ANTARCTICA

Report Backs Science, Not New Station

The National Science Foundation's (NSF's) dream of building a new research station at the South Pole got a splash of cold water last week. A White House panel praised the foundation's Antarctic research program but stopped short of endorsing construction of the new station. Instead, it asked NSF to assemble outside experts to recommend ways to reduce the $196 million annual cost of the Antarctic program, and suggested that at least part of the new station may have to be funded from such savings.

This suggestion is part of a 67-page report* written by a subgroup of the presidential National Science and Technology Council (NSTC) and submitted last week to Congress. Legislators had asked for a review of U.S. policy in Antarctica in light of NSF's plan to build a $181 million facility by 2005 to replace the aging Amundsen-Scott South Pole Station, one of three year-round U.S. stations on the continent (*Science*, 1 December 1995, p. 1433).

The NSTC report endorses the current rationale for doing science in Antarctica, upholding a 14-year-old presidential directive that says the United States should exercise "an active and influential" presence on the continent. It says there are still compelling national security and environmental reasons for a continued U.S. presence there—among them acting as a buffer for other countries' overlapping territorial claims. And it concludes that NSF's research program is important and of high quality.

However, those reasons aren't enough for a new station when money is tight. NSF officials have pushed for additional funds to replace the station, citing a clause in the 1982 directive that says the Antarctic program should not be funded "at the expense of other NSF programs." But federal budget officials have urged the agency to set priorities within the existing Antarctic program and not to expect additional money. And the report restates that advice. "Recently realized fiscal constraints force a reexamination of the size, lifetime, and capability of the [new] station," the report declares. It recommends that NSF convene an external panel of experts "accustomed to operating in challenging physical environments" to suggest ways to squeeze money out of operations without endangering lives, the environment, or science. The implication is clear: The resulting savings could help finance a new station.

That's not what NSF wanted to hear. "I'm disappointed that we didn't get a green light for the redevelopment of South Pole station," says Cornelius Sullivan, head of NSF's Office of Polar Programs. Sullivan, however, took some solace from the fact that the panel "emphasized that science is one of the main reasons we should be in Antarctica" and supported NSF's request for $25 million in the 1997 budget for essential safety and environmental upgrades to the existing station.

The report seems unlikely to change congressional attitudes toward NSF's plans to replace the South Pole station. A Senate aide says it "reaffirms our concern" about the financial impact of a new station on NSF's current program. But Gerald Garvey of the White House Office of Science and Technology Policy, which coordinated the study, says that most panel members backed NSF's efforts. "While nobody is getting add-ons for science, most of the committee felt that NSF should negotiate as hard as it can [for the additional funding] because of the national interests involved as well as the quality of the work going on there. ... The fact is, at some point, you have to replace the current station."

However, it's not clear when that point will be reached. The report suggests that the outside advisory committee should finish in time for the 1998 budget cycle, which starts in September when NSF submits its request. But Sullivan thinks that the end of the year might be more realistic, after the panelists have gotten a first-hand look at the issue when the continent reopens to outsiders in November. "It's important that [they] go to Antarctica," he says. "It's a unique environment that needs to be experienced to be understood."

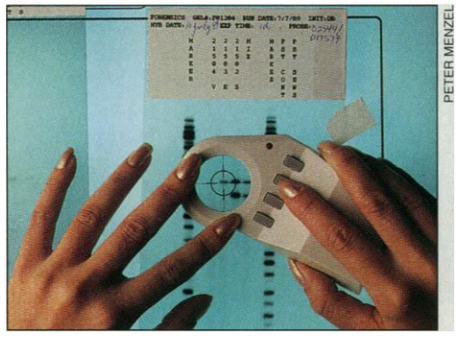
–Jeffrey Mervis

CRIMINOLOGY

Academy's About-Face on Forensic DNA

Four years ago, the National Research Council (NRC) published a controversial report advising the courts on the use of DNA evidence in criminal trials. The advice drew harsh criticism from prosecutors and some population geneticists, who lambasted it as arbitrary, illogical, and heavily tilted in favor of the defendant (*Science*, 5 February 1993, p. 755). The director of the Federal Bureau of Investigation asked for a reconsideration, and several agencies including the Institute of Justice put up the funds for another review of DNA fingerprinting. Last week, the NRC released the 200-page result.

The new panel, chaired by geneticist James Crow of the University of Wisconsin, concedes that the critics were right in saying the 1992 report was arbitrary. The panel has withdrawn the most troublesome recommendation—that courts should use a rigid formula known as the "interim ceiling principle" to express the likelihood of a chance match between the defendant's DNA and DNA left at the crime scene. Instead, the NRC now recommends a more flexible and specific approach in which odds are calculated on the frequency at which specific DNA markers occur in particular ethnic groups. In most cases, this will permit prosecutors to multiply the frequencies of four to six markers to determine the overall likelihood of a chance match, with a fudge factor for homozygotes, yielding impressively small odds. Already, DNA forensics experts like prosecutor Rockne Harmon of Alameda County, California, have embraced these guidelines as "reasonable."



PETER MENZEL

Fingerprints. Lifecodes Corp. scientist sizing autorads of DNA fragments.

The NRC's about-face was greeted with surprisingly little public comment. Four years ago, calculating odds based on differences between ethnic groups inspired fierce debate, but not today. For example, the outspoken Harvard University geneticist Richard Lewontin argued in the early 1990s that too little was known about the inheritance of DNA markers within ethnic groups. He also sent a letter to the NRC protesting the makeup of the panel, saying it would be naive to imagine it would improve on the cautious 1992 report. (The ceiling principle said that the odds of a match should be calculated by multiplying a series of frequency values for each DNA marker, using in each case the largest value derived from any racial group, or 10%, whichever was larger.) Now, Lewontin says, the "old population genetics question" is "not at the center" of the debate any longer.

Lewontin is still critical of the NRC, charging that the conclusions of this report were "bought" by the Department of Justice. The "serious problem," he insists, is now the lack of standardized, blind proficiency testing of DNA forensics labs. The odds of lab error, Lewontin and others argue, may be more significant than the odds of a chance DNA match. Lewontin also finds "disturbing" the use of big statistics—like "one in a million"—to impress jurors.

DNA forensics experts say this shift in critical focus means that the scientific furor is ending. What's changed, they say, is that the validity of their assumptions about DNA marker inheritance is now supported by lots of data. The FBI and other agencies have tested thousands of DNA samples from many ethnic groups. This has not turned up any surprises, says population geneticist Ranajit Chakraborty of the University of Texas, Houston. It has confirmed that differences in marker frequency are greater between broad racial groups than within them, suggesting that in calculating the odds of a match, it is best to use data for a single ethnic group, not an average or mix of values. But no matter how the odds are calculated, if one uses four or more markers, the likelihood of finding an erroneous match is vanishingly small. Says Mark Stoneking of Pennsylvania State University, an expert in population genetics: "The data are pretty conclusive."

Because confidence in the validity of DNA markers has increased, the NRC panel agreed that when the race of a person leaving evidence at the crime scene is known, the court should use the appropriate ethnic database to calculate the odds of a DNA match occurring by chance. If the race of the perpetrator is not known, the report says, the odds should be calculated using several different population profiles, and the court may decide which is the best to use.

The NRC panel decided not to ask the courts to mandate a uniform policy of proficiency testing for DNA labs, something many critics had sought. Instead, the report suggests that labs "should adhere to a high quality standard," "make every effort to be accredited," and "participate regularly in proficiency tests." Critics of DNA forensics practices fault the NRC panel for making such a bland recommendation. But the report says blind testing would impose "formidable" logistical demands on the system. As an alternative, the NRC panel asks that defendants be allowed to verify results by conducting independent tests on DNA samples "whenever feasible."

The NRC's new advice will still leave critics—and some enforcement officials—grumbling. For example, California prosecutor Harmon thinks that the report's recommendation for research on how to present complex statistics to a jury will prompt defense attorneys to file appeals on grounds that statistics are misunderstood. But for the most part, forensics experts say, the new NRC rules offer a rationale for practices that the courts are already adopting.

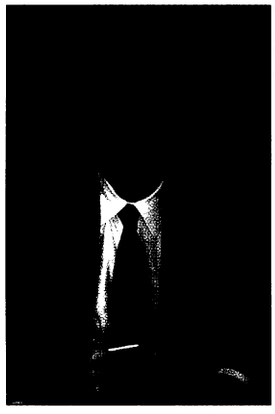
–Eliot Marshall

JAPAN

Five-Year Science Plan Under Debate

TOKYO—Next month a high-level working group will submit a draft of a 5-year plan for Japanese R&D to the Council for Science and Technology, an advisory body to the prime minister. The plan, which is eagerly awaited by Japan's scientific community, is expected to lay the groundwork for a major expansion of government support for R&D. Even before the document is finished, however, some researchers are worrying that it will not do enough to bolster basic research.

The council established the working group—composed of scientific and industrial leaders—to help implement a Science and Technology Basic Law passed last fall by the Diet. The working group's report will describe the policy initiatives needed to permit what the law terms a "radical expansion of the nation's investment in research and development." The law does not define "radical expansion," but the most frequently mentioned target is a boost in governmental spending on research to 1% of the country's gross national product from the current level of 0.53%. (The U.S. figure is approximately 1%.) The plan is also supposed to spell out nonbudgetary measures that would facilitate research efforts and identify steps to stimulate research in the private sector.



D. NORMILE

Big picture. Osawa says report will look at the country's overall research needs.

Hiroyuki Osawa, the head of the working group and a former vice minister of the Science and Technology Agency, says the group's recommendations will not focus on specific fields, nor will they differentiate basic and applied research. "Rather, they concern the overall research environment," says Osawa. One priority will be refurbishing cramped and outdated laboratory facilities in the country's 100 national universities. "It's the biggest problem," he says. Among nonbudgetary issues, the group is looking at laws affecting public servants that bar professors from consulting or participating in start-up businesses and make it difficult for universities to create postdoctoral positions.

That even-handed strategy doesn't surprise physicist Akito Arima, president of the Institute of Physical and Chemical Research (RIKEN) and a member of the working group. "That is the usual way in Japan," he says. But Arima believes that awarding across-the-board increases will not correct the existing imbalance between basic science and engineering. He says the disparity is visible on campus, where engineering departments dwarf their basic science counterparts, as well as in the equal representation of industry and academia on the committee drafting the 5-year plan.

"I don't want to be misunderstood," says Arima, who stresses his support for the budget increases. "Both [applied and basic research] are important. But applied science in Japan is relatively strong. We need more support for pure science." In particular, he cites astrophysics and mathematics as two fields that need additional support precisely because the chances of economic return are remote. At the same time, Arima admits that his is a minority opinion on the panel and that "I don't have any good ideas" on how to focus more attention on basic science.

Shinya Ono, a Diet member who is vice chair of the Liberal Democratic Party (LDP) committee that initiated the bill creating the basic law, says he does not see a sharp distinction between basic and applied work. "I think the emphasis should be on originality, regardless of whether it is in basic research or applied research," he says.

The basic law itself reflects the growing role of the legislature in shaping the direction of Japanese science. (The vast majority of bills in Japan are proposed by the administration.) Ono, formerly an aerospace engineer at the government's Institute of Space and Astronautical Science, says many Diet members believe the rapid growth of the government's research budget and the importance of science to the nation require that the "objectives, progress, and achievements should be reviewed by the Diet, especially for big projects." Already under discussion in the same LDP committee that generated the basic law is the creation of some mechanism, perhaps modeled on the now-defunct U.S. congressional Office of Technology Assessment, that would help the Diet with such reviews.

"Diet members used to tell me, 'I know [science policy] is important, but I don't know anything about it,' " says Masao Ito, a RIKEN neuroscientist who is president of the Science Council of Japan, an influential association of scientists. Now, he says, a number of Diet members do have a background and interest in science. And as Japan's science budgets grow, he says, "they expect their [political] power could expand as well."

–Dennis Normile