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 209

NEWS
Spiraling Costs Threaten Gridlock 210
>> Science Podcast
  Allegations of Waste: The ‘Seeding’ Study
The Promise and Pitfalls of Clinical Trials Overseas 214
Making Clinical Data Widely Available 217
Women Abound in NIH Trials 219
Cholesterol Veers Off Script 220

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

NEWS OF THE WEEK
HIV, HPV Researchers Honored, But One Scientist Is Left Out 174
Trio of Particle Theorists Lauded 175
Lights! Camera! Action! Zebrafish Embryos Caught on Film 176
>> Science Express report by P. J. Keller et al.
Pacific Northwest Sea Bird May Lose ‘Threatened’ Status 177

SCIENCESCOPE 177
Meeting of Research Leaders Spotlights African Development, Disaster Planning 178
Comprehensive Conservation Database Details Threats to Mammals
>> Research Article p. 225
Do Voter Surveys Underestimate the Impact of Racial Bias? 180
Tax Credit Extension Is Silver Lining for Science 181

NEWS FOCUS 182
Impacts Research Seen as Next Climate Frontier
From Remarkable Rescue to Restoration of Lost Habitat 184
Samurai Mathematician Set Japan Ablaze With Brief, Bright Light 185
Students Learn How, Not What, to Think About Difficult Issues 186

EDITORIAL 165
The Misused Impact Factor by Kai Simons

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
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
CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.
What Science Offers the Humanities Integrating Body and Culture E. Slingerland, reviewed by H. Fromm
Humans, Nature, and Birds Science Art from Cave Walls to Computer Screens D. Wheye and D. Kennedy;
A History of Paleontology Illustration J. P. Davidson, reviewed by M. Parrish

BROWSINGS

POLICY FORUM
Trends in Human Gene Patent Litigation C. M. Holman

PERSPECTIVES
Sauropod Gigantism P. M. Sander and M. Clauss
Regulating Suppression E. M. Shevach
Cold Molecules Beat the Shakes P. L. Gould
Armor Development and Fitness W. A. Cresko
Biodiversity in a Warmer World J.-C. Svenning and R. Condit
Volcanic Symphony in the Lab L. Burlini and G. Di Toro

BREVIA
PALEONTOLOGY
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
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.

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.

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. Qu, L. Dai, 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. Schwab 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. Elsworth, 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.

GEOPHYSICS
Laboratory Simulation of Volcano Seismicity
P. M. Benson et al.
Microseisms in a fractured rock sample in which pore water is experimentally decompressed replicate earthquakes seen in active volcanoes, explaining their origins. >> Perspective p. 207

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. 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. >> Perspective p. 204

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. >> Perspective p. 206

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.

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 autoproteolysis 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 viruses 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.

IMMUNOLOGY
CTLA-4 Control over Foxp3+ Regulatory T Cell Function
K. Wing et al.
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

MICROBIOLOGY
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. >> Science Podcast
The bacteria that cause periodontitis evade destruction by promoting crosstalk between two receptors that regulate the immune response.

PRESENTATION: The Endothelial Glycocalyx—A Mechano-Sensor and -Transducer
J. M. Tarbell and E. E. Ebong
A complex extracellular network of proteoglycans communicates mechanical stress to endothelial cells.

ST NETWATCH: Cellerator
This plug in for Mathematica allows users to model interactions between components of a signal transduction network or between multiple networks; in Modeling Tools.

ST NETWATCH: Clapham Lab
Find a wealth of information about TRP channels and calcium signaling from this lab at Harvard Medical School; in Labs and People.

ST NETWATCH: GenMAPP
Make sense of array data by using this application to map gene expression data onto cellular pathways; in Bioinformatics Resources.

Planning your research.

Maximizing Productivity and Recognition, Part 3:
Developing a Research Plan
S. Pfirman, R. E. Bell, P. J. Culligan, P. Balsam, J. D. Laird
To set your research on a clear course, you need a well-conceived but flexible plan.

Opportunities: The Political Scientist
P. Fiske
Not understanding political elements of the scientific culture can reduce your effectiveness.

Transferring Skills to Tech Transfer
L. Laursen
Technology transfer departments can bridge the gap between science and business.

Science Careers Blog
Science Careers Staff
Get advice, opinions, news, funding opportunities, and links to other career-related resources.

Planning your research.

Understanding gum disease.
322 (5899)

Science 322 (5899), 161-290.

http://science.sciencemag.org/content/322/5899

http://www.sciencemag.org/help/reprints-and-permissions