26 March 1982 • Vol. 215 • No. 4540 $2.50

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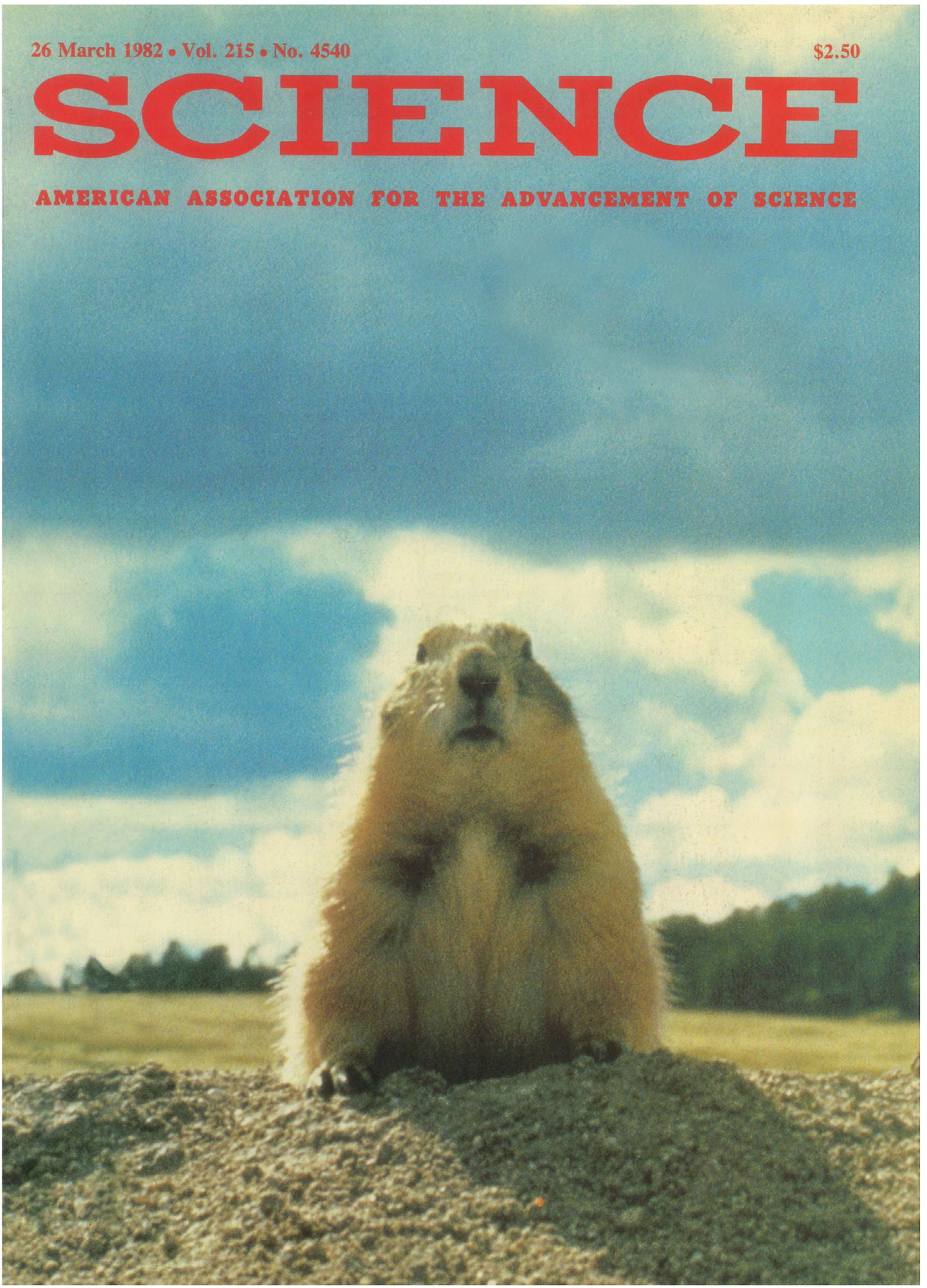

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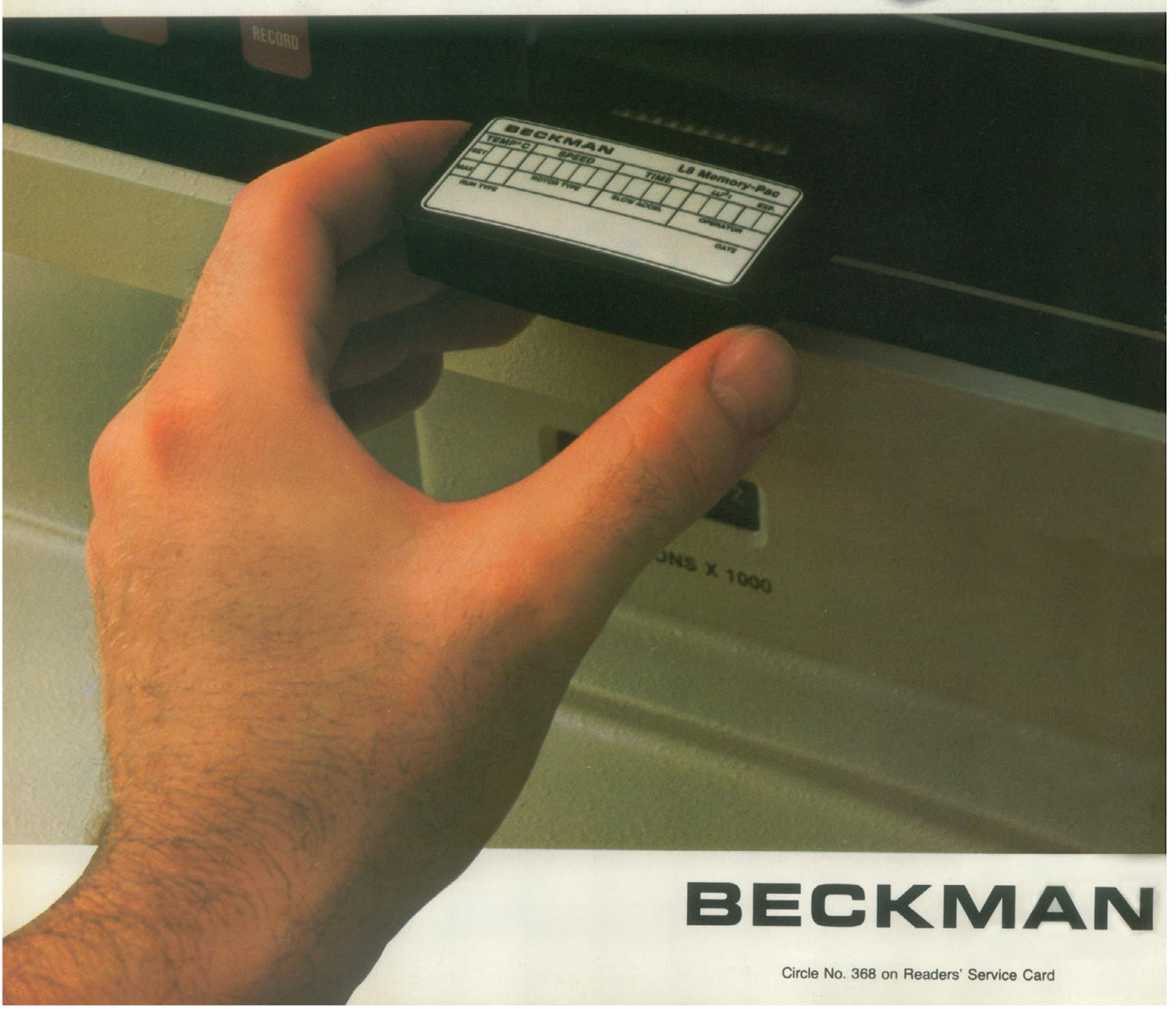

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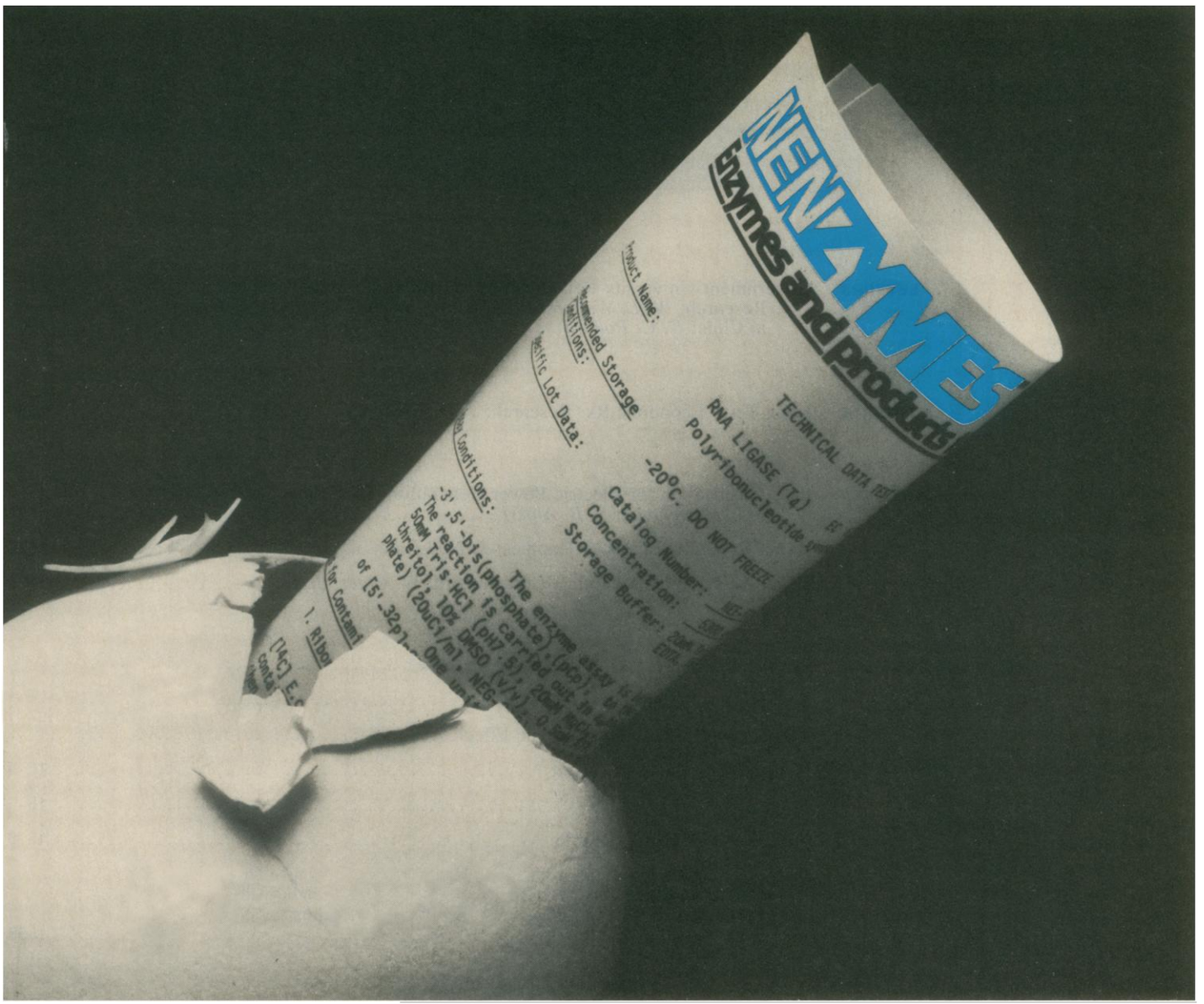

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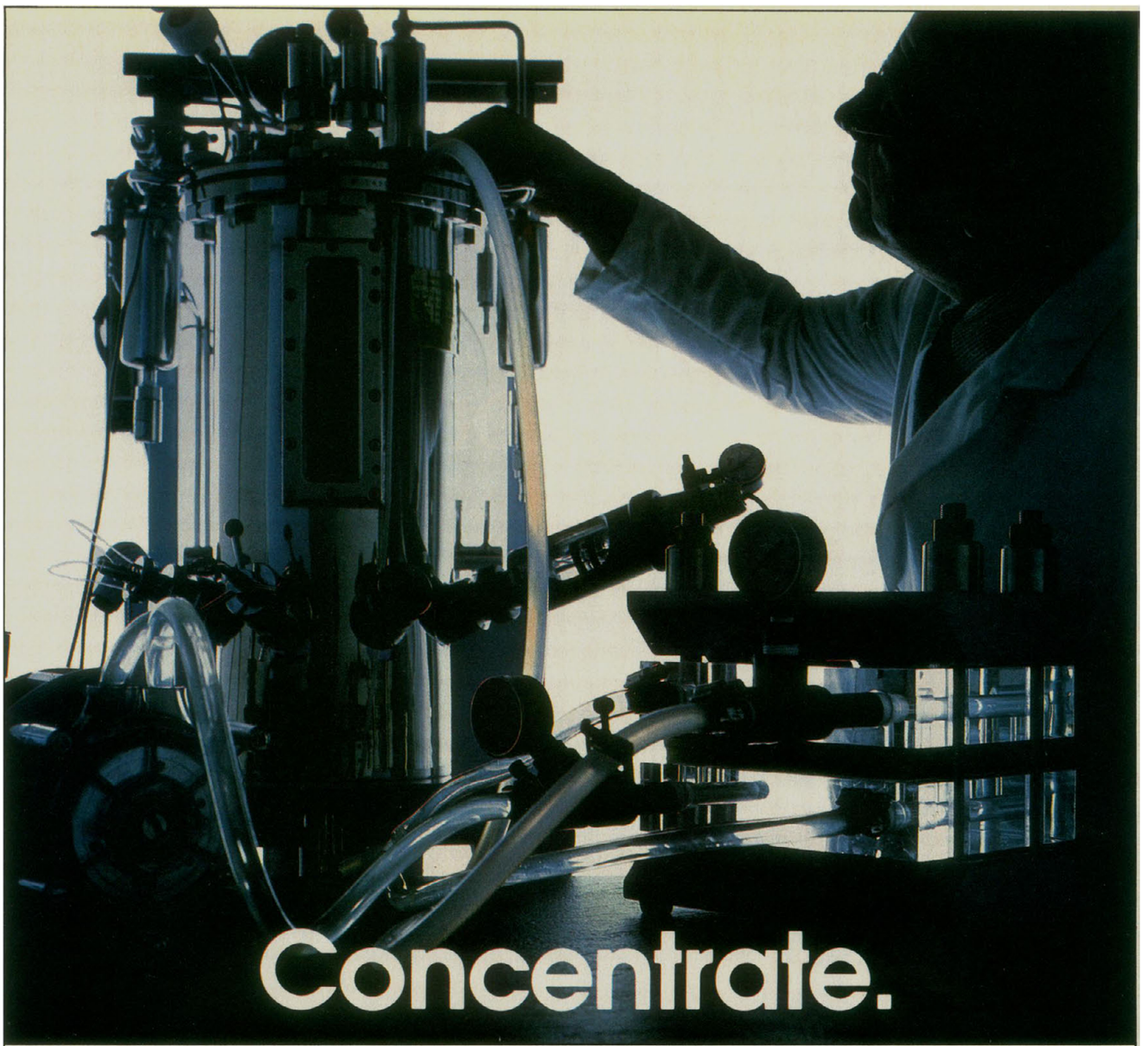
COVER

Black-tailed prairie dog (*Cynomys ludovicianus*) at Wind Cave National Park, South Dakota. Black-tails are colonial, harem-polygynous rodents of the squirrel family (Sciuridae). Because of male dispersal patterns and female choice of mates, individual black-tails do not copulate with close genetic relatives such as parents, offspring, or siblings. See page 1639. [National Park Service, Wind Cave National Park, South Dakota]



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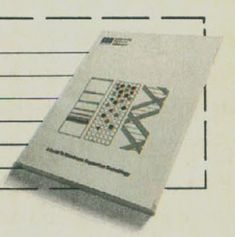

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for basic research is being severely restricted.

The announced philosophy of the current Administration is to reduce the role of government in our social and economic affairs. The objective of this NSF program is one which clearly should be fulfilled by private venture capitalism. I would hope that Congress and the Administration might redirect the funds allocated for SBIR into areas where they will benefit the public at large. NSF should not be in the business of spending public funds to enrich private enterprise.

BRIAN R. YOUNG
J. G. Van Dyke & Associates, Inc., Suite 301, 6410 Rockledge Drive, Bethesda, Maryland 20817

References

1. "Program Solicitation: Small Business Innovation Research" (National Science Foundation, Washington, D.C., no date), p. 1.

Congressman John J. LaFalce (Letters, 29 Jan., p. 456) cites the conclusion of a National Science Foundation study (*1*) that small R & D firms have been the primary generators of major technological innovations. While the conclusion appears to be well founded, one should bear in mind that the relationship between innovation and small R & D firms is more similar to that between the egg and chicken than the horse and cart. It may well be true that major technological innovations have been important, and perhaps the primary, generators of small R & D firms.

HORACE A. ORY
R & D Associates, 4640 Admiralty Way, Post Office Box 9695, Marina del Rey, California 90291

References

1. National Science Board, *Science Indicators 1976* (National Science Foundation, Washington, D.C., 1977).

Social Sciences in Chile

As a follow-up to John Walsh's account of the status of universities and degree programs in Chile ("New university law decreed in Chile," News and Comment, 27 Mar. 1981, p. 1403), it may be of interest to *Science* readers that some easing of the restrictions on social science programs has begun to occur. On 1 March 1981, Roberto Escobar B. was designated director of a new Department of Sociological and Anthropological Sciences, which replaces previous units, at the University of Chile, Santiago. The department contains 22 full-time and 28 part-time professors. As of January 1982 the university is the only one in Chile to offer an advanced degree in the fields of sociology, anthropology, and archeology, along with a master's level program in social sciences. The new department has also been able to reinitiate its publication series, including the *Boletín de Prehistoria*, which had been suspended since 1975, and the *Revista Chilena de Sociología y Antropología*; both journals will have an issue this year. Contributions are welcomed for either journal, with submissions to be directed to Roberto Escobar. Let us hope that this rerecognition of the social sciences in Chile continues and expands.

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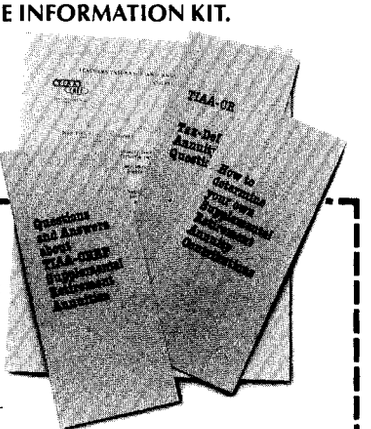

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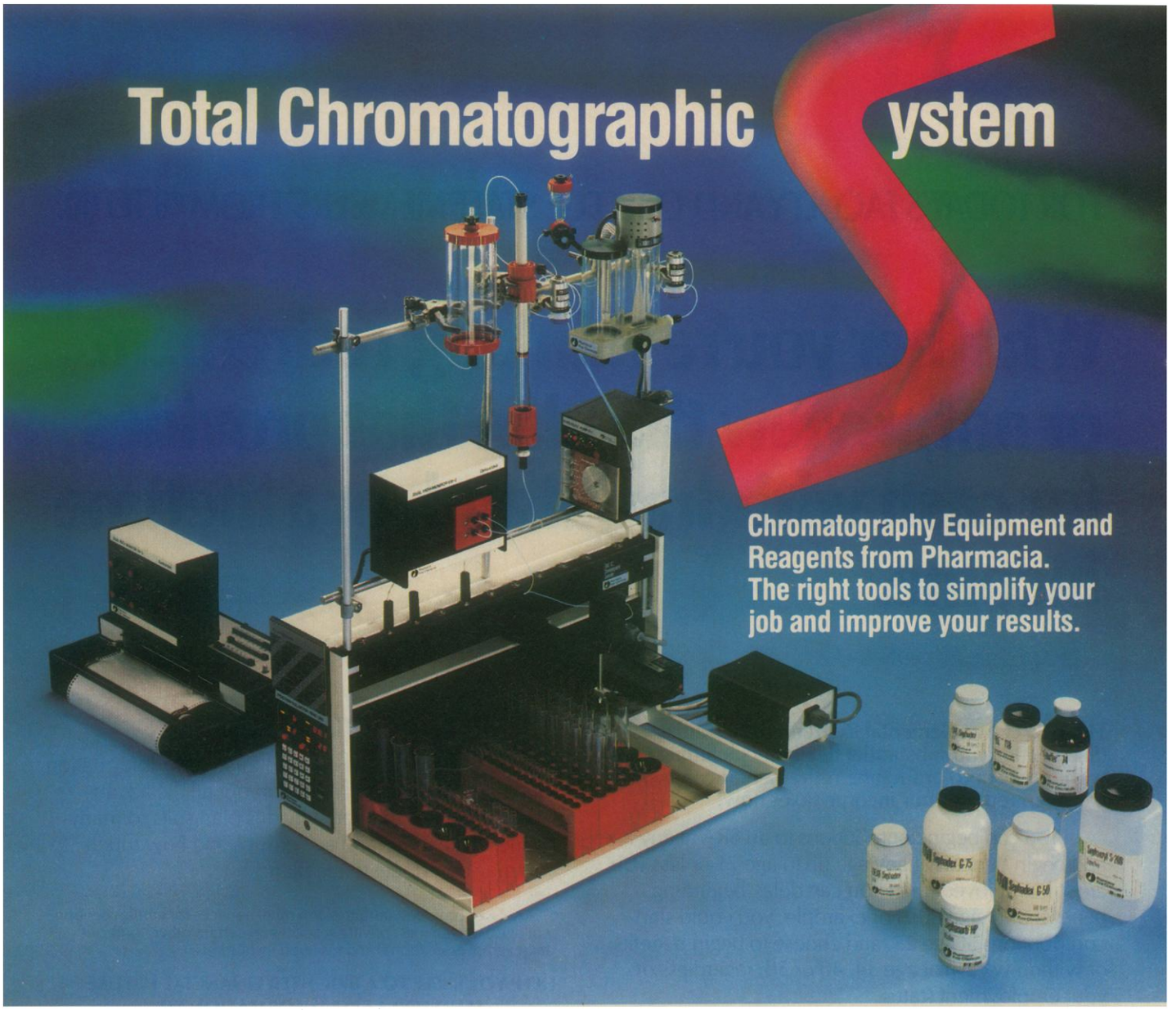

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26 March 1982, Volume 215, Number 4540 **SCIENCE**

Long-Term Economic Rx: Research

Research and development supported by both government and private sources transformed the United States into the dominant technological force in the world. But our commitment to maintain and extend the amount of research and development necessary to stay ahead in the technological race has slipped. Today, we are witnessing a wholesale retreat in the federal role in civilian research and development. This is manifest in the shrinking amount of research support for our universities, private nonprofit research laboratories, and national multi-program laboratories.

Over the past 15 years the proportion of the U.S. gross national product invested in research and development has steadily declined—dropping more than 20 percent since 1965. In the same period and by the same measure, the R & D investment in the Soviet Union climbed by 21 percent, in Japan by 27 percent, and in West Germany by 41 percent. In addition to this huge underinvestment in research and development, we are failing to produce the technically trained people that we need to sustain increases in productivity and to make advances in knowledge that will be the basis for our economic prosperity and national security in the coming decades. The intense demand for technically trained people has resulted in high salaries that are luring faculty and graduate students away from even our best universities. To complete this picture, there is mounting evidence that the research laboratories and instrumentation in American universities are rapidly becoming obsolete.

Let us examine the response of the Reagan Administration to this crisis in four specific areas: energy, space, science education, and the national laboratories.

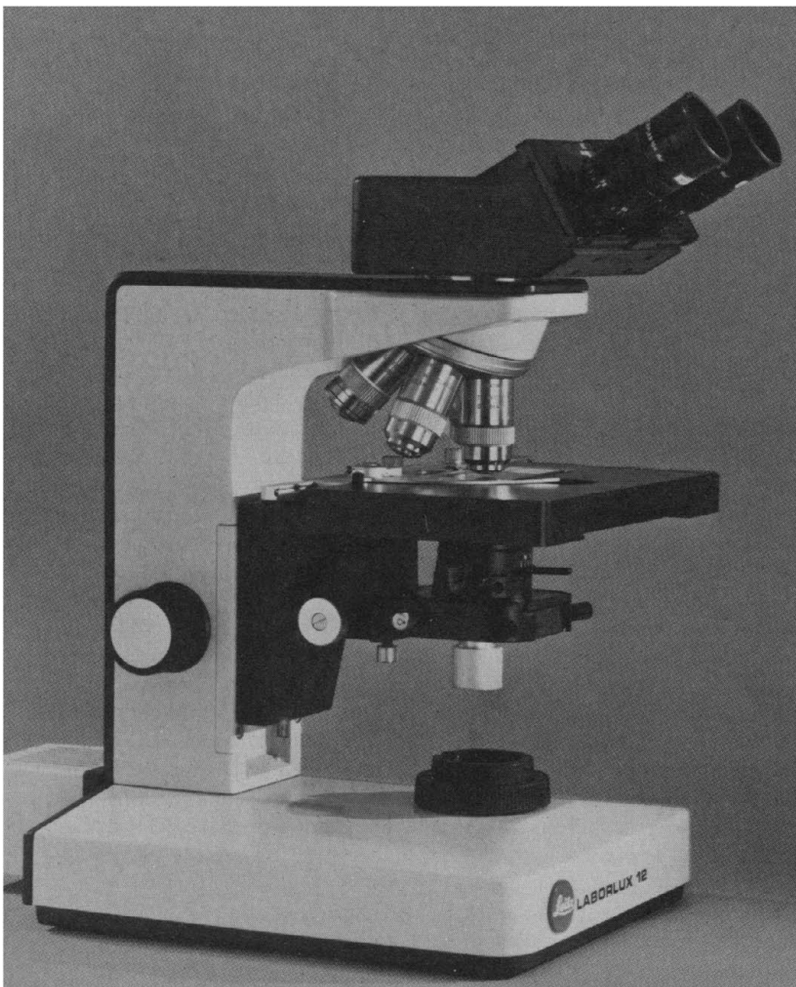
Productive R & D efforts in industrial energy conservation, energy-efficient buildings, energy storage, and solar energy have been zeroed out in the President's fiscal 1983 budget, thus helping to ensure an unnecessarily prolonged U.S. dependence on oil from the Arabian Gulf. There is no evidence that any of these programs will be picked up by private industry.

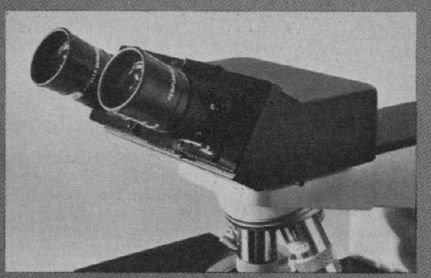
Decisions on the space program are equally egregious. The Galileo Program is now the only remaining U.S. planetary program in development, and some of the older space probes may be turned off. Funds have been cut for a satellite to test new advances in communication. Aeronautics research has been cut at a time when the Europeans are challenging us with the development of the airbus and the Japanese are thinking of launching major forays into the international aircraft market.

In science education, the National Science Foundation's (NSF) request for extra funds to upgrade university laboratories has been zeroed out, and a 70 percent reduction has been forced on NSF in the science education budget. As for the national laboratories, Argonne National Laboratory officials say that 25 percent of their work force may be eliminated within the year. Brookhaven National Laboratory, Fermi National Accelerator Laboratory, NASA-Lewis Laboratory, and Jet Propulsion Laboratory have also suffered.

Several steps can be taken to meet the R & D crisis in America. We must provide stable, predictable funding for scientific and technological research; alleviate shortages of technical personnel; provide incentives for better university-industry collaboration; restore the science education program at NSF and improve science and mathematics education at the precollege level; and develop a coherent national science and technology policy that includes a larger role for the science and technology community in the making of such policy. If the Office of Science and Technology Policy cannot be sufficiently effective in this role, we should think seriously about creating a cabinet-level department of science and technology as a focal point for federal nondefense research activities. I urge the science community to help us get back on the right track.—JOHN H. GLENN, *U.S. Senator (D–Ohio), Washington, D.C. 20510*

From a speech before the IEEE Conference on Technology Policy, 24 February 1982, Washington, D.C.





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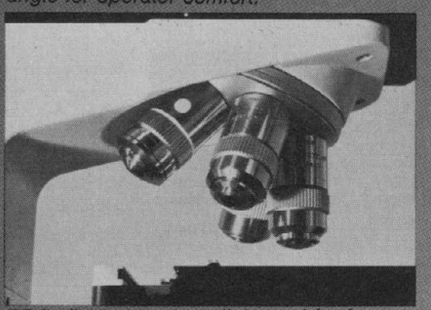

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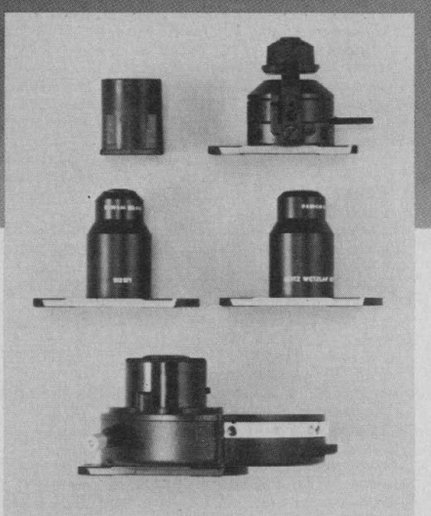

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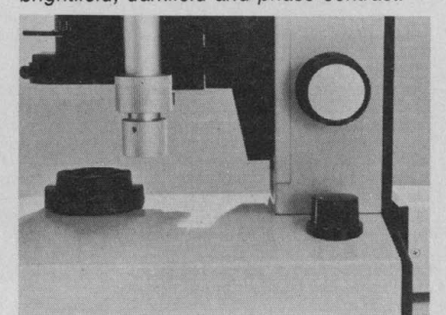

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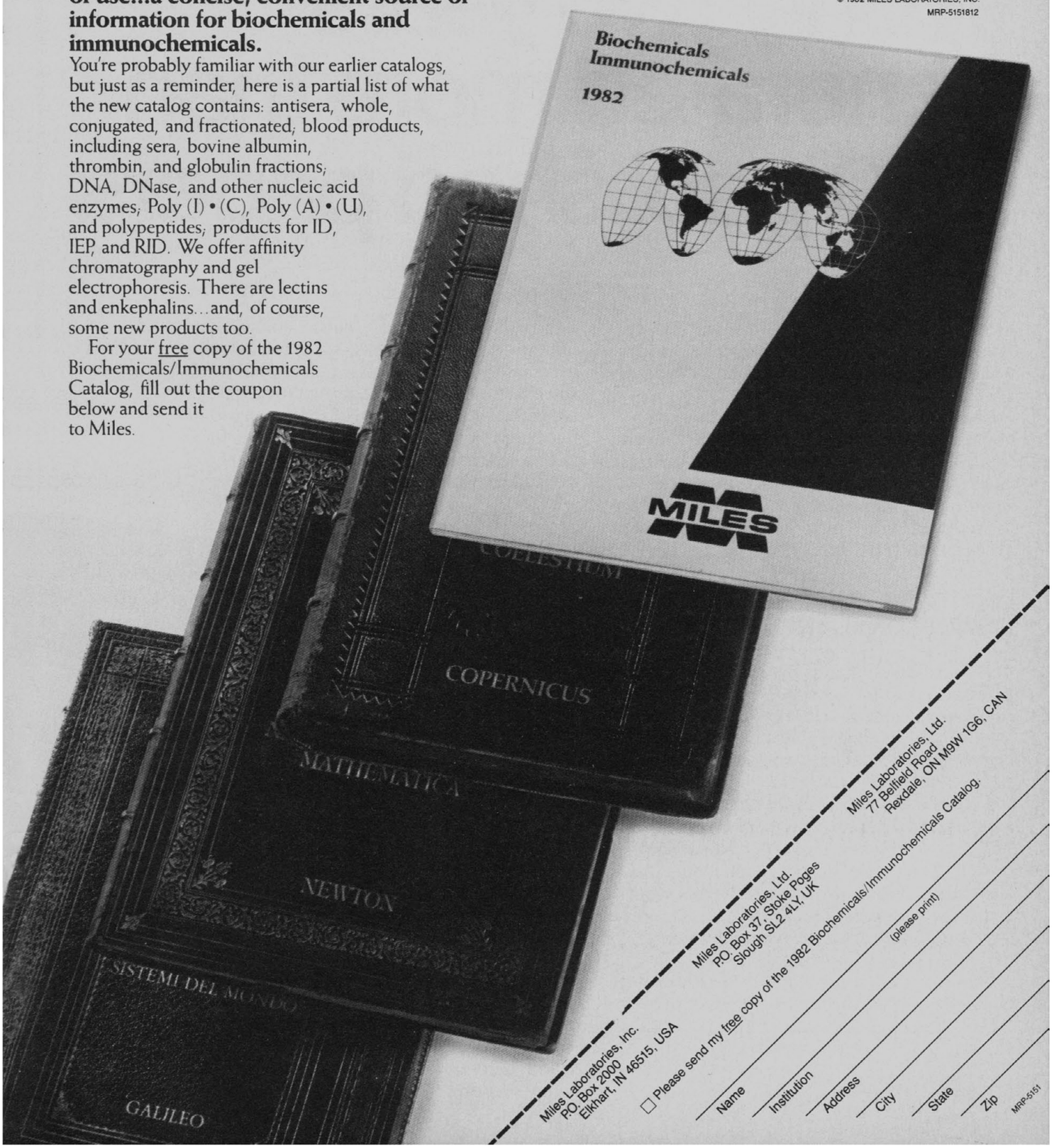

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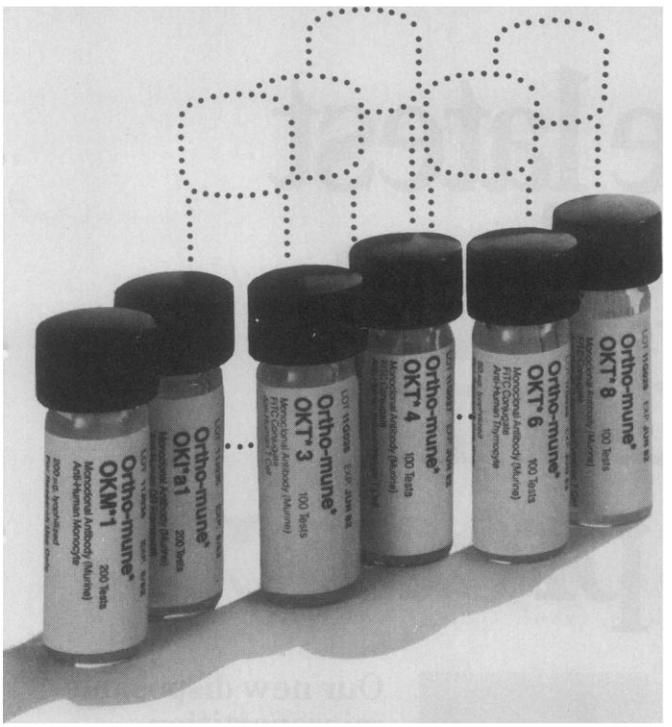

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We know how busy you are. Our new fluorescein- conjugated OKT monoclonal antibodies should help. They reduce staining procedures to one time-saving step. And more new monoclonal antibodies and fluorescent reagents are being developed and characterized at Ortho.

THE LEADING EDGE

Applications for the Ortho-mune products are following quickly on the heels of research developments. Research oncologists, rheumatologists and immunologists in and out of Ortho are using the System to take a closer look at leukemia, rheumatoid arthritis, multiple sclerosis, myasthenia gravis and response to infections. We've become more than just producers of monoclonal antibodies. We have a commitment to development of integrated systems for analysis of the human immune system. Ortho Immunology Systems is a name that seems to cover it.

Ortho brings you innovative technology—reagents and instruments developed by research immunologists for immunology research.

We'll be pleased to talk with you about setting up a system for lymphocyte subset analysis in your own laboratory. Call us at (800) 526-3875. In New Jersey, call (201) 524-1365.

CELL SORTING AND ANALYSIS: CYTOFLUOROGRAF®

We created the Cytofluorograf to meet the growing demands for laser based cell analysis and sorting. Then we combined it with the Model 2150 computer system to provide the flexibility needed for ever-changing research demands in immunobiology, chromosome analysis and molecular genetics. That's the kind of innovation that makes the Cytofluorograf a leader in flow cytometry.

ORTHO SPECTRUM III*

If you are involved in large volume clinical research projects, you may need high speed analysis of whole blood, without the inconvenience of time-consuming sample preparation. That's what the Ortho Spectrum III does. Integrating Ortho-mune‡ monoclonal antibody technology and laser flow cytometry, this flexible microcomputer-based system can be programmed for accurate cell differentiation on the basis of size and immunofluorescence.

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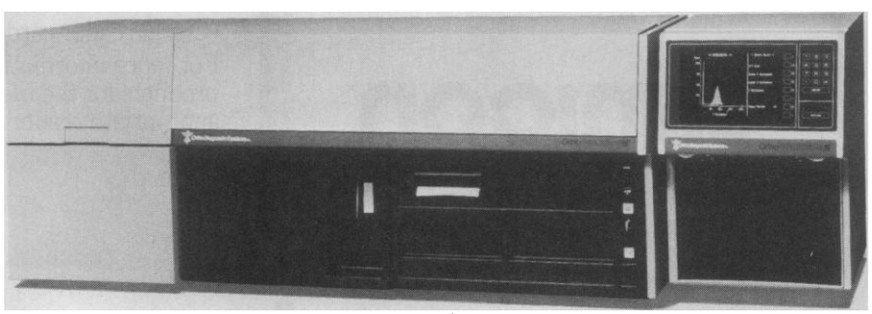

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Ortho Immunology Systems: at the leading edge in human immunology research

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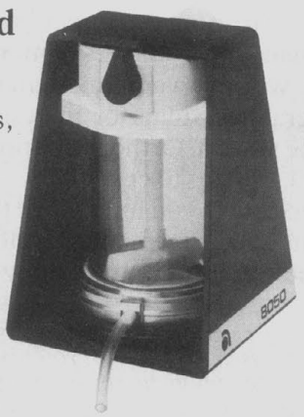

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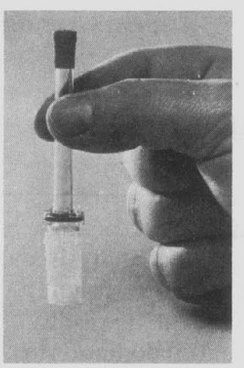

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Amicon has developed the first commercially available PBA (phenyl boronate agarose) gels. Convenient and cost-effective, these Matrex™ gels are available in three controlled ligand concentrations – each one optimized for particular applications. PBA gels are ideal for the group-selective purification of glycoproteins, nucleic acids, complex carbohydrates, and other diol-containing biomolecules.

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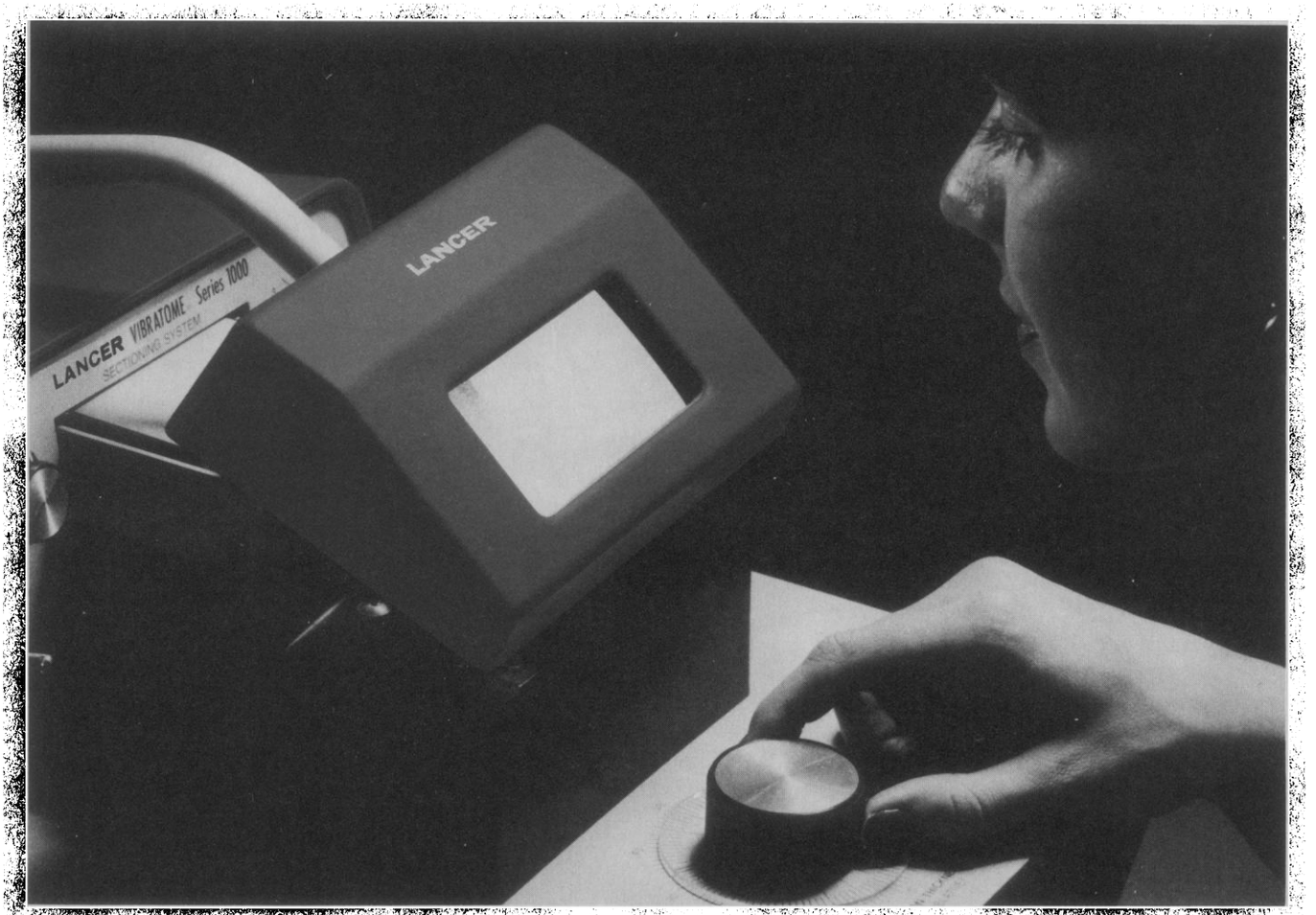

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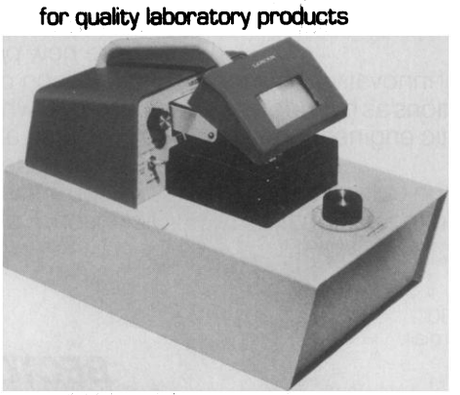

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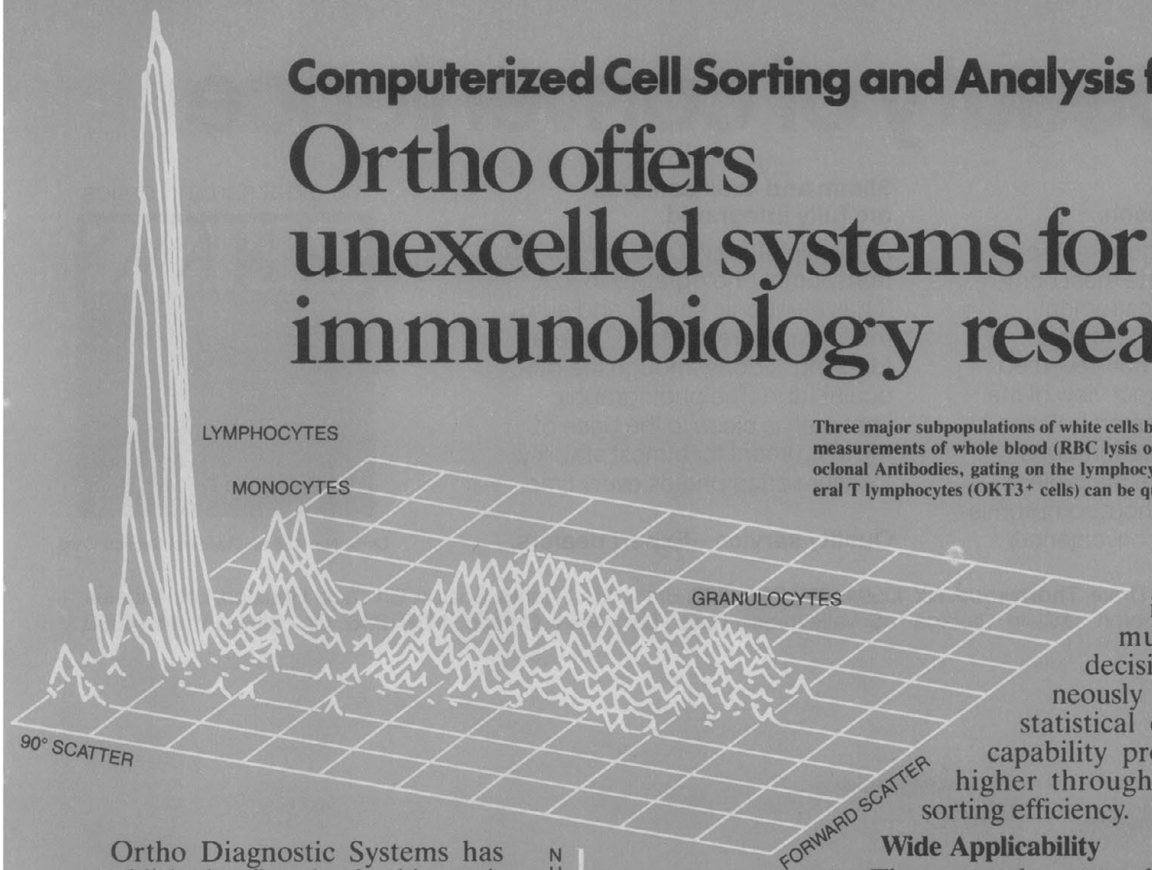
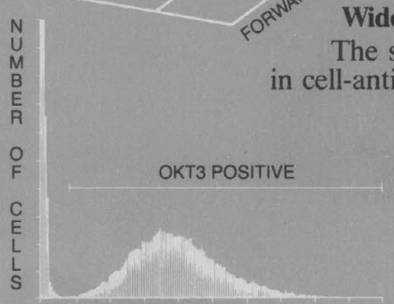


Three major subpopulations of white cells by forward and 90° light scatter measurements of whole blood (RBC lysis only). Using Ortho-mune Monoclonal Antibodies, gating on the lymphocyte population, human peripheral T lymphocytes (OKT3+ cells) can be quantitated and/or sorted.

Ortho Diagnostic Systems has established a firm leadership position in cell sorting and analysis instrumentation—in fact, acceptance of Ortho systems by the scientific community has been so great that these instruments now are considered the standard of performance in the field.



Versatile Instrumentation

The Ortho Cytofluorograf* Flow Cytometer is an example of that leadership and commitment to research. As the only flow cytometer to offer a choice of five lasers, (including two installed as standard), the Cytofluorograf provides exceptional applications flexibility.

Flexibility is enhanced further by a modular design which allows the system to be upgraded as research needs change. Performance too is outstanding with analysis rates of up to 10,000 cells per second. And only Cytofluorograf offers direct measurement of seven optical parameters including axial light loss, a valuable technique that allows the use of non-fluorescent stains.

The new 2150 Computer and software can acquire up to 16 histograms and simultaneously display any four of these, all in real-time, allowing the operator complete control over all aspects of the experiment. Because 2150 has two independent microprocessors, it can perform rapid multiparameter sort decisions while simultaneously providing complete statistical data analysis. This capability provides significantly higher throughput and increased sorting efficiency.

Wide Applicability

The system has proved extremely valuable in cell-antigen and tumor studies. It can also be employed for research into cell sizing, DNA and chromosome analysis and many aspects of cell kinetics and microbiology. The exceptional versatility of the system allows it to keep pace with the researcher's interests, never to limit them.

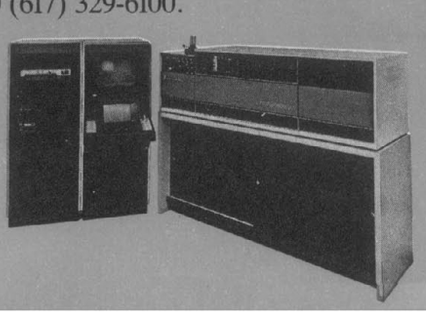
Total Professional Support

Ortho's interest in cellular biology extends beyond producing instrumentation. For example, Ortho has developed Ortho-mune* monoclonal antibodies, the first panel (for research use only) of murine monoclonal antibodies reactive with human T lymphocytes. The company maintains well-equipped applications and training laboratories to develop new techniques and to provide consultative services for customers.

The results of these investigations and others are published in Protocols so that other researchers may share the results. Free copies are available by contacting Ortho.

Ask about the Cytofluorograf Flow Cytometer, 2150 and the complete range of Ortho services. Contact Ortho Diagnostic Systems Inc., Research Instruments Division, 410 University Avenue, Westwood, MA 02090 (617) 329-6100.

Ortho Diagnostic Systems Inc.



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