does say that not enough R&D has been done to prepare for it. Alvarez thinks the borosilicate glassification program is ill-conceived. He fears that future accidents may cause the project to lose public support and die. If so, the waste may never be removed. Instead, Alvarez prefers a more expensive approach, one used on a small scale at DOE's nuclear laboratory in Idaho, where wastes are made into a powder through calcining. This powder will be converted later into a solid or glass form. Alvarez concedes it would be vastly more expensive to follow this route, and he notes that it would create a greater volume of waste.

Other critics of DOE have praised the agency and du Pont for their first steps in cleaning up Savannah River, while at the same time denouncing DOE's record of stalling. One critic, Dan Reicher of the Natural Resources Defense Council (NRDC), says: "Things are changing. Large amounts of money are being spent, but there is still a concern that DOE is operating outside of federal laws and regulations."

The NRDC has been in court since the mid-1970's, trying to impose civilian standards on DOE weapons facilities. It sued to have DOE file an environmental impact statement on its plan to restart the mothballed L-reactor at Savannah River. NRDC won that case in 1982. Then NRDC sued to enforce a cleanup of the Y-12 plant at Oak Ridge, where millions of pounds of mercury were dumped. NRDC won again in 1983. Meanwhile, DOE insisted that it did not have to comply with all elements of the new toxic dump laws (the Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980) because it was a self-regulating defense agency. NRDC argued that the agency did have to comply and won in federal court in 1984. DOE did not appeal. Now state officials and environmentalists are getting down to finer details in their talks with DOE on just what it means to abide by civilian standards. The arguments are becoming denser and more legalistic and may lead to new lawsuits over the proper method of cleaning the site.

From the late 1970's until 1983 DOE resisted change in court, but it rapidly lost support in Congress for its obstinacy. The agency finally was compelled to take action on the festering problem at Savannah River. Under intense pressure from the House, DOE agreed in 1983 to begin the present cleanup and glassification project that is meant to clear the site by the end of the century. DOE now wishes to be judged on this effort, and not on the historical record. ■ ELIOT MARSHALL

Petersdorf to Head Medical Colleges

Academic medicine must face up to the need for some real changes in research and education

On 1 September, Robert G. Petersdorf will leave the University of California at San Diego, where he has been dean of the medical school since 1981, to become president of the Association of American Medical Colleges, the Washington-based institution that Petersdorf calls the "Chamber of Commerce" of academic medicine. He succeeds John A. D. Cooper (AAMC president for 17 years) at a time when academic medicine feels itself beleaguered.

Robert Petersdorf: *Not all medical schools need to do research.*

Three years ago Petersdorf summed up his view of the situation when he wrote, "The establishment that is responsible for medical education is again under attack for overproducing physicians, for glutting the country with specialists, and for operating a system of medical education that is anachronistic and not responsive to societal needs." Not one to buy the simplistic view that the serious issues in medical care can all be laid at academic medicine's door, he nonetheless went on to state, "I contend that unless we make some changes in the way we operate our academic enterprise in education, research, and health care, we may be heading for disaster—a disaster that is largely of our own making."*

The AAMC is a membership organization (all 127 of the nation's medical schools belong), that is known in Washington as a strong defender of the academic status quo. Petersdorf, 60, is something of an iconoclast, very much a member of the inner sanctum but one whose blunt challenges of the medical establishment set him apart from his brethren. In an interview with *Science*, he acknowledged that many of the things he has said and written during the past several years have put him "toward the left of the establishment, if that is the progressive side," and said that as AAMC president and spokesman he may have to "keep still" when it comes to some of his personal views unless he can achieve the goal of bringing his colleagues in academic medicine around to his thinking. "A leader," he says, "cannot lead if he is too far ahead of his flock."

But in recent speeches and articles Petersdorf has left a trail that plainly indicates some of the directions in which he thinks academic medicine should go and which problems it should tackle.

The rising costs of health care, driven in part by a physician surplus and a huge corps of high-priced medical specialists, has become something of a national obsession, a real issue but one that is easy to satirize. "In the communities with which I am familiar," Petersdorf has wryly written, "there are few echocardiograms in search of a cardiologist to read them, there is only a rare belch wanting a gastroenterologist, and there is not a single even slightly plugged coronary that does not have three specialists waiting in the wings." The blame, he says, lies squarely with academic medicine itself for a failure to limit residency and fellowship subspecialty training programs.

A couple of years ago, he made a startling and unpopular suggestion: reduce specialty training by limiting the number of years that residencies and fellowships are supported by the current system of subsidy with revenue from the care of hospital patients. At present, the system supports new doctors

*Robert G. Petersdorf, "Is the Establishment Defensible?" *The New England Journal of Medicine*, **309**, 1053 (1983).

not only through the years of training after medical school that are necessary to become qualified to take exams for board certification in a specialty but also pays for their advanced or subspecialty education. For instance, the system subsidizes the first 3 years of training in internal medicine, and then supports additional years for subspecialty training in cardiology, or nephrology, or any of the other medical subspecialties. Total years in training can easily number 5; in surgery even more.

Petersdorf proposed that all training beyond that needed for board certification should be paid for by grants, or money provided by the departments that want subspecialists, or by private funds, or by loans assumed by the trainees themselves. It was a position he argued for as a member of an AAMC committee on funding graduate medical education and one on which he won a partial victory. The AAMC now advocates general funding of residency training for the basic 3 years, plus only one for subspecialty education.

In the 1960's, Congress, with the advice of academics, proclaimed that the country was about to suffer a severe physician shortage and urged academic medicine to rally to the cause. Lured by generous "capitation" funds from the federal government, allocated on the simple basis of numbers of students per class, existing medical schools expanded and nearly 40 new ones opened. Calling the perceived doctor shortage a "figment of somebody's imagination," Petersdorf has doubts about the wisdom of having so readily agreed to rapid expansion. "Suffice it to say that there are now too many schools, some of which are of questionable quality," he has written. "The wild expansion of the 1970's threatens the very quality of medical education."

While the student body was expanding, driven by congressional pressures for more doctors, medical school faculties were growing in substantial numbers as well, for reasons related to an overall growth of the biomedical research enterprise fueled by federal funds—in particular by money from the National Institutes of Health. Petersdorf cites growth at the University of Washington during his own tenure as chairman of medicine from 1964 to 1979 as an example. In 1964, there were 12 research faculty members in the department; by 1979 they numbered 67, virtually all competing for and dependent on grant support, 60% of which came from NIH. Petersdorf told *Science* that as AAMC president he will argue unhesitatingly for a steady increase in research funding from NIH but made the point that some very basic changes in the structure of the research enterprise in the nation's medical schools are inevitable. Indeed, Petersdorf thinks them highly desirable. For instance, he says, "We need to train fewer people to do research, but we need to train them longer and better and be sure there is grant money available to them when they are through."

Petersdorf went to medical school at Yale and graduated in 1952. His career in academic medicine flourished during the 1960's when NIH funds were increasing seemingly without limit and when important advances were made by M.D. researchers who worked both in the laboratory and at the bedside. During that era, the image of the ideal clinical investigator as a person who excelled equally as doctor, researcher, and teacher developed. This was the image to which Petersdorf and most of the present generation of leaders of academic medicine aspired; it is still an ideal.

But with the end of limitless NIH expansion and with a major change in the nature of laboratory research itself in this era of high-tech molecular biology, Petersdorf challenges the "mystique" that has grown up around academic research and looks toward a new ideal. In an article in *Daedalus*† he questioned the following tenets of the establishment: that "researchers are better teachers," that "research-intensive schools are better medical schools," that "researchers are better clinicians," and that "all academicians must do research." "The individual and the university must realize that the day of the triple-threat academic is over, is as defunct perhaps as one-platoon football," he wrote. In its place, he sees the advent of the two-platoon system, manned by the clinician-teacher and the investigator-teacher, two distinct species of medical academic. "The idea," he observes, "has not been well received."

The issues confronting not only academic medicine but the national health care system in general are legion; these are but a few. But they are of special concern to Petersdorf and to the AAMC which, he says, must carefully select those policy issues it is most able to tackle.

Petersdorf has no illusion that the remedies he proposes for changing the academic system will readily come to pass; quite the opposite. "There is a belief out there that our medical system is the best in the world and that anything that changes it will be for the worse." It may be the best, Petersdorf agrees, but it also needs changing, which he would rather see initiated from within the establishment than forced upon it from outside. So he has decided to give it a shot. ■

BARBARA J. CULLITON

†Robert G. Petersdorf, "Medical Schools and Research: Is the Tail Wagging the Dog?" *Daedalus*, Spring 1986.

Briefing:

House Endorses Pork Barrel Funding

For the second time in a month, Congress has turned back attempts to block pork barrel funding of research and construction projects at individual universities. The latest move came on 23 July, when the House of Representatives soundly rejected an amendment to delete a total of $69.7 million, earmarked for eight university projects, from the appropriations bill for the Department of Energy (DOE). The vote was 315 to 106. Four weeks earlier, the Senate had similarly refused to delete $55.6 million for projects at nine other universities from the Defense Department's budget (*Science*, 11 July, p. 145).

In most cases, proposals for the projects have not been submitted to the department that will provide the funds, and none of them has even gone though the usual congressional approval process.

The votes in both the House and the Senate were preceded by lengthy debates on the propriety of distributing research and construction funds on the basis of congressional directive rather than scientific peer review. Both votes sent a clear message: there is a good deal of unhappiness on Capitol Hill over perceived inequities in the distribution of R&D dollars, and Congress intends to go right on earmarking funds for specific projects.

The House debate focused on eight projects that the House Appropriations Committee has directed DOE to bankroll in fiscal year 1987. Three of them involve further installments of funds for construction projects that Congress directed DOE to finance in previous years, and the other five are new projects.* The committee inserted funds for the projects in DOE's FY 1987 appropriations bill and, in a report that accompanied the legislation, gave the department explicit instructions on where the money should be spent.

When the bill reached the House floor, Representative Robert S. Walker (R–PA), a conservative critic of government spending, proposed an amendment to knock out the

*The three ongoing projects are: National Center for Chemical Research, Columbia University, $4 million; Center for Science and Technology, Atlanta University, $7.5 million; and Demonstration Center for Information Technologies, Brown University, $5 million. The five new projects are: Center for New Industrial Materials, Iowa State, $6 million; Center for Nuclear Imaging Research, University of Alabama at Birmingham, $12.3 million; Energy Research Complex, University of South Carolina, $16.3 million; St. Christopher's Hospital for Children, Philadelphia, $14.8 million for an energy demonstration project; Center for Excellence in Education, Indiana University, $3.8 million.