heredity in terms of nucleotide base sequences, had become established as a separate discipline whose frame of reference clearly transcends that of billiard-ball-gene classical genetics.

By 1953, the Phage Group counted dozens of members and Delbrück was beginning to lose interest. For, with the discovery of the DNA double helix, it seemed likely that the eventual solution of the problem of self-replication would not lead to any deep paradoxes and hence would fail to uncover any new complementarity relations (the self-complementary nature of the DNA double helix is not, of course, the kind of complementarity that Bohr had been talking about), and so Delbrück turned his attention to sensory perception, on which he has been working ever since. Luria and Hershey, however, continued to make important research contributions to the further growth of molecular genetics, which has meanwhile blossomed into an elephantine academic discipline.

No recitation of the research accomplishments of these three laureates can, however, give an adequate account of the real role they have played in the growth of molecular genetics. Although it would be difficult to imagine three personalities more unlike than those of Delbrück, Luria, and Hershey, they have one trait in common—total incorruptibility—and it is just this trait of their personalities that these three men managed to impose on an entire scientific discipline. Undoubtedly Luria and Hershey would agree that, in the personality department, it was Delbrück who actually wielded the greatest influence. For Delbrück managed to become a kind of Gandhi of biology who, without possessing any temporal power at all, was an ever-present and sometimes irksome spiritual force. "What will Max think of it?" had become the central question of the molecular biological psyche. Thus the award committee for the Nobel prize in physiology or medicine is to be congratulated for its wisdom in recognizing the contributions of three men who have made molecular biology not merely a nice place to visit but also a good place to work.

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NSF: McElroy Seeks to Impart Political Headway to Agency

No one can fault the new director of the National Science Foundation (NSF) for failing to "think big." William D. McElroy, who took charge of NSF on 1 July, is already talking of more than doubling the agency's budget and of making it the "lead" agency for supporting basic research and scientific education in this country. That's no small goal, considering that NSF's budget is currently on the decline and that NSF ranks fifth among federal agencies in dollar support of basic research. But McElroy professes optimism that he can boost NSF's budget to $1 billion—from the current level of less than $500 million—within 3 years. And, as a first step toward achieving this goal. McElroy has launched an ambitious drive to give NSF something it has sorely lacked in recent years—namely, a sure political touch and public-relations savvy that might help persuade Congress to provide larger appropriations. Traditionally, NSF's leadership has regarded politicking as a bit unseemly and has tried to stand aloof from the political arena, so McElroy's plans constitute a radical change in NSF's operating style.

For a variety of reasons, many of them beyond the agency's control, NSF has never been able to achieve the role in American science originally envisioned for it. Vannevar Bush and his colleagues, in their landmark 1945 report, *Science, the Endless Frontier*, proposed the creation of a "national research foundation" which they visualized as the major—indeed, the *only*—federal support of basic research. That report led to the founding of NSF in 1950, but even before NSF came into being, a number of other federal agencies began to actively support basic research. As the nation was confronted with seemingly urgent problems in defense, space and health, the role of the so-called "mission" agencies in supporting basic research related to their missions became increasingly important. The result, ironically, is that NSF, although it is the only agency with

William D. McElroy

NEWS IN BRIEF

• **NIH SCIENTISTS CHALLENGE HEW ON CENSORSHIP**: Scientists at the National Institutes of Health (NIH) sought court action last week to contest HEW's refusal to allow government employees to hold antiwar meetings, including a speech by child care specialist Benjamin Spock, at NIH and HEW facilities on Vietnam Moratorium day, 15 October. The American Civil Liberties Union, which handled the case, filed a court appeal seeking the injunction against HEW. The court ruled against the HEW ban prohibiting Spock from speaking at NIH during the lunch hour. The court refused, however, to set aside an HEW regulation barring Spock from speaking at an HEW auditorium downtown during working hours. HEW has lost two censorship cases during the last year. One involved HEW's refusal to allow Michael Tigar to speak at HEW on the draft; the other involved an HEW attempt to bar the distribution of welfare rights leaflets on HEW grounds. Some NIH employees complain that HEW's policy on political speakers is unfair and inconsistent. They point out that in the past the department has allowed HEW employees to hear such political speakers as former assistant Secretary of State William Bundy, Selective Service Director Lewis B. Hershey, and Senator Strom Thurmond (R–S.C.).

• **STUDENT LOAN BILL PASSED**: Congress has finally agreed on a compromise bill that will increase the availability of bank loans to college students who are now finding it difficult to obtain college loans because of high interest rates. The bill provides an incentive allowance to banks equal to 3 percent interest in addition to the interest of up to 7 percent guaranteed under the 1965 higher education act. The legislation was passed because the prime interest rate has risen to 8.5 percent, which has had the effect of reducing the total volume of student loans available.

• **MARINE SCIENCES RESEARCH**: The Nixon Administration has proposed a marine sciences research program which includes the establishment of coastal laboratories, a pilot technological study of lake pollution to guide restoration of the Great Lakes and an intensification of Arctic environmental research. Several of these recommendations were originally made by the Marine Sciences Commmission (*Science*, 17 January). The Commission, however, recommended that an additional average expenditure of $800 million annually be made on new marine sciences efforts during the next decade; the Nixon Administration's plan would initially cost only $30 million annually and total about $200 million during the next 5 years.

• **ARCHES OF SCIENCE AWARD**: Gerard Piel, editor of the monthly *Scientific American*, has been named the fifth recipient of the Arches of Science Award "for outstanding contributions to the public understanding of the meaning of science." The award, which includes a $25,000 prize and a gold medal, is sponsored by Pacific Northwest business and industry and is administered by a nonprofit corporation, the Pacific Science Center Foundation of Seattle.

• **NIXON CREATES SCIENCE TASK FORCE**: President Nixon announced on 6 October the creation of a task force on science policy which "will review the federal government's present science policy and make recommendations as to its future scope and direction." The task force is chaired by Dr. Ruben F. Mettler, executive vice president of TRW, Inc., in Redondo Beach, California. Among its 11 other members are Dr. Philip Handler, president of the National Academy of Sciences, and Dr. Alvin M. Weinberg, who is director of Oak Ridge National Laboratory.

• **POLIO VACCINATIONS**: Public Health Service (PHS) officials at the U.S. Communicable Disease Center in Atlanta, Ga., are concerned that there could be an outbreak of polio in the near future among preschool children in poor urban areas. PHS officials estimate that 11 percent of these preschool children are without vaccination and that 25 to 30 percent are incompletely vaccinated. Only 11 cases of paralytic polio had been reported as of September 1969, but officials fear that if the current percentage of unvaccinated children is allowed to increase over a period of several years, outbreaks of polio could greatly increase.

explicit responsibility for supporting basic research, has never been able to provide more than about 12 percent of the federal government's support of basic research and about 17 percent of the government's support of academic science. In recent years the National Aeronautics and Space Administration (NASA), the Department of Health Education and Welfare (HEW), the Atomic Energy Commission (AEC) and the Department of Defense (DOD) have spent more on basic research than NSF has.

This is not to say that NSF has played a negligible role in promoting the health and welfare of American science. Lee A. DuBridge, President Nixon's science adviser, told a Congressional committee in July that NSF has had "a brilliant record." He said the agency has been "a prime mainstay of our academic science effort," has "given support to many areas of science which did not come . . . within the purview of the mission agencies," has put "a great new effort behind the progress of graduate education in the sciences," and has "even contributed greatly to improving science education in the colleges and high schools."

But NSF, a relative midget among Washington's giant bureaucracies, has found it virtually impossible to assume the leadership role in American science that was part of its original mandate. In practice, NSF has tended to support talented investigators who either don't want support from a mission agency, or whose work is of little interest to a mission agency. As NSF's own budget presentation noted this year, "NSF has been regarded more and more as merely a 'balance wheel' or gap filler and it has become progressively more difficult to fulfill even this responsibility within the relatively small NSF budgets."

These budgets have actually shrunk in comparison with 5 years ago. In fiscal year 1965 NSF received appropriations of $420.4 million. The total subsequently climbed to the agency's all-time high of $495 million in fiscal 1968, but then fell back sharply to $400 million in fiscal 1969. And the outlook for fiscal 1970 is not appreciably better. The Nixon administration has requested appropriations of $500 million, but the House of Representatives has approved only $420 million, and while the Senate has yet to be heard from, it seems unlikely that NSF will get much of a boost this year.

Moreover, it must be understood that

NSF's budget, which is relatively modest to begin with, does not go solely to the support of research projects. For fiscal 1970 NSF has proposed spending only about 50 percent of its budget on support of scientific research, of which about three-fourths would support research projects initiated by investigators and the rest would support various national research centers, national research programs, and specialized research facilities. The remainder of NSF's budget would support science education (22.6 percent), institutional development (14.3 percent), computing activities in research and education (4.2 percent), and a host of smaller programs.

There are many reasons for NSF's failure to grow larger and more influential, and most of them involve inherent difficulties in attracting political support. For one thing, NSF lacks the powerful constituency that the mission agencies enjoy. Academic scientists are an anemic bunch compared to the "military-industrial complex" and the other strong constituencies that clamor for more research spending on defense, atomic energy, and space, or even compared to the organized health groups that push for more medical research. For another thing, NSF does not deal in research that has an obviously useful application, and it therefore has a harder time "selling" its program to Congress than, for example, the National Institutes of Health, which can justify its research program in terms of health benefits. Third, NSF has never found a congressional champion —no one to rival Lyndon Johnson's support of the space program, or Lister Hill's and John Fogarty's support of health research. Indeed, NSF's basic philosophy of supporting excellence in science conflicts somewhat with its need for broad political support. Many Congressmen are more interested in how much "pork barrel" money is funneling into their own state university than in whether outstanding scientists at the nation's leading institutions are receiving adequate support. Philip Handler, chairman of the National Science Board, the policy-making body for NSF, told *Science* that NSF "has suffered from the lack of a congressional advocate—someone who truly identified his political career with the fortunes of the agency." However, Handler said that the chief reason NSF hasn't been able to assume the leadership role originally proposed has less to do with the fortunes of NSF than with the fact that the mission agencies have supported research with "a great positive thrust" that had not been anticipated by the founders of NSF.

But, after all the explanations have been made, it must be acknowledged that much of the blame for NSF's political impotence lies with the agency itself. NSF has shown little interest or talent for political affairs, and it has occasionally been so inept as to damage its standing on Capitol Hill. In a wide-ranging interview with *Science* last January, Ivan L. Bennett Jr., then deputy director of the President's Office of Science and Technology, called NSF "absolutely the most politically ineffective agency I've seen." Bennett said he was "amazed at how much the scientific community relies on NSF. It's a broken-down, pitiful, ineffectual agency, but the scientists feel it is theirs. They don't realize what a weak sister it is." Bennett was speaking in the wake of a discouraging budget year and before McElroy, who has an aggressive political effort planned, had been named to head NSF.

Perhaps the most glaring deficiencies in NSF's political effort have involved its relationships with the White House, the Congress, and the press. NSF has not only failed to cultivate these sources of political power; it has, in fact, deliberately avoided making much effort to cultivate political backers. The reasons lie partly in a feeling that science and politics shouldn't mix, and partly in the personal preferences of NSF's first two directors, Alan J. Waterman and Leland Haworth.

With respect to the White House, neither Waterman nor Haworth enjoyed direct access to the President. If a matter of importance to NSF came up, they would present their case to the president's science adviser and leave it up to the science adviser to carry the ball from there. Last year, during NSF's budget crisis, Haworth did not

Panel on Oil Spills Warns of More

The presidential panel on oil spills which was set up in the wake of the Santa Barbara Channel blowout issued its report last week, warning of the possibility of a sharply rising incidence of such disasters. Coincidentally, the report followed by only a few days an announcement by Secretary of the Interior Walter J. Hickel indicating that the fast pace of offshore oil development—interrupted by the Santa Barbara blowout—soon will be resumed. Hickel said an oil lease sale will be held in December for tracts totaling 96,000 acres in the federal domain off Louisiana, and that this sale probably will be followed by another Gulf of Mexico sale next year. Furthermore, the possibility of holding a lease sale on tracts off Alaska [probably in the Gulf of Alaska] is being considered, the secretary said.

The oil spill panel, which was set up by Lee DuBridge, the White House science adviser, at President Nixon's request, said that the know-how for controlling blowouts or cleaning up spills from offshore drilling or tanker mishaps is still lacking. The panel noted that, since 1954, some 8000 wells have been drilled offshore and that eight oil and 17 gas blowouts have occurred, though only a few of the blowouts have been major. If offshore drilling continues to increase at the present rate, "3000 to 5000 wells will be drilled annually by 1980, and we can expect to have a major pollution incident every year," the panel said. According to the panel, the Santa Barbara spill has involved the loss of from 1 to 3 million gallons of oil—an amount vastly larger than previous estimates by the oil industry or the government.

The group, which is chaired by John C. Calhoun of Texas A & M University, recommended a 5-year program of research and development on the problem of coping with blowouts and oil spills. Other recommendations of the panel included one calling for deferral of decisions on whether to allow drilling on some offshore lands and one stating that "common sense and the public interest" require that the government obtain more information about the offshore lands it administers (if necessary, by purchasing it from the oil industry or possibly obtaining it through regulation).—L.J.C.

M.I.T. "I" Lab Changing Direction

The retirement of Professor Charles Stark Draper as director of the Massachusetts Institute of Technology Instrumentation Laboratory is being taken as evidence that M.I.T. is implementing a new policy of shifting the balance of effort away from military research in its off-campus "special laboratories." Draper, 68, the founder and dominant personality in the "I" Lab for three decades, says he was "fired." His retirement takes effect on 1 January; Charles L. Miller, chairman of the M.I.T. civil engineering department, has been named Draper's successor.

The Instrumentation Laboratory established its reputation during World War II with advances in gunfire control and navigation aids. More recently the lab has been given primary credit for the development of inertial guidance systems for U.S. spacecraft and missiles and has been a special target for campus critics protesting M.I.T. involvement in military research. (The "I" Lab's current annual budget is $54 million, $26 million of this amount coming from defense agencies.)

Last June a faculty-administration-student committee urged that M.I.T. retain its links with both the "I" Lab and M.I.T.'s other large off-campus lab, the Lincoln Laboratories, which specializes in applied electronics research, but recommended that the balance of work in both labs be shifted toward more socially useful research. During the summer, the M.I.T. Corporation accepted the committee recommendations, but did not rule out the special laboratories' performing research funded by the Defense Department, including classified projects. The statement said, "The executive committee of the corporation believes that it would be inappropriate for the institute in incur new obligations in the design and development of systems that are intended for operational deployment as military weapons. This does not mean that, with its unique qualities, the institute should not continue to be involved in advancing the state of technology in areas that have defense applications." M.I.T. President Howard W. Johnson has said he will appoint an advisory committee with members drawn from the faculty, administration, and student body to review work undertaken by Lincoln Laboratories and the "I" Lab.—J.W.

even get to plead his case before the Budget Bureau Director. Whether a direct appeal from NSF would have made much difference is debatable, but the fact remains that some agencies have used a direct pipeline to the president to gain budgetary plums. Once Glenn T. Seaborg, chairman of the Atomic Energy Commission, for example, won reinstatement of a budget item that had been vetoed by the Budget Bureau and the Office of Science and Technology simply by making a personal visit to President Johnson and coming out with what envious officials dubbed "Seaborg's Christmas present."

With respect to Congress, NSF, in a low-pressure way, has developed cordial relations with some members of the committees that have jurisdiction over science. But the agency has not made much effort to cultivate the "power centers" of Congress or to broaden the base of its congressional support. As Handler describes it: "The director and the board have rather deliberately avoided the relationships—the lunches with senators and congressmen—that most agencies have with their Congressional committees. This agency has never done that kind of thing. It was not the style of either director (Waterman or Haworth). NSF has remained as apolitical as it could possibly be."

In similar fashion, NSF's relationships with the press have been extremely limited in recent years. Haworth, for example, almost never held press conferences and was seldom available for interviews.

In at least one case, NSF was so inept in its dealings with Congress that it antagonized a senator who was in a position to hurt the agency. This happened when NSF failed to inform Colorado Senator Gordon Allott about an award that Allott was particularly interested in. Subsequently Allott, who is the ranking Republican on the appropriations subcommittee that handles NSF, subjected NSF to the roughest budget hearing in the agency's history and charged that NSF was violating the law by asking college officials to lobby for more money for NSF (*Science*, 3 May 1968).

NSF's aloofness from politics was not particularly noticeable—and may even have been desirable—during a period of budgetary plenty. But after several successive years of tight budgets, the various federal agencies find themselves pitted in a harsh competitive struggle for the available dollars. The prize, most likely, will go to the "strongest" rather than to the "purest" of the federal agencies. Recognizing this fact, McElroy, who believes that NSF's programs have already been "cut down to the bone" and "can't get much lower" without inflicting unacceptable damage on American science, is undertaking an extensive campaign to repair NSF's political fences. He told *Science* he expects to spend fully half his time during his first year in office on congressional, public, and other "external" relations.

McElroy has already personally visited some 25 senators and representatives; he has had at least one lengthy session with Robert Mayo, Nixon's budget director; and he says he is prepared to go directly to the President when crucial issues arise. Another possible avenue to the President lies through the National Science Board which has already met twice with Nixon.

Recently McElroy also had an informal background dinner with the press, a tactic which is not new to Washington but which seems revolutionary for NSF. McElroy was clearly at ease with the reporters. He joked about the sex lives of fireflies (bioluminescence is his research specialty), fielded questions deftly, warned of the dire consequences of budget cuts for science, and even threw in a few jocular digs at a reporter who had written an article that was critical of him. There seems little doubt that McElroy is more attuned to dealing with the press and the politicians than either of his predecessors. And McElroy is convinced that time spent on improving NSF's public relations will pay substantial dividends. "A lot of people are friends of the foundation, contrary to popular opinion," he says. "Maybe we just haven't spent enough time emphasizing the

importance of the foundation to the future of science and the viability of our educational institutions."

Meanwhile, there are a number of internal problems still to be faced at NSF. The agency, for the past few years, has given the impression of drifting. "A destroyer wallowing in the trough," is how John T. Wilson, provost of the University of Chicago and former deputy director of NSF, describes it. Similarly, Aaron Rosenthal, NSF's comptroller for many years, who is leaving the agency to join the National Academy of Sciences, believes NSF has lost its creative zip. Rosenthal finds "a radical change in outlook" at the agency. "When I first came here 6 years ago, people talked about 'What new things can we do?' " he recalls. "They were concerned with innovation, with new kinds of support, new areas of need, new forms of programs. But the last couple of years, rather than pioneering, the attitude has been to support the ongoing thing. It's been continuing support rather than innovative. And I don't know why."

There seems to be no agreed-upon diagnosis of what might be ailing the agency. Some observers suggest that a stagnant or declining budget inevitably tends to stifle innovation. Others suggest that the less-than-dynamic leadership of former director Haworth tended to discourage pioneering. Haworth was frequently in poor health and he had a reputation for trying to do everything himself, thus leaving little room for originality by subordinates. Still others suggest that key staffers at NSF have become too bogged down in routine to do much effective planning for the future. Rosenthal even suggests that there may have been "a leveling off of talent" in the agency. "Maybe we should fire everyone who's been here more than 5 years," he jests.

McElroy clearly has his work cut out for him. A consultants' report which recommends ways to improve NSF's organizational efficiency has been prepared and awaits his action. And he must scout up talented appointees to fill five new positions—a deputy directorship and four assistant directorships—that were authorized in legislation passed last year. The caliber of the people attracted to these posts may well determine how aggressive and innovative NSF becomes in the years ahead. McElroy says he expects the new high-level appointees to become "thinkers" who will spend "a high percentage of their time" generating and refining ideas. Although NSF already has a planning council, McElroy says that its members are "so busy they spend all their time running the shop" and don't have much time left over to think about where the agency should be going.

At this point the prognosis for NSF is uncertain. But if high aspirations count for anything, McElroy may well be able to start NSF on the road toward that "endless frontier."

—PHILIP M. BOFFEY

Campus Unrest: Confrontation Increasingly Means Litigation

Patterns of student protest are seldom predictable, but observers see a trend of confrontations occurring in court as well as on campus. Students were the first to turn to the judicial process to seek legal rights and student power. But the most recent major development was the use last year, by college and university administrators, of the injunction to quell campus disturbances or to block impending ones.

Both sides can consolidate bargaining positions in the courts. By prosecuting and enjoining demonstrators, the universities can neutralize the students' most potent weapon. Students can enhance their bargaining position by securing court protection from arbitrary dismissal or from suppression of First Amendment freedoms of speech, assembly, and the press.

But since the real issues increasingly involve the distribution of power, the courts are unlikely to provide more than partial, short-term solutions to campus problems. The student power movement will find the courts less and less useful as it drives toward its central concern—a voice in academic and other campus decisions. The courts may help the universities to put down a particular insurrection, but not to get at the underlying causes of student discontent which produce the disorders.

The courts have not been eager to intervene in campus disputes of any kind. They have kept absolutely clear of academic matters such as curriculum reform, grades, or the awarding of degrees. Judicial restraint in academic matters is certain to continue.

It is hardly a new phenomenon for students to seek judicial relief from campus disciplinary actions they think unfair. Until around 1900, the courts generally held that students have the same rights as other citizens. Then, for more than a half-century colleges had pretty much their own legal way under the doctrine of *in loco parentis*. The doctrine holds that the legal relationship between college and student is similar to that between parent and child. It was used in a 1925 case in which a court upheld the expulsion of a coed because she was not "a typical Syracuse girl."

Changes in higher education and in society have made *in loco parentis* obsolete, but no new doctrines have emerged that are widely accepted. About 93 percent of all college students are over 18, and the median age is around 21. And spiraling college enrollments have removed the intimacy between students and campus authorities that may have prevailed in an earlier time.

"It simply blinks at reality to treat the mother and college as one and the same in drawing legal analogies, no matter how frequently one refers to his alma mater for other purposes," says William Van Alstyne, a law professor at Duke University and a leading scholar on the law as it pertains to higher education.

The increase in enrollments has been accompanied by growing recognition that the college degree is the passport to the affluent society. Without it, employment opportunities and lifetime earnings are severely limited. Although no court has said so yet, there is a growing body of opinion which holds that an education beyond high school is becoming a right.

Prior to 1961, cases involving student rights were isolated. In essence, the student power movement and the