



COVER

A mosaic of visible to near-infrared images of the surface of Mercury, obtained by the MESSENGER spacecraft on 14 January 2008. The circular feature in the upper right is the Caloris impact basin, 1500 kilometers in diameter. Results from the flyby are discussed in a special section beginning on page 58.

Image: NASA/Johns Hopkins University Applied Physics Laboratory/Arizona State University/Carnegie Institution of Washington

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www.scienceexpress.org

MOLECULAR BIOLOGY

A Global View of Gene Activity and Alternative Splicing by Deep Sequencing of the Human Transcriptome

M. Sultan et al.

Shotgun sequencing of 27–base pair segments of messenger RNA from human kidney and immune cells identifies previously undescribed transcriptional units and splice junctions.

10.1126/science.1160342

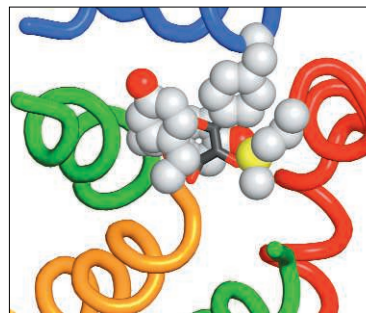
ATMOSPHERIC SCIENCE

BREVIA: N₂O₅ Oxidizes Chloride to Cl₂ in Acidic Atmospheric Aerosol

J. M. Roberts, H. D. Osthoff, S. S. Brown, A. R. Ravishankara

Laboratory studies affirm that the oxidation of chloride ions in aerosols by N₂O₅ is a significant source of chlorine in the troposphere, a major reactant that helps form ozone.

10.1126/science.1158777



BIOCHEMISTRY

The Crystal Structure of a Sodium Galactose Transporter Reveals Mechanistic Insights into Na⁺/Sugar Symport

S. Faham et al.

The structure of a sugar transporter suggests how these proteins may rearrange to permit the sugar to enter and leave the binding site on opposite sides of the membrane.

10.1126/science.1160406

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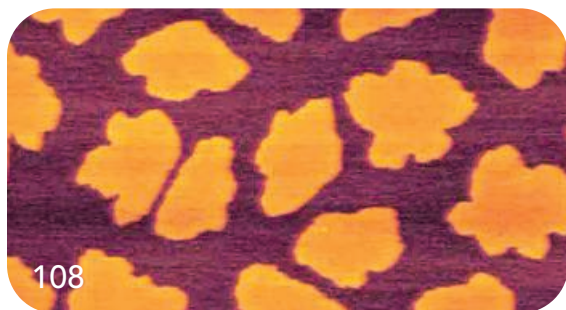
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An annual surge with a geographical range that expanded after the Ice Age shows decreased response to selection at the edges of its new range, as predicted by theory.

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Phanerozoic Trends in the Global Diversity of Marine Invertebrates

J. Alroy et al.

A compilation of more than 3 million specimens of fossil marine invertebrates shows that their diversity increased more in the Jurassic and less since then than an earlier study implied.

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Self-Sorted, Aligned Nanotube Networks for Thin-Film Transistors

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Treating silicon substrates with a silane layer allows them to absorb spin-coated, semiconducting carbon nanotubes, yielding aligned and densely packed nanotube films.

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G. Hlawacek et al.

In contrast to the growth of inorganic films, bending of a rod-shaped organic molecule at step edges and its anisotropy leads to a change from growth of layers to terraced mounds.

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Large and Rapid Melt-Induced Velocity Changes in the Ablation Zone of the Greenland Ice Sheet 111

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Rapid sample spinning during nuclear magnetic resonance spectroscopy reveals a highly ordered cation distribution in layered materials.

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Autophagy Is Essential for Preimplantation Development of Mouse Embryos 117

S. Tsukamoto et al.

As fertilized mouse eggs develop into embryos and maternal proteins are eliminated, the degradative process of autophagy is required for proper growth.

EVOLUTION

Phylogenetic Signal in the Eukaryotic Tree of Life 121

M. J. Sanderson

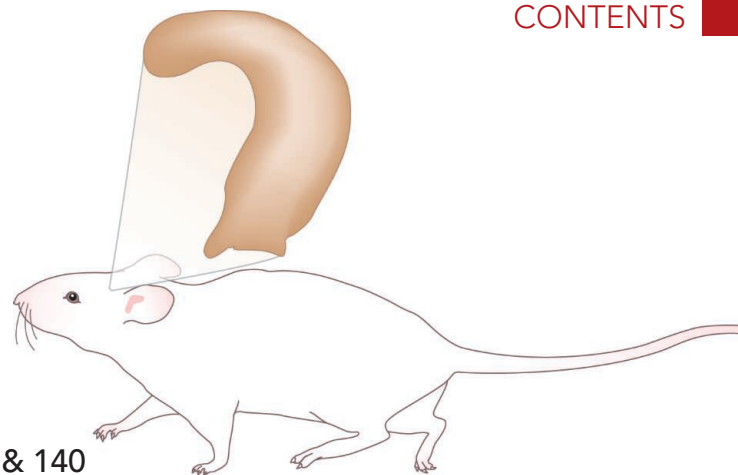
A survey of sequences in GenBank, which represent about 10 percent of described species, shows that the patchy distribution of data is insufficient to build a eukaryotic tree of life.

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Accelerated Human Population Growth at Protected Area Edges 123

G. Wittemyer et al.

Contrary to expectations, human populations living near protected areas in 45 countries in Africa and Latin America are increasing nearly twice as fast as other rural ones.



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Robust, Tunable Biological Oscillations from Interlinked Positive and Negative Feedback Loops 126

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E. Audero et al.

In young mice, expression of higher than normal levels of a type of serotonin receptor causes sporadic death with features reminiscent of sudden infant death syndrome. >> *Science Podcast*

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J. M. Laakso, J. H. Lewis, H. Shuman, E. M. Ostap

Myosin I, a motor protein that plays a role in hearing, is a sensitive tension sensor, reacting to small loads (less than 2 piconewtons) by binding for much longer times to actin.

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The Spread of Ras Activity Triggered by Activation of a Single Dendritic Spine 136

C. D. Harvey, R. Yasuda, H. Zhong, K. Svoboda

When strengthened, individual synapses on dendritic spines contain an activated small regulatory protein that spreads to nearby spines, possibly altering their sensitivity.

NEUROSCIENCE

Finite Scale of Spatial Representation in the Hippocampus 140

K. B. Kjelstrup et al.

The rat hippocampus provides a representation of the animal's entire spatial environment, coding distances up to 1 meter away in the dorsal region and up to 15 meters at the ventral tip.

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Letting go.

SCIENCE NOW

www.sciencenow.org

HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

Why It's Hard to Say Goodbye

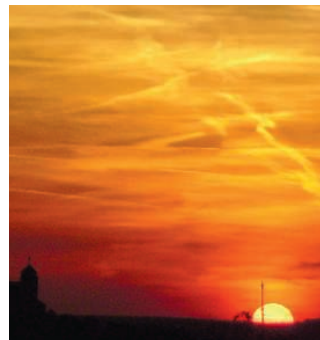
Study links loss of a loved one to the brain's pleasure center.

Don't Judge a Plant by Its Species

An ant, an aphid, and a milkweed are changing thoughts about community ecology.

African Lion-Killer Had Help

Virus conspired with tick-borne parasites and extreme droughts.



Farewell, Micella.

SCIENCE CAREERS

www.sciencereers.org/career_development

FREE CAREER RESOURCES FOR SCIENTISTS

Educated Woman, Postdoc Edition, Chapter 18: End of the Road

M. P. DeWhyse

Micella Phoenix DeWhyse celebrates her Independence Day—and we're sad; with related podcast interview.

Taken for Granted: By the Numbers

B. L. Benderly

A committee calls for better government data collection about jobs for scientists.

In Person: Research in France

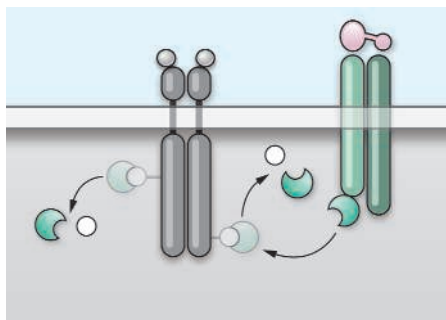
A. Bikfalvi

Understanding the French public research system is critical to foreign scientists coming into the country.

July 2008 Funding News

J. Fernández

Learn about the latest in research funding, scholarships, fellowships, and internships.



TIMP-dependent dephosphorylation.

SCIENCE SIGNALING

www.sciencesignaling.org

THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

REVIEW: Tissue Inhibitors of Metalloproteinases in Cell Signaling—Metalloproteinase-Independent Biological Activities

W. G. Stetler-Stevenson

TIMPs can act directly through cell surface receptors or indirectly through modulation of proteases.

PERSPECTIVE: The Cytoplasmic Tail of MUC1—A Very Busy Place

D. D. Carson

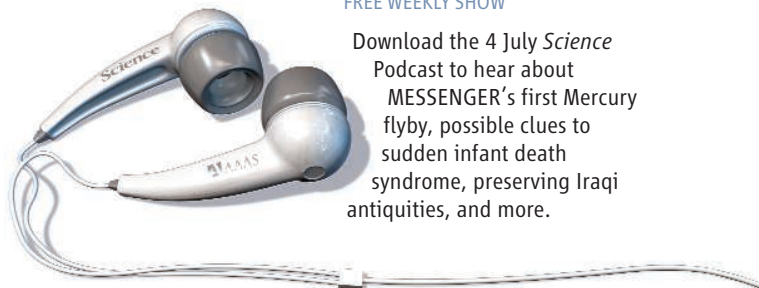
The cytoplasmic domain of mucin 1 (MUC1) plays numerous roles in intracellular signaling pathways.

SCIENCE PODCAST

www.sciencemag.org/multimedia/podcast

FREE WEEKLY SHOW

Download the 4 July *Science* Podcast to hear about MESSENGER's first Mercury flyby, possible clues to sudden infant death syndrome, preserving Iraqi antiquities, and more.



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