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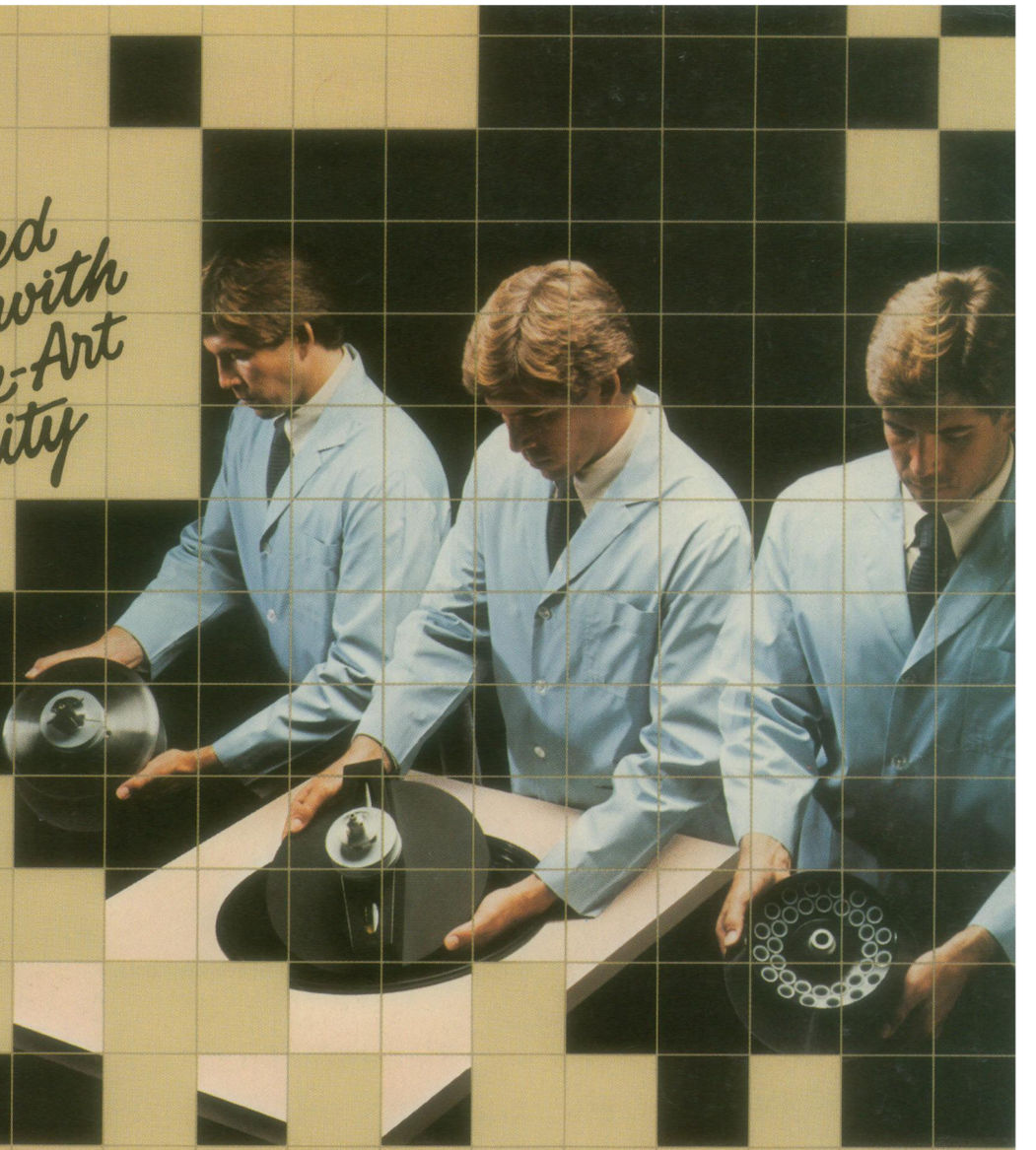

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REPORTS

COVER

Cliff face of a Haitian raised reef (designated as "Mole") dated at 81,000 years ago. Visible in the upper portion are fossil corals (*Acropora palmata*). See page 1423. [Richard E. Dodge, Nova University Oceanographic Center, Dania, Florida 33004]

LETTERS

Allocation of EPA Funds

Two major thrusts of the Administration are elimination of unnecessary regulation and, more recently, using technology to enhance productivity. As the Environmental Protection Agency (EPA) can contribute to both of these, one would expect that the 1984 research budget would reflect these initiatives. Even a cursory examination, however, reveals at least two inconsistencies with stated policy—and with common sense.

A noncontroversial way to avoid regulation is to show that it isn't needed. Or, if an environmental problem can be discovered while it is still small, it might be resolved with a minimum of social and economic dislocation. The EPA Exploratory Research Program accomplishes both by funding peer-reviewed investigators engaged in problem-*definition* research. The program has worked because it is managed by EPA's Office of Research and Development (ORD) as a deliberate complement to the problem-*solving* R & D done by that office. But the 1984 budget shows that, of the $10 million total, $4 million is to be "passed through" to the National Science Foundation. Even if one grants no loss through administrative and management problems—an unlikely event—such an arrangement will shift the $4 million toward *basic* environmental research rather than toward the problem-definition mode needed to avoid future problems.

The second inconsistency of budget with policy is less subtle. Industry, hit by regulation, too often responds by Rube Goldberg, bucket-at-the-end-of-the-pipe add-ons or, worse, fights in court while it continues to pollute. For years, ORD's Industrial Research Program has provided a constructive alternative—seed money from the government allows industrial research on "process modification." When successful, a new way to produce a product is found, a way that not only results in less pollution but generally uses less raw material and less energy, is less costly, and sometimes results in useful by-products. Small wonder that the new process can become the industry standard.

While it is true that industry conducts this sort of research on its own, the successful results can be proprietary and not generally available. Or they can be so simple as to be unpatentable and then not worth the development investment. Thus, left to itself, industry does not put a high priority on process modification.

Just at the moment the Administration is pushing new technology as the key to productivity, the EPA's process modification work and seed money for more efficient control technology have been eliminated from the 1984 budget.

Perhaps in reconsidering EPA's priorities and management, the Administration should weigh the benefits of structuring it as an environmental protection organization with a suite of instruments: research, public information, grants-in-aid, regulation, enforcement, and so forth, rather than as a primarily regulatory organization assisted by supporting functions. If the concept is attractive, a good way to begin would be to examine the research budget for consistency with some laudable policies of the present Administration.

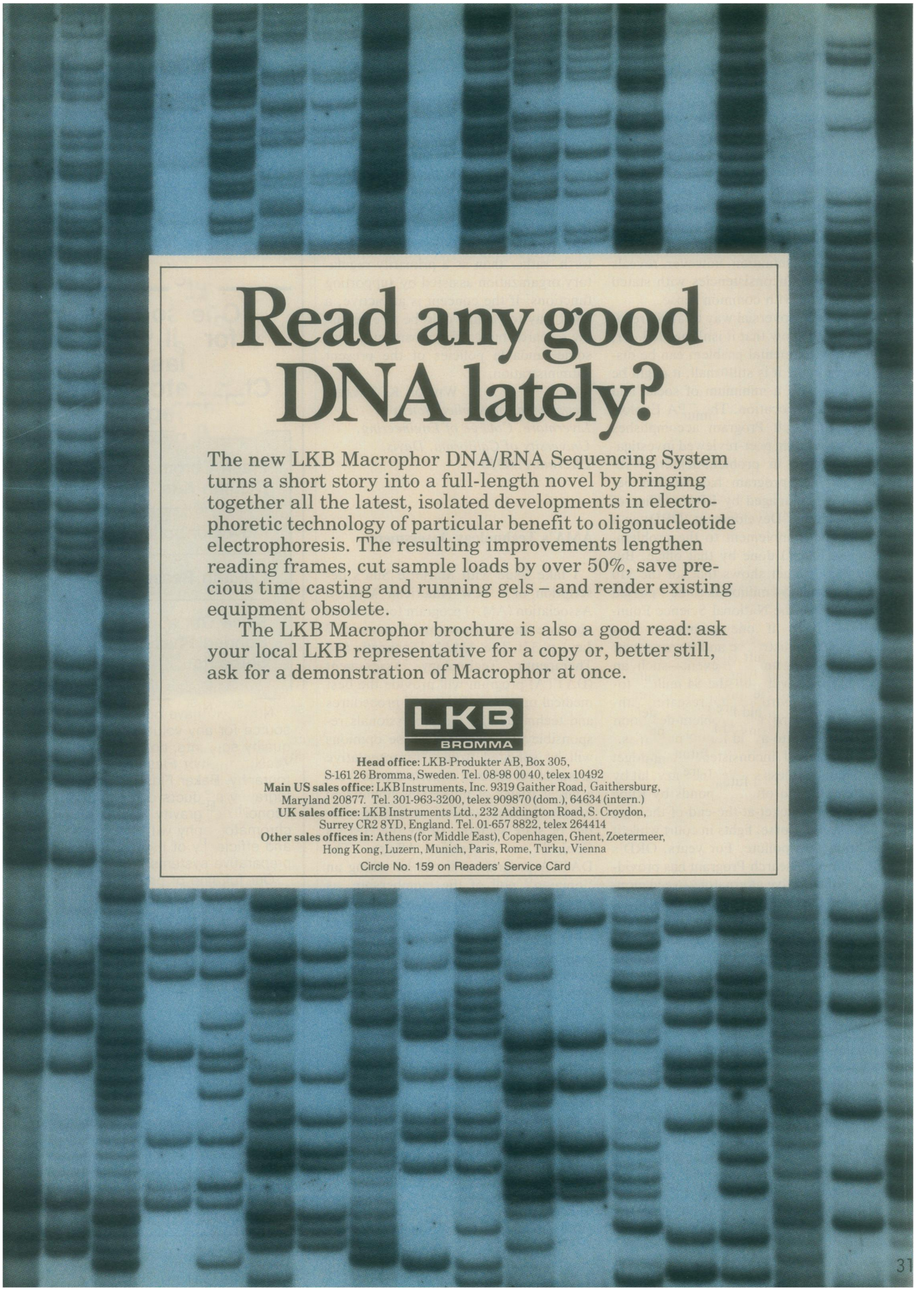
WILSON K. TALLEY
Department of Applied Science–Livermore, College of Engineering, University of California, Davis, Livermore 94550

AMA's Technology Assessment

I take issue with Marjorie Sun's description of a new American Medical Association (AMA) program for technology assessment (News and Comment, 7 Jan., p. 37). The AMA's Diagnostic and Therapeutic Technology Assessment (DATTA) program will provide the best medical opinions of selected procedures and techniques by the professionals responsible for their use. These opinions will be solicited from a representative group of recognized experts drawn from a larger roster of physicians nominated to serve by their various medical specialties or state societies or by the AMA's Council on Scientific Affairs. The DATTA program will not be taking an "opinion" poll of the membership, as suggested by Sun. Instead, a synthesis of the individual responses will be prepared by staff. This synthesis will then be reevaluated before final review by the Council on Scientific Affairs and the publication of conclusions.

In the DATTA program and in many other ways, the AMA is working to bring to practitioners and patients what Seymour Perry has described (*1*, p. 1097) as "current information concerning the safety, effectiveness, and comparative values of technologies communicated in an understandable form." Considerable effort is also being spent on imbuing in practitioners the cost implications of their decisions.

The AMA believes the exercise of good judgment by physicians in the



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References

1. S. Perry, *New Engl. J. Med.* **307**, 1095 (21 October 1982).

Nuclear Plant Availability

In the article "New U.S. (Japanese) reactors" (News and Comment, 21 Jan., p. 266), Eliot Marshall writes that current nuclear plant availability in the United States averages around 75 percent. But, according to *Chemical & Engineering News* (*1*, p. 16), the averages for all U.S. nuclear plants in 1979 and 1980 were below 60 percent. And Charles Komanoff stated in 1981 that the capacity factor of U.S. nuclear plants ranged from 50 percent to 62 percent during the 5 years from 1975 through 1980.

Is Marshall correct or have U.S. nuclear plant operators suddenly become unusually efficient in a very short time?

GEORGE A. HUHN
Waterloo and Beaumont Roads, Devon, Pennsylvania 19333

References

1. E. V. Anderson, *Chem. Eng. News.* **60**, 11 (20 September 1982).

According to the Nuclear Regulatory Commission's "gray book" of January 1982, nuclear plants in the United States were available on average 67.8 percent of the time in 1981. Westinghouse reports that its own plants were available 67 percent of the time in 1982, and it hopes the new pressurized water system will achieve 90 percent availability.

—ELIOT MARSHALL

Residential Radiological Standards

In discussing criticism of the Environmental Protection Agency (EPA) for considering the adoption of lifetime risk objectives as high as 1 per 10,000 exposed individuals, Eliot Marshall (News and Comment, 3 Dec., p. 975) does not explore the fundamental question of whether society is prepared to apply lower risk objectives with any consistency. We are, of course, all aware of the fervor with which the media, the politicians, and public interest groups bemoan imputed lifetime risks as low as 1 per million when there are convenient scapegoats to bear the blame and the cost of mitigative action and punitive litigation. But even responsible scientific spokesmen are willing to endorse popular public policies that lead to imputed risks as high as 1 per 100 on a comparable basis.

A dramatic case in point is the indoor radiological problem, which is demonstrably exacerbated by government-recommended and government-subsidized reductions in home ventilation to conserve energy. A committee of the National Council on Radiation Protection and Measurements (NCRP) has proposed to rectify the present absence of residential radiological standards by adopting a limit of two working level months (*1*) per year for public exposure to radon progeny (*2*, p. 19). The risk from lifetime exposure to two working level months per year is estimated by the same committee to be 18,200 per million (*2*, p. 38).

HENRY HURWITZ, JR.
827 Jamaica Road, Schenectady, New York 12309

References and Notes

1. The working level month is a unit used to measure integrated exposure to radon progeny in air. A working level is equivalent to the equilibrium concentration of radon progeny in the presence of radon at a concentration of 100 picocuries per liter. (At one working level, the radon progeny present in 1 liter of air would ultimately emit 1.3×10^5 million electron volts of alpha particle energy.) A working level month is defined as exposure to one working level for 170 hours. (EPA standards are expressed in terms of working level, while the NCRP prefers to specify working level months per year. EPA would estimate working level months per year by multiplying the average indoor working level by about 25, while the NCRP uses 50 as the ratio of working level months per year to average working level.)
2. J. H. Harley, testimony before the U.S. House of Representatives, Committee on Armed Services, Subcommittee on Procurement and Military Nuclear Systems (No. 97-55, House Armed Services Committee, Washington, D.C., 17 and 18 August 1982), pp. 15–63.

Erratum: In the report "Human endometrial adenocarcinoma transplanted into nude mice: Growth regulation by estradiol" by P. G. Satyaswaroop *et al.* (7 Jan., p. 58), the two tumor grades in Table 1 should have been I and III, not I and II.

Erratum: In the article "Impact of genetic manipulation of society and medicine" by A. G. Motulsky (14 Jan., p. 135), the last part of the sentence beginning on line 8 of the summary should have read ". . . no new ethical problems arise beyond those presented by any novel therapy."

Erratum: In the article "Ultrasafe reactors, anyone?" by Eliot Marshall (News and Comment, 21 Jan., p. 265), the location of the Andrew W. Mellon Foundation should have been given as New York, not Pittsburgh.

Erratum: In Arthur L. Robinson's article "Berkeley advanced materials center OK'd" (Research News, 18 Feb., p. 827), a line was omitted in the first column of page 828. The second sentence in the second paragraph should have read, "Synchrotron radiation sources are evolving rapidly. The ALS will be the first of the third generation of sources in which most, if not all, the synchrotron radiation comes from special magnets with the generic name 'insertion devices,' rather than from the dipole bending magnets that keep the electron beam in its approximately circular orbit."

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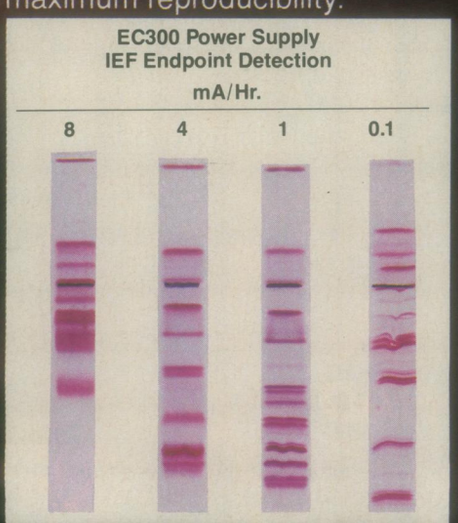

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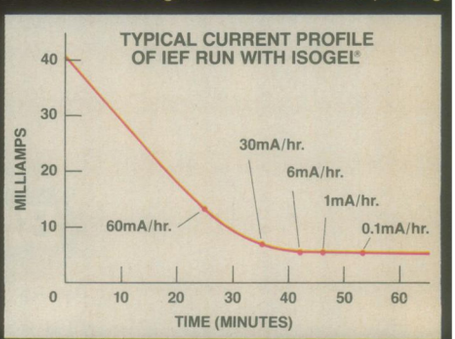

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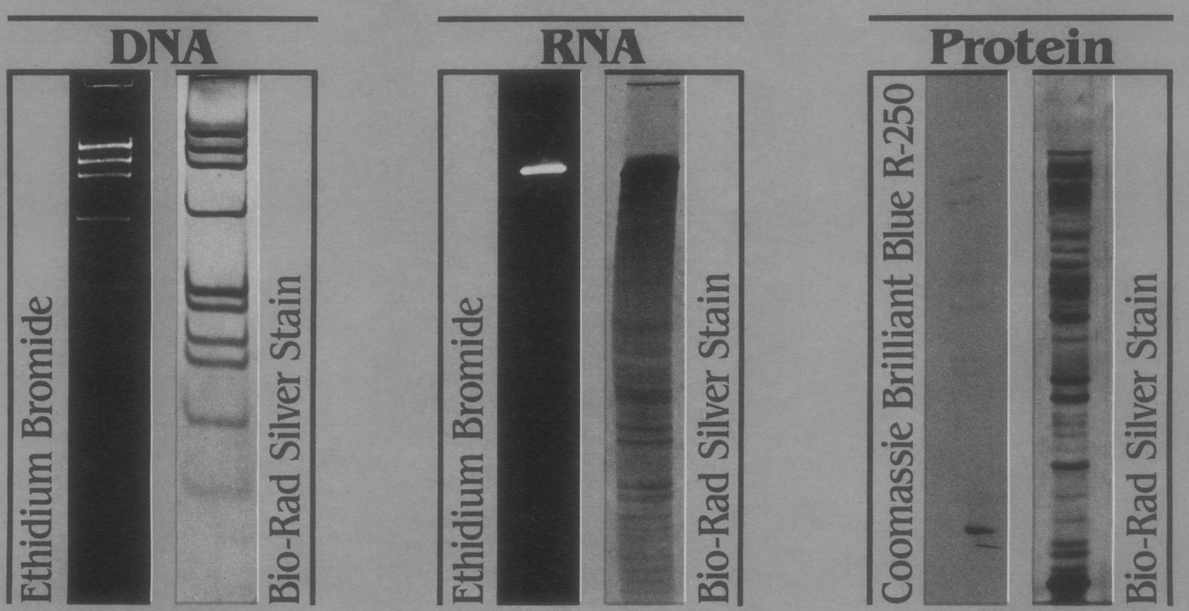

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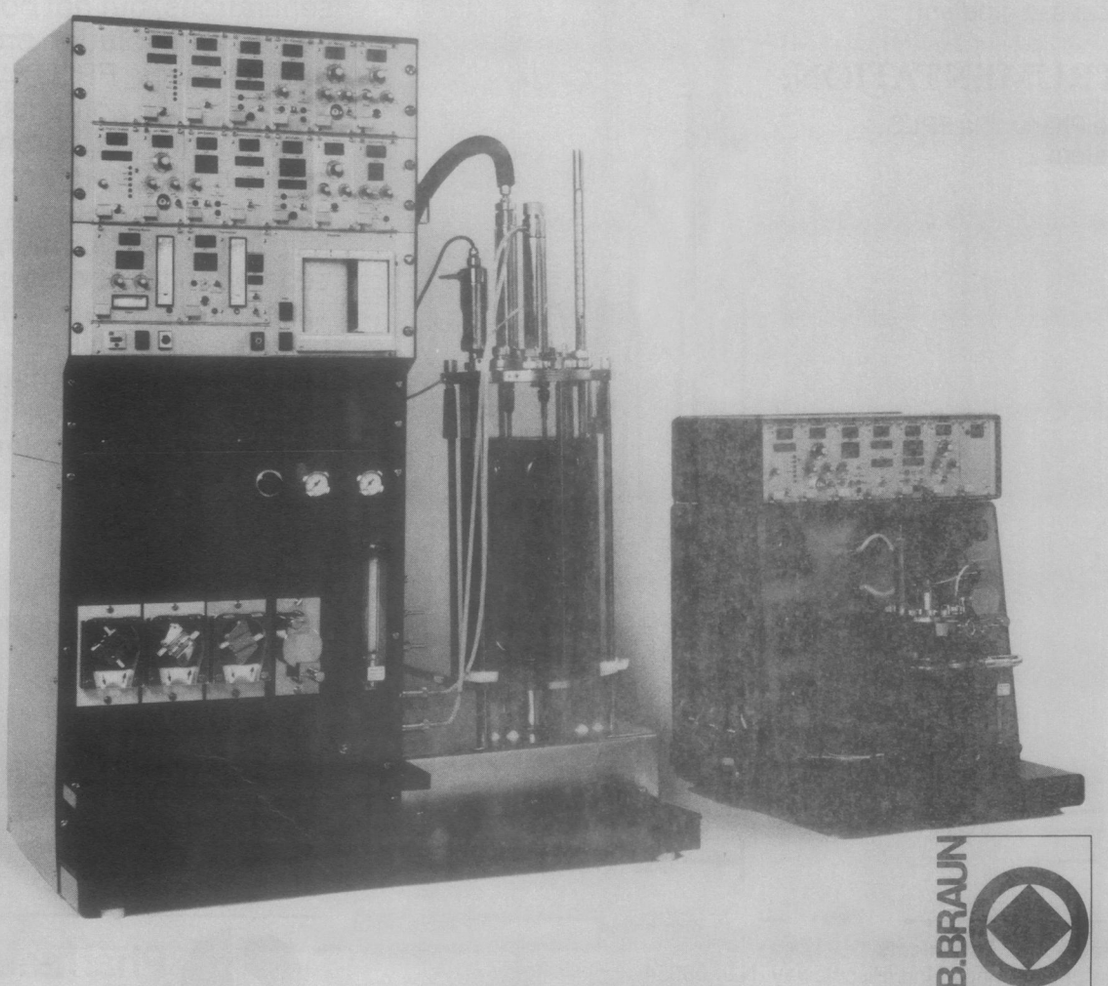

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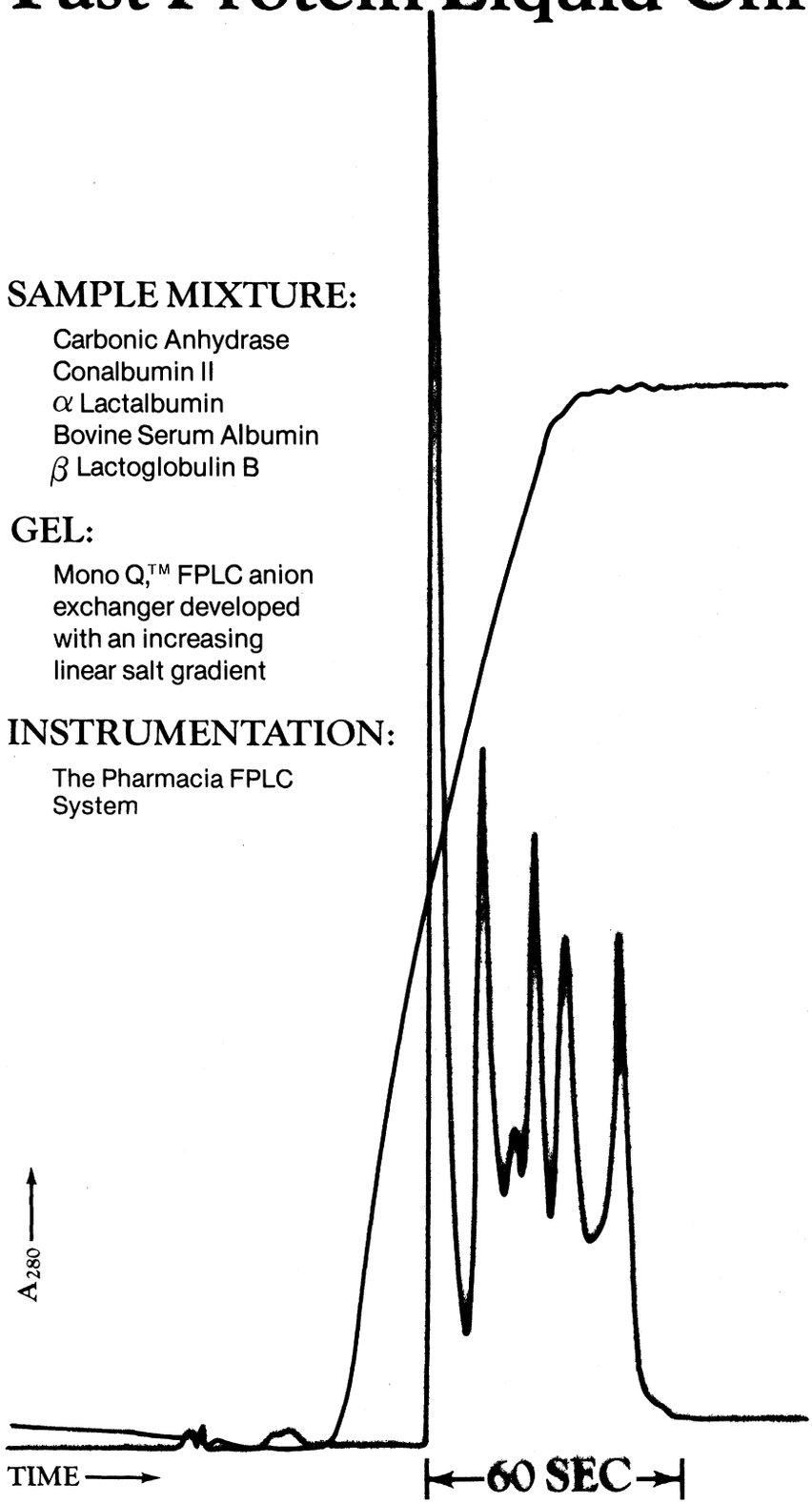

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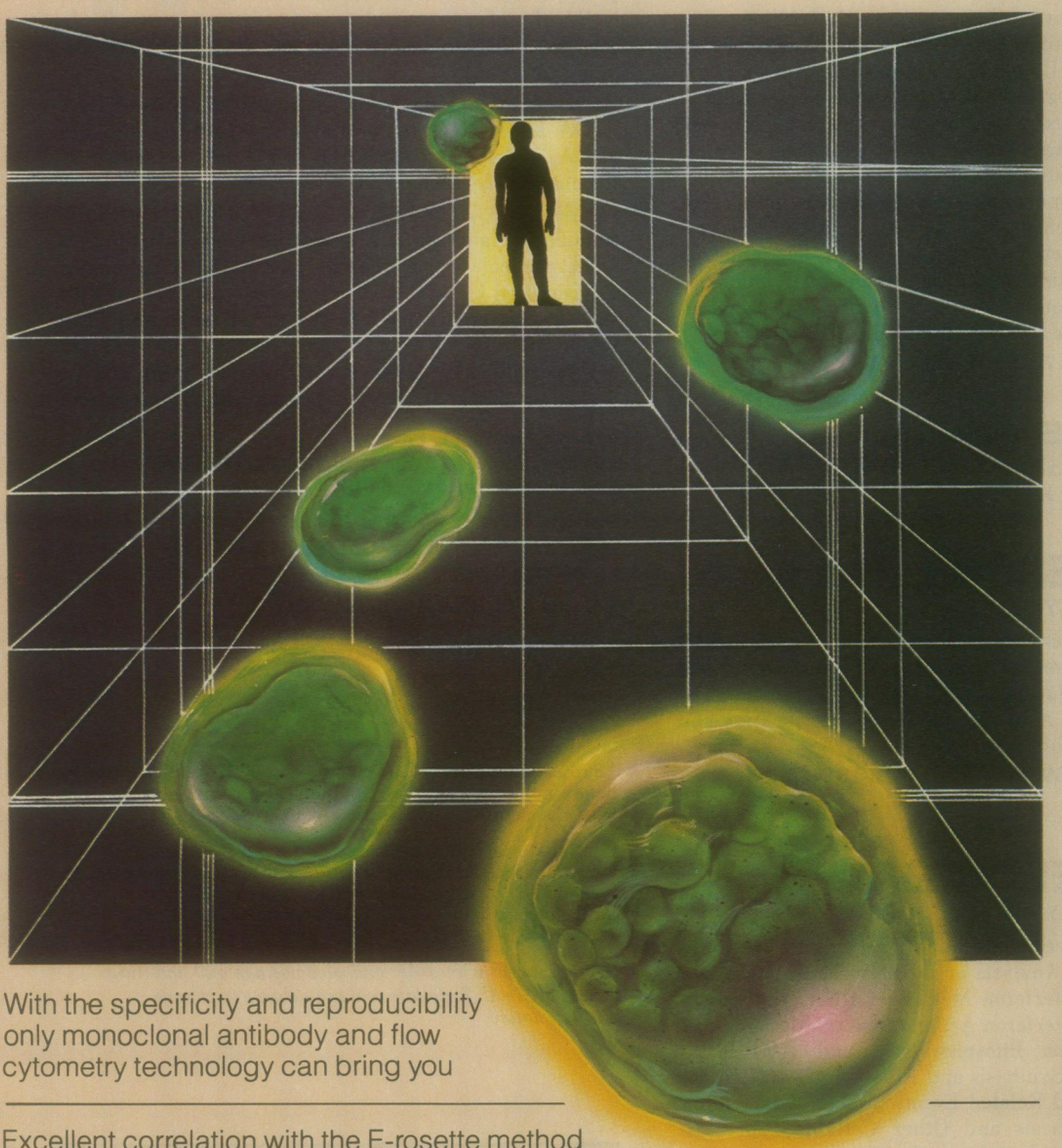

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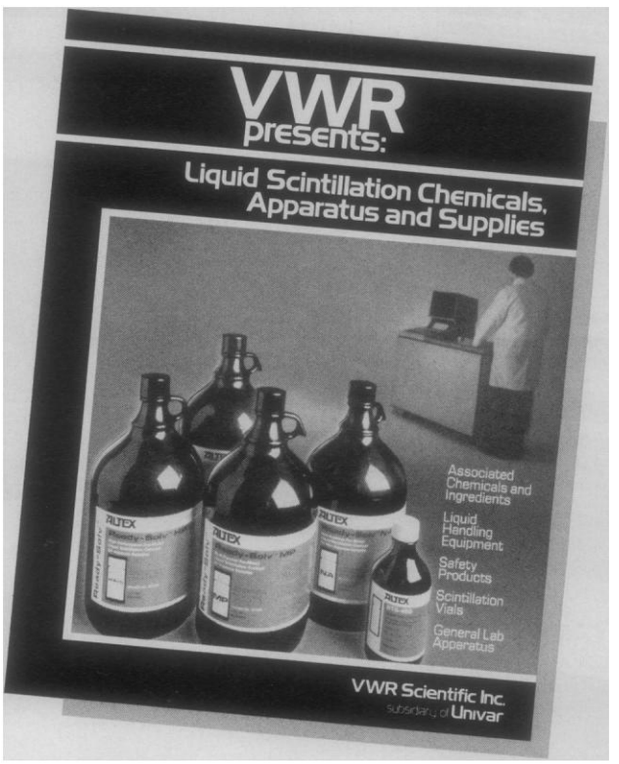

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The Two Faces of Genetic Engineering in Man

To those who deal with the victims of hereditary defects there can be no question that gene therapy—the use of genetic engineering to correct such defects—is an admirable goal, solidly within the traditions of medicine. Moreover, for the loosely organized cells of the bone marrow (though not for those of most organs) cure by implantation of genes in somatic cells now seems only a few years off. Unfortunately, however, the cold term "genetic engineering" has suggested to the public other, nonmedical potential uses of the techniques, such as reshaping our physiques or our personalities, cloning favored adults, or creating subhuman hybrids.

Two years ago the three main religious groups in this country sent President Carter a joint letter that viewed research in this area as a source more of danger than of benefit. The issue was referred to an excellent presidential commission, with Morris B. Abram as chairman and Alexander Capron as executive director. Its recent draft report, and subsequent congressional hearings under Representative Albert Gore, Jr. (D–Tenn.), strongly supported the conclusion that gene therapy is a thoroughly legitimate goal. The problem has thus been handled in a much more sensible way than the emotional earlier debate over recombinant bacteria. Also encouraging is the restrained response of the major media to the recent announcement that the implantation of a gene for growth hormone into cells of mouse embryos had produced a giant strain. Evidently gene therapy itself, separated from other kinds of genetic engineering, no longer seems to present moral problems different from those of other kinds of experimental therapy, and these are supervised by local bioethics committees.

On the other hand, both the commission and some participants in the hearings viewed changes in the germ plasm as more dangerous than somatic corrections because they tamper with evolution. But, by domesticating animals and extinguishing species, man has been tampering for a long time. Moreover, as a form of preventive medicine, gene therapy in human embryos would have the same effect on the gene pool as an accepted approach: prenatal diagnosis, leading to selection for normal embryos in a family of carriers. The evolutionary argument thus does not carry much weight. However, there is a practical consideration that will deter responsible investigators from altering human embryos for a long time to come: the need for virtually perfect reliability. In somatic cell therapy a 50 percent cure rate would be a triumph, but manipulations of embryo cells that damaged even one child in a thousand would be intolerable.

Although the commission did not consider the conceivable nonmedical uses an immediate threat, it recommended the establishment of a body to watch future advances and protect against their misuse. But some interventions, as we have seen, are too dangerous to apply to humans, while others are distant or impossible. In particular, the possibilities for genetic control of behavior, as in Aldous Huxley's *Brave New World*, seem much more limited than those for the cure of monogenic diseases, both because behavioral traits are polygenic and because most genetically determined differences between individuals are laid down in the brain circuitry before birth.

It thus appears that a special continuing commission on genetic engineering might find itself watching only for developments that either are very distant or are too dangerous to try. If so, it would have little to do, and it might then be tempted to become a busybody, imposing federal restrictions on activities that are better regulated on the local scene. On the other hand, the existence of some mechanism for continuing surveillance of genetic engineering could have real value in protecting the public from unwarranted anxiety. Perhaps the best way to achieve this end, while avoiding undue interference, would be to assign the task not to a special body but to one with wider responsibilities for biomedical ethics.—BERNARD D. DAVIS, *Harvard Medical School, Boston, Massachusetts 02115*

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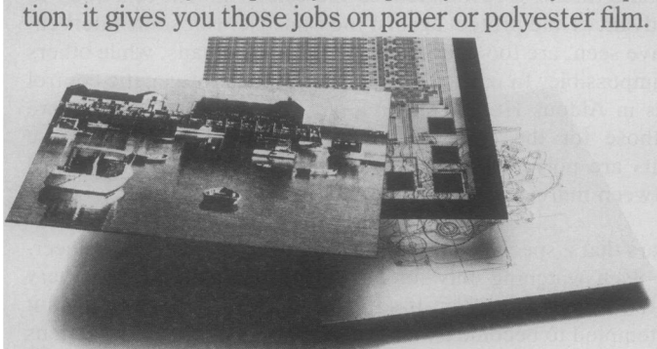

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