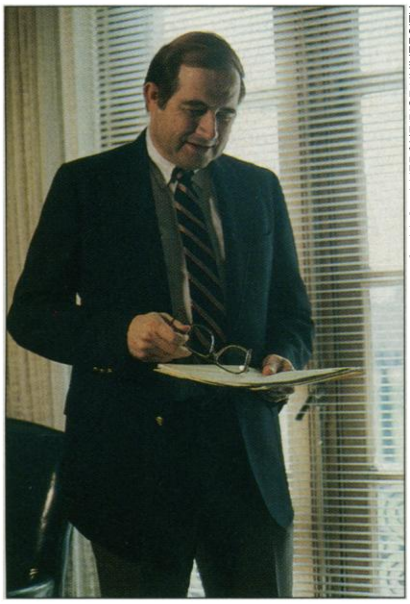
NATIONAL SCIENCE FOUNDATION

Rice University Physicist Nominated to Lead NSF



THOMAS C. LA VERGNE/RICE UNIVERSITY

Fast Lane. "Small scientist" Neal Lane faces big issues at NSF.

The nomination of physicist Neal Lane, provost of Rice University, to be the next director of the National Science Foundation (NSF) is intended to send a clear signal to the U.S. academic community: NSF will remain focused on basic research and will not become a foot soldier in a campaign to revitalize and reshape the U.S. economy. At least that's how top officials in the Clinton Administration want scientists to view the long-awaited selection of a successor to Walter Massey. And keeping the focus on basic research is a mission Lane's colleagues say the lifelong academic is supremely qualified to carry out.

"We wanted to find someone who, de facto, represents the vital strength of NSF," says presidential science adviser John Gibbons. The Administration decided not to look for an industrial scientist, said Gibbons, because "someone with a lot of industrial experience might want to move NSF in that direction, and that's not good." This is bound to be reassuring to NSF-watchers in the basic research community who fear that Congress will try to push the agency to focus more on applied research, as it did last year.

Gibbons, although he has never worked directly with Lane, played a key role in recruiting him. He screened several candidates and picked Lane after his first choice, University of California, Santa Cruz, astrophysicist Sandra Faber, turned down the job. Gibbons also secured Vice President Al Gore's blessing. Gore met with Lane last month and, according to Lane, expressed "strong support for NSF." Lane said that the two men discussed their shared interest in information technology and in the importance of a national electronic highway.

Asked to describe Lane's qualifications for the job, which pays $133,600 a year, Gibbons mentioned experience as an administrator—in addition to a 7-year stint as provost at Rice, he was for 2 years chancellor of the University of Colorado at Colorado Springs (see box)—achievement as a bench scientist, and familiarity with the foundation. But that's not all. "Interest in the job and availability," Gibbons says, "are also important. I learned that the hard way."

Lane brings a broad scientific perspective to his new job. A theoretical molecular physicist whose focus has been the optical properties of atomic collisions, he is the quintessential "small" scientist: For years he has worked with teams consisting of a single postdoc and a handful of students.

At the same time, he has for 6 years helped to oversee the country's biggest "big science" project—the Superconducting Super Collider (SSC)—as a member of the SSC board of supervisors for the Universities Research Association, which is building the $10 billion proton-proton accelerator. He has been a leader in fostering interdisciplinary work, and his interests include a strong commitment to education and training. He has also served on his share of national advisory panels.

The president's announcement on 13 July of his intention to nominate Lane has drawn rave reviews from those who know him. "It's a wonderful choice," says George Rupp, president of Columbia University and Lane's former boss at Rice. "Not only is Neal extraordinarily able, but his appointment means that NSF is going to continue to be serious about funding basic research even as the Clinton Administration works on technology issues and defense conversion."

Those who have worked with Lane describe him as "easy-going," "a good listener," and "someone willing to consider the views of others." University of Kentucky computer scientist John Connelly, who in 1984 picked Lane to head an advisory panel that designed a network of NSF supercomputing centers and the Internet, recalls that Lane functioned "quietly and effectively" in the face of intense lobbying from Congress and the computing community over how to spend some $40 million. A few years later, Lane chaired an advisory committee for the congressional Office of Technology Assessment that wrote a widely praised report, "From Grade School to Grad School," on what the nation must do to ensure an adequate supply of scientists. In that exercise, notes project director Darryl Chubin, Lane exhibited "a familiarity and sensitivity to policy issues" and an appreciation for "the big picture." Adds Chubin, "He's not arrogant and he's willing to work with people."

By and large, his biggest fans are the people for whom he has worked. Rupp, who lured Lane back to Rice as provost in 1986 when Rupp became president, says Lane played a major role in creating half a dozen interdisciplinary centers and institutes—including one funded by NSF—intended to allow Rice, a small private school with 4000 undergraduates and only 450 faculty, to remain a world-class research institution. "It was a strategy designed to allow our small

Neal Lane: A Snapshot

Current positions: Provost and professor of physics, Rice University

Specialty: Theoretical atomic physics

Sources of funding: U.S. Department of Energy, Welch Foundation

Education: Ph.D., M.S., B.S., U. of Oklahoma, 1964, 1962, 1960

Birthplace: Oklahoma City, 1938

Major career steps: Joined Rice physics department, 1966; made full professor in 1972; became director, Physics Division, NSF, 1979-80; named chancellor of the University of Colorado at Colorado Springs, 1984; returned to Rice in 1986 as provost.

Career choice: "I decided to be a scientist as a young child, before I knew what scientists did. I originally wanted to be an astrophysicist, and I'm still awed by the universe and how it works."

Goals: "I don't consider the [NSF] job to be a step along the way to anywhere. I plan to devote the full [6 years] required to succeed."

scale to be an asset," says Rupp. "In addition, Neal was an active participant in one [the Rice Quantum Center] that served as a model for our strategy."

Asked by *Science* what he considers the biggest issues he will face in his new job, Lane singled out the stiff competition for funding and the paucity of jobs for new Ph.D.s. He said he worries about the impact of these twin problems on those who might be thinking of becoming scientists. His biggest political challenge, however, is likely to be dealing with congressional pressure for NSF to play a larger role in rejuvenating high-tech industry. Massey responded to such pressure last summer by forming a blue-ribbon panel to examine the future of NSF. Although the commission's final report (*Science*, 27 November 1992, p. 1434) proved to be a Rorschach test—each side found support for its vision of what NSF should become—many university officials fear that Congress will again try to steer NSF toward more industrial research. Lane apparently has Gibbons' support in countering that pressure, but he must identify a unique role for the $3 billion agency—one that will ensure its place at the table during a time when the government is reshuffling its research portfolio and rewriting the missions of several agencies.

The Senate is not expected to hold a hearing on Lane's nomination until after it returns from a 4-week August break, but NSF officials are hoping that he can be confirmed by the start of the 1994 fiscal year, which begins on 1 October. Deputy director Fred Bernthal has been acting NSF director since Massey left in March, and he is likely to remain at NSF for several more months until a deputy director is announced and confirmed.

–Jeffrey Mervis

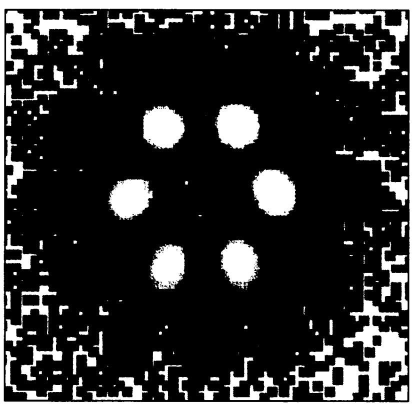
ADVANCED NEUTRON SOURCE

Physicists Band Together to Support a New Megaproject

As the Superconducting Super Collider (SSC) flirts with death in the congressional budget process for a second year, another mammoth science project is coming to life. Just a few days after the House voted to kill the $10 billion particle accelerator last month, it approved next year's funding for a megaproject that is a little cheaper and a lot less familiar: a $2.7 billion nuclear reactor known as the Advanced Neutron Source (ANS), to be built at Tennessee's Oak Ridge National Laboratory as a national facility for probing materials with beams of neutrons. The project's success in the House is a sign that physicists can still make a case for big science—at least when the project has a broad scientific constituency and plausible links to national competitiveness.

The Department of Energy (DOE), which is to fund the reactor, didn't get everything it asked for. The House granted only $22 million of the $39 million requested for 1994, but project supporters say they consider the decision a green light, and they note that prospects look good in the Senate. Says a staffer for Senator James Sasser (D–TN), a strong supporter of the project, "I think it will end up somewhere... around $29 million or $30 million." That will be enough to move ahead with detailed designs for the project, says Oak Ridge physicist William Appleton. Construction should start in about 2 years. When the facility is completed in 2002, says project leader Colin West of Oak Ridge, it will be the world's most powerful neutron source, delivering 10 times the flux of neutrons produced by its nearest competitor, at the Institut Laue-Langevin in Grenoble, France.

The power of that neutron stream to illuminate the internal structure of materials has drawn scientists from a host of different disciplines into the camp of ANS supporters. Indeed, the project received top billing early this year from a broad-based committee of physicists assembled by DOE to set priorities for nuclear physics. Says one supporter, Brookhaven National Laboratory physicist John Axe, "The advanced neutron source will open up a whole new field of neutron spectroscopy involving superconductors." Similar endorsements are coming from polymer scientists, protein chemists, and metallurgists. Concludes Appleton, "I can't imagine how the scientific community can do without a new neutron source." He and his colleagues add that, by advancing materials science, the ANS will benefit industrial competitiveness as well. Says Cornell materials scientist Edward Kramer, "Unlike what we hear about the SSC, which is scientifically interesting but full of hype about 'spinoffs,' there's an awful lot of productive uses for this."



J. W. LYNN AND N. ROSOV, NIST

Scatter shot. Neutrons scattering from magnetic vortices in a sample of niobium yielded this diffraction pattern.

Not everyone swallows the competitiveness argument. "I approve of ANS scientifically," says Princeton physicist William Happer, the former DOE energy sciences chief, "[but] the people who are beating us [economically] are the Japanese." And Japan, as Happer notes, doesn't have anything like the ANS. But the competitiveness argument is likely to become a familiar refrain given the project's cost, which makes some other physicists wince. "It blows my mind that it's so expensive," says physicist Robert Park, who heads the American Physical Society's Washington office. Park says he approves of the rationale for the project but opposes it at the current price, well above the few hundred million dollars of early informal estimates. A raft of health and safety regulations has pushed up the cost, says supporters, but some physicists say it might have been kept under control by inviting international participation, or by adopting an alternative technology as the neutron source—not a reactor but a particle accelerator.

Getting to the heart of matter. For now, designs call for a reactor about one-tenth the size of a power reactor, says project director West. Fission in the reactor core will send out a steady stream of neutrons. Slowed by heavy water to little more than walking speed, the neutrons will be carried through guides that work like fiber optic cables—by reflecting the neutrons internally, like tennis balls ricocheting down a pipe—to experiments tens or hundreds of meters away.

There the neutrons will probe the atomic-scale structure of materials in a way that depends on quantum mechanical duality. Like any subatomic particles, neutrons can be thought of as waves as well as particles. When they bombard matter, their wave nature comes into play. The slow neutrons from the ANS will have a wavelength about equal to the spacing between atoms in a typical solid, making the neutrons especially sensitive to atom-by-atom architecture.

X-rays of the same wavelength can also probe matter, and they are on tap at synchrotron research facilities around the world. But they often damage the very structures they're meant to reveal, especially in polymers and biological materials, says West. And while x-rays penetrate just microns, neutrons go a centimeter or more, says Brookhaven's