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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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”
M. R. Heath
full text at www.sciencemag.org/cgi/content/full/321/5895/1446b
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K. A. Selkoe et al.
full text at www.sciencemag.org/cgi/content/full/321/5895/1446c

BREVIA
GENETICS
A Mutation in Hairless Dogs Implicates FOXI3 in Ectodermal Development
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
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
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
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
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
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.

ATMOSPHERIC SCIENCE
Atmospheric Warming and the Amplification of Precipitation Extremes
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
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
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
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.

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

CELL BIOLOGY
FBXW7 Targets mTOR for Degradation and Cooperates with PTEN in Tumor Suppression
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
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 Syntaxin-1 Controls Synaptic Vesicle Fusion
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.
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

E. 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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