and these were related to my children, too. My goal is connected with my children. . . . I have tried many things before my decision. . . . I came from Russia as a good friend of the Soviet Union. And they took me for a good friend . . . and as a good friend of the Soviet Union and as a so-called progressive scientist and big manager of science, I was invited to many meetings and conferences which I was not very happy about because I don't like to speak in a manner half the truth and half the lie. . . . Before the wall there was always the possibility of escaping, so scientists were permitted some little bit of freedom, a little bit of liberalization and a little opportunity to associate with the West, to go to the West on journeys or take part in scientific meetings and so on. . . . So life became very, very disagreeable [after the wall], there was no exchange of ideas, no discussion, all these things stopped.

"So after the wall, I discussed the problems with my wife—already two years ago, while in Moscow, we had discussed the idea of leaving for this and for the sake of the children."

Barwich related that they delayed their defection because the children of his first marriage were in East Germany. But eventually they decided to break with the East. Of the children who remained behind he says, "The children are not so old, they are young people, and they will survive and they will get some solution in the future."

Barwich's movements since his defection have been closely guarded. He appeared before the subcommittee in December, and in the course of his testimony made reference to a recent visit to Brookhaven National Laboratory. At present, it is understood that he is in West Germany and may take an academic position there.

—D. S. GREENBERG

Congress: Subcommittee Surveys Effects of Federally Supported Research on Higher Education

The question of the extent to which federal support of research has harmed as well as helped American institutions of higher education is not a new one inside Congress or out, but a House subcommittee has lately been giving the subject its most intensive scrutiny to date on Capitol Hill.

The initiative came from the House Government Operations Committee's new subcommittee on research and technical programs chaired by Representative Henry S. Reuss (D–Wis.). This subcommittee, established in February, is the latest among several groups formed in the House to consider the conduct and implications of the $15-billion-plus-a-year federal research and development effort.

Reuss's subcommittee based its investigation on 3 days of hearings in mid-June and a canvass by letter of some 300 "selected faculty members in a number of fields, as well as university administrators and other distinguished citizens." About 170 replies were received in time to allow the subcommittee staff to put together a compendium intended to provide a cross section of opinion and to publish it as a committee print in advance of the hearings.* About half the 170 responses are represented either by full letters or excerpts. There are plans for including later replies in the published record of the hearings.

Answers to a Questionnaire

The subcommittee's "poll" was based on questions grouped under five major headings (see box) and, according to the introduction to the committee print, the questions were "compiled from extensive literature which has appeared in the last few years. They seemed to the committee to summarize the salient aspects of the problem."

The questions are clearly not the sort that can very usefully be answered yes or no. Because of the broad focus of the questions and the variety of viewpoints expressed, the results of hearings and the canvass are inevitably inconclusive. But the subcommittee has made a solid contribution by giving serious attention to a number of interrelated questions which have been vexing people in higher education since the rise of Big Science. And the record of the investigation will be a useful one not least because the net was cast wider in the academic community than usual and brought in a number of people besides those who by virtue of achievement or position are, ex cathedra, perennial witnesses before Congress.

Both the letters and the testimony in the hearings reflect a consensus that the wartime marriage between government and the universities is, for better or worse, permanent; in general, they support the judgment of the Carnegie survey of 2 years ago that, on balance, the relationship is beneficial to the universities.

This is not to say that on a number of counts there were not expressions of serious concern. The quality of teaching undergraduates are getting was the subject of fairly widespread although certainly not universal worry. Sharpest concern was directed to the independent liberal-arts colleges, which are seen as suffering, indirectly at least, from emphasis on research in the universities.

Most pessimistic perhaps was one unnamed member of the faculty of the Columbia University graduate school of business who said: "Small liberal arts colleges are threatened not (so much) by federal grants as by economics of scale in higher education, which raises the question whether these institutions are viable."

Much more typical was a view that liberal arts colleges must and can do more to create an atmosphere in which research—particularly in the sciences—is an integral part of education, as has been successfully done in a number of the "prestige" colleges.

It was generally recognized that the key to the problem is faculty and that able young scholars in fast-moving fields will not emigrate to the colleges and stay there if such action forecloses their chances for a research career. Most of the suggestions for mitigating the isolation of the researcher in the liberal arts colleges implied establishment of new or modified federal programs as well as cooperative programs among institutions. The main recommendations were for arrangements to lighten the characteristically heavy teaching loads in the colleges, to make it easier for college faculty to use the library and laboratory facilities of the universities and national laboratories, and to enable college scholars to work periodically for sustained periods with leading men in their fields.

As for undergraduate education in the universities, it was acknowledged that teaching may be left largely in the hands of graduate teaching assistants. This can be unsatisfactory, but a fairly strong segment of opinion held that this is not necessarily a bad thing. One who expressed this latter view without sounding like Pangloss was C. H. Braden, a professor of physics at Georgia Tech.

"Perhaps the principal consideration," wrote Braden, "is the increasingly large fraction of the college age population that attends college. This, cou-

* *Conflicts Between the Federal Research Programs and the Nation's Goals for Higher Education,* available from the Committee on Government Operations, House of Representatives, Washington, D.C.

pled with the increase in population, means that colleges must employ 'mass production' techniques that deliver a good quality education to large numbers of students. In the future it will be a graduate degree, rather than simply a college degree, that will be a mark of academic distinction, and it will be in the graduate program that the close contact between faculty and student will be achieved which formerly marked the undergraduate program also.

"This new order of things need not imply an inferior undergraduate education. On the contrary, many 'mass production' colleges offer programs of the highest competence. The generally accepted way to offer such a program is to place the undergraduate program under the close supervision of distinguished faculty members who have an interest in undergraduate teaching, and such faculty are not rare, and then provide much assistance in the way of junior instructors, technicians, and student assistants. Moreover, many young instructors are superior teachers because of their enthusiasm and close contact with problems of current interest."

On the final morning of the hearings when several representatives of research-supporting federal agencies appeared, the discussion turned to agency regulations which have prevented graduate assistants working on federally funded research from teaching. The National Science Foundation, an agency with a special sensitivity to university opinion and with room to maneuver, because of its responsibilities for education as well as research, has revised its rules so that its graduate-student beneficiaries can do some teaching, and the general trend among the agencies would appear to be toward more flexibility. A crucial factor in the matter, however, would appear to be university insistence that graduate students teach as part of their regular program and teach well.

Criticism of teaching standards elicited a counterattack from Lloyd V. Berkner, director of the Southwest Center for Advanced Studies, Graduate Research Center of the Southwest, who was expressing a hard line not uncommonly held by senior men in the hard sciences.

"In my opinion," said Berkner, "the complaint against the teaching in our great research universities arises primarily from students (and their indulgent parents) who would like the university to be a kind of advanced high school—a continuation of the sheltered life the student has enjoyed at home.

"The university must assume its students are mature individuals who attend because of their dedication to learning and desire careers in a society that today fully depends on sufficient education. The basis of that learning must be books and a modern, rigorous curriculum. This means that the teachers at the university level, though dedicated to the highest standards of scholarship, can only be supplementary guides to a student who is forced to assume responsibility. These qualities of the institution will themselves assure the quality of the undergraduate (and graduate) education which it offers. To mature its students, to give them self-discipline, the university must be tough. The intellectual competition is high, and to develop qualities of independent decision and leadership expected of university graduates by society, the university cannot hold the student's hand or cajole him. In such an environment the success of the student must depend primarily upon himself—his intellectual qualifications, his growing self-discipline, his inquiring mind, his self-development toward qualities of leadership.

"Graduate students have to teach because they must learn to teach and they have to start somewhere. Moreover, the teaching experience by the graduate student requires that he think more clearly, formulate his presentation more precisely. Teaching is an important part of his own graduate experience—equally important, it is conducted under the tutelage and guiding hand of men who, through their own research

SUBCOMMITTEE QUESTIONNAIRE

General Questions Which Have Been Raised Concerning the Possible Conflict of Present Federal Research Practices with the Nation's Goals for Higher Education

1. The students

Is undergraduate education suffering from overemphasis on research? It has been charged that teaching is left more and more to inexperienced instructors or second-rate graduate students, because talented professors and superior graduates find research more rewarding than teaching.

2. The faculty

Is there a shift in "loyalty" among those who do research on the campus (whether or not they also teach) away from the university to the Federal agencies that supply the research funds?

Does the Federal research program encourage faculty members to desert the campus for jobs in Government or for Government-supported work in private industry?

3. The institutions

Has the Federal research program caused imbalances by—

(a) inordinate support of the hard science departments to the neglect of the social sciences, the humanities, and the nonscience professions;

(b) aggrandizing the larger research-performing universities and institutes, and neglecting the smaller liberal arts colleges;

(c) discouraging the growth of centers of excellence over a wider geographic area by concentrating projects and funds in a few relatively select institutions;

(d) encouraging certain schools to become "research factories" rather than academic institutions engaging in research as a normal and necessary part of the educational function;

(e) causing institutions with established traditions of excellence in certain academic fields to abandon them in order to conform to a research pattern that will give them a bigger share of the research bonanza?

4. The graduates

Are the Government's research practices excessively turning graduates away from teaching, particularly in the less glamorous and financially less rewarding subjects; and if so will the Nation face a shortage of teachers and practitioners of the social sciences, humanities, and nonscience professions?

If the research pattern should shift, might there be a glut of specialists in presently popular disciplines and a scarcity in others?

5. The Government

If there should be available limited (or any) increases in Federal research funds, should the increase be used—

(a) to expand the number and variety of small research projects at a greater number of institutions;

(b) to pay the full costs of projects, relieving the institution of the cost-sharing burden;

(c) provide more institutional grants (i.e., those not restricted to specific projects)?

in creative frontiers, are holding themselves in the forefront of today's science."

Berkner also doubts that humanistic studies are suffering as the result of federal expenditures on science. He argues that federal support of scientific research has released large sums for the development of nonscientific university activities. In addition he feels that research in the "hard" social sciences—those that submit to quantification—should be supported by the government, but that the "soft" social sciences "uncontrolled by experiment should be left to private support."

Another View

A diametrically opposed view was expressed by one in quite a different field and stage in his career, Norman S. Care, an instructor in the philosophy department at Yale.

Care argues that there is little money available to support research in the humanities. He points out that humanists are on the short end of a salary differential between them and scientists and, on top of that, a scientist can usually count on the federal government's underwriting summer research while his colleague in the humanities often must teach to piece out his salary. Another hurdle to research in the humanities, says Care, is generally heavier teaching loads for humanities faculty compared with the sciences.

"The upshot," says Care, "is that academicians in the humanities are not only materially deprived, but also made out to be professionally second rate. There is a form of status attached to having research grants, and lack of opportunity to secure such aid is sometimes interpreted as a sign that one's discipline is somehow not respectable in a vigorous and practical society. I have encountered this kind of artificial ranking among both students and faculty in my experience on the campuses of two major State universities and one large private university. However, it is worth adding that this form of grading is not common on campuses with strong traditions of education in the liberal arts."

A political scientist, whose name was withheld by request, wrote complaining about grants to the social sciences. "Apparently only research projects which are completely susceptible to quantification and computerization will be considered by NSF," he said. "This appears to be an artificial limitation which can only have an adverse effect on the kinds of research undertaken by political scientists. I have no quarrel with quantification where it is applicable, but strongly disagree with the notion implicit in such a requirement that only that which can be measured and counted is significant."

On the fundamental matter of concentration of federal funds for university research in science projects and in a relatively few institutions, there seemed to be virtual unanimity among witnesses and those who responded to the questionnaire that there should be no major redistribution of funds or discontinuance of the project grants which have been instrumental in creating the present pattern. Rather, it appeared there was fairly strong sentiment for putting additional funds into programs which will improve the research atmosphere in liberal arts colleges and the quality of instruction and research in universities which fall distinctly short of excellence. Sentiment for the greater use of "institutional" grants to strengthen aspiring universities seemed strong, although there was equally firm espousal of the principle that federal funds should not be spent without reasonable assurance of significant improvement in the institution receiving them.

One interesting excursion into high policy occurred on the final day of hearings when it was asked if many of the problems being discussed might not be solved if education programs were consolidated under the jurisdiction of one agency. On hand were Commissioner of Education Francis Keppel, Commissioner Mary I. Bunting of the Atomic Energy Commission, and representatives of NSF, the National Institutes of Health, the Office of Science and Technology, and the Bureau of the Budget. While the subject was not pursued at length, the clear consensus was that present diversity is regarded to be of advantage to both the federal government and the universities.

The task of the subcommitte is now to review the record and decide what if any action is in order. Congressman Reuss says he emerged from the hearings disturbed by the patent fact that "Unless we do something about it, there's going to be a very considerable shortage of university teachers in the next few years. Maybe closed circuit TV and computers can do the job [the inevitability of such measures was mentioned during the hearings], but if we do shortchange undergraduate and graduate students in the universities we are not only going to hurt them, but we're going to hurt the nation too."

He said that the investigation had confirmed in the minds of the subcommittee that the federal research program is indispensable, "but some nagging questions present themselves.

"Many research grants do take teachers off teaching.

"The federal research program has resulted in a great imbalance between a few favored universities with graduate departments and the other thousands of colleges and universities in the United States.

"Teachers have lost caste . . . and federal research grants have in part made it so.

"There is an observable imbalance between the support of science on the one hand and of the social sciences and the humanities on the other."

Reuss has no ready solutions for these problems, though he does say "We must make up our minds whether we want the federal government to support the humanities the way it supports science."

Recommendations Coming

The end product of the subcommittee investigation will probably be a report recommending legislative and administrative changes. The subcommittee is supposed to deal with problems which transcend departmental programs and committee lines of authority. Specific action would appropriately be left to the committees with authorization authority.

Examination of the conflict between federal research programs and goals for higher education was the first venture of the new subcommittee, and the experience of wrestling with a formidable subject does not seem to have daunted it. Next in prospect, although not scheduled, is consideration of problems in such areas as transportation technology, sewage and waste disposal, and building construction, which are important to the public but have been the object of relatively little federally financed research. An effort would be made, says Reuss, without batting an eye at the far-flung implications, to look at the relative payoff of various government research programs.

—JOHN WALSH