SPECIAL SECTION

Dealing with Data

INTRODUCTION
692 Challenges and Opportunities

NEWS
694 Rescue of Old Data Offers Lesson for Particle Physicists
696 Is There an Astronomer in the House?
698 May the Best Analyst Win

PERSPECTIVES
700 Climate Data Changes in the 21st Century
J. T. Overpeck et al.
703 Challenges and Opportunities of Open Data in Ecology
O. J. Reichman et al.
705 Changing the Equation on Scientific Data Visualization
P. Fox and J. Hendler
708 Challenges and Opportunities in Mining Neuroscience Data
H. Aki et al.
712 The Disappearing Third Dimension
T. Rowe and L. R. Frank
714 Advancing Global Health Research Through Digital Technology and Sharing Data
T. Long
R. G. Baraniuk
719 Ensuring the Data-Rich Future of the Social Sciences
G. King
721 Metaknowledge
J. A. Evans and J. G. Foster
725 Access to Stem Cells and Data: Persons, Property Rights, and Scientific Progress
D. J. H. Mathews et al.
728 On the Future of Genomic Data
S. O. Kahn

EDITORSIAL
649 Making Data Maximally Available
Brooks Hanson, Andrew Sugden, Bruce Alberts

NEWS OF THE WEEK
654 A roundup of the week’s top stories

NEWS & ANALYSIS
658 Pfizer’s Shakeup Means Less Money for Research
659 From Nuclear Watchdog to the Maelstrom of Cairo

LETTERS
673 Undercutting the Grant Process
A. M. Gade

POLICY FORUM
678 Measuring the Results of Science Investments
J. Lane and S. Bertuzzi

PERSPECTIVES
681 The Eukaryotic Ribosome
V. Ramakrishnan

682 Learning from Nature
J. O. Kephart

683 The Lives of Proteins
J. B. Plotkin

685 The Genetics of Primary Aldosteronism
J. W. Funder

686 Astronomy in the Time Domain
E. Bernardini

687 Unusual Thermoelastic Properties of Methanol Monohydrate
J. N. Grima et al.

CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.
675 Disaster Deferred
S. Stein, reviewed by M. Hamburger
676 Atlas of Science
K. Börner, reviewed by M. A. Porter

POLICY FORUM
678 Measuring the Results of Science Investments
J. Lane and S. Bertuzzi

681 The Eukaryotic Ribosome
V. Ramakrishnan

682 Learning from Nature
J. O. Kephart

683 The Lives of Proteins
J. B. Plotkin

685 The Genetics of Primary Aldosteronism
J. W. Funder

686 Astronomy in the Time Domain
E. Bernardini

687 Unusual Thermoelastic Properties of Methanol Monohydrate
J. N. Grima et al.

CONTENTS continued >>
ESSAYS

689 Genome-sequencing Anniversary: A Celebration of the Genome, Part II
  My Genome
  D. Tutu
  Genome Literacy
  E. T. Dermitzakis
  Personal Genomics: For One and for All
  J. Wang
  The Landscape of Human Evolution
  P. Sabeti
  My Genome, My Identity, My Health
  C. D. M. Royal
  What Will Drive Genomics Over the Next 10 Years?
  A. Caplan
  An Anniversary Party
  K. Stefánsson
  First Steps on a Long Road
  E. Schadt

>> News stories pp. 660, 662, and 666

RESEARCH ARTICLE

730 Crystal Structure of the Eukaryotic 40S Ribosomal Subunit in Complex with Initiation Factor 1
  J. Rabl et al.
  The structure provides insight into how protein synthesis is initiated and into the evolution of the eukaryotic ribosome.
  >> Perspective p. 681

REPORTS

736 Discovery of Powerful Gamma-Ray Flares from the Crab Nebula
  M. Tavani et al.

739 Gamma-Ray Flares from the Crab Nebula
  A. A. Abdo et al.
  Gamma-ray observations of the Crab Nebula by two different space telescopes challenge particle acceleration theory.
  >> Perspective p. 686

742 Negative Linear Compressibility and Massive Anisotropic Thermal Expansion in Methanol Monohydrate
  A. D. Fortes et al.
  At low temperatures, a simple molecular crystal can shrink along one axis when heated and expand along it when compressed.
  >> Perspective p. 687

746 Increasing Solar Absorption for Photocatalysis with Black Hydrogenated Titanium Dioxide Nanocrystals
  X. Chen et al.
  An amorphous surface layer on titanium dioxide nanoparticles creates electronic states that allow longer-wavelength photoexcitation.

750 Complete Fourth Metatarsal and Arches in the Foot of Australopithecus afarensis
  C. V. Ward et al.
  A long bone of the foot of an early human indicates that its foot was stiff and arched, as in modern humans.

753 Embryological Evidence Identifies Wing Digits in Birds as Digits 1, 2, and 3
  K. Tamura et al.
  Digit identities in living birds are the same as in three-fingered dinosaurs, in agreement with paleontological evidence.

757 Structure of MyTH4-FERM Domains in Myosin Vila Tail Bound to Cargo
  L. Wu et al.
  Structural data suggest how mutations in a myosin tail cause deafness in humans.

760 HSPC117 Is the Essential Subunit of a Human tRNA Splicing Ligase Complex
  J. Popow et al.
  The human enzyme that joins transfer RNA exons together is discovered.

764 Proteome Half-Life Dynamics in Living Human Cells
  E. Eden et al.
  In times of stress, long-lived proteins increase their durability.
  >> Perspective p. 683

768 K+ Channel Mutations in Adrenal Aldosterone-Producing Adenomas and Hereditary Hypertension
  M. Choi et al.
  Potassium channel mutations drive both cell growth and hormone production in an adrenal tumor that causes severe hypertension.
  >> Perspective p. 685

772 Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping
  J. D. Karpicke and J. R. Blunt
  Two different ways of thinking through texts are compared for learning value.

775 Leishmania RNA Virus Controls the Severity of Mucocutaneous Leishmaniasis
  A. Ives et al.
  An RNA virus of a parasite binds to human Toll-like receptor 3 and modulates host immune responses to the parasite.

778 Posttranslational Modification of Pili upon Cell Contact Triggers N. meningitidis Dissemination
  J. Chamot-Rooke et al.
  Regulated deaggregation allows meningitis-causing bacteria to propagate to new host cells and migrate across epithelia.
SCIENCEONLINE

SCIENCE

www.sciencemag.org
SCIENCE VOL 331 11 FEBRUARY 2011

SCIENCEEXPRESS
www.sciencexpress.org
The World’s Technological Capacity to Store, Communicate, and Compute Information
M. Hilbert and P. López
An inventory of the world’s technological capacity from 1986 to 2007 reveals the evolution from analog to digital technologies.
10.1126/science.1200970

SCIENTALK
Join an online discussion about data use and access and take our reader poll, both part of this week’s Dealing with Data special section at
www.sciencemag.org/special/data/

SCIENCECAREERS
www.sciencemag.org/career_magazine
Free Career Resources for Scientists
More Than Words: Biomedical Ontologies Provide New Scientific Opportunities
C. Wald
Biomedical ontology is growing as an informatics specialty, and ontologies are proving to be powerful software and data-mining tools.

SCIENCEPODCAST
www.sciencemag.org/multimedia/podcast
Free Weekly Show
Download the 11 February Science Podcast to hear about genomic and climate data challenges, the world’s data capacity, and more.

SCIENCENOW
www.sciencenow.org
Highlights From Our Daily News Coverage
What did George Washington really look like?
Computer analysis allows researchers to reconstruct pre-photography faces.
http://scim.ag/gw-portrait

New Zealand’s Lost-and-Found Pink Terraces
Geologists rediscover a natural wonder drowned for over a century.
http://scim.ag/pink-terrace

Convince Your Friends You’re a Genius With Two Cans and Some Sand
A simple physics experiment highlights the surprising nature of granular materials.
http://scim.ag/sand-trick

SCIENCESIGNALING
www.sciencesignaling.org
The Signal Transduction Knowledge Environment
8 February Issue: http://scim.ag/ss020811

RESEARCH ARTICLE: The Crystal Structure of a Self-Activating G Protein α Subunit Reveals Its Distinct Mechanism of Signal Initiation
J. C. Jones et al.
The Arabidopsis G protein α subunit exhibits properties necessary and sufficient for receptor-independent activation.

PERSPECTIVE: Gαs and Phospholipase C-β—Turn On, Turn Off, and Do It Fast
E. M. Ross
A crystal structure illuminates reciprocal regulation between a G protein and its effector.

PERSPECTIVE: How Cells Use Pseudopods for Persistent Movement and Navigation
P. J. M. van Heerest
A model of pseudopod formation, splitting, and persistence describe how cells migrate.

GLOSSARY
Find out what MAX, FRK, and TIMP mean in the world of cell signaling.

SCIENCE TRANSLATIONAL MEDICINE
www.sciencetranslationalmedicine.org
Integrating Medicine and Science
9 February Issue: http://scim.ag/stm020911

COMMENTARY: Power to the People—Participant Ownership of Clinical Trial Data
S. F. Terry and P. F. Terry
The time has come to crowd-source data for diagnostic and therapeutics development.

COMMENTARY: Electronic Consent Channels—Preserving Patient Privacy Without Handcuffing Researchers
R. H. Shelton
Policy-makers, researchers, and information technology leaders can help transform how we protect and use patient data.

RESEARCH ARTICLE: Photodynamic Ablation of Lymphatic Vessels and Intralymphatic Cancer Cells Prevents Metastasis
T. Tommela et al.
Photodynamic therapy suppresses metastasis by eradicating both the in-transit tumor cells and their conduit to distant tissues.

RESEARCH ARTICLE: 5-Lipoxygenase Metabolite 4-HDHA Is a Mediator of the Antiangiogenic Effect of α-3 Polyunsaturated Fatty Acids
P. Sapieha et al.
In mice, certain fatty acids in the diet are converted to a metabolite that blocks destructive vessel growth similar to diabetic retinopathy.

SCIENCE

www.sciencemag.org/special/data/
>> Dealing with Data section p. 692 and

Sciencesignaling.org
www.sciencesignaling.org
>> Dealing with Data section p. 692

www.sciencemag.org/special/data/
>> Dealing with Data section p. 692 and

www.sciencexpress.org
www.sciencemag.org/special/data/
www.sciencemag.org/special/data/
>> Dealing with Data section p. 692

www.sciencemag.org/special/data/
>> Dealing with Data section p. 692

www.sciencemag.org/special/data/
>> Dealing with Data section p. 692

www.sciencemag.org/special/data/
>> Dealing with Data section p. 692 and

www.sciencemag.org/special/data/
>> Dealing with Data section p. 692

SCIENCE PODCAST
www.sciencemag.org/multimedia/podcast
Free Weekly Show
Download the 11 February Science Podcast to hear about genomic and climate data challenges, the world’s data capacity, and more.

SCIENCE INSIDER
news.sciencemag.org/scienceinsider
Science Policy News and Analysis

SPECIAL SERIES
http://scim.ag/genome10
Human Genome 10th Anniversary
A special month-long series explores the impacts of the genomics revolution on science and society.

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals Mail postage (Publication No. 484460) paid at Washington, DC, and additional mailing offices. Copyright © 2011 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): $149 (174 allocated to subscription). Domestic institutional subscription (51 issues): $999; Foreign postage extra: Mexico, Caribbean (surface mail) $35; other countries (air mail delivery) $185. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #1254 88122. Publications Mail Agreement Number 1069624. Printed in the U.S.A. Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96176, Washington, DC 20090-6176. Single-copy sales: $10.00 current issue, $25.00 back issue prepaid includes surface postage; bulk rates on request. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that $25.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075. Science is indexed in the Reader’s Guide to Periodical Literature and in several specialized indexes.