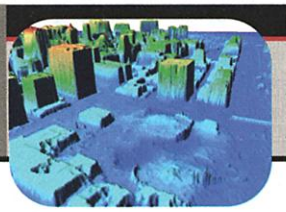

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Marshaling science against terrorism

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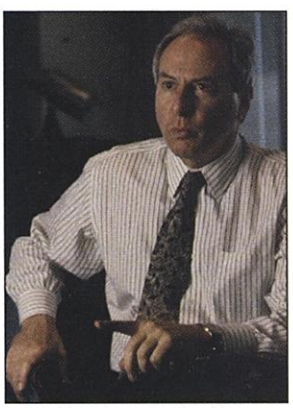
China's first foreign hire

NASA

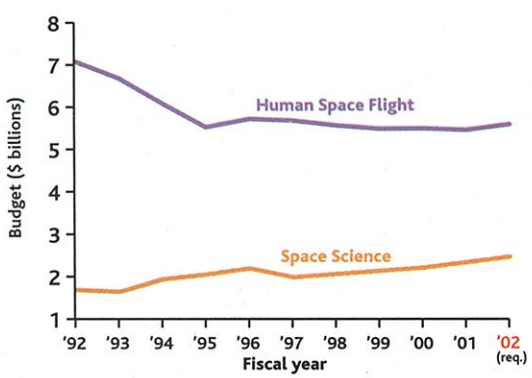
Goldin Quits Top Space Agency Post, But His Legacy Lingers

Revolution is an overused term in Washington, a city always claiming to be reinventing its institutions. But when NASA chief Dan Goldin departs next month after nearly a decade of service, he will leave behind a U.S. civilian space program that even his harshest critics say has been streamlined, modernized, and made more flexible. Unfortunately, Goldin is also walking away from an agency struggling with huge cost overruns on the space station, an aging shuttle system, and a simmering revolt by life and microgravity scientists. And his take-no-prisoners management style has created a power vacuum within the agency's upper ranks.

A 30-year veteran of the aerospace industry, Goldin imposed a "faster, cheaper, better" philosophy on an institution that had grown accustomed to multibillion-dollar science and human space flight efforts, each of which required decades to complete. "He was somewhat brilliant in technical matters and had the social skills and stamina to get across his message," says one veteran agency manager. "For the most part, he succeeded in his revolution—and the science program is better for it." But the cost of that revolution was high, say those who worked with him. "The change was difficult: He was a brutal person to work for," recalls Wesley Huntress, who served as Goldin's space science chief and who now is a geophysicist at the Carnegie Institution of Washington.

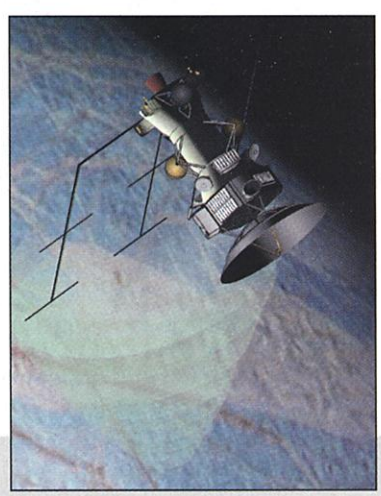


Friend of science. Dan Goldin nurtured space science at NASA, including a planned Europa mission that will search for life on the Jovian moon, even as funding for human space flight dropped significantly during his tenure.



Goldin's resignation came after the White House declined to send a signal that it wanted him to remain, even though it has been having trouble finding a successor, according to Administration sources. He went public with his decision on 17 October, 1 day after his chief of space flight, Joseph Rothenberg, announced his retirement. Goldin will leave in mid-November. Because the deputy administrator slot has never been filled under Goldin's tenure, the two vacancies will leave the agency very thin at the top. Former Senator Jake Garn (R–UT) and Thomas Moorman, an aerospace executive and retired Air Force general, are rumored to be current candidates for the top job.

Goldin was named administrator in April 1992 after a series of agency embarrassments, including the Hubble Space Telescope's faulty vision. He wasted no time in revamping mammoth projects. Under his tenure, for example, the $15 billion Earth Observing System was split up into large and small satellites, while a series of smaller planetary spacecraft were openly competed. The 1993 failure of the $1 billion Mars Observer gave Goldin the chance to apply that philosophy to the agency's Mars program. But the approach—which resulted in the successful



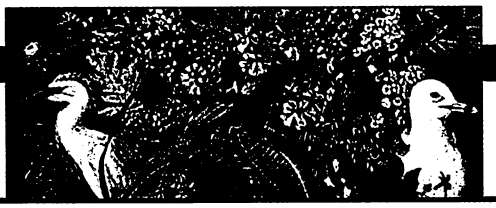
Tight Budget Forces Agencywide Review

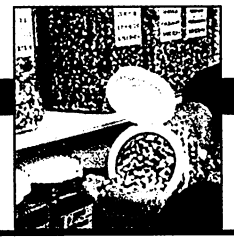
The first task awaiting NASA's next administrator is likely to be damage control. The White House has asked agency managers and outside advisers to find ways to squeeze NASA's budget and hold down costs for the U.S. share of the international space station.

"This is a major reexamination of the agency," says Charles Kennel, director of the Scripps Institution of Oceanography in La Jolla, California, and chair of NASA's Advisory Council. Senior agency officials are drawing up a list of proposed institutional changes, from mothballing the facility that handles Apollo lunar samples to giving universities responsibility for operating spacecraft, that the council will review in early December. In the meantime, an independent panel chaired by retired aerospace executive Thomas Young is expected to issue a report next week on how NASA should handle space station overruns without decimating plans for conducting scientific research on it. Sources say the program, which faced a $5 billion overrun last year, remains more than $1 billion in the hole despite significant trimming.

Both the institutional study and the space station report stem from the Bush Administration's desire to curb the growth of NASA's annual budget. Congress may finish work this week on a 2002 request for $14.5 billion—$200 million more than in 2001—that allows few initiatives. "It's impossible at this stage to do all the good things NASA wants to do," says Rafael Bras, a hydrologist at the Massachusetts Institute of Technology and a member of the Advisory Council. "We are very, very concerned." –A.L.

CREDITS: (CLOCKWISE FROM TOP) RICK KOZAK; NASA/JPL SOURCE: NASA





landing of the innovative Mars Pathfinder—was called into question after the 1999 failures of the Mars Polar Lander and Mars Climate Orbiter, mishaps that many blamed on hasty attempts to cut corners on costs. Goldin also tried to cancel the $3 billion Cassini mission to Saturn in favor of less massive approaches, but he lost out to congressional and scientific pressure to spare the program.

Despite those defeats, Goldin is credited with a successful reformulation of NASA's scientific goals. "He raised the level of space science in the agency," says Huntress. Adds John Logsdon, a political scientist at George Washington University, "He made the science program conceptually interesting, and now it has a strategic vision."

Goldin's most ambitious attempt to rethink the agency's scientific mission built upon the discovery of purported evidence of ancient fossil life in a Mars meteorite found in Antarctica (*Science*, 16 August 1996, pp. 864 and 924). That announcement, although controversial, invigorated efforts at NASA to find extrasolar planets and explore bodies within the solar system, such as Jupiter's moon Europa, where conditions may be conducive to life. The approach, using the Hubble Space Telescope and future missions, won strong backing from the Clinton White House.

But other pieces of Goldin's science legacy shine less brightly. He was late in revamping the agency's troubled life and microgravity sciences program, which remains stymied by a lack of leadership, flight opportunities, and respect from the larger biological and physical sciences communities. The space station's voracious appetite for construction funds has put planned scientific facilities on the back burner. And recent moves to scale back crew size on the station may limit the number and scope of life and microgravity experiments that can be performed there.

Goldin's proclivity to use and discard managers could cause problems for his successor. "He left no disciples, no legacy within the ranks," says one senior government official who worked closely with him. His abrasiveness and the fact that he was a holdover from the Clinton Administration left him without support in the new White House, placing him in limbo since January, aides say. But even without friends or a following in the Bush Administration, Goldin's revolution may now be so deeply rooted that it cannot be reversed. **–ANDREW LAWLER**

CREDIT: STEVEN E. FRISCHLING/CORBIS SYGMA

BIOTERRORISM

Researchers Question Obsession With Cipro

Everybody loves Cipro. In the aftermath of deadly bioterrorist attacks on U.S. soil, the first line of defense against anthrax has reached Viagra-like status: Many people are suspected of hoarding it, or even gulping it, and supplies at pharmacies are running out. Some have urged the government to break Bayer's patent on ciprofloxacin, as the compound is officially known. As NBC news anchor Tom Brokaw—himself the target of one of the mail attacks—put it: "In Cipro we trust."

But some scientists warn that the current obsession with Cipro is unwarranted and may backfire. Other, cheaper antibiotics can treat anthrax, they argue, and popping too much of the drug may create resistance in other pathogens. It might also tempt future bioterrorists to produce Cipro-resistant strains of *Bacillus anthracis*—which a recent study by U.S. scientists shows is possible.

So what exactly catapulted Cipro to drug manufacturer's heaven? The roots of Cipro's popularity go back to the Gulf War, says C. J. Peters, a former deputy commander of the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) in Fort Detrick, Maryland. When Operation Desert Shield was launched in 1990, the U.S. suspected Saddam Hussein of having a biological warfare program that included anthrax, and vaccines were in short supply. Peters—who is now director of the Center for Biodefense at the University of Texas Medical Branch in Galveston—says he and other experts had a "little huddle" to choose the best antibiotic out of dozens available to counter the threat. Their biggest concern, he says, was that Iraq would develop resistant strains. So the group focused on ciprofloxacin, which not only killed anthrax readily in the test tube but was also relatively new, minimizing the chance that Iraq had figured out how to elude it. A quick experiment by USAMRIID's anthrax expert Arthur Friedlander showed that the drug worked well in monkeys, says Peters. "So we said: Go with Cipro!"

As a result, Bayer supplied the government with 30 million tablets of Cipro during the war, according to a company slide show posted at the U.S. Food and Drug Administration's (FDA's) Web site. That marked the beginning of the drug's ascent. In 1998, it appeared as the drug of choice in the Army's *Medical Management of Biological Casualties Handbook*. In 1999, a group of experts published a so-called "consensus statement" about anthrax biowarfare in *The Journal of the American Medical Association*. Their conclusion: As long as the anthrax strain is unknown, Cipro is the best bet, because there have been no published reports about resistance.

But the group, headed by Thomas Inglesby of the Johns Hopkins Center for Civilian Biodefense Studies in Baltimore, Maryland, also concluded that once researchers find out that the strain is vulnerable to other antibiotics, doctors should just go with "the most widely available, efficacious, and least toxic" one. Cipro can cause a series of side effects, which some believe may be especially serious in children.

Drug of the day. Overreliance on Cipro may tempt future terrorists to create resistant strains; a recent study shows that it can be done.

In August 2000, the FDA added Cipro to the list of antibiotics approved for use in victims of anthrax inhalation. But it's not better than other antibiotics, says Peters; the edge that it had 10 years ago—its newness—is long gone. Besides, "if you rely too much on Cipro, you're inviting people to create resistant strains," says Paul Keim of Northern Arizona University in Flagstaff.

In fact, Keim and his colleagues have already done just that, they reported at a recent meeting. Their goal was to find the mutations that make *B. anthracis* invulnerable to the drug, which could help quickly detect other Cipro-resistant strains in the future. To