an even more frightening scenario: "The missing data also reveal how a stolen bomb might be set off," Gary Milhollin of the Wisconsin Project on Nuclear Arms Control wrote on 16 June in *The New York Times*. Such fears led Senate Energy Committee chair Frank Murkowski (R–AK) to press DOE officials to confirm or deny that assertion at a hearing last week. They declined, citing security concerns.

Some specialists, however, doubt that even savvy terrorists would be able to defeat the multiple fail-safe devices that prevent an unauthorized user or an accident from detonating a weapon manufactured by one of the major nuclear powers. Although little is known publicly about Russian and Chinese weapons, U.S. and European warheads are known to carry "electronic combination locks," called permissive action links (PALs), notes arms-control scholar Dan Caldwell of Pepperdine University in Malibu, California. PALs automatically disable a weapon if a user makes repeated guesses at the correct digital code, he says. Even a thief with the right code would still face formidable obstacles to detonating the weapon, as sensors must detect an exact sequence of pressure, acceleration, or temperature changes before triggering the conventional explosives that prime the nuclear reaction. In addition, the trigger mechanism is believed to be sealed in a tamper-proof barrier that disarms the weapon if it is pried apart or subjected to unusual electromagnetic bursts. For all these reasons, the idea that terrorists could use information on the NEST hard drives to arm a stolen weapon "doesn't seem to be the most plausible" scenario, says Mello.

Still, the disappearance of the disks has reignited a long-running debate in Congress over how to protect U.S. nuclear secrets. Richardson and several senators had long resisted appointing someone to lead the new nuclear security agency, saying that the organization undermines the secretary's authority and would hamper environmental cleanup and civilian science programs at the labs. That resistance evaporated just days after DOE revealed the loss of the hard drives, however, with the Senate voting 97–0 on 15 June to confirm Gordon.

More changes are on the way. In interviews after the disks were rediscovered, Richardson said he had already ordered the reintroduction of document tracking and other security measures abandoned in the early 1990s. He promised to penalize researchers involved in the disk episode, once identified, and he declared that officials at the University of California, which oversees both Los Alamos and California's Lawrence Livermore weapons lab, "have some explaining to do." The university is "very strong on science," he noted, but hasn't "done a good job" on security.

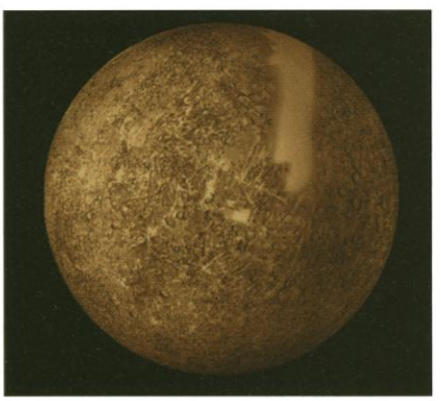
Six members of the House Commerce Committee, including Representative John Dingell (D–MI), want Richardson to dump UC. "It is time for [DOE] to take charge," they wrote in a 16 June letter. Other critics, such as Milhollin, would like to give weapons work back to the Pentagon, which controlled it during and immediately after World War II, saying that it "has a much better security record." UC's contract runs through 2002, however, and spokesperson Rick Malaspina says its "commitment to managing the labs remains strong."

Meanwhile, many Los Alamos researchers are demoralized by the latest publicity and beg to be left alone. "Things were just getting back to normal after the fire," says one scientist. "Now we're right back in the flames." –DAVID MALAKOFF

PLANETARY SCIENCE

Imaging Spat Pits Amateur Against Pros

BOSTON—A long-running dispute over who should get credit for first reporting landmarks on Mercury's uncharted hemisphere burst into public view on 26 May, when a Boston University press release claimed honors for a BU team without mentioning the contributions of an erstwhile collaborator, amateur astronomer Ron Dantowitz. The row, which has left both sides bitter and unwilling to work with each other, "was the opposite of how a collaboration between amateurs and professionals should be," says one of the scientists involved.



Two different takes on a world. Full frontal Mercury imaged by Mariner 10 (*above*) and a slice of the planet's once-hidden hemisphere imaged by Dantowitz's team (*top right*) and Mendillo's group (*bottom*).

CREDITS: (TOP TO BOTTOM) ASTROGEOLOGY TEAM/U.S. GEOLOGICAL SURVEY; RONALD DANTOWITZ, BOSTON UNIVERSITY

Mercury is a major challenge to observe, because Earth-based telescopes must tease out the tiny planet's reflected light from the sun's glare. And Mercury orbits too close to the sun to be imaged by the Hubble Space Telescope, whose optics might be damaged by stray sunlight. Most of what we know about the scorched and pitted planet comes from images beamed back by Mariner 10, which in three flybys in 1974 and 1975 mapped half its surface. For the next quarter-century, the other half remained a mystery.

That was until Dantowitz, an education associate at the Boston Museum of Science, developed a technique called selective image reconstruction. It improves on the established "shift and add," in which short-exposure photos, snapped in rapid succession, are aligned and combined for an overall sharper picture. The technique helps remove much of the blurriness caused by Earth's turbulent atmosphere. Dantowitz's improvements are faster imaging—using 1/60th-of-a-second frames from a high-speed video camera—and an old-fashioned eyeballing of each frame to select the sharpest parts of the best images, snapped during minimal turbulence, before creating the composite image. Testing his approach with light gathered by a 12-inch (30-cm) telescope at the museum's Gilliland Observatory, Dantowitz a couple of years ago captured sharp views of the Russian space station Mir and the U.S. space shuttle. Later, at the 60-inch (152-cm) Mount Wilson Observatory in California, he obtained high-resolution images of Jupiter and Saturn and their satellites.

In 1998 Dantowitz, with Scott Teare of the University of Illinois, Urbana-Champaign, was planning to observe Mercury from Mount Wilson when he was contacted by BU astronomer Michael Mendillo, who studies the planet's rarefied sodium atmosphere and wanted to cooperate on a project along with BU colleagues Jeffrey Baumgardner and Jody Wilson. "I offered to send the video feed of the high-speed camera to their digital recorder," Dantowitz says. His group gathered data on the planet in late August 1998 and copied it, as promised, to a BU recording device.

Several months later, Dantowitz's team—including Teare and the museum's Marek Kozubal—finished its analysis, in which they described dark plains and at least one large, bright crater on Mercury's unmapped hemisphere. In June 1999, the trio submitted a paper to *The Astronomical Journal*.

The submission surprised the BU group, which learned about it through the Internet. They had been planning to list Dantowitz as a co-author on a paper featuring their own analyses. "We felt we had a collaboration," says Baumgardner, "but he submitted his pa-

per unilaterally without consulting us at all." In a 24 August letter to *Astronomical Journal* editor Paul Hodge of the University of Washington, Seattle, Mendillo claimed that Dantowitz's paper was based on data belonging to the group and not Dantowitz's exclusive intellectual property. Hodge responded that he would hold up publication until the parties resolved the disagreement themselves.

After negotiations conducted mostly by e-mail—Mendillo and Dantowitz at the end were no longer on speaking terms—the two teams last February agreed to publish separate papers highlighting the newly observed mercurial features, which both appeared in last month's issue of *The Astronomical Journal*. The matter appeared settled, until BU issued a press release touting the technique and the images in advance of a presentation by Mendillo on 2 June at a meeting of the American Geophysical Union in Washington, D.C. Conspicuously absent was reference to the work of Dantowitz and his colleagues. In retrospect, says Baumgardner, "it probably would have been better if we had had a common press release." With the bad blood, however, the teams may have Mercury's once-obscured face in better perspective than each other's point of view.

–GOVERT SCHILLING

Govert Schilling is an astronomy writer in Utrecht, the Netherlands.

NEUROBIOLOGY

Death Leads to Brain Neuron Birth

Of all the body's organs, the brain seems least able to repair itself if damaged by injury, disease, or stroke. Indeed, throughout most of the 20th century, scientific wisdom held that neurons simply could not regrow after brain development ended. But in the past few years, scientists have provided mounting evidence of neurogenesis, or the production of new neurons, in some areas of the adult brain in organisms ranging from birds to mice and primates. One area that did not seem capable of such regeneration, however, was the neocortex—the region most concerned with such higher brain functions as memory and learning. But new work has now added the neocortex to the list.

In the 22 June issue of *Nature*, neuroscientists Sanjay Magavi, Blair Leavitt, and Jeffrey Macklis of Children's Hospital and Harvard Medical School in Boston report that when they induced certain neurons in the neocortex of adult mice to self-destruct, the loss triggered the formation of replacement neurons by brain stem cells. What's more, the newly formed neurons migrated to the same positions and made the same connections as their deceased predecessors.

Making tracks. A neuron labeled for both BrdU (green) and Doublecortin (red) can be seen making its way into the neocortex.

CREDIT: S. S. MAGAVI, B. R. LEAVITT, J. D. MACKLIS, *NATURE* (22 JUNE 2000)

"This work shows that the adult brain has the capacity to respond to damage by repairing itself," says neuroscientist Elizabeth Gould of Princeton University. If similar regeneration of brain neurons can be triggered in humans, the findings could open the door for treatments that might restore memory in Alzheimer's disease, for example, or undo the damage wreaked by spinal cord injury.

The current research is an outgrowth of previous findings in which Macklis and his colleagues showed that cell death, of all things, could foster a healing environment. Working with neurobiologists Constance Scharff and Fernando Nottebohm of Rockefeller University in New York City, Macklis had selectively induced apoptosis, a form of programmed cell death, in song-related areas of the brains of zebra finches. The result: a burst of neurogenesis. (The research was published in the 24 February issue of *Neuron* and was also described in *Science*, 25 February, p. 1381.) "But this was in a brain area and species where we know neurogenesis takes place," notes Macklis. "The next question was, 'Could we induce it where it does not normally occur?' "

To find out, Macklis and his Harvard colleagues zeroed in on a group of neurons in the mouse neocortex. Although new neurons were not known to grow in the area, it is near a potential source of neurons, because it lies above the subventricular zone, which contains so-called multipotential neural precursor cells, better known as stem cells. The researchers injected a select group of neurons in the neocortex with a light-activated chemical that triggers apoptosis. The resulting neuronal death mustered the underlying precur-

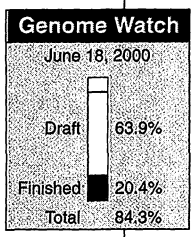
ScienceScope

Reviving the Dead Zone A White House plan to shrink the Gulf of Mexico's "dead zone" calls for major cuts in river-borne nutrients and more funds to create pollution-trapping wetlands and stream-side buffers. But observers say the draft road map, released last week by the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, still lacks some key details—such as a price tag.

The 18,000-square-kilometer dead zone appears each spring at the mouth of the Mississippi. Floods wash excess nitrogen into the gulf, triggering algae blooms and an ecological chain reaction that reduces oxygen levels and suffocates sea life (*Science*, 10 July 1998, p. 190). To reduce the nutrients, the panel calls for restoring 2 million hectares of wetlands and cutting fertilizer runoff by 20% by 2010 in the Mississippi Basin, which holds more than half of the nation's farmland.

Will Congress back the plan? "That depends on the price—and assurances that it won't harm the region's $100 billion farm economy," says a House aide. A final version is due later this year.

Any Day Now In May, the 16 international partners producing a publicly owned sequence of the human genome set a 15 June deadline for submitting 90% of the gene-containing regions to GenBank, a public database. The milestone would signal the end of a frantic race to produce a rough draft of the 3.3-billion-base genome ahead of private competitor Celera Genomics of Rockville, Maryland.



But as of 18 June, the team was short of its goal—stuck at about 84% (right). A weekly tabulation by the National Center for Biotechnology Information (NCBI) revealed one reason why: Although GenBank has almost 3.9 billion bases of human sequence in-house, more than a billion are duplicates. The duplication is a natural outcome of the sequencing process, which starts with small chunks of overlapping DNA that are pieced together into a long, continuous string. As a result, the "redundancy goes up as [the project] approaches completion," explains NCBI's Greg Schuler. His Genome Watch, which charts sequencing progress, has edged up at just 1% per week lately, but the sequencers still hope for a June finish. Tune in to www.ncbi.nlm.nih.gov/genome/seq/HsHome.shtml to see if they make it.

Contributors: Jocelyn Kaiser, Pallava Bagla, David Malakoff, Elizabeth Pennisi