must be shipped in from overseas factories. In theory, this makes them vulnerable to unpredictable events abroad, including terrorist actions.

Yet another report will be issued in April by the White House task force on military efficiency chaired by David Packard, chairman of the Hewlett-Packard electronics company. According to a staffer, the report will not deal with national security per se, but with the need for greater efficiency in the military's use of electronic parts. For this reason, the Packard report may run against the grain, in that there appears to be a clash between the desire for high efficiency and for 100 percent domestic manufacture.

The Semiconductor Industry Association, of course, has had a hand in promoting these issues. The SIA is now engaged in a multiple-front campaign against Japanese manufacturers and is looking for support wherever it can be found. Until now the chip makers have not been able to coax defense officials into declaring that the domestic chip makers should be protected for national security reasons. Now this may change. If not, says one SIA official, "We will have to do something on the Hill. No one has written the legislation yet, but we're talking about it." ■ ELIOT MARSHALL

# Gene-Splicing Debate Heats Up in Germany

*The Greens want a halt to all industrial biotechnology; the government plans to extend the scope of safety guidelines*

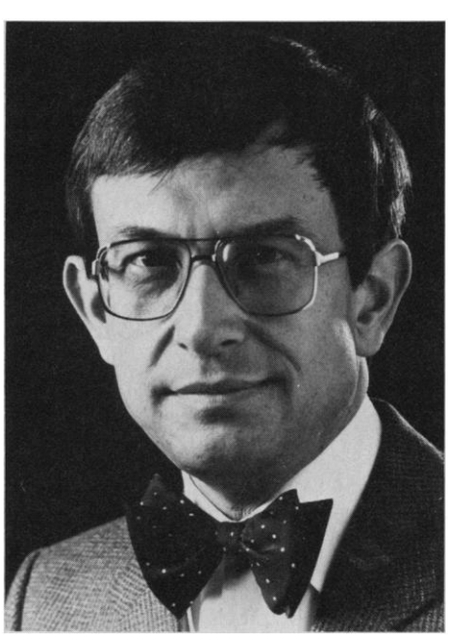
*Bonn*

GROWING public pressure has persuaded the German government to take a firmer stand than it had previously intended on the regulation of genetic engineering research. In particular, it has proposed that new regulations should be legally binding on all industrial experiments, rather than remain voluntary as they are at present.

The deputy minister for research and technology, Hans-Hilger Haunschild, announced during a debate in the German federal parliament, the Bundestag, on 12 March that a revised version of current safety guidelines will be introduced within a few weeks. Although more liberal than the current guidelines, Haunschild said their application would no longer be formally restricted to publicly funded research. The current guidelines are closely modeled on those developed by the U.S. National Institutes of Health and have remained essentially unchanged since they were introduced in 1978.

The Federal Ministry of Research and Technology had been suggesting that it intended to keep industrial compliance voluntary, following a commitment from German chemical and pharmaceutical companies engaged in the research that, even without legislation, they would follow the approved safety guidelines.

The government's change of heart has been partially prompted by the news that a small Heidelberg-based firm, Gen-Bio-Tec, had been carrying out experiments on the use of bacteria to produce blood-clotting factor without formally notifying the ministry's Committee for Biological Safety. The Gen-Bio-Tec incident was the principal trigger of a sharp attack on the government's handling of genetic engineering research during the debate in the Bundestag. The government was accused of promoting the rapid development of a new technology before adequate control procedures had been put in place. (Federal Research Minister Heinz Riesenhuber announced last June that he will provide $480 million over the next 4 years to support a wide range of research and development activities.)



**Heinz Riesenhuber**

*Developing new safety guidelines.*

Criticism came from members of the two principal opposition parties, the Social Democratic Party and the environmentalist party, the Greens. Both seem confident that rising public concern about genetic engineering will give the issue a high profile in the campaign for the federal elections at the beginning of next year.

Until recently, public debate on genetic engineering has been relatively muted in West Germany compared to the United States. The government has had little difficulty in meeting concerns about safety by adopting guidelines closely modeled on those developed by the National Institutes of Health.

According to observers here, however, three issues have now significantly increased the intensity of the discussion:

- the possible application of genetic engineering to humans, which has triggered deep-seated memories of eugenics experiments conducted by the Nazis;
- the implications for academic freedom of the growing links between German universities and large chemical companies;
- criticism from the environmentalist movement of the possible effects of the release of genetically engineered organisms into the environment.

The result has been a political debate that has focused not just on safety questions but also on wider philosophical issues. "Many people feel that they were bypassed in the early stages of the debate over nuclear energy," says Gunter Altner of the Institute for Applied Ecology in Heidelberg, which has been actively engaged in recent controversies. "Industry must come to recognize that it is legitimate to question new technological programs from both a social and an ethical point of view; otherwise the citizen only feels it possible to say no, and this can be very dangerous."

Members of Germany's scientific community have accepted the need for a debate. "The decision about how these new techniques should be applied will not be taken

by the scientists involved; we need a broader perspective, and should involve others," says Klaus Hahlbrock, acting director of the Max Planck Institute for Plant Breeding Research in Cologne. "However, we are worried by the fact that the debate tends to get very emotional."

Eighteen months ago the German Parliament, responding to a demand first put forward by the Greens, set up an all-party commission of inquiry with the ambitious charge of compiling a broad assessment of all aspects of genetic engineering and recommending what new legislation might be needed to regulate it. "We have set out to collect all the information we could about the state of basic research, and have held two public hearings to discuss the most important applications, so that we can weigh up the benefits and the costs," says the commission's chairman, Social Democrat Wolf-Michael Catenhusen.

Initially it was hoped that the commission's conclusions—due to be published by the end of the year—would represent a broad consensus that could be used as the basis for new legislation. Indeed, the government has promised that in some areas, such as the release of genetically engineered microorganisms into the environment, no decisions will be taken until the report appears.

However, the announcement that the revised research regulations will be published within the next few weeks reflects pressure that has come particularly from various commercial companies which claim that the current guidelines place them at a disadvantage compared to foreign competitors. They point, for example, to the need to obtain special permission for all large-scale fermentation experiments using more than 10 liters of culture.

***Feminist groups have claimed responsibility for two bombs that were placed outside university research laboratories.***

The new guidelines are expected to be modeled closely on those currently under discussion within the Organization for Economic Cooperation and Development, which drawn heavily on current practice in the United States.

The government clearly hopes that referring to the OECD's recommendations will help to legitimate its actions. But neither the commission's recommendations nor the government's adoption of more liberal safety guidelines is likely to still the public debate.

Some groups have already taken extreme positions. Last April, for example, a national meeting of women's groups attended by over 2000 delegates passed a strongly worded resolution condemning all "genetic engineering and reproductive technologies" as a "declaration of war against woman and nature," and describing genetic counseling as "negative eugenics." Feminist groups subsequently claimed responsibility for two bombs that were placed outside genetics research laboratories, one at the University of Heidelberg and the other at the University of Cologne.

Last month, a national convention of the Greens, held in Hagen, adopted by a large majority as official party policy a resolution expressing its opposition to all industrial uses of genetic engineering techniques. "We must be able to say no to technologies [such as genetic engineering] not merely because they are dangerous, but because we do not like the way of handling people or nature that they represent," says Erika Hickel, a member of the Greens from the Technical University of Braunschweig.

This hard-line position has been controversial, even within the party. The original resolution presented by a working party to the national convention suggested merely a moratorium on the development of genetic technologies and research into "alternative applications."

Most members of the scientific community in Germany dismiss the Greens' total rejection of genetic engineering as an excessively emotional reaction, and many have been prompted to participate in public discussions, for example to counter some of the more sensationalist charges being made in parts of the national press. "Almost all scientists involved in this field are trying to go out and give talks about their work at a very basic level" says Hahlbrock in Cologne. Some scientists have also been organizing their own meetings about the issues raised, for example on the relative merits of different research strategies in areas such as herbicide resistance.

At present, however, there is little dialogue between the scientific community and its strongest critics. The Greens, for example, are already preparing a dissenting opinion to the report of the commission of inquiry. The government is keen that regulations should not excessively impede research but, with elections coming up, also feels it necessary to respond to public sentiments. Legislation extending the safety guidelines to all genetic engineering experiments, a proposal already supported by commission chairman Catenhusen but previously resisted by Riesenhuber, may well be one of the more immediate results. ■ **DAVID DICKSON**

# President Awards Science and Technology Medals

On 12 March, President Ronald Reagan awarded the National Medal of Science to 20 U.S. researchers. He presented the National Medal of Technology to six recipients. The National Medal of Science winners are:

**Solomon J. Buchsbaum,** Bell Telephone Laboratories, Inc.; **Stanley Cohen,** Vanderbilt University; **Horace R. Crane,** University of Michigan; **Herman Feshbach,** Massachusetts Institute of Technology; **Harry B. Gray,** California Institute of Technology; **Donald A. Henderson,** Johns Hopkins University; **Robert Hofstadter,** Stanford University; **Peter D. Lax,** New York University; **Yuan Tseh Lee,** University of California, Berkeley; **Hans W. Liepmann,** California Institute of Technology; **Tung Yen Lin,** T. Y. Lin, International; **Carl S. Marvel,** University of Arizona; **Vernon B. Mountcastle,** Johns Hopkins University School of Medicine; **Bernard M. Oliver,** NASA Ames Research Center; **George E. Pallade** (emeritus), Yale University; **Herbert A. Simon,** Carnegie Mellon University; **Joan A. Steitz,** Yale University; **Frank H. Westheimer,** Harvard University; **Chen Ning Yang,** State University of New York, Stony Brook; **Antoni Zygmund,** Univerity of Chicago.

The Medal of Technology winners are:

**Bernard Gordon,** Analogic Corporation; **Reynold B. Johnson** (formerly with), IBM Corporation; **William C. Norris,** Control Data Corporation; **Frank N. Piasecki,** Piasecki Aircraft Corporation; **Stanley D. Stookey,** Corning Glass Works; **Francis VerSnyder,** United Technologies Corporation.