ests, not only in patentable items developed in its own self-sponsored programs, but in the know-how which, in the Wholgemuth case, is held to be a "property?" It is evident that institutions of higher learning, having entered into commercial research, are in no position to leave the protection of its marketable products to individual faculty members, nor should they neglect intellectual property rights which, to judge from the litigation generated in private industry, are either valuable on their own merit or are potentially valuable in connection with future patentable inventions. Some sort of administrative action should be taken by the universities and colleges as institutions to protect their rights to both of these kinds of "property."

This action may require a revision of employment contracts with faculty or improved contractual arrangements with purchasers of research, or both. Certainly the establishment of a firm policy for the protection of intellectual properties is a necessity. Firm patent and copyright policy is also necessary, as are internal procedures which will insure evidence of priority of discovery in the event that litigation should be a part of that policy. In short, if our educational institutions are to operate a business, even though it be the business of research, they should adopt appropriate methods for it.

These methods may or may not involve the institution in actions such as *Goodrich v. Wholgemuth*, but the implications and ramifications of this case are too great to be disregarded. The final word on freedom of employment versus the keeping of trade secrets has not yet been heard. When other cases in this area are decided, we may have a better idea of the extent of possible protection of property interest in ideas. Until that time, caution is required.

News and Comment

Post-Sputnik: Relations between Science, Government Now Passing into More Settled, Mature Stage

Nearly 7 years have passed since Sputnik caused Washington and science to become acutely aware of each other, and now, after a good deal of excitement, misunderstanding, and extravagant fears and prophesies, a number of important patterns in the relationship seem to have become fairly well established and are likely to endure for a long time.

First of all, though some university budget officers still conduct exercises on what to do if the federal money stops—just as the Navy, prepared for anything, still runs an occasional drill on repelling boarders—no informed person in the government or the universities thinks the money is going to stop. The amount and scope of federal assistance for research and education gets bigger year by year, and there is every reason to assume that, unless a political or economic catastrophe occurs, the now-established pattern of federal financial support will prevail. Over, let us say, the next 5 years, there may be a few jigs and jogs in the curve, but there is nothing in present executive and congressional attitudes toward research to indicate any inclination toward reductons. On the other hand, there seems to be considerable support in the making for increasing the present rate of growth, which began to level off last year under general budgetary pressures.

Closely involved with federal support is the question of the strings that are tied to it. Here again it appears that fearfulness has interfered with clear vision. Last year, when the National Institutes of Health established tighter accountability requirements for grants, many researchers reacted as though they expected the next step would be for NIH to prescribe their attire, diet, choice of mate, and religious training for their children. Several researchers were reported to have turned their grants back to NIH in protest. But now that the scientific community has lived with the new accountability regulations for a year or so, it appears that they do not differ very much from the regulations that they supplanted, and that there was no justification for the predictions of scientific calamity that would ensue from researchers' having to fill out a few more reports.

In many cases, onerous or not, the present accountability requirements probably represent the outer limit of paperwork for a long time to come. The cries of pain they evoked were of questionable validity, but they did serve the useful purpose of notifying Congress that scientists don't like to make too many financial reports, and they also served to increase the granting agencies' sensitivity to the likes and dislikes of their clients. Those in quest of money may sometimes doubt that any such sensitivity exists, but the people in the agencies like to be well thought of by the scientific community, and there is a psychological feedback when important elements of the scientific community feel aggrieved by a granting agency.

Thus, it can be said with reasonable certainty that the present patterns of increasing support and accountability will be maintained. There is considerably less certainty, however, about just what additional role Congress may carve out for itself in its relations with matters that come under the heading of research and development. During the past year the Elliott and Daddario committees in the House have been studying federal support of R & D with unprecedented intensity, but so far these committees have failed to turn up any data or conclusions that are at variance with the orthodox thinking of the scientific community. Conceivably, they might have obtained a different view of science and government if they had dipped down a layer or two and had solicited the views of persons other than university presidents and administrators, members of the National Academy of Sciences, and top-level government science administrators.

It might, for example, have proved interesting had the committees obtained the views of some pre- and postdoctoral fellows on how their scientific training has fared under federal support systems. (Those who would be fearful

of the effects that frank testimony might have on their careers could adopt a custom from internal security hearings and wear masks.)

Despite the broad extent of current congressional interest in R&D, it is still not clear just how Congress might further involve itself in this area, beyond taking a traditional pork-barrel approach to science. Clearly, it is already doing this, as is evidenced by the decision earlier this month to require that the Public Health Service's proposed Environmental Health Center be no closer to Washington than 50 miles (*Science*, 11 September). But even among legislators with a keen interest in federal support of science, there has been little inclination to poke into any other aspect of scientific administration.

The high-water mark of such interest probably manifested itself in Representative L. H. Fountain's (D–N.C.) studies of NIH administrative practices, studies which resulted in extremely critical reports and, eventually, in NIH's new accountability requirements. Fountain has since moved on to matters involving drugs and the Food and Drug Administration, and though his staff has off and on been conducting some studies of NIH traineeships, there are no plans at present for the sort of continuing, systematic investigation that took place earlier.

In a speech last week at a conference sponsored by the General Electric Company in Schenectady, N.Y., Representative Daddario (D–Conn.) stated that "as a newly active partner in the overall government-science effort, the voice of Congress will make itself heard." On just what matters it will make itself heard, he didn't say, except to point out that many people are unhappy about the geographical distribution of funds for research and development. This again, however, is the pork-barrel issue, and it is one for which the leadership of the scientific community has made preparations in the form of the argument that funds for achieving scientific excellence must be distinguished from funds for scientific research. Out of this concept, for example, has grown the National Science Foundation's centers of excellence program, which is intended to elevate aspiring second-rank institutions to the topmost rank (*Science*, 10 April).

Daddario, in noting that a forthcoming study by his committee found that California got 38.4 percent of all federal R&D funds in a recent 4-year period, pointed out: "we cannot overlook the fact that Congress is a political body and reacts in a political way. This is generally true whether we are dealing with taxes, agriculture, immigration or trade treaties. We can be sure that in the future this will also be true in regard to Congressional dealings with matters scientific or technical. To anticipate anything else would be naive indeed."

It would certainly be naive, but unless Congress wants to get into scientific administration, which Daddario says it doesn't and shouldn't, it is not at all clear that its involvement with science 5 years from now is going to be very different from what it is today —pork-barrel matters excepted.

Perhaps the key factor in congressional dealings with science is the balkanized committee structure, which gives virtually every one of Congress's approximately 300 committees and subcommittees at least a little piece of research jurisdiction. Some sort of reshuffling and consolidation would probably help bring the committee structure into line with the outside scientific world, but since any change necessarily involves shifts in committee power, the status quo prevails.

As a result, all sorts of anomalies persist. For example, the Public Health Service was established in 1798 to provide medical services for seamen, and eventually thereby came under the jurisdiction of the House Interstate and Foreign Commerce Committee. It remains there to this day, though the PHS has gone on to become involved with an enormous range of matters that have not the remotest connection with interstate and foreign commerce. Nevertheless, the committee retains jurisdiction, and writes the basic legislation for the PHS and its principal subsidiary, NIH, though neither the committee nor its staff rank the PHS very high among their concerns. This creates problems for the PHS and NIH when they seek legislative changes, but the situation is not likely to change.

Among the changes that Sputnik produced in the science-government relationship, perhaps one of the most striking and easily misunderstood involves the question of the political power of scientists. To an extent that would have been startling a decade ago, scientists now abound as full-time government administrators and advisers. After Sputnik, President Eisenhower obtained a full-time science adviser, reactivated the President's Science Advisory Committee (PSAC), which, in turn, built up a full-time staff that eventually became the White House Office of Science and Technology (OST). Scientists were brought in increasing numbers into various government departments, particularly the Defense Department, which, then as now, spent the bulk of the federal funds appropriated for research and development.

President Kennedy carried the scientists-in-government policy even further by making an effort to provide every major government agency with a policy-level science adviser. As a result, scientists are in plentiful supply in Washington, and their very numbers might suggest that the U.S. Government now subscribes to C. P. Snow's belief that scientists are uniquely equipped for dealing with the nonscientific as well as the scientific problems of modern society.

Influence is a hard-to-measure commodity, but it would be difficult to establish that the capital's scientists have any considerable influence on governmental affairs outside of areas that involve science and technology; and even in these areas, they are far from having carte blanche. In evaluating the political influence of scientists, it is useful to remember that unilke labor, business, or the farmers, scientists didn't crash their way into Washington with voting power and political contributions; they were invited to Washington because their skills were needed by the men who had come to occupy positions of political power.

The positions to which they have been invited are influential ones simply because science and technology are so thoroughly mixed into our society, but as things have worked out, the scientists have been pretty well compartmentalized in their dealings with governmental affairs; and it could even be reasonably argued that their influence on nonscientific governmental matters has actually declined in recent years. Under Eisenhower, when the nuclear test ban came up for negotiations with the Soviets, the diplomats deferred to the scientists, and a number of scientists actually played key diplomatic roles in talks with the Russians. They weren't altogether absent when the ban was finally negotiated and signed last year, but it was clear that the political leadership felt confident about its own ability to deal with, or seek advice on,

the scientific concepts involved in the test ban, and the scientists were very much in the background when the test ban was signed.

Again, when Kennedy sought a director for the National Aeronautics and Space Administration, he did not select a scientist or engineer. Rather, with a clear understanding that the space program would probably be beset more by political than by technical problems, he chose James Webb, a political insider with broad experience in government and business.

In general, the political leadership has accepted the argument that the house of science fares best when it is left to its own leadership, and science has managed to achieve the goal of vast federal support with little federal interference. But on governmental matters that do not contain significant scientific or technical components, the scientific community cannot reasonably claim that it exerts very much influence in Washington. And when the political leadership, for whatever reason, decides not to pay attention to its scientific colleagues, there is no constituency to which the scientists can appeal. Last year, when the budget of the National Science Foundation was gutted in Congress, no one outside the scientific community was interested. This is not to suggest even remotely that science is friendless in Washington. It is clearly nothing of the sort when scientists occupy high advisory positions in most major agencies, and when Congress regularly votes generous budgets for research and scientific training. But the influence seems to have fairly rigid boundaries, and this largely restricts the capital's scientists to matters of science and technology.

An incident that occurred a few years ago perhaps best illustrates this situation. The secretary of one of the major governmental departments asked his science adviser to set up a series of meetings at which well-known scientists would provide scientific briefings for the top officers of the department. One of the participants was a Nobel laureate who proceeded to deliver a talk on national political affairs, a subject, he explained, which currently engaged his attention as much as science. The secretary listened politely, but afterwards told his science adviser that he had all the political advice he could use, and that when he called in a scientist he wanted to hear about science.

—D. S. GREENBERG

NIH: Moratorium on Career Awards for Researchers Called for Blend of Budgetary and Policy Reasons

Announcement last June by the National Institutes of Health of a moratorium on new research career awards was received with mixed feelings in the far-flung NIH constituency.

Career awards, which provide up to $25,000 a year for senior researchers, carried with them certain undeniable advantages in status and security, as well as salary for recipients, but the program had introduced some new tensions into the delicate triangular relationship involving the federal agency, the investigator, and his institution.

A research career program was started in 1961, according to an NIH policy statement, "to increase the number of stable, full-time career opportunities for scientists of superior potential and capability in sciences related to health."

Under the research career program two categories of awards were provided: "career awards" designed to support established investigators literally for the duration of their careers, and "development awards" to finance research positions for younger but promising scientists for a maximum of 10 years.

The moratorium put the freeze on the senior category of awards. Present holders of awards continue to receive support, but no new awards are being made. The moratorium did not apply directly to the development awards, but budgetary factors make it appear that fewer of the development awards will be available.

According to NIH officials, the moratorium and cutback are attributable primarily to fiscal realities. The rate of growth of the NIH budget has been curbed by Congress, and program expansion has, consequently, to be limited. Furthermore, the research career program is financed out of fellowship funds, and training money is appropriated less willingly by Congress than "project" money. And in recent years additions to training funds have been directed mainly into the field of mental health, to bolster service activities as well as to increase the supply of research manpower.

The cumulative cost of the research career program gave NIH officials pause. By this year some 236 researchers held career grants, at a cost of $5.5 million annually, and 805 others held development grants, at a cost of $14.5 million. NIH also is committed to providing salary increases on a normal schedule to those receiving less than the $25,000-a-year maximum, so there is a built-in cost-rise factor in the program. As with all long-term extramural programs, the awards are based on a kind of moral commitment by NIH, since no federal agency can guarantee money beyond that provided in its annual appropriation by Congress.

In addition to the financial squeeze, misgivings were being voiced inside and outside NIH about the effect on university organization and research of this rapidly growing program. And it was a combination of these factors which prompted a major reappraisal of the program, of which the moratorium is only an interim result.

The idea for the career awards program evolved in the late 1950's and early 1960's (*Science*, 3 Nov. 1961, page 1399) in the wake of studies to determine how further medical research should be conducted. One of the salient findings in these studies was that more stable, fulltime research positions were needed in university science departments and medical schools. In seeking to help meet this need, NIH was responding to a problem in the health sciences it had been instrumental in creating.

The Outsiders

In its flourishing growth in the past decade, NIH not only gave financial support to increasing numbers of researchers but also through its direct and indirect support of graduate students, produced many more full-fledged investigators. The result was that a growing proportion of researchers in universities and other institutions were supported by research grants rather than in the traditional way with institution funds. In universities, these researchers generally were excluded from the tenure structure and occupied anomalous positions as far as status and staff privileges were concerned. There also has been nagging concern about what happens if the federal checks ever stop coming, but, in the era of Big Science, at reputable institutions this problem has remained largely hypothetical.

NIH and other agencies fairly early in the game devised the postdoctoral fellowship to help tide the young researcher over the awkward period between the time when he acquires his doctorate and the day when he finds an institutional niche or has gained the experience and reputation which make