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contribution," are still sticking to their
1984 demand for a mandatory, 48-hour-
notice inspection. "Whether the United
States is going to move at all from their
position is now the $64,000 question," says
a European diplomat.

If agreement on verification procedures
can be reached, then most participants in the
chemical weapons convention are confident
that other outstanding issues of disagre...
ment would rapidly fall into place. Th...
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...lly—and perhaps least predictably—
...re is the impact of the new talks designed to eliminate medium-range nuclear missiles in Europe, a move that has focused attention on the East-West balance of conventional forces and chemical armaments. Already France has announced that, in the light of what it considers to be a growing chemical threat from the Soviet Union, it intends to start the production of chemical weapons as a "dissuasive force." ■ DAVID DICKSON

Politics of the Genome

Since the initiative to sequence the human genome first became exposed to public discussion, which effectively began at last summer's Cold Spring Harbor Symposium, enthusiasm for embarking in the near future on a full-scale sequencing effort has waned in favor of the more modest short-term goal of genetic and physical mapping of the genome. In the public domain at least, that trend continues, as evidenced by the discussions at the second meeting of the National Academy of Sciences (NAS) committee on the genome project. However, one notable absence from the gathering was Walter Gilbert, who recently resigned from the committee in order to pursue his plans to establish a private company, Genome Corporation, that would push ahead rapidly with both mapping and sequencing. Gilbert, who is at Harvard and was for a time chairman of Biogen, hopes to combine this joint experience in a venture that would, he said, be selling genetic information.

Gilbert's departure from the NAS committee has, for many people involved, produced a more balanced approach to the committee's stated objectives, in which a complete sequence of the genome's 3 billion bases is described as "a subsidiary goal." For more than a year Gilbert has been attempting to raise private funds to establish what he termed the "Human Genome Institute," whose activities would include development of new technologies but would be aimed at both mapping and sequencing in the short term. He plans to have a physical map within a year of start-up and major regions sequenced within 3 years.

These figures caused raised eyebrows at the Academy's gathering, being considered to be rather optimistic. By contrast, the committee was talking in terms of a genetic map (which is related to the physical map) being produced over a period of 5 years, and at a cost of $100 million. And major forays into sequencing are thought best delayed until faster and cheaper methods have been developed.

As the technical debate is being honed, so too is political sensitivity, both in terms of potential congressional response to the project and the interagency tensions that are developing over how funding for the various components of the project might be organized. James Wyngaarden, director of the National Institutes of Health (NIH), told the NAS committee that during hearings on the institute's current budget proposals, positive comments are already being made about the scope of the human genome project, both in terms of benefits and costs. And Robert Cook-Deegan, who is heading an Office of Technology Assessment report on the genome project, said that some congressmen are interested in the project as a potential boost to American competitiveness in biotechnology.

Biologists can be encouraged by these sentiments, said Cook-Deegan, but, he warned, the process of going to Congress with major initiatives in science is extremely unpredictable, no matter how meritorious the project may be. A great fear, repeatedly expressed, is that Congress will warmly embrace the proposal but will not appropriate sufficient new funds to cover it: funding agencies, particularly NIH, might then be left with no political option but to squeeze existing projects to pay for genome mapping and sequencing. Nevertheless, it is not at all clear that sufficient enthusiasm has yet been engendered in Congress to ensure successful passage for a human genome proposal, quite apart from the vagaries of the system.

A second fear, expressed strongly by David Botstein of the Massachusetts Institute of Technology, and James Watson of Cold Spring Harbor Laboratory, concerns the quality of the work that might be funded. Specifically, although participants said that they were comfortable with the peer-review system that operates f... NIH research grants, they were less sanguine about quality control for work fun... ed by the Department of Energy (DOE) and carried out in its laboratories. The DOE, although it is the chief instigator of the current genome project and has a... ready committed considerable funds to it, is seen by some members of the biolo... cal community as having strayed into their territory. Tensions over academic sta... dards will therefore add to the already established turf battles between the two ... jor agencies. If, as seems likely, the genome project does proceed as some kind ... coordinated, interagency venture, then the disparity in the different systems tha... in place at NIH and DOE for assessing research proposals and research contra... will probably be modified. ■ ROGER LEWIN this explanation would suggest at a minimum that industries are supporting faculty who are very important to their parent institutions.

In this respect, it is interesting to note that faculty involved in UIRR's seem capable of commercial as well as academic productivity. This lends support to the anecdotal observation that individuals who are highly successful in one dimension, such as scholarship, seem also to be capable of success in rather different dimensions, such as the production of intellectual property with potential commercial value. It should prove reassuring to universities that the commercial accomplishments of faculty involved in UIRR's do not seem to diminish their commitments to publication, teaching, or other forms of service to the university or scientific community, at least by the measures employed in our survey. This finding is consistent with other research showing that faculty who consult to outside agencies do not show diminished productivity in their university roles (*11*).

Another possible explanation for the observed productivity of faculty involved in UIRR's is that industrial support enhances their performance along some or all of the dimensions we examined. It would seem perfectly plausible that contact with industrial sponsors, even through agreements that support basic research, would increase the commercial productivity and the earnings of university faculty. Less obvious, but equally plausible, is the possibility that UIRR's could increase the scholarly productivity of faculty, either through adding to their research support, or through exposing them to new perspectives on their work. A considerable body of scholarly work suggests that interaction between scientists doing applied and basic research may enhance the work of both groups (*12, 13*).

A critical question, of course, is whether these apparent benefits of UIRR's in biotechnology for universities and their faculties are associated with any risks to traditional university values or practices. Our data strongly suggest that such risks exist.

One of the most important is an apparent tendency toward increased secrecy among faculty supported by industries. Other risks include an apparent tendency, worrisome to the great majority of respondents, for UIRR's to shift university research in more applied directions and the frequency with which industries seem to place restrictions on publication beyond requiring simply that they be allowed to review papers prior to submission. In previous work, we also reported that students and fellows supported by industry funds often face obligations to work on projects identified by industry, or to work for industries when their training is completed—conditions not imposed by governmental sponsors (*1*).

In some respects, however, even our findings concerning the risks of UIRR's in biotechnology are reassuring. Only a tiny minority of biotechnology faculty in our sample report that they hold equity in companies supporting their university research. Some observers may even find reassuring the frequency with which faculty report that they are concerned about the risks posed by industrial support of biotechnology research. These figures offer some evidence that, at least at current levels of involvement with industry, faculty remain sensitive and committed to traditional university values and practices. Although not a guarantee against erosion of these values, such faculty attitudes may indicate that they retain a capacity to police their own relationships with industrial sponsors. Those whose major interest is the field of biotechnology may also find it reassuring that biotechnology faculty are still much less likely than chemists and engineers to have connections with industry, though this, of course, may change over time.

In assessing the risks of UIRR's, however, the limits of our study should be kept in mind. Because faculty may have been unwilling to report certain behavior, we may have underestimated the prevalence of certain worrisome situations. Our quantitative measures of faculty productivity could have missed important qualitative effects of industrial support on their work. A survey of faculty inevitably fails to explore adequately the full effects of UIRR's on students. Such effects remain to be explored more thoroughly.

Table 4. Risks reported by biotechnology faculty.

Question	"To some extent or to great extent" (%)	
	Industry support	No industry support
To what extent does industry research support pose the risk of		
Shifting too much emphasis to applied research	70	78*
Creating pressures for faculty to spend too much time on commercial activities	68	82†
Undermining intellectual exchange and cooperative activities within departments	44	68†
Creating conflict between faculty who support and oppose such activities	43	61†
Creating unreasonable delays in the publication of new findings	40	53†
Reducing the supply of talented university teachers	40	51*
Altering standards for promotion or tenure	27	41†

*Significantly different from faculty with industry support ($P < 0.05$); †Significantly different from faculty with industry support ($P < 0.01$).

In addition, even the small probability of certain devastating occurrences is sufficient to engender caution. Of greatest concern may be Krimsky's (*14*) suggestion that UIRR's, precisely because they involve very talented and productive faculty, could threaten the collective judgment or ethics of scientists in a field of research. The worry here is that researchers with industrial support or other types of involvement in commercial enterprises may be influenced by their personal financial interests in judging the merits of proposals submitted for peer review to funding agencies or in commenting on public policy problems. Another related concern is that junior faculty without commercial involvements may be reluctant to speak out on certain policy issues because they fear displeasing senior faculty whose financial interests might be adversely affected.

Another difficulty in comparing the benefits and risks of UIRR's in biotechnology or other fields is that the long-run implications of current findings are hard to estimate. Furthermore, the trade-off depends on how society values the various consequences of UIRR's. Any losses to science or to university values that result from marginal increases in the level of secrecy in universities may be more than offset by net additions to knowledge that result from the infusion of industry funds into the labs of talented faculty. Marginal shifts in the direction of university work toward more applied and commercially relevant projects may have benefits for human health and economic growth that far outweigh the risks to scientific progress. In the long run, the continued well-being of universities and university science depends importantly on the health of our economy and on public perception that supporting university research contributes directly to practical results.

Though much remains to be learned, our data at least suggest some ways in which universities and government can reduce any risks that industrial support poses for involved academic institutions. First, universities should carefully monitor their relationships with biotechnology companies. Universities may want to make clear to faculty and companies that they are opposed to the protection of trade secrets resulting from industrially supported research and that the right to publish research results (with modest delays for companies to file patents) must be protected. Past research has also

IT'S TIME EUROPEAN
WERE GIVEN A LESSON

participate in time-consuming chores, such as consulting, that will compete with university activities.

To assess whether such shifts in behavior are occurring among biotechnology faculty who are involved in UIRR's, we asked respondents to tell us how many articles they had published in refereed journals during the last 3 years, how many hours of contact they had weekly (including laboratory supervision) with students or postdoctoral fellows, and whether they had served in any of several professional roles within or outside the university in the last 3 years (*7*).

Compared with colleagues doing biotechnology research, faculty receiving industry support in biotechnology reported significantly more publications and involvements with other professional activities but no statistically significant differences in teaching time (Table 2). However, such simple comparisons of faculty with and without industry support could be misleading. In order to be classified as receiving industry support, faculty in our sample had to be principal investigators on at least one industrial grant or contract. In contrast, the group without industry support includes some faculty who are not PI's on projects of any sort and may be less senior than or differ in other ways from principal investigators on industry projects.

To correct for such confounding effects, we performed multivariate analyses that examined the association between key faculty behaviors and industry support while controlling for the faculty member's academic rank, the number of years since completing his or her highest degree, the faculty member's total research budget from all sources, his or her involvement in consulting or other relationships with industry, and a variety of other characteristics of faculty and the universities in which they work. In taking account of sample faculties' research budgets from all sources, we effectively controlled for whether they were PI's on at least one externally funded grant or contract. Because of the way our questionnaire was constructed, faculty could report receiving research funds only for projects on which they were PI's. These multivariate analyses confirmed the significance and direction of the associations reported in Table 2.

It is possible that faculty with industry funds are publishing less than they did before they began receiving industry support, even though they still compare favorably along this dimension with faculty not participating in UIRR's. To examine this possibility, we asked faculty how many papers they had published in refereed journals during their professional careers and then compared their publication rates for an average 3-year period with their reported rates during the last 3 years (*8*). As Table 2 shows, biotechnology faculty with and without industry support reported publishing more in the last 3 years than they did during an average 3-year period. Faculty with industry support reported a greater increment in their publications than did other faculty. However, the difference was not statistically significant ($P = 0.14$), a finding confirmed in multivariate analysis.

Faculty who receive a large proportion of their research support from industry, or combine such heavy support with other types of industrial relationships, may be more affected by industrial support of university research than faculty with lesser levels of involvement with industry. To see whether this might be the case, we examined the reported behavior of several subgroups of biotechnology respondents: faculty who received more than 50% of their biotechnology research support from industry; faculty who received more than 50% of their research support from industry and also added at least 20% to their base salary from consulting to a for-profit company; faculty with more than 50% of their support from UIRR's who also consulted exclusively for one biotechnology company; faculty who received more than 80% of their research support from industry; and a series of other combinations of characteristics that might

Table 2. Selected measures of behavior among biotechnology faculty. Publications refers to publications in refereed journals during the previous 3 years. Teaching time refers to the average number of hours of contact per week with graduate students or postdoctoral fellows. Activities refers to the number of activities in universities or professional roles (university administration, professional journals, and officer in professional association). Publication trends refers to the difference between the number of refereed publications during last 3 years and number of publications for an average 3-year period during a faculty member's career.

Status	Publications	Teaching time	Activities	Publication trends
No industry support	11.3*	20.3	1.1*	2.2
Industry support	14.6*	22.2	1.4*	3.3

*Differences were statistically significant ($P < 0.05$).

signal heavy involvement with industry. Controlling for other factors, these heavily involved groups reported publication rates, hours of student or postdoctoral contact, and involvements in other professional activities that did not differ significantly from (and in some cases exceeded) those of other faculty.

The measures used here to assess the relation between faculty behavior and industrial support of their research have obvious limitations. Simple figures on publication rates and teaching time could have missed differences in the quality or nature of publications or teaching among biotechnology faculty with and without industrial support. By lumping classroom teaching together with laboratory supervision, we could have missed differences in the way faculty with and without industry funds distribute their time among these very different types of educational activities. Nevertheless, the findings should on balance prove reassuring to the university community. Certainly, our data on selected indicators provide no evidence that industrial support of faculty research in biotechnology is associated with decreased faculty productivity. If anything, the opposite seems the case.

Commercial productivity among faculty. One of the possible benefits of UIRR's in biotechnology and other fields is that they may encourage faculty to commercialize their research findings more readily than faculty without industrial research support. Such a tendency could result in greater income for the university and benefits to society through increasing the rate at which research results are transferred into practical application.

To examine this hypothesis, we asked biotechnology faculty in our sample whether their university research had resulted in any patent applications, patents, or trade secrets. Faculty with industry support were more than twice as likely (37 versus 17%, $P < 0.001$) as faculty without such support to answer affirmatively.

These data do not establish that industrial support actually increased the commercial productivity of faculty. It may be that industry successfully seeks out faculty whose work seems likely to have commercial application. However, faculty seem to feel that industrial support is helpful in producing commercially useful results from their research. Among biotechnology faculty participating in UIRR's who reported patent applications, patents, or trade secrets, 48% said that industry support had contributed significantly to the work that led to these commercialization efforts. When asked about the benefits of industrial support of university research, a majority of faculty with and without industry research funds agreed that UIRR's increase the rate of applications from basic research to some extent or a great extent (Table 3).

Involvement in UIRR's may also offer faculty opportunities to increase their personal income through royalties from licensed patents, consulting to industry, and other means. Such additional earnings may reduce pressures on universities to increase faculty

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THE PEUGEOT 505 STX V6.

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University-Industry Research Relationships in Biotechnology: Implications for the University

DAVID BLUMENTHAL, MICHAEL GLUCK, KAREN SEASHORE LOUIS, MICHAEL A. STOTO, DAVID WISE

The growth of university-industry research relationships in biotechnology has raised questions concerning their effects, both positive and negative, on universities. A survey of over 1200 faculty members at 40 major universities in the United States reveals that biotechnology researchers with industrial support publish at higher rates, patent more frequently, participate in more administrative and professional activities and earn more than colleagues without such support. At the same time, faculty with industry funds are much more likely than other biotechnology faculty to report that their research has resulted in trade secrets and that commercial considerations have influenced their choice of research projects. Although the data do not establish a causal connection between industrial support and these faculty behaviors, our findings strongly suggest that university-industry research relationships have both benefits and risks for academic institutions. The challenge for universities is to find ways to manage these relationships that will preserve the benefits while minimizing the risks.

UNIVERSITY-INDUSTRY RESEARCH RELATIONSHIPS (UIRR's) in biotechnology have grown increasingly important for both industries and universities in the United States. Recent research indicates that nearly half the firms conducting or supporting research in biotechnology are involved in UIRR's. Their funds may account for 16 to 24% of all external support for university research in biotechnology (*1*).

The growth of UIRR's in biotechnology and other fields, however, has raised critical questions concerning their effects on institutions of higher education. Do such relationships affect the scholarly or commercial productivity of university faculty? Do UIRR's influence the commitment of faculty members to teaching or their participation in the time-consuming, sometimes tedious administrative activities so essential to the health of universities or a field of science? Do industrial research relationships encourage secrecy among scientists, disrupt relationships among scientific colleagues, or lead faculty to shift the direction of their research toward applied or commercially oriented projects?

From a survey of over 1200 faculty members in 40 of the most research-intensive U.S. universities, we report on the effect of UIRR's on faculty whose work involves the "new biotechnologies" (*2*). These fields include recombinant DNA technology, monoclonal antibody techniques, gene synthesis, gene sequencing, cell and tissue culture techniques, large-scale fermentation, and enzymology. The expansion of UIRR's in these scientific fields has been especially dramatic in recent years. UIRR's in the new biotechnologies, therefore, provide an intriguing case study for exploring both the potential risks and the potential benefits of UIRR's generally for academic institutions.

Study Design

The analysis presented here is based on a survey of university faculty conducted in the winter of 1985. A sample of 1997 faculty was selected in a two-step process. First, we selected 40 universities from among the 50 schools that receive the largest amounts of federal research funds in the United States (*3*).

Second, for those 40 universities, we developed a list of 3180 life science faculty members (instructors, lecturers, assistant professors, associate professors, and full professors) included in published catalogs as members of the departments of biochemistry, molecular biology, genetics, microbiology, biology, cellular biology, or botany (*4*). We selected these departments because we judged them to be most likely to contain faculty conducting research involving the new biotechnologies. From this list, we randomly selected 1594 individuals. A comparison group of 403 nonlife scientists was drawn from a list of 1211 faculty in departments of chemistry and engineering from the same institutions. We sought such a comparison group in order to assess the relative prevalence of UIRR's in biotechnology and in other fields known to have a long history of involvement with industry.

Each of the 1997 faculty in our sample was mailed an eight-page questionnaire dealing primarily with his or her research activities and involvement with industry. If the questionnaire was not returned within 3 weeks, a second mailing was sent. One hundred fifty-six respondents were ineligible (deceased, retired, no longer associated with the university, or incorrectly reported as a faculty member in the catalog). Of eligible respondents, 69% (993) in the life sciences and 65% (245) in chemistry and engineering returned completed questionnaires. Table 1 summarizes pertinent characteristics of respondents.

Among life science respondents, 800 of 993 (81%) did research involving the new biotechnologies. In the body of the article, we refer to these respondents as "biotechnology" faculty and to the remaining 193 life science respondents as "other life science" faculty. Unless otherwise indicated, our analyses concern respondents in our biotechnology group. In comparing groups within our sample, we

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BY WALTER KIECHEL III

HOW TO GIVE A SPEECH

You should come across like your own sweet self. This usually takes a lot of preparation.

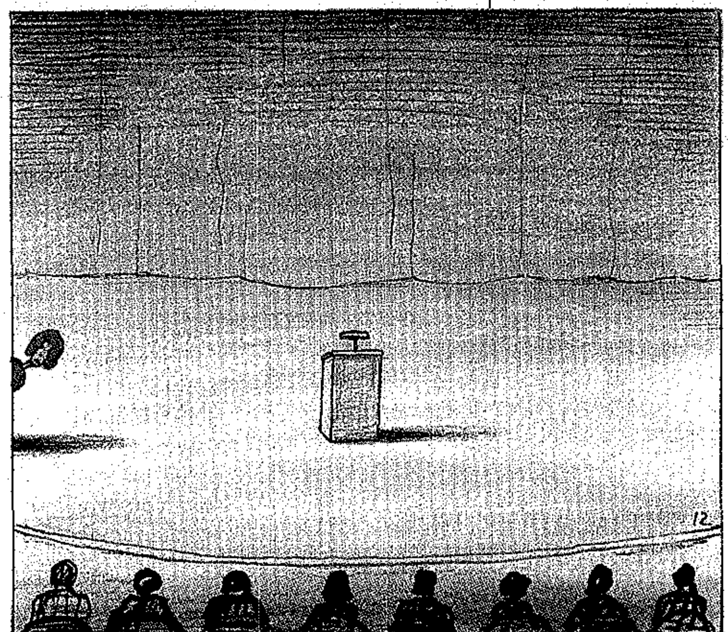
■ Looking for an easy way to reduce even a strong, self-confident manager to a nail-biting mass of insecurities? Just ask him to give a speech to an unfamiliar audience. If he can't get out of accepting, he'll probably devote several sweaty hours to writing out his remarks or, if he is senior enough, delegate the awful task of composition to some underling. When the hour of execution arrives, he will stride manfully to the podium, assume a quasi-fetal stance, and proceed to read his text word by droning word. Not for nothing does pop research indicate that the average American fears speaking before a group more than he fears death. As Paul Nelson, dean of Ohio University's college of communication, observes, "Death is faster."

Choose life, even if it means working to become a better speaker. Why don't more managers take up the challenge? "Most businessmen are worried that they're going to come across like someone else," argues Charles Windhorst, co-founder of Communispond. It's a firm that teaches executives that the trick in fact is to have all the mechanical stuff down so pat that the authentic, worth-listening-to you comes through undistorted. Learn the basics and get out of your own way.

The basics begin when you're invited to speak. While the folks asking may have a foggy idea of what they want you to talk on, their none-too-clear guidelines probably leave you ample room to set your own topic. Don't be in a hurry here. First, the experts universally advise, you should find out as much as you can about your audience.

Who are these people—what age, sex, and line of work—and why will they be assembled? If they're mostly women, you will want to use more examples that feature you know whom. Are they coming to hear you more or less voluntarily, or is their attendance required? Captive audiences are harder to grab. When are you supposed to talk to them? If it's right after a meal or at the end of the day, expect Coma City; leading off in the morning often means that you'll lose 15 minutes to your hosts' unavailing attempts to start on time. Maybe most important, why do they want to hear from *you*, of all people?

Much of this dope you can get by grilling the person who had the temerity to invite you. For the ultimate in analysis, though, nothing beats spending a little time with your prospective audience. Robert Waterman Jr., whose co-authorship of *In Search of Excellence* propelled him into big-time speakerdom, finds that if he's to exhort some company's troops, for example, it helps a lot to poke around the corporation for a day or so beforehand talking to everybody he can. He can then address their specific concerns.



ILLUSTRATIONS BY MARC ROSENTHAL

Pop research indicates that the average American fears speaking before a group more than he fears death.

Once you have a feel for your audience, consult your mental inventory of what interests you these days. Not just what you know or can amass facts on, but what you care about. Dale Carnegie said it 70 years ago, and the experts are still saying it: If you're not excited about your subject, you won't be able to excite your audience about it either. To find your topic, look for where your concerns intersect with their wants and needs. Decide on your purpose—whether to inform, persuade, or entertain. Then give your impending address what Max Wortman, a management professor at the University of Tennessee and a popular speaker, calls a "schmaltzy" title. Not "Current Realities and Future Trends in the Brake Shoe Industry";

Germany's 75 Years of Free Enterprise Science

The Max-Planck-Society has celebrated its 75th birthday with its third Nobel Prize in 3 years and bright prospects, but tensions remain over its relationship to German universities

Munich

THE core idea of the modern research university—that teaching and research thrive best if carried out in close proximity—was conceived by the German scientist Wilhelm von Humboldt in the early 19th century. It is therefore ironic that Germany's foremost organization for the support of basic research, the Max-Planck-Society (MPG), was created deliberately to free scientists from the heavy burden of teaching and administration that the pursuit of Humboldt's ideals had imposed on universities.

Currently celebrating its 75th birthday, the Max Planck's network of independent research institutes remains the envy of scientists throughout the world. Although the society has been contending with serious budget difficulties and tensions in its relations with German universities in recent years, it enjoys what research institutions in few other countries have been able to achieve: substantial public funding with almost complete scientific and administrative autonomy.

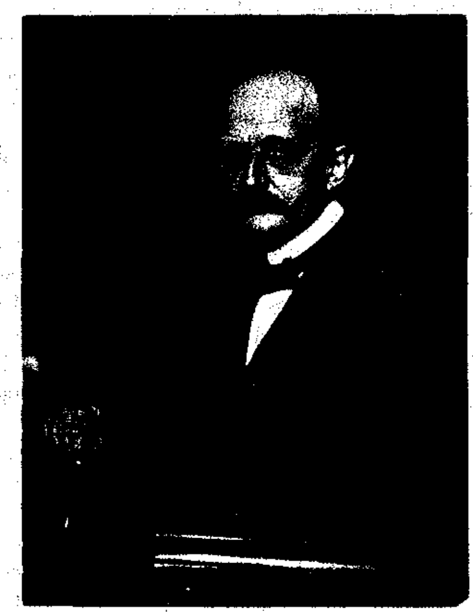
The society's scientific reputation was reconfirmed last month by the award of the Nobel Prize in physics—shared with Gerd Binnig and Heinrich Rohrer of IBM—to Ernst Ruska, the 79-year-old inventor of the electron microscope and formerly the director of MPG's Fritz-Haber-Institute in Berlin. Ruska is the MPG's 23rd Nobel prizewinner since its foundation, and the third in three successive years.

The publicity that has surrounded both this string of successes and the current birthday celebrations will, it is hoped, help break a funding deadlock that has held the Max-Planck-Society's budget constant at about $500 million a year for more than a decade. At the beginning of October, the länder (state) governments, which provide almost half the public financing, agreed to support a real budget increase of 3.5% next year. However, the MPG had been hoping for an increase of 5%, as well as an additional $10 million over the next 5 years for scientific equipment.

The Max-Planck-Society did not get its present name (suggested by British scientist Sir Henry Dale) until 1948. It began in Berlin in 1911 as the Kaiser-Wilhelm-Gesellschaft, and originated from a joint proposal by a group of scientists and industrialists who argued that advanced research was sufficiently important to receive public funding but to remain separate from the constraints of the university world.

Despite the many changes that have taken place in the world of science over the past 75 years, the philosophy of the Max-Planck-Society is largely unchanged. As a result, it remains an essentially elitist and conservative (some even use the word "feudal") organization, wedded to the idea that a nation's industry can prosper through the careful nurturing of basic science, but run with the traditional German emphasis on organizational efficiency and discipline.

The scientific activities of its 60 research institutes and project groups cover topics from nuclear physics through molecular genetics and coal research to the study of patent law. In size, they range from the 1000 scientists and technicians employed in the Max Planck Institute for Plasma Physics at Garching near Munich, to others—such as the new mathematics institute in Bonn—with no more than a dozen people on the staff.



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Max Planck. *Presided over the Kaiser-Wilhelm-Gesellschaft in the 1930's and immediately after World War II. The organization was named after him in 1948.*

Whatever an institute's size, its scientific autonomy is jealously guarded. The 200 scientific directors who are responsible for the individual research programs are each carefully selected. Once appointed, however, they are free to appoint their own staff and choose their own research topics. But they have to rejustify their support every 7 years.

Accountability is primarily scientific. Each institute is regularly scrutinized by an international team of visiting scientists, who report directly to the Max-Planck-Society president. The reports perform a double function, not merely checking on the quality of the work being performed, but also, says one administrator, "making us trustworthy on the political scene."

According to the current president, chemist Heinz Staab of the Max Planck Institute for Medical Research in Heidelberg, this independence has been made possible because the society's support has always come from two separate sources, each of which has tended to neutralize the influence of the other, leaving the MPG free to determine its own policies.

"There has always been a balance of power," says Staab. Initially it was between government and private sponsorship; now it is between the federal and state governments. "The research has never been dependent on just one of these groups," he adds.

In addition, Max Planck scientists work in an environment that reflects what one official describes as the "higher bourgeois" values of the early years of the century. This means, for example, that there has never been much reluctance to engage in research of explicit value to the private sector (provided individual topics remain set by the scientists themselves).

At the same time, it also means that there has been a conscious effort to isolate the content of research from political debates. During World War II, this led to some murky dealings with the Nazi regime, which later prompted the United States to propose that all the research institutes be disbanded (they were saved after intervention by the British).

In principle, however, the result has been to create a protected system of free enterprise science that is unique in the industrialized world. Scientists with a proven track record are provided considerable flexibility and freedom to innovate. "It is very effi-

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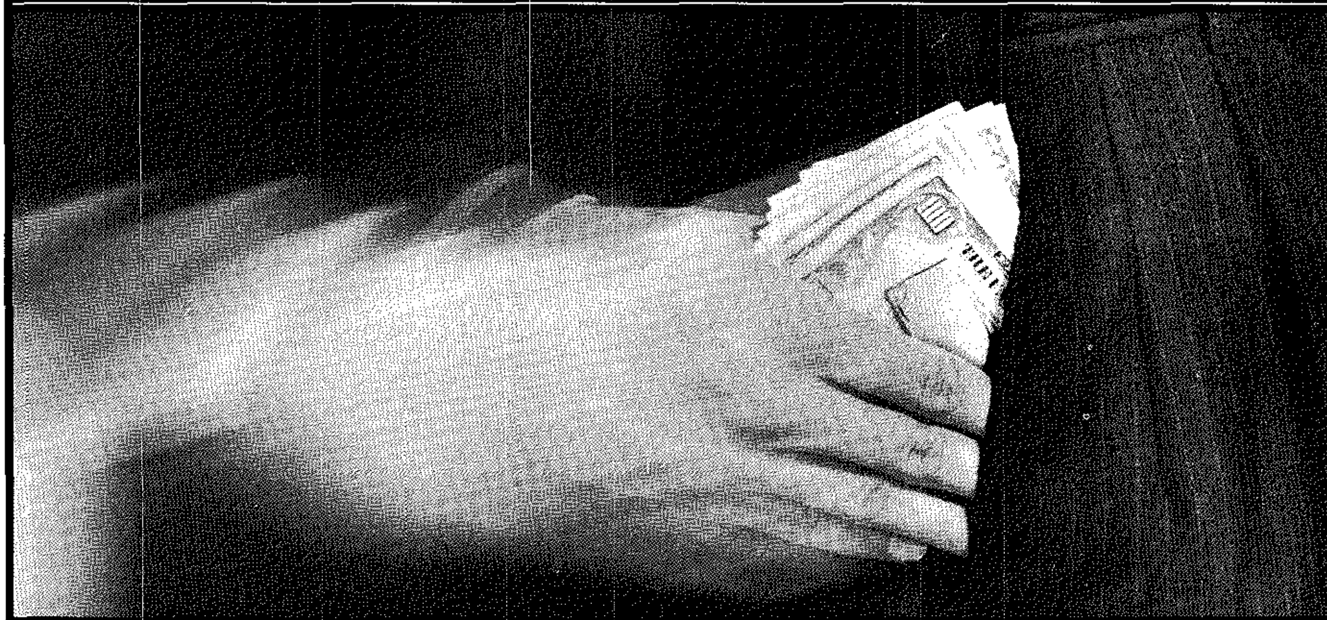

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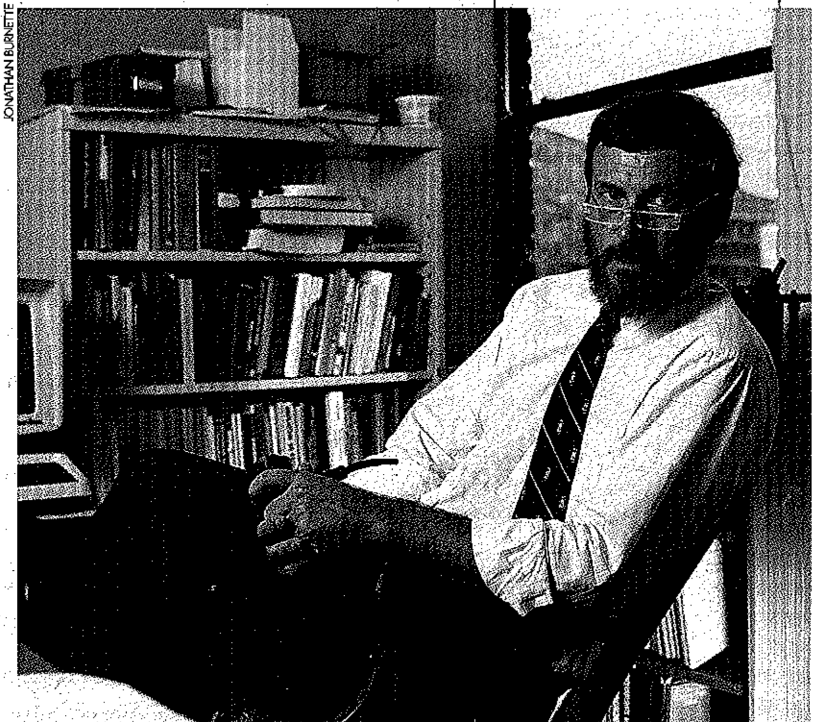
BY COTTON MATHER LINDSAY

HOW NOT TO CONTROL MEDICAL COSTS

Trying to keep patients from seeing specialists only pads the bill and undermines quality.



JONATHAN BURNETTE

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■ For three decades now, thanks to insurance and Medicare, consumers have paid relatively little out of their own pockets for medical services. Lacking compelling reasons to trade off costs against benefits, they naturally have demanded ever-increasing quantities of care. Just as naturally, the suppliers of health care—doctors, hospitals, laboratories, and so forth—have expanded their services, both to compete for business and because payment was a sure thing. Thus our health care system has encouraged "overservicing," a main cause of the upward spiral in health care costs.

Health maintenance organizations—HMOs—and other prepayment plans were supposed to solve the problem. Since HMOs receive a flat fee in advance, they have an incentive to control costs. But prepayment plans do nothing to constrain demand for care. Once a consumer enrolls in an HMO, he is free, in theory at least, to use as many services as he wants.

To solve that part of the equation, HMOs have turned to "gatekeeping." The idea is deceptively simple: Gatekeepers propose to reduce costs by making sure patients use the least expensive types of services. The gatekeeper, the first person to examine a prospective patient, has a dual function: to keep those who don't need special treatment from wasting the time of specialists, and to guide those who do need such treatment to the appropriate specialist.

Proponents of gatekeeping argue that it controls runaway demand without harming the quality of care. I believe their stand is based on several false assumptions or myths. In fact, gatekeeping may increase the costs of health care, and it poses a serious threat to patients.

Let's examine the myths first, then their consequences.

▶ **Myth 1: Gatekeeping ensures efficient medical care.** Gatekeepers, usually general practitoners or internists, are not efficient when they become middlemen, referring the patient to another physician. Referrals increase costs directly, by requiring another visit to a doctor, and indirectly, by delaying diagnosis of conditions that become more expensive to treat the longer they go untreated.

Nor are gatekeepers necessarily efficient when they themselves treat patients. The fans of gatekeeping assume that a generalist's fees will be lower than a specialist's, but that's not always true. Cardiologists and neurosurgeons often charge more for an office visit than generalists do; pediatricians, dermatologists, and orthopedic surgeons often charge less.

Fees for office visits aren't the only costs of treatment. Consider a 1983 Emory University study that compared how dermatologists and family practitioners would manage treatment of ten different skin diseases. Compared with the generalists, the specialists ordered tests that cost only half as much, and they would have required patients to return less often for treatment. While the specialists wrote more prescriptions, the total cost of medication wasn't much higher. Taking everything into account, the dermatologists would have provided care for 10% *less* cost than the family practitioners.