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.


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10.1126/science.1160342

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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

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Reduced Responses to Selection After Species Range Expansion
B. Pujol and J. R. Pannell
An annual spurge 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.

RESEARCH ARTICLE
PALEONTOLOGY
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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M. C. LeMieux et al.
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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Relativistic Spin Precession in the Double Pulsar
R. P. Breton et al.
Four years of data track the spin precession of a pulsar orbiting a second pulsar, providing a positive test of general relativity in a strong gravitational field.

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Characterization of Step-Edge Barriers in Organic Thin-Film Growth
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
R. S. W. van de Wal et al.
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Mg/Al Ordering in Layered Double Hydroxides Revealed by Multinuclear NMR Spectroscopy
Rapid sample spinning during nuclear magnetic resonance spectroscopy reveals a highly ordered cation distribution in layered materials.

DEVELOPMENTAL BIOLOGY
Autophagy Is Essential for Preimplantation Development of Mouse Embryos
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
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.

ECOLOGY
Accelerated Human Population Growth at Protected Area Edges
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
T. Y.-C. Tsai et al.
Analysis of known and theoretical oscillatory circuits in cells shows that those with both negative and positive feedback are more robust and allow frequency control independent of amplitude.

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Sporadic Autonomic Dysregulation and Death Associated with Excessive Serotonin Autoinhibition
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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Myosin I Can Act As a Molecular Force Sensor
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
C. D. Harvey, R. Yasuda, H. Zhong, K. Svoboda
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Finite Scale of Spatial Representation in the Hippocampus
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TIMPs can act directly through cell surface receptors or indirectly through modulation of proteases.
PERSPECTIVE: The Cytoplasmic Tail of MUC1—A Very Busy Place
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The cytoplasmic domain of mucin 1 (MUC1) plays numerous roles in intracellular signaling pathways.
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