January to name an Asian-American ombudsman, Jeremy Wu, to handle diversity issues for the department. DOE also released a report on racial profiling that found widespread concern among Asian Americans about "insensitive and offensive" accusations of spying aimed at ethnic Asians, whether foreign or U.S. nationals.

Meanwhile, Domenici said that he would like to see the government drop its investigation of the loss and recovery of two computer disks at Los Alamos holding classified weapons information (*Science*, 23 June, p. 2109). In a fiery statement during a debate over DOE's funding bill, Domenici challenged the FBI, saying, "If you can't prove there is spying or espionage, you ought to get off their backs." The FBI hasn't responded.

–ANDREW LAWLER

With reporting by David Malakoff.

PLANETARY SCIENCE

'Spiders' Channel Mars Polar Ice Cap

REYKJAVIK, ICELAND—Scientists studying the latest high-resolution photos of the martian south polar ice cap think they may have found additional clues to its ebb and flow. These hints of the planet's bizarre atmosphere come from a new class of dramatic-looking terrain features whose dark, multilimbed, vaguely radial designs have earned them the moniker "black spiders," and another group of dusky, spreading features called "dark fans."

At a recent gathering of Mars researchers,* Hugh H. Kieffer, a planetary scientist at the U.S. Geological Survey in Flagstaff, Arizona, proposed that the spiders might be subsurface gas channels, visible through an unusually transparent section of the martian ice. Within the legs, he suggested, blow hurricane-speed jets of carbon dioxide generated as the spring sun vaporizes the CO_2 ice deposited at the poles each winter. The jets may carry dust, he added, which spreads in fanlike shapes over the ice.

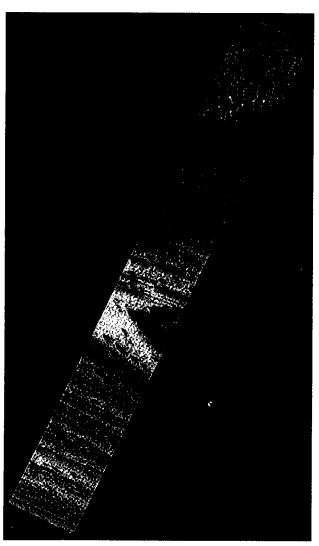
Steve Clifford, a planetary scientist at the Lunar and Planetary Institute in Houston, Texas, is excited by Kieffer's proposal, which he calls the first attempt to explain these features. Other scientists say the black spiders and the planet's other strange CO_2 features are critical to understanding the martian atmosphere, one-third of which is deposited each winter as CO_2 frost at the martian poles. Kieffer admits that his ideas are speculative but that the urge to interpret what he and others are seeing is irresistible. "I can make a wonderfully consistent story—which may or may not be what's going on," he says.

During the spring, solar heating vaporizes up to 10 kilograms of CO_2 per square meter per day, the equivalent of 1 cm of ice thickness. Kieffer proposes that black spiders, tens to hundreds of meters across, develop in regions where this vaporization happens not from the top down, but from the bottom up. The spider's legs collect gas from the transparent areas, conducting it beneath the surface to weak points, where it fountains free in roaring jets. Dust carried with the gas may then land atop the ice in spreading dark fans hundreds of meters in length. Although black spiders and dark fans have not yet been seen in tandem, Kieffer's theory suggests that they are linked, with the fans extending downwind from the vents of spiders that, for whatever reason, are not well enough defined to show up in satellite photos.

Kieffer's hypothesis requires the ice to be transparent, so that warm sunlight can penetrate deep enough for the resulting CO_2 gas to have trouble breaking through to the surface. This would be no problem with pure CO_2 ice, which is so clear that 75% of sunlight will penetrate at least a half-meter deep. But the CO_2 ice that condenses out of the martian atmosphere isn't pure. Instead, a heavy peppering of dust makes it opaque.

Kieffer also has proposed a mechanism by which spring sunlight can purge dust from the ice. Sun-warmed dust motes, he says, should easily become hot enough to evaporate adjacent CO_2. Near the surface, the vapor pressure may be enough to crack the ice, ejecting the dust in a puff of gas. Otherwise, gravity will cause the dust particles to tunnel ever deeper until they hit bottom, like a slow-falling rain. Because the martian polar atmosphere is predominantly CO_2 and cools each winter to the freezing point of CO_2, the microscopic tunnels are continuously reclosed with freshly deposited ice. The result is an increasingly transparent, self-sealing layer of CO_2 ice.

Meanwhile, enough sunlight reaches the dark sur-



CREDIT: MSS/NASA

Dark fans. Features that speckle the martian southern ice cap may be dusty fallout from CO_2 geysers.

* The Second International Conference on Mars Polar Science and Exploration, 21–25 August, Reykjavik, Iceland.

ScienceScope

At Long Last The research community's long push to raise science's profile at the State Department appears to have paid off. Secretary of State Madeleine Albright is set to appoint retired high-tech executive Norman Neureiter, 68, as the department's science adviser as early as this week, sources told *Science* as it went to press.

Two years ago, a National Academy of Sciences panel told Albright that the State Department needed to do more to involve technical talent in U.S. diplomacy (*Science*, 3 March, p. 1580). Officials agreed to create the position of science adviser, but the job search faltered over the past year.

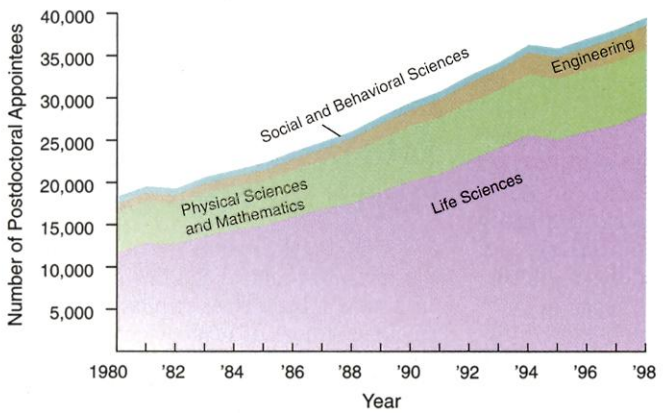
Neither Neureiter nor State Department officials would confirm the choice. But Washington insiders say he is a good fit, with experience as a program officer for the National Science Foundation, a foreign service science attaché, and an executive at Texas Instruments. Since retiring 2 years ago, he has worked as a Dallas-based consultant and pro bono adviser to an array of groups involved in science, education, and foreign policy.

Gender Gap Energy Secretary Bill Richardson has thrown in the towel on his search for a female director of Argonne National Laboratory in Illinois, clearing the way for this week's appointment of nuclear physicist Hermann Grunder. But he's stepping up efforts to attract more women into science and senior DOE management jobs.

Last week at DOE headquarters, Richardson staged a gala "Women in Science" forum to tout the department's progress in the past 2 years and to announce several initiatives to keep the ball rolling. Surrounded by female senior R&D managers from around the country, Richardson noted that 80% of the department's $17.4 billion budget is "managed by women," including new Office of Science chief Mildred Dresselhaus. (DOE's top four slots, however, are held by men—Richardson, deputy director T. J. Glauthier, and undersecretaries Ernie Moniz and John Gordon.)

He also touted efforts to diversify leadership at DOE's labs. "We got the first one," he said, referring to Lura Powell's appointment earlier this year as head of Pacific Northwest National Laboratory in Washington state, "and I still think it's critically important to have more women as lab directors. But we couldn't make it happen" at Argonne. Grunder, the longtime director of the Thomas Jefferson National Accelerator Facility in Newport News, Virginia, assumes his new post on 1 November.

Public Policy. The panel concludes that postdocs are "indispensable" to U.S. science but that low pay and uncertain job prospects have made them disgruntled. An electronic survey of leading research institutions conducted by the committee documents both the relative poverty and the precarious status of postdocs, including the fact that only about half of their academic employers provide them with vacation time and sick leave, and almost 60% give advisers complete control over the length of postdoctoral appointments. "Although many postdocs have stimulating and productive research experiences under the supervision of attentive, thoughtful mentors," says panel chair Maxine Singer, president of the Carnegie Institution of Washington, many also receive "embarrassingly low pay and meager benefits."



Growing force. Led by an explosion in the life sciences, postdocs have become a major force in academic research over the past 20 years.

SOURCE: SURVEY OF GRADUATE STUDENTS AND POSTDOCTORATES IN SCIENCE AND ENGINEERING, 1980–1998

The report says that the low salaries—averaging $28,000 for starting postdocs in 1998—are largely the result of a decision by universities not to supplement National Research Service Awards (NRSA), stipends provided by the National Institutes of Health (NIH) to cover training expenses. By not doing so, the panel notes, universities have made the NRSA levels the "de facto funding standard" for all academic-based postdocs.

Apart from pay, the panel urges institutions to adopt a common definition for postdocs and policies for their appointment, training, compensation, evaluation, and career guidance. It also recommends that universities set up a central office to handle postdoc affairs and emphasizes that faculty members should view postdocs as "apprentices" who require mentoring rather than as a "pair of hands" to carry out research at the bench. "Everybody has to ante up," says Singer about the issues facing the scientific community. "If everybody points to somebody else, then nothing will happen."

Several academic administrators and science managers give the report high marks. "I think the scientific community would be well advised to take these recommendations very, very seriously," says Michael Teitelbaum, program director for the Alfred P. Sloan Foundation, which helped pay for the study and which is supporting the creation of a national postdoc network (nextwave.sciencemag.org). Joel Oppenheim, an associate dean at the New York University School of Medicine, also welcomes the panel's advice but adds, "it's just a report. The real power to change things lies with the funding agencies, in particular NIH and the National Science Foundation." Walter Schaffer, research training officer at NIH, which helped fund the study, says that "I think they did a heck of a job. Most of what they are saying is right on."

Some observers claim, however, that the academies' panel downplayed what they see as the "exploitation" of postdocs by institutions that depend on them to get the work done. "They don't want to alienate the university faculty, who would have to pay higher salaries out of their grants," says Letitia Yao, a former chemistry postdoc and current staff member at the University of Minnesota, Minneapolis, who helped form one of the first postdoc associations at the University of California, San Francisco. "It all comes down to money: If institutions were paying postdocs 45 or 50 thousand [dollars], they'd also treat them right. You wouldn't even need a guide."

Jack Bennink, a section chief at the National Institute of Allergy and Infectious Diseases, believes that the status of postdocs is a moral as well as an economic issue. "In many cases their treatment borders on abuse and exploitation," he says. At the same time, Bennink agrees with Schaffer and others that the best course is "to make small fixes on a problem that is really, really complex."

With three-quarters of the postdocs working in the life sciences, many officials look to NIH for answers. And they see its growing budget as a painless way to boost salaries without trimming the number of postdoc slots and disrupting research. Schaffer agrees that the report puts pressure on NIH to raise its NRSA stipends from the current $26,916 starting point. But he says that it's not clear what the standard of comparison should be. "We need to figure out what's reasonable," he says, "and it should probably be on a cost-shared basis with universities."

–JEFFREY MERVIS

ScienceScope

Tennessee Tune-Up Democrats and Republicans are waging a pitched battle this fall over the Volunteer State, but they agree on one thing: sprucing up the Department of Energy's Oak Ridge National Laboratory.

Energy Secretary Bill Richardson visited the lab this week and pledged $125 million over the next 5 years to upgrade Oak Ridge's aging facilities. The state will kick in about $26 million, and contractor Battelle, which took over the job of running the lab in April, will contribute some $50 million. DOE will also transfer federal land to the state and to Battelle for new facilities, including a mouse genomics facility, a biological sciences lab, and modern space for computer and neutron sciences.

Oak Ridge director Bill Madia is ecstatic: "This modernization plan represents the largest construction effort [at Oak Ridge] since the Manhattan Project in 1943."

No Confidence Vote The world's largest laser project has hit a snag in Congress. Senators last week approved an amendment to the Department of Energy's (DOE's) 2001 budget bill that would block an extra $95 million the troubled National Ignition Facility (NIF) says it needs to stay on track. The measure, introduced by Senator Tom Harkin (D–IA), also asks the National Academy of Sciences to review the need for the $3.8 billion project, being built at Lawrence Livermore National Laboratory in California.

NIF is designed to allow scientists to study the behavior of nuclear weapons without actual testing and to conduct cutting-edge fusion energy research. But DOE officials revealed last year that the project is way behind schedule and over budget (*Science*, 18 August, p. 1126), prompting Harkin and other critics to call for downsizing or canceling it. The project has become "a massive public boondoggle" that will siphon money from other DOE science projects, Harkin said. NIF backers hope to win back the extra funds when Senate and House negotiators meet later this month to finish work on the spending bill.

Contributors: David Malakoff, Jeffrey Mervis, Andrew Lawler