



COVER

Millions of books written before the computer era are being digitized for preservation. Because the ink has faded, optical character recognition software cannot decipher many words. Through a repurposing of an existing online security technology called CAPTCHA, these words are being manually transcribed by millions of Web users. See page 1465.

Photo: Joshua Franzos

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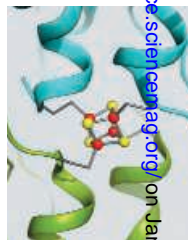
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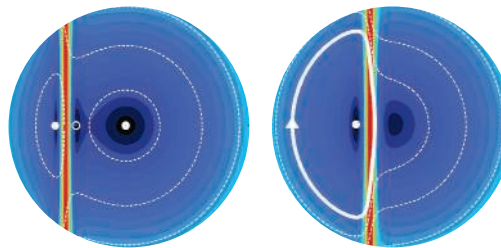
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SCIENCE EXPRESS

www.scienceexpress.org

GENETICS

Species-Specific Transcription in Mice Carrying Human Chromosome 21
M. D. Wilson et al.

An aneuploid mouse carrying a human chromosome shows that genetic sequence can dominate epigenetic, cellular, and organismal effects in determining transcriptional regulation and gene expression.

10.1126/science.1160930

CLIMATE CHANGE

Atmospheric CO₂ and Climate on Millennial Time Scales During the Last Glacial Period

J. Ahn and E. J. Brook

A detailed gas record from the Byrd ice core from 90,000 to 20,000 years ago shows that warming episodes tracked high CO₂ levels in Antarctica but lagged by several thousands of years in Greenland.

10.1126/science.1160832

APPLIED PHYSICS

Cavity Optomechanics with a Bose-Einstein Condensate

F. Brennecke, S. Ritter, T. Donner, T. Esslinger

Coupling a Bose-Einstein condensate to an optical cavity holding a few trapped photons provides a sensitive probe of mechanical oscillations in the quantum regime.

10.1126/science.1163218

CLIMATE CHANGE

Northern Hemisphere Controls on Tropical Southeast African Climate During the Past 60,000 Years

J. E. Tierney et al.

Abrupt changes in precipitation and temperature resolved in a record spanning the past 60,000 years from Lake Tanganyika, East Africa, are coeval with Northern Hemisphere climate events.

10.1126/science.1160485

TECHNICAL COMMENT ABSTRACTS

ECOLOGY

Comment on "A Global Map of Human Impact on Marine Ecosystems" 1446

M. R. Heath

[full text at www.sciencemag.org/cgi/content/full/321/5895/1446b](http://www.sciencemag.org/cgi/content/full/321/5895/1446b)

Response to Comment on "A Global Map of Human Impact on Marine Ecosystems"

K. A. Selkoe et al.

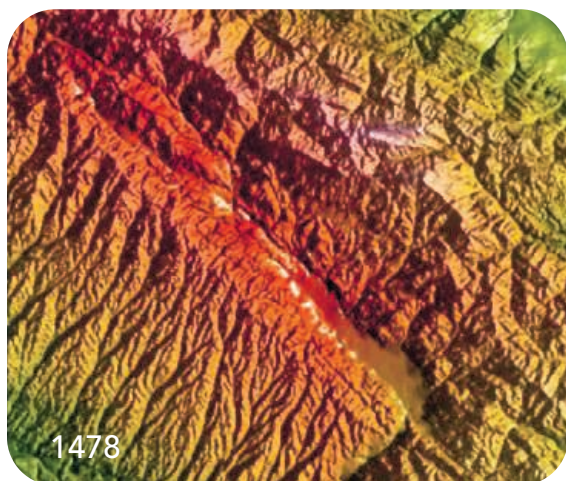
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APPLIED PHYSICS

Cooling, Heating, Generating Power, and Recovering Waste Heat with Thermoelectric Systems 1457

L. E. Bell



BREVIA

GENETICS

A Mutation in Hairless Dogs Implicates *FOXI3* in Ectodermal Development 1462

C. Drögemüller et al.

Mutations in a transcription factor gene involved in ectodermal development cause a lack of hair and abnormal teeth in Chinese Crested, Mexican, and Peruvian hairless dogs.

REPORTS

PHYSICS

Enhanced Sensitivity of Photodetection via Quantum Illumination 1463

S. Lloyd

Quantum-mechanically entangled light, in which one photon is kept as a reference, can exponentially improve the imaging of an object, as compared with unentangled illumination. >> [News story p. 1433](#)

COMPUTER SCIENCE

reCAPTCHA: Human-Based Character Recognition via Web Security Measures 1465

L. von Ahn et al.

A security system that relies on the superior performance of humans in comparison to computers in reading distorted text can be harnessed for digitized scanned documents.

MATERIALS SCIENCE

A Rubberlike Stretchable Active Matrix Using Elastic Conductors 1468

T. Sekitani et al.

A carbon nanotube-polymer film containing organic transistors and coated with silicon rubber can maintain its electrical properties while being stretched up to 70 percent.

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MATERIALS SCIENCE

Imaging of Transient Structures Using Nanosecond in Situ TEM 1472

J. S. Kim et al.

Rapidly pulsing electrons through a transmission electron microscope allows imaging of localized cooling and phase separation along a propagating reaction front in a laminate. >> *Science Podcast*

PLANETARY SCIENCE

The Magnetic Memory of Titan's Ionized Atmosphere 1475

C. Bertucci et al.

Cassini observations show that Saturn's moon Titan retains an imprinted memory of Saturn's magnetic field above its ionosphere, even after passing outside the field.

GEOPHYSICS

Postseismic Relaxation Along the San Andreas Fault at Parkfield from Continuous Seismological Observations 1478

F. Brenguier et al.

Correlating 5 years of seismic noise among nearby receivers reveals subtle seismic velocity signals reflecting changes in the properties of the San Andreas fault at Parkfield.

ATMOSPHERIC SCIENCE

Atmospheric Warming and the Amplification of Precipitation Extremes 1481

R. P. Allan and B. J. Soden

Satellite data show that in the tropics, heavy rain events have increased in warmer months and decreased in colder months, more than predicted by climate models.

PALEONTOLOGY

Superiority, Competition, and Opportunism in the Evolutionary Radiation of Dinosaurs 1485

S. L. Brusatte, M. J. Benton, M. Ruta, G. T. Lloyd

During their early radiation, dinosaur morphology evolved at comparable rates to that of competing archosaurs, implying that opportunity, not superiority, influences their success.

ECOLOGY

Niche Partitioning Increases Resource Exploitation by Diverse Communities 1488

D. L. Finke and W. E. Snyder

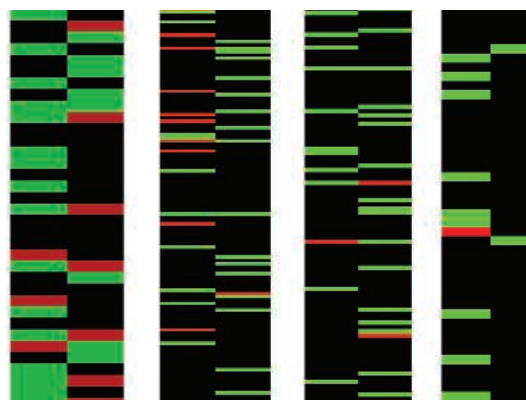
In an ecosystem comprising a parasite, an aphid, and a radish, the use of different resources by each species, not species diversity per se, increases overall consumption.

MOLECULAR BIOLOGY

Degradation of microRNAs by a Family of Exoribonucleases in *Arabidopsis* 1490

V. Ramachandran and X. Chen

A class of nucleases specific for short single-stranded RNAs is found to degrade microRNAs in *Arabidopsis*; their mutation results in numerous developmental defects.



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Activation of Aldehyde Dehydrogenase-2 Reduces Ischemic Damage to the Heart 1493

C.-H. Chen et al.

A compound that activates the mitochondrial enzyme aldehyde dehydrogenase-2 reduces the extent of heart damage in a rodent model of heart attack. >> *Science Podcast*

DEVELOPMENTAL BIOLOGY

Dual Origin of Tissue-Specific Progenitor Cells in *Drosophila* Tracheal Remodeling 1496

M. Weaver and M. A. Krasnow

When fruit flies metamorphose from larvae, a new trachea forms both from undifferentiated cells of the imaginal disc and differentiated cells that re-enter the cell cycle.

>> *Perspective p. 1450*

CELL BIOLOGY

FBXW7 Targets mTOR for Degradation and Cooperates with PTEN in Tumor Suppression 1499

J.-H. Mao et al.

A tumor suppressor is shown to control the degradation of a central protein regulator of cell proliferation.

NEUROSCIENCE

Unsupervised Natural Experience Rapidly Alters Invariant Object Representation in Visual Cortex 1502

N. Li and J. J. DiCarlo

Neurons in the most complex area of the brain's visual cortex can respond to a particular object in any orientation by rapidly learning to associate multiple views of that object.

CELL BIOLOGY

Conformational Switch of Syntaphin-1 Controls Synaptic Vesicle Fusion 1507

S. H. Gerber et al.

The synaptic vesicle protein that mediates membrane fusion during exocytosis also regulates the rate and extent of this process by controlling vesicle tethering.



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Hardy little creatures shrug off extremes of life outside a spacecraft.

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A Knack for Numbers

Kids who are good at judging relative quantities are also good at math.



How to deal with journalists.

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Your Research in the Headlines—Dealing With the Media *E. Pain*

Being prepared can improve the odds that your scientific work is portrayed accurately in the media.

Team Science and the Diversity Advantage

C. Rey

Do scientists with experiences in different cultures have an advantage in an era of team science?

In Person—Peter Brown, Patent Attorney

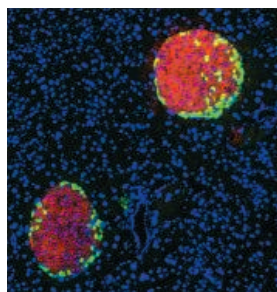
P. Brown

An award-winning New Zealand scientist tells why he decided to move from the bench to the bar.

International Grants and Fellowship Index

GrantsNet Staff

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Pancreatic islets in p110β mutant mice.

SCIENCE SIGNALING

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RESEARCH ARTICLE: Phosphoinositide 3-Kinase p110β Activity—Key Role in Metabolism and Mammary Gland Cancer but Not Development

E. Ciraolo, M. Iezzi, R. Marone, S. Marengo, C. Curcio, C. Costa, O. Azzolino, C. Gonella, C. Rubinetto, H. Wu, W. Dastrù, E. L. Martin, L. Silengo, F. Altruda, E. Turco, L. Lanzetti, P. Musiani, T. Rückle, C. Rommel, J. M. Backer, G. Forni, M. P. Wymann, E. Hirsch

The phosphoinositide 3-kinase p110β subunit has noncatalytic functions; its catalytic activity is pertinent to both diabetes and cancer.

PERSPECTIVE: Smad Signaling Dynamics—Insights from a Parsimonious Model

H. Shankaran and H. S. Wiley

Computational modeling of protein localization dynamics yields new information about Smad signaling.

GLOSSARY

Find out what Kir, Vg1, and YAP mean in the world of cell signaling.



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321 (5895)

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