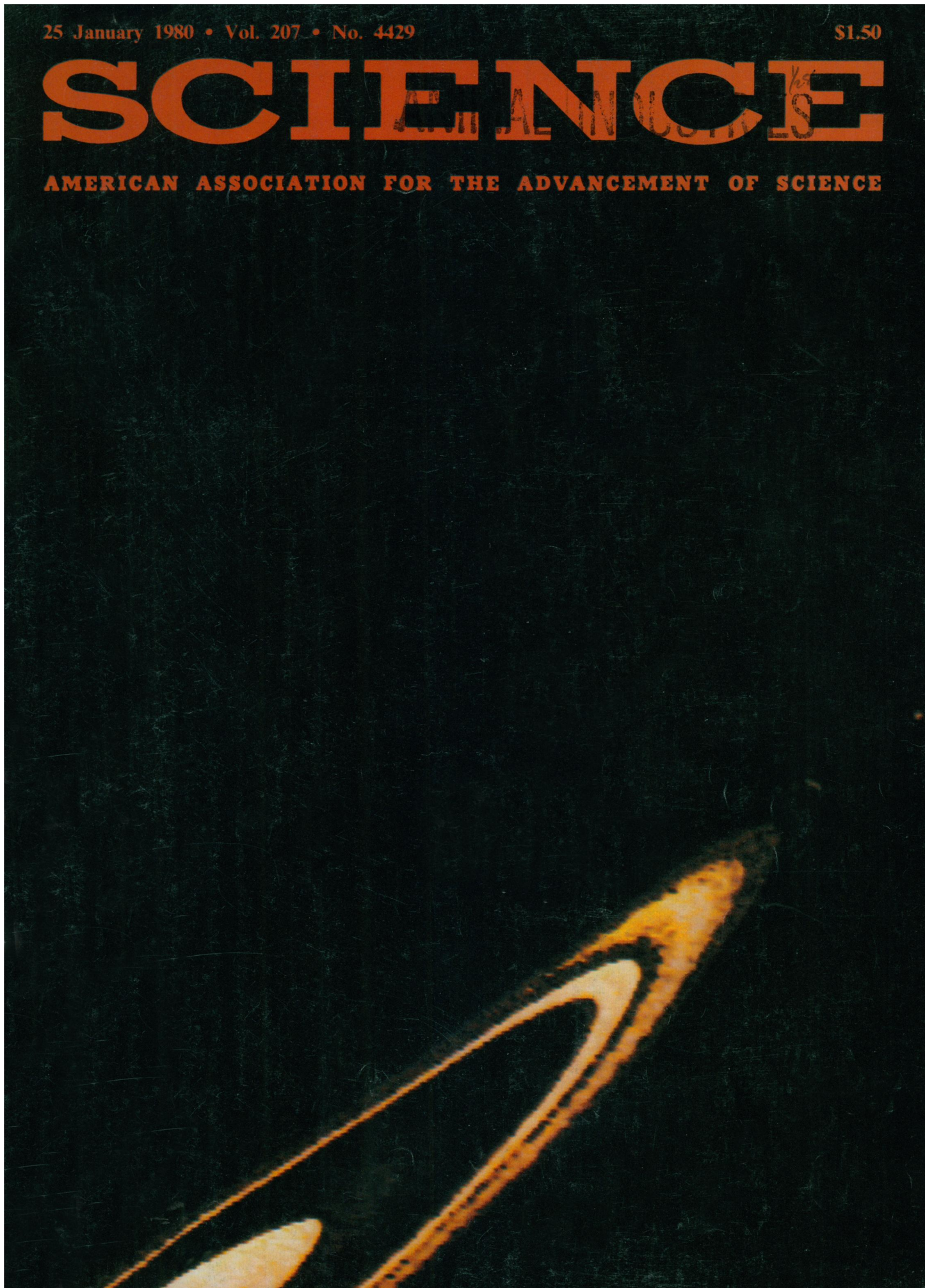


25 January 1980 • Vol. 207 • No. 4429

\$1.50

SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Now you can choose from two series of Beckman ultracentrifuges.

L8's—The Most Advanced

The results of six years of intensive research, the Model L8's are so remarkable, so advanced that they introduce a new era in preparative ultracentrifugation.

Discover features like the Ultra-8™ drive, a frequency-controlled induction motor that drives the rotor directly from *inside* the vacuum system. We warrant the complete Ultra-8 drive for 16 billion revolutions!

Microprocessor Control lets you select rotor speed, run time, and other parameters by a finger touch control panel — no knobs or switches.

The Memory-Pac™ Programmable Module is the ultimate in automation. You can program/reprogram it in seconds. For duplicate runs using the same rotor speed, temperature, etc., just insert it in the L8: you get error-free runs with no time spent in setups.

There's a Dry Cycle to remove moisture from the chamber, an ω^2t Integrator with recall capability, built-in slow-start programs, and internal diagnostic systems for simple servicing.

Choose from three models up to 80,000 rpm — only available in the Beckman L8 series.

L5B's—Efficient, economical

The Model L5B's have a host of proven features for separating your samples rapidly and economically. They give you convenience in the Automatic mode, with flexibility in the Manual mode.

A Dry Cycle keeps moisture out of the rotor chamber keeping your ultracentrifuge always ready to run — the next hour or the next day.

0 to 40°C operation lets you run physiological samples at body temperature, increasingly important in a variety of research. And the L-5B drive is powerful and efficient with its DC electric design.

Four models are available, from 50,000 rpm to 75,000 rpm.

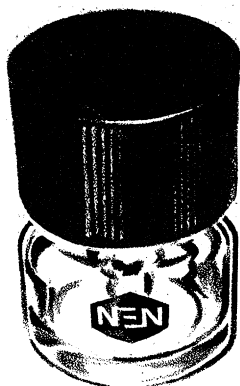
For information on the L8, write for Brochure SB-580; for the L-5B, write for Brochure SB-540 — to Beckman Instruments, Inc., Spinco Division, 1117 California Avenue, Palo Alto, CA 94304.



BECKMAN

Circle No. 11 on Readers' Service Card





THE NEW CATALOG
IS OFF THE PRESS.
WATCH FOR YOUR COPY.

NEW! Estradiol [¹²⁵I] FROM NEN!

Straightforward gamma counting,
more sensitive than ³H
Highly specific for the estrogen receptor
Low non-specific binding

Iodo-3,17β-estradiol, 16α-[¹²⁵I]-
~200Ci/mmol NEX-144L
>1000Ci/mmol NEX-144
Ethanol, in dry ice
10μCi 2x10μCi 50μCi 2x50μCi

Circle No. 133 on Readers' Service Card

1α, 25- Dihydroxyvitamin D₃ [³H] >130Ci/mmol

ACTIVE VITAMIN D₃ METABOLITE
FOR RECEPTOR BINDING STUDIES

Dihydroxyvitamin D₃, 1α, 25-[³H]-
>130Ci/mmol
Toluene:ethanol, 1:1, in sealed ampoule
under argon, in dry ice.
NET-626 5μCi

ALSO AVAILABLE:

Hydroxyvitamin D₃, 25-[³H]- NET-349

Circle No. 134 on Readers' Service Card

EXCLUSIVE Protease Substrates

Casein, [methyl-¹⁴C] methylated α-	NEC-735
Collagen, [methyl-¹⁴C] methylated-	NEC-729
Elastin, [methyl-¹⁴C] methylated	
soluble-	NEC-734
Methemoglobin, [methyl-¹⁴C]	
methylated-	NEC-728
Protein, [¹⁴C (U)]-(E. coli)	NEC-737

Contact NEN for detailed procedures developed or
modified by our staff scientists.

Circle No. 135 on Readers' Service Card

Exclusive STEROID ANALOGS

Ligands of choice for the study of the androgen,
progesterone, and estrogen receptors, respectively.
Cold material also available.

Methyltrienolone, [17α-methyl-³H]- (R1881*)
70-87Ci/mmol
NET-590 250μCi 1mCi

Promegestone, [17α-methyl-³H]- (R5020*)
70-87Ci/mmol
NET-555 250μCi 1mCi

Moxestrol, [11β-methoxy-³H]- (R2858*)
70-90Ci/mmol
NET-622 250μCi 1mCi

*Under licensed agreement of ROUSSEL-UCLAF.

Circle No. 136 on Readers' Service Card

8-ARGININE [¹²⁵I] VASOPRESSIN >95% MONOIODINATED

- From stock • Tested for binding and displacement in a specific RIA
- Purified by high pressure liquid chromatography

Vasopressin, 8-arginine, [¹²⁵I]-

>500μCi/μg
0.05M Sodium phosphate buffer (pH 7.4)
containing a stabilizer and proteolytic enzyme
inhibitor, in dry ice.

NEX-128 10μCi 2x10μCi 50μCi 2x50μCi

Circle No. 141 on Readers' Service Card

Not for use in humans or clinical diagnosis.

NEN New England Nuclear
®
549 Albany Street, Boston, Mass. 02118
Call toll-free: 800-225-1572
(In Massachusetts and International: 617-482-9595)

NEN Chemicals GmbH: D-6072 Dreieich, W. Germany, Postfach 401240,
Telephone: (06103) 85034, Telex: 4-17993 NEN D

NEN Canada Ltd., 2453 46th Avenue, Lachine, Que. H8T 3C9,
Telephone: 514-636-4971, Telex: 05-821808

SCIENCE

LETTERS	Generic Prescriptions: <i>P. S. Miller</i> ; Near-Infrared Microscopy: <i>W. A. Hagins</i> ; Priority?: <i>C. Sances</i>	358
EDITORIAL	Currency in Subject Matter: <i>E. J. Kormondy</i>	365
ARTICLES	Power Plant Cooling Systems: Policy Alternatives: <i>J. Z. Reynolds</i>	367
	Synthesis, Transport, and Release of Posterior Pituitary Hormones: <i>M. J. Brownstein, J. T. Russell, H. Gainer</i>	373
	Research, Innovation, and University-Industry Linkages: <i>D. J. Prager</i> and <i>G. S. Omenn</i>	379
NEWS AND COMMENT	Academy Energy Report Stresses Conservation	385
	UN at Odds over Science Center	387
	Carter Awards Science Medal	387
	<i>Briefing</i> : Fear of Spies Cuts Short Industry Tour; Paranormal Powers Are So Much Hocus-Pocus; History of Science Losing Its Science	388
	Religious Groups Unite Behind Banner of Conservation, Renewable Energy Sources	390
RESEARCH NEWS	Genes in Pieces	392
	Ozone Depletion Would Have Dire Effects	394
BOOK REVIEWS	The Basin of Mexico, reviewed by <i>R. N. Zeitlin</i> and <i>J. F. Zeitlin</i> ; Interacting Bosons in Nuclear Physics, <i>A. Klein</i> ; Primate Ecology and Human Origins, <i>R. H. Tuttle</i> ; Barrier Island, <i>O. H. Pilkey</i>	396

BOARD OF DIRECTORS

KENNETH E. BOULDING
Retiring President, ChairmanFREDERICK MOSTELLER
PresidentD. ALLAN BROMLEY
President-ElectELOISE F. CLARK
MARTIN M. CUMMINGSRENÉE C. FOX
NANCIE L. GONZALEZ

CHAIRMAN AND SECRETARIES OF IAAAS SECTIONS

MATHEMATICS (A)
Herbert B. Keller
Ronald GrahamPHYSICS (B)
William M. Fairbank
Rolf M. SinclairCHEMISTRY (C)
H. S. Gutowsky
William L. JollyASTRONOMY (D)
Tobias Owen
Donat G. WentzelPSYCHOLOGY (J)
Lloyd G. Humphreys
Meredith P. CrawfordSOCIAL AND ECONOMIC SCIENCES (K)
Kingsley Davis
Gillian LindtHISTORY AND PHILOSOPHY OF SCIENCE (L)
Brooke Hindle
Diana L. HallENGINEERING (M)
H. Norman Abramson
Donald E. MarloweEDUCATION (Q)
Joseph D. Novak
Roger G. OlstadDENTISTRY (R)
Robert J. Genco
Harold M. FullmerPHARMACEUTICAL SCIENCES (S)
David A. Knapp
Robert A. WileyINFORMATION, COMPUTING, AND COMMUNICATION (T)
Henry M. Kissman
Madeline M. Henderson

DIVISIONS

ALASKA DIVISION

Daniel B. Hawkins
PresidentT. Neil Davis
Executive Secretary

PACIFIC DIVISION

William L. Sims
PresidentAlan E. Leviton
Executive Director

SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

Henry J. Shine
PresidentM. Michelle Balcomb
Executive Officer

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*. Copyright © 1980 by the American Association for the Advancement of Science. Domestic individual membership and subscription (51 issues): \$34. Domestic institutional subscription (51 issues): \$70. Foreign postage extra: Canada \$12, other (surface mail) \$15, air-surface via Amsterdam \$40. First class, airmail, school-year, and student rates on request. Single copies \$1.50 (\$2 by mail); back issues \$2.50 (\$3 by mail); classroom rates on request. **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. **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

REPORTS	Pioneer Saturn: <i>J. W. Dyer</i>	400
	Scientific Results from the Pioneer Saturn Encounter: Summary: <i>A. G. Opp</i>	401
	Preliminary Results on the Plasma Environment of Saturn from the Pioneer 11 Plasma Analyzer Experiment: <i>J. H. Wolfe et al.</i>	403
	Saturn's Magnetic Field and Magnetosphere: <i>E. J. Smith et al.</i>	407
	Saturnian Trapped Radiation and Its Absorption by Satellites and Rings: The First Results from Pioneer 11: <i>J. A. Simpson et al.</i>	411
	Saturn's Magnetosphere, Rings, and Inner Satellites: <i>J. A. Van Allen et al.</i>	415
	Observations of Energetic Ions and Electrons in Saturn's Magnetosphere: <i>J. H. Trainor, F. B. McDonald, A. W. Schardt</i>	421
	Trapped Radiation Belts of Saturn: First Look: <i>W. Fillius, W. H. Ip, C. E. McIlwain</i>	425
	Ultraviolet Photometer Observations of the Saturnian System: <i>D. L. Judge, F.-M. Wu, R. W. Carlson</i>	431
	Imaging Photopolarimeter on Pioneer Saturn: <i>T. Gehrels et al.</i>	434
	Pioneer Saturn Infrared Radiometer: Preliminary Results: <i>A. P. Ingersoll et al.</i>	439
	Impact of Saturn Ring Particles on Pioneer 11: <i>D. H. Humes et al.</i>	443
	The Magnetic Field of Saturn: Pioneer 11 Observations: <i>M. H. Acuña and N. F. Ness</i>	444
	Vertical Structure of the Ionosphere and Upper Neutral Atmosphere of Saturn from the Pioneer Radio Occultation: <i>A. J. Kliore et al.</i>	446
	Pioneer Saturn Celestial Mechanics Experiment: <i>J. D. Anderson et al.</i>	449

PRODUCTS AND MATERIALS	Digestor; Specimen Dryer; Fluorometric Detector; Titrator; Microcarrier; Perchloric Acid Fume Hood; Literature	454
-------------------------------	---	-----

ALVA J. HARRISON PRESIDENT W. PETERSON	JOHN C. SAWHILL HARRIET ZUCKERMAN	WILLIAM T. GOLDEN Treasurer	WILLIAM D. CAREY Executive Officer
PHYSICS AND ASTRONOMY (E) Mrs. Malkin Curtis Mrs. E. Bisque	BIOLOGICAL SCIENCES (G) Thomas Eisner Walter Chavin	ANTHROPOLOGY (H) Edward I. Fry Priscilla Reining	
MEDICAL SCIENCES (N) Philip K. Bondy Mrs. M. Lowenstein	AGRICULTURE (O) Roger L. Mitchell Coyt T. Wilson	INDUSTRIAL SCIENCE (P) John D. Caplan Robert L. Stern	
STATISTICS (U) Carol Kempthorne John Glaser	ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W) Edward S. Epstein Glenn R. Hilst	GENERAL (X) Vera Kistiakowsky S. Fred Singer	

COVER

Discovery picture of the F ring of Saturn and of satellite 1979 S 1 (outside the main ring). See page 434. [NASA/Ames Research Center and University of Arizona, Tucson]

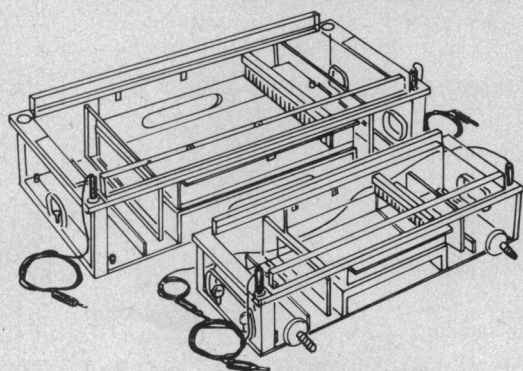
The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

FOR A SMALL COMPANY, WE OFFER BIG THINGS IN TRANSFER TECHNOLOGY.

At BRL®, we have everything you need in transfer technology. From restriction enzymes through final transfer of DNA, RNA, or protein.

We're confident of these products because we use them ourselves. In a working lab just like yours.

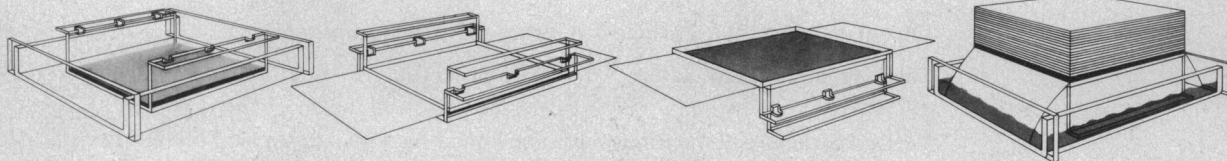
BRL TRANSFER TECHNOLOGY SYSTEM.



Separation – Gel Electrophoresis Systems.

Our Horizontal Gel Electrophoresis Systems give you excellent nucleic acid and protein separations, as well as simplified nucleic acid blot transfers.

Major features include two gel sizes, variable gel thickness and sample capacity, removable UV transparent tray, safety interlock lid, plus optional buffer cycling.



Transfer – BRL Blot Transfer System; DNA, RNA and protein.

Introducing a new way to carry out filter blot transfers. With this system, you can transfer from agarose or polyacrylamide gels. Transfer is easier, convenient, and systematic. Plus there's less chance of damaging the gel, since it's supported in a special tray.

Our Blot Transfer System comes with nitrocellulose filters and/or ABM-Cellulose paper. In convenient pre-cut sizes, both save time and money.

Hybridization Probe – Nick Translation Kit.

BRL has assembled the enzymes and non-radioactive reagents for nick translation of DNA. With *your* radioisotope and the tested components of our kit, high specific activity radio labeling of hybridization probe is assured.

For further information or to order, call toll-free 800-638-8992. In Maryland 301-840-8000, or write: Bethesda Research Labs, P.O. Box 6010, Rockville, Maryland 20850.



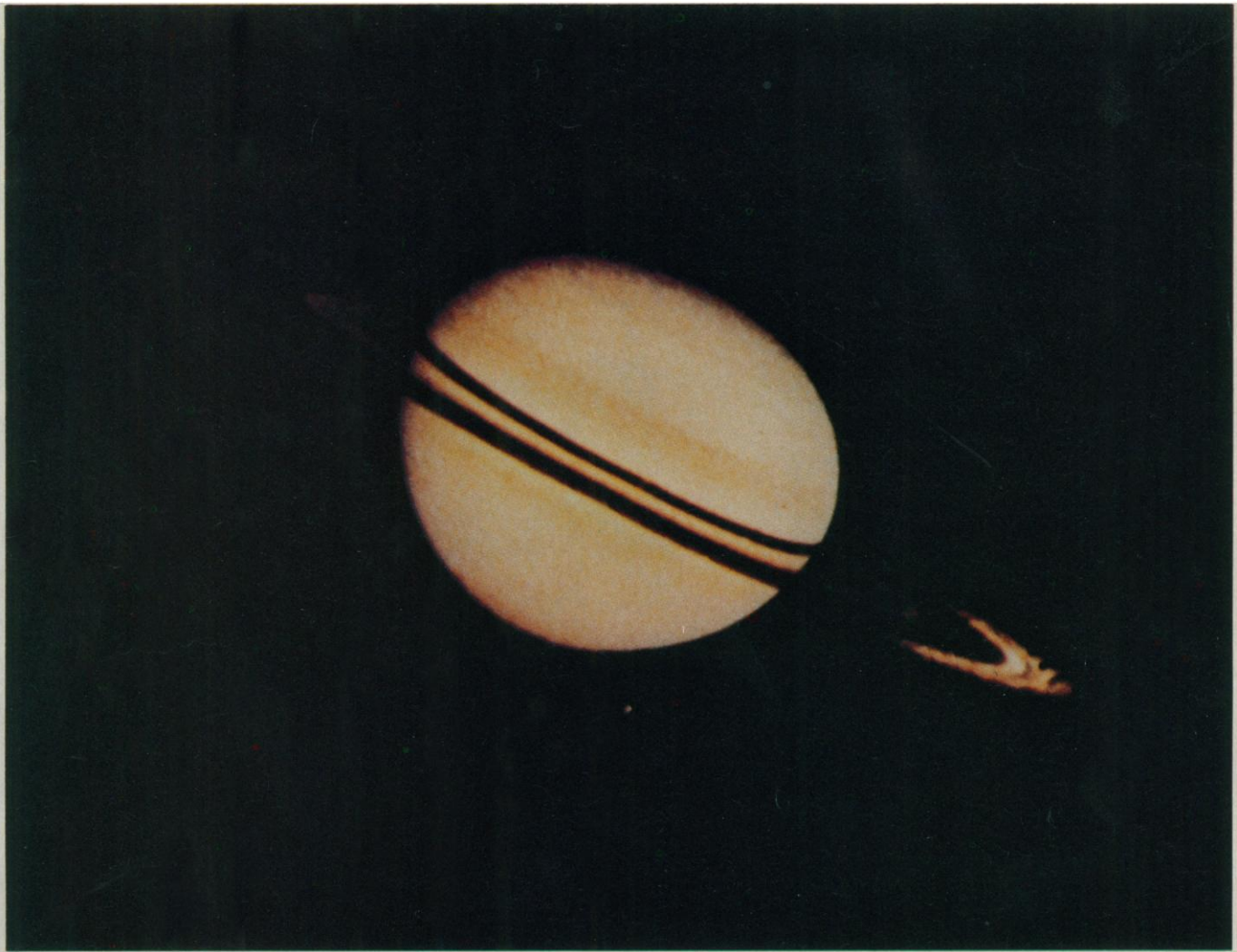
Most people don't expect products like these from a company our size. The way we look at it, you get the best of both worlds. Proven products. Plus personal, expert service.

BRL
Bethesda Research Laboratories, Inc.
411 North Stonestreet Avenue, Rockville, MD 20850 • (800) 638-8992

"THE MOLECULAR BIOLOGY COMPANY"

Circle No. 196 on Readers' Service Card

FIRST TO SATURN



Firsts. Pioneer 11 grazed Saturn's rings on September 1, 1979, right on target, 6 years after departing Earth and almost 5 years after rounding the Jupiter pylon. A twin, Pioneer 10, launched 7 years ago, had been the first to cross Mars orbit, traverse the asteroid belt, reconnoiter Jupiter, return photos, and use its gravity-assist to alter course. Developed for NASA's Ames Research Center by TRW to do outer-planet science, Pioneers 10-11 have performed for almost 14 years.

Long Life. These Pioneers exemplify the longevity of TRW spacecraft... typically multiples of design life. Here's our log: 4 **Pioneers** 6-9, also for Ames, 40 years orbital service since first launch in 1965; 6 **OGO's**, 19

years; **Velas**, the world's longest operating spacecraft; and **HEAO 1**, three times contracted life.

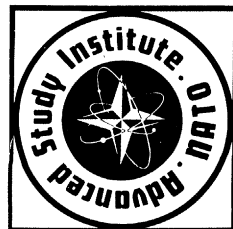
Pathfinders. While doing science, the Pioneer pair also surveyed the route for later missions. JPL Voyager controllers rehearsed their coming flyby as they peered over the shoulder of Pioneer on Saturn final approach.

To Eternity. First to send back breathtaking closeup images of the gas giants, longlife Pioneers 10-11 prove the soundness and confirm the vision of NASA's step-by-step program of solar system exploration. The next step is Voyager Saturn encounter in 1980.

Escaping our worlds, their work done, the Pioneers are passing beyond our ken, flying on forever.

LOGLIFE SCIENTIFIC SPACECRAFT

from a company called **TRW**



NATO ADVANCED STUDY INSTITUTES 1980

The Advanced Study Institutes (ASIs) sponsored by the NATO Science Committee are tutorial courses of two weeks on new, important topics, for up to 100 scientists and research students. The aim is not only the dissemination of advanced scientific knowledge but also the promotion of international contacts among scientists.

No tuition fees are requested from the participants, some of whom may obtain small grants to assist with travel and living expenses.

As each ASI is held under the responsibility of a Director and Organizing Committee, applications for attendance and grants should be submitted directly to those listed below, at least four months in advance of course dates.

PUBLICATIONS The Proceedings are published in the NATO ASI Series. There have already been 170 volumes published by : Plenum Co. (Life Sciences, Physics) — Reidel Co. (Mathematics, Chemistry, Earth Sciences) — Noordhoff/Sijthoff BV (Behavioural, Engineering & other Applied Sciences).

MANY ASIs ARE OF AN INTERDISCIPLINARY NATURE; PLEASE CHECK ALL SUBJECT AREAS. LOCATIONS AND DATES MAY CHANGE. TITLES AND ADDRESSES HAVE BEEN ABRIDGED.

I LIFE SCIENCES

- BIORHEOLOGY**
 SCIENCE, VOL. 207
 H.C. HWANG Cardiovasc. Flow Dynamics, Collen College Eng., Houston TX 77004, USA
 March 23-April 6 : Houston, Texas, USA
- THE BIOLOGY OF AGGRESSION**
 J.F. BRAIN Zoology Dept., University College, Swansea SA2 8PP, Wales, UK
 July 21-30 : Château de Bonas, France
- ACTIVE DEFENCE MECHANISMS IN PLANTS**
 R.K. WOOD Imperial College, London SW7 2BB, UK
 April/May : Athens, Greece
- GENOME ORGANIZATION AND FUNCTION**
 H. ZACHAU Inst. Biologie u. Zellbiologie der Univ. Göttingen 33, 8 München 2, FRG
 August 31-September 13 : Spetsai, Greece

- GAUGE THEORIES AND EXPERIMENTS AT HIGH ENERGIES**
 R.G. MOORHOUSE Nat. Philosophy Dept., Univ. of Glasgow, Glasgow G12 80Q, UK
 August 10-30 : St. Andrews, Scotland
- PHYSICS OF DEFECTS**
 M.R. BALLAN Physique Théorique, C.E.N. Saclay, BP 2, 91190 Gif-sur-Yvette, France
 July 28-August 31 : Les Houches, France
- COMMON TRENDS IN PARTICLE AND CONDENSED MATTER PHYSICS**
 M.T. BEAL-MONOD Bat. 510, Univ. Paris Sud, 91405 Orsay, France
 February 18-29 : Les Houches, France
- DIRECT METHODS IN CRYSTALLOGRAPHY**
 M.M. WOODFORD Physics Dept., Univ. of York, Heslington, York YO1 5DD, UK
 August 4-15 : York, UK
- SOLAR PHENOMENA IN STARS AND STELLAR SYSTEMS**
 R.M. BONNET Lab. Physique Stell. et Planét., BP 10, Verrières-le-Buisson, France
 September : Burgundy, France
- PHYSICAL PROCESSES IN LASER MATERIAL INTERACTIONS**
 D. ROSS Egehofenstr. 16, 8033 Pfäfers, FRG
 August 18-31 : Villa le Planore, Varese, Italy
- PHASE TRANSITIONS**
 M. LEVY Lab. de Phys. Théor., Tour 16, 4, Place Jussieu, 75230 Paris Cedex 05, France
 July 20-August 2 : Cagliari, Corsica, France
- NONLINEAR PHENOMENA IN PHYSICS**
 R.H. ENNS Physics Dept., Simon Fraser Univ., Burnaby B.C., Canada V5A 1S6
 August 17-29 : Banff, Canada
- STRUCTURE AND EVOLUTION OF NORMAL GALAXIES**
 O. LYNDEN-BELL Inst. of Astron., Observatory, Madingley Rd., Cambridge CB3 0HA, UK
 August : 15 : Cambridge, UK

- COMPUTATIONAL METHODS FOR FAST ION TRANSPORT**
 S.W. DE LEEUW Inst. Matematisk, University, Campusvej 55, 5230 Odense, Denmark
 August 4-22 : Odense, Denmark
- IDENTIFICATION OF SEISMIC SOURCES**
 E.S. HUSEBYE NTNF/NORSAR, P.O. Box 51, 2007 Kjeller, Norway
 September 8-19 : Oslo, Norway
- VARIÉTÉS COMPLEXES : APPL. EN GÉOM. ALGÈBRE ET EN PHYSIQUE MATH.**
 G. SABIDUSSI Dept. de Math. Université, B.P. 6128, Succ. A, Montréal, H3C3J7
 July 20-August 2 : Montréal, Canada
- METAL HYBRIDES**
 G. BAMBAKIDIS Physics Dept. Wright University, Dayton, OH 45435, USA
 June 17-27 : Rhodes, Greece
- EMISSION & SCATTERING TECHNIQUES/INORG. MOLECULES, SOLIDS & SURFACES**
 P. DAY Oxford Univ. Inorganic Chemistry Lab., S. Parks Rd., Oxford OX1 3QR, UK
 September 14-25 : Alghero, Sardinia, Italy
- GEOMETRY FROM VON STAUDT'S POINT OF VIEW**
 K. STRAMBACH Mathematisches Inst. University, Bismarckstr., 8520 ERLANGEN, FRG
 July 20-August 2 : Bad Windsheim, Germany
- SINGULARITIES IN BOUNDARY VALUE PROBLEMS**
 H.G. GARNIR Inst. Mathématique, 15 av. des Tilleuls, 4000 Liège, Belgium
 September 1-14 : Maratea, Italy
- ATOMIC & MOLECULAR COLLISION THEORY**
 F. GIANTURCO Ist. Chim. Fisica, Università, via Amendola 173, Bari, Italy
 September 14-27 : Cortona, Italy
- STOCHASTIC SYSTEMS**
 M. HAZEWINKEL Erasmus University, P.O. Box 1738, Rotterdam, The Netherlands
 June 22-July 5 : Les Arcs, France

NEUROPSYCHOLOGY AND COGNITION
 RN MALATESHA Jnrgen Sife Univ. School of Education, Corvallis, OR 97331, USA
 September 2-18 : Augusta, Georgia, USA

TIME-RESOLVED FLUORESCENCE SPECTROSCOPY IN BIOCHEMISTRY AND BIOLOGY
 RB CUNDALL Dept. of Chemistry, The University, Salford M5 4WT, UK
 March 17-28 : St. Andrews, Scotland, UK

REGULATION OF CELL FUNCTION AND GROWTH BY INTRACELLULAR SIGN SIGNALS
 JE DUMONT School of Medicine, U.L.B., 20 rue Evers, 1000 Bruxelles, Belgium
 July 14-24 : Nivelles, Belgium

REARRANGEMENT OF NEURONAL CONNECTIONS/NATURAL AND EXP. INDUCED
 S. Easter Biol. Sc., Univ. of Michigan, 830 N. Univ. Av., Ann Arbor MI 48109, USA
 May or June : Evian-les-Bains, France

CELL GROWTH
 CA NICOLINI Temple Univ. Health Sc. Cent., 3223 N Broad St., Philad. PA 19140, USA
 October 17-31 : Erice, Italy

SPINAL CORD INJURY - REHABILITATION ENGINEERING
 DN GHISTA Dept. Mech. Michigan Tech. Univ., Houghton, MI 49931, USA
 Summer/Autumn : Stoke Mandeville, UK

NEUROPSYCHOLOGY AND BEHAVIOUR
 G. RIZZOLATTI Univ., Inst. Physiology, Via Gramsci 14, Parma 43100, It.
 May 20-28 : Erice, Italy

CHROMOSOME DAMAGE AND REPAIR
 E SEEBERG Norwegian Def. Res. Est., Toxolod Div., POB 25, 2007 Kjeller, Norway
 May 27-June 5 : Godfysund Ford Hotel, Norway

METHODS IN MEMBRANE RESEARCH AND BIOLOGICAL ENERGY TRANSDUCTION
 EM KLINGENBERG Dept. Physical Bioch., University, Goethestr. 33, 8 Munich 2, FRG
 August 6-20 : Spetsai, Greece

DRUG ASSESSMENT
 GP VELO Univ. of Padova, Policlinico Borgo Roma, 37100 Verona, Italy
 October 2-13 : Erice, Italy

FORMATION AND REGRESSION OF THE ATHEROSCLEROTIC PLAQUE
 R PAOLETTI Inst. of Pharmacology, Via Andrea del Sarto 21, 20129 Milan, Italy
 July 16-27 : Bellgrate, Varese, Italy

MOLECULAR MECHANISMS OF DERMATOLOGICAL DISEASES
 MA PATHAK Harvard Medical School, Boston, Mass. 02114, USA
 September 1-10 : Corfu, Greece

MICROBIAL BREEDING
 G SERMONTI Ist di Islol ed Embriol., Via Elce di Sotto, 06100 Perugia, Italy
 June 3-13 : Erice, Italy

PROTEIN BIOSYNTHESIS IN EUKARYOTES
 R PEREZ-BERCOFF Inst. of Anatomy, University, Glinastr. 19, 8005 Zurich, Switz.
 September 7-17 : Maratea, Italy

RADIOSENSITIZERS OF HYPOXIC CELLS
 A BRECCIA Fac. di Farmacia, Università, Via Zandolini 3, 40126 Bologna, Italy
 August 27-September 9 : Cesenatico, Italy

II PHYSICS

PHOTOVOLTAIC AND PHOTOELECTROCHEMICAL SOLAR ENERGY CONVERSION
 W DEKEYSER Universiteit Lab. v. Kristalog, Krijgslaan 271, 9000 Gent, Belgium
 August 25-September 5 : Gent, Belgium

TECHNIQUES AND CONCEPTS OF HIGH ENERGY PHYSICS
 T FERREL Physics Dept. Univ. of Rochester, Rochester, NY 14627, USA
 July 2-13 : St. Croix, Virgin Islands, USA

RIGOROUS ATOMIC AND MOLECULAR PHYSICS
 G VELO Ist. di Fisica, Via Invern 46, 40126 Bologna, Italy
 June 1-15 : Erice, Italy

MOLECULAR ELECTRO-OPTICS
 S KRAUSE Chemistry Dept., Rensselaer Inst., Troy, NY 12181, USA
 July 14-24 : Troy, New York, USA

CURRENT TOPICS IN ELEMENTARY-PARTICLE PHYSICS
 K SCHLÜNG Fachb. 38-Gausstr. 20, 5600 Wuppertal 1, FRG
 September 1-12 : Bad Honnef, Rhine, Germany

SUPRAMOLECULAR AND NON-EQUILIBRIUM SYSTEMS/SCATTERING TECH.
 S CHEN Nucl. Eng. Dept., MIT Rm 24-209, Cambridge, MA 02139, USA
 August 3-14 : Wellesley College, Massachusetts, USA

NUCLEAR STRUCTURE
 PWM GLAUDEMANS Physics Dept., University, Princetopl. 5, 3808 TA Utrecht, Neth.
 August 11-23 : Dordten, The Netherlands

NON-EQUILIBRIUM SUPERCONDUCTORS PHONONS AND KAPITZA BOUNDARIES
 KE GRAY Bldg 223, Argonne Nat. Lab., Argonne, Illinois 60439, USA
 September 1-15 : Maratea, Italy

PHOTOMETRIC BINARY STARS
 Z KOPAL Dept. of Astronomy, University, Manchester M13 9PL, UK
 May or June : Maratea, Italy

MOLECULAR IONS : GEOMETRIC AND ELECTRONIC STRUCTURES
 J BERKOWITZ Physics Div., Argonne Nat. Lab., Argonne, Illinois 60439, USA
 September 29-October 10 : Kos, Greece

CLIMATIC VARIATIONS & VARIABILITY: FACTS & THEORIES
 AL BERGER Univ., Inst. d'Astronomie, 2 Ch. du Cyclotron, 1348 Louvain, Belgium
 March 9-21 : Erce, Italy

III CHEMISTRY, EARTH SC., MATHEMATICS

ANALYTICAL APPLICATION OF FT-IR TO MOLECULAR & BIOLOGICAL SYSTEMS
 JR DURING College of Science & Math, Columbia Univ., S. Carolina 29208, USA
 August 31-September 12 : Florence, Italy

EXPLORATION OF THE POLAR UPPER ATMOSPHERE
 DA EGELEND Inst. of Physics, Univ., P.O. 1038 Blindem, Oslo 3, Norway
 May 5-16 : Lillehammer, Norway

COMPUTATIONAL THEORETICAL ORGANIC CHEMISTRY
 IG CSIZMADIA Chemistry Dept. Toronto Univ. Toronto, Ont. M5S 1A1, Canada
 June 29-July 13 : Menton, France

TEPTRA STUDIES AS A TOOL IN QUATERNARY RESEARCH
 RSJ SPARKS Mineralogy Dept. University, Downing Place, Cambridge CB2 3EW, UK
 June 18-30 : Laugarvatn, Iceland

FAST REACTIONS IN ENERGETIC SYSTEMS
 C CAPELLOS Energetic Mat. Div., Bldg 3022 ICWSL, AFRADCOM, Dover NJ 07801, USA
 July 6-19 : Iannina, Greece

MODERN STATISTICAL DISTRIBUTION THEORY AND ITS APPLICATIONS
 B BALDESSARI Univ. Roma, Fac. Sci. Stat., Istituto Calcolo, Rome, Italy
 July 10-31 : Trieste, Italy

HARMONIC ANALYSIS & GROUP REPRESENTATION
 R CONTI Ist Matematico 'U Dini', Viale Morgagni 67/A, 50134 Firenze, Italy
 July 24-August 9 : Cortona, Italy

GEOPHYSICAL & GEOCHEMICAL PROCESSES IN THE EVOLUTION OF EARTH
 SK RUNCORN Physics Dept. University, Newcastle-upon-Tyne NE1 7RU, UK
 Easter 1980 : Newcastle, UK

MATRIX ISOLATION SPECTROSCOPY
 WJ ORVILLE-THOMAS Chemistry Dept., University, Salford M5 4WT, UK
 July 17-31 : Montpellier, France

HIGH RESOLUTION NMR SPECTROSCOPY
 T AXENROD Chemistry Dept. City University, New York, N.Y. 10031, USA
 September 1-14 : Villasimius, Sardinia, Italy

SILICATE MELTS
 DG FRASER Geology/Mineralogy Dept., Parks Road, Oxford OX1 3 PR, UK
 September 17-27 : Oxford, England

DYNAMIC SPATIAL MODELS
 DA GRIFFITH Dept. of Geography, State University, Buffalo, N.Y. 14260, USA
 July 6-20 : Besancon, France

IV ENGINEERING AND APPLIED SCIENCES

HEAT EXCHANGERS: HEAT TRANSFER AND FLUID FLOW FUNDAMENTALS
 S KARAC Mech. Eng. Dept., Middle East Tech. University, Ankara, Turkey
 August 4-15 : Istanbul, Turkey

COMPUTER DESIGN AIDS FOR VLSI CIRCUITS
 P ANTONIETTI Ist Electr., Università, Viale F. Causa 13, 16145 Genova, Italy
 July 21-August 1 : Sogesta, Urbino, Italy

GENERALIZED CONCAVITY IN OPTIMIZATION AND ECONOMICS
 S SCHABLE Univ. of Alberta, Finance and Management Dept., Edmonton, Alb. Canada
 August 4-15 : Vancouver, Canada

MULTIPLE PROCESSOR COMPUTERS
 M DOWSON Scicon Consultancy Ltd., 49-57 Berners St., London W1P 4AQ, UK
 June 15-28 : Maratea, Italy

NEW CONCEPTS IN MULTI-USER COMMUNICATION
 JK SKWIRZNSKI GEC-Marconi, W. Hammingfield Rd., Gt Baddow, Chelmsford, Essex, UK
 August 4-16 : Norwich, UK

UNDERWATER ACOUSTICS AND SIGNAL PROCESSING
 J BJØRND Acoustics Lab., Tech. Univ., Bldg 352, 2800 Lyngby, Denmark
 August 18-30 : Vardøse, Denmark

DIGITAL IMAGE PROCESSING AND ANALYSIS
 J SIMON Inst. Programming, Univ. Paris VI, 4, Pl. Jussieu, 75005 Paris, France
 June 23-July 4 : Château de Bonas, France

MODERN STRUCTURAL OPTIMISATION
 AJ MORRIS Structures Dept., Royal Aircraft, Est., Farnborough, Hants, UK
 August 11-22 : Château de Bonas, France

SCIENCE AND TECHNOLOGY OF SUPERCONDUCTING MATERIALS
 S FONER Nat. Magnet Lab., MIT, NW14-3117, Cambridge, MA 02139, USA
 August 20-31 : Greece or Portugal

DESIGN METHODOLOGIES FOR VERY LARGE-SCALE INTEGRATED CIRCUITS
 P JESPERS Univ. Cath. Bat. Maxwell, Pl. Levant 3, 1348 Louvain-la-Neuve, Belgium
 July 8-18 : Louvain-la-Neuve, Belgium

CHEMICALLY SENSITIVE ELECTRONIC DEVICES
 JN ZEMEL Elect. Eng. Dept., Penn. Univ., 200 S 33 St., Philadelphia PA 19104, USA
 June 9-21 : Hightstown, New Jersey, USA

MULTIPHASE CHEMICAL REACTORS
 AE RODRIGUES Chem. Eng. Dept., Porto Univ., Rua dos Bragas, 4089 Porto, Portugal
 August 18-30 : Vimeiro, Portugal

OPTIMIZATION OF DISTRIBUTED PARAMETER STRUCTURAL SYSTEMS
 EJ HAUG Materials Eng., Univ. of Iowa, Iowa City, Iowa 52240, USA
 May 26-June 6 : Iowa City, USA

DROUGHT IMPACT CONTROL TECHNOLOGY
 J FERRY-BORGES L.N.E.C., Av. Brasil, 1799 Lisbon, Portugal
 June 23-July 4 : Lisbon, Portugal

MASS TRANSFER WITH CHEMICAL REACTION TO MULTIPHASE SYSTEMS
 E ALPER Chem. Eng. Dept., Hacettepe Univ., Beytepe/Ankara, Turkey
 August 25-September 5 : Izmir, Turkey

DYNAMICS OF SOCIAL CONSTRAINT ON LONG-TERM RESOURCE AVAILABILITY
 DL MEADOWS Resource Policy Cent., Dartmouth College, Hanover, NH 03755, USA
 September 2-13 : Hanover, New Hampshire, USA

URBAN PROBLEMS AND POLICIES IN A SPATIAL CONTEXT
 P NUKAMP Dept. of Economics, University, POB 7161, Amsterdam, Netherlands
 August 10-23 : Soesterberg, The Netherlands

HEAT PUMP FUNDAMENTALS
 J BERGHMANS Inst. Mechanika, Celestijnenlaan 300A, Heverlee, 3030 Belgium
 September 1-12 : Portugal

HUMAN OPERATOR MODELS
 HG STASSEN Th. Mech. Eng. Dept., Melkweg 2, 2628 CD Delft, Netherlands
 August 11-22 : Delft, The Netherlands

Scientists wishing to organize an ASI should contact : NATO Scientific Affairs Division, B 1110 Brussels

Our compact MM-33 micromanipulator drives by hand or 'joy stick'.

Ideal for working at magnifications up to 250X, the MM-33 provides coarse movements in 3 planes (XYZ) plus fine movement in the thrust axis. Excursions calibrated in millimeters with vernier readings to 0.1 mm; final drive calibrated to 10 microns. Ball-bearing raceways assure smooth, backlash-free operation. All controls aligned in same vertical plane permits use of several MM-33's side by side. Mounts on Flexbar or a variety of bases.

Also available in a motorized version (MM-33M), with 'Joy Stick' remote unit for vibration-free control of speed and direction. For literature, write: Brinkmann Instruments, Cantiague Rd., Westbury, N.Y. 11590.

**B Brinkmann
Micromanipulators**



Circle No. 35 on Readers' Service Card

COMBATING THE #1 KILLER

The **SCIENCE**
Report on
Heart
Research

**JEAN L. MARX and
GINA BARI KOLATA**

—a direct, unbiased report with information for all investigators in the field, makers of public policy, scientists and the general public.

\$17.00 casebound \$7.50 paperbound
10% discount to AAAS members

Send name, address and remittance to

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Department B-3
1515 Massachusetts Avenue, NW
Washington, D.C. 20005

LETTERS

Generic Prescriptions

The article "Large drug firms fight generic substitution" (News and Comment, 30 Nov. 1979, p. 1054) is something of a paradox. In it, numerous cases are cited where generic drugs were found to be substandard or inequivalent to the prototype products. But rather than voicing surprise or concern about this, the author proceeds to quibble about the means by which we, the manufacturer, have attempted to draw attention to the problem.

For example, reference is made to Antivert (meclizine) advertising material which reported on chemical analyses of several generic "substitutes" for Antivert. It is pointed out that the initially reported results incorrectly stated that 10 of 17 tested generics failed these tests and that the correct figure should have been 11 of 65. [In fact, a recent audit of these data, soon to be provided to the Food and Drug Administration (FDA), indicates the true figure is 22 of 62.] However, the actual number of products that failed the test is not the central issue, for, even using the most favorable figures, the conclusion remains clear—a very substantial number of generic meclizine products are on the market today that fail to pass the compendial tests that provide threshold quality assurance for this product. Therefore, many prescriptions written for Antivert are being filled with clearly substandard meclizine.

In another portion of the article, the author refers to the dispute between Barre-National and Pfizer regarding Barre-National's generic version of Pfizer's Marax Syrup. As the author correctly points out, the chemical assays performed on the generic product yielded spurious results due to the presence of a preservative, methylparaben, not present in the FDA-approved prototype formulation—our Marax—which interferes with the established assay for quality assurance on this product. But, while the *Science* article focuses on the resultant discrepant assay results, it misses the obvious point: What about the preservative present in the generic product? Since the original product for which a New Drug Application was approved has no such preservative, the products are clearly not identical. But the more important issue is what the effect of this added chemical might be upon the allergic pediatric patient for whom Marax Syrup is typically prescribed. To our knowledge, there are no human stud-

ies demonstrating the effects of this chemical on immunologically sensitized children.

Human studies showing safety and efficacy must be performed with products like Marax that are approved under the New Drug Application procedure. The anticipated results of Marax in patients are based on such clinical data. To condone and promote substitution of "generic drugs" that are, in fact, qualitatively different from the clinically tested product is really a rejection of our whole system of regulatory preapproval of prescription drug products. Remember, it was the tragic inclusion of just such an untested, "inert" excipient that led to the Pure Food and Drug Amendments of 1938 in the first place.

Finally, the author discusses a recent film, *Pharmacy and the Law*, distributed by Pfizer. In that discussion, the author fails to focus on the underlying facts expressed by the legal experts in the film. The implication of a generic substitute in a situation where a patient has experienced a serious side effect, or a lack of therapeutic effect, will surely add a new dimension to product liability litigation. The product liability expert in the film pointed out that he would certainly include generic substitution as an additional cause of action in a complaint against those involved in such a case.

Pharmacists, after viewing the film, may indeed be more sensitive to the possible legal implications of substitution, but I believe this to be a prudent consideration. All aspects of the decision to substitute one drug for another should be weighed by the physician, when he or she authorizes the substitution, and the pharmacist, if he or she decides to make the substitution. Instances of substandard or nonequivalent generics on the market, as documented in the *Science* article, can only underscore the importance of such professional prudence.

PAUL S. MILLER

Pfizer Inc.,
235 East 42 Street, New York 10017

Near-Infrared Microscopy

In a recent issue of *Science* (Research News, 23 Nov. 1979, p. 918), Thomas H. Maugh II announces that near-infrared microscopy is useful for a number of biological problems, including observation of living photoreceptor cells in the dark-adapted state. Since workers on vision in vertebrates and invertebrates have used microscopes fitted with infrared image

converters for more than 20 years, Maugh's discovery comes late. In fact, we have in our laboratory a still quite useful image converter made for the British Army and bought in an electronic junk shop in London in 1955 for \$10. Much better ones, of course, are sold to amateur astronomers by surplus dealers in the United States for about \$200, and quite good new ones with miniature high-voltage supplies are available from at least two American manufacturers for about \$700, or about one-tenth the cost of the instrument described by Maugh.

It is true that standard achromatic and apochromatic microscope objectives give rather poor images in the 800- to 900-nanometer spectral region in which most work with photoreceptors is done. Such optics are designed for minimum spherical and chromatic aberration near 450 to 600 nanometers, and their corrections fall apart badly in the near infrared. But we have found that achromatic fluorite objectives, available from several manufacturers, give infrared images whose resolution and contrast are consistent with the longer wavelengths used. Some of these objectives are available for phase microscopy. A standard laboratory compound microscope with fluorite objectives, an image converter at its eyepiece, and an infrared-transmitting filter (such as a Wratten 87) on its light source gives micrographs comparable to those published in Maugh's article and at a much lower price than \$6900. In view of this I suggest that future articles like Maugh's be labeled "advertisement."

W. A. HAGINS

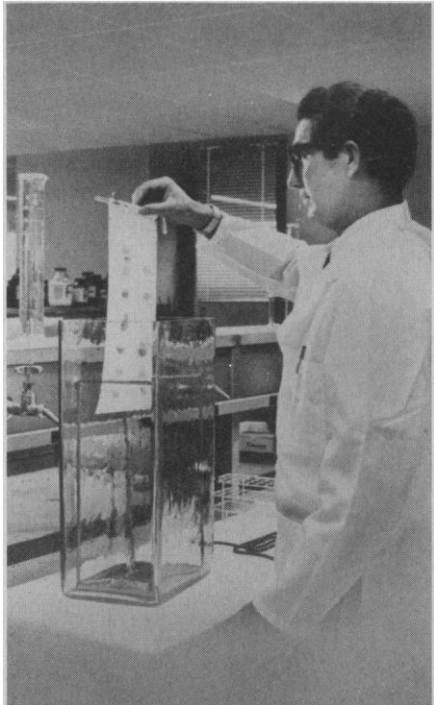
Laboratory of Chemical Physics,
National Institute of Arthritis,
Metabolism, and Digestive Diseases,
National Institutes of Health,
Bethesda, Maryland 20205

Priority?

Gartner and McGuirk (Articles, 14 Dec. 1979, p. 1272) propose a short but intensive drought in the latest Cretaceous to explain, in part, the extinction of the dinosaurs. I cannot resist pointing out that this same theory was proposed more than 30 years ago by Disney, in the animated classic *Fantasia*, which vividly portrays the great animals succumbing to thirst in the desert. Further study of this reference may be in order.

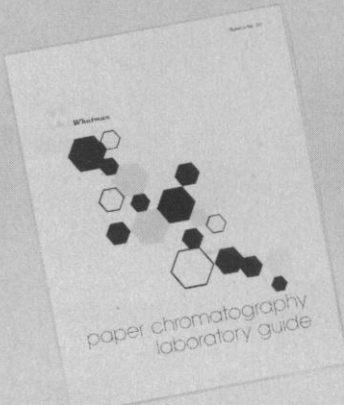
CONSTANCE SANCETTA

Lamont Geological Observatory of
Columbia University,
Palisades, New York 10964



**Paper
Chromatography.**

**Shouldn't
you take a
closer look?**



It's Free.

Write: **Whatman Inc.**
9 Bridewell Place
Clifton, N.J. 07014
Tel. (201) 777-4825

Whatman 

San Francisco Tapes

**To place your order for cassettes
from this year's taped sessions,
visit the Sales Desk,
AAAS Registration Area
San Francisco Hilton Hotel**

**(See the Meeting Program for a
descriptive listing of sessions)**

**aa
as**

**Annual Meeting
San Francisco
3-8 January 1980**

BREAK THE GLASS HABIT

Nalgene® Graduated Cylinders are as accurate as glass.

Nalgene PMP Graduated Cylinders are as easy to use as glass cylinders. They're transparent and accurately calibrated. They meet the same federal specifications for accuracy established for glass.*

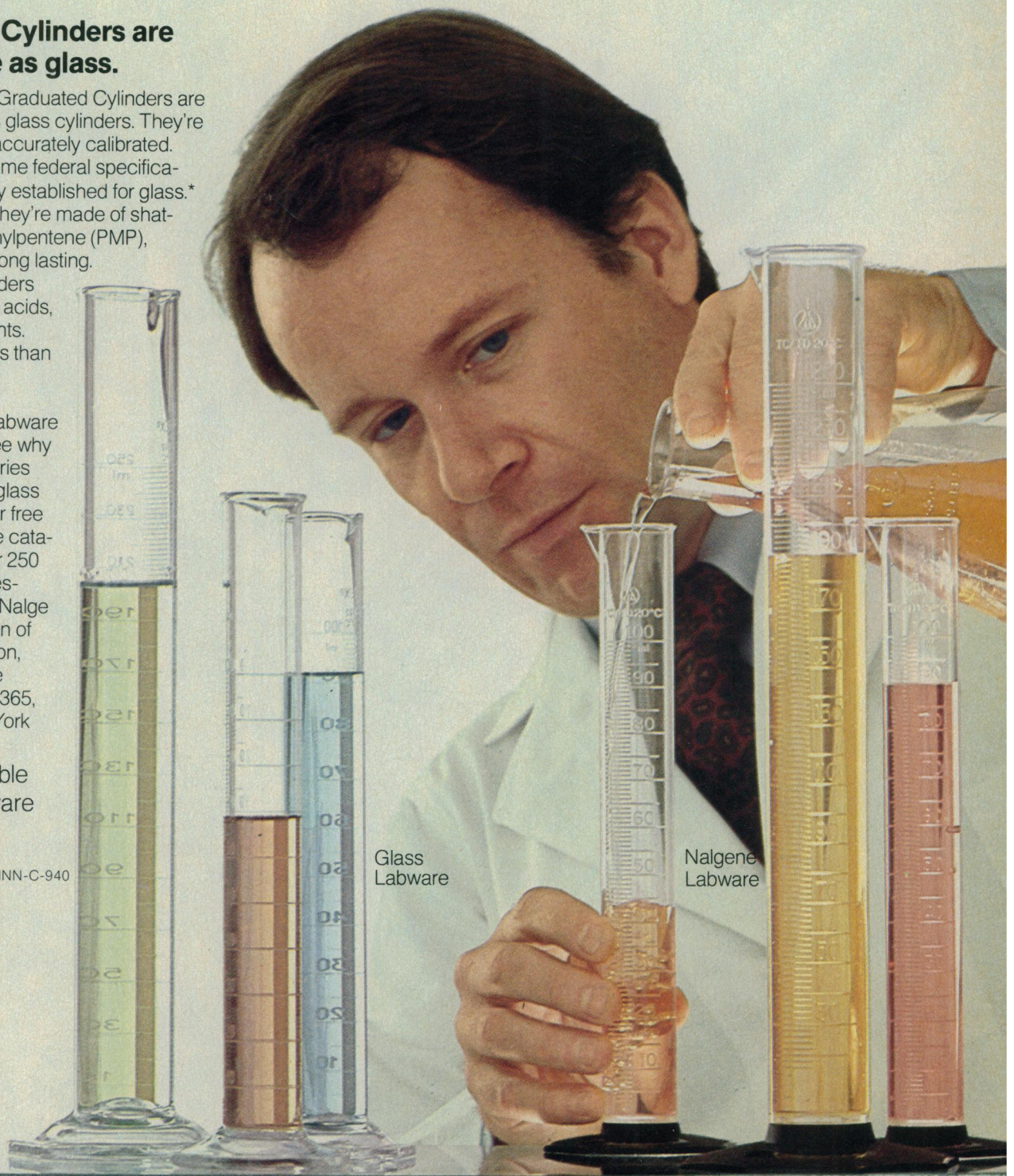
And because they're made of shatterproof polymethylpentene (PMP), they're safe and long lasting.

Our PMP cylinders can be used with acids, bases, and solvents. And they cost less than the leading glass cylinder.

Put Nalgene Labware to the test, and see why so many laboratories are breaking the glass habit. Send for our free Nalgene Labware catalog, featuring over 250 products for professional use. Write: Nalgene Company, Division of Sybron Corporation, Nalgene Labware Department, Box 365, Rochester, New York 14602.

And unbreakable Nalgene Labware lasts longer.

*Federal Specification NNN-C-940

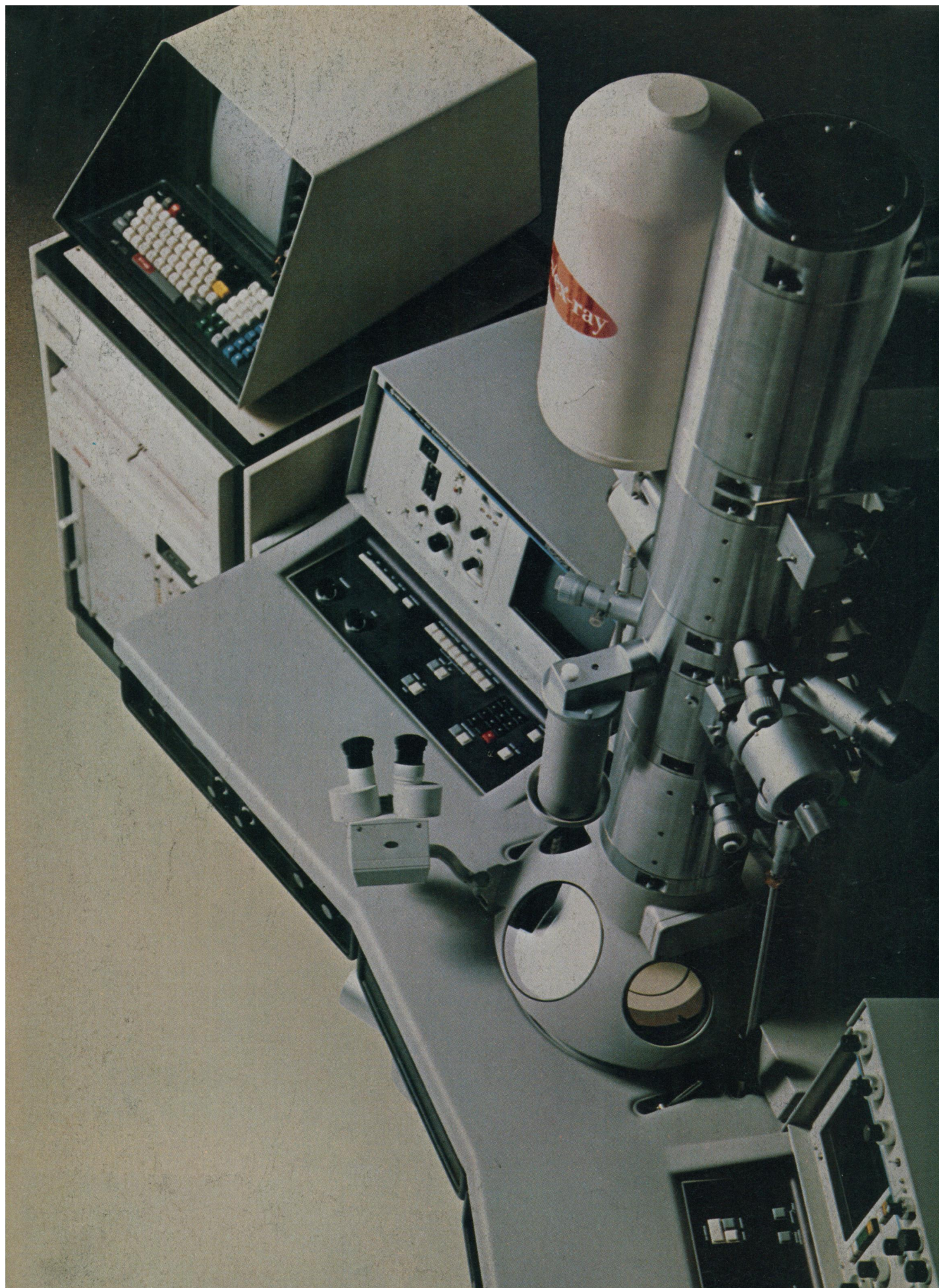


Glass
Labware

Nalgene
Labware

SYBRON | Nalge

Circle No. 13 on Readers' Service Card



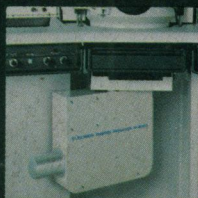
Now. Direct from Hitachi

The first analytical TEM with true microcomputer control

It's the H-600-1, an exceptionally powerful analytical tool that is exceptionally easy to operate.

Featuring an LaB₆ gun, the H-600-1 is a complete, integrated analytical system. Pushbutton-selectable microscope modes are: TEM (2.0Å), SEM (20Å), and STEM (10Å). The system also features a side entry goniometer stage and an ultra-high (5×10^{-7} torr) vacuum system.

In addition, the H-600-1 is available with EDX, Energy Loss Spectroscopy, Diffraction, Beam Rocking, and Spot Scanning. None of these analytical modes requires specimen repositioning.

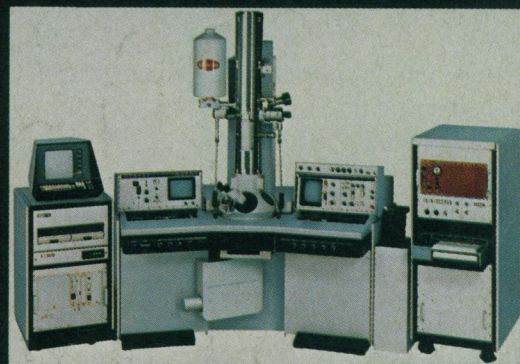


What's more, routine setups and adjustments are done automatically by the built-in microcomputer. For example, all seven lenses, including the 3-stage condenser lens system, are automatically adjusted for each specific operating mode and magnification level. Or, the computer can be "locked out" so that you can adjust each individual lens yourself.

Through focus series is another example. You merely enter the number of pictures and focus steps you want, and lift the fluorescent screen. The H-600-1 does the rest.

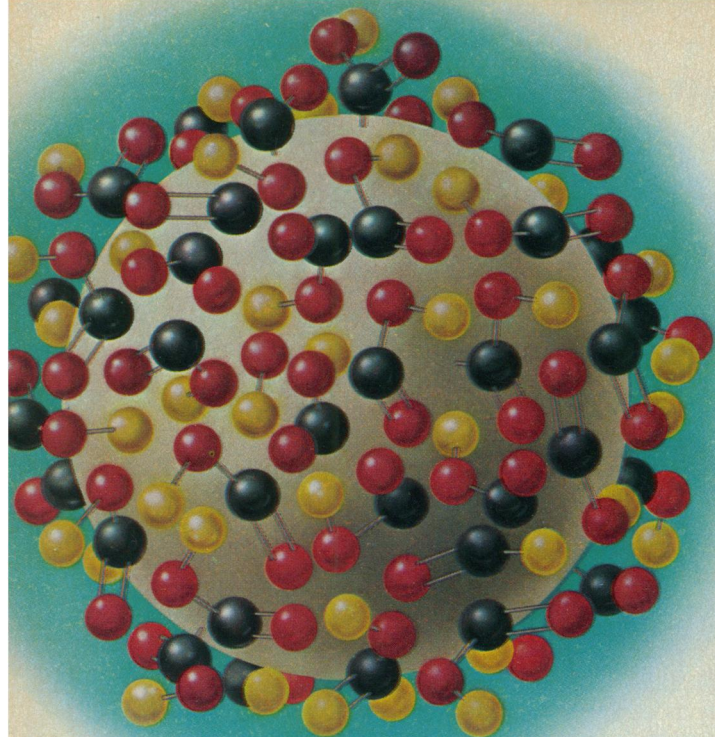
Microcomputer control also makes the H-600-1 much easier to operate than other TEMs in this range. Even novices can achieve high quality results after only a short training period. At the same time, experienced microscopists have more freedom to concentrate on "fine tuning" to obtain peak performance.

For those who don't need all of the features of the H-600-1, three other H-600 models are available. For details, call or write today. Hitachi, Scientific Instruments Division, 411 Clyde Avenue, Mountain View, CA 94043. Phone: (415) 961-0461.



HITACHI
SCIENTIFIC INSTRUMENTS
NISSEI SANGYO AMERICA, LTD.

Circle No. 91 on Readers' Service Card



*Artist's Interpretation of
a Carboxylate-Modified
Uniform Latex Particle.*

Carboxylate-Modified Uniform Latex Particles

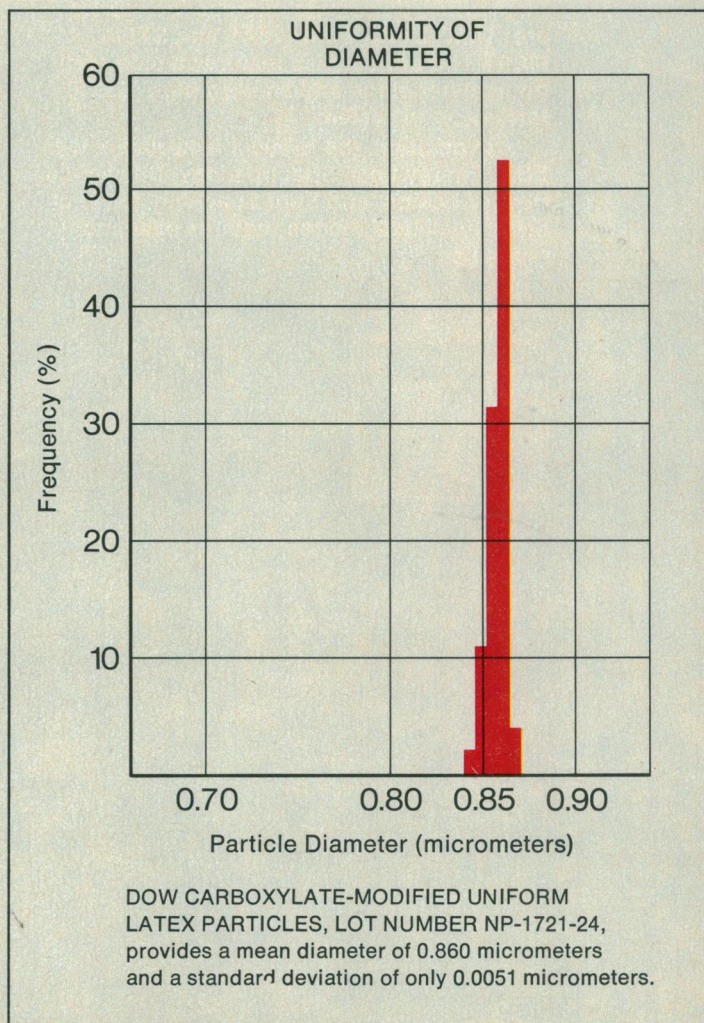
Dow Diagnostics has been successful in the development of Uniform Latex Particles which should permit covalent (chemical) bonding of antigens, antibodies, enzymes, etc., to their surface.

These Particles should permit attachment by amide bonds; amino groups on the biochemical species reacted with the carboxylic acid groups on the latex particles' surfaces.

Uniform Latex Particles are also available in a number of diameters, colors and surface chemistries for a wide range of applications. For more information, contact:



Dow Diagnostics
The Dow Chemical Company
P.O. Box 68511
Indianapolis, Indiana 46268



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Editorial Board

1980: RICHARD E. BALZHISER, WALLACE S. BROECKER, CLEMENT L. MARKERT, FRANK W. PUTNAM, BRYANT W. ROSSITER, VERA C. RUBIN, MAXINE F. SINGER, PAUL E. WAGGONER, F. KARL WILLENBROCK

1981: PETER BELL, BRYCE CRAWFORD, JR., E. PETER GEIDUSCHEK, SALLY G. KOHLSTEDT, EMIL W. HAURY, MANCUR OLSON, PETER H. RAVEN, WILLIAM P. SLICHTER.

Publisher

WILLIAM D. CAREY

Editor

PHILIP H. ABELSON

Editorial Staff

Managing Editor

ROBERT V. ORMES

Assistant Managing Editor

JOHN E. RINGLE

News Editor: BARBARA J. CULLITON

News and Comment: WILLIAM J. BROAD, LUTHER J. CARTER, CONSTANCE HOLDEN, ELIOT MARSHALL, DEBORAH SHAPLEY, R. JEFFREY SMITH, NICHOLAS WADE, JOHN WALSH. Editorial Assistant, SCHERRAINE MACK

Research News: BEVERLY KARPLUS HARTLINE, RICHARD A. KERR, GINA BARI KOLATA, JEAN L. MARK, THOMAS H. MAUGH II, ARTHUR L. ROBINSON. Editorial Assistant, FANNIE GROOM

Consulting Editor: ALLEN L. HAMMOND

Associate Editors: ELEANORE KUTZ, MARY DORFMAN, SYLVIA EBERHART, RUTH KULSTAD

Assistant Editors: CAITILIN GORDON, STEPHEN KEPPEL, LOIS SCHMITT

Book Reviews: KATHERINE LIVINGSTON, Editor; LINDA HEISERMAN, JANET KEGG

Letters: CHRISTINE KARLIK

Copy Editor: ISABELLA BOULDIN

Production: NANCY HARTNAGEL, JOHN BAKER; YA LI SWIGART, HOLLY BISHOP, ELEANOR WARNER; MARY MCDANIEL, JEAN ROCKWOOD, LEAH RYAN, SHARON RYAN

Covers, Reprints, and Permissions: GRAYCE FINGER, Editor; CORRINE HARRIS, MARGARET LLOYD

Guide to Scientific Instruments: RICHARD G. SOMMER

Assistant to the Editor: JACK R. ALSIP

Membership Recruitment: GWENDOLYN HUDDLE

Member and Subscription Records: ANN RAGLAND
EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Area code 202. General Editorial Office, 467-4350; Book Reviews, 467-4367; Guide to Scientific Instruments, 467-4480; News and Comment, 467-4430; Reprints and Permissions, 467-4483; Research News, 467-4321. Cable: Advancements, Washington. For "Instructions for Contributors," write the editorial office or see page xi, *Science*, 28 September 1979.

BUSINESS CORRESPONDENCE: Area Code 202. Membership and Subscriptions: 467-4417.

Advertising Representatives

Director: EARL J. SCHERAGO

Production Manager: GINA REILLY

Advertising Sales Manager: RICHARD L. CHARLES

Marketing Manager: HERBERT L. BURKLUND

Sales: NEW YORK, N.Y. 10036: Steve Hamburger, 1515 Broadway (212-730-1050); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-337-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772); DORSET, VT. 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581)

ADVERTISING CORRESPONDENCE: Tenth floor, 1515 Broadway, New York, N.Y. 10036. Phone: 212-730-1050.

Currency in Subject Matter

Of some 300,000 scientists and engineers employed in American colleges and universities, approximately two thirds teach undergraduates. The vast majority teach in nonresearch university settings such as the community and junior colleges and many of the former state teachers colleges. Even in universities offering advanced degrees, a number of faculty teach undergraduate courses exclusively. Although there is nothing startling or new about this pattern, there is emerging concern about this group of faculty: How are they to maintain currency in disciplinary (and in many cases interdisciplinary) subject matter? The problem is increasingly recognized by leaders in professional organizations of scientists and educators; executives of major private and public foundations; leaders in academic science, government agencies, and industry and business; and persons knowledgeable about needs for faculty development throughout the nation.

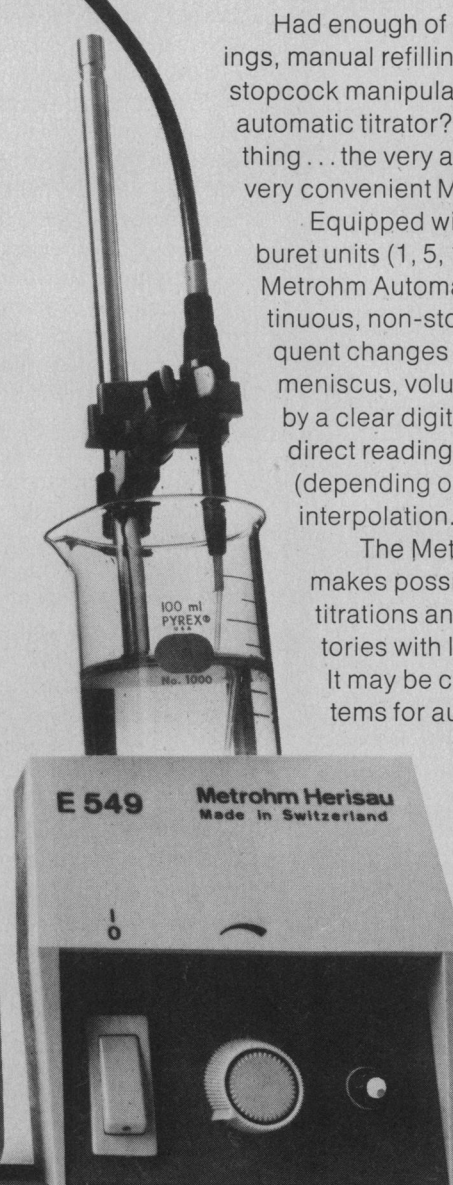
This state of potential stultification of faculty results from a combination of factors, some internal to institutions of higher education and others developed outside them. Budget cutbacks resulting from declining enrollments and loss of confidence in the ability of higher education to deliver are restricting already tight sabbatical leave and professional travel opportunities. Increased percentages of tenured faculty coupled with the pending extension of the retirement age and the leveling of retrenchment of faculty size will minimize the infusion of new talent and produce an aging, and hence more expensive, professoriat over the next decade. Exacerbating these limiting factors are the erosional effects of nearly double-digit inflation. Under the circumstances, no significant initiatives addressing the subject matter needs of faculty will be forthcoming from the collegiate sector. All this while science continues to advance, sometimes explosively.

College faculty will continue, nonetheless, to educate and train the nation's next generation of scientists and engineers. It is thus in its own best interest that the federal government ensure a continuing high level of subject matter currency. The present response is far from adequate. For example, the college faculty-oriented programs of the National Science Foundation involve only about 3200 faculty per year. Of these, some 3100 participate in the Chautauqua Short Courses Program. Another 100 benefit from the Science Faculty Development Program, a fellowship program allowing up to 12 months of study but averaging about 9 months. The Chautauqua program operates on an annual budget of slightly less than \$1 million and thus reaches its audience at an extremely low cost per person. By contrast, the Science Faculty Development Program, operating on a budget of about \$2 million, reached only 119 individuals in fiscal year 1977, 127 in 1978, and 84 in 1979 (the smaller number in 1979 reflects, in part, longer tenures and upward shifts in the average salary of the recipients). Quality-oriented and excellent as it has been for the small number of recipients, the impact of this program in the fast moving world of science is woefully inadequate.

The National Science Foundation is considering ways to complement the existing faculty development programs in order to reach substantially greater numbers of college faculty. But the problem of maintaining currency and vitality among the nation's college and university science teachers is too massive to leave to one poorly financed activity by a single federal agency. The matter is of sufficient importance to warrant the attention of state governments, industry, and the imaginative and creative responses of a variety of academic and professional organizations. Perhaps most important are the professors themselves. While they cannot be expected to bear the entire burden for initiatives in self-renewal, their positions require that they make special efforts to maintain currency.—EDWARD J. KORMONDY, *Provost, University of Southern Maine, Portland 04103*

LOOK... NO MENISCUS READING PROBLEMS!

**The Metrohm Automatic Buret.
The next best thing to an automatic
titrator, at a fraction of the cost.**



Had enough of inaccurate meniscus readings, manual refilling of burets and tedious stopcock manipulation? Can't afford a fully-automatic titrator? Then consider the next best thing... the very affordable, very accurate and very convenient Metrohm Automatic Buret.

Equipped with interchangeable 'snap-in' buret units (1, 5, 10, 20 and 50ml), the Metrohm Automatic Buret will perform continuous, non-stop titrations even with frequent changes of titrant. Instead of a meniscus, volume indication is provided by a clear digital display which gives direct readings to 0.01ml or 0.001ml (depending on buret size) without interpolation.

The Metrohm Automatic Buret makes possible faster, more accurate titrations and is the answer for laboratories with limited equipment budgets. It may be coupled to ancillary systems for automatic determinations of potentiometric or colorimetric end points.

For informative literature, write: Metrohm Division, Brinkmann Instruments, Inc., Cantiague Road, Westbury, N.Y. 11590. In Canada: Brinkmann Instruments (Canada), Ltd.



Metrohm Automatic Buret