garcia  
Cholera toxin becomes active inside an infected cell when a host lipid binds to it, allosterically exposing its active site, which allows autophosphorylation and thus infection.

**IMMUNOLOGY**
Noncytotoxic Lytic Granule-Mediated CD8* T Cell Inhibition of HSV-1 Reactivation from Neuronal Latency  
J. E. Knickelbein et al.  
Herpes virus in neurons can be kept in a latent state by T cells, which release granzyme B, an inhibitor of a protein necessary for viral gene expression.

**MATERIALS SCIENCE**
Laboratory Simulation of Volcano Seismicity  
P. M. Benson et al.  
Microquakes in a fractured rock sample in which pore water is experimentally decompressed replicate earthquakes seen in active volcanoes, explaining their origins.

**CLIMATE CHANGE**
Environmental Genomics Reveals a Single-Species Ecosystem Deep Within Earth  
D. Chivian et al.  
DNA sequences in water samples from a depth of 2.8 kilometers in a South African gold mine reveal the presence of a thermophilic microbe that can fix its own nitrogen and carbon.

**ECOLOGY**
A protein in T regulatory cells controls their ability to dampen activation of the immune system by antigen-presenting cells, preventing autoimmune disease.  
>> Perspective p. 202

**IMMUNOLOGY**
Microsatellite Variation and Reconstructed Effective Population Sizes of Human T Cells  
J. E. Knickelbein et al.  
Selection against an allele for the costly armor plating only partly explains the changes in allele frequencies over generations.

**ECOLOGY**
Threespine Stickleback  
R. D. H. Barrett, S. M. Rogers, D. Schlueter  
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.

**ECOLOGY**
Neutral Selection on a Major Armor Gene in Threespine Stickleback  
R. D. H. Barrett, S. M. Rogers, D. Schlueter  
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.

**ECOLOGY**
Inhibition of HSV-1 Reactivation from Neuronal Latency  
J. E. Knickelbein et al.  
Herpes virus in neurons can be kept in a latent state by T cells, which release granzyme B, an inhibitor of a protein necessary for viral gene expression.
Separate individual or institutional subscriptions to these products may be required for full-text access.