Fixing NIH: The 110% Solution

Concern that NIH is in danger of losing preeminence has sparked a look at ways the intramural research program might be changed for the 21st century

THE scientists running the National Institutes of Health want what a lot of people want—to be left alone. NIH, the "jewel in the crown" of the federal government's research enterprise, thinks it suffers not only from being part of the federal bureaucracy, but from being very low on the federal totem pole besides. The director of NIH, for example, does not speak directly to the head of the White House Office of Management or Budget (OMB) or to his cabinet secretary, as the heads of other science agencies do. He reports through an assistant secretary. That hurts.

NIH has been asking for different and higher status within the federal bureaucracy. It wishes it could be an independent agency, like the National Science Foundation, or NASA, or the Veterans Administration. NIH is looking for a little respect.

Across the street from NIH's university-like Bethesda campus, physicians at the Uniformed Services University of the Health Sciences can earn as much as faculty at Washington area medical schools. The military medical school is exempt from pay ceilings that limit other federal institutions. NIH wishes it could be like the military—without the uniforms.

After years of trying, NIH's plight finally caught the attention of officials at OMB, where a special "privatization" office is looking government-wide for ways to turn federal programs over to the private sector. Being types who favor making money and free enterprise, they were sympathetic. They evaluated NIH's various proposals to right the situation, and then proposed going one step further. "Rather than pursuing ad-hoc solutions, the NIH intramural program could be placed into the private sector as a freestanding research institute," OMB said in a memo on privatizing NIH. "Placing the NIH intramural laboratories in the private sector would remove, in one sweep, the need for administrative requirements which may threaten continued NIH preeminence."

The OMB has asked the Institute of Medicine to do a fast turn around study that will be done in collaboration with the National Research Council and headed by Princeton president Harold Shapiro. Both the Administration and Congress appear to be politically receptive to a fresh look at NIH, whose leaders endorse the idea.

This is the second of two articles on the future of the NIH intramural program. The first appeared in the 18 March issue, p. 1364.

What are the alternatives for preserving intramural NIH? In a 40-page position paper obtained by *Science*, NIH has spelled out several choices.

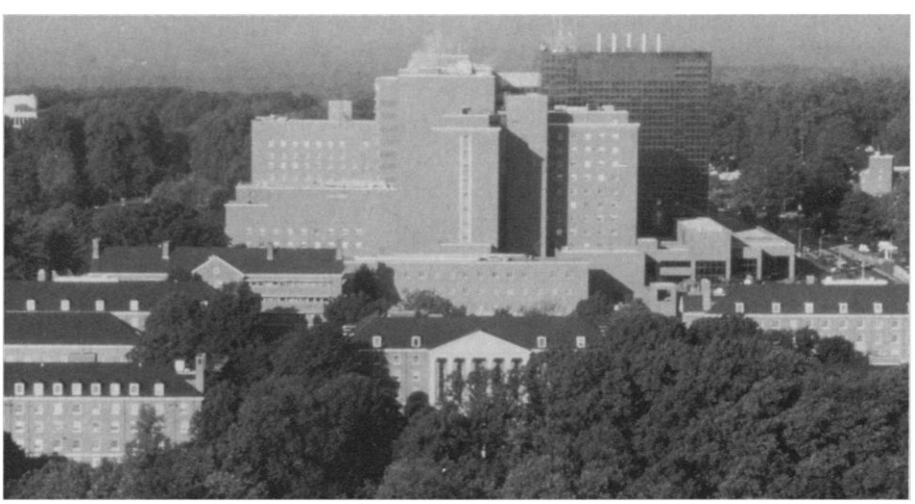
■ **Salaries.** For several years, NIH has submitted proposals to exempt its top people from federal pay caps by creating a special "scientific faculty" or "senior biomedical research service" within the government personnel system. A draft bill from NIH is now circulating among the President's Cabinet, whose members are likely to want the same for their agencies. And a bill to raise NIH salaries is in the Senate.

If NIH could establish a salary scale of its own, current salaries for top scientists would go up about 27%. The present cap for an M.D. scientist (excluding bonuses) is $85,000. It would go up to $110,000, which is 110% of current executive level salaries for cabinet secretaries and people in similar positions. The pay for Ph.D. researchers would jump from a $75,000 high to $95,000. NIH estimates the overall cost of salary increases throughout the institutes at $3.57 million, which does not sound like very much.

■ **Personnel ceilings.** For years, one of the great banes of NIH's existence has been its inability to hire the number of people it wants to—both scientists and technicians. Why? Because NIH is subject to personnel ceilings intended to control the size of the entire federal work force. The solution, NIH suggests, would be to give the NIH director authority to make personnel decisions as long as he keeps within the limits of the total intramural budget. "We need that flexibility," says NIH deputy director Joseph E. Rall.

■ **Space.** "Approval for new construction on the NIH campus . . . requires years of justification," NIH's internal memo states. The problem is compounded, according to NIH scientists, by the fact that the people who must be convinced—the bureaucrats at the General Services Administration—are "far removed from the dynamics of biomedical research."

"New and specialized space required to respond rapidly to public health emergencies requiring the immediate mobilization of human and physical resources may take



The mother church. *Thirty years ago, NIH was one of the few institutions for training young researchers; it has successfully fostered its own competition.*

years of persuasion to obtain." In 1983, Robert C. Gallo of the National Cancer Institute isolated the AIDS virus in serum from 48 patients—a pioneering step in the fight against AIDS. About 2 months ago, NIH was finally able to provide him with additional (not new) laboratory space. Gallo is, perhaps, the most visible but by no means the only NIH scientist for whom space is a vital and scarce commodity.

■ **Foreign travel.** It is not only the big things that put NIH at a competitive disadvantage. Seemingly little things matter too. Foreign travel is one of them. Emphasizing the international character of modern science, NIH observes that "much of the most innovative research follows reports and discussions at national and international meetings." Low travel ceilings for intramural scientists "run the risk of paralyzing research progress."

As with personnel, NIH sees a solution to this handicap by simply giving the NIH director authority to set travel ceilings within the budget.

It is little appreciated but true that the NIH director, for all his presumed responsibility for a $6.2-billion combined intramural and extramural budget, has precious little authority to make and execute decisions of the sort that are commonly within the purview of a university president, for example, or the head of an independent federal agency like the Veterans Administration.

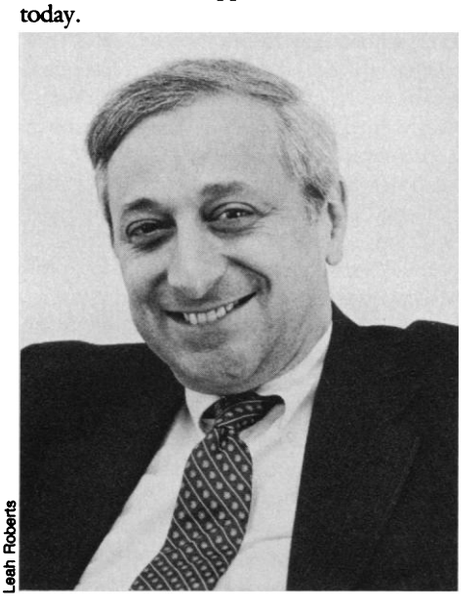
Although there is some sentiment for giving NIH independent agency status, other options are also likely to be considered. One is to turn the institutes into a GOCO—a government-owned, contractor-operated laboratory like Oak Ridge, which is another way of releasing NIH from the constraints of federal salary and personnel caps, for instance.

In fact, marketplace realities already have forced NIH into the position of contracting out for services that used to be part of its in-house operation. The NIH Clinical Center or hospital simply cannot attract anesthesiologists to its staff, so it hires them via a contract with Georgetown University—thereby paying these physicians at the same rate they would get in a medical school. Technicians for radiotherapy, as well as nuclear medicine technicians skilled in PET (positron emission tomography) scanning are also recruited to the Clinical Center via a university contract. "This sort of strengthens OMB's case for a new look at how we operate," one NIH official ruefully acknowledges.

Other options include chartering the NIH intramural program as a private but federally supported university like Howard and Gallaudet in Washington, D.C.

If one is sympathetic to NIH, the kinds of solutions it has proposed in order to maintain the preeminence of its intramural program sound eminently reasonable. But in assessing the issues, at least two questions remain. First, is the rumored demise of NIH real or imagined? Is there really a brain drain? Is there something new or especially threatening about its inability to recruit senior people? Second, even if NIH were to lose some of its status, does it matter?

The intramural program at NIH occupies a very special niche in the history of biomedical research in the United States. It is only a slight exaggeration to say that virtually every senior clinical investigator who currently holds a major academic or administrative post once passed through NIH's laboratory doors. There are at least two good reasons for this; neither applies to the situation today.



Leah Roberts

Samuel O. Thier: *The IOM will look at "all the possible options."*

First, there was a time—perhaps as long as 20 years ago—when NIH was not only the premier research training ground in the country but one of very few places where it was possible to make a start in basic biomedical research. Today, thanks to its success, the nation is rich with institutions that are the intellectual and financial offspring of the mother church. For instance, the University of California at San Francisco (UCSF) is one of the leading biomedical research institutions in terms of federal dollars and popularity with first-rate scientists. Twenty or twenty-five years ago, UCSF was not even on the research map. The University of Texas Southwestern Medical Center in Dallas, where Nobelists Joseph Goldstein and Michael Brown have just secured a $20-million gift from billionaire Ross Perot (*Science*, 5 February, p. 554) is another example of a school that was once a frontier outpost and now competes with NIH for top talent. Twenty years ago, Stanford was not the research giant it is today.

NIH has succeeded brilliantly in breeding its own competition. And, ironically, government salary caps have forced NIH into the uncomfortable position of being its own worst enemy when it comes to paying faculty. As faculty salaries on the outside rise, NIH grant funds generally rise with them. Not so the intramural pay scale.

The second important factor in the strength of intramural NIH is war. NIH director James B. Wyngaarden was an NIH fellow from 1953 through 1956. As a member of the Public Health Service's uniformed corps, Wyngaarden—like countless colleagues—fulfilled his military obligation in Bethesda rather than Korea. Younger research leaders—the men who are now in their forties and fifties—also found a haven in NIH. For them, service in Bethesda was an alternative to Vietnam.

Today, the lure of NIH as sanctuary is gone and the number of young men applying for fellowships is dropping as competitors get their share of new talent. It is a subtle situation though, hard to interpret until solid data about the recruitment and brain drain are in hand.

Is this disaster or healthy evolution? It is hard to say. There is no question but that, for all the talk of impending demise, NIH remains unique among biomedical research institutions. Its 540-bed hospital is populated exclusively with research patients. A new ambulatory care unit also treats only patients whose diseases are the subject of intramural research. NIH scientists are free of the teaching responsibilities that occupy their colleagues at academic institutions. And they have relatively few administrative chores. For all these years, to be a researcher at NIH was to be a researcher virtually 100% of the time and this intellectual luxury was a powerful attraction. Besides, it is only recently that academic salaries have far outpaced those at NIH.

NIH officials cite as evidence of impending demise the fact that it is nigh impossible to attract senior researchers away from university posts. This is true. It is hard to get top people to come to NIH at a loss of pay, unless they have independent means or, at the least, children who are out of college. But this problem has plagued NIH from the start. An anecdotal review of some of NIH's stellar institute and scientific directors reflects the very strength of the place as a training ground. As former NIH director Donald S. Fredrickson remarks, "NIH has always grown its own, some of the best."

The troublesome unknown is whether it

can continue to do so. Although faced with competition, NIH is still the best as far as many young researchers are concerned. Willa Hsueh, president-elect of the American Federation of Clinical Research, whose members become emeritus on their 41st birthdays, thinks most researchers, especially physician-scientists, still long for a stint at NIH. Or, as Judy Kim, a Johns Hopkins medical student who is spending a year at NIH as one of 30 Howard Hughes–NIH student scholars, said recently, "We all came here because NIH is Mecca." A fellow Hughes scholar offered an additional thought. In one specialized area or another, it might be possible to say that the best lab in the country is at this institution or that, "but there is nowhere else where the whole spectrum of research is spread out before you in one place—everything," she says. One of the greatest justifications for changing NIH to save it may be to maintain it as a premier institution for training young researchers.

Fredrickson suggests another special niche for intramural NIH—clinical trials. "We haven't even begun to appreciate the need for the clinical trials of the 21st century when we'll be testing countless new products of biotechnology," he says, adding that with researchers' increasing ties to industry, "everyone but NIH will be up to the hilt in conflict of interest."

And there is the intangible link between intramural and extramural NIH. About 90% of NIH's $6.2-billion budget is spent on extramural grants and contracts, managed by a large staff of administrator-scientists. There is a strong presumption that quality is enhanced overall by the intellectual and physical proximity of researchers and grant-givers. Institute directors, for instance, are responsible for both intramural and extramural research, giving them a certain closeness to ongoing science that their counterparts in agencies like the NSF do not have.

Part of the challenge to the Institute of Medicine will be to get a grip on these and other issues during the course of its upcoming study, which is expected to take only 6 months from start to finish. NIH has just now completed the paper work for the contract with IOM, whose president, Samuel O. Thier, is planning a broad study of "all the possible options"—not just those suggested by NIH.

Originally, OMB hoped the study could be done by May—in time for internal discussions about the budget for fiscal year 1990. But that cannot be done. The goal now is to have it in hand before the presidential election in November. ■

BARBARA J. CULLITON

Doubts Over Fermat Proof

A final verdict is still not in on a recently announced proof of Fermat's Last Theorem, but experts in the theory are skeptical. Early this month, Yoichi Miyaoka of the Tokyo Metropolitan University, who is currently at the Max Planck Institute for Mathematics in Bonn, West Germany, captured public attention when he completed a proof of the famous open problem in number theory. His final manuscript is only now being circulated, but based on preliminary lecture notes, some mathematicians think there is an error at a critical point in Miyaoka's complicated argument. Miyaoka, however, has reportedly addressed some of the skeptics' questions in the final manuscript.

Fermat's Last Theorem is a deceptively simple assertion. Around 1637, Pierre Fermat observed that, while the equation $x^2 + y^2 = z^2$, which is familiar from the Pythagorean Theorem, has infinitely many positive integer solutions (such as $x = 3, y = 4, z = 5$), analogous equations with higher exponents—$x^n + y^n = z^n$, with n larger than 2—seemed to have none. Fermat wrote this in the margin of a book, adding the comment, "I have discovered a truly remarkable proof, which this margin is too small to contain." Mathematicians are of three opinions as to Fermat's comment: he was joking; he was mistaken; or he was very very smart. In any event, a proof of Fermat's Last Theorem has eluded mathematicians for the last 350 years.

Because of its simplicity, Fermat's Last Theorem has attracted numerous attempts to solve it, ranging from the sublime to the ridiculous. Mathematicians have learned to take announcements of solutions with a sizable grain of salt—most of these "proofs" are amateur attempts that repeat mistakes made many times before. However, in the last 2 years, Fermat's Last Theorem has been shown to have deep connections with some modern developments in number theory and geometry. Miyaoka's proof is being taken seriously because it is based on one of the new approaches.

Miyaoka's work involves new ideas from a program to "translate" results in differential geometry into an arithmetical setting. This program gained prominence in 1983, when Gerd Faltings, now at Princeton University, proved several major results culminating in the solution of another important problem in number theory known as the Mordell conjecture. Faltings' breakthrough has a direct bearing on Fermat's equation, which persuaded many mathematicians that Fermat's Last Theorem might be accessible by the new methods.

A step in this direction was taken about a year ago by A. N. Parshin, a Russian mathematician, who proved that if the arithmetical analogue of a certain fundamental inequality in differential geometry—which Miyaoka himself had proved in the original setting—is true, then Fermat's Last Theorem is also true. Miyaoka's current work is an attempt to prove the arithmetical version of the inequality. But experts, including Faltings, are skeptical.

Enrico Bombieri of the Institute for Advanced Studies at Princeton has identified a serious problem in Miyaoka's proof. If a certain step is "translated" back into the geometric setting, the corresponding assertion is false. That does not necessarily invalidate the arithmetical step, but it violates the guiding philosophy of "parallelism" between geometry and number theory.

Faltings and Bombieri point out that they have only seen lecture notes on Miyaoka's proof and not an "official" manuscript, but the notes are enough to raise doubts. "The way a mathematician checks a proof is by looking at the concepts and how they are related," Bombieri says. "If the concepts look OK, then we start on a line-by-line check." Miyaoka's proof, according to Bombieri, is still at the first stage.

But according to Don Zagier, who is working with Miyaoka in Bonn, Miyaoka has taken care of many of the doubts, and the final manuscript is quite different from the lecture notes. Zagier, who is an expert in number theory but not in the type of mathematics that Miyaoka uses in his proof, says that Miyaoka's lecture was intentionally simplified for purposes of exposition, so that some parts of it were not precisely correct. "I wouldn't worry about anything too much until people have seen the proof."

Debate over the correctness of a mathematical proof usually takes place in a relatively quiet academic background, but interest in Fermat's Last Theorem runs unusually high. Even if Miyaoka has not proved the theorem, his ideas are bound to have an impact. "Some parts of the proof are of independent interest," Bombieri says. "This work certainly will help to understand better the analogies between geometry and number theory." Bombieri also does not dismiss the possibility that Miyaoka actually has proved Fermat's Last Theorem. "If Miyaoka's work turns out to be correct, it will be a fantastic achievement." ■

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