federal expenditure are being heavily pruned. Mathematics, in particular, will be given a generous boost, and the social sciences, which have been targeted for severe cutbacks in previous years by the Reagan Administration, will be given a modest increase, according to several sources. Knapp, who was nominated toward the end of the budget process, will be able to take some of the credit for the increases.

Nevertheless, the reaction to the resignations among scientists is sure to be negative, because in the past NSF has been considered immune to such changes. Branscomb, for example, says, "It is very unfortunate that in the year the President has apparently given high priority to NSF, he should send a confusing message by this set of personnel decisions."

Congress made the deputy and assistant directorships at NSF presidential appointments in order to give them visibility and status. Presidential appointments are usually political, however, and NSF is now finding that out.—**COLIN NORMAN**

German Firms Move into Biotechnology

Chemical giants are increasing their domestic support for basic research in molecular genetics—but will universities be left out in the cold?

Berlin. One hundred years ago, the German chemical industry invented the blueprint for the modern research university, at the time a unique mechanism for linking basic science to the worlds of manufacturing and commerce. Today, the same industry is once again designing new bridges to the academic community, spurred by the need to catch up with Japan and the United States in the rapidly expanding field of biotechnology. This time, however, universities are having to struggle hard to stay in the game.

In many ways, chemical giants such as BASF, Hoechst, and Bayer—three of the four largest chemical companies in the world—are adopting strategies identical to those pioneered by comparable manufacturers in the United States. On both sides of the Atlantic, company executives have agreed increasingly to sponsor the work of basic scientists; their common aim is not merely to obtain ideas for new products and processes, but to train their own staff in new research techniques and to provide a broad window on the markets of the future for themselves and their competitors.

There are, however, two major differences between Germany and the United States. One is that, given the virtual nonexistence of risk capital to grease the wheels, and an apparent aversion among many German scientists to the type of scientific entrepreneurship found in the United States, cooperation between the academic community and industry is being heavily primed by public funds. The other difference is that both funding constraints and political controls have made German universities increasingly unattractive to industry as research partners. This is among the reasons given by executives from Hoechst, for example, for creating a new department of molecular biology at the Massachusetts General Hospital in Boston 2 years ago, a decision still widely criticized by many German scientists who feel the money should—and could—have been spent domestically.

The Academic-Industrial Complex

This is the sixth in a series of occasional articles about the emerging relationships between industry and universities.

Illustrating both trends is a plan recently announced by the Berlin-based pharmaceutical company Schering AG to establish a new institute for research into genetic engineering (*Gentechnologie*) jointly with the city of Berlin. The budget of the new institute will be 80 million marks ($33 million) over the next 10 years, half coming from each partner, and the institute will employ a staff of about 30 scientists. Although the director will have a chair at one of the two Berlin universities, the institute itself will remain entirely separate in both funding and administration.

The federal government is keen to help build stronger bridges between public and private research institutions as part of a broad effort to promote basic research in biotechnology (see box). So far, however, it is proving difficult to forge links between industry and the universities. These difficulties stem less from antagonism toward the principle of building links with industry (many universities would currently welcome a new source of research funding) than from the more pragmatic problems of sustaining an active university-based research community in the current political and economic environment.

Many universities are suffering delayed consequences of the forced growth of recent decades. In the 1960's and 1970's, the German university system expanded dramatically to meet rapidly growing demands for higher education; at the time there was sufficient support from both state and federal governments, not only to sustain this growth but also to maintain a stable balance between teaching and research.

The situation has now changed. Student numbers continue to grow, fanned by the bleak job prospects facing those who leave school. But state governments, from which the universities receive their basic funding, are now demanding stringent cuts in university budgets to meet a period of economic austerity—in some science departments by up to 30 percent. Legally required to continue meeting teaching commitments, many universities are inevitably having to make cuts in their research activities, while inadequate funding for both staff and equipment has undermined the effectiveness of those activities that are being continued.

On top of this, university administrators are faced with the multiple legal requirements that have arisen from other social reforms introduced in the past few years, such as the limited number of times research staff can be employed on short-term contracts before they must be given a full-time position. Such changes have substantially improved the position of researchers; but they have also made universities nervous about accepting too many outside research contracts. After several years of battles over the reforms, however, the last of which were introduced by the federal government in the late 1970's, no one seems to want to negotiate a new round of changes in university regulations.

As a result, many companies interested in sponsoring basic research have

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been tempted to concentrate their funding outside the university sector. The separation of teaching from research is a strong tradition in Germany, in particular through the work of the publicly funded—but administratively independent—German Research Association and Max Planck Institutes (see box). In the postwar period, such research activities have frequently been isolated from the industrial sector; it is precisely this gap that, in areas such as biotechnology, is now being closed.

The Schering/Berlin plan for a jointly funded research institute is one model that could become more popular in the future. The institute represents the convergence of two lines of thought. Like Hoechst, Bayer, and BASF, Schering has concluded after a decade of tentative investigation that it needs greater access to the basic science community, particularly in the field of molecular genetics; at the same time the Berlin Senate has decided to provide funds to boost the growth of new-technology industries—such as biotechnology—which it sees as the key to the city's future prosperity.

According to Schering director Herbert Asmis, the institute will carry out research in the field of cell biology as a way "to overcome the current research lag behind other countries." There will be three research areas—microbiology, biochemistry, and molecular biology—and institute scientists will be free to develop their own projects. However, there is expected to be a constant dialogue with Schering scientists and executives, and the company will conduct complementary, product-oriented research in its own laboratories. Schering will have first rights to any useful results from the research, although the company emphasizes that it will pay the institute for the use of these results as it would any other research institute.

For the city of Berlin, the new institute

. . . With Help from the German Government

Increased efforts to link chemical and pharmaceutical manufacturers directly to the basic research community is one of the central planks of a new program for boosting German biotechnology announced in September by the Bundesministerium für Forschung und Technologie (the Federal Ministry for Research and Technology). In general, the Federal Ministry is not responsible for funding basic research, since this is supported primarily by federal and state governments through the Deutsche Forschungsgemeinschaft (DFG) and the Max-Planck-Gesellschaft (MPG); however, it is permitted to sponsor research felt to be in the long-term interests of particular industrial sectors. Molecular genetics has been identified as such a field.

Presenting plans for increasing spending by the Federal Ministry on Biotechnology from $35 million in 1982—already an increase of 34 percent over 1981—to $53 million by 1986, then Research Minister Andreas von Bülow stressed his satisfaction that major chemical companies, which in several cases besides Hoechst have provided money to U.S. research teams, were also beginning to do the same in Germany.

He listed ways in which the Federal Ministry intends to boost links between public and private research. One is to provide increased funding for the Gesellschaft für Biotechnologische Forschung in Braunschweig (Brunswick). This was taken over from the Volkswagen Foundation in the early 1970's as a center for research into the more classical applications of biological processes to industry and is now rapidly moving—with substantial involvement from the private sector—into fields such as the production of interferon and monoclonal antibodies.

A new initiative being launched by the Federal Ministry is a plan to provide half of the funding for research projects jointly sponsored by two or more small companies—a move which, it hopes, will help to make up for the virtual nonexistence of small genetic engineering companies in Germany.

Von Bülow also announced two specific grants to basic research institutes, both of which will be combined with industry funding. One is for about $7 million over a 4-year period to the Vogelsanger Max Planck Institute for Plant Breeding Research in Cologne, and the University of Cologne, to support research especially in the area of the application of molecular genetics to plant growth.

Previously a center for classical plant breeding research, the Max Planck Institute has been rapidly moving into the new research directions in plant biology opened up by genetic engineering techniques. The extra money from the Federal Ministry will be used to support small research teams working on particular projects. In announcing the grant, von Bülow added that it will be accompanied by an additional $1.5 million from Bayer. The company's contribution will go into the general budget of the institute and will entitle it to send a number of its scientists to collaborate on specific research projects. This will give the company a presence on the frontiers of plant genetics research—a field where the time scale of any potential economic return is still highly uncertain—without the substantial investment that would be required if it were to set up its own laboratory.

A second grant is being provided by the Federal Ministry to the University of Heidelberg. This is for more than $6.5 million over a 3-year period and will be used to support research in the areas of gene regulation and immunology. This time, BASF will provide an additional $2 million over the next 5 years. Even though it has some way to go before realizing long-term plans to create a large research and training institute for molecular genetics, Heidelberg has already been more successful than some other universities in attracting outside research funds.

Besides a generalized statement of support for biotechnology, Germany's new Science and Technology Minister, Heinz Riesenhüber, has yet to announce whether he intends to make any significant changes to his predecessors's plans. However, as a materials engineer with a Ph.D. and several years of research and management experience in the chemical industry, Riesenhüber is expected to have few reservations about encouraging greater industry interest in basic research and vice versa. During a visit to Schering in Berlin last month, Riesenhüber spoke of basic research in biotechnology as an important new focal point of the government's research policy. He added that new forms of collaboration were needed to make sure that research results were promptly put to practical application.—**D.D.**

has both a pragmatic and a symbolic value. With the decline of many traditional industries (several thousand jobs were recently lost, for example, when beleaguered AEG-Telefunken decided to move some of its production facilities to Spain as part of its efforts to avoid bankruptcy) the Christian Democrats, who came to power in the Berlin Senate last year, have decided to boost the city's efforts to promote itself as a European center for high technology.

Seen as a central component to this strategy, the city Senate hopes that a prestigious research institute will help to attract world-class scientists to Berlin. The Minister for Research and Culture, Wilhelm Kewenig, talks of "bringing back to life" an old tradition—that of a close relationship between science and industry—on which the city's previous prosperity was founded. The new institute, says Kewenig, will show that Berlin is a better place for research than its current reputation suggests.

The creation of the institute has been welcomed by the city's two universities, the Free University and the Technical University. Schering and the Berlin Senate have agreed that the director of the institute will be provided with a chair at one of them (the Free University is the current favorite), which should make it easier to attract a suitably qualified candidate.

Neither university has hidden its concern, however, that the city's funding of the institute could result in a shift in support away from their own research programs. In a statement welcoming the Schering announcement, the president of the Free University, Eberhard Lämmert expressed the hope to Kewenig that the creation of the institute would not be accompanied by a reduction in the university's research budgets and that "the strengthening of the city's research potential in this area will not be illusory."

Describing the many advantages of establishing close links between the new institute and the university, Lämmert suggested in particular that appointing a university scientist as director of the institute might help ease public anxiety over whether the research is being carried out in a responsible manner.

In general, however, there seems to have been less public controversy in Germany than in the United States over the potential hazards of genetic engineering research. Three years ago, aware that excessive public opposition could undermine its efforts to stimulate the rapid growth of the biotechnology industry, the government announced plans to introduce legally based regulations, but it has since backed away. Declaring the operation of current guidelines, modeled on those of the U.S. National Institutes of Health, as both "smooth and unbureaucratic," Research Minister Andreas von Bülow told the federal Parliament in September that "a genetic engineering law is not necessary."

There is more concern within the scientific community about the disruptive potential of excessive secrecy as commercial interest grows in even the most fundamental areas of research. The tradition of "pure research" is deeply engrained in German science, and few scientists have been tempted to venture into the commercial world to set up their own companies; disturbing stories circulate rapidly about potentially corrupting practices, such as telephone requests for samples of cell cultures coming from scientists who do not reveal that they are working for a private company.

Aware of such concerns, a panel of experts convened earlier this year by the Organization for Economic Cooperation and Development concluded that "ways must be found" to avoid the risks of knowledge being lost due to trade secrecy, "even if the reduction of government funds for R & D is making increased industrial financing inevitable."

—DAVID DICKSON

FTC Seeks a Little Less Honesty

Reagan appointees complain that too much scientific truth hurts

Two Reagan Administration appointees at the Federal Trade Commission (FTC) are pressing for reforms that may sharply limit the agency's ability to stop the use of bad science in consumer advertising. The effort apparently stems from an Administration concern that the agency has gone too far in its enforcement of a requirement that advertisements have a reasonable basis in truth.

In recent years, the FTC has acted under this requirement to stop the use of flawed clinical trials, poor surveys, inexpert scientific opinions, and unrealistic product tests in the marketing of such items as over-the-counter drugs, household appliances, automobiles, and groceries. Despite the obvious public appeal of this program, James Miller III, the FTC chairman, and Timothy Muris, the director of its Bureau of Consumer Protection, believe that the agency's actions against inappropriate or biased scientific testing are often unwarranted.

Miller has proposed that Congress approve a new, narrow definition of consumer deception, designed explicitly to hamper the agency's intervention in what he describes as "marginal cases." Miller says that the following advertisements fall under this description: those that engage in extreme exaggeration, those that describe an independent—and potentially unproved—analysis, and those that distort the attributes of inexpensive products. Under his proposal, advertisements such as these would probably not attract an FTC investigation.

Muris similarly believes that the FTC has demanded too much evidence in support of advertising claims. In a recent memo to Miller, Muris said that "the Commission has flirted with the notion that many advertising claims cannot be made unless they can be substantiated beyond a reasonable doubt with sophisticated scientific data. This approach, although sometimes warranted, is inappropriate for most ad claims." Muris has proposed that the agency refine its criteria for ad substantiation, so that less evidence is required (see box).

Miller, an economist, says that he is concerned about the increasing cost of substantiating ads, which, he claims, inhibits the wide dissemination of useful consumer information. "The FTC needs to study whether the costs imposed on society of preparing substantiation reports for claims that are true exceed the benefits derived in the form of reduced fraud and deception," he said at his Senate confirmation hearing last year. Before going to the FTC, Miller served

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