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*One of the highest honors bestowed by the American Chemical Society is its Charles Lathrop Parsons Award. Given usually once every two years, it recognizes outstanding public service by members of the society. Past winners include James Conant, Glenn Seaborg, Russell Peterson, and William O. Baker. This year's recipient is Charles G. Overberger (C&EN, July 17, page 20). Active in IUPAC and ACS—he was ACS president in 1967 and chaired the society's Committee on Chemistry & Public Affairs from 1973 to 1977—Overberger has long been deeply involved in applying chemical research and chemical knowledge to world problems. The veteran polymer chemist received the award at a dinner in Washington, D.C., last week. Currently vice president for research for the University of Michigan and head of the school's Macromolecular Research Center, his address was on something very close to his professional heart—the link between the federal government and the universities. Following is the text.*

# Universities and the federal government: a marriage that has survived

**Charles G. Overberger,** vice president for research, University of Michigan

Wartime marriages are considered notoriously poor risks. I'd like to talk about one wartime marriage that has survived the years, even though some signs of rift have appeared now and then. I have in mind the research partnership of the federal government and universities formed during World War II.

What started as a wartime liaison, hastily concocted and heedless of the future, has now, like any marriage in its middle term, accumulated lots of trappings and bric-a-brac, lots of commitments, and a whopping financial problem. You all know that the partnership I am referring to is not a trivial matter, from whatever perspective it is viewed. Federally sponsored research in universities is now at about $2.9 billion per year, which is a lot of money even by federal standards. On my own campus, the federal government spends $60.6 million per year to support research. This is almost one sixth of our total budget. Clearly, we have a considerable stake in this marriage—financially, at least, if not emotionally.

Actually, I should hasten to say that this financial stake is, in reality, a double-edged sword. My campus has benefited greatly, of course, from its large and varied research program—in obtaining new buildings, in attracting high-quality faculty members and students, in developing new curricula—but there have also been costs not fully covered by the sponsors of this research. So, in one sense, the larger our research program, the more severe our financial problem.

But, finances aside, there is something of an emotional commitment as well. This much is true at least. We are strongly convinced that this marriage, if not made in heaven, is at least good in some absolute or general sense. Universities have become a great national resource as much for their research as for their training of new minds, and the continuing intellectual well-being of the nation is to some considerable extent dependent on the kind of research that is best conducted by universities.

Clearly, all parties involved admit that research in universities is part of the national research and development effort. True, not all colleges or universities have substantive research programs; so that it is clear that my remarks pertain primarily to the hundred universities that have substantial research commitments and graduate programs.

My remarks can be interpreted to be optimistic ones, rather than pessimistic ones. I do not believe that our educated society will allow direct political interference in the affairs of a national resource such as the large research-oriented university.

Currently, the national research and development effort largely consists of three sectors: first, the broad division of effort in the industrial sector; second, government laboratories and national facilities such as (a) National Institutes of Health, (b) the Fermi National Accelerator Laboratory in Batavia, (c) the National Radio Astronomy Center in Arecibo, P.R., (d) Kitt Peak National Observatory in Arizona, and (e) the National Center for Atmospheric Research in Boulder, Colo. Many of these laboratories carry out mission-oriented research but there is much basic research carried out under a general framework of a broadly defined mission.

However, most basic research is carried out in universities,

the third sector. There has been a substantial increase in basic research funds from the federal sector to the universities during the period 1955–77. The percentage of the national total R&D effort performed in universities goes from 5% in 1955 to 9% in 1975. Universities and colleges are the primary performers of basic research. They conducted 54% of the total basic research effort in 1977. During the period 1953–77 universities and colleges increased their share of total basic research performance from 25% to 54% because of increased federal funding of basic research in the university sector. This percentage has rather stabilized and indeed lost ground in more recent times because of the curse of inflation and increased competition for the same funds from federal laboratories and, indeed, even a few industrial laboratories.

I don't want to dwell on the many benefits of this marriage. I want, instead, to look at some of the concerns that I mentioned earlier. As in many marriages into their third decade, one partner seems to become increasingly suspicious, autocratic, and domineering. Divorce is out of the question, so there is an urgent need for some effective communication. Let me then highlight some of the problems that we most want to communicate about. For the most part, these are the problems that universities around the country—particularly the hundred or so universities with substantial research and graduate programs—have in common with the federal government. These must be resolved if our relationship with the federal government is going to continue to be productive and mutually beneficial. Many groups are discussing them, and I am confident that there is sufficient wisdom and patience on both sides to find workable solutions.

Looking to the future, what are the trends that will determine the soundness of the federal government/university marriage in the next 10 years? In asking this question, we must remember that some conditions and phenomena that we may not think greatly significant today may well be crucial matters after a development of 10 or 15 years—just as the patterns we are following now were set some time ago, not by some master plan, but as a result of countless smaller decisions whose cumulative effects are now visible on the national scene.

It is useless to ignore the fact that the financial health of the country will play a major role in future intellectual developments in research. Financial problems in universities are a direct result of financial problems in the federal sector and, indeed, in the country as a whole. Inflation takes its deadly toll on every part of our lives.

Within our research programs, inflation has not only eroded the total structure, but also has entirely cut away certain features of research support that we found quite essential to a healthy program. The institutional funds that used to be available from the National Science Foundation, for example, permitted us to stimulate and facilitate research across a broad spectrum of the campus. A small purchase of equipment here and there, a bit of assistance to tide someone over between projects, a modest seed grant now and then—when we could bolster our program and, so to speak, put out fires with a small amount of discretionary money, we could perform a most important service to the university. The good effects of this kind of money multiply far beyond the original amounts involved. Such money may be the single most important tool of research administration in a university, even though it may also be the most difficult to justify to unfriendly critics. Some way must be found to restore these kinds of funds.

NIH has been an exception, by the way, in that it still funds support grants by which the health-science schools that receive sizable amounts of NIH competitive grant money receive also a small sum for discretionary purposes. But even this money has been eroded, and it is a constant battle in Congress to keep these funds available.

Aside from the amount of direct financial support, the most serious problem the universities face with the federal government is the increasing pressure to conform in various ways. Although not for the first time in U.S. history, universities are again being subjected to direct political pressure from Congress and from society generally. Let us discuss a few instances of this.

There is, first of all, the pressure to mold university research according to the latest national problem or the most recent focus of Congressional attention. Wide swings in general research themes and in problem areas occur every few months. If universities were to pay too much attention to these swings of public attention, they would soon lose the center of gravity that gives their programs stability. Research excellence takes a long time to develop and must be built on a very broad foundation. We want to help the nation solve its various large problems, and there is much the universities can do—as they have demonstrated—but they cannot swing from problem area to problem area as fast and as freely as many people in public life wish. We cannot just be problem solvers. We must continue to state the case for basic research and hope we can make officials understand that problem solving must rest upon a solid base of fundamental knowledge. Turn to the universities for solutions to problems, yes—but give them also the resources that build the base.

***Most serious problem faced is the increasing pressure to conform***

A second pressure on universities today has resulted from the national concern with goals in affirmative action of various types. In universities we applaud the goals and are working hard to achieve them, but there are real difficulties. The available pool of applicants for top positions is small, and there is fierce competition for the best among the minority candidates. With respect to the middle ranges of quality, we face a serious dilemma in balancing our need for the best minds against our need to increase the representation of minorities at universities, both as students and as faculty members. Add to this basic dilemma a patchwork of administrative requirements for reporting progress and we have an almost insuperable problem. Different monitoring agencies have asked for different kinds of data. The ball game changes almost every inning, it seems, and the university offices charged with monitoring affirmative action have spent countless hours trying to collect and then recollect the data required. Just recently, when the Department of Labor assumed the responsibility for oversight of affirmative action programs, my university had to provide a new set of data to fulfill new requirements. To meet the deadline that was imposed, we essentially collected and compiled the data over a weekend. Every dean, chairman, and director throughout the university participated in this frantic weekend whirl, and literally hundreds of manhours were involved. The point is not that the report was unnecessary or undesirable, but ways must be worked out with the monitoring agencies so that data can be collected in a routine and consistent manner. Crash programs to change all the parameters are costly and wasteful.

Attacks on the peer review system are yet another worry. It is generally agreed within the research community that there

is no better way to identify meritorious proposals, and the review system itself has been refined and improved over the years. Nevertheless, and despite various studies which indicate otherwise, peer review is alleged by some critics to be biased in favor of prestigious institutions, to discriminate against young, female, and minority researchers, and to amount to little more than a mutual backscratching and admiration exercise. These sentiments are, to some degree, the natural outgrowth of using merit as the dominant criterion for allocating public monies in a society that is simultaneously attempting to become more egalitarian. Certainly the peer review process should be monitored and controlled so that it serves the public interest. However, it would do the public a great disservice if the primary means for identifying and supporting scientific excellence were watered down or abandoned.

Accountability has become a watchword for most of our large institutions. Public confidence has fallen in the light of many disclosures in the past few years of instances of wrongdoing or poor judgment, and universities have reaped this whirlwind along with government and organizations of all types. As a result we have had to develop complex networks for compliance with rules and regulations concerning such matters as the use of human subjects in research, the use and care of animals for research, health and safety conditions, hazardous biological research, etc. The usual requirement in monitoring these conditions is to set up review committees—sometimes with members from outside the university.

***Accountability has become a watchword for large institutions***

I really have been talking previously about pressure from society in general. Let us mention a few other reaction parameters with the federal sector:

- Capitation grants in the health sciences.
- The impact of the Nuclear Regulatory Commission.
- Revision of the A-21 circular and the indirect cost calculation.
- Auditing procedures of HEW and other federal agencies.
- Geographic distribution of federal R&D funds.
- Continued harassment from attention-seeking political figures on such items as indirect cost reimbursement, titles of research grants and contracts.
- Limitation of allocation of salaries to a research grant or contract at a fixed level.
- Sharing of research equipment.
- Pressures from the Office of Management & Budget to terminate projects in agencies.

We, of course, recognize the necessity for complying with regulations designed to ensure the safe and proper functioning of the research program, but, at the same time, universities must not sacrifice their autonomy. If we are to survive as the intellectual leaders of the world, we must work out a long-term arrangement between universities and the federal sector. There must be some mutual trust and understanding.

In a positive vein, it is clear that the Carter Administration is supporting the role of basic research. Let me quote briefly from some remarks by Frank Press at an [Association of American Universities] meeting in October of 1977:

"We know that universities perform over 50% of all our basic research. It is most likely that this role and this proportion will remain if not expand. Although we would like to see more basic research in industry, the trend has been in the reverse direction. Therefore, the predominance of basic research will remain with the universities and that research must somehow be strengthened. The question is how. Although I personally support the action in the fiscal 1978 budget in providing financial support above the level of inflation, pumping federal funds into this situation cannot be the sole solution to this state of affairs. Money is essential but so are improvements in the system that will absorb it. Together, we will have to do some hard thinking about this.

"One way of doing this—and I know it is on your minds—is to lighten the load of federal red tape involved in administering your research programs. We are sympathetic to this. Much can and probably will be done to improve the situation. I can assure you that there are a great many of us that are sympathetic to your burden in dealing with the requirements of federal reports."

A particularly promising development is the formation, quite recently, of a National Commission on Research. The members of this group are not only very distinguished, they are also knowledgeable regarding the present relationship between the federal government and the research universities. Likening this commission to a marriage counselor may be carrying my metaphor too far, but in fact the members will be addressing themselves to the various points of dissonance in the relationship. After a thorough, objective review they are expected to formulate recommendations which it is hoped will provide a basis for an amicable reconciliation.

Sooner or later, this whole subject, like most others of national import, will be debated in Congress, I submit. In fact, it would be healthy if this were to happen during the coming year. At the risk of being presumptuous, let me mention some important topics which should be treated in such a debate:

- Simplification of the research project support system in order to achieve a better balance of effectiveness, accountability, and equity for all parties.
- Improved modes of financing basic research so as to allow for legitimate needs, such as instrumentation and facilities, and to minimize the deleterious effects of "stop and go" funding.
- Means of encouraging industry and universities to undertake cooperative research projects, perhaps by providing financial incentives, and certainly by minimizing patent and regulatory barriers.
- Development of scientific manpower policies which take account of national needs while helping to support young researchers of outstanding promise in their chosen fields.

While universities and federal agencies try to reach some understanding of mutual problems and develop working relations that will safeguard the best interests of both parties, what about the professor who is directing the theses of graduate students and interested in publishing original creative results? It is easy to be discouraged these days in university life. In the first place, there is a very high energy gap to reach a tenured position. The turnover is much slower. New, young minds keep new ideas flowing into the system. Faculty salaries are not keeping up with inflation. The very heart of our system of education is based on the interaction of a highly talented individual with younger students. The reward system for intellectual endeavor is slowly changing. Old traditions are not always necessarily the best traditions in a changing world, but certainly the importance of a measure of excellence in creative research will never change.

If I have one message for professors of chemistry, it is simply to keep your standards high; your tendency for selfishness to a minimum. Give your time and energy to the training of young minds, not necessarily in your exact image, but in the image of a changing, creative, intellectual world of chemistry.

I am an optimist—I believe that the highly developed human species if alive will be searching for new knowledge. He will continue to search for complete explanation of his total life processes; it is hoped he will bend his marvelous intellect and will to ensure survival; and last but not least, he will continue to communicate his wisdom and knowledge to new generations.

Ordered societies, federal or otherwise, will support the endeavors of these dedicated leaders in education and research for the future. This is my long-range prediction. □