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Geologists Find Vestige of Early Earth—Maybe World’s Oldest Rock 1755

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Scientists Strive for a Seat at the Table of Each Campaign

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BOOKS ET AL.

The Race Between Education and Technology
C. Goldin and L. F. Katz, reviewed by T. Lemieux
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L. Daston and P. Galison, reviewed by A. Richardson

EDUCATION FORUM

School Performance Will Fail to Meet Legislated Benchmarks
M. J. Bryant et al.

PERSPECTIVES

For Quantum Information, Two Wrongs Can Make a Right
J. Oppenheim >> Report p. 1812

The Past Martian Dynamo
B. Langlais and H. Amit >> Report p. 1822

The Metastasis Cascade
C. A. Klein >> Report p. 1841

Unlocking the Potential of the Spoken Word
D. W. Oard

Can Neural Data Improve Economics?
E. Maskin >> Report p. 1849

Nonlinear Thinking About Molecular Energy Transfer
R. M. Stratt >> Report p. 1817
**DEVELOPMENTAL BIOLOGY**

Induced Pluripotent Stem Cells Generated Without Viral Integration

*M. Stadtfeld, M. Nagaya, J. Utikal, G. Weir, K. Hochedlinger*

Transient exposure of mouse fibroblast and liver cells to an adenovirus vector carrying factors that induce pluripotency generates stem cells without viral elements in the genome.

10.1126/science.1162494

**GENETICS**

Conservation and Rewiring of Functional Modules Revealed by an Epistasis Map in Fission Yeast

*A. Roguev et al.*

Comparison of genetic wiring in two types of yeast reveals that protein complexes are conserved, but the interactions between them can change radically between species.

10.1126/science.1162609

**MATERIALS SCIENCE**

Evolution of Block Copolymer Lithography to Highly Ordered Square Arrays

*C. Tang, E. M. Lennon, G. H. Fredrickson, E. J. Kramer, C. J. Hawker*

The addition of hydrogen bonding units to two block copolymers leads to a template with square patterns that can be used for manufacturing integrated circuits.

10.1126/science.1162950

**PHYSICS**

Complete Characterization of Quantum-Optical Processes

*M. Lobino, D. Korystov, C. Kupchak, E. Figueroa, B. C. Sanders, A. I. Lvovsky*

A method requiring only the light from a laser as an input yields a full characterization of quantum optical processes by probing its effect on classical states.

10.1126/science.1162086

**CHEMISTRY**

Assembling Materials with DNA as the Guide

*F. A. Aldaye, A. L. Palmer, H. F. Sleiman*

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**BREVIA**

**GEOPHYSICS**

Magnetic Source Separation in Earth’s Outer Core

*K. A. Hoffman and B. S. Singer*

Analysis of Earth’s magnetic field as it has changed and reversed suggests that its dipole arises from a distinct part of the outer core than that of the rest of the field.

1800

>> News story p. 1756

**RESEARCH ARTICLES**

**MEDICINE**

Core Signaling Pathways in Human Pancreatic Cancers Revealed by Global Genomic Analyses

*S. Jones et al.*

Sequencing of DNA mutations shows that the same 12 signaling pathways are disrupted in most pancreatic tumors, suggesting these as key to tumor development.

1801

**MEDICINE**

An Integrated Genomic Analysis of Human Glioblastoma Multiforme

*D. W. Parsons et al.*

Comprehensive analysis of mutations in a brain cancer identifies previously unidentified cancer genes and a frequently mutated protein that may serve as a therapeutic marker.

1807

**PHYSICS**

Quantum Communication with Zero-Capacity Channels

*G. Smith and J. Yard*

Two quantum communication channels, each of which is so noisy that it has zero capacity to independently transmit information, can do so when used together.

1812

>> Perspective p. 1783

**CHEMISTRY**

Synthesis and Solid-State NMR Structural Characterization of $^{13}$C-Labeled Graphite Oxide

*W. Cai et al.*

Solid-state nuclear magnetic resonance study of graphite oxide made with 100 percent carbon-13 reveals a complex bonding network involving several carbon species.

1815
REPORTS CONTINUED...

CHEMISTRY
Linear Response Breakdown in Solvation Dynamics Induced by Atomic Electron-Transfer Reactions
A. E. Bragg, M. C. Cavanagh, B. J. Schwartz
A solvent equilibrates faster around a sodium-electron ion pair formed from Na⁺ than from Na⁻, violating a widely used approximation for modeling solvent dynamics.

>> Perspective p. 1789

PLANETARY SCIENCE
Mars’ Paleomagnetic Field as the Result of a Single-Hemisphere Dynamo
S. Stanley, L. Elkins-Tanton, M. T. Zuber, E. M. Parmentier
A model of Mars’ early magnetic field with a north-south gradient in heat flow from the core yields a strong field only in the south, explaining the relic magnetism in the crust.

>> News story p. 1756; Perspective p. 1784

GEOCHEMISTRY
The Structure and Dynamics of Mid-Ocean Ridge Hydrothermal Systems
D. Coumou, T. Driesner, C. A. Heinrich
A three-dimensional model shows that mid-ocean hydrothermal systems self-organize into broad warm downflows feeding narrow, pipelike hot upflows.

GEOCHEMISTRY
Neodymium-142 Evidence for Hadean Mafic Crust
An unusual isotopic anomaly in rocks along the Hudson Bay suggests that they formed 4.28 billion years ago and support early formation of a separate reservoir in Earth’s mantle.

>> News story p. 1755; Science Podcast

PSYCHOLOGY
Infants’ Persuasive Search Errors Are Induced by Pragmatic Misinterpretation
J. Topál, G. Gergely, Á. Miklósi, Á. Erdőhegyi, G. Csibra
Infants may make mistakes in certain tasks because of the powerful effects of social interaction with an adult, not because of brain immaturity as was previously assumed.

>> News story p. 1756 & 1828

PSYCHOLOGY
Ingroup Favoritism
C. Efferson, R. Lalive, E. Fehr
Results of a laboratory game show that cultural groups and ingroup favoritism arise spontaneously when individuals display an external marker that predicts their actions.

>> News story p. 1755

MEDICINE
Disruption of the CFTR Gene Produces a Model of Cystic Fibrosis in Newborn Pigs
C. S. Rogers et al.
Newborn pigs carrying a mutated copy of the gene defective in cystic fibrosis exhibit many features of the human disease and may provide fresh insights for therapy.

>> News story p. 1755 & 1828

MEDICINE
Seedling and Propagation of Untransformed Mouse Mammary Cells in the Lung
K. Podsypanina et al.
In mice, normal mammary cells can colonize the lung, suggesting that metastases might arise from displaced normal cells acquiring genetic changes that confer malignancy.

>> News story p. 1756; Perspective p. 1784

MEDICINE
Understanding Overbidding: Using the Neural Circuitry of Reward to Design Economic Auctions
M. R. Delgado, A. Schotter, E. Y. Ozbay, E. A. Phelps
Brain areas sensitive to loss are selectively engaged during bidding in an auction, suggesting that the desire to avoid loss underlies the phenomenon of overbidding.

>> News story p. 1755; Science Podcast

TIPS FOR AUTHORS
Report for Reviewers: A Global Perspective on Science
A. E. Bragg, M. C. Cavanagh, B. J. Schwartz
A solvent equilibrates faster around a sodium-electron ion pair formed from Na⁺ than from Na⁻, violating a widely used approximation for modeling solvent dynamics.
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HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

Conservation Efforts May Have Backfired for Spanish Toad
A potentially deadly fungus was accidentally introduced as part of a breeding program for an endangered amphibian.

Wasps Make Peace With Past Enemies
The insects steer clear of foes they have fought in the past.

Fat Molecule Fights Weight Gain
Compound prevents mice from storing unhealthy fat.

SCIENCE SIGNALING
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RESEARCH ARTICLE: Nedd4 Controls Animal Growth by Regulating IGF-1 Signaling
X. R. Cao, N. L. Lill, N. Boase, P. P. Shi, D. R. Croucher, H. Shan, J. Qu, E. M. Sweezer, T. Place, P. A. Kirby, R. J. Daly, S. Kumar, B. Yang
Nedd4 acts through Grb10 to enhance insulin-like growth factor signaling and control animal growth.

PERSPECTIVE: Caspase-2—Vestigial Remnant or Master Regulator?
C. M. Troy and E. M. Ribe
Both mitochondrial-dependent and -independent cell death pathways are mediated by caspase-2.

PODCAST
E. M. Adler, N. R. Gough, A. M. VanHook
Bacteria secrete factors that regulate genes that contribute to virulence.

Dave Jensen tools up his own career.

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Tooling Up: My Career Dissected
D. Jensen
Dave Jensen highlights some of his own career mistakes.

From Watching 'The Expert' to Being an Expert
L. Cahoon
Melanie Lee attributes her success partly to a childhood TV show.

Union Aftershocks in California
C. Rey
Postdocs and others in the University of California system adjust to life with a union.

The Science Careers Web Log
Science Careers Staff
Here’s where to find information from around the Web on careers in the sciences.

Intracellular colocalization of Grb10 and IGF-1 receptors.

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