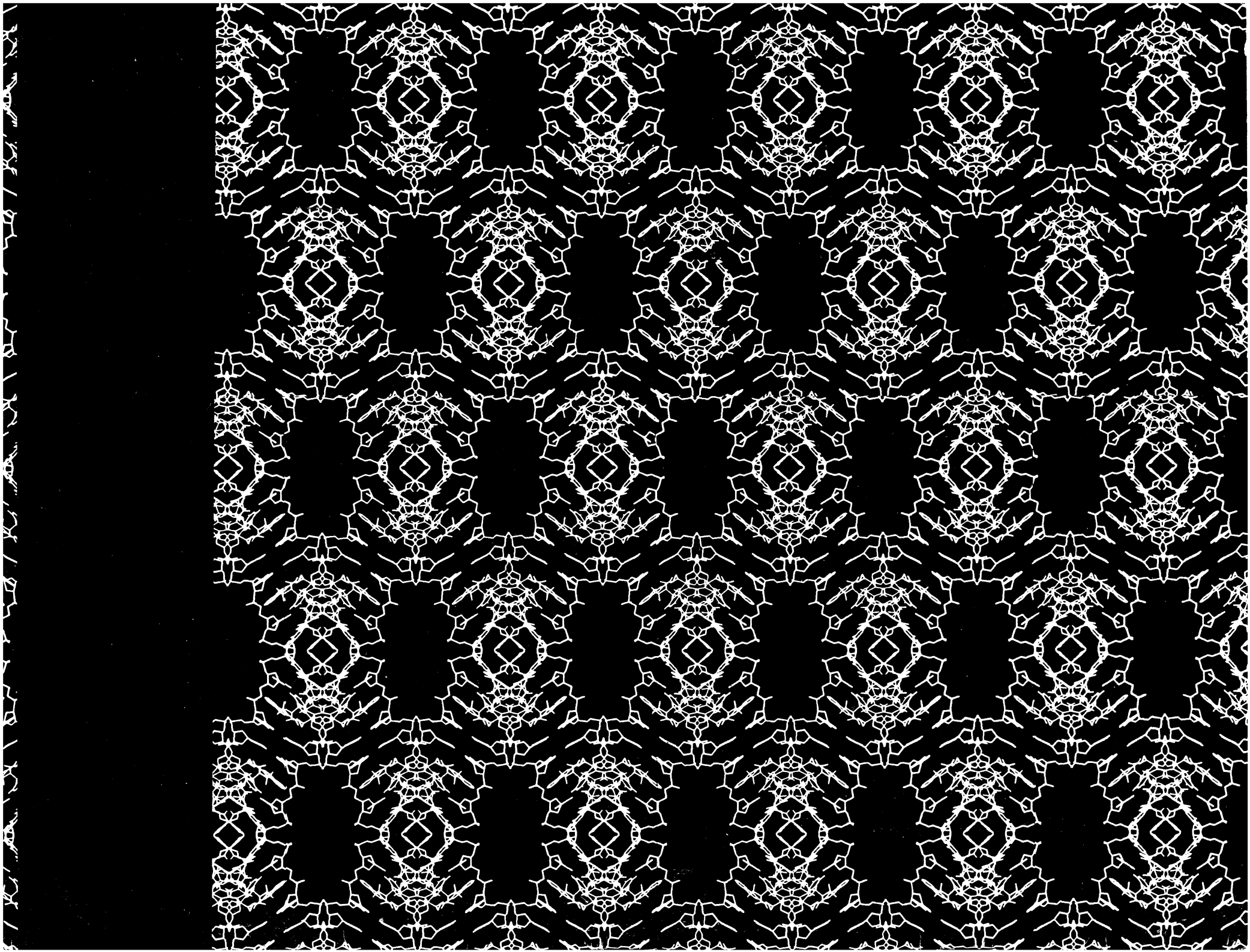

THE TJ-6 CENTRIFUGE:

Everyone says great things about it.

The TJ-6 from Beckman continues to be very popular in bioresearch, clinical and industrial labs. And users continue to tell us why, every chance they get.

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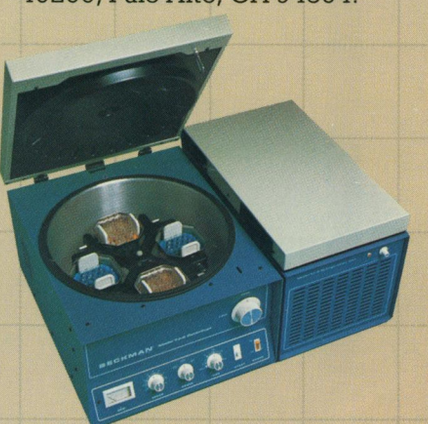
With its UL listing and CSA approval, full year warranty and seven-year rotor warranty, owners have complete confidence in the TJ-6. They're delighted with its excellent reliability, and they know that Beckman service is unsurpassed.

Users of the TJ-6R like the convenience of the frost-free refrigeration system—a first from Beckman that eliminates ice and water in the chamber and prevents sample freezing.

For a full description of the popular TJ-6 Tabletop Centrifuge, ask for brochure SB-490. Contact your local Beckman representative or write to: Beckman Instruments, Inc., P.O. Box 10200, Palo Alto, CA 94304.



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Model	Capacity/Readability	Suggested List Price
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B300D	300 g/30 g x 0.0l g/ 0.001 g	$1375
B500	500 g x 0.01 g	$1125
B1500	1500 g x 0.1 g	$ 875
B1500D	1500 g/150 g x 0.1 g/ 0.01 g	$1275
B3000D	3000 g/300 g x 0.1 g/ 0.01 g	$1375
B5000	5000 g x 0.1 g	$1075

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ISSN 0036-8075

14 September 1984

Volume 225, No. 4667

SCIENCE

SCIENCE is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. Second-class postage (publication No. 484460) paid at Washington, D.C., and at an additional entry. Now combined with **The Scientific Monthly**®. Domestic individual membership and subscription (51 issues): $56. Domestic institutional subscription (51 issues): $93. Foreign postage extra: Canada $24, other (surface mail) $27, air-surface via Amsterdam $65. First class, airmail, school-year, and student rates on request. Single copies $2.50 ($3 by mail); back issues $3 ($3.50 by mail); Biotechnology issue, $5 ($5.50 by mail); classroom rates on request. **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. The identification code for *Science* is 0036-8075/83 $1 + .10. **Postmaster:** Send Form 3579 to *Science*, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

View down the *c* axis of the crystal lattice of a triostin A–DNA complex. The DNA complex fragments stack end-to-end to make the diagonal criss-cross array. The empty spaces are solvent-filled channels parallel to the *c* axis. See page 1115. [Alexander Rich, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139]

Exxon research is today's cars by keeping

New fuels and lubricants must anticipate advancing technology and increasing performance demands.

Turbochargers, electronics, advanced transmissions, knock sensors, fuel injectors and other sophisticated devices are being rapidly incorporated into today's automobiles. While they permit more precisely controlled and optimized vehicle operation, they also place greater demands on fuels and lubricants. Keeping ahead of the changing requirements has challenged scientists and engineers at Exxon Research and Engineering Company (ER&E), and their Exxon colleagues at three major affiliated laboratories outside the U.S.

Hotter Engines

Today's engines are smaller. They operate at temperatures some 50° to 75°F hotter than their older V-8 counterparts. Turbocharged engines run even hotter. Higher temperatures can cause motor oils to oxidize faster, producing sludge and varnish deposits which thicken the oil. This in turn can lead to greater friction and increased engine wear.

In the 1970's, ER&E scientists and engineers discovered an additive technology which resulted in the first fuel-saving motor oil using oil-soluble friction modifiers. Today, they are creating new oils for the hotter engines and subjecting the most promising formulations to grueling tests.

For example, a fleet of New York taxi cabs runs on *Uniflo*® motor oil test formulations for 50,000 miles, using oil drain intervals more than twice those recommended. The taxi engines are dismantled before and after each test to measure wear on critical parts in microns, and to examine engine deposits.

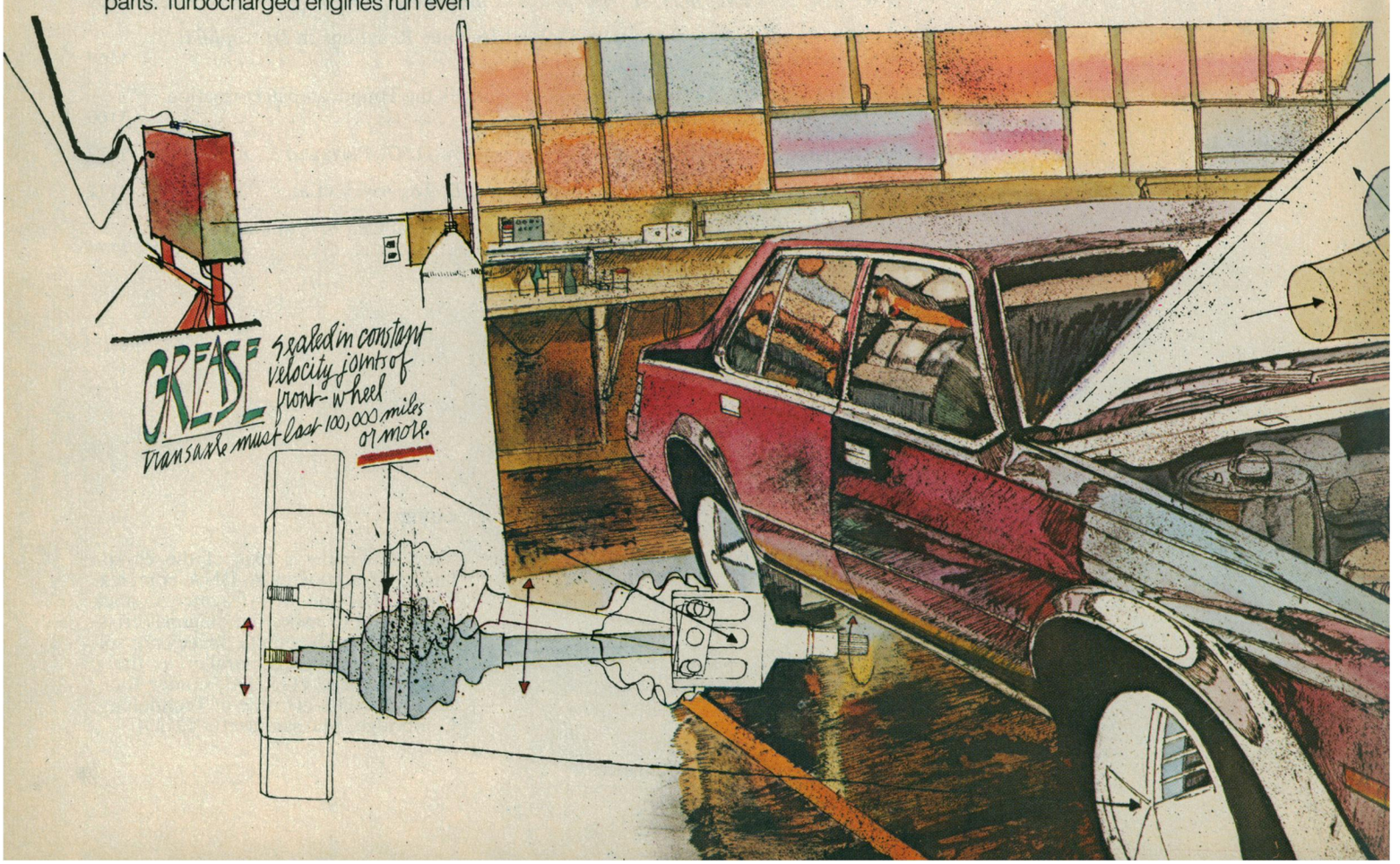
MOFT

Balancing friction and antiwear properties of an oil is a delicate task. Lower viscosity reduces friction, improves fuel efficiency and aids startability, but too low viscosity may result in excessive engine wear.

Minimum Oil Film Thickness (MOFT), a patented technique developed at ER&E, electronically measures the protective lubricant film between the bearings and crankshaft of a running engine–sometimes only a fraction of a micron thick. These measurements permit researchers to compare different oil and additive formulations in their search for better wear protection and fuel mileage.

FWD Transaxles

The heat and wear demands of "sealed for life" constant velocity joints in front-wheel transaxles posed other challenges for ER&E scientists in lubricant research. Their response, a lithium-based grease, 5191, can be found in many U.S. front-wheel-drive vehicles,



keeping ahead of an eye on tomorrow's.

withstanding temperatures up to 300°F and lasting for over 100,000 miles.

Electronic Knock Sensors

Pioneering research at ER&E demonstrated the concept of electronic knock sensors which are now being installed in many of today's cars. These sensors detect engine knock and feed the information to an on-board computer which corrects spark timing to match gasoline octane. This makes higher compression ratios feasible at any given octane level, resulting in more efficient engines.

Changing Fuels for Changing Engines

The continuing replacement of carburetors with fuel injection systems places increasing importance on fuel quality. Gum, varnish, and dirt deposits can clog the very fine holes through which the fuel is sprayed. This results in uneven distribution to some cylinders and reduced engine performance. Ongoing work at ER&E is defining the cleanliness needs of these and future systems and, in parallel, developing fuel quality features to meet those requirements.

Exxon Research and Engineering Company

Improving products for the transportation industry is just one example of the research programs under way at ER&E. A wholly owned subsidiary of Exxon Corporation, ER&E employs more than 2,000 scientists and engineers working on petroleum products and processing, pioneering science and the engineering required to develop and apply new techniques to the manufacture of fuels and other products. For more information on automotive products research or ER&E, write Dr. E. E. David, Jr., President, Exxon Research and Engineering Company, Room 201, P.O. Box 101, Florham Park, New Jersey 07932.

EXXON

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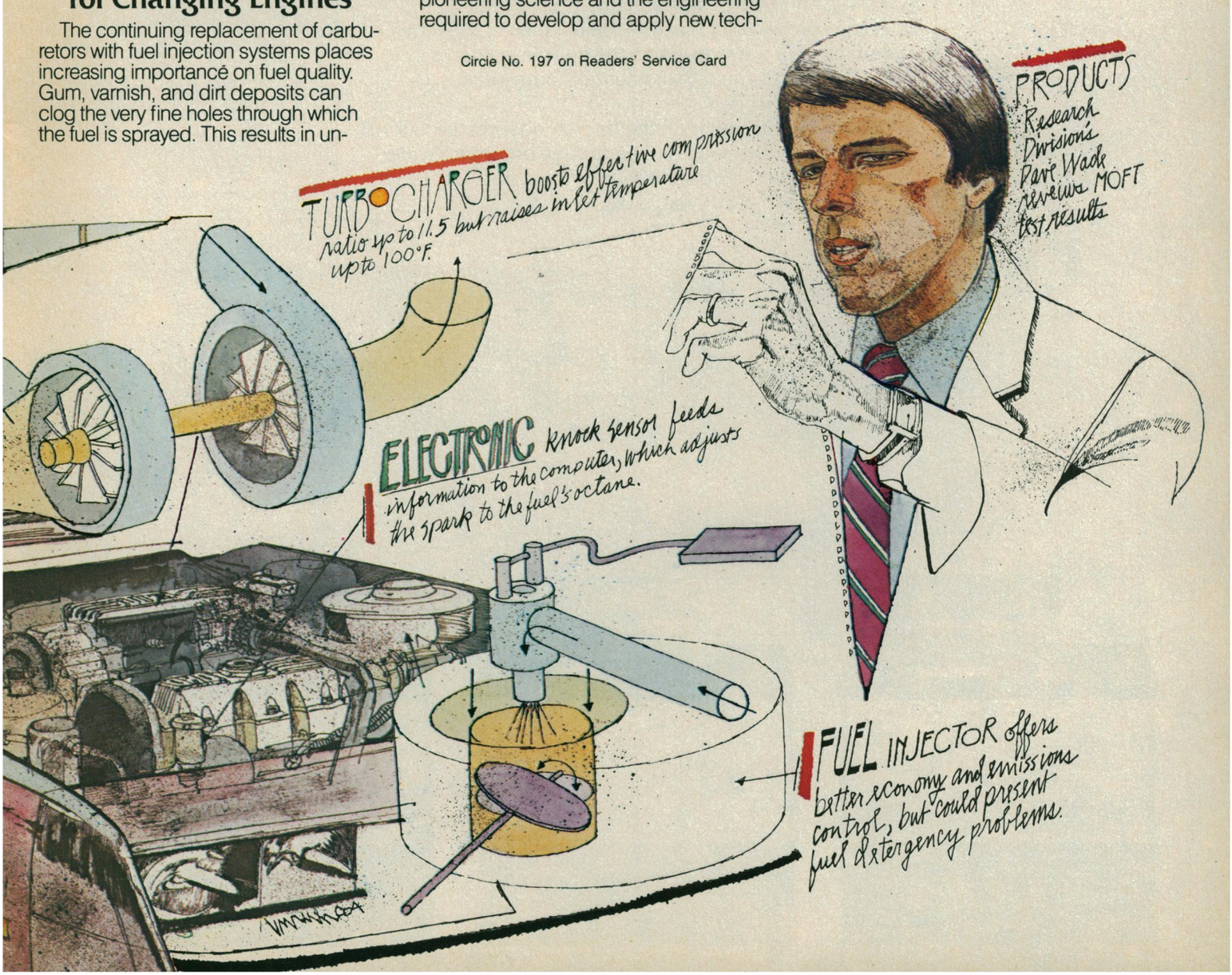

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SCIENCE//SCOPE

NASA's Project Galileo Probe, which will explore the planet Jupiter later this decade, must arrive at a precise angle if it is to carry out its measurements of the chemical composition and physical state of the Jovian atmosphere. The Hughes Aircraft Company-built probe will arrive at 107,000 miles per hour. If the probe hits at too shallow an angle, it will skip off into space; too steep, it will be reduced to ashes. Even at the proper angle, the probe will encounter extremes never before faced by spacecraft. In less than two minutes, much of the forward heat shield will be eroded by temperatures of thousands of degrees. With atmospheric entry forces reaching 360 times the gravitational pull of Earth, the 742-pound probe will take on a weight equal to an empty DC-10 jetliner. Project Galileo is scheduled to be launched from the space shuttle in May 1986 and to arrive at Jupiter in August 1988.

Improvements to a "super cooler" used with infrared sensors in space will extend the life and boost the efficiency of the device. The cooler, vital to defense applications and geological surveys, is a Vuilleumier cycle cryogenic refrigerator. It is designed to chill sensors near absolute zero to increase their sensitivity to thermal radiation. These coolers are ideal for use in space because the low internal forces required by this kind of cooling cycle cause little wear on bearings and seals. Hughes is working under a U.S. Air Force contract to extend the unattended operating life of the cooler beyond five years. The cooler will use less power, so smaller and fewer batteries will be needed to power the device during eclipse periods—a savings of hundreds of pounds.

Significant improvements in infrared simulation technology loom with the development of a device that converts complex visible scenes into infrared images. The device would at first be used for testing missile seekers and other military systems. It converts visible images into infrared by means of a modified silicon liquid-crystal light valve. The Hughes device is being developed to be fully compatible with standard video rates and computer-image generation systems.

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Hughes Missile Systems Group, located in Canoga Park, California, an attractive suburb of Los Angeles, is seeking engineers and scientists for such developmental and engineering programs as AMRAAM multimode guidance, Phoenix, and IR Maverick. Openings are in radar and electro-optical systems design, systems software and hardware/software integration, analog and digital circuits design, hybrid process engineering, systems performance, and microwave and power supply/transmitter design. Qualified applicants are assured prompt replies. Please send resume to Hughes Engineering Employment Manager, Dept. S2, Fallbrook at Roscoe, Canoga Park, CA 91304. Equal opportunity employer. U.S. citizenship required.

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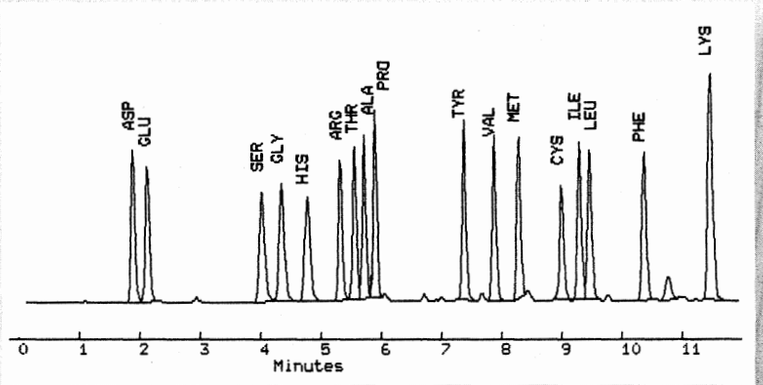
Now analyze primary and secondary amino acids with one picomole sensitivity.



Introducing Waters high-speed PICO·TAG™ method. This innovative pre-column derivatization method is pre-packaged for guaranteed results. In 15 minutes, you can run a complete compositional analysis from as little as 100 nanograms of protein, with a detection limit of one picomole. Waters provides the complete methodology, plus reagents, buffers, column, Waters HPLC System and PICO·TAG Work Station.

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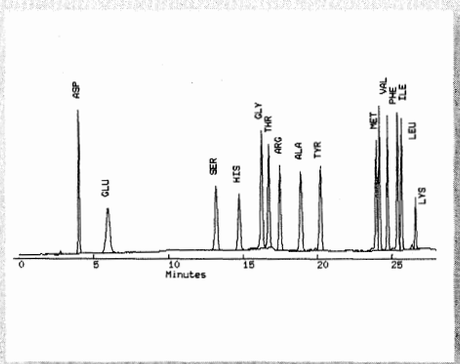

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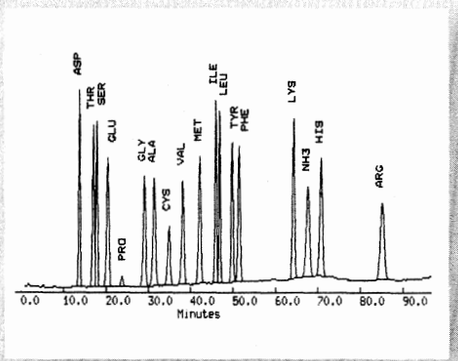

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COMPUTERS IN SCIENCE

28 October - 1 November 1984

Washington Hilton, Washington DC

Chairman: Stephen R. Heller
Environmental Protection Agency, Washington DC 20460

THEME: Workstations for the Scientist

OPENING ADDRESS

Computer Education/Literacy for the Scientists – C.D. Martin, George Washington University, Washington, D.C.

SESSION TOPICS

Scientific Data Bases – L. Gevantman, National Bureau of Standards, Washington, D.C.
Computer Aided Molecular Design – R. Potenzone Jr., American Cyanamid Co., Stamford, Conn.
Artificial Intelligence – P. Friedland, Stanford University, Stanford, CA.
Biological Workstations – P. Armstrong, Intelligenetics, Inc., Palo Alto, CA.
Management of the Electronic Laboratory – R. Dessy, Virginia Polytechnic Institute, Blacksburg, VA.
Laboratory Automation and Robotics – J. Lemanowicz, Exxon Research and Engineering, Annadale, N.J.
Workshops – Joseph L. Modelevsky, Lilly Research Labs.
Molecular Biology Software: Conventions, distribution and exchange
Molecular Biology Computing: Perils, prospects, and payoffs
* Other Workshops to be announced

POSTER SESSIONS: WORKSTATION APPLICATIONS

Participants are invited to submit abstracts for the poster sessions. These abstracts will be reviewed up until the time of the meeting; however, only those accepted by 15 September 1984 will be listed in the conference program. For abstract forms contact address listed below.

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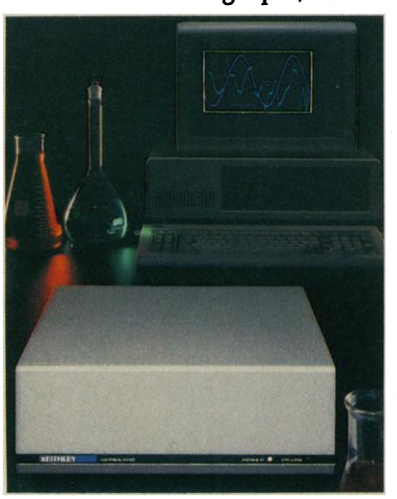

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16 Channels	Yes	Yes	+$600	+$362(2)	+$2104(3)
Instrumentation Amplifier	Yes	+$800	+$800	Yes	Yes
±0.035% Absolute System Accuracy	Yes	+$1100(4)	+$1100(4)	No	Yes(5)
30 kHz Sampling	Yes(6)	No	Yes(7)	Yes	No
High Speed Programmable Ranges	Yes	No(8)	No(8)	Yes	No
Other I/O					
5 12-Bit Voltage Outputs	Yes	+$187(9)	+$937(10)	+$937(10)	+$2500(11)
16 Digital Inputs	Yes	Yes	+$175(12)	+$330	+$530
16 Digital Outputs	Yes	Yes	+$175(12)	+$350	+$710
4 120VAC Outputs	Yes	No	No	+$638(13)	+$265(14)
System Features					
Programmable Timers	Yes	Yes	Yes	Yes	+$555
Realtime Clock	Yes	Yes	Yes	Yes	Yes
Power Supply	Yes	+$350	Yes	Yes	Yes
Software System					
Data Acquisition BASIC	Yes	Yes	Yes	Yes	No
Foreground/Background	Yes	No	Yes(15)	Yes(15)	No
Data Analysis	Yes	No	No	No	No
Realtime Graphing	Yes	Yes	Yes	Yes	No
Engineering Units	Yes	No	No	No	No
Package Price	$4800	$6387	$7887	$6277	$9654

1. System 520. 2. 16 channels of $725 32 channel card. 3. $1640 A/D card plus 16 channels of $580 20 channel card. 4. +0.003% accuracy @ 200 Hz. 5. ±0.006% accuracy @ 40Hz. 6. Apple system 27 kHz, IBM system 31.4 kHz. 7. 200 kHz option available +$3825. 8. Only available with 16-bit A/D converter with programmable gain preamplifier +$1100. 9. 1 channel from $750 4 channel card. 10. 5 channels from $750 4 channel card. 11. 5 channels from $1000 2 channel card. 12. 16 channels of $350 32 channel card. 13. Price based on 16 channel rack @ $550 plus 4 AC output relays @ $22. 14. Four channels of $525 8 channel card. 15. Or other multi-tasking structure.

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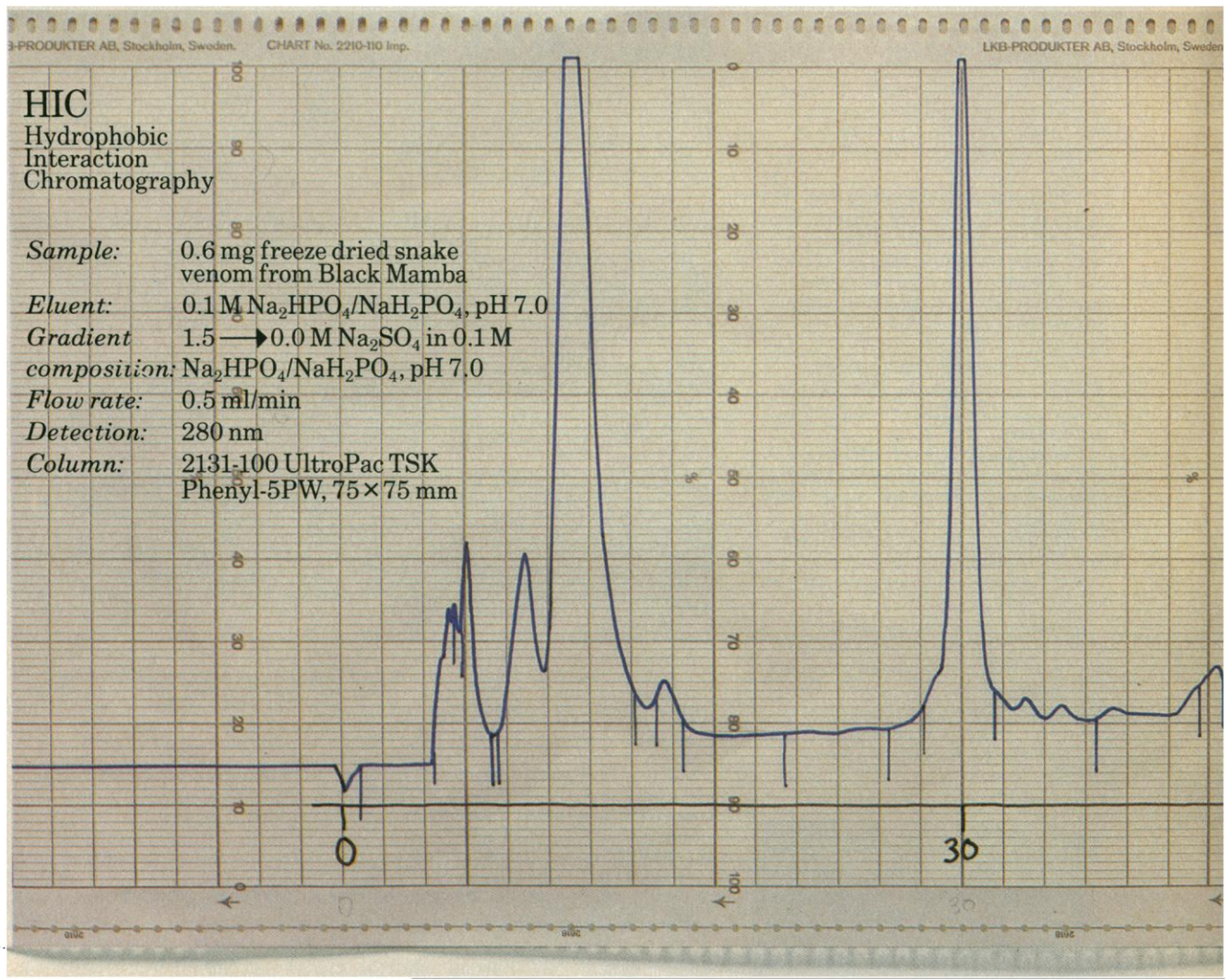
A new prot
High biological activi



The problem

Purification of proteins, peptides and nucleic acids still presents the biochemist with the problem of how to preserve high biological activity, get good resolution, and do it fast.

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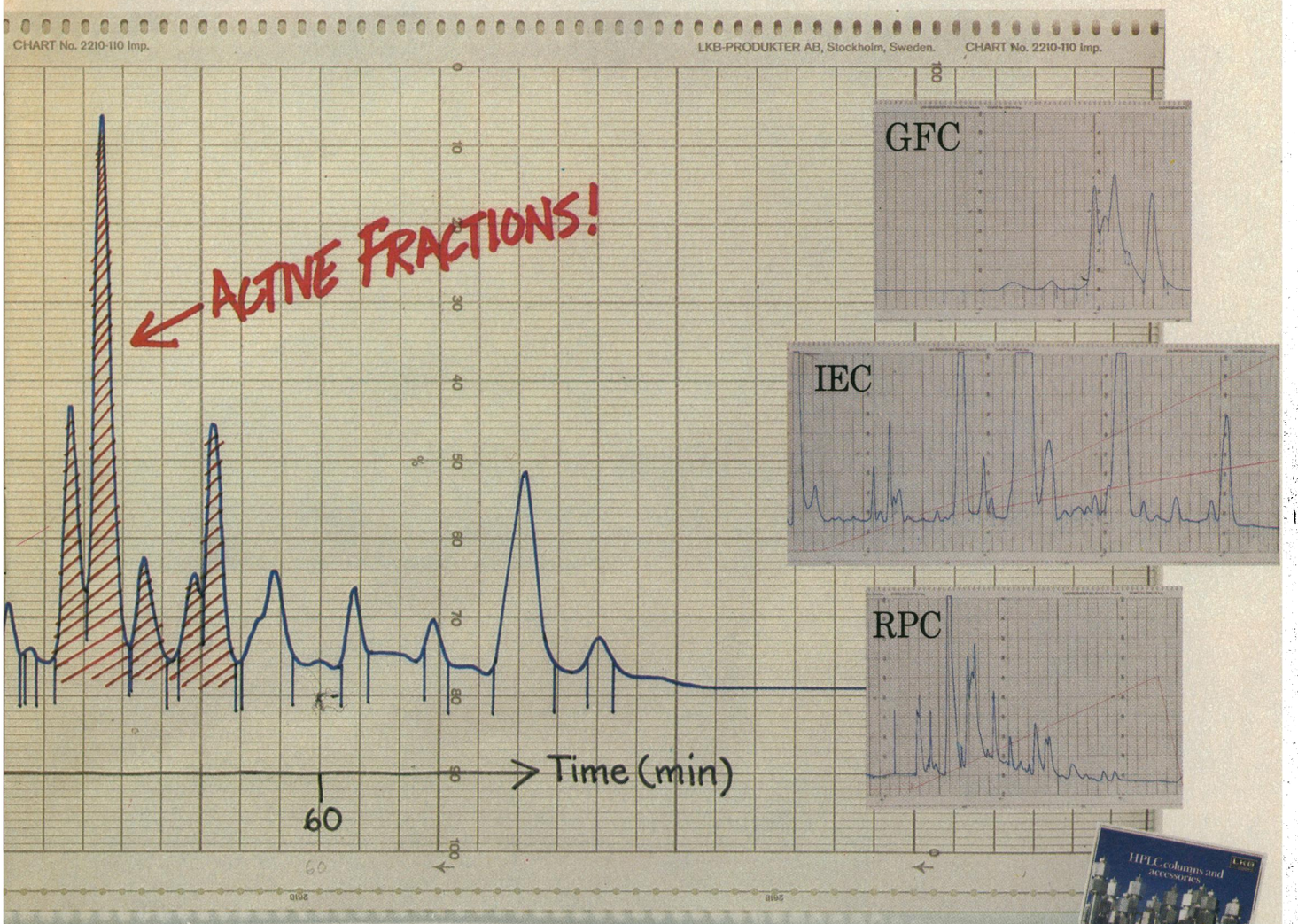

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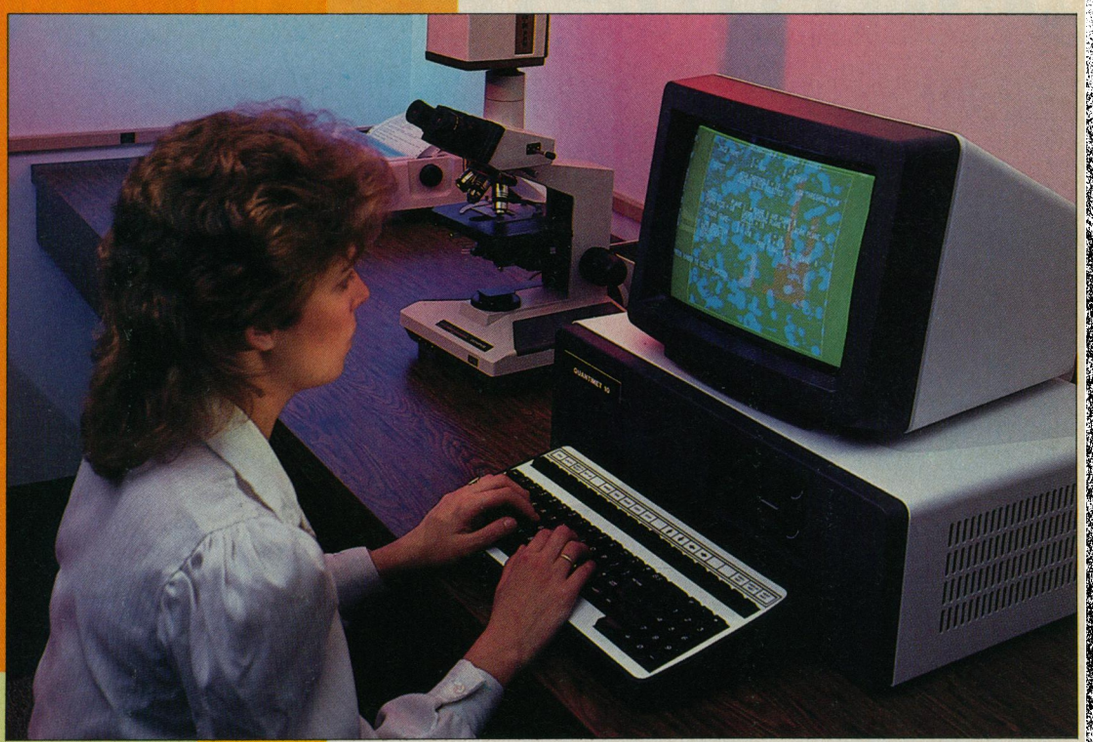

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  Horlein, D., McPherson, J., Goh, S.H., Bornstein, P.
  (1981) PNAS *78*, 6163-6167
- *In Vitro* Translation
  Kream, B.E., Rowe, D.W., Gworek, S.C., Raisz, L.G.
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- Human Lung Fibroblasts
  Breul, S.D., Bradley, K.H., Hance, A.J., Schafer, M.P., Berg, R.A., Crystal, R.G.
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"A more critical criterion of the specificity of the purified collagenase in this system is that it did not digest tryptophan-^{14}C-containing proteins isolated from guinea pig granuloma (collagen does not contain this amino acid)." Miller & Udenfriend (1970) Arch. Biochem. Biophys. **139,** 106.

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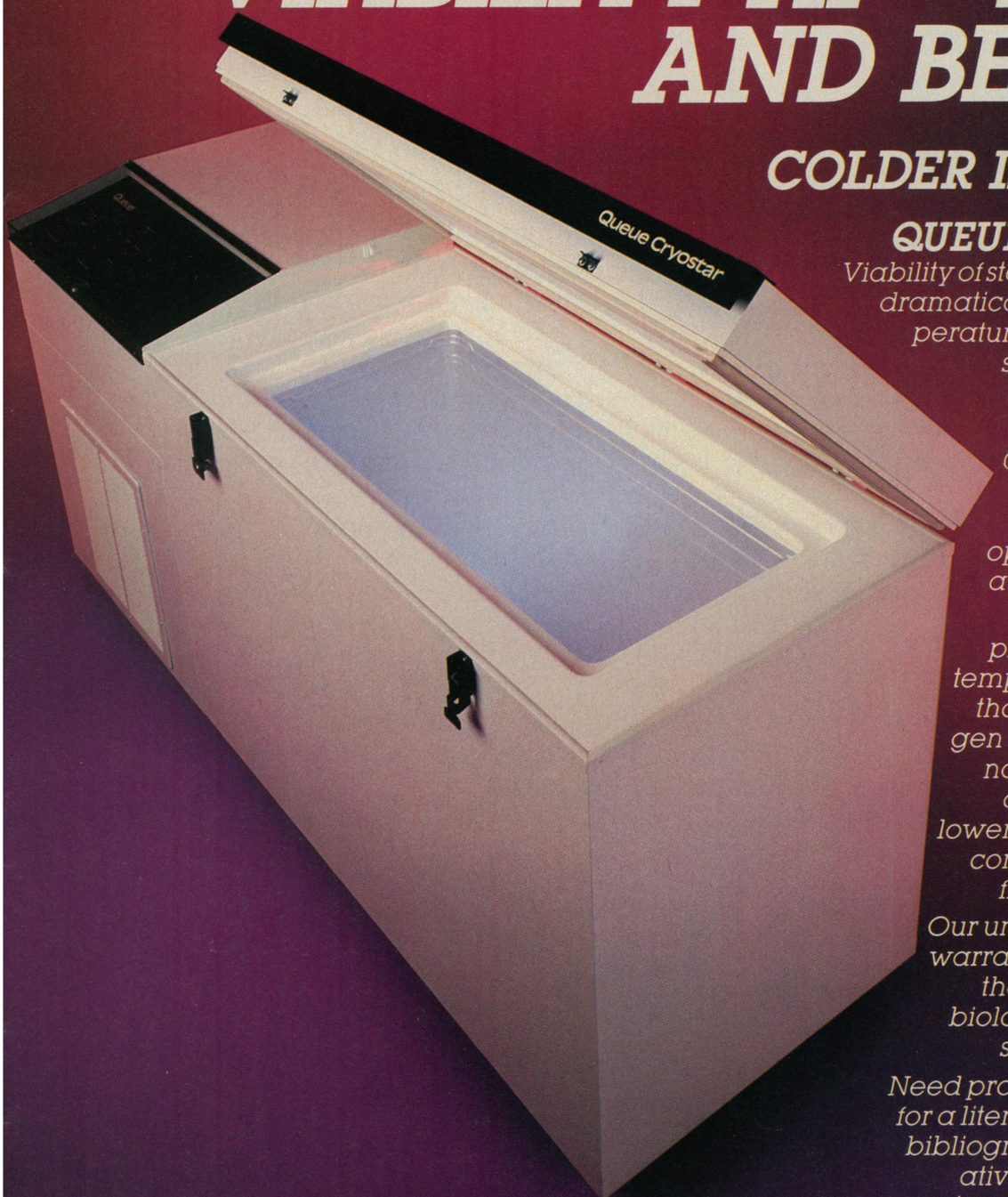

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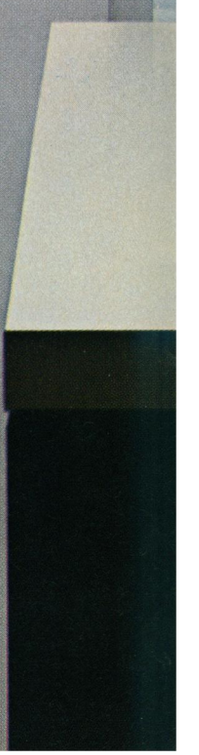

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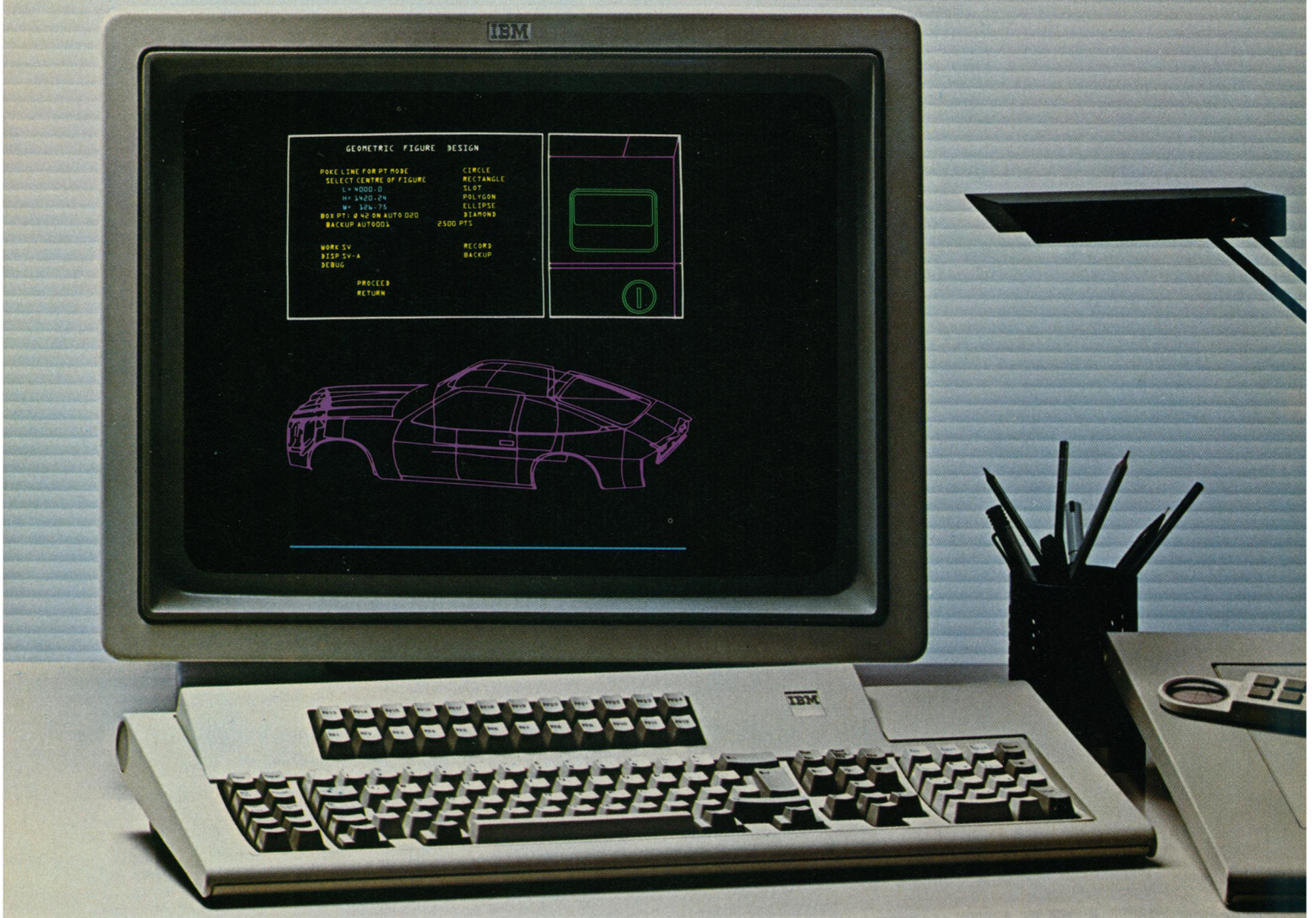

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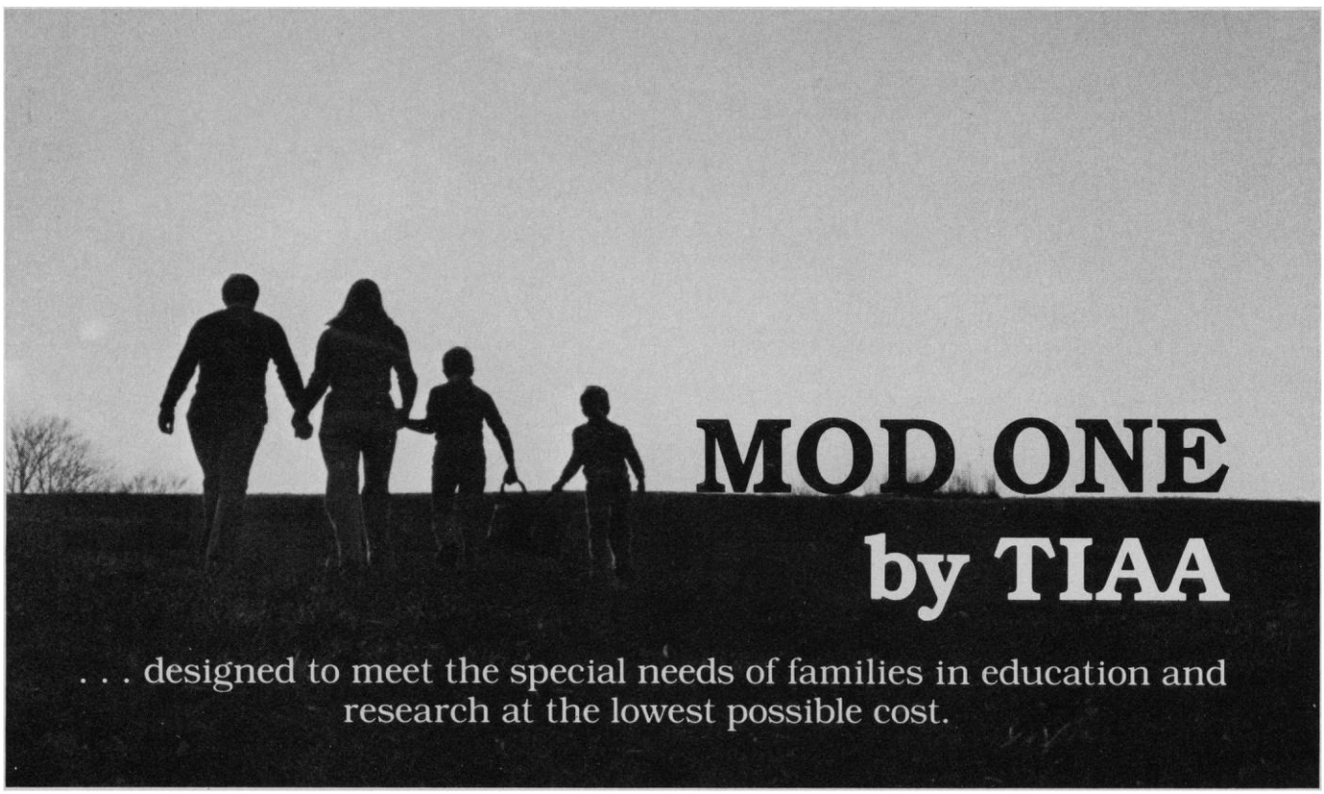

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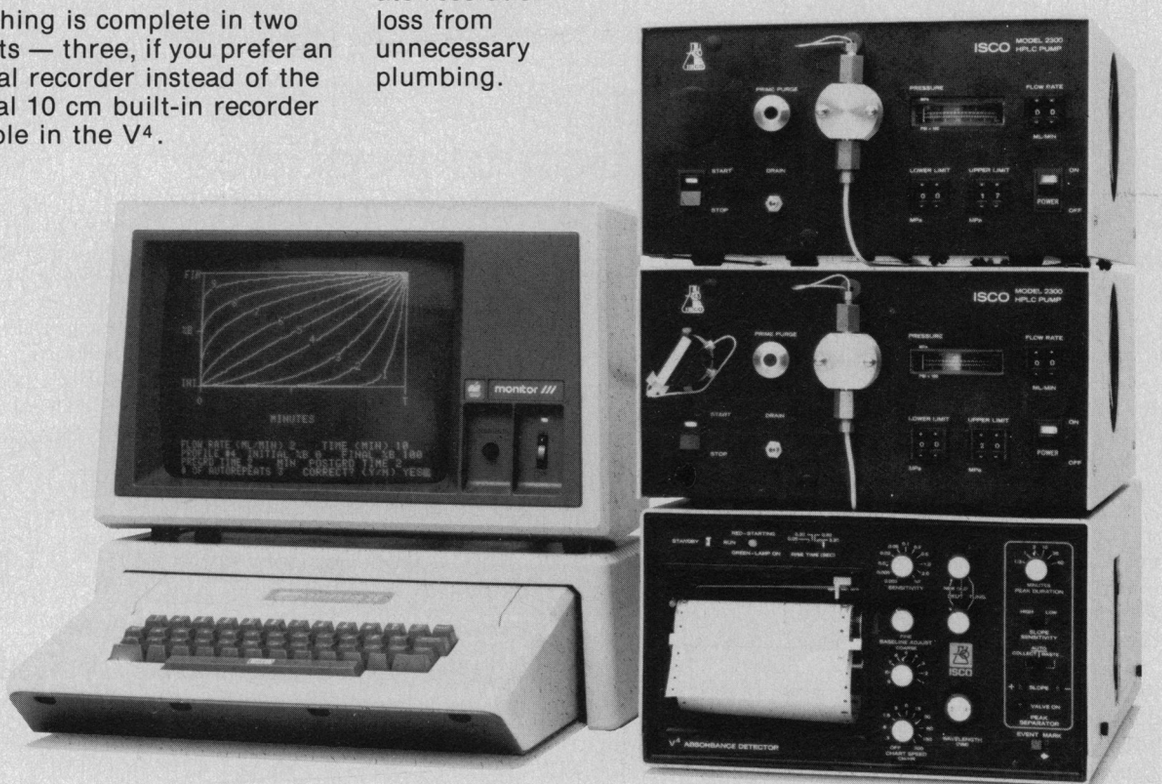

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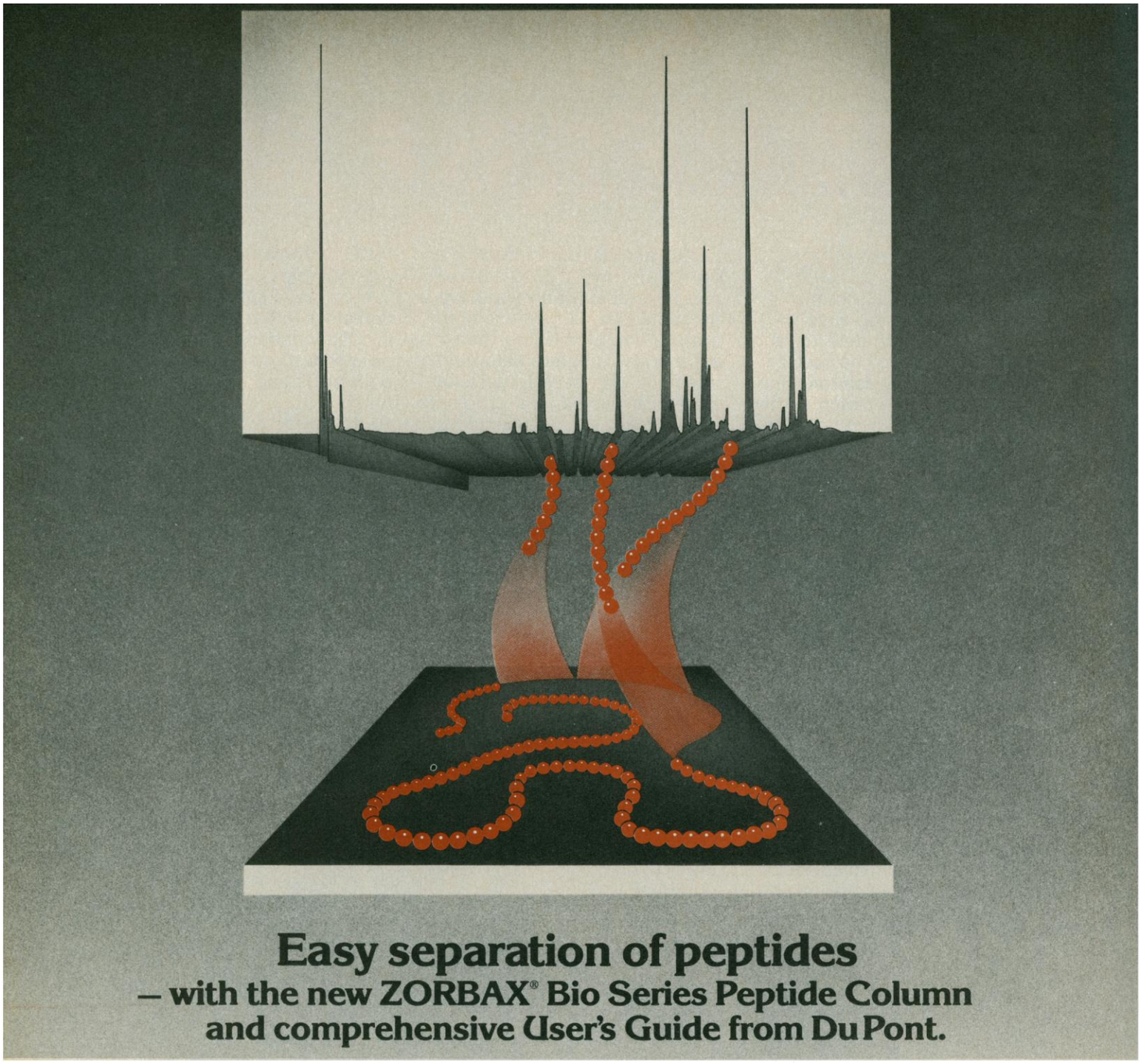

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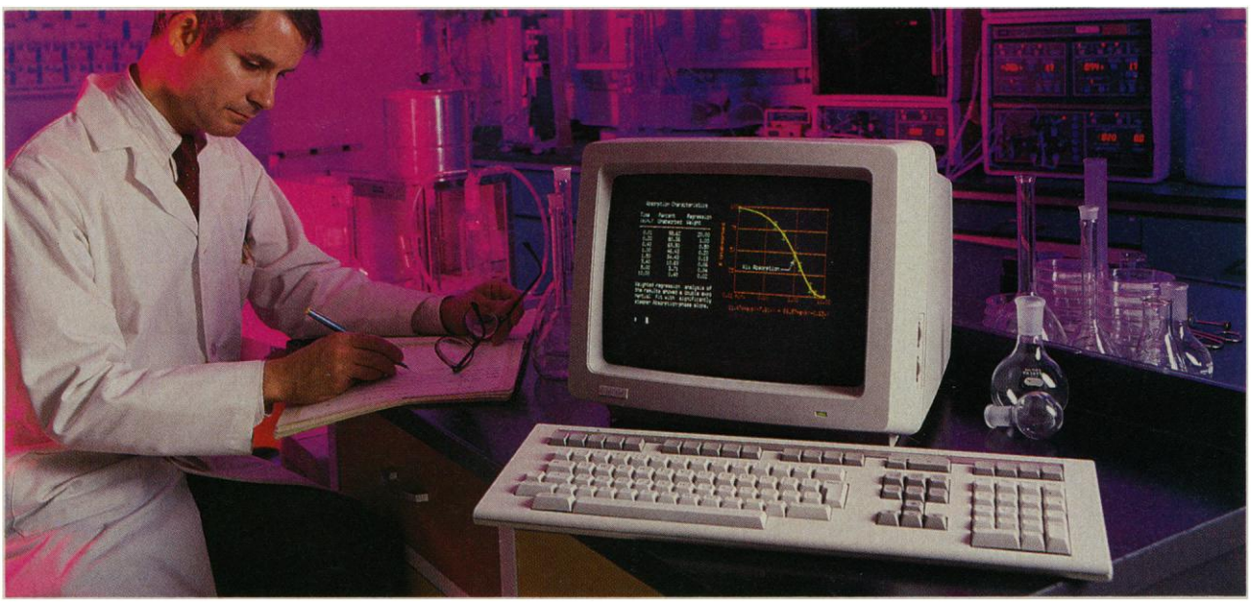

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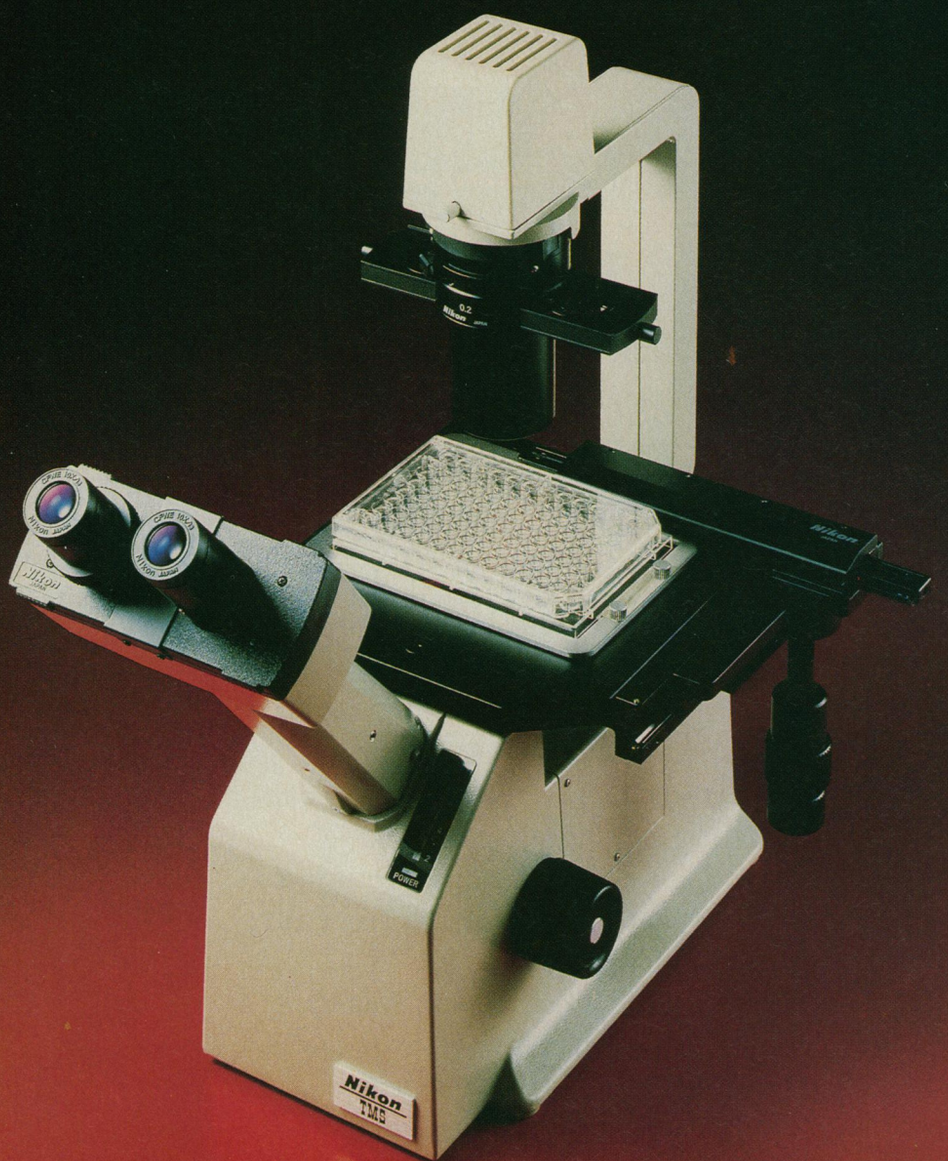

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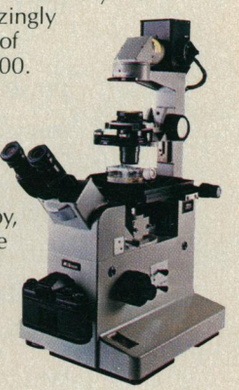

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14 September 1984, Volume 225, Number 4667 **SCIENCE**

Hemispheric Cooperation in Science

Ten years ago a new mechanism was announced for facilitating cooperation among scientists of the Western Hemisphere. Interciencia, as it came to be called, is largely an association of associations for the advancement of science. Founding members included organizations in Argentina, Brazil, Colombia, Mexico, the United States, and Venezuela. Goals announced for the Interciencia Association included the linking of the American scientific community, fostering national development and human well-being, and stimulating the formation of associations for the advancement of science.

At the start the organizers agreed on the necessity of good communication. Accordingly, one immediate objective was the creation of a trilingual journal devoted to such topics as energy, tropical agriculture, tropical diseases, and transfer of technology. This goal was achieved with most credit belonging to Marcel Roche, editor, and to the Venezuelan government, which has furnished a large fraction of needed funds. The journal has published excellent material and has appeared on its bimonthly schedule since its first issue in 1976. Circulation of the journal has not reached the levels that its quality deserves. Latin America has been suffering the worst depression in 50 years.

A second major form of communication has been 24 international symposiums organized to address pressing practical problems involving applications of science. In general, the symposium topics have been chosen and participants selected by co-arrangers from the two halves of the hemisphere. Scientists associated with the participating organizations serve as communications nodes for their countries. They are in position to identify and contact qualified talent in their respective countries.

Among some very successful symposiums was one on energy conducted at Guarujá, Brazil, in 1978 and a second on biotechnology held in 1983 in Costa Rica. The sessions on energy, which lasted nearly a week, were attended by about 100 invited participants from 16 countries. The symposium on biotechnology was of great interest to the participants and to their countries. An expert from a leading U.S. biotechnology company has written, "The quality, energy, and enthusiasm of the participants in the symposium were most impressive. My initially skeptical attitude about how much could be accomplished through such a meeting has been transformed into a real conviction that there is a great deal of value which can be accomplished at relatively low cost in developing biotechnology in the Americas. I believe the Interciencia conference will have played a vital role in catalyzing this development."

Attempts to encourage formation of associations for the advancement of science have met with mixed success. On the positive side has been the adherence of Canada, Jamaica, Peru, and the National Research Council of Costa Rica. Efforts begun in several other countries have been delayed by political uncertainties.

The most recent initiative of Interciencia Association is the linking of research institutions in the hemisphere to promote utilization of lesser known trees and plants of promising economic potential. Known as PIRB (Interciencia Biological Resources Program), this is a cooperative venture to uncover new sources of food, energy, chemicals, and materials and will be coordinated from Colombia.

Interciencia Association* has survived during difficult times and has made effective use of limited resources. It has been a catalyst in bringing scientists of the hemisphere together. It has been especially useful in fostering cooperation among Latin American scientists. To achieve greater effectiveness will require the participation of more scientists and obtaining the requisite financial support.—PHILIP H. ABELSON

*The first presidents of Interciencia Association were Oscar Sala, Universidade de São Paulo (1975–1979), and Leonard M. Rieser, Dartmouth College (1979–1983). The current president is Michel Bergeron, Faculty of Medicine, University of Montreal, Montreal, Quebec H3C 3T8. The executive director is James W. Rowe, AAAS, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036.

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