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/

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 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 178
>> 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

CONTENTS continued >>
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 >> Report p. 271

Cold Molecules Beat the Shakes
P. L. Gould >> Research Article p. 231

Armor Development and Fitness
W. A. Cresko >> Report p. 255

Biodiversity in a Warmer World
J.-C. Svenning and R. Condit >> Reports pp. 258 and 261

Volcanic Symphony in the Lab
L. Burlini and G. Di Toro >> Report p. 249

BREVIARIA

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.

ECOLGY
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

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. Schwabl 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. Elsworth, G. Mattioli, J. Taron, B. Vought, R. Herd
Data from the Soufrière Hills volcano reveal that 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. 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.

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.
SCIENCE NOW
www.sciencenow.org
HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

Ig Nobels Honor Studies of Lap Dancing, Soft Drink–Based Contraception
Comic take on Nobels awarded to 10 research teams, amid flying paper airplanes.

Blood Test for Mom Picks Up Down Syndrome in Fetus
New approach offers hope for cheaper, less invasive diagnosis.

Caving for Seismic History
Stalagmites may serve as record of past earthquakes.

Understanding gum disease.

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

PODCAST
N. R. Gough and J. F. Foley
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.

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

Maximizing Productivity and Recognition, Part 3:
Developing a Research Plan
S. Pfriman, 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.

SCIENCE ONLINE FEATURE
VIDEO: Pediatric Medicine—Prescribing Drugs “Off-Label”
A progress report on regulating and testing medicines for kids.
>> Clinical Trials section p. 209 or go to www.sciencemag.org/clinicaltrials/

Download the 10 October Science Podcast to hear about digital blueprints of vertebrate development, a single-species ecosystem deep within the Earth, clinical trials gridlock, and more.