that "this opinion will be a much more dangerous phenomenon in American academic life than the person who provoked the opinion himself, Bruce Franklin."

There is no question that Franklin was a popular and effective teacher. He was also, as one student put it, the only professor at Stanford who both advocated and lived according to Marxist ideas, and thus exposed students to Marxist principles in a fashion that no one not fully committed was capable of. But it was perhaps inevitable that Franklin, who had the habit of signing his letters "death to all Fascist pigs" and frequently identified the university as part of an educational-industrial complex that he held responsible for the Vietnam war, should clash with the Stanford administration, who correctly identified Franklin's long-range goal as stopping the "normal" activities of the university.

Dershowitz and other civil libertarians have pointed out that the quasi-legal nature of campus hearings—which exclude, for example, the right to challenge prospective jurors—provides fewer guarantees of due process than exist in criminal law. Thus the dismissal of persons such as Franklin for "just cause," as interpreted by most faculty members in U.S. colleges and universities, may nonetheless result in the weakening of academic freedom. Disagreeing with this view, however, advisory board chairman Kennedy told *Science* that, his dissent on Franklin's dismissal notwithstanding, he believes existing procedures do protect academic freedom. The result at Stanford, in any event, has been to leave the university a quieter, but possibly less interesting, place.—ALLEN L. HAMMOND

Division of Biologics Standards: The Boat That Never Rocked

There can be few graver opportunities for man-made disaster than the mass immunization campaigns that are now routine in many countries. Should the vaccine preparations become contaminated with an undetected agent present in the host cells, such as a cancer-causing virus, a whole generation of vaccinees could be put in jeopardy. This, of course, is no science fiction writer's horror story—it has already happened once; millions of people have been injected with a monkey virus known as SV40, which was found in 1961 to be contaminating polio and adenovirus vaccines. The virus causes cancer in hamsters; no one yet knows what it may do in man.

Short of forswearing all vaccines and inviting the return of epidemic diseases, the necessary safeguard against such accidents is vigilant surveillance and research. The government institution entrusted with this duty is the Division of Biologics Standards (DBS), a 260-man agency set on the campus of the National Institutes of Health, in Bethesda, Maryland. The DBS has recently been the focus of unfavorable publicity. A Civil Service grievance committee recommended censure of the division's management for allowing a DBS research scientist, J. Anthony Morris, to be harassed by his supervisors (*Science*, 25 February), and Morris and his attorney, James S. Turner, have accused the DBS of scientific mismanagement in a document made public by Senator Abraham Ribicoff (D–Conn.) (*Science*, 3 March). The significance of the specific charges raised by Morris and Turner has yet to be determined, but their indictment prompts a number of general questions about the role of the DBS in vaccine regulation. How well has the DBS research program been managed? What are the important decisions that have faced the DBS and how has it approached them? What kind of a track record does the division have in fulfilling its regulatory responsibilities?

These questions are hard to answer from the outside, in part because of the clublike, partly closed nature of the vaccine community. Federal responsibility for vaccines does not rest solely on the DBS, but is diffused over a handful of committees with interlocking memberships. Thus, if the mass annual inoculations against influenza were indeed the "forcing on the public [of] a bogus situation. . . . The vaccine we were promoting was not having any beneficial effects,"* it is not too clear whether responsibility would lie with the DBS for certifying an inefficacious vaccine or with a second body, the Center for Disease Control's Advisory Committee on Immunization Practices (ACIP), whose function is to decide who should be vaccinated against what. Again, when the typhus vaccine shot into every U.S. Army recruit since World War II turned out in 1969 to be producing insufficient antibody even though it had regularly passed the DBS tests, it was unclear whether the DBS or the Armed Forces Epidemiological Board (AFEB) should claim fatherhood of the fiasco. Federal responsibility for the development of new vaccines is notably imprecise. Both the DBS and another segment of the NIH, the Infectious Diseases Branch of the National Institute of Allergy and Infectious Diseases, are permitted to develop new vaccines, but neither has specific responsibility for doing so.

Besides diffuseness of responsibility, the picture is also blurred by a reluctance among vaccine workers to discuss problems openly when they arise. This is because of the understandable fear that public confidence in vaccines—and vaccine authorities—will be eroded. As one participant—in fact, the chairman of the NIH committee that studied the Morris-Turner charges—said at a recent conference on vaccines: "From our debates on what is best or what is wrong, we are conditioning the public to reject measures that sometimes, in some situations, are very important."† The importance attached to presenting an unruffled surface to the public is exemplified by the SV40 incident of 1961; even when the contaminating virus was found to be oncogenic in hamsters, the DBS and its expert ad-

* A. D. Langmuir, *International Conference on the Application of Vaccines* (Pan American Health Organization, Washington, D.C., December 1970), p. 614. Langmuir, now at the Harvard University Medical School, was formerly head of the epidemiology branch of the Center for Disease Control at Atlanta, Georgia.

† A. S. Benenson, *International Conference on the Application of Vaccines* (Pan American Health Organization, Washington, D.C., December 1970), p. 612.

visory committee decided to leave existing stocks on the market rather than risk eroding public confidence by a recall. Even after the polio accidents of 1955, the scandal that led to the creation of the DBS from the former Laboratory of Biologics Control, continuity was stressed as much as change; the assistant chief of the laboratory, Roderick Murray, became the director of the DBS, and the chief of the laboratory became a lab chief in the DBS.

None of this implies that faults have been covered up or that the public has been conspired against in any way; but there are dangers that problems will be underemphasized in any system that discourages the fullest possible discussion, as some believe the DBS does. For instance, a recent article on the reactions associated with viral vaccines concludes: "There has been a tendency on the part of certain higher government circles to play down any open discussion of problems associated with vaccines. . . . Perhaps this has been overdone. Scientists now find themselves in the position of balancing the benefits of a vaccine against the risks, yet are in no position to judge what the long-term risks are."‡

Evaluating the risks of vaccines is one of the tasks of the DBS, which is charged with ensuring the safety and quality of biological products. Of the six laboratories of the DBS, one deals exclusively wtih blood products, one with inspection and control activities, and the remaining four with vaccines. For fiscal 1972 the DBS has a budget of just over $9 million, of which roughly $2 million is devoted to an extramural contract research program. The in-house budget of the DBS is split roughly equally between research and control activities (no exact figure is available).

Without doubt the DBS has capably fulfilled its minimum function, that of ensuring the immediate safety of vaccines. What is at question is whether the DBS has adequately carried out such broader responsibilities as improving the quality of vaccines and assessing the longer term risks and benefits associated with vaccine use. To carry out such responsibilities, the DBS might be expected to support an aggressive, centrally directed research program, closely coordinated with regulatory decisions.

In fact, the DBS research program is neither evidently aggressive, nor strongly directed, nor ranked in equal importance with regulatory activities. The attitude of the present management toward research is more one of toleration than active encouragement. Over the last decade, DBS Director Roderick Murray has not been notably successful in increasing the DBS's research competence. Although Murray has been director since 1955, when the DBS was created, the division in its early years was closely supervised from the NIH front office by James A. Shannon, then director of the NIH, and associate director Joseph E. Smadel. Smadel eventually transferred to the DBS as a laboratory chief, from which position he, in effect, directed the division until his death in 1963. During this period, the DBS staff grew from 54 to 249 positions; between 1963 and the present, the DBS has enjoyed a net increase of 11 persons, although its responsibilities have grown in far greater proportion. The only major growth in DBS research activities since 1963 was the establishment of the contract research program in 1966. But the program originated from elsewhere on the NIH campus and was assigned to the DBS by the NIH front office.

Headless Research Program

What many consider to be a major structural weakness in the present DBS research program is the absence of a scientific director. Although this function might be expected to be performed by the director of the DBS, Murray has left the planning of research to the initiative—some say the whims—of the laboratory chiefs. The only attempt at central coordination of research was in 1966, when the NIH front office assigned Leon Jacobs, a toxoplasma expert, to direct the new contracts program. Jacobs also took the title of scientific director, but left the DBS within 2 years, apparently because Murray allowed him no authority over the in-house research program. The NIH front office (where Jacobs is now assistant director for collaborative research) has made no attempt to install a second scientific director of the DBS, presumably because of the experience of the first.

Despite the absence of central direction, some DBS scientists believe the various lab chiefs have coordinated their activities to cover all the essential areas of research, at least in relation to the size of their staff. Others consider that serious gaps have been allowed to develop. Says former DBS scientist Kendall O. Smith, now professor of microbiology at the University of Texas Medical School, San Antonio: "There are inexcusable gaps in the DBS research program, specifically in regard to the safety of the viral substrates used to grow vaccines. It's only Murray's ultraconservatism that makes the gaps less obvious than they are." Another former DBS scientist, B. G. Young, now chairman of the microbiology department at the University of Maryland, criticizes the scanty efforts made to anticipate research problems. "The only time the DBS got upset was a month before something came up for licensing," Young told *Science*.

Specific research areas in which the DBS coverage is most commonly faulted are the improvement of existing vaccines, particularly influenza and pertussis, the hypersensitivity phenomenon associated with certain killed vaccines, and the study of the various oncogenic and other viruses that are possible contaminants of vaccines.

Besides lacking scientific direction, the DBS research program has probably also suffered, or failed to benefit, from the use made of the DBS's board of scientific counselors. Although originally constituted to look into the research program of the division, the board has, according to Murray, made only one real suggestion for research, and even that was not implemented. Since membership is drawn from the ranks of the most distinguished scientists in the vaccine field, the board would not seem to have been used to the best possible advantage. Several present members complain that they have been used only as a "sounding board," and clearly the nature of the DBS research program would not be very different if the board had never existed.

Research Findings Unwelcome

Potentially more serious than either organizational weakness or lack of resources is the attitude of DBS management toward research findings that have implications for regulatory decisions. There is no proof that the DBS management has deliberately ignored or suppressed scientific data, yet there seems to have been a curious inertia in seeking out or pursuing research data with implications for a regulatory decision. Present and former DBS scientists repeatedly use the phrase "Don't rock the boat" in describing Murray's

‡ P. Isacson, *Progr. Med. Virol.* **13**, 263 (1971).

attitude toward research that might lead to some regulatory change or decision. According to C. W. Hiatt, formerly senior chemist at the DBS and now at the University of Texas Medical School, San Antonio, "The intellectual attitude of the DBS management was not hostile as long as your research didn't rock the boat. We only got ourselves tangled up when we got involved in any way with control responsibilities. The occasions when actual findings were ignored were very, very few. But there were incipient instances of that, when the organization would prefer you didn't get into a given area."

Says a scientist who is still with the DBS: "The DBS is negative toward research. The main concern of the management is to fulfill their regulatory function, and there is a certain air of tolerance toward basic research. . . . There is something about Murray that always comes back to the same theme, 'Don't rock the boat.' "

B. G. Young, a former DBS scientist who has endorsed the Morris-Turner criticisms of the DBS management, describes the DBS attitude toward research as being one of "suppression, harassment, and censorship of individual investigators such as Morris, Eddy, Smith, and Hiatt. I finally came to realize that you had either to compromise yourself or leave. Morris and Eddy are the real heroes in that place because they stayed and fought. The others voted with their feet and left."

Morris has stated that he was relieved from influenza control duties because he raised questions about the efficacy of the vaccine. Eddy was demoted after demonstrating in 1961 that SV40 virus causes tumors in hamsters. Smith, Hiatt, and Young left the DBS for varying reasons, but each had differed strongly with the DBS management over particular research issues that they felt should prompt a regulatory decision. Hiatt, as senior chemist in the DBS, believed that manufacturers should be required to institute a standard industrial check test to ensure that excess preservatives had not been added to vaccines. "Most chemists with any kind of industrial background would feel guilty in not insisting that this kind of screening be followed," Hiatt told *Science*, "but the management felt I was exaggerating its importance."

The specific issue that concerned Smith was the procedure for screening the monkey cells used in growing vaccines. "To detect all the possible contaminating viruses, you need to hold the cells for much longer than the 2 weeks specified in the DBS regulations. One of the chief ways I became obnoxious to the DBS management was in continuing to press for a longer incubation time. I think it is unforgivable that the DBS did not change their regulations" Smith told *Science*.

What alarmed Young was the discovery by a DBS research contractor of herpes virus in the dog kidney cells in which it was proposed to produce rubella vaccine. Yet, Young says, he could not get the DBS authorities to investigate the matter further; "The DBS puts almost total trust in the manufacturers to do all the most important testing work. The DBS simply reads the manufacturers' protocols."

Part of the dissatisfaction felt by these scientists could be due to the apparent uncommunicativeness of the DBS management in explaining its actions. Murray, who in fact has delegated little if any of the decision-makng power in the DBS, is not by nature expansive. "Even those who work with him rarely know his opinion on a matter," says a colleague. Another factor in the distrust felt for the management's attitude toward research may be one related to the nature of scientists. "Scientists are particularly hard to direct unless they feel a certain amount of respect for the personality directing them," says one vaccine specialist. "Murray has done reliable, consistent work on hepatitis, but is not much known scientifically."

But the personnel problems of the DBS seem to go deeper than just the handling of scientists. The Morris grievance hearing last year resulted in a committee recommendation that the DBS management be censured for allowing Morris to be harassed. The NIH front office does not accept this verdict. Says Robert W. Berliner, NIH deputy director for science, "If the DBS deserves censure, it is because they tolerated Morris for as long as they did. Morris was disruptive, insubordinate, and failed to take adequate action to straighten out the problems of the flu vaccine potency." (Morris's position is that he did try to improve flu potency tests, even though DBS managers ignored the results of existing tests.) Morris, however, is not alone in finding the DBS management hard to live with; besides the scientists who have left, some 20 or so members of the present staff of the DBS are involved in personnel disputes of various degrees of severity.

How has the management of research contributed to the DBS decision-making process? Significantly, maybe, many of the most important decisions made by the DBS have been reached with the aid of large, often international, conferences. Murray says the licensing of live polio vaccine in 1961 was the hardest choice he has faced because there were three different virus strains from which to select, but he emphasizes that the decision was made on a collective basis, not by him alone.

Decisions on Rubella and WI-38

Another important decision was the licensing of rubella vaccine in 1969, when again there was a choice of virus strains—one developed by three scientists in the DBS (Harry M. Meyer, Paul D. Parkman, and Hope E. Hopps) and another by Stanley Plotkin of the Wistar Institute. There is no reason to suppose that individual DBS scientists acted other than entirely honorably, but the DBS as an institution was put in a classic conflict of interest position in having to decide upon a vaccine it had itself developed. The position was made the more invidious when a particular manufacturer, Merck Sharp and Dohme, abandoned its own strain of rubella virus in favor of that developed by the DBS. Even if Murray was scientifically justified in awarding the vaccine license to Merck Sharp and Dohme with the DBS virus strain, he failed to do so in a manner that was obviously fair to observers inside or outside the DBS. Says former DBS scientist Smith of the rubella decision: "The situation was not handled in a manner that could clearly be seen to be just. Murray must have seen it coming step by step. He could have stopped it but didn't." According to Paul S. Moorhead of the University of Pennsylvania and a member of the board of scientific counselors, "The handling of the rubella vaccine was an obvious conflict of interest and the DBS made no obvious attempt to head it off."

Perhaps the single most important decision to have faced the DBS—although Murray says he does not regard it as important—is that of whether to make vaccines in primary cells or in continuously passaged cells. In brief, the advantage of continuously passaged cells is that they can be exhaustively tested for normality, the absence of contaminating viruses, and so forth. By contrast, primary cells, which are taken directly from animal tissues such as

monkey kidney or duck eggs, may carry the viral flora unique to their host, yet for economic reasons can only be screened in a comparatively cursory manner. §

In 1962, a continuously passaged cell line derived from a human fetus was established by Leonard Hayflick, then at the Wistar Institute. Hayflick's cells, known as WI-38 cells, have been used for vaccines in other countries and, since 1965, by the U.S. Armed Forces. Yet the first WI-38 vaccine for U.S. civilian use was licensed by the DBS only last month.

Why did the DBS take a decade to make up its mind on WI-38 cells? Hayflick, now at the Stanford University School of Medicine, gave *Science* the following account of his efforts to persuade Murray to come to a decision on the cells. By 1963–1964, it had become clear, Hayflick says, that the DBS was highly resistant to licensing vaccines produced in WI-38 cells, though the reasons for this opposition were never stated. It was also clear that in most major vaccine developments embraced by the DBS, the primary risk-taking happened to have been borne outside the United States. (For example, live polio vaccine was licensed by the DBS after the Soviet Union had injected more than 15 million people. Live measles vaccine was first tested out, not on U.S. citizens, but on the inhabitants of the Upper Volta.)

Since it seemed that U.S. citizens would not get the benefit of WI-38 cells until foreign countries had taken the risk, Hayflick told *Science*, he organized an international committee called the Cell Culture Committee, to promote the use of WI-38 cells abroad. In 1967, Yugoslavia became the first country to license WI-38–grown polio vaccine. The U.S.S.R. adopted the cells in 1970, and England and France followed suit in 1971.

There is a respectable reason for being wary of WI-38 cells—the theoretical possibility that they might contain a human cancer agent somehow more insidious than those known to exist in animal cells. The DBS could be respected if it had taken this position, but, surprisingly, Murray has never taken any position at all on WI-38 cells, on the grounds that no manufacturer has applied to produce a WI-38 vaccine. To Hayflick, this is simply a stratagem for refusing to discuss the issue because, he says, no manufacturer would risk investing in a new type of vaccine before getting "an informal reading in face-to-face confrontation that Murray will be amenable." A nonscientific reason in persuading Murray to reverse his position may have been pressure from manufacturers who, according to *Drug Research Reports* (21 July 1971), said they would quit making polio vaccine unless allowed to do so in WI-38 cells.

Asked what new scientific facts had come to light to justify reversal of the DBS position, Murray told *Science* only that the "DBS acted promptly to move towards the problems of licensing such a product when it received a license application." Says a senior scientist in the DBS: "To this day I don't know what Murray thinks about WI-38 cells and I don't know why he has decided to license them now. It's another breakdown in communication. By refusing to discuss controversial issues, Murray has many times made the controversy worse."

Since many of the accidents with vaccines have occurred when new processes were introduced, it is probably sound policy not to make changes unless there are clear benefits in sight. Murray is widely praised, for example, for his refusal to allow mineral oil adjuvants to be put into vaccines, despite heavy pressure from manufacturers and parts of the academic community. (Oil adjuvants were recently tried in England with adverse results, an experience that has validated Murray's position.) No one disputes the fact that Murray practiced a conservative policy as director of the DBS, but some see his conservatism in a positive, others in a negative light. Vernon Knight, chairman of the microbiology department at the Baylor University College of Medicine, Houston, says of Murray: "He has a record of absolute honesty and total devotion to protecting the public. If there is any criticism, it is that he has been overdeliberate. But frankly, that is the way to stay alive in this business." Another view is that of Paul S. Moorhead: "If Murray does nothing, he doesn't get much criticism; but if he makes an innovation, then he is really under pressure." According to former DBS scientist Kendall O. Smith, "About 90 percent of the problems in this field will work themselves out if left alone. If you don't change much, you don't risk much. I feel that what people have admired as Murray's conservatism is only his inability to take leadership in a growing field." Says one scientist acquainted with the DBS: "Murray doesn't really make decisions. So people don't realize from the outside that things don't really happen unless there is a broad consensus both inside and outside the DBS."

Problems with Potency

Failure to make certain important scientific decisions openly and from a position of evident strength is probably one consequence of a weakly managed in-house research program. Another is the sometimes weak-kneed stance the DBS has taken in persuading manufacturers to improve the quality of their vaccines. In ensuring vaccine safety, the DBS has a record blemished only by errors that sprang from the state of knowledge at the time. (These are the SV40 incident of 1961, the hypersensitivity caused by the killed measles vaccine used in the early 1960's, and, in the opinion of some, the licensing of a rubella vaccine which was grown in dog kidney cells and which caused unexpectedly severe side effects.) But the DBS is also required to ensure the quality of vaccines and, in some instances, has been less than zealous in doing so. For 10 years, the DBS, as well as higher government officials, failed to realize that the division possessed the legal authority to ensure the efficacy of vaccines (*Science*, 10 March). The confusion that has reigned over the potency of influenza vaccine since at least 1957 is now officially ascribed by the DBS to the failure by manufacturers to calibrate the colorimeters used in assessing the vaccines potency. To have taken more than a decade to require that manufacturers standardize their measuring instruments is hardly an outstanding record for a regulatory agency.

Another potency problem occurred with typhus vaccine, developed in the early 1940's and used essentially unchanged to immunize all army recruits at an annual cost of hundreds of thousands of dollars. In 1969, the Armed Forces Epidemiological Board found that some vaccine lots were not giving good antibody responses, even though they had passed the DBS's potency tests. It is not known for how many years before 1969 the army had been using useless vaccine, but the incident casts some doubt on the general alertness of the DBS's quality control procedures.

§ For example, the DBS requires the monkey kidney cells used in growing live polio vaccine to be held for only 28 days in order to ensure that they contain no SV40 virus. According to A. Girardi of the Wistar Institute, SV40 may remain latent for up to 35 days. Nor does the DBS require monkey kidney cells to be screened for chromosomal abnormalities—a possible indicator of cancerous tendencies—a test they would probably fail in large numbers.

Most biological tests are imprecise, and the DBS should not be faulted for having failed to solve problems that were beyond the prevailing state of the art. Yet some of the DBS's problems with vaccine potency tests seem to have arisen as much from lack of management as lack of science.

In overview, the various blemishes on the DBS escutcheon that have come to light in recent months are less significant than the 17-year safety record the DBS has behind it. The division was set up to prevent recurrence of the 1955 polio accident and, under Murray's stewardship none has occurred. Murray has outlasted and outperformed half a dozen commissioners of the Food and Drug Administration, and many would assent to the belief of the NIH front office that Murray has an excellent record as a government official responsible for a regulatory agency. The chief imperfections in the DBS arise from the nature of the office, not its holder. Despite the diffuseness of the federal system for controlling vaccines, the major responsibility devolves on the DBS, whose director has too much power, too much pressure, and too little protection. There is no limit to the director's term of office and yet no effective mechanism for subjecting his scientific decisions to peer review and peer support. There are conflicting pressures from manufacturers, the scientific community, and, more recently, from the consumer movement. Says one vaccine specialist, "The DBS is the most thankless job in the world—you have to be some kind of a Jesus Christ to do a perfect job. You have to give Murray points for staying power—he hasn't cut and run."

Where Murray has strayed from perfection is probably in taking the narrowmost conception of the division's responsibilities. Safety has been assured, but the improvement of vaccines has been pursued less aggressively. The characteristic posture of the DBS has been one of stand-pat conservatism rather than innovative leadership. A common theme underlying the complaints of critics inside and outside the DBS is Murray's unwillingness to make decisions and even—if the harsher critics are correct—to pursue lines of enquiry that might render necessary a regulatory decision.

Such an attitude is probably inevitable, however, granted the DBS's stretched resources and the belief, presumably endorsed by Murray's superiors, that the DBS should be primarily a rule-making operation with a subordinate and undirected research program. Given these ground rules, it is hard to be sure that anyone else could have bettered Murray's long record in protecting the public from hazardous vaccines.

For the future (Murray is due to retire in 2 years' time), possible changes suggested to *Science* by Turner, Morris, and scientists inside and outside the DBS, include the following proposals. The whole mechanism of biologics control should be reviewed in the light of consumer protection—the DBS should probably assume from the manufacturers the prime responsibility for conducting the more crucial tests of vaccine safety. Preparation should also be made to cope with the surge of new biological products that may be devel-

Briefing

An Alliance for Hearts

It wasn't very long ago at all that Senator Edward M. Kennedy, of Massachusetts, and Representative Paul G. Rogers, of Florida, were carrying the banners for opposite sides in the long and sometimes bitter tussle over who was to manage the federal government's crusade against cancer. Apparently the fight left no permanent scars though, for now the two Democrats say they're joining forces to back another billion-dollar medical onslaught—this time against heart, lung, and circulatory diseases.

In a news conference held late last week in a chandeliered room of the Capitol building, precisely halfway between the House and Senate wings, Rogers and Kennedy sat shoulder-to-shoulder to announce their simultaneous introduction of the National Heart, Blood Vessel, Lung and Blood Act of 1972, a bill they both acclaimed as probably the most important piece of health legislation to come before Congress this session.

The bill proposes to spend $1.29 billion over the next 3 years on cardiovascular and lung disease, in contrast to current annual funding of $232 million. Under the heading of control programs, $90 million of the new money would go to establish 15 community "screening and education" centers. (The bill doesn't say how these would relate to the Regional Medical Program for heart, cancer, and stroke services run by the Department of Health, Education, and Welfare.) The remaining $1.2 billion would be funneled through the National Heart and Lung Institute to support 15 new clinical R & D centers for cardiovascular disease and 15 new centers for pulmonary disease.

Joint support of the bill by Rogers and Kennedy is especially significant since the two Democrats head the respective House and Senate subcommittees that will handle it. Staff aides for Kennedy and Rogers say the bill's chances of passage are further enhanced by the absence of administrative provisos of the kind that led to last year's contest over the cancer bill.

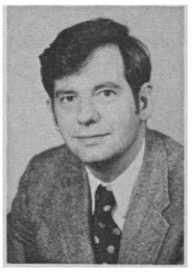
Approval by Congress, however, may be the least of the heart and lung bill's problems. Even if the appropriation committees grant all the money that the bill authorizes, which is by no means assured, there is no guarantee that the White House will spend it. The Nixon Administration, like its Democratic predecessor, is not in the habit of spending all or even very much of the money Congress generously appropriates for crusades of its own, particularly when those crusades seem designed—if only in part—to overshadow the administration's.

In the present case, the White House seems to be under the impression that the $22 million increase it proposed with some fanfare earlier this year for heart, lung, and blood diseases is generous enough. Congressional Democrats—or at least those on Kennedy's and Roger's subcommittees—disagree. And while their motives may be pure, there is room for suspicion that, by upping the ante nearly an order of magnitude, the Democrats may hope to sink their claws into at least one substantial health issue in an election year when issues of any kind are notably scarce. After all, who's to say that the 790,000 Americans who die from cardiovascular and lung diseases each year are less deserving than the 340,000 who succumb to cancer?—R.G.

oped over the next decade. The director of the DBS should have responsibility for organizing the research program as well as the regulatory activities of the division.

In addition, federal responsibility for vaccine development should be clarified, in a way that ensures the DBS does not develop vaccines in-house. There should be some court of appeal against the director's decisions. Since the DBS acts, in effect, for the academic community on behalf of the public, there should be a stronger connection with the academic world than occasional ad hoc conferences and a rubber-stamp board of scientific counselors. Standing committees of scientists might be established—one to oversee research and another for regulations—so as to buttress the director's posture toward manufacturers. Problems with vaccines should be more openly discussed, and herd immunity should be sought by means other than treating the public as one. Most importantly, the boat in which the DBS director sits should be strong and flexible enough to withstand the occasional rocking.—NICHOLAS WADE

APPOINTMENTS



W. G. Bowen

M. H. Bernstein

William G. Bowen, provost, Princeton University, to president of the university. . . . **Marver H. Bernstein**, professor of politics and public affairs, Princeton University, to president, Brandeis University. . . . **David R. Derge**, dean for administration, Indiana University, to president, Southern Illinois University, Carbondale. . . . **Timothy W. Costello**, professor of psychology and management, New York University, to president, Adelphi University. . . . **N. Ferbee Taylor**, vice president for administration, University of North Carolina system, to chancellor, University of North Carolina, Chapel Hill. . . . **Ivan L. Frick**, president, Finlay College, to president, Elmhurst College. . . . **Harold P. Hanson**, dean, Graduate School, University of Florida, to vice president for academic affairs at the university. . . . **Archie R. Dykes**, chancellor, University of Tennessee, Martin, to chancellor, University of Tennessee, Knoxville. . . . **Victor Jones**, professor of engineering and applied physics, Harvard University, to dean, Graduate School at the university. . . . **Thomas G. Cook**, assistant professor of education, University of Wisconsin, to dean, School of Education, Ferris State College. . . . **William Happ**, operations research analyst, U.S. Army Corps of Engineers, to dean, School of Engineering, Sacramento State College. . . . **Leonard E. Goodall**, vice chancellor, University of Illinois, Chicago Circle, to chancellor, University of Michigan, Dearborn. . . . **Conrad T. Burriss**, professor of chemical engineering, Manhattan College, to dean, School of Enginering at the college.

RESEARCH NEWS

Cancer Radiation Therapy: Potential for High Energy Particles

Although the causes of cancer are still unknown, treatment with radiation therapy alone or in combination with chemotherapy and surgery helps to save hundreds of thousands of lives a year. Large doses of radiation, however, damage healthy tissues in addition to destroying tumors and thus may cause severe side effects. The use of high energy particles instead of the conventional x-rays or gamma rays may make possible significant improvements in radiation therapy, according to a growing number of physicists and radiotherapists, and the preliminary results of several laboratory and clinical trials seem to support this belief.

Both the physical and radiobiological properties of energetic particles indicate that they may be able to alleviate some of the problems of conventional radiotherapy, although clinical trials are needed to ascertain that new and untoward effects do not occur. The potential uses of particle radiation may be restricted to localized cancers—a category of diseases that does not include some of the most common, such as lung and breast cancer. Nonetheless, the use of particle radiation, if its potential advantages turn out to be clinically significant, may be able to help the large number of patients who now die from localized cancers despite treatment with conventional radiotherapy.

Practical applications of particle radiation in cancer therapy may be slow in coming. Except on a small scale, the necessary clinical trials are not now being conducted in this country, and there appears to be little likelihood of systematic trials with many types of particles in the near future. Despite the large increases in funding for cancer research, relatively little support is available for radiotherapy research, including particle radiation. National Cancer Institute support for investigations of particle radiation totaled less than $1 million in fiscal year 1971, a figure that NCI officials estimate may rise to $2.5 million by fiscal 1973. One reason, according to NCI, for the relatively low level of funding is a shortage of qualified radiotherapists who are interested in particle radiation. Research proposals have been rejected by the peer review system for lack of scientific merit—a consequence, according to one NCI official, of the naiveté in radiobiological matters on the part of the physicists who proposed them.

Whatever the reason, several physics laboratories that have an interest in using their particle accelerators for cancer research may find it impossible to do so, and in one case the lack of other sources of funding may result in the closing of the laboratory.

The current interest in medical uses for particle radiation contrasts strongly with the attitudes that have prevailed