

**EDITOR**

Douglas K. McCormick

**RESEARCH EDITOR**

Harvey Bialy

**SENIOR EDITOR**

Jennifer Van Brunt

**ASSOCIATE EDITOR**

Pamela Knight

**CONTRIBUTING EDITORS**

Peter Newmark

Jeffrey L. Fox

**EDITORIAL ASSISTANT**

Christin R. Ciresi

**ART DIRECTOR**

Dennis Ahlgrim

**ASSISTANT ART DIRECTOR**

Diana Zelvin

**SENIOR PRODUCTION MANAGER**

Donna Zuckerman

**PRODUCTION MANAGER**

Suzanne McCoy

**PUBLISHER**

Gary M. Rekestad

**ADVERTISING MANAGER**

George F. Cominsky

**EUROPEAN ADVERTISING MANAGER**

Hilary Turnbull

**CIRCULATION DIRECTOR**

James Skowrenski

**EDITORIAL CORRESPONDENCE:**

BIO/TECHNOLOGY, 65 Bleecker St., New York, NY 10012. Telephone: (212) 477-9600. Telex: 668497UW.  
 BIO/TECHNOLOGY, 4 Little Essex Street, London WC2R 3LE. Telephone: (01) 836 6633. Telex: 262024.

**SCIENTIFIC ADVISORY BOARD****George Poste**, Chairman

Smith Kline &amp; French

**Ken-ichi Arai**

DNAX Research Institute

**Ronald E. Cape**

Cetus Corporation

**Jean-Pierre Changeux**

Institut Pasteur

**Mary-Dell Chilton**

CIBA-Geigy

**Nam-Hai Chua**

Rockefeller University

**Rita R. Colwell**

University of Maryland, CARB

**Carlo Croce**

Wistar Institute

**Arnold Demain**

Massachusetts Institute of Technology

**J. Lawrence Fox**

Abbott Laboratories

**David Goeddel**

Genentech

**Leroy Hood**

California Institute of Technology

**Morio Ikehara**

Protein Engineering Research Institute

**Ernest Jaworski**

Monsanto Company

**Irving Johnson**

Eli Lilly Research Laboratories

**E. Thomas Kaiser**

Rockefeller University

**David Mount**

University of Arizona

**Victor Nussenzeig**

New York University Medical Center

**Carl-Gustaf Rosen**

Abitec AB

**Yukio Sugino**

Takeda Chemicals

**Lemuel B. Wingard**

University of Pittsburgh

**Wataru Yamaya**

Mitsubishi Chemical

## / THE FIRST WORD

**IS OUR MONEY  
WHERE OUR MOUTH IS?**

Another damned, thick, square book! Always scribble, scribble! Eh, Mr. Gibbon?

*William Henry, Duke of Gloucester*

*upon receiving the second volume of*

*Edward Gibbon's Decline and Fall of the Roman Empire*

The U.S. Congress's Office of Technology Assessment published yet another volume of its epic *New Developments in Biotechnology* the other day. And, yes, 4: *U.S. Investment in Biotechnology* really is another damned, thick, square book. Always scribble, scribble, scribble, eh, Mr. Gibbons? (John H. Gibbons is Director of OTA. We couldn't resist.)

Actually, the results of this unusual information exercise have been excellent, dating back to 1984's *Commercial Biotechnology: An International Analysis*. It's easy to lose track of that in the tide of venom and recrimination that tends to greet each new report.

We have much to be thankful for—not least for the selflessness of OTA in providing, on a regular schedule, sitting ducks for editorial drumfire. Naturally, OTA's data are never wholly consonant with our view of the biotechnologies. And the recommendations to Congress almost always include options we regard as unpalatable, if not utterly insane. But that's the way it goes.

The most recent report contains a wealth of data that we wish, frankly, had been published here first (well some of it *was*). Well presented, too. But there is some new material that bears thinking about.

Just as it is difficult to imagine people going hungry in the United States, it is difficult to imagine any kind of biotechnology languishing for want of capital. Yet, the OTA's premier conclusion is that, "in some areas, the investment level is insufficient to meet the promise suggested by current work in the area." That sounds odd at first, until one realizes that "some areas" are agbiotech and toxic-waste treatment, which sometimes seem the step-children of the industrial biology revolution.

Twelve federal agencies spent roughly \$2.7 billion on biotechnological research in 1987. A bit of unscrupulous back-of-the-envelope manipulation of OTA's figures indicates that private investors have bet about \$700,000 on every scientist and engineer working at publicly financed biotech start-ups. And that industry is spending about \$105,000 every year on the 19,000 scientists and engineers working on biotech in companies large and small. That is some pretty hefty support.

Yet, agriculture—America's and the world's biggest industry—receives just over 3 percent of the federal money supporting biotech R&D. The private sector is doing a bit better. About eight percent of what OTA calls "dedicated biotechnology companies" and about 13 percent of diversified companies focus on plant agriculture; another 6 percent of start-ups and eight percent of conglomerates focus on applications in animal husbandry.

Environmental applications (presumably represented by EPA) account for just *three-tenths of one percent* of government biotech funding. Less than two percent of the industrial biotechnology effort focuses on sorely needed environmental clean-up.

Through the OTA, the U.S. Congress has mounted what may be the world's most impressive biotech information gathering-and-digesting organism. From *Commercial Biotechnology's* Nanette Newell and Oskar Zaborsky, to Robert Cook-Deegan, Gary B. Ellis, Luther Val Giddings, and (on the current report) Kathi Hanna, the study directors deserve a great deal of (grudging) credit. It continues to perplex us, though: All of this information-gathering, all of this painstaking enumeration of options and outcomes, has failed to produce anything resembling a national biotechnology policy. We slight vital applications like agriculture and the environment because one is low-margin, the other a small market, and both politically thorny. We are left with patch work policies and slapdash support, all overseen by bureaucratic satrapies that seem by turns benevolent, malevolent, and asleep at the wheel.

—Douglas McCormick