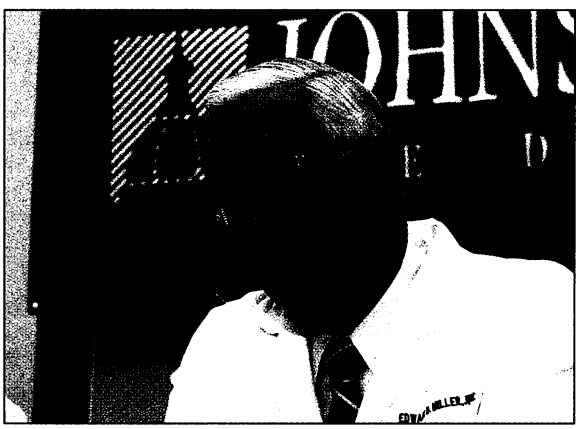
faculty. But, he added: "We accept full institutional responsibility" for the tragedy.

The inquiry concluded that the fatal reaction was probably triggered by a chemical used in the trial, hexamethonium bromide. Roche was the third volunteer to inhale this chemical; the first developed a short-lived dry cough, and the second reported no problems. Roche responded differently. The alveolar sacs of her lungs, which transfer oxygen into the blood, were irreversibly damaged. She slowly asphyxiated between 4 May, when she inhaled hexamethonium, and 2 June, when she suffered multiple organ failure.



Full responsibility. Johns Hopkins medical dean Edward Miller announced institutional changes at a press conference.

Hexamethonium blocks certain autonomic system nerves, including those controlling the airways. It was used as part of a simulated asthma episode in volunteers who were given a drug that induces asthma-like effects. More than 3 decades ago, doctors prescribed a pill form of hexamethonium to treat hypertension; that approved use ended when manufacturers withdrew the drug in the 1970s. (Its main side effect was to decrease blood pressure too much.) Clinical researchers a decade ago also gave an inhalable form of hexamethonium—similar to the one used at Hopkins—to 20 volunteers in two independent studies. They reported no ill effects. But, the Hopkins review found, the Food and Drug Administration (FDA) has never approved hexamethonium for any use by inhalation.

The report also notes that, to shorten the procedure, hexamethonium was delivered to Roche's lungs by a more powerful spray mechanism than was used for the first two volunteers. This might have resulted in a higher concentration, the report says, although "the pharmacokinetics of inhaled hexamethonium are not known, and any possible increase in lung tissue concentration in [Roche] cannot actually be verified."

Given the lack of experience with the drug, the panel examined whether the lead researcher, Alkis Togias, and the university's human safety group, the Institutional Review Board (IRB), had researched the hazards adequately. The panel found that Togias's literature review was "standard," although it failed to turn up reports of lung toxicity from 1953 to 1970 among seriously ill patients who had taken hexamethonium intravenously. But the panel faulted the IRB for lack of rigor, concluding that there was not adequate evidence for it to conclude "that inhaled hexamethonium was safe for use in research subjects."

Becker's group also noted problems in the consent form. It didn't state that inhaled hexamethonium had never been approved by the FDA or that volunteers could risk death. The panel found no evidence that Roche or other volunteers had been coerced into participating, but it disclosed that eight of the nine volunteers for the trial were employed by the Hopkins Asthma Center. When asked if employees were expected to volunteer as part of their work, Becker responded firmly that they were not. The aim of the research, Becker's panel said, was "important," and the scientific rationale was "solid."

Miller announced that Hopkins intends to add a third IRB to the two it already maintains—this one to conduct random checks of clinical trials. Plans are also under way for a stem-to-stern review of clinical operations. And all trials directed by Togias, as well as 16 others employing chemicals not approved by FDA for clinical use, have been suspended pending review. "We will have to raise the bar [for clinical research] even higher," Miller said. The next step, he added, will be to ask a panel of experts headed by Samuel Hellman, dean emeritus of the University of Chicago School of Medicine, to take an independent look. That report will go to the university's trustees "by late summer." –ELIOT MARSHALL

ASTRONOMY

Wet Stellar System Like Ours Found

A solar system is dying, and in its last gasps astronomers 5 light-years away can see signs that a billion comets are blazing into oblivion at once. The discovery of huge amounts of water streaming away from an aging, swollen red giant star in the constellation Leo shows that our own planetary system is not alone in harboring a key ingredient of life as we know it, researchers reported in last week's issue of *Nature*.

Scientists operating the Submillimeter Wave Astronomy Satellite (SWAS) in low-Earth orbit had no intention of getting into

ScienceScope

Brain Drain? A noted U.S. fertility researcher is relocating to England in a move that some researchers say underscores the uncertainty created by the current debate over government funding of research involving embryonic stem cells (see p. 413). University of California, San Francisco (UCSF), researcher Roger Pedersen said this week that he has accepted a job at the University of Cambridge. Pedersen, who has been working with human embryonic stem cells for several years with support from Geron Corp., will maintain ties to his laboratory at UCSF, but the lab will not move with him. "I was faced with an irresistible career opportunity and the possibility of carrying out my research ... with public support," Pedersen said in a statement.

UCSF also announced last week that Pedersen's work has been temporarily suspended until it can be moved to an off-campus building that houses no federally funded research. On 12 July, the National Institutes of Health issued a bulletin clarifying U.S. policy that derivation of embryonic stem cells, which NIH is not allowed to fund, cannot take place in a building that uses federal funds for maintenance or administration. A UCSF spokesperson said Pedersen's lab will resume its work in a new location on or before 1 August.

NSF Names Education Head Judith Ramaley, a biologist and former college president, has been named head of the National Science Foundation's (NSF's) $800 million education directorate. Her appointment last week ended 2 years of uncertainty over the direction of the foundation's second-largest—and fastest growing—segment. On 1 August, Ramaley will replace interim chief Judith Sunley, who will become a senior adviser to NSF director Rita Colwell.

Ramaley, 60, studied fertility and biological rhythms. Her administrative experience includes an acclaimed 6-year stint as president of Portland State University in Oregon and a rocky 4-year tenure as president of the University of Vermont in Burlington, which ended on 30 June. Her Vermont stay was clouded by a hazing scandal involving the men's hockey team.

Ramaley says she is looking ahead to "this marvelous opportunity to view education and training from a national perspective." Former NSF official Anne Petersen, vice president of the W. K. Kellogg Foundation in Battle Creek, Michigan, calls her "a bold, visionary academic leader, a person of action."

CREDIT: (TOP TO BOTTOM) MARTY KATZ/ADEC

astrobiology. SWAS was designed to measure water, oxygen, and carbon in gas clouds around the galaxy, but a gap in the observing schedule seemed best filled by a star called CW Leonis, one that should have had practically no detectable water anywhere near it. Instead, SWAS detected 10,000 times more water than the star could have been giving off. The only way to make that much water is by vaporizing it from a billion icy comets at once, SWAS researchers concluded. "Nothing but comets comes close to the amount of water SWAS is seeing," says SWAS team member David Neufeld of Johns Hopkins University in Baltimore. "We believe we are witnessing the apocalypse that will engulf our solar system in 6 billion years."

CW Leonis, it appears, is consuming a belt of small, icy bodies orbiting it just as Kuiper Belt objects (KBOs) orbit our sun beyond Pluto and Neptune. KBOs become active comets only when one swoops near the sun, but CW Leonis, running low on nuclear fuel, has ballooned out to the distance of Jupiter from our sun and blazed to 5000 times its normal luminosity. That would vaporize the ice of bodies orbiting 10 to 100 times the Earth-sun distance from CW Leonis, SWAS researchers say, turning each into an active comet with a fuzzy, glowing head and streaming tail.

Nearing the end. The star CW Leonis has swollen to engulf any nearby planets and is vaporizing an entire belt of comets.

"If their interpretation is correct, instead of just finding huge planets around other stars, we're finding comets," says astronomer Tobias Owen of the University of Hawaii, Honolulu. "A lot of us believe these icy bodies are fundamental building blocks of planets. It's nice to know they're out there. It helps the prospects of finding planets, planets with the [gases] that make atmospheres and oceans"—and that could sustain life.

–RICHARD A. KERR

SPACE STATION SCIENCE

Congress Orders Halt To Planned NASA Cuts

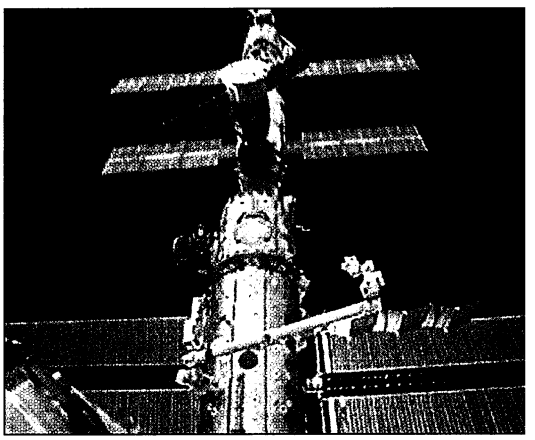
Researchers upset about cuts to space station research have found some allies in Congress. A powerful House panel that sets NASA's budget last week ordered the agency to halt its plans to gut nearly 40% of the orbiting facility's science program. It also added money to rescue one set of experiments and asked President George W. Bush for a "clear and unambiguous statement" on the role of research aboard the orbiting lab. The move sets the stage for another confrontation between Congress and the new Administration over who should pay for the station's skyrocketing price tag.

This spring, the White House refused to request additional funding to meet an overrun of more than $4 billion on the $60 billion facility, ordering NASA to find the money within the program's own strained budget. That prompted NASA to scale back the number of crew members planned for the station as well as its budget for research equipment. Researchers quickly claimed that those moves would cripple science aboard the orbiting lab (*Science*, 23 March, p. 2291).

NASA Chief Scientist Kathie Olsen says the agency intends to spend, through 2006, 36% less on research facilities than the $4.4 billion in its original plans. Some areas, such as fundamental biology, would take up to an 80% cut. In 2002 alone, the $452 million planned for facilities would sink to $284 million, according to Olsen. She adds that the changes amount to a shortfall of only $70 million to $75 million in research-related efforts in 2002, in part because a new round of delays in launching station hardware means there's no rush to build some of the experimental facilities. But Olsen insists the cuts don't mean a reduced commitment to science: "Research remains central on the station—I am adamant on this."

The House panel moved last week to ease the problem by adding $35 million for fluids and combustion research, which accounts for a small portion of planned 2002 station research funding. Much of that program is run by the Glenn Research Center in Cleveland. The panel also added $275 million for work on a crew return vehicle to carry six persons—the number needed to support the station's ambitious scientific agenda—provided the Administration includes funding for the vehicle in its 2003 budget planning.

The committee has asked for a comprehensive plan on the station by 1 March 2002, and it told NASA to suspend its plans to cut research until Congress decides the number of crew members. The agency is setting up an independent panel to review NASA's scaled-back station plan, with a report due by the end of the year. NASA is also searching for cheaper alternatives to keep research on track, including use of the space shuttle for extended periods.



Growing pains. The expanding station—and its higher price tag—leaves less room for research.

In the meantime, NASA's international partners are having their own problems. A Japanese centrifuge to conduct a host of biological experiments has been delayed repeatedly because of technical problems and won't be available to researchers until late 2008. Such distant dates frustrate would-be station researchers. "It's just so discouraging," says Patricia Russell, executive director of the American Society for Gravitational and Space Biology.

–ANDREW LAWLER

SMITHSONIAN INSTITUTION

New Panel Will Redirect Science

The Smithsonian Institution took a long-awaited step this week, selecting 18 researchers to help guide this conglomerate of 16 museums, a zoo, and a half-dozen research centers through a reorganization of its scientific research. The institution has been in turmoil since early April, when institution scientists and the public got wind of Smithsonian Secretary Lawrence Small's plans to cut some research efforts and revamp others. The Smithsonian's Governing Board of Regents decided in early May to convene this panel to help quell the outcry and chart a less controversial course for future scientific endeavors (*Science*, 11 May, p. 1034; 13 July, p. 194).

The panel includes biologists, astronomers, geologists, anthropologists, and paleontologists—a half-dozen of whom are Smithsonian staff members. Chaired by Jeremy Sabloff, director of the University of Pennsylvania Museum of Archaeology and Anthropology in Philadelphia, the pan-

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