massive star, it causes a small but noticeable wobble in the star's motion. Due to the Doppler effect, this wobble appears as a subtle variation in the star's color as it gets redshifted, blueshifted, and redshifted again.

To detect those changes, the planet hunters use a sensitive spectrometer. Before the light enters the instrument, it passes through a cell full of iodine vapor, which absorbs some of it, superimposing dark lines upon the spectrum at well-known wavelengths. From the way the spectrum shifts relative to that standardized grid, the scientists can get a precise measurement of the motion of the star. By charting stellar motions in a database of over 1000 stars, Marcy and Butler have found a score of planets, each about the size of Jupiter or larger. Naturally, the smaller the planet or the more distant its orbit, the weaker its tug on its mother star—and the subtler the corresponding wobble. Because of this, Marcy and Butler had not been able to detect planets smaller than about half of Jupiter's mass—until now.

To detect fainter wobbles, Marcy says, the astronomers beefed up a computer program that corrects the "idiosyncrasies" of their equipment at the Keck Telescope on Mauna Kea, Hawaii. "Up until 1 year ago, the precision we could measure in stars was plus or minus 8 meters a second," he says, noting that the equipment can now pick out wobbles with a precision of 3 meters a second.

Within months, the newly honed equipment had spotted two planets smaller than Saturn, each roughly a third of Jupiter's mass. The first orbits the star HD43675, located 109 light-years from Earth in the constellation Monoceros, with a period of 3 days; the second orbits the star 79 Ceti, 117 light-years away in the constellation Cetus, with a period of 74 days. By detecting such small planets—particularly the one around 79 Ceti, with its larger orbit—Marcy and Butler have shown that they would be able to spot a twin of our solar system, with a Jupiter-mass planet fairly distant from its star: 79 Ceti's planet sets it wobbling at 11 meters per second, just a shade less than the 12-meters-per-second wobble Jupiter causes in the sun.

Although it's risky to extrapolate from such a small sample, the newcomers hint that big, gassy planets come in an unbroken range of sizes, says Carnegie Institution astrophysicist Alan Boss. "It suggests that there is a continuous distribution of masses" from relatively rare super-Jupiters to fairly common sub-Saturns and below, Boss says. "What we're seeing is really just the tip of the iceberg."

The planets' masses aren't known precisely. The Doppler effect reveals only motion toward us or away from us; side-to-side motion does not affect the color of starlight. Thus, if the orbit of a planet is sharply tilted with respect to our view of the star, astronomers on Earth would detect only part of the star's wobble and would underestimate the planet's mass. For that reason, the two new planets' masses may be larger than announced. But Butler thinks it's unlikely that scientists would greatly underestimate the masses of both planets, as well as others that the astronomers have hinted at but haven't yet unveiled.

Marcy and Butler think that they can refine their technique by another factor of 3, according to Hammel. If so, she says, they should soon be turning up planets about the mass of Uranus, a mere twentieth of Jupiter's. To get much beyond that, however, they will need space-borne instruments such as the ones slated for NASA's Space Interferometry Mission in 2006. "We'll be out of business in 10 years" when it starts working, Marcy says. But until then, says NASA scientist Anne Kinney, there are plenty of planets out there waiting to be discovered. "This is brand-new," she says. "We're going to learn what kind of animals are in that zoo."

–CHARLES SEIFE

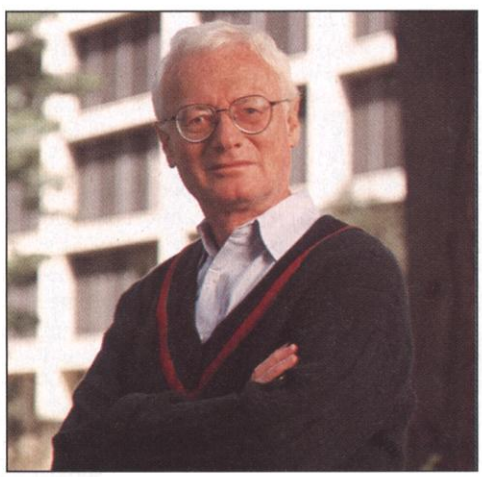
CREDITS: (TOP TO BOTTOM) ILLUSTRATION BY PAT RAWLINGS/NASA; SAM KITTNER

BIOMEDICAL RESEARCH

## AIDS Research Head to Retire From NIH

The widely respected, hyperkinetic overseer of the $2 billion AIDS research program at the National Institutes of Health in Bethesda, Maryland, announced last week that he will retire from NIH on 1 September. "That's my 73rd birthday, and the family said, 'You've paid your dues and it's time to come home,' " says Neal Nathanson, director of the Office of AIDS Research (OAR).

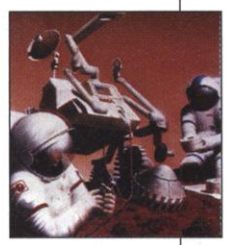
Nathanson, a renowned viral epidemiologist, was coaxed from his longtime lab at the



**Going home.** Neal Nathanson says his family told him he had paid his dues.

## ScienceScope

**Weightless Watchers** NASA has long studied the effects of weightlessness on the human body, knowing that sending people to Mars would expose the crew to the deleterious effects of microgravity for months and even years. But a new report from the National Research Council urges NASA not to forget the hardware. The panel, chaired by engineer Ray Viskanta of Purdue University in West Lafayette, Indiana, calls for an extensive new research program aimed at understanding how gravity's absence affects fluids, flames, and flow controls—and thus fire-prevention, power-production, and sanitation systems critical for a safe flight.



NASA microgravity chief Eugene Trinh praised the soon-to-be-released study: "We've looked at this piecemeal, but this puts it all together." But the panel also complains that "territoriality" at NASA centers is getting in the way of existing research, which it describes as "poorly communicated" and sometimes duplicative. And it concludes that such problems pose a major stumbling block to implementing the report's recommendations. But Trinh believes the agency is "doing a very good job," although he says it will take the criticism seriously.

**Money Talks** Scrambling to keep up with the debate over genetically modified crops, several big ag biotech companies this week unveiled a public relations campaign "based on objective scientific research." A new Council for Biotechnology Information may spend as much as $50 million a year on ads, speakers, and a Web site to counter what a spokesperson calls "inaccuracies" in the media and to "create a public dialogue." The sponsors are Aventis CropScience, BASF, Dow Chemical, DuPont, Monsanto, Novartis, and Zeneca Ag Products Inc.

The council is still looking for a director, says Dan Eramian of the Biotechnology Industry Organization of Washington, D.C., which will serve as its home. But organizers have already recruited several heavy hitters to the group's advisory board, including former Health and Human Services chief Louis Sullivan and Nobel Prize biologist James Watson.

Biotech critic Jeremy Rifkin, president of the Foundation on Economic Trends in Washington, D.C., thinks the council's efforts will "backfire." More publicity, he says, will only help his cause.

University of Pennsylvania in Philadelphia (where he still keeps his home) in July 1998 by Harold Varmus, then director of NIH. Nathanson had little AIDS experience, but he threw himself into the job with the enthusiasm of a graduate student. "Part of the reason he was able to accomplish the things he did is because he was not an insider," says Philip Greenberg of the University of Washington, Seattle, an HIV immunologist who sits on the OAR council. "He had no vested interests, and he didn't have a career to extend."

Greenberg and others credit Nathanson with fostering cooperation among NIH institutes, boosting the AIDS vaccine research budget, better coordinating primate research, and rescuing an endangered HIV-specific "study section" that reviews outside grant applications. Nathanson says dealing with the tensions among the various institutes presented him the greatest challenge of all. "The institute directors are much too powerful, and the NIH director is much too weak," Nathanson says. "The institutes do not play well together. And I've done a lot of behind-the-scenes negotiations."

Nathanson plans to return to the University of Pennsylvania, and he's interested in working in the AIDS vaccine area, at Penn or elsewhere. "Who knows what will come along?" he says. NIH has not yet formed a search committee to find his replacement. "It's going to be tough filling his shoes, I'll tell you," says Anthony Fauci, head of the National Institute of Allergy and Infectious Diseases. **–JON COHEN**

ACADEMIC EMPLOYMENT

## Jury Awards $545,000 In Stanford Case

A federal jury last week ordered Stanford University to pay $545,000 to a former medical informatics researcher who was laid off 3 years ago after alleging sex discrimination on the job. The researcher is also one of several women whose complaints have triggered an ongoing Department of Labor investigation into the university's affirmative action policies.

Yesterday's decision involves Colleen Crangle, a computer sciences expert who worked in the department of medicine at Stanford's medical school. In a suit filed in U.S. District Court in October 1997, Crangle alleged that she was let go in March 1997 with one day's notice because she complained about the way she was being treated by male colleagues—specifically, about a set of restrictions imposed on her activities as a researcher. The jury ruled that Stanford had acted "with malice" toward Crangle, a part-time senior research scientist who did not hold a formal faculty position and who worked on a series of projects.

**Winner.** Jury agrees that Stanford retaliated against Colleen Crangle.

CREDIT: C. CRANGLE

The verdict does not address directly the issue of sex discrimination. Judge James Ware threw out a discrimination claim in Crangle's suit in a summary judgment last fall. But the basis for the jury's awarding her damages is its finding that Crangle had a valid reason to feel discriminated against, and the larger issue is clearly on the minds of both parties. "I think [the verdict] sends a real message to Stanford that they can't overlook these cases," says Dan Siegel, Crangle's lawyer. Despite persistent complaints, he says, "Stanford really has turned a blind eye" toward allegations of sex discrimination.

Debra Zumwalt, Stanford's acting general counsel, disagrees that the university has ignored the issue or acted improperly. An internal review, she says, found that salaries and tenure rates for women faculty members are on par with those for men. "It's very frustrating that there is a vocal minority who give the impression that there is a persistent problem," she says. During the trial, Stanford's lawyers argued that Crangle's superiors went out of their way to help find her work when money ran out on the project she was working on. "Crangle's position was explicitly made contingent upon continued outside funding, and that funding ran out," says Zumwalt. "Obviously, we are disappointed with the jury's verdict" and plan to appeal the case, she adds.

One of the strongest pieces of evidence introduced to buttress Crangle's case, says Siegel, was a series of e-mails. In one, written in December 1996, Medical Infometrics director Mark Musen discusses Crangle's complaints with Edward Shortliffe, the associate medical school dean, and then states, "I'd like to see what options we have right now simply to lay her off."

In its unanimous verdict, the eight-member jury awarded the maximum amount allowed under federal law in such cases. Crangle sees the verdict as vindication of her complaint that, despite her qualifications, she was required to serve as a "girl Friday" to male colleagues. At the same time, Crangle says that if given the opportunity, she would reclaim her job. "I'm tired of seeing good women leave and be forced out," she says. "The only way it will change is if I, and people like me, stay and work to make it better."

The verdict comes as the U.S. Department of Labor is investigating charges that the university has systematically violated rules involving the hiring and promoting of women employees. Because Stanford receives grants and contracts from the federal government, it is required to adhere to federal policies that prohibit discrimination on the basis of race, color, religion, sex, or national origin. The complaints were brought by current and former Stanford employees —a group that numbered as many as 32 in February 1999. This winter the government provided Stanford with the names of nine women, Zumwalt says, including Crangle. University officials say they have nothing to hide: "We have zero tolerance for discrimination and retaliation, and [we have] strong policies that prohibit such behavior. And we enforce those policies," says Zumwalt.

**–ROBERT F. SERVICE**

ACADEMIC EMPLOYMENT

## UCSF Researchers Leave, Charging Bias

A prominent research couple has decided to leave the University of California, San Francisco (UCSF), for tenured jobs at another UC school after accusing the university of sex discrimination. UCSF officials deny any bias or wrongdoing, and some scientists say the real problem is the vulnerability of adjunct faculty members—a problem that isn't confined to UCSF.

The departure this summer of Nelson Freimer, a key member of UCSF's human genetics program, and his wife, biomathematician Sally Blower, for UC Los Angeles will mark the end of a stormy 5-year relationship between Blower, an adjunct professor, and UCSF. Blower says that powerful male faculty members have humiliated her in a variety of ways, for example by forcing her to beg for permanent work space and shuttling her among departments and temporary space assignments. "If they think this is the correct way to treat women," says Blower, "I find it offensive. I don't want to be at this kind of institution."

Freimer, who joined the UCSF faculty in 1990 and whose work on isolating human disease genes has been integral to UCSF's new human genetics program, supports her claims. "My faith in the values of the institution has been repeatedly shaken by my witnessing Sally's treatment here over the past several years and has been utterly destroyed by her experiences over the past several months," he wrote in a letter to UCSF Chancellor J. Michael Bishop in early February. Blower has received a position as a full professor in the