(continued from page 1329)

yield information about the prevalence of genetic mutations and the results of therapy that might otherwise be missed.

Another mini–think tank—led by Eric Lander of the Whitehead Center/Massachusetts Institute of Technology Center for Genome Research and Arnold Levine of Princeton University—is already drawing up plans for a new NCI investment in cancer diagnostic methods based on gene sequencing. Klausner told *Science* that this investment in what he calls the "cancer genome anatomy project" will be aimed at creating equipment that might "read in real time from a single cell the complete genome," using novel electronic sensors. Several biotech companies are investing in such technology (Lander and Levine are associated with two of them), and Klausner has invited staffers from these firms to meet with his planning group.

Klausner would like to put substantial resources into this area. The bypass budget proposes spending $79 million in 1998 on "developmental diagnostics," including $50 million to establish 10 labs to support technology-oriented R&D. Klausner says one of the first tasks will be to create high-quality libraries of full-length cDNA sequences from well-characterized human tissues, something that has never been done. NCI will soon be asking for bids to develop such libraries, he says, and he plans to use the NCI facility in Frederick, Maryland, as a "national resource center" for cDNA library production.

Klausner also used this consensus-building method to good effect last spring, nipping what might have become an embarrassing scientific disagreement in the bud. Aware that studies of the mechanism of the breast cancer gene *BRCA1* were reporting inconsistent results on expressed proteins, Klausner called for a summit of the involved scientists in his office in Bethesda, Maryland, along with NIH director Harold Varmus and others (*Science*, 10 May, p. 799). "A whole bunch of us sat for a day and talked about it," Klausner recalls. "After some initial anxiety, people really opened up … and agreed to exchange reagents, and they agreed on a whole set of experiments that needed to be done." Klausner says that they asked to be invited back to review the results later, and he plans to issue invitations this fall.

On a wider scope, Klausner and the National Academy of Sciences last month agreed to create a new council based at the academy to debate policy and make recommendations for cancer policy affecting the nation, particularly controversial topics like how to control smoking. This independent body, Klausner has said, will include people representing "all the stakeholders in the national cancer program, be chosen by the academy, and establish its own agenda."

The new NCI director certainly cannot be faulted for a lack of new ideas. But all the new activity may be confusing to some observers. Commenting on the proliferation of expert consultants and cancer advisory committees under Klausner, one patient advocate said that people may begin to wonder "what does one group do that all the others don't do?" The answer to that question may become clear. But it's not an issue that seems to trouble Klausner. From his viewpoint, when it comes to planning the NCI's future, there's no such thing as too much advice.

–Eliot Marshall

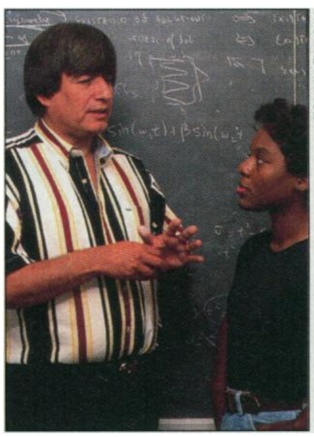
ASSESSING RESEARCH

Pilot Study Teaches NSF Costly Lesson

When a panel of the National Academy of Sciences issued an assessment last month of one of the most visible research programs at the National Science Foundation, the outcome was music to NSF's ears. The Committee on Science, Engineering, and Public Policy (COSEPUP) gave a strong endorsement to NSF's Science and Technology Centers (STCs) program—a $60-million-a-year effort launched in 1989—and recommended that it be continued (*Science*, 16 August, p. 866). Although NSF officials were pleased with the result, the review process itself pleased virtually nobody. Indeed, the assessment turned out to be a $727,000 lesson in how not to measure the value to society of basic research.

NSF officials had hoped the review would do double duty. They needed a top-to-bottom assessment of the STCs to help them decide whether to renew the program before the first centers complete their 11-year funding cycle in 2000. But they also wanted to make the review a model for how to assess the NSF's entire $3 billion research and education portfolio. NSF and every other federal agency will soon be required to make such sweeping evaluations under the 1993 Government Performance and Results Act (GPRA), which directs agencies to justify their budgets based on the value of what they accomplish (*Science*, 6 January 1995, p. 20).

NSF's original plans called for one organization to conduct a 2-year study in two steps: a thorough evaluation of the STC program, which would feed information to an expert panel that would offer advice on the future of the program. But center directors were worried that a contractor might not be able to assemble the necessary talent for a blue-ribbon assessment of their programs. "This program was created out of an academy panel [the so-called 1987 Zare report], and we felt there should be an equally distinguished panel looking at its future," says Ken Kennedy, director of the Center for Research on Parallel Computation based at Rice University. So last summer NSF divvied up the job, awarding COSEPUP $184,000 to assemble the expert panel and giving a $543,000 contract to Abt Associates Inc. of Cambridge, Massachusetts, to collect information on the program. (Abt's four-volume report was submitted to NSF in June.)



TOMMY EWASKO

Center stage. NSF centers run educational outreach programs like this one involving Rice's Richard Tapia and student Pamela Williams.

The academy hoped its expert panel would be able to shape Abt's effort to gather a mass of information on how well the centers were meeting their triple mission of pursuing frontier research, improving science education, and transferring knowledge to industry. Unfortunately, Abt had already developed its survey and begun to collect data by the time the academy panel was formed. In addition to the different paces of the two organizations, NSF was forced to push up Abt's deadline because it needed to submit the findings this summer to another advisory panel, which was preparing a final recommendation to the National Science Board. The board, NSF's oversight body, is expected to make a decision in November.

The result was a procedural nightmare. "The panel strongly recommends against NSF's use of a process like the one used in the STC program evaluation as a model for future evaluations," COSEPUP concluded in its report. "We need to recognize that this was an approach that didn't work even though [NSF] spent huge amounts of money on it," says William Brinkman, vice president for physical sciences at Bell Laboratories and chair of the COSEPUP panel. "The fundamental structure was wrong."

And the price was most definitely not right. "We realized, in retrospect, that there was no way we could afford to do this across the whole foundation," says Anne Petersen, NSF's deputy director and chief financial officer.

To compound these problems, NSF didn't flesh out its approach to GPRA program assessment until December, when the STC review was nearing completion, and it opted for a less quantitative approach than it originally proposed. That made the highly quantitative STC study less relevant as a model for the more sweeping GPRA review. "When the STC evaluation began, we thought there might be a way to do things in a more quantitative way," says Petersen. "But now I think the pitfalls outweigh any benefits." While it is useful to collect detailed information about such aspects of the program as the publication citation rates of scientists, the number of students trained, and the extent of industrial partnerships, says Petersen, GPRA requires agencies "to look at the big picture."

Stephen Fitzsimmons, a vice president at Abt and principal associate on the study, agrees that GPRA is a tall order for agencies. "The government can say, 'Thou shalt have a set of indicators [to measure research outcomes].' But that doesn't mean you'll get them. It will take some time to develop a sound approach to assessing fundamental research," he says. "I don't know how to do it."

Petersen says she empathizes with the center directors, who felt that they were being used as guinea pigs for an experiment whose methodology had not been worked out. But NSF has come away with one important lesson from the exercise: "From now on, our GPRA reviews will be done in-house, through an expanded use of existing committees," says Petersen.

–Jeffrey Mervis

JAPAN'S R&D BUDGET

Proposed Increases Follow 5-Year Plan

TOKYO—Three months ago, the Japanese government adopted a plan to spend $170 billion on science and technology over the next 5 years—an investment that would double, by 2000, what was being spent in 1992 (*Science*, 28 June, p. 1868). Last week various government ministries unveiled their budget proposals for the upcoming fiscal year, and the double-digit increases being requested for many R&D programs are a clear downpayment on that investment.

If the Diet approves these proposals later this year, Japanese graduate students and young scientists will find it easier to make ends meet, neuroscience will get a major new research institute, and research-industry ties will proliferate. The proposals "are a great step toward realizing the [targeted spending]" proposed earlier this year, says Masaki Tanaka, director for budget planning at the Science and Technology Agency (STA).

Just how much of a step won't be clear until later this month, however, when the STA compiles government-wide data on proposed R&D spending for the 1997 fiscal year that begins 1 April. And the actual amount in the 1997 budget is likely to be less than what has been proposed once negotiations are completed with the Ministry of Finance and the budget is submitted to the Diet for approval later this year. However, officials say that R&D programs are sure to get increases that outstrip the overall growth in government spending, now slated for an 8.4% increase. The difference, they add, is a clear sign that the government is committed to higher R&D spending.

One of the biggest proposed percentage jumps is for neuroscience, which would increase nearly 300% to $95.4 million. Part of that rise would fund a new neuroscience institute, under Masao Ito, at the Institute of Physical and Chemical Research (RIKEN), outside Tokyo. A variety of programs sponsored by the Ministry of International Trade and Industry to foster cooperation among national research labs, universities, and private industry would also get a big boost as the nation seeks new technologies to shore up economic growth.

Other significant increases would fund such emerging programs as the drive to create 10,000 postdoctorate positions by 2000, almost triple the number that existed last year (*Science*, 8 September 1995, p. 1335). Michiyasu Takahashi, deputy director of the science division at the Ministry of Education, Science, Sports, and Culture (Monbusho), says the new budget proposal would add about 1300 new postdoc positions to the 4600 positions at Monbusho-affiliated labs. Other ministries with fewer postdoc slots are also anticipating major growth in their programs.

"This isn't the end," Takahashi says. "We're intending further increases [in future years], but we think it is a good number for this stage of the program."

STA's Tanaka warns that the budget requests still face "intense discussions" with the Finance Ministry, which has agreed in principle to increase R&D spending but is also responsible for reining in Japan's ballooning budget deficit. A 4-year recession that is just ending has left Japan with the largest debt, in proportion to its economy, of any major industrialized nation. Many scientists are concerned that this rising tide of red ink could scuttle the 5-year spending plan.

"A budget crunch will be coming," warns Akito Arima, RIKEN's president. While he predicts that significant budget increases are likely for next year and the year after that, he is less certain about the odds for sustained growth. "I don't know what will happen in 3 years," he says.

–Dennis Normile

JAPAN'S PROPOSED R&D BUDGET: LOOKING UP
(selected programs, in millions of dollars)

Agency/Program	'97 Request	% increase
MONBUSHO (education and science)		
Graduate school programs	$226	27%
Grants-in-aid (research grants)	$1087	12%
Postdocs and research assistantships	$188	49%
University-industry cooperation	$962	15%
SCIENCE AND TECHNOLOGY AGENCY		
Neuroscience (including new institute)	$95	300%
Global climate change	$544	35%
New building materials	$26	(new)
Next-generation supersonic aircraft	$19	(new)
Oceanographic science and technology	$228	20%
Postdocs and STA fellowships	$106	40%
Regional research activities	$135	66%
Large facilities (including SPring-8 and computer networks and databases)	$561	22%
Public safety and disaster mitigation	$471	24%
MITI (international trade and industry)		
R&D for new creative industries	$3770	17%
Information technologies	$105	42%

SOURCE: JAPAN GOVERNMENT MINISTRIES