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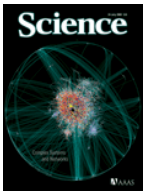

24 JULY 2009
VOL 325, ISSUE 5939, PAGES 357-504

Issue Highlights

- Special Issue: Complex Systems and Networks
- Black Hole Energy Boost
- Connecting Organelles
- Chirality from Achiral Molecules

Special Issue

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Complex Systems and Networks

Connections
Barbara R. Jasny, Laura M. Zahn, and Eliot Marshall
Science 24 July 2009: 405.
Full Text » PDF »

News

NEWS
Ourselves and Our Interactions: The Ultimate Physics Problem?
Adrian Cho
Science 24 July 2009: 406-408.
In the field of complex socioeconomic systems, physicists and others analyze people almost as if they were interchangeable electrons. Can that approach decipher society and what ails it?
Summary » Full Text » PDF » Podcast Interview »

NEWS
Econophysics: Still Controversial After All These Years
Adrian Cho
Science 24 July 2009: 408.
Econophysics is the biggest branch of complex-systems research, and physicists have flocked into finance. But many economists view econophysicists as dilettantes.
Summary » Full Text » PDF »

NEWS
Counterterrorism's New Tool: 'Metanetwork' Analysis
John Bohannon
Science 24 July 2009: 409-411.
Researchers have created sophisticated new programs to probe beneath the surface of social interactions. How well do they work against terrorists?
Summary » Full Text » PDF »

NEWS
Investigating Networks: The Dark Side
John Bohannon
Science 24 July 2009: 410-411.
A few months ago, Lawrence Wilkerson, a former U.S. State Department official and Army colonel, painted a nightmare scenario of how social network science can be applied in a battle zone, outlining something he called "the mosaic philosophy."
Summary » Full Text » PDF »

Perspectives

Scale-Free Networks: A Decade and Beyond
Albert-László Barabási
Science 24 July 2009: 412-413.
Abstract » Full Text » PDF » Supporting Online Material »

Revisiting the Foundations of Network Analysis
Carter T. Butts
Science 24 July 2009: 414-416.
Abstract » Full Text » PDF »

Disentangling the Web of Life
Jordi Bascompte
Science 24 July 2009: 416-419.
Abstract » Full Text » PDF »

A General Framework for Analyzing Sustainability of Social-Ecological Systems
Elinor Ostrom
Science 24 July 2009: 419-422.
Abstract » Full Text » PDF »

Economic Networks: The New Challenges
Frank Schweitzer, Giorgio Fagiolo, Didier Sornette, Fernando Vega-Redondo, Alessandro Vespignani, and Douglas R. White
Science 24 July 2009: 422-425.
Abstract » Full Text » PDF »

Predicting the Behavior of Techno-Social Systems
Alessandro Vespignani
Science 24 July 2009: 425-428.
Abstract » Full Text » PDF »

Review

Transcriptional Regulatory Circuits: Predicting Numbers from Alphabets
Harold D. Kim, Tal Shay, Erin K. O'Shea, and Aviv Regev
Science 24 July 2009: 429-432.
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This Week in *Science*
Editor summaries of this week's papers.
Science 24 July 2009: 366.
Full Text »

EDITORIAL:
Research Data in the Digital Age
Daniel Kleppner and Phillip A. Sharp
Science 24 July 2009: 368.
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Editors' Choice
Highlights of the recent literature.
Science 24 July 2009: 369.
Full Text »

***Science* Podcast**
Science 24 July 2009: 494.
The show includes how clouds impact climate, research on complex socioeconomic systems, policing nuclear testing, and more.
Summary » Full Text » Transcript »

New Products
Science 24 July 2009: 494.
A weekly roundup of information on newly offered instrumentation, apparatus, and laboratory materials of potential interest to researchers.
Summary » Full Text » PDF »

News of the Week

SOUTH KOREA
Forensic Finds Add Substance to Claims of War Atrocities
Richard Stone
Science 24 July 2009: 374-375.
Last week, South Korea's Truth and Reconciliation Commission revealed evidence from an ongoing excavation confirming the February 1951 Bulgap massacre as one of the Korean War's darker chapters.
Summary » Full Text » PDF »

CAREER SUPPORT
DOE Puts Up $85 Million for Grants to Young Scientists
Jeffrey Mervis
Science 24 July 2009: 375.
The U.S. Department of Energy (DOE) has committed $85 million next year for a new program to help 50 young scientists establish their research careers. It is the latest federal agency to try to lend a hand to this vulnerable population.
Summary » Full Text » PDF »

CLIMATE CHANGE
Clouds Appear to Be Big, Bad Player in Global Warming
Richard A. Kerr
Science 24 July 2009: 376.

On page 460 of this week's issue of *Science*, the first reliable analysis of cloud behavior over past decades suggests—but falls short of proving—that clouds are strongly amplifying global warming. If that's true, then almost all climate models have got it wrong.

Summary » **Full Text »** **PDF »**

ENVIRONMENTAL MONITORING

Spy Satellites Give Scientists A Sharper Image of Field Sites
Yudhijit Bhattacharjee
Science 24 July 2009: 377.

Last week, thanks to the U.S. intelligence community, researchers saw pictures that will allow them to model the breakup of sea ice at a level of detail they never imagined.

Summary » **Full Text »** **PDF »**

*SCIENCE*NOW.ORG

From *Science*'s Online Daily News Site
Science 24 July 2009: 377.

Highlights from *Science*'s online daily news site, *Science*NOW, this week include exploding raindrops, no risk in disclosing genetic risks, an ancient climate-change puzzle, and elephants that don't always keep it in the family.

Summary » **Full Text »** **PDF »**

GEODESY

NOAA Project to Measure Gravity Aims to Improve Coastal Monitoring
Brittany Johnson
Science 24 July 2009: 378.

How high is up? The U.S. government has launched a 10-year, $38 million research project to answer that question in hopes of improving its management of coastal regions and reducing the damage from severe storms and rising sea levels.

Summary » **Full Text »** **PDF »**

BIOFUELS

ExxonMobil Fuels Venter's Efforts To Run Vehicles on Algae-Based Oil
Robert F. Service
Science 24 July 2009: 379.

Last week, in one of the biggest biofuel bets so far, ExxonMobil announced that it will spend up to $600 million over 5 to 6 years to produce biofuels from algae.

Summary » **Full Text »** **PDF »**

*SCIENCE*INSIDER

From the *Science* Policy Blog
Science 24 July 2009: 379.

*Science*Insider this week reported on India's refusal to agree to mandatory reductions in carbon emissions, a delay in the restart of the Large Hadron Collider, and other stories.

Summary » **Full Text »** **PDF »**

IMAGING

With 'Phenomics,' Plant Scientists Hope to Shift Breeding Into Overdrive
Elizabeth Finkel
Science 24 July 2009: 380-381.

Institutes worldwide are racing to build facilities with instrument arrays that can scan thousands of plants a day in an approach to science akin to high-throughput DNA sequencing.

Summary » **Full Text »** **PDF »**

SCIENTIFIC PUBLISHING

Data Integrity Report Sends Journals Back to the Drawing Board
Jocelyn Kaiser
Science 24 July 2009: 381.

A National Academies panel released a report this week offering broad principles for dealing with data but calling on disciplines to work out the details themselves.

Summary » **Full Text »** **PDF »**

Random Samples
Science 24 July 2009: 373.
Full Text »

News Focus

INTERNATIONAL TREATIES

Test Ban Monitoring: No Place to Hide
Daniel Clery
Science 24 July 2009: 382-385.

A nearly complete global network can reliably spot secret nuclear explosions, researchers say. Will holdout nations now ratify the test ban?

Summary » **Full Text »** **PDF »** **Podcast Interview »**

INTERNATIONAL TREATIES

Comprehensive Test Ban: The Long Road
Daniel Clery
Science 24 July 2009: 384.

Science gives a timeline of the steps that have been taken over the past half-century leading to the current effort for a comprehensive ban on nuclear weapons testing.

Summary » **Full Text »** **PDF »**

ECOLOGY

Deadly Flights
Andrew Curry
Science 24 July 2009: 386-387.

Massive wind turbines seem to be killing more and more migratory bats, prompting research into these neglected creatures and efforts to minimize the toll.

Summary » Full Text » PDF »

MICROBIOLOGY

Phytoplasma Research Begins to Bloom
Evelyn Strauss
Science 24 July 2009: 388-390.

Spread by insects, bacteria called phytoplasmas co-opt plant development, sometimes creating beauty but more often bringing devastation.

Summary » Full Text » PDF »

MATHEMATICS

A Good Sign
Angela Saini
Science 24 July 2009: 391.

When existing notation for explaining a complex mathematical problem wasn't enough, Byron Cook teamed up with an artist to design his own.

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Letters

Promoting Engineering
Eugene C. Eckstein
Science 24 July 2009: 392.
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Do Not Underestimate Science
Christof Koch
Science 24 July 2009: 392.
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Immune System: Success Owed to a Virus?
David H. Dreyfus
Science 24 July 2009: 392-393.
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Immune System: "Big Bang" in Question
Thomas Pradeu
Science 24 July 2009: 393.
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Immune System: Promethean Evolution
Arthur M. Silverstein
Science 24 July 2009: 393.
Full Text » PDF »

Corrections and Clarifications
Science 24 July 2009: 393.
Full Text » PDF »

Books *et al.*

ANTHROPOLOGY

The Cooking Ape
Andreas Keller
Science 24 July 2009: 394-395.

In their books, Wrangham and Burton present two quite different perspectives on how learning to control fire may have played a crucial role in human evolution.

Summary » Full Text » PDF »

RESEARCH MISCONDUCT

Neglecting the Crucial "Why?"
Donald Eigler
Science 24 July 2009: 395.

Reich discusses the Schön case and how it was handled by the journals that had been publishing his high-impact papers and by scientists in the affected fields.

Summary » Full Text » PDF »

Books Received
Science 24 July 2009: 395.

A listing of books received at *Science* during the week ended 17 July 2009.

Summary »

Policy Forum

SOCIOLOGY

Can We Reinvent the Internet?
Viktor Mayer-Schönberger
Science 24 July 2009: 396-397.

To build a better Internet may require us to rewire the social communities that created its code.

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Perspectives

MATERIALS SCIENCE

Evolutionary Photonics with a Twist
Pete Vukusic
Science 24 July 2009: 398-399.

The iridescent appearance of the hard forewings of scarab beetles can be caused by complex helical nanostructures.

Summary » Full Text » PDF »

ASTRONOMY

A Flare for Acceleration
Mitchell Begelman
Science 24 July 2009: 399-400.

Radio and gamma-ray observations show that particles are accelerated to extremely high energies very close to a black hole.

Summary » Full Text » PDF »

MICROBIOLOGY

Tumbling for Stealth?
Roman Stocker and William M. Durham
Science 24 July 2009: 400-402.

A green alga changes its flagellar beating patterns to create a run-and-tumble motion that may help it escape predation.

Summary » Full Text » PDF »

CHEMISTRY

How Deformation Can Lend a Hand to Molecular Ordering
David B. Amabilino
Science 24 July 2009: 402-403.

Liquid crystal phases of molecules with no inherent handedness undergo subtle deformations that create unusual chiral fluids and nanostructures.

Summary » Full Text » PDF »

CELL BIOLOGY

Connecting Organelles
Nils Wiedemann, Chris Meisinger, and Nikolaus Pfanner
Science 24 July 2009: 403-404.

Protein contacts between mitochondria and the endoplasmic reticulum allow metabolic exchange and communication.

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Brevia

Knockout Rats via Embryo Microinjection of Zinc-Finger Nucleases
Aron M. Geurts, Gregory J. Cost, Yevgeniy Freyvert, Bryan Zeitler, Jeffrey C. Miller, Vivian M. Choi, Shirin S. Jenkins, Adam Wood, Xiaoxia Cui, Xiangdong Meng, Anna Vincent, Stephen Lam, Mieczyslaw Michalkiewicz, Rebecca Schilling, Jamie Foeckler, Shawn Kalloway, Hartmut Weiler, Séverine Ménoret, Ignacio Anegon, Gregory D. Davis, Lei Zhang, Edward J. Rebar, Philip D. Gregory, Fyodor D. Urnov, Howard J. Jacob, and Roland Buelow
Science 24 July 2009: 433.

Targeted gene disruption in rats paves the way for new human disease models.

Abstract » Full Text » PDF » Supporting Online Material »

Research Articles

Dependence of Mouse Embryonic Stem Cells on Threonine Catabolism
Jian Wang, Peter Alexander, Leeju Wu, Robert Hammer, Ondine Cleaver, and Steven L. McKnight
Science 24 July 2009: 435-439.
Published online 9 July 2009 [DOI: 10.1126/science.1173288] (in *Science* Express Research Articles)

Mouse embryonic stem cells exist in a high-flux metabolic state comparable to that of rapidly dividing bacteria.

Abstract » Full Text » PDF » Supporting Online Material »

String Theory, Quantum Phase Transitions, and the Emergent Fermi Liquid
Mihailo Cubrovic, Jan Zaanen, and Koenraad Schalm
Science 24 July 2009: 439-444.
Published online 25 June 2009 [DOI: 10.1126/science.1174962] (in *Science* Express Research Articles)

Mathematical methods developed in string theory to describe gravity are applied to complex condensed matter systems.

Abstract » Full Text » PDF » Supporting Online Material »

Reports

Radio Imaging of the Very-High-Energy γ-Ray Emission Region in the Central Engine of a Radio Galaxy
The VERITAS Collaboration, the VLBA 43 GHz M87 Monitoring Team, the H.E.S.S. Collaboration, the MAGIC Collaboration
Science 24 July 2009: 444-448.
Published online 2 July 2009 [DOI: 10.1126/science.1175406] (in *Science* Express Reports)

Particles are accelerated to very high energies in close proximity to a super-massive black hole.

Abstract » Full Text » PDF » Supporting Online Material »

Structural Origin of Circularly Polarized Iridescence in Jeweled Beetles
Vivek Sharma, Matija Crne, Jung Ok Park, and Mohan Srinivasarao
Science 24 July 2009: 449-451.

The cellular ordering in the exoskeleton of a beetle is analogous to the molecular ordering in cholesteric liquid crystals.

Abstract » Full Text » PDF » Supporting Online Material »

Chiral Isotropic Liquids from Achiral Molecules
L. E. Hough, M. Spannuth, M. Nakata, D. A. Coleman, C. D. Jones, G. Dantlgraber, C. Tschierske, J. Watanabe, E. Körblova, D. M. Walba, J. E. Maclennan, M. A. Glaser, and N. A. Clark
Science 24 July 2009: 452-456.

Banana-shaped molecules lacking handedness form a macroscopically isotropic fluid that still has overall chirality.

Abstract » Full Text » PDF » Supporting Online Material »

Helical Nanofilament Phases
L. E. Hough, H. T. Jung, D. Krüerke, M. S. Heberling, M. Nakata, C. D. Jones, D. Chen, D. R. Link, J. Zasadzinski, G. Heppke, J. P. Rabe, W. Stocker, E. Körblova, D. M. Walba, M. A. Glaser, and N. A. Clark
Science 24 July 2009: 456-460.

Molecules lacking handedness can form layered, mesoporous helical structures.

Abstract » Full Text » PDF » Supporting Online Material »

Observational and Model Evidence for Positive Low-Level Cloud Feedback

Amy C. Clement, Robert Burgman, and Joel R. Norris
Science 24 July 2009: 460-464.

Decreased low-level cloud cover in the Northeast Pacific region amplifies increases in sea surface temperatures.

Abstract » Full Text » PDF » Supporting Online Material » Podcast Interview »

The Dynamics of Phenotypic Change and the Shrinking Sheep of St. Kilda

Arpat Ozgul, Shripad Tuljapurkar, Tim G. Benton, Josephine M. Pemberton, Tim H. Clutton-Brock, and Tim Coulson
Science 24 July 2009: 464-467.
Published online 2 July 2009 [DOI: 10.1126/science.1173668] (in *Science* Express Reports)

Environmental change has led to decreasing body size in a sheep population over 20 years, despite selection for increased size.

Abstract » Full Text » PDF » Supporting Online Material »

Heat Exchange from the Toucan Bill Reveals a Controllable Vascular Thermal Radiator

Glenn J. Tattersall, Denis V. Andrade, and Augusto S. Abe
Science 24 July 2009: 468-470.

Toucans alter blood flow to their massive bills according to ambient conditions.

Abstract » Full Text » PDF » Supporting Online Material »

Synchronous and Stochastic Patterns of Gene Activation in the *Drosophila* Embryo

Alistair N. Boettiger and Michael Levine
Science 24 July 2009: 471-473.

Synchronous activation of genes with stalled RNA polymerase improves transcriptional coordination.

Abstract » Full Text » PDF » Supporting Online Material »

A Gene Network Regulating Lysosomal Biogenesis and Function

Marco Sardiello, Michela Palmieri, Alberto di Ronza, Diego Luis Medina, Marta Valenza, Vincenzo Alessandro Gennarino, Chiara Di Malta, Francesca Donaudy, Valerio Embrione, Roman S. Polishchuk, Sandro Banfi, Giancarlo Parenti, Elena Cattaneo, and Andrea Ballabio
Science 24 July 2009: 473-477.
Published online 25 June 2009 [DOI: 10.1126/science.1174447] (in *Science* Express Reports)

Coordination of the genes that regulate lysosomal biogenesis occurs via a shared sequence motif and one transcription factor.

Abstract » Full Text » PDF » Supporting Online Material »

An ER-Mitochondria Tethering Complex Revealed by a Synthetic Biology Screen

Benoît Kornmann, Erin Currie, Sean R. Collins, Maya Schuldiner, Jodi Nunnari, Jonathan S. Weissman, and Peter Walter
Science 24 July 2009: 477-481.
Published online 25 June 2009 [DOI: 10.1126/science.1175088] (in *Science* Express Reports)

A protein complex zippers mitochondria to endoplasmic reticulum for phospholipid transfer.

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Pathogenesis and Transmission of Swine-Origin 2009 A(H1N1) Influenza Virus in Ferrets

Vincent J. Munster, Emmie de Wit, Judith M. A. van den Brand, Sander Herfst, Eefje J. A. Schrauwen, Theo M. Bestebroer, David van de Vijver, Charles A. Boucher, Marion Koopmans, Guus F. Rimmelzwaan, Thijs Kuiken, Albert D. M. E. Osterhaus, and Ron A. M. Fouchier
Science 24 July 2009: 481-483.
Published online 2 July 2009 [DOI: 10.1126/science.1177127] (in *Science* Express Reports)

Animal experiments compare the dynamics and effects of the virus causing the 2009 flu outbreak to those of seasonal H1N1 flu.

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Transmission and Pathogenesis of Swine-Origin 2009 A(H1N1) Influenza Viruses in Ferrets and Mice

Taronna R. Maines, Akila Jayaraman, Jessica A. Belser, Debra A. Wadford, Claudia Pappas, Hui Zeng, Kortney M. Gustin, Melissa B. Pearce, Karthik Viswanathan, Zachary H. Shriver, Rahul Raman, Nancy J. Cox, Ram Sasisekharan, Jacqueline M. Katz, and Terrence M. Tumpey
Science 24 July 2009: 484-487.
Published online 2 July 2009 [DOI: 10.1126/science.1177238] (in *Science* Express Reports)

Animal experiments compare the dynamics and effects of the virus causing the 2009 flu outbreak to those of seasonal H1N1 flu.

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***Chlamydomonas* Swims with Two "Gears" in a Eukaryotic Version of Run-and-Tumble Locomotion**

Marco Polin, Idan Tuval, Knut Drescher, J. P. Gollub, and Raymond E. Goldstein
Science 24 July 2009: 487-490.

Algal cilia beat synchronously for forward movement and asynchronously for turning.

Abstract » Full Text » PDF » Supporting Online Material »

Translocator Protein (18 kD) as Target for Anxiolytics Without Benzodiazepine-Like Side Effects

Rainer Rupprecht, Gerhard Rammes, Daniela Eser, Thomas C. Baghai, Cornelius Schüle, Caroline Nothdurfter, Thomas Troxler, Conrad Gentsch, Hans O. Kalkman, Frederique Chaperon, Veska Uzunov, Kevin H. McAllister, Valerie Bertaina-Anglade, Christophe Drieu La Rochelle, Dietrich Tuerck, Annette Floesser, Beate Kiese, Michael Schumacher, Rainer Landgraf, Florian Holsboer, and Klaus Kucher
Science 24 July 2009: 490-493.
Published online 18 June 2009 [DOI: 10.1126/science.1175055] (in *Science* Express Reports)

Possible drug alternative for rapid treatment of anxiety disorders could replace benzodiazepines.

Abstract » Full Text » PDF » Supporting Online Material »

Science. ISSN 0036-8075 (print), 1095-9203 (online)