face beneath the ice—perhaps a meter down—to evaporate more ice, allowing the CO_2 gas to build up there. Kieffer predicts that small, branching gas channels will feed into larger ones, like merging raindrops on a windowpane. Where these big channels break through to the surface, he predicts that the gas could reach a velocity of 50 meters per second, fast enough to keep the jets open throughout the 150-day CO_2 evaporating season. Clifford calls Kieffer's hypothesis "interesting" and "reasonably coherent" but notes that important details remain to be filled in. They include whether the proposed mechanism can produce gas channels large enough to be seen from space, and whether the martian CO_2 ice is sufficiently clear for the bottom-up heating effect to occur. But he doubts that any of these will prove fatal to the basic theory.

Andrew Ingersoll, a planetary scientist at the California Institute of Technology in Pasadena, says black spiders and dark fans are just part of the "crazy stuff" that makes up the overall puzzle of the Red Planet's atmospheric dynamics. **–RICHARD A. LOVETT**

Richard A. Lovett is a science writer based in Portland, Oregon.

BIOMEDICINE

'Glue Grant' Boosts Cell Signaling Consortium

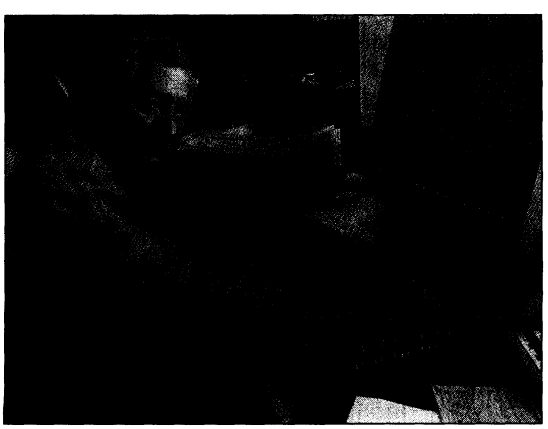
A "glue grant" may sound like financial support for a revolutionary adhesive, and in fact, that's not far off the mark. The National Institute of General Medical Sciences (NIGMS), in announcing its first glue grant last week, said it aims to use a novel funding approach to bind together researchers in cutting-edge fields at many institutions, allowing them to transcend their individual areas of expertise.

NIGMS has awarded $5 million a year for 5 years to a group of scientists studying cellular signaling. The project is headed by Alfred Gilman, chair of pharmacology at the University of Texas (UT) Southwestern Medical Center in Dallas and co-recipient of a Nobel Prize in 1994 for his work on "G proteins," which act as gatekeepers for information entering cells. To speed their findings into the public domain and make them available for use in drug testing, Gilman and members of the project have agreed to post new results in a public database and forgo some patent and authorship claims.

The group of 50 participating scientists at 20 universities, called the Alliance for Cellular Signaling (AFCS), expects to spend a total of $10 million a year on this work. They have raised half of this sum through pledges from individuals, institutions, and corporate backers, including Eli Lilly and Co., Johnson & Johnson, Merck, and Novartis, among others. The drug companies also have agreed to forfeit proprietary rights to alliance findings.

Researchers have identified thousands of cellular signaling molecules that carry information between and within cells. "The classic example is the fight-or-flight response," said Gilman, in which signals from the brain trigger responses in the heart, blood vessels, lungs, and gastrointestinal system. The AFCS plans to chart interactions among these signaling molecules to produce a model of how mouse heart muscle cells (cardiac myocytes) and immune cells (B cells) respond to stimuli. Gilman foresees pharmaceutical companies using it to develop "a treasure chest of very specific drugs."

Officials at NIGMS said that increased public funding, combined with Internet links that permit quick transfer of mammoth data sets, has made the time ripe for such huge cooperative studies. "This differs from anything else we're doing, or anything that we've done before, in that it doesn't supply underlying research support for investigators," said Marvin Cassman, director of NIGMS. It will enable researchers "to reach a goal they can achieve only by working together." Michael Rogers, director of NIGMS's Division of Pharmacology, Physiology, and Biological Chemistry, finds it "remarkable" that "traditionally independent-minded individuals" are now ready to join big collaborations.



Equal access. Alfred Gilman says the consortium will make findings immediately available on the Internet.

CREDIT: DAVID GRESHAM/UT SOUTHWESTERN MEDICAL CENTER

Scientists participating in the alliance will be asked "to steer, to guide, to hypothesize, and to design models," said Gilman. In addition, 250 "member" scientists around the world will host Web sites and augment the AFCS database. The glue grant will fund work in seven newly established labs. Stanford University will be in charge of microscopy; the California Institute of Technology, molecular biology. The San Francisco Veterans Affairs Medical Center will deal with signaling assays. The University of California's San Diego Supercomputer Center will be the hub of bioinformatics. UT Southwestern will have three new labs, one focusing on antibodies and one on each type of mouse cell under investigation.

Part of the glue that holds the alliance together is electronic. AFCS plans to communicate via Internet 2, a university-based system with enhanced bandwidth and speed. A virtual conferencing system will allow Gilman to meet simultaneously with 36 of his colleagues. Gilman said it was necessary to forfeit some intellectual property and first-time publication rights to allow "real-time" posting of group findings. "There will be publishing opportunities for the people employed in the labs," he explained, "but it will be higher level interpretation, not conventional findings." The community has "got to know that we're playing fair with them and that everybody's got an equal shot" at the alliance's data, he added.

Private donors may be sacrificing proprietary rights in the short run, but their investment may pay off later as their own researchers use the AFCS models to develop new drugs. Steven Paul, group vice president of Lilly Research Laboratories of Eli Lilly and Co., said his company made its $500,000-a-year pledge not out of philanthropy but because its scientists hope to glean immediately useful data. "This is a fantastic group of extraordinary scientists," said Paul. "We feel strongly that there will be enormous public ramifications." **–KATHLEEN FISHER**

Kathleen Fisher is a writer in Alexandria, Virginia.

U.S. POSTDOCS

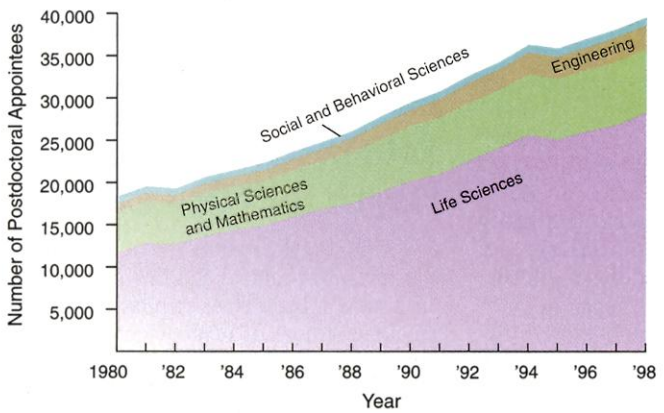
Report Urges Better Treatment, Status

For years, U.S. postdocs have been complaining about paltry salaries, lack of benefits, and lowly status. This week, they won some high-level support. A committee of the National Academies of Sciences and Engineering and the Institute of Medicine has validated many of the complaints and lent its considerable weight to efforts to provide greater institutional support for postdocs. At the same time, however, the panel sidestepped two burning issues by explicitly declining to recommend a boost in postdoc salaries or take a position on whether to curtail the size of the postdoc workforce, which has more than doubled in the past 20 years to an estimated 52,000 (see graph).

The recommendations are contained in a guide* issued this week by the academies' Committee on Science, Engineering, and

* Web Guide to Enhancing the Postdoctoral Experience for Scientists and Engineers (nationalacademies.org/postdocs), 2000.

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