such a policy be doomed to failure, it would also be suicidal.

In the few institutes where a high-level graduate program is already a possibility, students should be encouraged to stay until they get their Ph.D.'s. In the majority of cases, however, it is still necessary to offer fellowships for graduate study abroad. It is also important, at the postdoctoral stage, to give a young scientist the opportunity to work on his own and gain confidence in himself, instead of overloading him with responsibilities immediately after he receives the Ph.D., as is often the case.

Finally—and this is one of the most fundamental points — Latin-American governments must learn to respect the autonomy of universities and research institutes, as part of the respect for scientific work. Scientific research flourishes in a climate of full intellectual freedom. Universities should not get mixed in politics, but individual rights and freedoms must be protected. Intervention in the affairs of universities cannot be tolerated. The researchers who have been the victims of such attempts in the past should be invited to return to their positions, without any discrimination.

These are only a few of the many measures that must be taken as a first step. They do not depend on the scientists; rather, they depend on the government and on public opinion in Latin-American countries.

The scientists of Latin America have already demonstrated that they can build good research institutes, given enough resources and government support over a period of at least 10 years. Once this point is reached, the problem is no longer in their hands. If their work is respected and encouraged, its continuity and long-term stability may eventually be guaranteed, and a few high-level institutes may gradually lead to the formation of true universities. Development, in the last analysis, is a synonym of education, and good universities are the foundation of any educational system.

On the other hand, experience unfortunately indicates that, if lack of respect for science continues to dominate, the difficulty and effort required for building good research institutes will be matched only by the ease with which they can be destroyed.

It is up to the governments and peoples of Latin America to decide which road they are going to follow. We should be ready to contribute as much as we can to the great task of their development.

References and Notes

1. For numerical data, see "Migration of Health Personnel, Scientists, and Engineers from Latin America: Report Prepared by the Pan-American Health Organization Sub-Committee on Migration for the P.A.H.O. Advisory Committee on Medical Research," *Pan.-Amer. Health Organ. Sci. Publ. No. 142* (1966). See also, W. Adams, Ed., *The Brain Drain* (Macmillan, New York, 1968).
2. These figures, which are based on data supplied by Brazilian government sources, should be regarded only as upper bounds. The actual values may be well below those given. Reliable statistical information on this and other subjects is very scarce.
3. Samples of "subversive materials" apprehended after the 1964 revolution included Stendhal's *The Red and the Black*, Tolstoy's *War and Peace*, and Diderot's works.

NEWS AND COMMENT

NIH: Agency and Clients React to Retrenchment

When the Presidential committee chaired by Dean E. Wooldridge reported on its study of the National Institutes of Health (NIH) in 1965, it urged that NIH prepare to deal with problems the agency would face when it reached "maturity," an oblique allusion to the time when NIH's fast-rising budgets leveled off. What neither the committee nor almost anyone else anticipated was the abruptness with which the day of reckoning would arrive. The Vietnam war and accompanying inflation and competition for funds within the health budget have put heavy stress on NIH and created unprecedented strains between the agency and its clients.

In August, NIH began its second year of austerity by announcing an across-the-board, 20-percent cut in research grants up for renewal; this sent shock waves through the biomedical research community. Just as cries of dismay from angry grantees were gathering force, the cuts were reduced to the order of 5 to 10 percent by NIH's superiors in the Department of Health, Education, and Welfare (HEW).

The incident not only dramatizes the fact that NIH has moved from an era of expansion to one of decline in terms of what money buys but also demonstrates that the basic relationships and assumptions with which NIH operated during its period of growth have changed decisively.

To a much greater extent than in the past, decisions made elsewhere, particularly in the upper echelons of the Executive, where budget issues are settled, crucially affect NIH. The agency's special relationship with Congress has eroded since the death of Representative John Fogarty and the retirement of Senator Lister Hill and NIH director James A. Shannon. And NIH's traditional powers of self-determination have been further diminished by a shift in the balance of control over expenditures from Congress toward the Executive. Last year, when Congress passed the revenue and expenditures act, it told the President to designate which expenditures were to be cut below budget levels. And Congress, which has still not acted on the $1-billion-plus NIH research budget for the current year, now finds itself in the position of appropriating funds which the Administration may decide not to spend. This has happened to NIH.

The 20-percent cut in research grants was decided on by NIH officials to hedge against a stiff limit on spending which they expected HEW to impose. According to NIH and HEW officials, the downward revision of the cuts that was announced 12 September was made possible by a decision high up in the Administration to insulate biomedical research and other HEW activities by treating Medicare, Medicaid, and Social Security costs separately. HEW Secretary Robert Finch had campaigned hard for the ruling, and some HEW officials who are delighted that he won also admit surprise that he did, since the control of expenditures is a top-priority matter in Washington today.

While the Executive is primarily concerned these days with expenditures—

the actual outflow of money in a given year—NIH works essentially with obligations—the money committed but not necessarily spent in a particular year. And this is a source of difficulty for NIH and of confusion for outsiders. Particularly in the case of grants, NIH has very imperfect control over the flow of expenditures. It makes a grant, and in effect extends a line of credit to the grantee. Less than half the money committed in grants in a year is, in fact, spent in that year. NIH, for example, went into the present fiscal year with $1.5 billion in unexpended obligations held over from last year. In ordinary times this is acceptable practice, but when the Administration hopes to bridle inflation by limiting expenditures, this unpredictability can earn an agency unpopularity at the Bureau of the Budget.

Biomedical researchers in the universities and medical schools tend, by and large, to judge how things are going at NIH by what happens to the regular project research grants, which account for well over $400 million of the $600-million-plus extramural research budget. This year the Nixon budget originally called for project grant support amounting to $462 million, up about $8 million over last year, but with the cuts settled on after the recent flurry the amount would be reduced to about $425.7 million.

In acting on the project grants, HEW officials directed that across-the-board cuts of 5 percent be levied on grants on which NIH informal commitments to fund for 3 to 5 years had not lapsed, and that cuts of 10 percent be levied on grants which had to compete for extension. The directive prevented NIH from negotiating cuts, as is the agency's habit; as one official said, "We can pass the buck on that one."

(The cuts are not universally being imposed across the board. The Institute of Arthritis and Metabolic Diseases is negotiating cuts of about 15 percent in order to save funds for renewals and new awards. It is difficult, at this point, to determine an overall NIH pattern.)

The combined effect of budget stringencies and inflation can perhaps best be traced in the decline in the number of research grants made in recent years. From 12,324 grants awarded by NIH in 1965, the number declined to 11,199 in fiscal 1968, and to 10,985 last year. A level of 10,000 was set for this year, but the recent cuts would reduce it to a level considerably below that.

Project grants have not, of course, been the only targets of the economizers. Especially vulnerable, apparently, is the category of "research resources and facilities," which includes animal centers substantially financed by NIH. Part of the rationale here is that costs in this sector have been rising very rapidly and cutbacks are essential.

Inflation was also blamed as a leading factor in the decision to phase out 19 or 93 small regional research centers (*Science*, 19 September 1969) unless new funding can be found.

NIH's $100-million intramural research budget, which goes largely to support in-house research on the agency's Bethesda campus outside Washington, has so far not been subjected to radical surgery. NIH has sought to keep its research cadre intact and has had to absorb the recent federal pay increase, which approached 10 percent in the upper brackets. The agency has been operating under the government-wide order to reduce staff, and in the last 14 months it has lost about 5 percent of its employees. The attempt to hang on to professionals has meant that attrition has been heaviest among "high turnover" groups—secretaries, security and maintenance forces, and animal-care and laundry workers. The cuts in supporting services seem to have virtually reached the limit, and cuts in regular programs are now being considered. As one administrator said, "We're mindful that people expect us to tighten our belts as well as tighten theirs."

Resistant to Economizing

Some programs are especially resistant to economizing. The pressure for results from population research, for example, has increased greatly in recent years. Despite the budget squeeze, funds for population research rose from $7.7 million in 1968 to an estimated $10.8 million last year, and are to jump to $15.5 million this year. A new National Eye Institute was bestowed last year on NIH, which was decidedly lukewarm about getting it. NIH now must make the effort to make the new institute viable. A National Institute of Environmental Health Sciences, recently established near Durham, North Carolina, also exercises special claim on funds.

One activity which will sustain a sharp cutback is manpower training. Funds for training grants and fellowships are scheduled to be cut by $18 million, from a total of about $196 million last year. Training grants will be allotted about $132 million, and fellowships, $46 million. The $18-million reduction is to be split about evenly between the two categories, so the smaller fellowship program will take a proportionately deeper slash.

The impact of the cuts is expected to be felt fully next spring when the awards are made, but cutbacks have already wiped out training programs in some departments, and university researchers point out that such programs can't be easily revived.

The negative effects of recent developments on university research are hard to assess in detail at this point. A spot check of departments accustomed to receiving substantial NIH funding, however, revealed agreement that the most serious adverse effects are being felt by younger researchers at the postdoctoral stage or seeking funds to establish themselves as independent investigators. The most widespread reaction to budget problems last year seems to have been to fire the dishwashers and reduce the number of postdocs. This year, however, the reduction in the number of research awards is hitting established investigators. As one Ivy League departmental chairman said, last year senior men, especially at better-known institutions, generally were above NIH's cut-off point for awarding grants; this year, "the borderline has moved up."

The mood among NIH clients seems to have changed from last year, when grantees in the universities braced themselves for what they hoped would be a short-term shortage of funds and improvised their way through the year. Now they realize that the difficulties are long-term ones. The reaction so far doesn't seem to indicate any fire at the grass roots. But some tempers are certainly fraying. The making of grant cuts across-the-board was resented by some, for instance. And the reported unilateral freezing of travel funds by at least one institute caused muttering that NIH was "dictating science policy."

NIH officials, who themselves seem to have combined improvisation with some wishful thinking last year, are evidently now working on the clear assumption that the agency faces an extended period of budgetary rationing. Although Congress has not yet acted on HEW appropriations for the current fiscal year, final negotiations are in progress on the requests HEW will send to the President for his fiscal 1971 budget. One of the sobering possibilities that NIH officials had to consider in shaping their proposals was that research funds might

remain at their present levels through 1973. Officials emphasize that long-range forecasts are notoriously fallible, but dour NIH officials are certainly taking care not to raise false hopes.

One bright spot is that NIH feels less like a bureaucratic orphan than it did last spring when the office of HEW assistant secretary for health and scientific affairs was untenanted because of a political contretemps (*Science*, 11 April 1969). The new incumbent, Roger O. Egeberg, is regarded as an effective advocate of biomedical research. And Egeberg's deputy, Jesse Steinfeld, is a former deputy director of the National Cancer Institute, so NIH feels it has a well-informed friend "downtown."

A decisively brighter budget picture for NIH soon, however, does seem unlikely. In recent weeks the comments of Administration officials, like Presidential urban-affairs adviser Daniel P. Moynihan, have built the impression that even an early settlement in Vietnam would not release a major flow of funds in the direction of biomedical research.

What this suggests is that NIH management will have to make increasingly difficult decisions under mounting pressures. And it is worth remembering that the Wooldridge committee put strong emphasis on the need for improving the decision-making machinery at NIH.

As a result of a Wooldridge-panel recommendation, NIH has created an advisory committee of distinguished nongovernment people. But no matter how helpful this committee proves in giving advice on general policy matters, it meets only four times a year and can't help with critical day-to-day management decisions.

NIH management machinery really hasn't altered since NIH's formative years. The judgment of scientific peer groups will probably continue to be decisive in the award of research grants, with study sections setting priorities and council approving grants. But decisions on large sectors of the NIH budget are much more directly influenced by management. The congressional appropriations process, which, in effect, provides separate budgets for each of the institutes, sharply limits management ability to shift funds, for example. But NIH administrators have considerable influence on such questions as the division of emphasis between extramural and intramural research, and also on negative decisions. In recent years NIH has backed away from expanding research in behavioral sciences and biomedical engineering, for example, not because these areas were unpromising but essentially because of financial limitations. Other hard decisions face NIH, on which management may have to take the bit in its teeth. Cries of distress are rising from the medical schools, many of which are heavily dependent on NIH financing, and pressures are growing for NIH to launch a major rescue operation that presumably would drain more funds from regular university research.

NIH management has been accounted generally successful, but the Wooldridge committee, in its friendly assessment, added a fairly common qualification when it said, "The sophisticated understanding, common motivation, and personal compatibility of this handful of capable men has permitted them to work around the handicaps of less than optimum organizational structure and operational procedures and achieve a quality of results considerably higher than would ordinarily have been possible."

NIH administrators, by and large, have enjoyed the confidence of their clients in the biomedical research community. The agency, however, has moved rapidly from relative affluence to retrenchment, and NIH beneficiaries are already asking for a greater voice in deciding how funds are to be distributed. In this more competitive day, attention may well be shifting from the question of the quality of NIH's research to the quality of its policy decisions.—JOHN WALSH

France: Profit Rather than Prestige Is New Policy for Research

Paris. All governments with sizable budgets for science and technology eventually begin to worry about whether they are getting a good return on their investment. In the United States, relations between science and government have been agitated by this factor for nearly a decade; in Britain, profitability is now openly proclaimed to be a major consideration in government support of research; and the Soviets, too, have been wondering whether they have been getting enough out of research and, as a consequence, have been working at arrangements for closer links between research and industry. Now, after a 10-year period in which science and technology were expanded and venerated mainly to enhance national prestige—and with little regard for economic payoff—France is following the same pattern. And, as has been the case elsewhere, basic researchers are among those who regard the future with most anxiety, though the beneficiaries of Gaullist affection for highly visible prestige projects, especially in atomic energy and space, are also fearful.

The French situation, though part of what emerges as an international pattern in relations between science and government, is, however, affected by a number of peculiar national characteristics. First of all, it is doubtful that any other scientific community has to contend with the sort of administrative rigidities and centralization of management that have been bred into French science since Napoleonic days. As the Nobel laureate Jacques Monod remarked in an interview, "Our local institutions have been preconditioned to nonresponsibility on many important administrative matters. It is difficult for them to play the independent role that they should play in a modern scientific community." Also affecting the potential for revamping French science and technology is the Frenchman's stubborn, personal aversion to changing jobs and locale. In recent years, this has begun to erode, and job changes are not the rarity that they once were. But the preference to stay put is still strong, and it is backed up by a highly unionized scientific and technical community which in the past has demonstrated its readiness to go out on strike in behalf of job security. As a result, "mobility" is today one of the terms most often heard in discussions of French scientific and technical planning. Among govern-