

Science Breakthroughs

From the origins of the universe, to the mysteries of the ocean floor, articles published in *Science* offer intriguing glimpses of leading-edge discoveries, and expand human knowledge as research moves ever-forward. See www.sciencemag.org. In 2006, *Science* highlights included these and other breakthroughs:



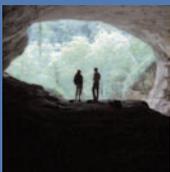
Stardust Surprise

The first samples from a comet, captured by the Stardust Discovery Mission, offered a surprise: Instead of seeing the expected interstellar space materials, researchers discovered a wide range of mineral grains of vastly different origins mixed together. The materials were formed under hot and cold conditions, in the inner and outer parts of the solar system.



Real-Time Changes on Mars

By comparing images of Mars' surface taken seven years apart, researchers documented the formation of new craters and found possible evidence for liquid water trickling down crater walls. (Image courtesy of NASA)



Neanderthal DNA

Based on fragments of nuclear DNA from a 38,000 year-old Croatian Neanderthal bone, researchers said that the most recent common ancestor of modern humans and Neanderthals lived about 706,000 years ago, and the two populations had split into separate species by about 370,000 years ago. The Neanderthal and modern human genomes are more than 99.5 percent identical, they said, though there is little evidence that Neanderthals contributed to the modern human gene pool.



Sea Urchin Genome

The genomic sequence of the purple sea urchin, one of biology's most beloved organisms — more closely related to humans and other vertebrates than fruit flies or nematodes, and capable of living more than a century — promises new insights regarding development, evolution, immunology, gene regulations, and other topics. (Image courtesy of Charles Hollahan)



Fisheries Collapse Predicted

The rate of marine biodiversity loss is accelerating so rapidly that, at current rates, little sustainable fish or sea food may remain by 2048, according to the first "meta-analysis" of data related to the world's marine ecosystems. Still, scientists said, it's not too late to reverse the trend. (Image courtesy of USDA)



Macular Degeneration Gene

The identification of a specific variation within the HTRA1 gene seems to put certain individuals at much greater risk for developing a rapid form of age-related macular degeneration (AMD), the most common cause of blindness in people over 50. Such insights may ultimately lead to improved diagnosis and treatment of AMD.



PTSD and Vietnam Vets

Research based on improved diagnostic methods and military records (rather than self-reports) confirmed that the Vietnam War exacted a substantial psychological toll on returning U.S. soldiers. New investigations revealed a lifetime post-traumatic stress disorder (PTSD) rate of 18.7 percent among veterans as well as a strong "dose-response" relationship to trauma.



Climate Change and Wildfires

Climate change in the western United States seems to have amplified forest wildfire activity in the region over the last 35 years, researchers found. A database of large forest wildfires from 1970 to 2003, compared with climate, hydrology, and land-surface conditions, showed a jump in wildfires in the mid-1980s.



Science of Invisibility Cloaks

Who hasn't imagined how much easier life might be with Harry Potter's invisibility cloak? Two studies offered a hypothetical explanation for how a cloaking device could work, by guiding waves of light around an object, using metamaterials to produce neither reflection nor shadow. A third paper described a real "cloak" for shielding objects from microwave radiation.



Influenza Issue

Contributors to the special influenza issue of *Science* described strategies for marshalling existing concern about the H5N1 strain of avian influenza to build a long-standing international infrastructure to monitor and thwart threats from such emerging infections.



Future Sea Level Rise

The Earth may be warm enough by 2100 for widespread melting of the Greenland Ice Sheet and partial collapse of the Antarctic Ice Sheet, according to two papers featuring model comparisons of Earth's climate 129,000 years ago and over the next century. If the past is a guide, conditions with the potential to melt enough of the Greenland and Antarctic ice sheets to raise sea level by several meters may exist by the end of the 21st century, researchers said.



Cassini Mission to Enceladus

The Cassini space probe, orbiting Saturn since 2004, explores the planet's well-known rings and dozens of moons. Three flybys of Enceladus, one of Saturn's most intriguing

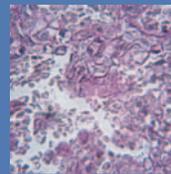
satellites, revealed it to be surprisingly dynamic: A vast plume of water vapor gilds its bright surface with fresh ice, and Enceladus also features a distinctive "tiger stripe" pattern at its southern pole. (Image courtesy of NASA/JPL/Space Science Institute)



Bee and Flowering Plant Diversity

The diversity of bees and the plants they pollinate has declined in Britain and the Netherlands, scientists reported. Many agricultural crops and natural plant communities depend on pollination, often by wild populations of insects. (Image courtesy of Mike Edwards, UK)

Science News



HIV/AIDS Special News Section

In a free special section of *Science*, correspondent Jon Cohen, with photographer Malcolm Linton, outlined the shape of the HIV/AIDS epidemic in Latin America and the Caribbean, the overlapping forces that have driven the spread of the disease. A related video presentation put a human face on the disease. See <http://www.sciencemag.org/sciext/aidsamericas/>.



Less Ice, Higher Seas

Reporter Richard A. Kerr Startling reported that amounts of ice slipping into the sea have taken glaciologists by surprise; now they fear that this century's greenhouse emissions could be committing the world to a catastrophic sea-level rise.



ScienceNOW Celebrates 10 Years

Science's premier Web portal, *ScienceNOW*, marked 10 years of daily dispatches, making it an official pioneer of online science news. Every weekday, reporters with *ScienceNOW* deliver short, intriguing stories on beetle horns, stem cell policy, and more.