



## DATA POINTS: BIG BEYOND PLUTO

This winter astronomers apparently discovered the two largest planetoids beyond Pluto. Called 2003 VB12 (tentatively named Sedna) and 2004 DW, they assume the top spot held by Quaoar, found in 2002. The new objects add to a growing list of large bodies found at the fringes of the solar system; Sedna's extreme location in particular provides evidence for a hypothesized distant collection of icy bodies called the Oort cloud. Astronomers expect to find five to 10 more in the next couple of years, some perhaps even bigger than Pluto.

Diameter, in kilometers, of:  
Pluto: **2,300**

Pluto's moon Charon: **1,300**

Quaoar: **1,250**

2004 DW: **Up to 1,600**

Sedna: **Up to 1,700**

Distance to the sun,  
in billions of kilometers:

Pluto: **4.4 to 7.4**

2004 DW: **4.6 to 7**

Sedna: **13 to 135**

Time to orbit the sun:

2004 DW: **248 years**

Sedna: **10,500 years**

SOURCE: California  
Institute of Technology

## OPTICS

# Attosecond Laser Pulses

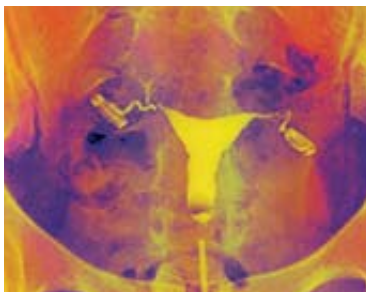
An electron completes an orbit around a hydrogen atom in a mere 150 attoseconds—what the tick of a secondhand is to 200 million years. (One attosecond is  $10^{-18}$  second.) Hoping to investigate such brief phenomena, physicists have made attosecond-scale laser flashes, typically by exciting electrons into ultimately releasing the flash. But precisely measuring the pulses has proved difficult; techniques have relied on indirect means or calculations based on how the pulse was made. A team led by Ferenc

Krausz at the Vienna University of Technology has come up with a more accurate way. The group directed attosecond-scale x-ray flashes at neon atoms to strip the electrons off. Then a second light pulse sweeps the electrons sideways. Knocked clear, the electrons could have their energies measured. That enables researchers to determine the duration of the original pulse, which, in the data reported in the February 26 *Nature*, was 250 attoseconds long. —Alexander Hellemans

## REPRODUCTION

# More Eggs in One Basket

That women are born with all the eggs they will ever have may be a myth. Researchers have found that mice retain the ability to make egg-generating oocyte cells into adulthood. In juvenile female mice, follicles (oocytes encased in support cells) died rapidly enough that egg supplies should have been depleted in days or weeks. Still, mice can remain fertile past one year of age; moreover, follicle numbers overall remained virtually unchanged. This evidence suggests female mice have a previously undiscovered type of stem cell that continuously generates reproductive cells, just as males do. About 60 cells near each mouse ovary possessed chemicals typical of these stem cells. If these findings prove true in humans, theories about how a woman's reproductive system ages and how smoking, chemotherapy and radiation affect fertility will have to be reexamined. The report appears in the March 11 *Nature*. —Charles Choi



EGGED ON: The supply might not be finite.

## ENVIRONMENT

# Power Sludge

Roughly 33 billion gallons of wastewater are treated daily in the U.S. at an annual cost of more than \$25 billion. A microbe-based device could offset the expense by generating electricity as it cleans sewage. The fuel cell, consisting in part of electrodes made of graphite and a carbon-plastic-platinum catalyst membrane, fills with wastewater.

The germs in the sludge generate free electrons as their enzymes break down sugars, proteins and fats. In experiments, the invention produced 10 to 50 milliwatts of power per square meter of electrode surface (5 percent of the power needed to light one Christmas tree bulb). Meanwhile the fuel cell removed up to 78 percent of the water's organic muck. Environmental engineers at Pennsylvania State University say that their hand-size gadget could incorporate alternative materials to generate 10 to 20 times as much power. The findings appeared online in the February 21 *Environmental Science & Technology*. —Charles Choi



WASTEWATER could be a source of electricity.

BRIEF  
POINTS

- Ten of 13 authors of a 1998 paper linking the childhood MMR vaccine to autism retracted their conclusions, in part because the selection of subjects may have been biased and because one author received undeclared funds from a group pursuing legal action on behalf of children allegedly damaged by the vaccine.

*Lancet*, March 6, 2004

- Psychological stress appears to help trigger multiple sclerosis. Parents who lost a child were 50 percent more likely to develop the disease than those who did not; unexpected child deaths doubled the likelihood.

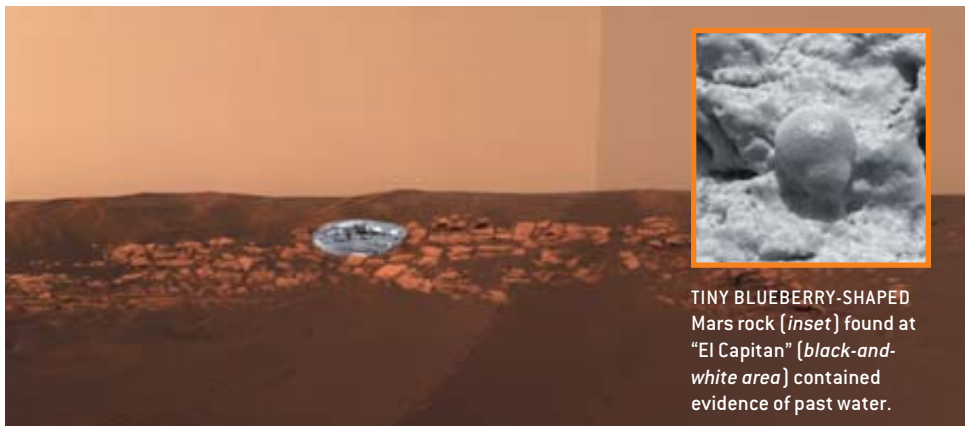
*Neurology*, March 9, 2004

- Astronomers have detected the most distant galaxy yet, one with a redshift of 10, meaning that it is 13.2 billion light-years away. It may be among the first objects in the universe to generate their own light.

European Southern Observatory announcement, March 1, 2004

- Populations of plants, insects and birds in the U.K. have dropped precipitously in the past 40 years—more evidence that the world is in the midst of its sixth mass extinction. The previous one wiped out the dinosaurs.

*Science*, March 19, 2004



TINY BLUEBERRY-SHAPED Mars rock (*inset*) found at “El Capitan” (*black-and-white area*) contained evidence of past water.

## MARS

## Foreshadowing Flashes in the Planum

**Water may explain** mysterious Martian flashes. For decades, astronomers have spied bursts of light on sites such as Meridiani Planum, where the rover Opportunity landed, even when the skies above the Red Planet were clear. Perhaps dunes or salt deposits left behind by ancient seas were reflecting sunlight. In 2002 NASA’s Mars Odyssey orbiter found signs of ice lurking just below the planet’s surface, including at Meridiani. This March, Opportunity sent back stunning evidence that water once drenched those very rocks. The rover’s onboard spectrometers detected high concentrations of metal sulfate salts. Terrestrial rocks with that much sulfur either formed in water or soaked in it a long time. Rice-shaped indentations in the rock strongly resemble voids left by salt crystals grown in briny Earth water, and BB-size particles could have formed from minerals deposited in wet, porous rock. The flashes and the Odyssey results “support the Opportunity findings that there’s something very interesting, and related to past Mars soaking, in this area,” comments William Sheehan, an astronomer based in Willmar, Minn., who predicted and documented the most recent Martian flashes. —*JR Minkel*

## PHYSICS

## Nonstick Sliding

**Friction arises when** the atoms of a sliding surface “pluck” opposing atoms, producing vibrations that fritter energy away into heat. If the solids interact weakly enough, they should be able to rub without making vibrations—in other words, without friction. Ernst Meyer and his co-workers at the University of Basel have conclusively borne out this decades-old prediction by sliding a custom-made silicon tip over a crystal of salt. When the downward force on the tip is high, the atoms in the crystal get stretched like springs, and the tip repeatedly sticks and slips its way over the corrugated crystal surface, with each slip dissipating energy into heat. But when the force is low enough, the atomic bonds stay rigid, and the tip slides smoothly, producing essentially zero friction. The stick-and-slip results were scheduled to appear in an April issue of *Physical Review Letters*. —*JR Minkel*

## NEAR-EARTH OBJECTS

## Close Calls

**For nine hours in January**, a real-life *Deep Impact* looked possible. Thankfully, the first asteroid ever predicted to hit Earth within days (and with megaton force) turned out to be a false alarm. “I never said I was going to call the White House, as the 24/7 news media reported,” says astronomer Clark R. Chapman of the Southwest Research Institute in Boulder, Colo. At a February conference on planetary defense, Chapman faced accusations that he overreacted to early data on Asteroid 2004 AS1, which passed Earth with distance to spare. Keeping watch for collisions today is the Spaceguard Survey, an international network of observatories, but it only looks for objects bigger than a kilometer across. Smaller threats, such as the 500-meter-wide 2004 AS1, can go undetected. To track them, Representative Dana Rohrabacher of California has proposed legislation to boost planetary defense funding from \$3.5 million to \$20 million annually. —*Ian Steer*