

INDUSTRIAL POLICY: WHERE IS BIOTECH?

State planning and private enterprise often seem contradictory in the realm of traditional American politics. Nevertheless, citizens and politicians are beginning to realize that coordination of industrial development serves everyone if the economy progresses. This explains why the issue of industrial policy is frequently being debated across the political spectrum in the U.S. Some experts from industry and government point to the desperate need for the U.S. to begin planning its economy more carefully and deliberately. While conservative opponents react negatively to the idea that government should play an overly directive role, they agree that international competition demands a concerted response.

This debate must all seem like folly to countries such as Japan, France, and to a lesser extent, the U.K. and Canada. These countries have targeted specific technologies for growth, and their governments have provided the needed capital to support R&D in these fields. Furthermore, they all include support for biotechnology in their plans.

As the U.S. begins to look toward its presidential election next year, the issue of industrial policy will heat up. It certainly promises to be a central point of divergence between the Democratic presidential candidate and Mr. Reagan. But don't be surprised if biotechnology fails to enter the debate, even while the better known high technologies enjoy increased attention. Some of the reasons for biotech's low profile in this debate are clear. Two key factors—lack of concentration of biotechnology in any single industry and a sense that biotech is relatively

remote from the product manufacturers—are partially responsible for the failure of biotechnology to find industry representatives who can promote its role in shaping industrial policy.

Technologies for robotics, microelectronics, lasers, and other new areas are linked to specific types of manufacturers, but biotechnology is too broad to be closely linked to any one industry. It also continues to suffer from lack of understanding by laymen and lack of political support by industry. Industries that use biotech see it as one of a set of key technologies on which it must depend for manufacturing new products. Because much of biotechnology is still exploratory work, its application seems to be further removed from the production or manufacturing process than is true for classical R&D projects. Since biotechnology, at least for now, causes no major labor or health problems and has not directly generated profits for most research-based corporations, why should it become an issue that corporate leaders press for political attention?

Lacking focused industrial support, how can biotechnology possibly become an object of debate in the continuing discussion of industrial policy? If the U.S. follows Japan and several European countries, and formally prioritizes different areas for industrial development, biotechnology will compete directly with other new technologies for government research funding, training programs, and incentives for commercializing research. Who will speak up for biotechnology?

—Christopher G. Edwards

CLOSING VOLUME 1 OF BIO/TECHNOLOGY WITH A WORD OF THANKS

BIO/TECHNOLOGY is very pleased to close its first volume with this December issue. A healthy circulation base and steadily increasing interest from advertisers testifies to the demand for this unique international publication. Independent surveys and conversations with our readers show that researchers have a strong interest in the corporate news and features, as well as the research papers and technical assessments. Our business-oriented readers tell us that the research we cover is relevant to their work, and that our efforts to translate research developments into easily understood language are appreciated by those who have educated themselves in the fundamentals of biotech for business purposes.

One of the great difficulties in starting and running a publication such as BIO/TECHNOLOGY is selecting the most important developments from the ever-increasing array of information generated by the biotechnology community. We strive to present exclusive reports whenever possible, always emphasizing the economic and technological impact of new discoveries and inventions.

There are two great resources available to the staff of BIO/TECHNOLOGY: our readers and our contributors

from the scientific and industrial communities. Only our readers can tell us how our publication succeeds or fails to meet their needs. The quality of the journal depends on their willingness to write or call our office to comment on the editorial content. Letters to the editor will always be considered for publication.

Our contributors have often written or rewritten their articles and papers with record speed to accommodate our policy of rapid publication. We thank each of these contributors, who are listed in the Author Index included in this issue.

We would also like to thank the reviewers, who have provided detailed, critical reviews of manuscripts, without expectation of reward beyond the opportunity to maintain the standards of good research. We especially thank the following reviewers: Sami Ahmad, W. Andersch, David Anderson, Douglas Anderson, Jean-Paul Aubert, Robert Beelman, Joan Bennett, Douglas Berg, Fred Bloom, Ross Brown, David Brusick, Benjamin Burr, Byron Butterworth, Gary Calton, Bruce Chassy, Mary-Dell Chilton, K. M. Chin, Raphine Datta, Douglas Eveleigh,

Continued on page 897

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COMING UP IN JANUARY'S ISSUE:

/ **RESEARCH PAPERS:** Novel high-level cloning vehicles; conservation of T-DNA in plants regenerated from hairy root cultures; a polypeptide fusion designed for the purification of recombinant proteins.

/ **FEATURE:** New strategies for immunization.

/ **TECHNOLOGY REPORTS:** The choice of chromatographic gel media for large scale protein purification; an analysis of the current problems surrounding the UNIDO biotechnology center. Meeting reports from around the world.

/ **NEWS:** U.S. biotech reaps federal grants; update on enzyme engineering in Japan; how the biotechnology industry is responding to lawsuits blocking commercialization; reports on an amylase which functions with stability at high temperatures; the BIO/TECHNOLOGY index of specialty firms.

EDITORIAL (Continued from page 821)

Betty Faber, Chris Flick, Robert Fraley, Stanton Gelvin, David Goeddel, Joseph Goodin, U. Hamerling, Angus Hepburn, M. Inouye, I. H. Johnston, Clarence Kado, Stanley Katz, Ted Labuza, Aat Ledebouer, Peter Lomedico, Paul Lovett, John McCullough, Ralph Messing, Bland Monteneourt, Anthony Moreira, D. Mullins, Toshio Murashige, Jack Murray, Knut Norstog, Richard Novick, John Olson, Nicole O'Neil, Marc Ostro, George Pieczenic, Otto Plescia, Carl Price, James Quigley, Gary Reineccius, M. Reuss, George Ridgeway, William Rutter, Dave Schooley, Henry Schneider, Daniela Sciaky, Vern Seligy, James Shapiro, Sharon Shoemaker, Thomas Silhavy, Robert Simpson, Martin Sonenberg, Cecil Still, Charles Stuber, Randy Swartz, Frank Szoka, Steven Tanksley, Rod Taylor, Jan Tkacz, Che-shen Tomich, Patricia Vary, Graham Walker, R. A. J. Warren, Henry Wu, and Oskar Zaborsky. ▣

COMMENTARY (Continued from page 868)

the trade-offs against price reductions consequent upon higher yields. Land released from palm growing can be turned over to other food crops, and the rate of erosion of tropical rain forest can be reduced. Second, today's "average" oil may be replaced by a range of oils for different purposes—a development serving the interests of both profitability and diversity.

Contributors to the FAST paper are right to remind us about crass errors perpetrated even in the recent past by mindless technocrats. But as Unilever's achievement shows, it is possible to proceed with due sensitivity in furthering frontier science in the Third World. Indeed, this should come as no surprise when we recall that the family soap business established almost exactly a century ago by the Lever brothers, William and James, was famed for its progressiveness and partnership. Those qualities were extraordinary then. Today they are mandatory, especially for technology-based commerce functioning in the impoverished South. ▣

FINAL WORD (Continued from page 907)

es attention on the technical resources of which many potential industrial users were once unaware. Now the question is, what impact will all this have on the state economy? Only time will tell, but the first steps all have been in the right direction. ▣

BIOTECHNOLOGY

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