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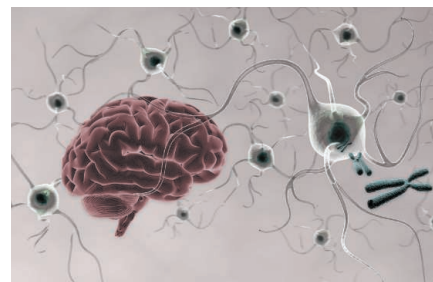
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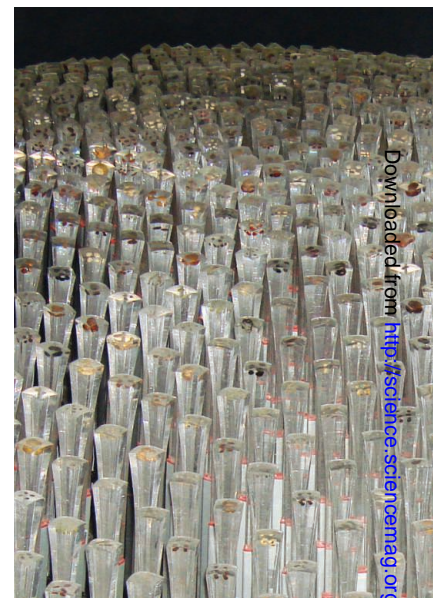
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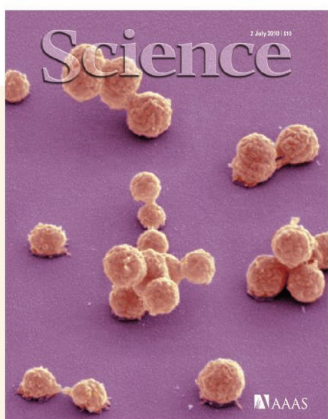


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COVER

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

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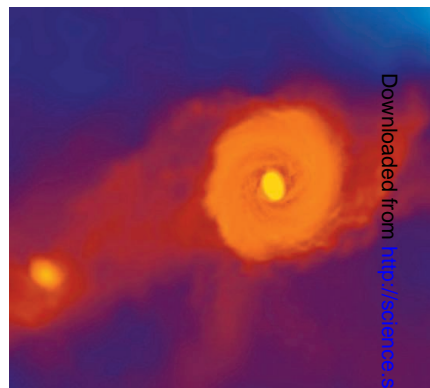
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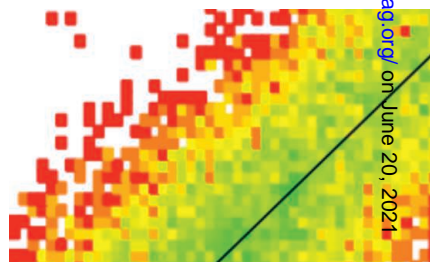
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Peripheral Protein Quality Control Removes Unfolded CFTR from the Plasma Membrane

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

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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.

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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.

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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.

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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.

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

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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

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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.

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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 #1254 88122. Publications Mail Agreement Number 1069624. **Printed in the U.S.A.**

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Science

329 (5987)

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

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