

EDITORIAL

- 13 Science Attachés in Embassies
Farouk El-Baz

NEWS OF THE WEEK

- 18 Conflicting Papers on Hold as XMRV
Frenzy Reaches New Heights
- 19 India Launches New Probe
of Cyanide Disaster
- 20 Evidence for Free-Flowing Supersolid
Slipping Away?
- 21 From *Science's* Online Daily News Site
- 21 From the *Science* Policy Blog
- 22 Hunting for Plumes, Learning to Live
in a Media Spotlight
- 23 How to Kill a Well So That It's
Really Most Sincerely Dead

NEWS FOCUS

- 24 The Seductive Allure of
Behavioral Epigenetics
A Role for Epigenetics in Cognition
>> *Science Podcast*
- 28 In Archaeobotanist's Hands,
Tiny Fossils Yield Big Answers
- 30 Righting a 65-Year-Old Wrong

LETTERS

- 32 Racial Differences in Breast Cancer Patterns
L. Shi
Cryptic Loss of India's Native Forests
J.-P. Puyravaud et al.
Variability of Our Somatic (Epi)Genomes
V. Sgaramella

FDA Regulations for Drug Development
R. E. Behrman and J. Woodcock
Response
A. D. Levinson

33 CORRECTIONS AND CLARIFICATIONS

BOOKS ET AL.

- 34 Science Tourism:
Some Stops for Summer Trips

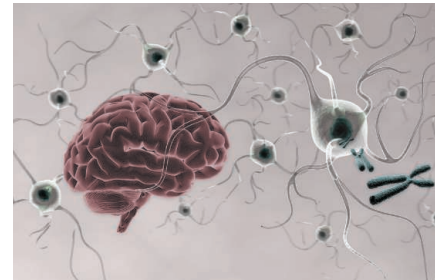
POLICY FORUM

- 38 Synthetic "Life," Ethics, National Security,
and Public Discourse
M. K. Cho and D. A. Relman
>> *Research Article p. 52; Science Podcast*

PERSPECTIVES

- 40 Genes for High Altitudes
J. F. Storz
>> *Reports pp. 72 and 75*
- 41 Tropical Arthropod Species, More or Less?
R. M. May
- 42 Downsizing the Hydrated Electron's Lair
K. D. Jordan and M. A. Johnson
>> *Report p. 65*
- 44 A Guardian of T Cell Fate
J. P. Di Santo
>> *Reports pp. 85, 89, and 93*
- 45 To Cool or Not to Cool
V. Bromm
>> *Report p. 69*

CONTENTS continued >>

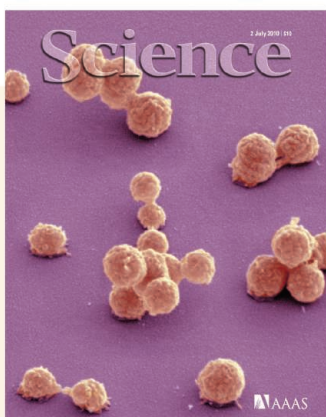


page 24



page 34

Downloaded from <http://science.sciencemag.org/> on October 19, 2018



COVER

Electron micrograph of *Mycoplasma mycoides* JCVI-syn1.0 cells (magnification ~25,000×). These cells were produced following transplantation of a 1.08-megabase pair synthetic *M. mycoides* genome into *M. capricolum* recipient cells. The cells are controlled by the synthetic genome, exhibit the expected phenotypic properties, and are capable of self-replication, thus providing proof of principle for the production of cells from digitized sequence information. See page 52.

Photo: Thomas Deerinck and Mark Ellisman, National Center for Microscopy and Imaging Research, University of California at San Diego

DEPARTMENTS

- 10 This Week in *Science*
- 14 Editors' Choice
- 16 *Science* Staff
- 17 Random Samples
- 97 New Products
- 98 *Science* Careers

REVIEW

- 47 **The Unconscious Will: How the Pursuit of Goals Operates Outside of Conscious Awareness**
R. Custers and H. Aarts

BREVIA

- 51 **Graphite in an Apollo 17 Impact Melt Breccia**
A. Steele et al.
Ancient carbonaceous material possibly delivered during meteorite bombardment has been found in lunar rock.

RESEARCH ARTICLE

- 52 **Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome**
D. G. Gibson et al.
A synthetic *Mycoplasma mycoides* genome transplanted into *M. capricolum* was able to control the host cell.
>> *Policy Forum p. 38*

REPORTS

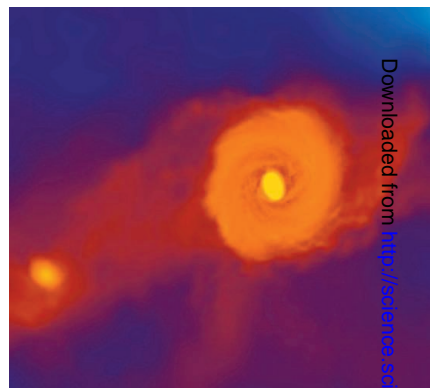
- 57 **A Giant Planet Imaged in the Disk of the Young Star β Pictoris**
A.-M. Lagrange et al.
The Very Large Telescope reveals that a huge planet formed within a star's dusty disk in a few million years.
- 59 **Controlled Injection of Spin-Triplet Supercurrents into a Strong Ferromagnet**
J. W. A. Robinson et al.
Unusual magnetic ordering in a rare earth metal is used to create superconducting currents with aligned spins.
- 61 **Quantized Anomalous Hall Effect in Magnetic Topological Insulators**
R. Yu et al.
Magnetically doped topological insulators are predicted to be ferromagnetic and exhibit the quantum anomalous Hall effect.
- 65 **Does the Hydrated Electron Occupy a Cavity?**
R. E. Larsen et al.
A long-standing model of the solvent geometry surrounding a free charge in water is questioned by new numerical simulations.
>> *Perspective p. 42*

- 69 **Experimental Results for H_2 Formation from H^- and H and Implications for First Star Formation**
H. Kreckel et al.
Precise measurements of molecular hydrogen formation rates help improve models of star assembly in the early universe.
>> *Perspective p. 45*
- 72 **Genetic Evidence for High-Altitude Adaptation in Tibet**
T. S. Simonson et al.
A candidate gene approach reveals genes under selection in humans living at high altitudes.
- 75 **Sequencing of 50 Human Exomes Reveals Adaptation to High Altitude**
X. Yi et al.
Sequencing coding regions identified genetic changes that were likely involved in adaptation to hypoxia.
>> *Perspective p. 40*
- 78 **Genome-Wide Reprogramming in the Mouse Germ Line Entails the Base Excision Repair Pathway**
P. Hajkova et al.
Removing epigenetic marks early in mammalian development involves a DNA damage repair pathway.
- 82 **Increased Mutagenesis and Unique Mutation Signature Associated with Mitotic Gene Conversion**
W. M. Hicks et al.
Repair of double-strand breaks in the genome is accompanied by highly elevated levels of mutagenesis.
- 85 **Reprogramming of T Cells to Natural Killer-Like Cells upon *Bcl11b* Deletion**
P. Li et al.
- 89 **An Early T Cell Lineage Commitment Checkpoint Dependent on the Transcription Factor *Bcl11b***
L. Li et al.
- 93 **An Essential Developmental Checkpoint for Production of the T Cell Lineage**
T. Ikawa et al.
A transcription factor is essential for maintenance of T cell identity.
>> *Perspective p. 44*

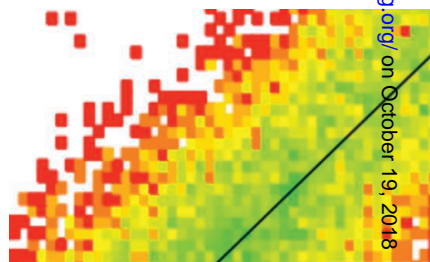
CONTENTS continued >>



page 41



pages 45 & 69



pages 40, 72, & 75

SCIENCEONLINE

SCIENCEEXPRESS

www.sciencexpress.org

Peripheral Protein Quality Control Removes Unfolded CFTR from the Plasma Membrane

T. Okiyoneda et al.

Cells clear misfolded and damaged proteins from the cell surface, sometimes frustrating attempts to treat protein-folding diseases.

10.1126/science.1191542

Genetic Signatures of Exceptional Longevity in Humans

P. Sebastiani et al.

Centenarians have genetic signatures that distinguish them from random individuals but are themselves genetically diverse.

10.1126/science.1190532

>> [Science Podcast](#)

Muscle Dysfunction Caused by a K_{ATP} Channel Mutation in Neonatal Diabetes Is Neuronal in Origin

R. H. Clark et al.

Identification of the origin of muscle weakness that accompanies a form of neonatal diabetes may lead to safer therapies.

10.1126/science.1186146

Functional Modules and Structural Basis of Conformational Coupling in Mitochondrial Complex I

C. Hunte et al.

A long helix transduces conformational energy to the proton-pumping elements in complex I.

10.1126/science.1191046

Ultrahigh Porosity in Metal-Organic Frameworks

H. Furukawa et al.

The large surface areas of these materials would correspond to that of dispersed nanocubes just 3 to 6 nanometers wide.

10.1126/science.1192160

Single-Shot Readout of a Single Nuclear Spin

P. Neumann et al.

The quantum state of a single nitrogen vacancy in diamond can be read out nondestructively in a single-shot measurement.

10.1126/science.1189075

SCIENCENOW

www.sciencenow.org

Highlights From Our Daily News Coverage

'Altitude Doping' Has Its Limits

Athletes who spend too long at high elevation to gain a competitive advantage may be hurting their performance.

Earth-Like Planets May Be Shielded From Solar Scorching

Simulation finds that M dwarf stars will not destroy the atmospheres of habitable worlds.

Bats and Wallabies Have a Lot of NIR

"Fossil" genes from the Ebola family of viruses found in a wide range of mammals reveal pathogens' ancient origins.

SCIENCE SIGNALING

www.sciencesignaling.org

The Signal Transduction Knowledge Environment

EVOLUTION OF SIGNALING SYSTEMS

EDITORIAL GUIDE: Focus Issue—

The Evolution of Complexity

N. R. Gough and W. Wong

With the wealth of data in genomics and proteomics, scientists can begin to investigate how signaling systems evolved.

RESEARCH ARTICLE: Evolution of the TSC1/TSC2-TOR Signaling Pathway

J. Serfontein et al.

PODCAST

C. J. Howe and A. M. VanHook

Analysis of TOR signaling pathway evolution may shed light on the early divergence of eukaryotic lineages.

RESEARCH ARTICLE: Origins and Diversification of a Complex Signal Transduction System in Prokaryotes

K. Wuichet and I. B. Zhulin

PERSPECTIVE: The Promise of Evolutionary Systems Biology—Lessons from Bacterial Chemotaxis

O. S. Soyer

Genomic analysis reveals missing links in the evolution of chemotaxis systems.

NETWATCH: Understanding Evolution for Teachers
Teach and learn evolutionary concepts with materials appropriate for K-12 students; in Educator Sites.

SCIENCE CAREERS

www.sciencereers.org/career_magazine

Free Career Resources for Scientists

Charting Relationships in an Unseen World
S. Carpenter

Metagenomics research probes how complex microbial communities function.

Scoring a Career in Sports Science

K. Travis

Three scientists talk about their careers in sports-related science.

Science Careers Communities

Science Careers Staff

MySciNet and CTSciNet offer opportunities to connect with like-minded scientists.

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org

Integrating Medicine and Science

EDITORIAL: Qualifying Therapeutic

Discovery Project Tax Credit

V. E. Boegh and G. L. Hecimovich

PODCAST

V. E. Boegh et al.

Small life sciences companies can earn tax credits for research and development or exchange these credits for grants.

COMMENTARY: Offering Individual Genetic Research Results—Context Matters

L. M. Beskow and W. Burke

A "one size fits all" threshold cannot be developed for decisions about return of individual results.

RESEARCH ARTICLE: Genomic Architecture Characterizes Tumor Progression Paths and Fate in Breast Cancer Patients

H. G. Russnes et al.

PERSPECTIVE: Translating the Genomic Architecture of Breast Cancer into Clinical Applications

H. M. Horlings et al.

An objective score of structural alterations in tumor chromosomes gives prognostic information about breast cancer.

RESEARCH ARTICLE: Serotonergic Neurons Mediate Dyskinesia Side Effects in Parkinson's Patients with Neural Transplants

M. Politis et al.

A serotonin receptor agonist reduces the involuntary movements that can result from cell-based therapies for Parkinson's disease.

SCIENCEPODCAST

www.sciencemag.org/multimedia/podcast

Free Weekly Show

Download the 2 July *Science* Podcast to hear about genetic signatures of long life, biosecurity and ethical concerns about synthetic biology, behavioral epigenetics, and more.

SCIENCEINSIDER

news.sciencemag.org/scienceinsider

Science Policy News and Analysis

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 © 2010 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): \$146 (\$74 allocated to subscription). Domestic institutional subscription (51 issues): \$910; Foreign postage extra: Mexico, Caribbean (surface mail) \$55; other countries (air assist delivery) \$85. First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request, GST #R1254 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 96178, Washington, DC 20090-6178. **Single-copy sales:** \$10.00 current issue, \$15.00 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 \$20.00 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.



ADVANCING SCIENCE. SERVING SOCIETY

Science

329 (5987)

Science **329** (5987), 10-97.

ARTICLE TOOLS

<http://science.sciencemag.org/content/329/5987>

PERMISSIONS

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

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.