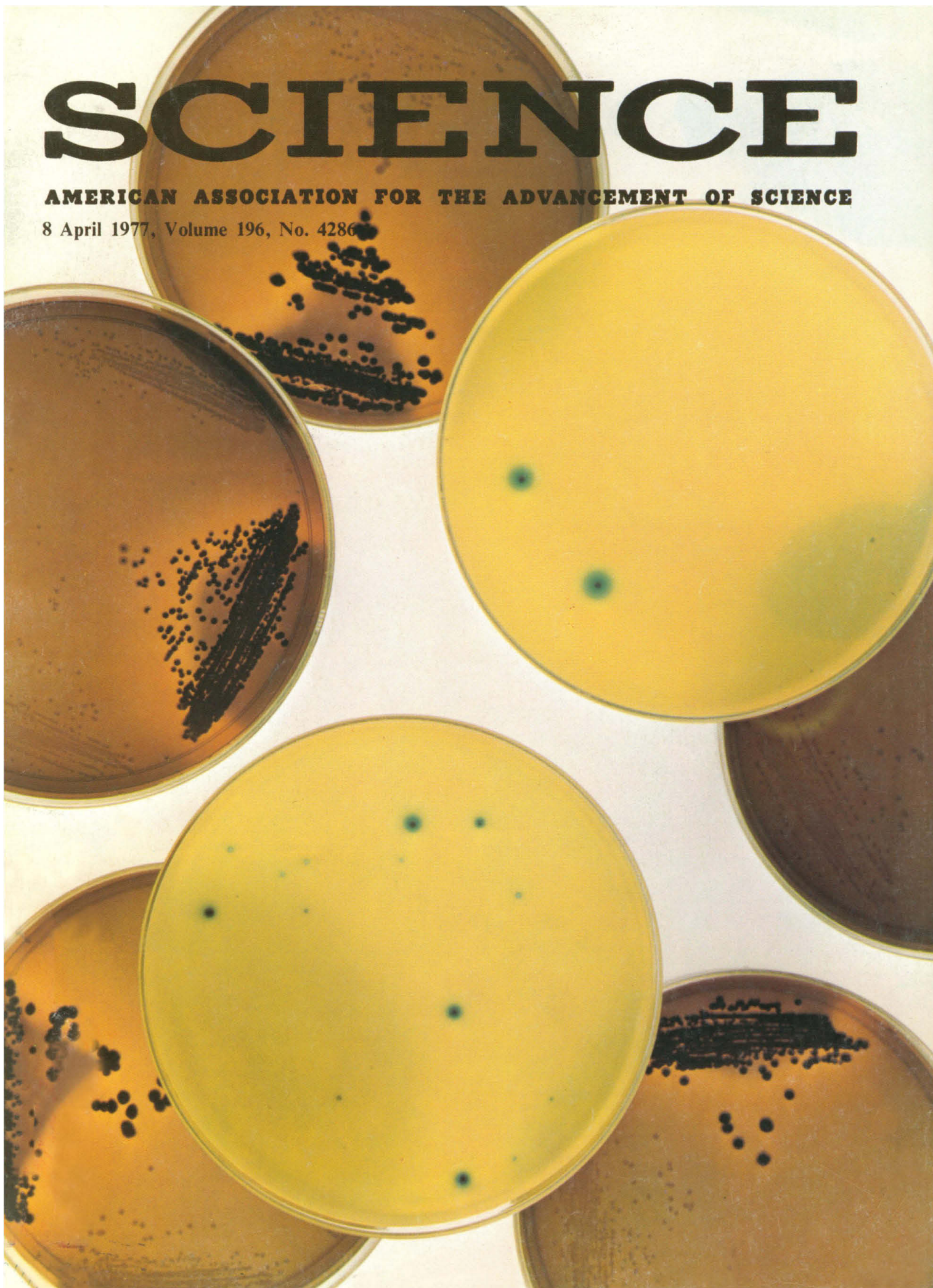


SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

8 April 1977, Volume 196, No. 4286



New Beckman TJ-6 Centrifuge



**A large capacity table top
with optional refrigeration.**

Now there's a table top centrifuge that holds up to 960 ml — and it's available with or without refrigeration.

It's the Beckman TJ-6.
The TJ-6 four-place rotor and



Maxi-Carrier tube racks hold every popular-size tube, and more of them: 120 RIA tubes of 10 x 75 or 12 x 75 mm, 96 14 x 100 mm, 72 16 x 100 mm, or 16 50-ml tubes. With its refrigeration option, large capacity, and speeds to 5700 rpm, this new table top can handle many separations which formerly required the expense and size of a refrigerated floor-model.

The TJ-6 also has a rotor bowl that lifts out for easy cleaning,



stainless steel buckets which hold the tube racks and contain spillage in case of tube breakage, and a rotor imbalance detector.

With the TJ-6 and TJ-6R, you now have two more choices from Beckman — the most respected name in centrifugation.

For complete information, send for Data File SB-490. Write Beckman Instruments, Inc., Spinco Division, 1117 California Avenue, Palo Alto, CA 94304.

BECKMAN®

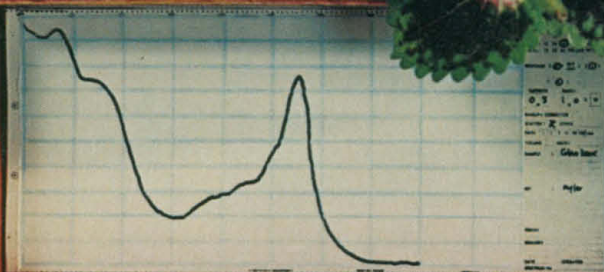
Circle No. 265 on Readers' Service Card



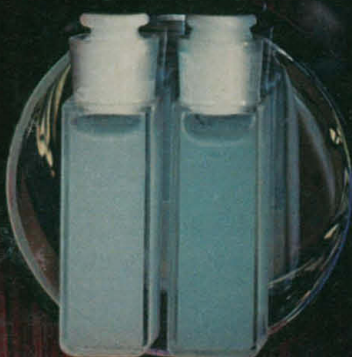
PERKIN-ELMER

576

ST Spectrophotometer



spectrum of chlorophyll in
a coleus leaf



Identify with UV Value

If you can identify with measuring cytochromes in microsomal and mitochondrial fractions, components of whole cell suspensions, even the spectrum of chlorophyll in a leaf, the Perkin-Elmer Model 576 UV-VIS Spectrophotometer is for you. This new Scattered Transmission Spectrophotometer includes a second sample compartment so that the sample is directly adjacent to the photomultiplier tube, a large 2" end-on unit. Once your sample and reference suspensions are installed, flatten the baseline electronically with a push of a button and then go on to record the difference spectrum. The Model 576 STS comes standard with repetitive scanning, digital background correction, automatic zero and source change, and the ordinate can be expanded to 0.01 A full scale. If you wish to identify with UV value put this on your wall and a Model 576 in your lab. For a demonstration and further details, contact The Perkin-Elmer Corporation, Main Ave., Norwalk, Conn. 06856.

Circle No. 268 on Readers' Service Card

8 April 1977

Volume 196, No. 4286

SCIENCE

LETTERS	Recombinant DNA Research: International Cooperation: <i>V. Sgaramella</i> ; Is Sweden More Energy-Efficient?: <i>C. Starr</i> and <i>S. Field</i> ; <i>L. Schipper</i> and <i>A. J. Lichtenberg</i> ; Controversial Grant Proposal: <i>E. A. Shneour</i>	120
EDITORIAL	The Recombinant DNA Debate: <i>M. F. Singer</i>	127
ARTICLES	The Need for a New Medical Model: A Challenge for Biomedicine: <i>G. L. Engel</i>	129
	Second Phases in Steel: <i>W. R. Bandi</i>	136
NEWS AND COMMENT	NSF: Pressures Mount to Provide Grants for Industrial Researchers	142
	Mathematician Paul Erdős: Total Devotion to the Subject	144
	<i>Science in Europe</i> /Benn and British Rethink Energy Policy	146
	Science and Technology at State: Recognizing the Problem	148
RESEARCH NEWS	Persistent Infections: The Role of Viruses	151
BOOK REVIEWS	Jupiter, reviewed by <i>J. W. Warwick</i> ; Patterns of Human Variation, <i>M. H. Crawford</i> ; Science and Civilisation in China, <i>P. M. Rattansi</i> ; Discrete Multivariate Analysis, <i>I. Olkin</i> ; The Ethology of Predation, <i>T. W. Schoener</i> ; Books Received and Book Order Service	153
REPORTS	Recombinant DNA: Examples of Present-Day Research: <i>J. Abelson</i>	159
	Charon Phages: Safer Derivatives of Bacteriophage Lambda for DNA Cloning: <i>F. R. Blattner</i> et al.	161
	Recombinational Switch for Gene Expression: <i>J. Zieg</i> et al.	170
	Gene Cloning and Containment Properties of Plasmid Col E1 and Its Derivatives: <i>K. A. Armstrong</i> , <i>V. Hershfield</i> , <i>D. R. Helinski</i>	172
	EK2 Derivatives of Bacteriophage Lambda Useful in the Cloning of DNA from Higher Organisms: The λ gtWES System: <i>P. Leder</i> , <i>D. Tiemeier</i> , <i>L. Enquist</i>	175
	Chemical Synthesis of Restriction Enzyme Recognition Sites Useful for Cloning: <i>R. H. Scheller</i> et al.	177
	Screening λ gt Recombinant Clones by Hybridization to Single Plaques in situ: <i>W. D. Benton</i> and <i>R. W. Davis</i>	180

BOARD OF DIRECTORS	WILLIAM D. MC ELROY Retiring President, Chairman	EMILIO Q. DADDARIO President	EDWARD E. DAVID, JR. President-Elect	MARTIN B. CUMMINGS RUTH M. DAVIS	RENÉE C. FOX MIKE MC CORMACK
CHAIRMEN AND SECRETARIES OF AAAS SECTIONS	MATHEMATICS (A) Dorothy M. Stone Truman A. Botts	PHYSICS (B) Norman Ramsey Rolf M. Sinclair	CHEMISTRY (C) Norman Hackerman Leo Schubert	ASTRONOMY (D) Beverly T. Lynds Arlo U. Landolt	
	PSYCHOLOGY (J) Donald B. Lindsley Edwin P. Hollander	SOCIAL AND ECONOMIC SCIENCES (K) Matilda W. Riley Daniel Rich	HISTORY AND PHILOSOPHY OF SCIENCE (L) Ernan McMullin George Basalla	ENGINEERING (M) Ernst Weber Paul H. Robbins	
	EDUCATION (Q) Herbert A. Smith James T. Robinson	DENTISTRY (R) Harold M. Fullmer Sholom Pearlman	PHARMACEUTICAL SCIENCES (S) Stuart Eriksen Raymond Jang	INFORMATION, COMPUTING, AND COMMUNICATION (T) Lawrence P. Heilprin Joseph Becker	
DIVISIONS	ALASKA DIVISION		PACIFIC DIVISION		SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION
	George C. West President	Keith B. Mather Executive Secretary	Robert T. Orr President	Alan E. Leviton Secretary-Treasurer	Erik K. Bonde President Max P. Dunford Executive Officer
SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with The Scientific Monthly®. Second-class postage paid at Washington, D.C., and additional entry. Copyright © 1977 by the American Association for the Advancement of Science. Member rates on request. Annual subscriptions \$60; foreign postage: Canada \$10; other surface \$13; air-surface via Amsterdam \$30. Single copies \$2 (back issues \$3) except Guide to Scientific Instruments \$6. School year subscriptions: 9 months \$45; 10 months \$50. Provide 6 weeks' notice for change of address, giving new and old addresses and postal codes. Send a recent address label, including your 7-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.					

Use of Phage Immunity in Molecular Cloning Experiments: <i>K. Backman, D. Hawley, M. J. Ross</i>	182
Hybridization in situ of SV40 Plaques: Detection of Recombinant SV40 Virus Carrying Specific Sequences of Nonviral DNA: <i>L. P. Villarreal and P. Berg</i> . . .	183
Increase in Conjugational Transmission Frequency of Nonconjugative Plasmids: <i>N. J. Crisona and A. J. Clark</i>	186
Five Hundredfold Overproduction of DNA Ligase After Induction of a Hybrid Lambda Lysogen Constructed in vitro: <i>S. M. Panasenko et al.</i>	188
Interspersion of Short Repetitive Sequences Studied in Cloned Sea Urchin DNA Fragments: <i>A. S. Lee, R. J. Britten, E. H. Davidson</i>	189
Nucleotide Sequences from a Rabbit Alpha Globin Gene Inserted in a Chimeric Plasmid: <i>A. Y. Liu et al.</i>	192
Analysis of Chicken Ribosomal RNA Genes and Construction of Lambda Hybrids Containing Gene Fragments: <i>W. McClements and A. M. Skalka</i>	195
Clones of Individual Repetitive Sequences from Sea Urchin DNA Constructed with Synthetic Eco RI Sites: <i>R. H. Scheller et al.</i>	197
Human Globin Messenger RNA: Importance of Cloning for Structural Analysis: <i>J. T. Wilson et al.</i>	200
Cloned Ribosomal RNA Genes from Chloroplasts of <i>Euglena gracilis</i> : <i>M. I. Lomax et al.</i>	202
Cloning of Yeast Transfer RNA Genes in <i>Escherichia coli</i> : <i>J. S. Beckmann, P. F. Johnson, J. Abelson</i>	205
Excision and Recombination of Adenovirus DNA Fragments in <i>Escherichia coli</i> : <i>M. Perricaudet et al.</i>	208
Cloning of Cauliflower Mosaic Virus (CLMV) DNA in <i>Escherichia coli</i> : <i>W. W. Szeto et al.</i>	210
The Effects of <i>Escherichia coli</i> and Yeast DNA Insertions on the Growth of Lambda Bacteriophage: <i>J. R. Cameron and R. W. Davis</i>	212
Use of Isolators in Recombinant DNA Research: <i>P. Kourilsky</i>	215
Degradation of DNA by Nucleases in Intestinal Tract of Rats: <i>L. Maturin, Sr., and R. Curtiss III.</i>	216
Probability of Establishing Chimeric Plasmids in Natural Populations of Bacteria: <i>B. R. Levin and F. M. Stewart</i>	218
Interbacterial Transfer of <i>Escherichia coli</i> - <i>Drosophila melanogaster</i> Recombinant Plasmids: <i>D. H. Hamer</i>	220

PRODUCTS AND MATERIALS

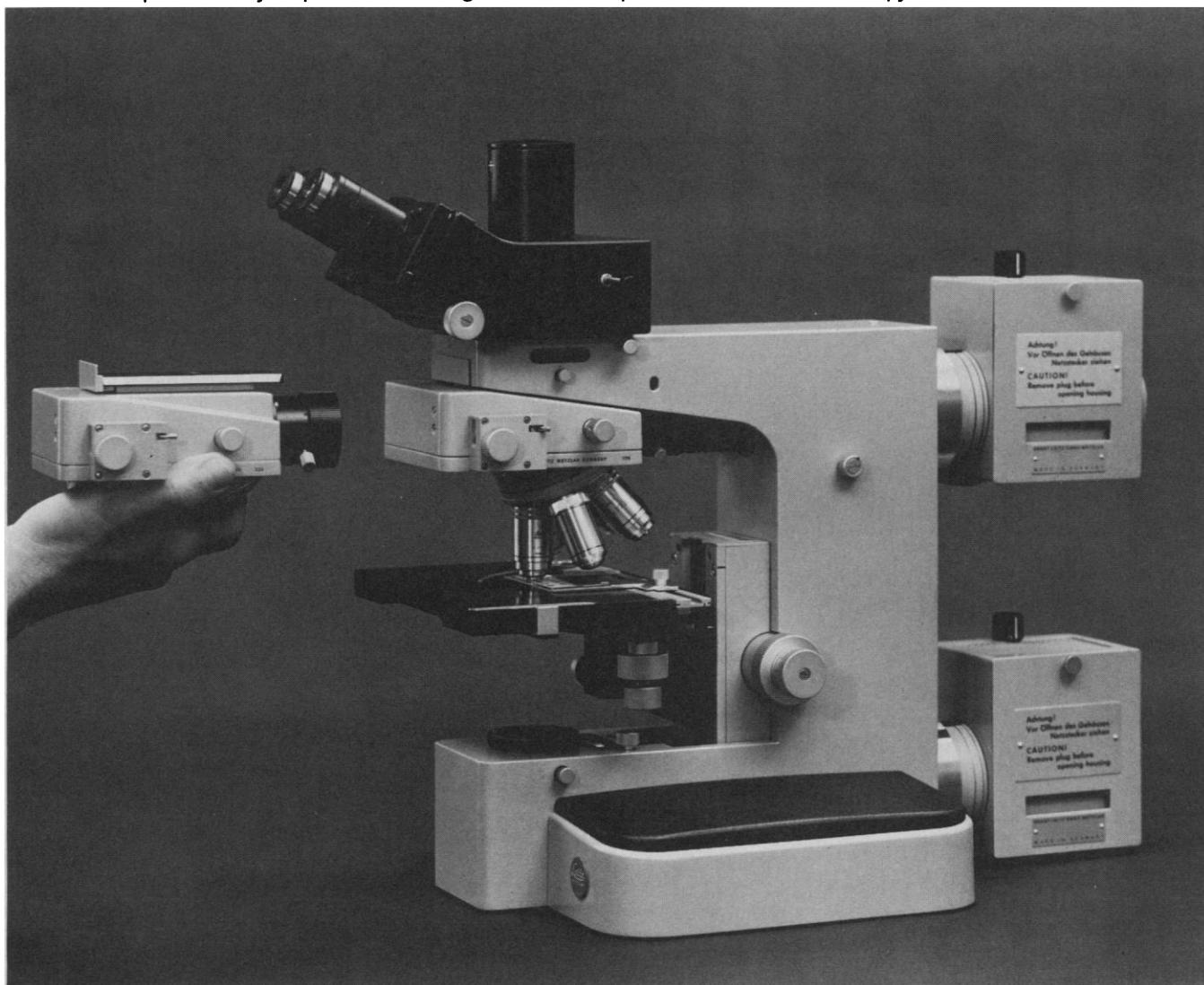
Chemical Carcinogen Glove Box; Storage Cabinets for Flammables; Modulation Contrast System; Infrared Spectrophotometers; Ultrasonic Cup Horn; Measurement of Atmospheric Electricity; Bench-Top Chemostat; Organic Carbon Analyzer; Disposable Water Dispensers; Skeletal Vascular Casting; Back-Lighted Digitizers; Electronic Balances; Gas Chromatographs; Vertical Slab Polyacrylamide Gel Electrophoresis; Data Recording System; Literature	222
---	-----

FREDERICK MOSTELLER CHAUNCEY STARR	CHEN NING YANG	WILLIAM T. GOLDEN Treasurer	WILLIAM D. CAREY Executive Officer
GEOLOGY AND GEOGRAPHY (E) Howard R. Gould Ramon E. Bisque	BIOLOGICAL SCIENCES (G) Mary E. Clark Jane C. Kaltenbach	ANTHROPOLOGY (H) Raymond H. Thompson Philleo Nash	
MEDICAL SCIENCES (N) Robert W. Berliner Richard J. Johns	AGRICULTURE (O) John P. Mahlstede J. Lawrence Apple	INDUSTRIAL SCIENCE (P) Joseph H. Engel Robert L. Stern	
STATISTICS (U) John W. Pratt Ezra Glaser	ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W) Robert G. Fleagle Stanley A. Changnon, Jr.	GENERAL (X) Mary Louise Robbins Joseph F. Coates	
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 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.			

COVER

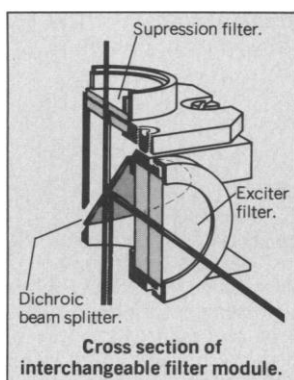
Charon 11 vector phages (dark indigo plaques) can be distinguished on *lac*⁺ bacteria (lower left, yellow plate) from reconstituted vector phages with the *lac* fragment reversed (light blue plaques) and from the phages with foreign DNA (small colorless plaques). On *lac*⁻ bacteria (upper right, yellow plate) the reverse phages are also colorless. The brown plates verify safety features of the host bacteria. See page 161. [Frederick Blattner *et al.*, University of Wisconsin.]

The Ploemopak® 2 readily adapts Leitz® "building block" microscopes for fluorescence microscopy.



3535R

Leitz introduces the second generation vertical fluorescence illuminator.



These requisites are met with interchangeable filter modules. About the size of a Flashcube, each module is an entire filter system: exciter filter, dichroic beam splitter and suppression filter.

This completely new Ploem unit is designed to ease your work by making fluorescence techniques as convenient as possible; to permit use of all the methods of fluorescence microscopy; and to be adaptable to any new development.

These requisites are met with interchangeable

Four modules can be placed in the illuminator body. They mount on a turret so you can quickly switch from one to another.

Sixteen modules are available. Twelve have filter systems that meet the characteristics of specific fluorochromes. Four other modules have built-in beam splitters; you choose your own filters.

New optics complement the system. These 10 X to 100 X oil immersion objectives provide highest intensity and contrast.

Ploemopak models are available for all current Leitz microscopes.

For more information, contact E. Leitz, Inc., Dept. SC4 Rockleigh, N.J. 07647.

Leitz

Where most new developments start.

Circle No. 158 on Readers' Service Card

Sartorius proudly introduces "affordable" electronic weighing; a completely new series of compact, fully electronic balances in the most popular weighing ranges, priced from \$1,895.

The new Series 3700 balances have no beam, no knife edges, no knobs, no dials and no mechanical zero adjustment. To weigh, just place the sample on the pan; in 1-2 seconds the readout is shown on a large, bright 7-segment digital display. Just touch the sensor bar for instant electronic taring (or zero adjustment) over the entire weighing range.

Other advanced features of the Series 3700 include a unique "stable reading" indicator and an electronic filter to eliminate the effects of high frequency vibration. Analog and digital outputs permit interfacing

with printers, records, calculators and data processing equipment. Check this table for the cost of the model with the weighing range and readability you need. You'll be amazed at the savings (Model 3706 costs little more than comparable mechanical top loaders).

Model	Weighing Range	Readability	Price
3705	0-160g	0.001g	\$2995
3704	0-1200g	0.01g	2995
3716*	a) 0-120g b) 0-1200g	a) 0.01g b) 0.1g	2295
3706	0-1200g	0.1g	1895
3703	0-3000g	0.1g	2295
3709	0-600g	0.01g	2330

*Dual Range Other models available with time integrator.

For an informative folder on these revolutionary balances, write: Sartorius Balances Division, Brinkmann Instruments, Inc., Cantiague Road, Westbury, N.Y. 11590.

**The first fully electronic balances
with the accuracies you want, in the ranges
you need, at a price you can afford.**

Sartorius Series 3700.

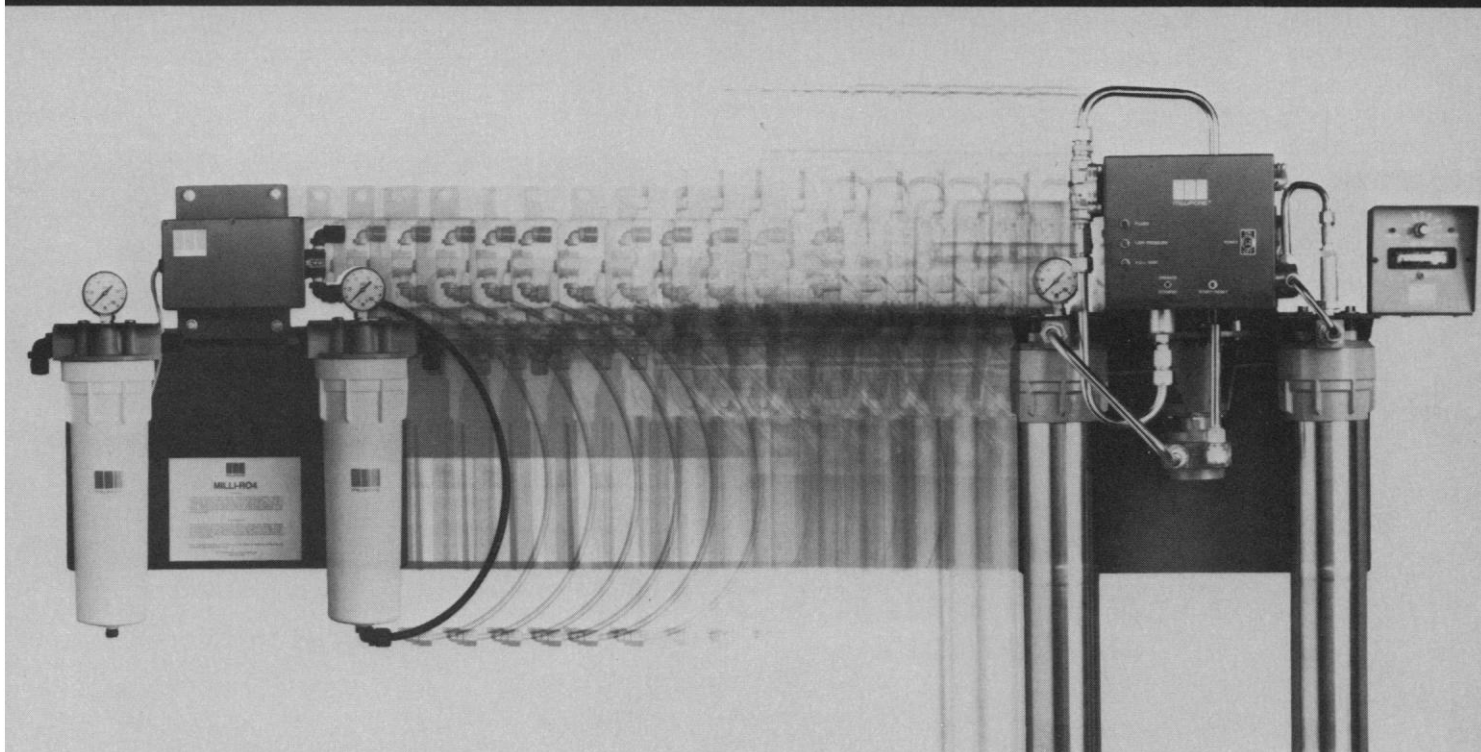


**1976
IR 100
COMPETITION WINNER**
Cited by
Industrial Research
magazine for developing
one of the 100 most
significant technical products
of the year

sartorius

Circle No. 149 on Readers' Service Card

Pure Water- From 0 to 250 in 6 Systems



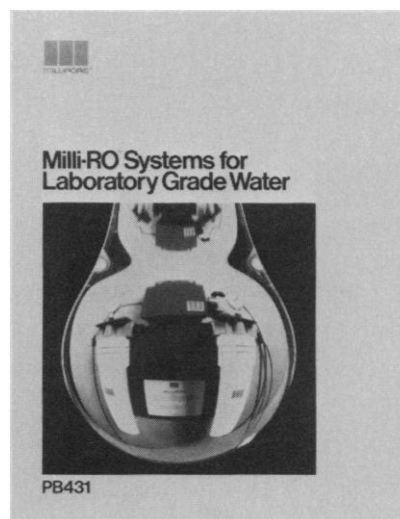
Whether you need pure water at the point-of-use or centrally produced, Millipore makes a reverse osmosis system that's just your speed.

Milli-RO™ reverse osmosis systems produce consistently pure water from 4 to 250 liters per hour. Spiral-wound or hollow fiber membrane cartridges combine dependable performance with minimal maintenance. Compared to a still, water quality is equivalent while capital and operating costs are considerably less.

Milli-RO systems hang on the wall to conserve space. Our systems are modular so you can scale up as your requirements grow simply by changing a cartridge or adding a pump.

Milli-RO system quality and design are based on 20 years experience in membrane technology and product engineering. For pure water at a low price, replace your still with a Milli-RO reverse osmosis system. Off-the-shelf delivery and regional service are available.

Call us toll-free at **800-225-1380** for a copy of our technical bulletin. (In Canada, call 800-261-0961; in Massachusetts, call 617-275-9200.) Water Systems Division, Millipore Corporation, Bedford, Massachusetts 01730.



Circle No. 270 on Readers' Service Card

In nucleic acid research—in genetic control and transcription experiments, in genetic recombination, mapping and structure analysis, or in DNA and RNA sequence studies — you want your enzymes to do just the job you intended . . . and nothing else. With your needs in mind, Worthington has assembled a wide spectrum of choice, high purity biochemicals. We've taken special care to ensure that they are free of interfering contaminants.

We have recently introduced a number of new products to supplement previously available materials for this critical work. New enzymes include, among others, DNA and RNA polymerases, restriction endonucleases and terminal transferase.

Polymerases include DNA polymerase α from calf thymus, DNA polymerase γ from fetal calf liver, DNA polymerase I from *E. coli* and RNA polymerase II from wheat germ.

Restriction endonucleases include Eco RI, Bam HI, Hae II, Hae III and Alu I. All are produced free of contaminating nucleases.

Terminal transferase from calf thymus is endonuclease-free and is suitable for end-labeling.

Phage λ and plasmid PMB 9 DNA also are newly available.

All are supplemental to products we have been supplying for nucleic acid studies—DNases I and II; RNases I and T₁; spleen and venom phosphodiesterases; acid and alkaline phosphatases; polynucleotide phosphorylase; micrococcal nuclease; and DNA and RNA.

Understanding your special needs for suitable research materials, we insist on producing all our own enzymes. We carry each product from raw material through purification, quality control and final packaging.

As a prime source of research biochemicals, we can provide you with important assurances of purity, quality and reliability—assurances resellers can't offer.

For additional technical information on any of the above Worthington enzymes, or for a copy of the complete Worthington life science catalog, write us or contact our technical service department by calling our toll-free number (800) 631-2142. In New Jersey only, call collect (201) 462-3838.



Worthington Biochemical Corporation
Freehold, New Jersey 07728 USA

A subsidiary of Millipore Corporation

Worthington enzymes and biochemicals for nucleic acid research...



with the activity you need – without the contaminants you don't.

Worthington Biochemical Corporation

Freehold, New Jersey 07728 / Call Toll Free: 800-631-2142

Send the following technical data sheets:

- | | |
|---|---|
| ☐ Eco RI, Bam HI, Hae II, Hae III, Alu I | ☐ Phosphodiesterases |
| ☐ DNA polymerase I, α , γ | ☐ DNase I, II |
| ☐ Terminal transferase | ☐ RNase I, T ₁ |
| ☐ RNA polymerase II | ☐ Polynucleotide phosphorylase |
| ☐ Phage λ and PMB 9 DNA | ☐ Micrococcal nuclease |
| ☐ Acid, alkaline phosphatase | |
| ☐ The Worthington Biochemical Catalog | |

NAME _____

TITLE _____

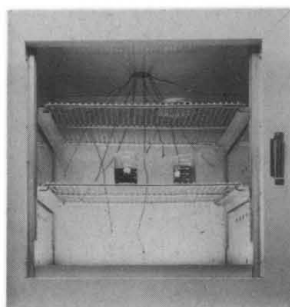
INSTITUTION _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____



WE GUARANTEE YOUR TEMPERATURE 12 WAYS AND THEN HAND YOU A FREE MITT

We think your oven should hold the same temperature at the top, at the bottom, at either side, and in the center.

We suspend highly sensitive 24 gauge Iron/Constantan thermocouples at a dozen different places in the oven and record the full operating range.

When we say the Precision Model 28 oven shown here is uniform to $\pm 1.0^{\circ}\text{C}$ at 100°C , we mean at all twelve locations. *Ditto* when we say $\pm 1.4^{\circ}\text{C}$ at 225°C .

We guarantee those performance figures!

Part of the reason why we have such confidence in Precision oven performance is the attention we give to design theory down to the sizes of the holes in the diffusion ducts.

Part of the reason is our use of "black heat" elements that minimize temperature overshoot as well as offering trouble-free service.

The biggest reason why we think Precision is your best buy is that we've made more laboratory ovens and incubators than anyone else.

Get your mitt on our catalog. For as long as they last we're giving a free mitt for safer oven use to any and all who send for the complete catalog of Precision Ovens. Just write Precision Scientific Group, 3737 West Cortland St., Chicago, Illinois 60647.



CONSTANT TEMPERATURE TAKES

PRECISIONTM

Circle No. 238 on Readers' Service Card



THE PICTURESQUE NIKON

The new Nikon Biophot with HFM photomicrography system gives you the brightest, sharpest pictures you've ever seen.

Nikon optics are picture-perfect for sharpness and clarity, razor-edge resolution, revealing contrast. Both instruments feature Nikon's recently developed CF glass and integrated multi-coatings for unprecedented reduction of chromatic errors, internal reflections and glare.

The HFM's electro-magnetic shutter is vibration-free and automatic. Formats include 35mm, 3¼" x 4¼" Polaroid®, and 4" x 5."

Photo-oriented Nikon gives you more: if you remove a film-loaded camera from the HFM, it closes automatically to protect the film. Because you may be a scientist first and a photographer second, Nikon equipped the HFM with a light meter, IC-controlled shutter with ultra-precise resistance element for automatic exposure control and a reticle that safeguards you against shooting out-of-focus due to the eye's tendency to accommodate. And the ability to be used on any standard microscope.

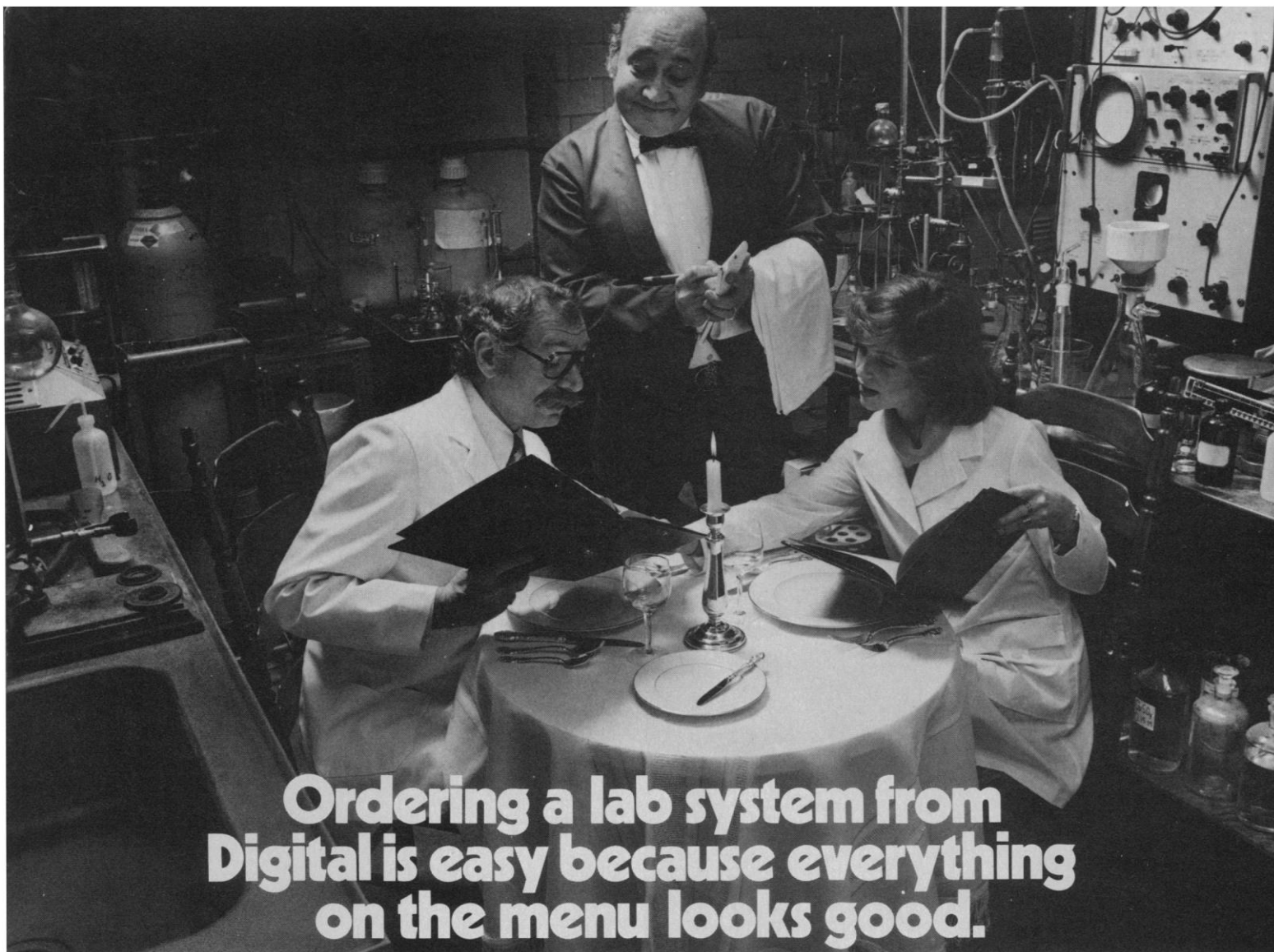
For a clear picture of this newest Nikon advance, write or phone for details. Nikon Instrument Division, Ehrenreich Photo-Optical Industries, Inc. ☐ 623 Stewart Avenue, Garden City, NY 11530, Phone (516) 222-0200.

Nikon

The first name — and the last word — in optics.



Circle No. 201 on Readers' Service Card



Ordering a lab system from Digital is easy because everything on the menu looks good.

Digital presents lab systems that suit your taste without stretching your budget. Nine different PDP-11 based DECLAB hardware systems with two different DECLAB real-time software packages. So now you can pick just the right combination of power and price, hardware and software that fits your lab because it was designed for it.

With DECLAB, you can choose a system that gives you graphics capability. Hard copy capability. Digital's latest analog-to-digital as well as digital-to-analog interfaces. Single or multi-task real-time operating systems. And more.

And since all our DECLAB systems are compatible, you can take your system and expand it as your lab expands. You can add printers, graphics terminals, storage disks. You can also add our new general purpose interface bus (IEEE Standard 488).

You can even tie everything together using DECnet communications protocols. And that means you can design a lab system that's perfect now. And years from now.

So if you're looking for a lab system, look for the system that's easy to start with. And stay with. Digital's DECLAB. For details, call your nearest Digital sales office. Or send the coupon to Digital Equipment Corporation,

Laboratory Data Products Group, MR2-4/M51, Marlborough, MA 01752. Telephone: (617) 481-9511, ext. 6951. European headquarters: 81 route de l'aire, 1211 Geneva 26. Tel: 42 79 50. In Canada: Digital Equipment of Canada, Ltd.

digital

Digital Equipment Corporation, Laboratory Data Products Group, MR2-4/M51, Marlborough, MA 01752.

- ☐ I'm interested. But my need is long range. Please send me the DECLAB Family brochure.
- ☐ I'm very interested. Please have your nearest sales engineer get in touch with me.

Name _____ Title _____

Company _____ Phone _____

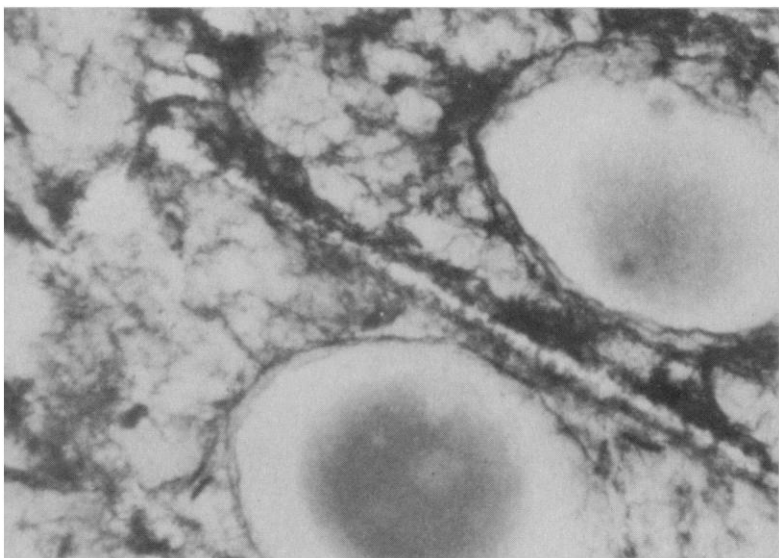
Address _____

City _____ State _____ Zip _____

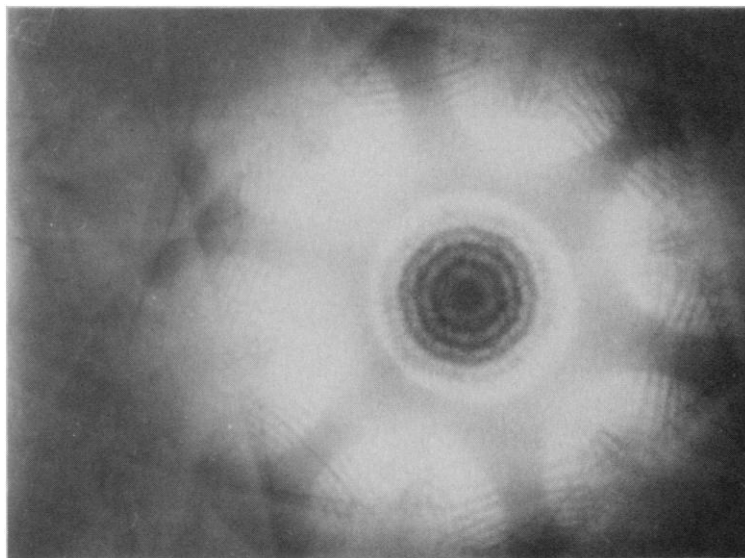
Philips
STEM
400

More Science

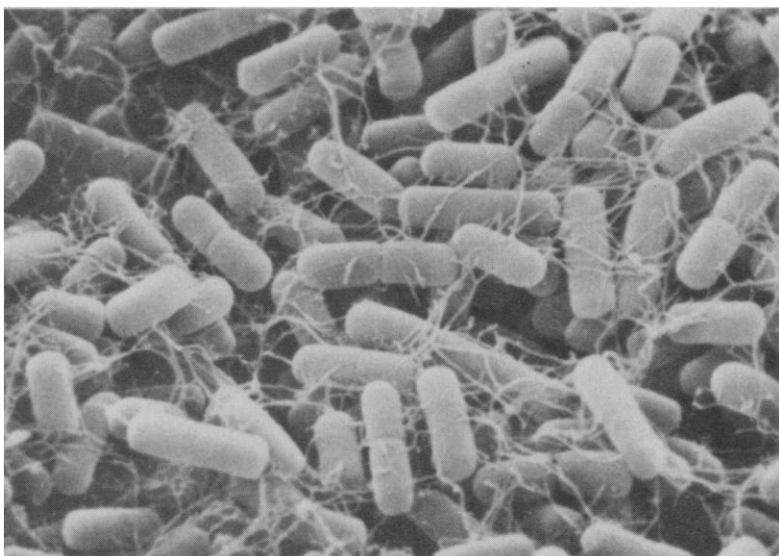
Philips
STEM
400



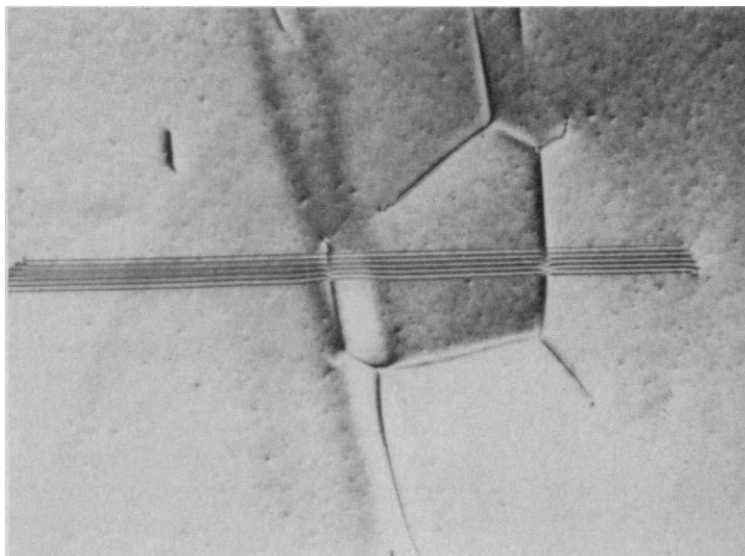
Thick specimen Section of 2 micron thick, castor oil plant root 8,000x



Rocking Beam-Channeling Adjacent 200A areas in silicon.



Primary Electron Backscatter Escherichia coli. STEM in SEM mode. 15,000x (Made on EM301 STEM)



Convergent Beam Zone Axis Pattern Silicon foil 400A; area selected by focussed beam. (Courtesy G. Rackham & J. Steeds, Dept. of Physics, Bristol University, England)

5 reasons why:

1. The cleanest imaging system of any electron microscope . . . (STEM 400's ion pumped column gives a true 10^{-7} specimen vacuum) allows practical use of the small diameter, intense beam required by STEM.
2. STEM 400's intense small diameter beam is practical because the 10^{-7} specimen area vacuum virtually eliminates etching and contamination in the specimen environment.
3. The significant reduction in chromatic aberration of the 4 lens magnification system permits extension of specimen selection to include extremely thick specimens, to 2μ thick.
4. Digital electronics permits instant changeover from STEM to TEM mode & vice versa.
5. Automation of routine operations allow unprecedented speed in specimen area selection, focus and observation.

Philips Electronic Instruments, Inc.
85 McKee Drive
Mahwah, N. J. 07430
A North American Philips Company

Circle No. 264 on Readers' Service Card



PHILIPS

NEW FROM MILES RESEARCH PRODUCTS

LECTINS

As a major producer of lectins, FITC-conjugated lectins and immobilized lectins, we are pleased to announce the development of four new lectins from lentil seed and castor bean. These are available in both the free and immobilized forms as well as the FITC derivatives.

	LECTINS Code No.	FITC-LECTINS Code No.	AGAROSE- IMMOBILIZED LECTINS Code No.
Lens Culinaris Hemagglutinin A	79-130	79-104	79-133
Lens Culinaris Hemagglutinin B	79-135	79-105	79-138
Ricinus Communis Agglutinin—60	79-140	79-106	79-143
Ricinus Communis Agglutinin—120	79-145	79-107	79-148

ALSO AVAILABLE: In free and agarose-immobilized forms and as FITC-derivatives:

Concanavalin A and Con A Salts
Fucose Binding Protein (from lotus seed)
Soybean Agglutinin
Wheat Germ Agglutinin
Ferritin-Concanavalin A (for Electron microscopy)

AVAILABLE SOON: Phytohemagglutinin

More detailed description of these products can be found in our new Biochemicals Catalog. If you don't have one, write the office nearest you for your free copy.



Research Products
Miles Laboratories, Inc.
 Elkhart, Indiana 46514
 Phone: 219-264-8804

Miles Laboratories, Ltd.
 Post Office Box 37, Stoke Poges
 Slough, England SL 2 4 LY
 Phone: Farnham Common 2151

Circle No. 176 on Readers' Service Card

Science for Listening

CANCER — the latest in the AAAS audiotape cassette album series.

WHY? This most baffling question is asked every day by over 1000 Americans. Cancer, a disease of fear, anxieties, and of the unknown. A disease that strikes for no apparent reason. Is there an answer? Is there hope? On four hour-long cassettes, science journalists interview 19 leading physicians and cancer researchers. Listen to what the experts in medical science know and the potential that research holds. The newest audiotape album from AAAS is accompanied by a 40-page booklet condensing much of the information contained in the series of tape-recorded narratives. Order the entire package or the booklet alone.

List price: \$49.95 Booklet alone: \$2.50
(special PREPAID member price: \$44.95. Booklet alone: \$2.00)

AND NOW . . . for a limited time only, the Association is able to offer its readers the following proven favorites at a special low price to enable you to expand your collection. Which ones do you need for classroom discussions, personal study, or library reference? Look over the list and note how prices have been reduced. Increase your knowledge while we decrease our prices. Order NOW while the supply lasts.

☐ Energy: A Dialogue

A six-tape album plus booklet which focuses on three major themes: the energy crisis, what it is and how it got that way; the technological options, what they are and how much they will cost; and the interrelationship of energy with environment and politics and how it affects our lifestyles and family budgets.

List price: ~~\$49.95~~ **\$35.00**

☐ Origins

What is man's deepest mystery? How did life begin? What is the genesis, life, and death of stars? How was the universe created? Four of the world's leading scientists probe these and other questions in *Origins*, an audiotape album with four 50-minute cassettes and accompanying booklet. For the inquisitive mind, for the science student, for anyone who wants to learn more about his own origin or that of his world.

List price: ~~\$39.95~~ **\$30.00**

☐ The Physical World

Designed for the graduate physicist and other scientists, *The Physical World* contains six lectures selected from presentations at the 14th General Assembly of the International Union of Pure and Applied Physics. The lectures explore such topics as the theory and techniques of scattering methods, the evolution of solid state theory, the various types of nuclear phenomena, as well as questions about how

physicists and the lay public can share "the thrill of discovery and the satisfaction of understanding." The accompanying booklet contains reproductions of many of the slides used in the original presentations.

List price: ~~\$69.95~~ **\$55.00**

☐ Speaking of Science

To help you understand the world through science, AAAS created this three-volume series of audiotapes. Thirty-six conversations between well-known scientists and science writers explore pertinent scientific issues, discoveries and topics of research. Designed for listening both in the home and in the classroom, each volume contains 12 scintillating half-hour conversations certain to spark hours of interesting and informative discussions. The volumes may be purchased separately or in a set. Quantities are limited.

A partial listing of conversations

Volume I: Health Care and Delivery; Technology Today; The Finite Earth.
List price: ~~\$99.95~~ **\$35.00**

Volume II: The Dilemma of Prisons; New Dimensions in Human Genetics; Energy Rationing.
List price: ~~\$39.95~~ **\$35.00**

Volume III: The Science of Violence; Population Policy and Human Development; The Earth's Fire.
List price: ~~\$39.95~~ **\$35.00**

Three-Volume Set (Vols. I-III)
List price: ~~\$99.95~~ **\$85.00**



ORDER FORM

Cancer Album
— ~~\$49.95~~ Retail (**\$44.95** AAAS member, prepaid)
Cancer Booklet
— ~~\$2.50~~ Retail (**\$2.00** AAAS member, prepaid)

Please send the following at the reduced prices:

— Energy: A Dialogue — **\$35.00**
— Origins — **\$30.00**
— The Physical World — **\$55.00**
— Speaking of Science (Vol. I) — **\$35.00**
— Speaking of Science (Vol. II) — **\$35.00**
— Speaking of Science (Vol. III) — **\$35.00**
— Speaking of Science (Three-Volume Set) — **\$85.00**

TOTAL AMOUNT ENCLOSED _____

Check or Purchase Order must accompany all orders. **DO NOT SEND CASH**

Name _____

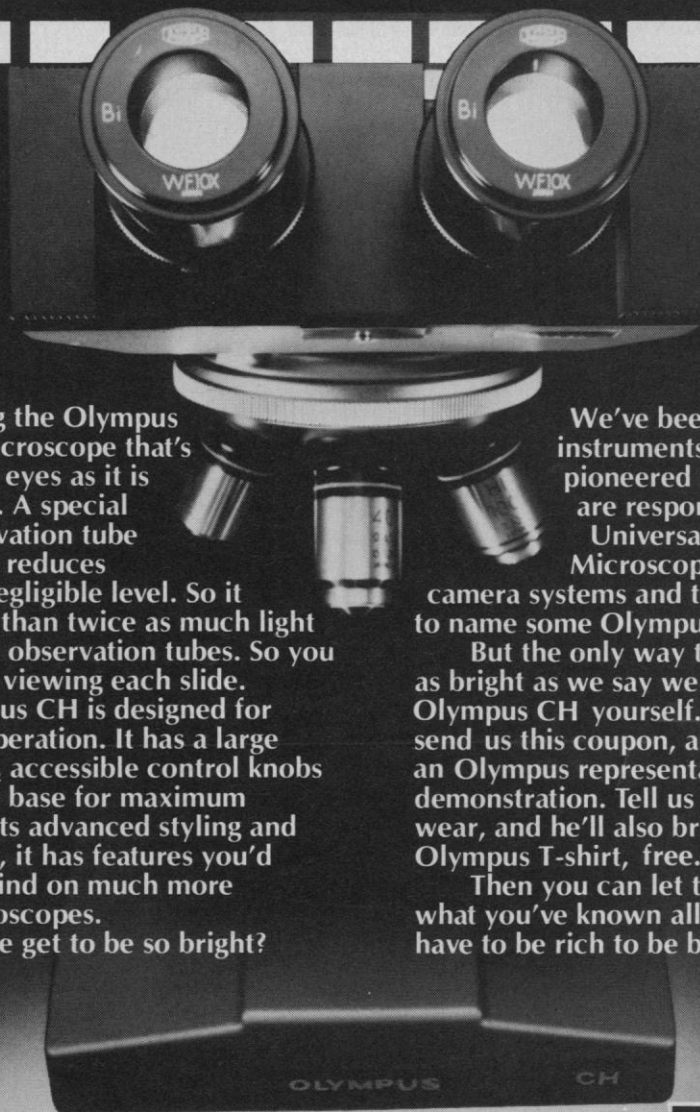
Address _____

City _____

State, Zip _____

Mail to:
AAAS, Dept. A-1
1515 Massachusetts Ave., N.W.
Washington, D.C. 20005
(Please allow 6-8 weeks for delivery)

You don't have to be rich to be bright.



Introducing the Olympus CH; the first microscope that's as easy on your eyes as it is on your budget. A special Olympus observation tube coating process reduces light loss to a negligible level. So it transmits more than twice as much light as conventional observation tubes. So you spend less time viewing each slide.

The Olympus CH is designed for smooth, easy operation. It has a large stage and large, accessible control knobs placed near the base for maximum comfort. With its advanced styling and modular design, it has features you'd normally only find on much more expensive microscopes.

How did we get to be so bright?

We've been making precision instruments since 1919. We pioneered fiberoptics. And we are responsible for the Vanox Universal Research

Microscope, Olympus OM camera systems and tape recorders, just to name some Olympus achievements.

But the only way to find out if we're as bright as we say we are, is to try an Olympus CH yourself. Drop us a line or send us this coupon, and we'll send you an Olympus representative for a demonstration. Tell us what size shirt you wear, and he'll also bring you a blue Olympus T-shirt, free.*

Then you can let the world know what you've known all along: "You don't have to be rich to be bright."

OLYMPUS
SEEING BEYOND MAN'S VISION

Name (and title) _____

Company (or institution) _____

Address _____

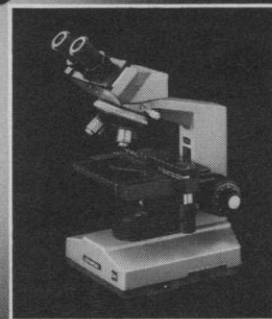


City _____ State _____ Zip _____

Size: Small, Medium or Large (circle one)

Olympus Corporation of America
2 Nevada Drive, New Hyde Park, New York 11040

*T-Shirt offer expires July 31, 1977.



Olympus CH. The first affordable bright image.

Which Büchi/Brinkmann Rotary Evaporator should you get?

We make the choice hard, to make the extraction easy.

Büchi/Brinkmann offers rotary evaporators in a variety of models to facilitate all types of extractions.

There is a rotary evaporator for volumes as small as 5 ml, and Pilot Plant Models for volumes as large as 50 l. In between, there are models with variable speed electronic motors, sparkless induction and explosion-proof motors, quick-action jacks, stainless-steel heating baths, and a wide selection of flasks, condensers and accessories.

If the rotary evaporator you need is not shown here, you'll find it in the new Büchi/Brinkmann brochure. For your copy, write: Büchi Division, Brinkmann Instruments, Cantiague Road, Westbury, N.Y. In Canada: 50 Galaxy Boulevard, Rexdale (Toronto), Ont.

B Büchi/Brinkmann Rotavapors



ROTAVAPOR EL

Specially designed distribution head with built-in duct permits applications not possible with other rotary evaporators. Also has electronically-controlled motor, quick-action jack and stainless-steel heating bath.



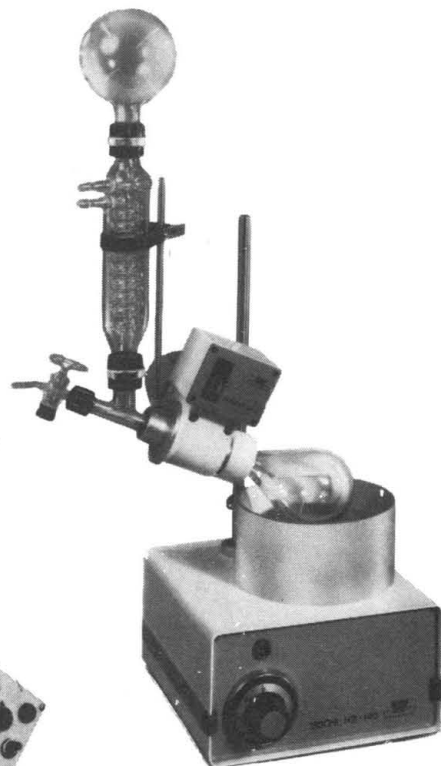
ROTAVAPOR RE

Has fully transistorized, electronically controlled high torque motor. Variable speed, 10 to 220 r.p.m. Continuous solvent feed. Equipped with safety deflector shield, quick-action jack and stainless-steel heating bath.



ROTAVAPOR R-10

Designed for large volume applications. Has 10 liter flasks, mechanical lift, electronic speed control (10 to 150 r.p.m.) and thermostatically-controlled heating bath. For batch or continuous-feed operations.



SMALL VOLUME ROTAVAPOR M

For evaporations, organic synthesis, and analysis of volumes 5 to 100 ml. Rotates at 150 r.p.m. All glassware is threaded. Comes with 4 evaporating and 3 receiving flasks plus extra vacuum seals. Less than 2 ft. wide.



ROTAVAPOR R-50EX

Explosion-proof Pilot Plant Model for large volume extractions. 50 liter capacity flasks, high throughput of solvent. Variable speed motor. For batch or continuous-feed operations.

Three major technical advances have made Neslab's constant temperature circulating baths the most advanced laboratory cooling baths available. The temperature range of +250 down to -100°C only hints at the new lows we've reached.

Multi-point sensing probes housed in a stainless steel sheath read the temperature three times per second at three different points in the bath. Unavailable in laboratory baths at any price, Neslab's 3-point sensing virtually eliminates overshoot and lag, and keeps control deviations lower than ever before possible.

The proportional IC controller provides unmatched short-term control without long-term instability or drift. Four integrated circuits provide stability of a low $\pm 0.02^\circ\text{C}$ or less. Conservatively.

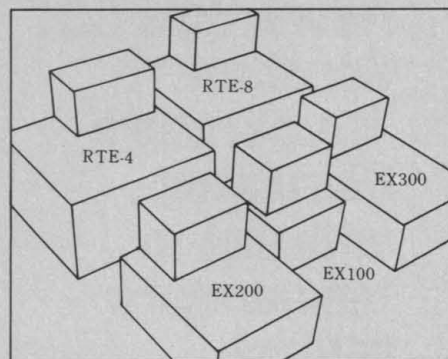
The new circulating pump is adjustable from 0 to 13 liters/minute. It combines a specially designed motor, industrial grade ball bearings, a multi-bladed rotor and a massive $\frac{1}{2}$ " diameter shaft, reducing vibration and noise to a new

low. With no sacrifice in flow or pressure.

The efficient, progressive cavity pump design reduces mechanical heat input to a new low. It can operate with a wide range of temperatures, bath fluids and viscosity conditions, and is designed to run for years. Continuously.

Lowest of all is the price tag. Neslab's baths actually cost less than others not having their exclusive features. And we think that's the best low of all.

Phone right away. Or write away.
NESLAB INSTRUMENTS, INC.,
871 Islington St., Portsmouth, N.H.
03801 U.S.A., (603) 436-9444.

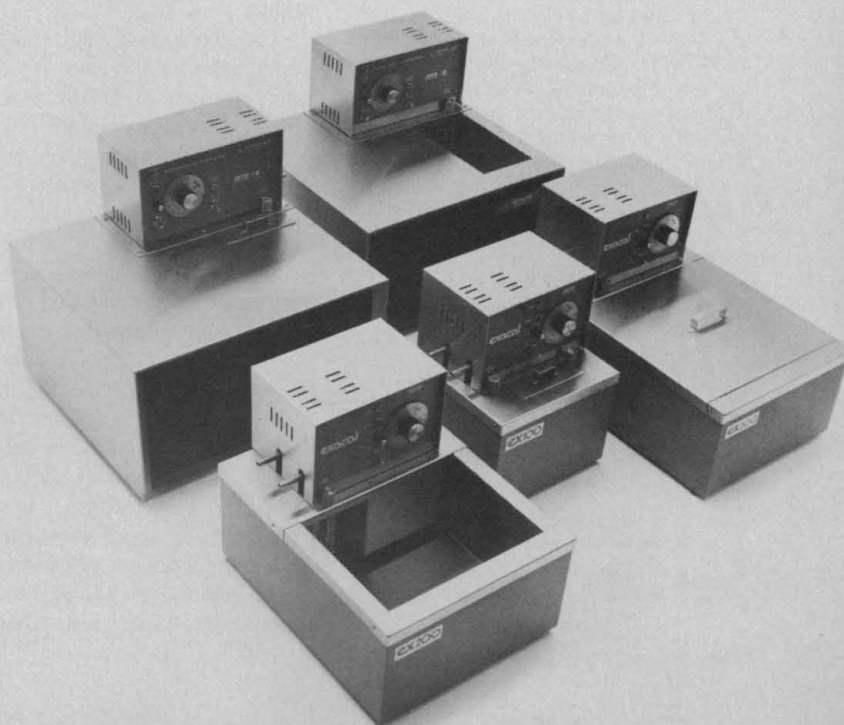


EXACAL BATH CIRCULATORS provide constant temperatures from -35 to +150°C. Stability: $\pm 0.02^\circ\text{C}$ or less. Work areas: up to 10" x 12" x 5 $\frac{3}{4}$ " deep. Accessories: refrigeration units; electronic temperature programmer.

RTE-4 & 8 REFRIGERATED BATH CIRCULATORS have 20-30% greater cooling capacity than most baths. From -30 to +100°C. Stability: $\pm 0.02^\circ\text{C}$. Work areas: up to 8 $\frac{3}{4}$ " x 4 $\frac{3}{4}$ " x 9" deep. Accessory: electronic temperature programmer.

LT-9 LOW-TEMPERATURE BATH CIRCULATOR (not illustrated) can maintain a high 300 watt heat removal capacity at -70°C. From +10°C to -80°C. Stability: $\pm 0.05^\circ\text{C}$. Work area: 6 $\frac{3}{4}$ " dia. x 8" deep. Accessory: electronic temperature programmer.

We've reached some new lows in temperature control.



New Lauda C-3T Constant Temperature Circulator with dial-in temperature control.

Only \$399.



Your laboratory could be using a new Lauda Constant Temperature Circulator with dial-in temperature control, and for as little as \$399.

That's the price the new Model C-3T, with 1,000 watt heater, 8-liters per minute pumping capacity, easy-to-set one-knob thermostatic control, built-in coil for external cooling, all stainless-steel components, reading thermometer, and 30-100°C operating range (0-100°C using external cooling) with $\pm 0.2^\circ\text{C}$ control accuracy.

Need greater control accuracy? Model C-3B has it ($\pm 0.03^\circ\text{C}$), plus pre-set temperature selection (25°, 37° and 56°C) and fine adjustments within $\pm 1.0^\circ\text{C}$, all for \$540.

For literature on these and other Lauda models, write: Lauda Division, Brinkmann Instruments, Cantiague Rd., Westbury, N.Y. 11590. In Canada: 50 Galaxy Blvd., Rexdale, Ont. M9W4Y5.

A DIVISION OF
B Lauda
Circulators
BRINKMANN

LETTERS

Recombinant DNA Research: International Cooperation

The World Health Organization (WHO) carries a major responsibility to protect the health of mankind. This is a social responsibility that must be fulfilled, not only in securing the benefits derivable from basic and applied biomedical sciences, but also in coordinating those measures aimed at the reduction of the risks associated with the natural environment of man as well as his multiform activities.

It is thus appropriate that WHO has given and gives great attention to the problem of research in genetic manipulation and, in particular, to recombinant DNA technology. In 1975 the WHO Advisory Committee on Medical Research recommended to the Director-General that "the continuation, under appropriate safeguards, of microbiological research, including genetic manipulation and cell fusion studies, is of the utmost importance for progress in medicine and public health." Accordingly, a Special Programme on Safety Measures in Microbiology has been set up within WHO. Among other items, its objectives include a close review of this research activity. Specifically, WHO can serve as an international focus for the collection and dissemination of information, so that appropriate initiatives can be considered at the national and international levels. WHO can also see that the various initiatives are coordinated, especially for the development of the safest possible biomaterials and the evolution of techniques which reduce the hazards of working with them.

Clearly, a most crucial parameter in deciding the best avenues to these ends is the assessment of the so-called "conjectural" or "potential" risks associated with recombinant DNA research. The evaluation of their specific nature and level, as quantitatively as possible, can create formidable limits both to the design of experiments and to the interpretation of the ensuing results. Nevertheless, careful risk assessment is a necessary prerequisite to reconciling the different, and often conflicting, scientific views on this subject.

The WHO special programme is intended to stimulate all concerned and competent scientists (i) to cooperate in the design of appropriate experiments for the acquisition of relevant data on risk assessment; (ii) to see that the most meaningful experiments are performed as

'Gene' has an issue devoted to recombinant DNA six times a year.

gene

An International Journal focusing on Gene Cloning and Gene Structure and Function.

Editor-in Chief:

Dr. W. Szybalski,

McArdle Laboratory for Cancer Research,

University of Wisconsin, Madison, WI 53706, U.S.A.

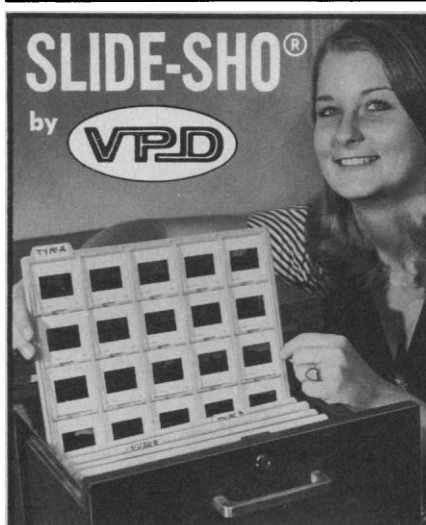
1977 - 1 volume in 6 issues
Dfl. 124.00/US \$50.75
postage included

For a specimen copy write to:

The Promotion Manager,
**Elsevier/North-Holland
Biomedical Press,**
P.O. Box 1527, Amsterdam,
The Netherlands.

*The Dutch guilder price is
definitive.*

Circle No. 224 on Readers' Service Card



THE VERSATILE SLIDE FILING AND RETRIEVAL SYSTEM FOR 100 OR 100,000 SLIDES

adapts to your specific needs

SEE 20 SLIDES AT A GLANCE

on VPD Slide-Sho Pages, molded of lightweight, rigid, translucent plastic with matte, light diffusing back panel. For file cabinets, ring binders, rear-screen illuminators.

ASK FOR FREE SAMPLE
and brochure "Slide Filing Ideas"

JOSHUA MEIER DIVISION
W.R. Grace & Co., North Bergen, N.J. 07047

Circle No. 241 on Readers' Service Card

Circle No. 151 on Readers' Service Card

safely as possible and without delay; and (iii) to ensure wide participation in the analysis of the results, be they positive or negative. To this end a letter has been circulated to more than 200 involved scientists, and their answers are being analyzed.

But any exercise in the assessment of risks must include an equally careful analysis of the expected benefits. It is therefore of the utmost importance that recombinant DNA research be developed with close consideration not only to its contributions to the fundamental problems in molecular genetics but also to the conversion of their solutions into practical and beneficial applications. Explicit action toward these goals should go beyond conferences and courses to collaborative research. Results of experiments will be required to ensure that the claims of proponents of a lively continuation of research in genetic manipulation are legitimate.

Once the risks are more critically assessed, and the benefits more clearly defined, appropriate steps ought to be taken by the various national and international bodies concerned. These initiatives should lead to an improved concept of international cooperation toward safer and more productive research in this as well as other areas of biomedical science.

V. SGARAMELLA

*Consultant, World Health Organization
Special Programme on Safety
Measures in Microbiology,
Consiglio Nazionale delle Ricerche,
Pavia, Italy*

Is Sweden More Energy-Efficient?

In their article "Efficient energy use and well-being: The Swedish example" (3 Dec. 1976, p. 1001), Schipper and Lichtenberg draw the conclusion that Sweden is more energy-efficient than the United States by comparing the economic output per unit of energy consumption in the two countries. They further conclude that the living standards are the same in each country. Although the study is an interesting analysis, these conclusions are a misinterpretation of the facts. Based on the simplistic criterion used in the analysis, the states of New York, Rhode Island, Vermont, Connecticut, and Hawaii are more efficient in economic productivity per unit of energy use than is Sweden. Although such studies as that of Schipper and Lichtenberg are beneficially provocative in the energy conservation debate, they may also become exhortations for unrealistic energy conservation targets.

A basic fallacy in their study is the omission of the difference in the mix of industrial, service, and agricultural activities within the two countries. An analysis of different economic activities in the United States reveals that energy use per unit of labor varies by as much as a factor of about 75 between energy-intensive operations, such as oil refineries, to such low-energy users as printing and publishing. For example, the United States refines 133 percent more oil per capita than Sweden; but Sweden produces 77 percent more newspapers and 141 percent more books per capita than the United States. Because of the differing industrial mixes among the states of the United States, there is a variation of about a factor of 5 in the economic output per unit of energy among the 50 states—even though the United States has a mobile labor market, a common economic basis, a common currency system, and common consumer product availabilities and life-style. Similarly, variations in the detailed industry mix in each nation can result in large variations in the energy used per unit of economic output and can be misinterpreted as differences in technical efficiency of energy use and in implementation of conservation.

Schipper and Lichtenberg mask the true comparison of the economic value added in manufacturing per unit of energy use as shown in their table 9 [column E_j (kwh/\$)]. Manufacturing use of electricity is certainly separable from the available mix of generation sources, and this comparison should have been made on equivalent primary energy input (the gross kilowatt-hours total described in the heading of table 9). If this table is thus recalculated, then the kilowatt-hours of total energy (t) per dollar of value added would show the United States at 16.5 kwht per dollar and Sweden at 21.2 kwht per dollar. Thus, Sweden's manufacturing is only 78 percent as economically effective in the use of energy as is U.S. manufacturing. This should not be interpreted as indicating either Swedish wastefulness or a potential for conservation—rather it is undoubtedly the result of the economic optimization of the use of all the resources (capital, labor, materials) available in each country.

Further, international comparisons, as between Sweden and the United States, are distorted by the difficulty of converting monetary exchange rates into comparisons of real purchasing values. The comparison of the well-being or scale of living among nations cannot be inferred by the dollar equivalent of monetary exchanges. Total personal income per family is a better measure of economic well-

ACCURATE QUANTITATION!

Presenting QUANTEX-RAY™
The XES answer machine
from Kevex.



Quantex-Ray is a completely computerized X-ray energy spectrometer system for rapid quantitative elemental analyses. It's an enormously flexible system, allowing both interactive and automatic operation. In fact, operation can be so automatic that all you do is type one simple command to activate a total analysis. What does Quantex give you? In one, totally modular XES system, Kevex provides:

- A powerful, versatile digital computer, capable of independent and simultaneous operation. It identifies trace elements and major elements and automatically removes Si escape peaks.
- Easy-to-use software, including Colby's MAGIC V, FRAME B, Bence-Albee, and thin film...all for electron column applications. EX-ACT handles X-ray fluorescence analyses. Oxide percents? Yes.
- The highest-resolution X-ray detection subsystem, featuring the new Kevex Mark V 30 mm² detector with 148 eV resolution available. You get higher throughput and more useful data per minute than any other XES system.
- Human-engineered control console with interactive color coded video display and printer terminal. You can "see" the analysis as it proceeds—with anomalous data clearly flagged. The bottom line? Printout of qualitative and/or quantitative results.

Kevex strongly supports Quantex-Ray with training, service, applications and software assistance. Contact us for more details about the industry's premier XES system.

kevex

Kevex Corporation
898 Mahler Road, Burlingame, CA 94010
Phone (415) 697-6901

Circle No. 163 on Readers' Service Card

**First Issue--
FALL 1977!**

Plasmid

**AN INTERNATIONAL
JOURNAL DEVOTED TO
EXTRACHROMOSOMAL
GENE SYSTEMS**

Editor-in-Chief:

RICHARD P. NOVICK

Editors:

Julian E. Davies, Donald R. Helinski,
Anthony W. Linnane, Mark Richmond,
Peter Starlinger, and Charles A.
Thomas, Jr.

Plasmid has been developed in response to the emergence of extrachromosomal gene systems as a coherent and very active field of biology and of the consequent need for a specific medium of communication therein. The primary content of the journal will thus be reports of original research into the biology of extrachromosomal gene systems, in prokaryotic and eukaryotic organisms including their biological behavior, their molecular structure and genetic function, and their specific products.

VOLUME 1, 1977-1978 (6 Issues)

Personal subscription rate,

*U.S.A.: \$22.50; all other countries:
\$30.25/£20.20 (prices include
postage)*

Personal subscriptions are available only on orders which the subscriber places directly with the publisher and pays for out of personal funds. Please write to the Journal Subscription Department and enclose a personal check or money order.

All journal subscriptions are payable in advance.

Prices are subject to change without notice.



ACADEMIC PRESS

*A Subsidiary of
Harcourt Brace Jovanovich, Publishers
111 FIFTH AVENUE, N.Y. N.Y. 10003
24-28 OVAL ROAD, LONDON NW1 7DX*

Circle No. 32 on Readers' Service Card

being than gross domestic product per capita because of the differences in the national savings fraction and differences in family composition.

The Swedish total family income, including government-provided social services, in 1971 was about 78 percent of that in the United States, even after adjusting the relative Swedish income upward to correct the exchange rate for higher purchasing power in Sweden. It would probably be very difficult to convince an average American family that it would not be lowering its living standards if it accepted a Swedish family income. The comparisons by Schipper and Lichtenberg of automobiles, television, food, and housing support the differences in standard of living suggested by the differences in total personal income per family.

With regard to conservation techniques, because of the relative international mobility of technologies, worldwide differences among nations in the effectiveness with which energy is used industrially are likely to become similar in a short time. There are, of course, individual national differences in resource availability, demography, and social structure which give rise to selective cases of improved efficiency of energy use to meet specific end purposes. For example, the combination of electricity generation with district heating that is fairly common in Sweden and Northern Europe represents a more efficient energy use system for these purposes. However, it is not necessarily the most efficient in terms of the total national resources that need to be applied for these same purposes. For this reason, district heating in the United States has only rarely been used, even though the technologies have been available for decades.

CHAUNCEY STARR, STANFORD FIELD
*Electric Power Research Institute,
3412 Hillview Avenue,
Palo Alto, California 94303*

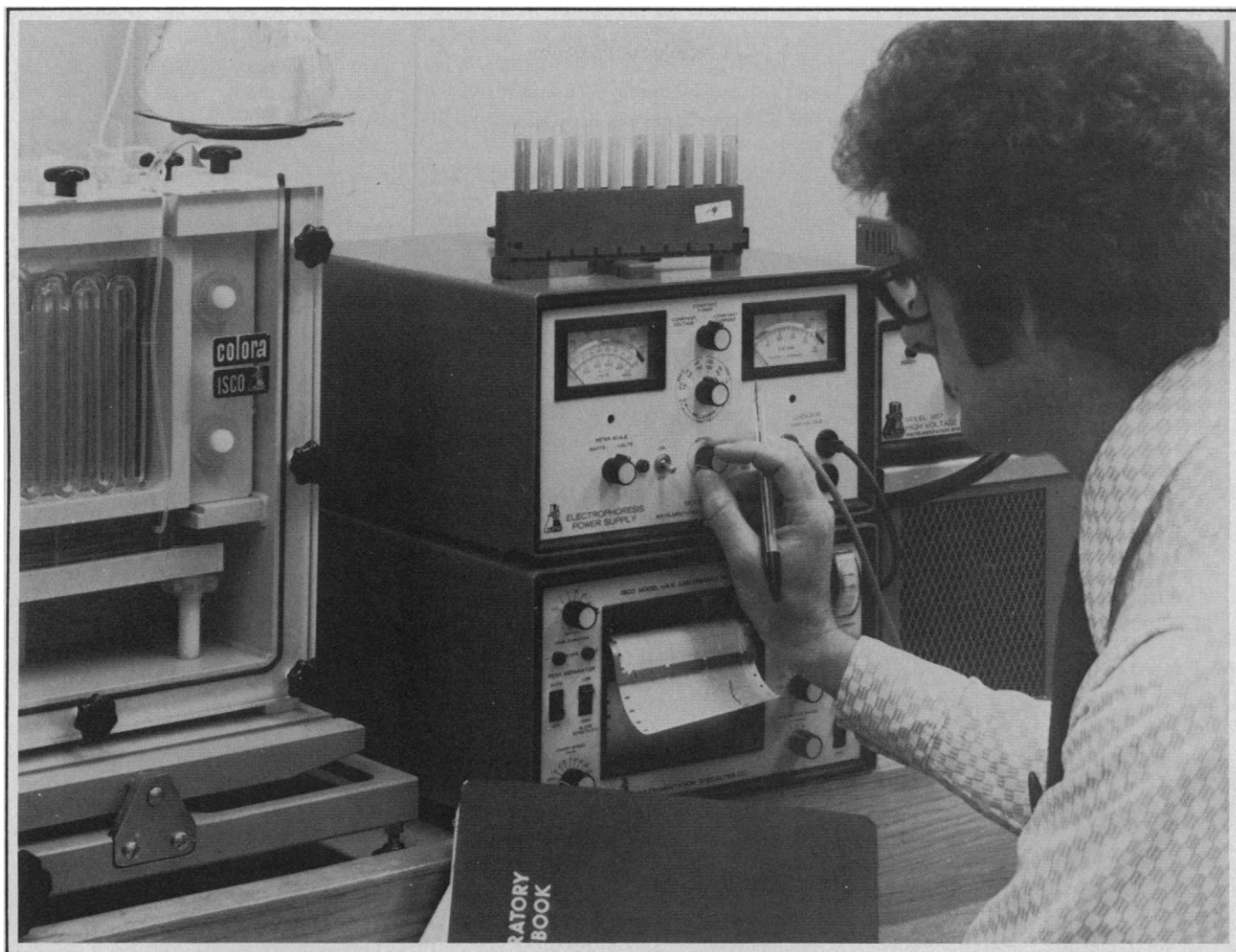
We share the concern expressed by Starr and Field over misuse of simplistic measures like energy use per unit of GNP (gross national product). Unfortunately the literature is also replete with (to paraphrase Starr and Field) "exhortations toward energy supply targets" based primarily upon manipulations of that ratio (*I*). Careful reading of our work, however, shows that our conclusions were not based upon that ratio, but instead arose from consideration of energy use efficiencies and the mix of economic activities in Sweden and the United States. We compared the most im-

portant energy-using activities, and not aggregate ratios, as Starr and Field mistakenly assert.

Ironically, they also ignore our sixth conclusion, in which we state that "consideration of . . . only the energy/GNP ratio . . . obscures dramatic differences in intensity (or efficiency) and economic structure." We could not have expressed our concerns over the abuse of the energy/GNP ratio more strongly.

Moreover, the comparison of the energy/GNP ratio for individual states within the United States, as attempted by Starr and Field, is of little meaning unless the data are adjusted for the energy embodied in flows of goods across state boundaries, climate, and so forth. Such adjustments were explicitly made in our article and found to be of vital importance in our comparisons. As 40 percent of U.S. energy is used in industry, ignoring the energy embodied in steel produced in Indiana and shipped to New York, for example, makes such comparisons almost useless.

We also took structure into account explicitly, another part of our work overlooked by Starr and Field in their letter. We noted differences in production and consumption mix. The figures given by Starr and Field are incomplete. Had they drawn upon the figure for oil refining given in our table 10, they would have seen in the very next line in that table that, compared to the United States, Sweden produces four times more paper and pulp per capita, far more energy-intensive products than refined oil. This activity accounts for as much energy consumption in Sweden as the combined refining and chemical sectors in the United States. These data and our explicit discussion of structure contradict the implication of Starr and Field that the United States (producing more oil and less newspapers) has a more energy-intensive manufacturing sector than Sweden. In fact, the reverse is true. One of our Swedish references (2) points out that if the United States produced the same product mix that Sweden does with U.S. technology, U.S. energy use would be considerably higher. As we said in our article, the higher energy/GNP ratio in manufacturing in Sweden arose because of this structural phenomenon and the vagaries of "simplistic" aggregation of the energy/GNP ratio, since virtually all important energy-intensive products in Sweden are made with modern, more energy-efficient technology than are the same products in the United States. There may be minor differences due to different kinds of steel or oil products manufactured, but the overall conclusion, that energy-intensive products in Sweden are produced more



Electrophoresis with a difference

ISCO analytical and preparative electrophoresis equipment can give you results you can't get in any other way. Here are some examples:

Power Supplies. Pulseless constant power (wattage) prevents overheating due to variations in system resistance, while still maintaining the highest possible separation speed. Superior line and load regulation suits the Model 493 for precise analytical electrophoresis; 200 watt capacity accommodates even a large preparative apparatus.

Analytical Tube Gel Apparatus. The Model 1270 features a linear alignment of gel tubes and a bottom tank which can be lowered on a track. There is no need to remove or empty either tank when changing tubes. A rapid electrophoretic destainer is also available.

Gel Scanner. Gels run in quartz tubes may be scanned at UV wavelengths before electrophoresis is terminated, and after electrophoresis they may be stained and scanned at visible wavelengths. An isoelectrically focused gel may simultaneously be scanned with a blank to remove background ampholyte absorbance.

Preparative Slab Gel Apparatus. The exclusive dual buffer elution system of the Colora UltraPhor® produces a greater sample yield with a tenth the dilution common to other preparative apparatus.

Density Gradient and Isoelectric Focusing Column. Put an end to blind electrophoresis: record UV absorbance of the sample as often as you want during separation. The column can also be adapted for use with preparative gels.

ISCO electrophoresis instruments can expand your research without stretching your budget. Send now for a catalog and technical bulletins to learn how.

Circle No. 244 on Readers' Service Card



ISCO

BOX 5347
LINCOLN, NE 68505

PHONE [402] 464-0231
TELEX 48-6453

the new super duper



It's a technical wizard. It's the quick, simple and most reliable way to make better duplicate slides, filmstrips, internegs, technical blowups and super-impositions without guesswork.

Write today to get the full story about

**the new, more versatile
BOWENS ILLUMITRAN 3**

BOGEN PHOTO CORP.

Box 448, Englewood, N.J. 07631

Now! Painless Product Photography



Technal Transi-Table

Assure shadow-free product shots. Reduce costly retouching. Frosted translucent plastic provides sweeping working surface. Sturdy framework, easy to assemble in minutes. Overall 63" high, 48" wide. Ideal for any studio.

See your dealer or write for literature.

BOGEN PHOTO CORP.

Box 448, Englewood, N.J. 07631

efficiently than in the United States, largely because of higher relative fuel prices in Sweden, is supported by a large number of other American and Swedish analyses referenced in our original article and in a recent study (3) sponsored by the Electric Power Research Institute as well.

Our conclusions were also not very sensitive to the method of accounting for electric power, a topic we dealt with in considerable detail. In several tables we provided energy use totals that reflected both electricity use counted with and without real thermal conversion losses and imaginary losses allocated to hydropower. We also explained that allocating thermal losses to hydropower distorts the economics of energy use, both because the relatively inexpensive hydropower available in Sweden stimulates relatively higher use of electric-intensive processes and because the use of combined heat and electricity cycles makes the Swedish heat rate considerably lower than that in the United States.

We also dwelt at great length upon the subject of international comparisons of well-being and the difficulty of measuring living standards with the GNP. We are not familiar with the measure of well-being "total personal income per family" offered by Starr and Field and could find no economists who had used this. However, the difference in this index between Swedish and American incomes is almost exactly cancelled out by the difference in family size, Swedish families in 1971 being only 79 percent as large as American families. Furthermore a comparison based only upon material goods is unrealistic. The Swedish comprehensive health care and housing for the aged counts, as well as washers and dryers, in measuring well-being. In any case, the issue is not who is wealthier. Our comparison was based on "how well" energy is used, not "how much."

We share the optimism of Starr and Field over the international spread of conservation techniques. However, we do not find 12 inches of attic and wall insulation or automobiles with a fuel efficiency of 24 miles per gallon—ingredients in Swedish energy use—"unreasonable conservation targets" as Starr and Field imply. With regard to district heating, we questioned the overall effectiveness of this technique in Sweden and did not consider it a major factor in our conclusion. Elsewhere, however, the Swedes appear to share our enthusiasm for additional conservation, having embarked upon a national investment campaign that has already shown results. Thus international comparisons reveal both important techniques for using ener-

gy effectively, as well as the high degree of flexibility in long-run energy needs.

Leaders in the power industry have shown a great degree of skepticism toward suggestions that the United States could significantly improve energy-use efficiency. This skepticism is understandable if the basis for those suggestions is crude comparisons of energy/GNP ratios. The same skepticism should also be applied to industry forecasts of "needs" that use such aggressive measures [see (1) and articles in (4)]. We certainly agree that there are grounds for debate over what are "reasonable" conservation targets. The letter from Starr and Field, however, is founded primarily on generalizations, aggregations, and selective use of the available data. A careful reading of our article shows that there are indeed many promising Swedish techniques and policies that provide for more effective use of energy and other resources.

LEE SCHIPPER, A. J. LICHTENBERG
*Energy and Resources Program,
University of California, Berkeley 94720*

References

1. C. Starr, "Strategy for national electricity production," testimony before the Joint Committee on Atomic Energy, in *Review of LMFBR Program* (Government Printing Office, Washington, D.C., 1975), vol. 2, p. 714; and S. Field, *Economic Growth, Employment, and Energy* (Electric Power Research Institute, Palo Alto, Calif., 1977); C. Starr, in *The Transitional Storm* (Edison Electric Institute, New York, 1977), p. 59.
2. B. Carlsson, in *IUIs Långtidsbedömning 1976* (Industrins Utrednings Institut, Stockholm, 1976), p. 270; lecture at Industrial Energy Day, Stockholm, May 1976.
3. J. Alterman, J. Dunkerley, J. Darmstadter, "How industrial societies use energy: A comparative analysis" (Resources for the Future, Washington, D.C., in press).
4. *The Transitional Storm* (Edison Electric Institute, New York, 1977).

Controversial Grant Proposal

My editorial of 11 March (p. 939) refers to a move by the House of Representatives in April 1976 to shut off funds for a controversial National Science Foundation grant proposal. This is incorrect. It was a grant proposal to the National Institute on Drug Abuse (Department of Health, Education, and Welfare), rather than one to the National Science Foundation. The congressman involved, of course, was Representative Robert Michel (R-Ill.). A report on this action appeared in the 30 April 1976 issue of *Science* (News and Comment, p. 450).

I apologize for any embarrassment this inadvertent error might have caused the National Science Foundation.

ELIE A. SHNEOUR
*Biosystems Associates, Ltd., Post Office
Box 1414, La Jolla, California 92037*

Meet the new head of our nucleotide family:

ATP- γ - ^{32}P >5500Ci/mmol

And the next of kin:

ATP- γ - ^{32}P 1000-3000Ci/mmol

ATP- γ - ^{32}P 10-40Ci/mmol

ATP- γ - ^{32}P 2-10Ci/mmol

And the first cousins, at 5-30Ci or 80-200Ci/mmol:

ATP- α - ^{32}P dATP- α - ^{32}P

GTP- α - ^{32}P dGTP- α - ^{32}P

CTP- α - ^{32}P dCTP- α - ^{32}P

UTP- α - ^{32}P dTTP- α - ^{32}P

All are of highest purity. New lots are prepared every two to four weeks. Call for the schedule and ordering information: 617-482-9595. From western states call toll free: 800-225-1572.



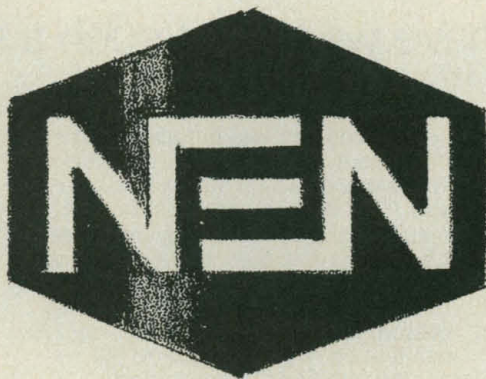
New England Nuclear

549 Albany Street, Boston, Massachusetts 02118
Customer Service 617-482-9595

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

Europe: NEN Chemicals GmbH, D-6072 Dreieich, W. Germany,
Daimlerstrasse 23, Postfach 401240, Telephone: (06103) 85034, Telex: 4-17993 NEN D

Circle No. 200 on Readers' Service Card





This Lab Products plant makes first-rate metal cages for lab animals. (So why have we kept it such a secret?)

First let it be noted that we really didn't *know* that we had kept it a secret. This all came out the other day when our field sales people, to a man, angrily reported on the existence of a paradox. Namely: that many people just can't get it out of their heads that we're "the plastic cage people," despite the fact that our plant above, for years now, has been turning out excellent metal cages, racks, and accessories for some of the most demanding customers around*.

Accordingly, herewith a belated three-part proclamation: (1) That is *our* metal-fabricating plant that you see in the photo above. (2) It is devoted *exclusively* to the fabrication of metal products of all kinds for animal housing.

(3) It does *nice* work. Incidentally, we're proud of this plant and like to show it off. Care to visit?

*Something else we just learned: it looks as though we now have more full-time sales/service people in the field to cater to customer needs than anyone else in the business. For the name of the helpful person in your area, write or call.

How can you find out about our metal cages, etc., anyway? There are several ways, one of which may well surprise you. That is, if you have *anybody's* metal cage catalog, that's almost as good as having ours, because we can (and do) make many of products shown ... either as a standard product or by custom fabrication. When you say "How can that be?" you bring us to yet another well-kept trade secret.

Almost every metal cage that you order from *anyone* is put into production after your order is received. And it almost has to be that way because of the tremendous amount of space and money that an inventory of metal cages would tie up. (And the cost to you would have to go up!)

So, you can now look in *anybody* else's metal cage catalog and ask Lab Products for a quote on any item shown. Simple.

Another simple way: request *our* catalog showing our extensive line of animal care products. And if your needs are not met by a specific catalog

item, just ask us to quote... we're tired of hearing our people complain that we just haven't told you that we're "the metal cage people" too.

For details, write or call Lab Products Inc., 365 W. Passaic St., Rochelle Park, N.J. 07662 (phone: 201/843-4600). Why not also request our complete catalog?

**lab products
inc** a **BioMedic** company

**Lab Products...not just
plastic cages, metal cages,
custom fabrication, laminar
flow systems, bedding,
automatic watering systems,
accessories...**

Circle No. 36 on Readers' Service Card

Copyright © BioMedic Corporation 1976

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

1977

WARD GOODENOUGH	DONALD KENNEDY
CLIFFORD GROBSTEIN	NEAL E. MILLER
H. S. GUTOWSKY	RAYMOND H. THOMPSON
N. BRUCE HANNAY	

1978

RICHARD E. BALZHISER	FRANK W. PUTNAM
JAMES F. CROW	MAXINE SINGER
HANS LANDSBERG	PAUL E. WAGGONER
EDWARD NEY	F. KARL WILLENBROCK

Editorial Staff

Editor

PHILIP H. ABELSON

Publisher

WILLIAM D. CAREY

Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

Assistant Editors: ELLEN E. MURPHY, JOHN E. RINGLE

Assistant to the Editors: RICHARD SEMIKLOSE

News and Comment: JOHN WALSH, *Editor*; PHILIP M. BOFFEY, LUTHER J. CARTER, BARBARA J. CULLITON, CONSTANCE HOLDEN, DEBORAH SHAPLEY, NICHOLAS WADE, *Editorial Assistant*, SCHERRAINE MACK

Research News: ALLEN L. HAMMOND, *Editor*; GINA BARI KOLATA, JEAN L. MARX, THOMAS H. MAUGH II, WILLIAM D. METZ, ARTHUR L. ROBINSON, *Editorial Assistant*, FANNIE GROOM

Book Reviews: KATHERINE LIVINGSTON, JANET KEGG

Cover Editor: GRAYCE FINGER

Editorial Assistants: JOHN BAKER, ISABELLA BOULDIN, ELEANORE BUTZ, MARY DORFMAN, SYLVIA EBERHART, JUDITH GIVELBER, CAITILIN GORDON, CORRINE HARRIS, NANCY HARTNAGEL, OLIVER HEATWOLE, CHRISTINE KARLIK, RUTH KULSTAD, MARGARET LLOYD, JEAN ROCKWOOD, LEAH RYAN, LOIS SCHMITT, YA LI SWIGART, ELEANOR WARNER

Guide to Scientific Instruments: RICHARD SOMMER

Membership Recruitment: GWENDOLYN HUDDLE;
Subscription Records and Member Records: ANN RAGLAND

Advertising Representatives

Director

EARL J. SCHERAGO

Production Manager

MARGARET STERLING

Advertising Sales Manager: RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Herbert L. Burklund, 11 W. 42 St. (212-PE-6-1858); 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-DE-7-4973); 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)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phones: (Area Code 202) Central Office: 467-4350; Book Reviews: 467-4367; Business Office: 467-4411; Circulation: 467-4417; Guide to Scientific Instruments: 467-4480; News and Comment: 467-4430; Reprints and Permissions: 467-4483; Research News: 467-4321; Reviewing: 467-4443. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xi, *Science*, 26 March 1976. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

The Recombinant DNA Debate

For the last 3 years scientists, laymen, and responsible government institutions have engaged in open, public analysis of the hazards that might result from recombinant DNA research, hazards that remain speculative. A set of safety guidelines* for the conduct of the experiments emerged from the discussions. In the absence of all the necessary facts, the guidelines were made extremely stringent in order to compensate for possible errors in judgment, and they apply to all studies funded by the federal government. There is now a concentrated effort to obtain federal legislation imposing the guidelines on all recombinant DNA experiments in the United States, regardless of the source of funds. Similar guidelines exist in many countries.

The foregoing summary reflects neither the current level of interest, emotion, or confusion on the subject in the United States, nor the attitudes reflected in graphics accompanying relevant newspaper and magazine articles and television shows—fanciful ugly bugs crawling out of test tubes, DNA double helices ending in monster heads, chimeric animals that insult the Greek imagination.

The nature of the current debate was evident at the public forum on recombinant DNA held at the National Academy of Sciences from 7 to 9 March. The forum successfully fostered an exchange of views among scientists and the public, although the atmosphere was often charged. The encounter illuminated the arguments of both biologists and laymen who refer to themselves as "opponents" of recombinant DNA research.

It was argued that all recombinant DNA research should be stopped and the nation should instead give priority to the distribution of existing methods of health care and sound nutrition to the citizens of the world. This argument is specious. Certainly there is a need to rectify inexcusable inequities in the distribution of food and health care. But recombinant DNA research is neither an alternative to such action nor a competitor for the necessary funds. Rather it provides for future opportunities to solve problems that are unsolved or that may yet arise.

Another argument was the denial of any positive value in the research. This country, through representative government, long ago committed itself to the importance and support of basic biological research. That investment has now yielded a powerful tool for investigating basic processes relevant to understanding serious and intractable diseases. There is no other way at hand or foreseeable to investigate the structure of the genome of complex organisms. Has the purpose of the investment been forgotten? Surely when a distinguished biologist couples denial of any positive value in the research with a denial that the bacterial chromosome can be characterized as a DNA molecule or with a denial that insulin is clinically useful, we must wonder just what the debate is all about.

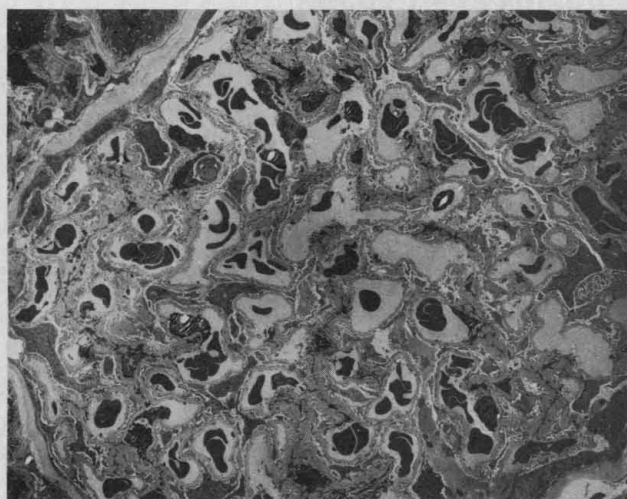
It was argued that because recombinant DNA techniques may make genetic engineering (deliberate modification of the genes of complex organisms, including man) feasible, all such work should stop. The argument assumes a public consensus that genetic engineering is evil, although the arguers concede, with everyone else, that the subject needs intense, universal discussion. The argument also denies historical lessons that teach us to distinguish carefully between the acquisition of knowledge and its application.

It is difficult to take demands for bans on "all" recombinant DNA research seriously when they come from those who demand to be heard but do not stay to listen. Those now labeled "proponents" of the research worked long and hard for prohibiting certain experiments and matching containment requirements to estimated risks for others. The cautious analytical approach is a discouraging tactic against uninformed fear, mysticism, and political opportunism. But it must continue; nothing less than science itself is at stake.

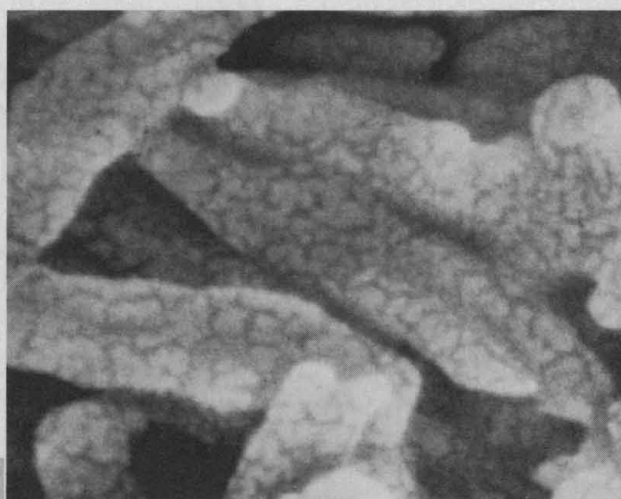
—MAXINE F. SINGER

*"Guidelines for research involving recombinant DNA molecules," *Fed. Regist.* **41** (No. 131) (1976).

Hitachi/Perkin-Elmer introduces H-300 the world's first Universal Electron Microscope (UEM)



Mouse glomerules at 700X, full frame; wider field of view, with full frame, obtainable at 250X.



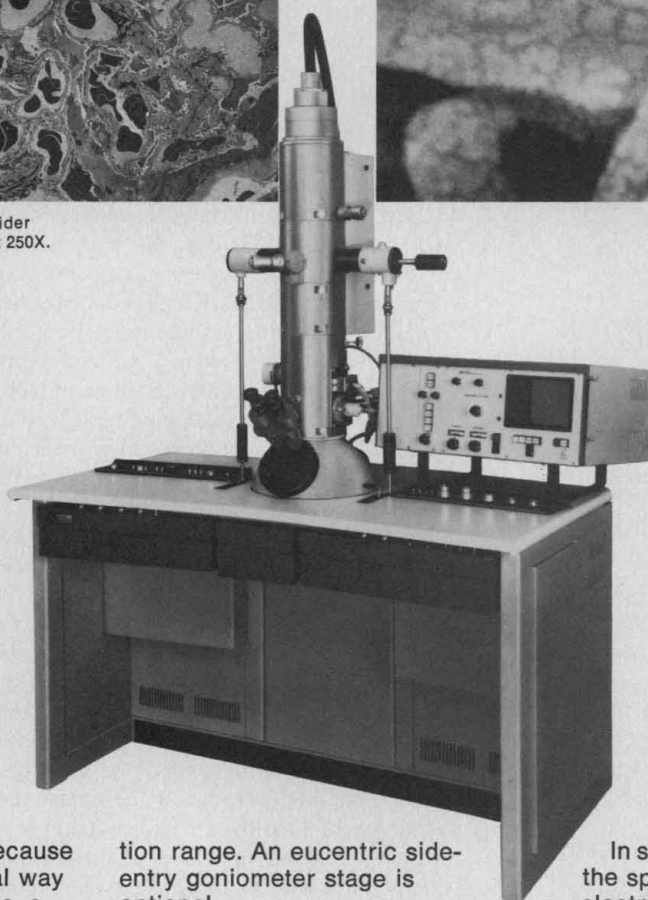
Magnetic tape, Au coated @ 100,000X.

It's a TEM

4.5Å guaranteed
75 kV
250X-100,000X

It's a SEM

100Å guaranteed
20 kV
50X-100,000X



We call the H-300 a UEM because there's simply no conventional way to describe it. For the first time, a full-fledged TEM and a full-fledged SEM are packaged in a common console—without compromising performance in either mode.

The TEM mode, for example, includes a wide field, low mag image free of peripheral blur. This eliminates tedious montaging. You also get zoom over the entire magnifica-

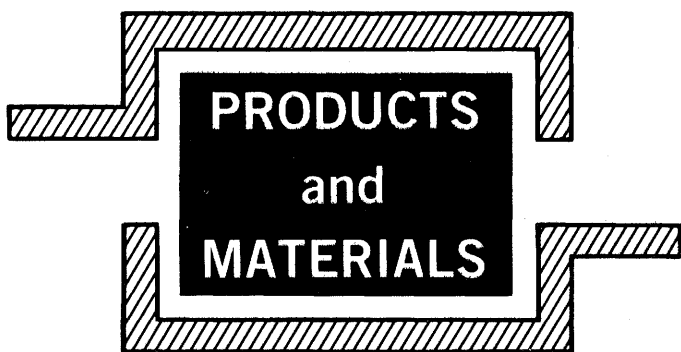
tion range. An eucentric side-entry goniometer stage is optional.

As an SEM, the H-300 is just as versatile, easily handles bulk specimens. You can also add options like Mode Control with EDX interface, an energy dispersive X-ray spectrometer and Automatic Data Display. Plus Hitachi-patented Dual Magnification: using a single CRT, you can switch from a low mag view of your specimen to a high mag view of a specific field of interest.

In short, the H-300 gives you, in the space of one instrument, a total electron microscopy capability.

Best of all, you can get the UEM package for around \$49K. Or, buy it as a TEM for around \$35K, integrate the SEM later. For full details, and/or a demonstration, call or write: Perkin-Elmer, Instrument Marketing Division, 411 Clyde Avenue, Mountain View, CA 94043. Phone (415) 961-0461.

PERKIN-ELMER



Chemical Carcinogen Glove Box

This enclosure is equipped with both HEPA and charcoal exhaust filters. In addition, there is an HEPA inlet air filter. The cabinet is constructed of fiberglass reinforced polyester and the interior features seamless coved corners. Features also include a variable-speed blower, a gauge to monitor air flow, fluorescent lighting, and an interchange compartment for passage of apparatus. There are two three-wire electric outlets and separate switches for lights and electricity. Lab-conco. Circle 704.

Storage Cabinets for Flammables

UC-26-R-FMS is a 26-cubic-foot refrigerator with UL approval for the storage of flammable materials. Temperature range is 0° to 14°C. The interior is free of sparking devices, there are no interior lights nor are there any heaters in the cabinet or the door. Refrigeration is external and top-mounted. Automatic cycle defrost uses remote-mounted fans. Kelvinator Commercial Products. Circle 710.

Modulation Contrast System

The Hoffman system will convert microscopes for tissue culture studies and other research involving living, unstained specimens for direct observation or for photomicrography. The system converts regions with optical phase gradients into intensity variations that are clearly visible. Images appear three dimensional. There are no halos to obscure details nor is there any effect from birefringence. Nikon, Instrument Division. Circle 713.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Readers' Service Card (on pages 118A and 222A) and placing it in the mailbox. Postage is free.

—RICHARD G. SOMMER

Infrared Spectrophotometers

The X99 series comprises three new units. Model 599 has a spectral range of 4000 to 200 cm^{-1} ; model 399 has a spectral range of 4000 to 400 cm^{-1} ; and model 299 has a spectral range of 4000 to 600 cm^{-1} . Each of the units has a microcomputer to control the recorder and optical systems. The monochromator frequency can be displayed continuously to 0.1 cm^{-1} on the digital readout. Integrated scan controls allow the operator to select a single parameter (scan time, slit setting, or relative noise) and the instrument automatically sets the other two. The user then sets the gain with a patented Auto-Chek system. Resolution is to within 0.5 cm^{-1} with all models. Ordinate scale expansion is continuously variable in both linear absorbance and percent transmission in discrete steps from 0.1 to 10 $\times$. Abscissa expansion is standard to 20 $\times$ in discrete steps. Perkin-Elmer. Circle 705.

Ultrasonic Cup Horn

This device enables one to sonicate samples in sealed vials, ampoules, or other vessels without direct exposure to a sonic horn or tip. The cup horn also provides for direct liquid cooling of the radiating surface and the sample container which allows continuous sonication without a temperature buildup. Cup horns will accommodate vessels whose diameters do not exceed 3 inches. A transparent polycarbonate cup allows the sample to be observed during sonication. Heat Systems-Ultrasonics. Circle 706.

Measurement of Atmospheric Electricity

The model 700 ion flux meter counts electron impacts on its 10-square-centimeter probe within 2 percent. Its range is 10^{-4} to 10^{-13} ampere. The model 710 ion collector-counter separates ions at three mobility ranges: 22, 66, and 300 volts. It counts ions of either polarity and provides volumetric data on air ion con-

centration. The model 740 remote control console facilitates data collection from difficult sites. The model 730 electric field meter measures a-c and d-c fields and it will detect gradients as low as 0.1 volt per centimeter. The series is rounded out by the model 340 air ion generator which will produce ions of either polarity continuously. Ozone output is low. Santek. Circle 712.

Bench-Top Chemostat

BioFlo defines parameters such as agitation, aeration, temperature, nutrient addition, and harvesting of cells grown in pure culture. It can also be equipped with miniature probes and controllers for dissolved oxygen and pH regulation. An integral air pump is included as well as a slide-out autoclave rack and two 13-liter reservoirs. New Brunswick Scientific. Circle 711.

Organic Carbon Analyzer

PHOTOChem determines the organic carbon in solution in concentrations from 2000 parts per million to 50 parts per billion and lower including all volatile organic compounds. The device uses photochemical oxidation and does not require external gas or pure air and water connections. It features a replaceable filter cartridge. The sample solution is passed through an irradiation chamber where carbon compounds are oxidized. The carbon dioxide is purged with water that circulates in a reaction chamber-purifying loop. The subsequent change in resistivity of the water is measured and converted to milligrams of carbon per liter and this figure is displayed. Barnstead. Circle 707.

Disposable Water Dispensers

A "transit kit" consists of a disposable automatic watering valve and a pouch of treated water to provide laboratory animals with water during transport. This kit eliminates the need for substitutes commonly used which in turn reduces equilibration time in the laboratory and stress during shipping. Cold Spring Products. Circle 709.

Skeletal Vascular Casting

Anatomists who wish a three-dimensional preservation of vascular structure down to precapillaries with preservation



New Catalog

A new 192 page catalog of
Biological shakers • Controlled-environment shakers • Incubators • Laboratory and pilot plant fermentors • Process control equipment and instrumentation • Tissue culture apparatus • Freeze dryers • Colony counters • and many other instruments for research in the life sciences.

WRITE TODAY FOR CATALOG 377/S477



NEW BRUNSWICK SCIENTIFIC CO., INC.

P.O. BOX 986 • 44 TALMADGE ROAD, EDISON, NEW JERSEY 08817

At NBS Advanced Technology is a Way of Life

Circle No. 124 on Readers' Service Card

for in vitro DNA Synthesis

For in vitro research only

dTTP to 100Ci/mmol

NET-520 is labeled in the methyl and 1',2'- deoxy-ribose positions to increase the sensitivity of assays for DNA and RNA-dependent DNA polymerases. It is the highest specific activity [³H] nucleotide available.

NET-520: dTTP, [methyl, 1',2'-³H]-, 80-100Ci/mmol
NET-221X: dTTP, [methyl-³H]-, 40-60Ci/mmol
NET-221H: dTTP, [methyl-³H]-, 10-20Ci/mmol
NET-369: dCTP, [5-³H]-, 15-30Ci/mmol
NET-448: dGTP, [8,5'-³H(N)]-, 25-50Ci/mmol
NET-429: dGTP, [8-³H(N)]-, 5-15Ci/mmol
NET-268: dATP, [³H(G)]-, 10-20Ci/mmol



New England Nuclear

549 Albany Street, Boston, Massachusetts 02118
Customer Service 617-482-9595

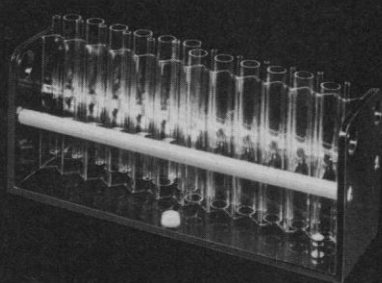
NEN Canada Ltd., Lachine, Quebec. NEN Chemicals GmbH, Dreieich, W. Germany.

Circle No. 202 on Readers' Service Card

Hoefer Gel Tube Electrophoresis The Most Versatile System on the Market

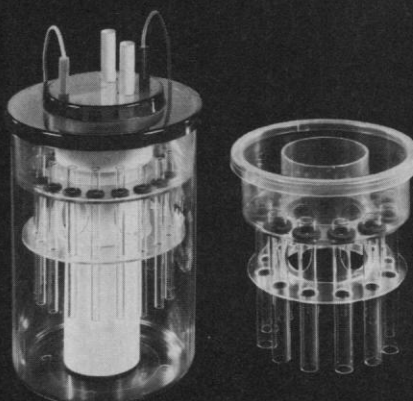
New Gel Tube Unit, GT Series

One unit serves 5 gel tube sizes.
How? *Interchangeable upper buffer chambers.* To change the tube size, simply change the buffer chamber.
Accurate temperature control. The central cooling core provides 645 cm² of heat exchange surface.



Tube Holder Rack

Holds 24 tubes in any combination of sizes, from 4 to 17 mm OD.
How? Stainless steel leaf springs hold each tube securely in place.
Excellent for filling, viewing, and photo-polymerizing.



Electric Gel Slicer

Slice at room temperature, up to 160 mm (± .03) segments in one pass.
Handles gel diameters from 5-15 mm, up to 16 cm long, in concentrations as low as 5%, as high as 30% acrylamide.

Instruments that set the standard for design and performance

Hoefer Scientific Instruments • 650 Fifth Street • San Francisco, CA 94107 • Phone: (415) 495-4410

Circle No. 251 on Readers' Service Card

Prevent vacuum line contamination.



It's our all-new, patented Vacuum Guard II. The Vacuum Guard II is designed to aid technicians in satisfying safety requirements for Recombinant DNA Research. It also has been designed to satisfy safety procedures as set forth in NIH's Biohazards Safety Guide.

Should biological solutions be inadvertently drawn toward the vacuum line, a float and magnetic reed switch de-energize a solenoid valve in series with the vacuum line, thus prohibiting any fluids from contaminating the lines. A replaceable .6 microns biological filter is located between the vacuum load and the reservoir to assure that no aerosolized contaminants escape to the solenoid valve.

The non level-sensitive Vacuum Guard II is lightweight and compact; 12-volt operation makes it especially safe for laboratory use. Available from stock, it is \$115.00 (including filter) F.O.B., Fairfax. An optional 115-volt converter is \$12.50.



Spectroderm
INTERNATIONAL INC.

2711 Dorr Avenue, Fairfax, Virginia 22030 • 703/560-3530

Circle No. 243 on Readers' Service Card

of skeletal structure now are offered a technique to do this. The technique consists of injecting a dyed, liquid plastic mass into the blood vessels, allowing the mass to set, then stripping the soft tissues with the leather beetle, *Dermestes vulpinus*. Former techniques of stripping involved corrosive chemicals that also destroyed the skeleton. Whole body skeletal-vascular casts are available and custom projects will be undertaken. International Biologics. Circle 708.

Back-Lighted Digitizers

The Cybergraph system now includes a feature that enables the operator to prepare computer graphics from negatives. Back-lighted digitizers allow one to use computer or calculator language to process data derived from x-rays or other negatives. Resolution is 1000 lines per inch, accuracy is to within 0.01 inch standard with accuracy to 0.005 inch available as an option. Lung volumes, orthodontic histories, and ventricular measurements are a few of the medical applications possible with this accessory. Talos Systems. Circle 714.

Electronic Balances

The semiautomatic TB-1600S has a weighing range of 1.6 kilograms, a taring range of 125 grams, a 2-second stabilization time, 0.01-gram readability, and reproducibility to within 0.005 gram. The TB-1000 and TB-1000S have the same features but their capacity is 1 kilogram. In all three models, weight measurement is a function of torque applied to special alloy metal bands. Taring is additive and does not subtract from the full working range of each balance. Up to 125 grams of tare may be dialed in by means of a control knob. Torsion Balance. Circle 716.

Gas Chromatographs

The 429 series gas chromatographs are microprocessor controlled; they can store and execute up to 15 user-variable programs and have three fixed programs which provide for pneumatic control routines. Temperatures, flow rates, detector sensitivity and attenuation, polarity, and auto-zero routines are programmable on a time basis. The pneumatic control routines provide back flushing, heart cutting, and solvent venting. The systems are modular and may be assembled to suit the users' needs. Packard Instrument. Circle 717.

BROWSE

through our collection of 1969—1975 AAAS annual meeting audio-tapes.

We must reduce our stock, so we've slashed prices on both cassette and reel audiotapes. Each session now costs only \$12 if cassette recorded or \$6 if reel-to-reel.

We have tapes on biological sciences, chemistry, earth sciences, engineering, information and communication, mathematics and logic, medical sciences, physical sciences, and social and behavioral sciences. Quantities of any particular session, however, are limited. Check the 1976 AAAS Audiotapes brochure for titles, information, and order form.

For more information, write to:



AAAS Audiotapes, 1515
Massachusetts Ave., N.W.
Washington, D.C. 20005

FREE... ALFA'S NEW 1977-78 CATALOG

ALSO INCLUDING:

- Catalysts • Deuterated NMR Solvents
- Analytical Standards • Electronic Materials
- Degussit Ceramic Labware

Over 600 new items!
Send for your new Alfa Catalog today!

Foreign Subsidiaries:
Ventron GmbH Nippon Alfa Chemical Co., Ltd.
Postfach 6540 Ishikura Building
75 Karlsruhe-1 1-1 Nihonbashi-odenmachi
West Germany Chuo-ku, Tokyo (103)

Alfa Division
Ventron Corporation
Dept. 24, 152 Andover Street, Danvers, MA 01923
(617) 777-1970

NAME: _____
TITLE: _____
COMPANY: _____
CITY: _____
STATE: _____ ZIP: _____

Circle No. 211 on Readers' Service Card

Vertical Slab Polyacrylamide

Gel Electrophoresis

The new unit separates 8, 12, 16, and 24 samples, up to 180 by 223 by 3 millimeters, at one time. This eliminates the handling of single rods and, because the samples are adjacent, direct comparison of patterns may be made. Cooling is accomplished by water circulated through platens on both sides which reduces temperature gradients and eliminates distortion of the bands. The apparatus is easily disassembled for cleaning and gel removal. Shandon Southern Instruments. Circle 718.

Data Recording System

The Physioscribe is available with optional accessories and in various configurations for a wide variety of recording tasks. The basic unit consists of a chassis with variable-speed chart drive, a biopotential amplifier channel, two transducer amplifier channels, one time and event marker channel and features an individual inking system. Chart speed varies from 1 to 25 millimeters per second. Accessories are available for many physiological recording applications. Stoelting. Circle 715.

Literature

Systems and Methods for Biochemical Research is a general catalog of laboratory apparatus for a wide variety of biochemical separations such as isoelectric focusing, gel filtration, ion exchange, and chromatography. LKB Instruments. Circle 719.

Electronic Instrument Rental Catalog includes full specifications of over 800 instruments and is indexed by manufacturers. Continental Leasing. Circle 734.

Secondary Ion Mass Spectrometer describes the model 300-10 including full design specifications. Extranuclear Laboratories. Circle 720.

Gels for Hydrophobic Interaction Chromatography are listed in a bulletin devoted to Octyl-Sepharose CL-4B and Phenyl-Sepharose CL-4B. Pharmacia Fine Chemicals. Circle 721.

Thermistors describes the YSI 49000 series of space-qualified thermistors for temperature compensation, measurement, and control. Yellow Springs Instrument. Circle 722.

Sound Level Meter is devoted to the Featherweight model 1680, a self-contained portable sound measuring device. Thermo Systems. Circle 723.

From Buchler...keeping pace with the age of discovery:

A programmable controller that automates almost any laboratory.

Buchler's new Program-A-Lab automatically operates up to eight pieces of lab equipment so that you can set up virtually any procedure and leave it to run itself. Use your existing equipment without modification.

Program-A-Lab is tireless and accurate. It's all-solid-state and ultra-reliable, yet extremely simple to use. No programming knowledge is required.

The coupon below will bring you full details. Or, contact any leading laboratory supply house. Program-A-Lab, from Buchler.

SEARLE

Buchler Instruments

Division of Searle Diagnostics Inc.
1327 Sixteenth Street
Fort Lee, N.J. 07024 U.S.A.
201 - 224-3333



Buchler Instruments: made in the United States, sales and service worldwide.

Buchler Instruments, Division of Searle Diagnostics Inc.
1327 Sixteenth Street, Fort Lee, N.J. 07024, U.S.A.

Gentlemen: Please send me FREE full details on the new Program-A-Lab.

Name _____ Title _____

Organization _____

Address _____

City _____ State _____ Zip _____

Phone () _____

Our new HPLC Columns are well packed!

Guaranteed peak symmetry
and minimum plates
per meter doubly assure
you of optimum
column performance.

A completely new line of "state-of-the-art" packed columns for high pressure liquid chromatography is now available in the U.S. and Canada from Rheodyne.

All columns are 4.6 mm ID x 25 cm long. Each column is tested and supplied with its own chromatogram. Currently six columns are available over a price range of \$180 to \$240.

The table below showing column performance specifications and typical test conditions offers an excellent argument for the addition of these columns to your HPLC equipment.

COLUMN TYPE	SI-100*	NH ₂	DIOL	RP-8*
Particle size	5 μ m	10 μ m	10 μ m	5 μ m
Min. plates per meter	36,000	14,000	**	26,000
Max. peak asymmetry	1.6	1.6	**	1.6
Solvent	hexane	hexane	hexane	40% acetonitrile
Flow, ml/min	2.0	2.0	2.0	2.0
Pressure, psi	1640	280	280	3000
Test substance	nitro-benzene	nitro-benzene	nitro-benzene	diethyl phthalate

*available in 10 μ m particle size also.
**under evaluation

Made by Brownlee Labs, the columns are guaranteed by both Brownlee and Rheodyne. Column packings are LiChrosorb (a registered T.M. of E. Merck Darmstadt Germany).

For More Information. A detailed technical brochure is available for the asking. Address Rheodyne, Inc., 2809 Tenth Street, Berkeley, CA 94710. For even faster service, phone (415) 548 5374.



RHEODYNE

Circle No. 199 on Readers' Service Card

BOOKS RECEIVED AND BOOK ORDER SERVICE

(Continued from page 158)

German edition (Weinheim, 1970) by Derek F. Klemperer. Butterworths, Boston, 1976. viii, 250 pp., illus. \$23.50.

Clinical Bacteriology. E. Joan Stokes. Arnold, London, ed. 4, 1975 (U.S. distributor, Year Book Medical Publishers, Chicago). x, 394 pp., illus. Paper, \$8.95.

Computational Mathematics in Engineering. S. A. Hovanessian. Lexington (Heath), Lexington, Mass., 1976. xviii, 254 pp., illus. \$27.50.

Computer Science and Scientific Computing. Proceedings of a conference, Williamsburg, Va. Apr. 1976. James M. Ortega, Ed. Academic Press, New York, 1976. x, 306 pp., illus. \$15.50.

Conservation and Restoration of Pictorial Art. Papers from a congress, Lisbon, Oct. 1972. Norman Brommelle and Perry Smith, Eds. International Institute for Conservation of Historic and Artistic Works, London, and Butterworths, Boston, 1976. xvi, 270 pp., illus. \$34.50.

Contact Catalysis. Z. G. Szabó and D. Kalló, Eds. Translation and revision of the Hungarian edition (Budapest). Elsevier, New York, 1976. Two volumes, illus. 540 pp. and 480 pp. \$96.25.

Cooling Technology in the Food Industry. Aurel Ciobanu, Gabriela Lascu, Vasile Bercescu, and Lidia Niculescu. Translated from the Romanian edition (Bucharest, 1971). Abacus Press, Tunbridge Wells, Kent, England, 1976 (U.S. distributor, International Scholarly Book Services, Forest Grove, Ore.). 506 pp., illus. \$40. To order this book circle No. 362 on Readers' Service Card

The Cutting Edge. Interfacial Dynamics of Cutting and Grinding. Proceedings of a AAAS symposium, New York, Jan. 1975. Sholom Pearlman, Ed. National Institutes of Health, Bethesda, Md., 1976 (available from the National Institute of Dental Research, Bethesda, Md.). viii, 256 pp., illus. Paper. DHEW Publication No. (NIH) 76-670.

Desideratum in Washington. The Intellectual Community in the Capital City, 1870-1900. J. Kirkpatrick Flack. Schenkman, Cambridge, Mass., 1976. xvi, 192 pp. + plates. \$11.25.

Designing the Open Nursing Home. Joseph A. Koncelik. Dowden. Hutchinson and Ross, Stroudsburg, Pa., 1976. xvi, 176 pp., illus. \$18. Community Development Series, 27.

The Development of Microbiology. Patrick Collard. Cambridge University Press, New York, 1976. viii, 202 pp., illus. \$15.95.

Developmental and Learning Disabilities. Evaluation, Management, and Prevention in Children. John H. Meier. University Park Press, Baltimore, 1976. xii, 444 pp. \$12.95.

Differential Topology with a View to Applications. D. R. J. Chillingworth. Pitman, San Francisco, 1976. x, 292 pp., illus. Paper, \$17. Research Notes in Mathematics, vol. 9.

Digital Computer Fundamentals. Jefferson C. Boyce. Prentice-Hall, Englewood Cliffs, N.J., 1977. xvi, 430 pp., illus. \$15.95.

Electronic Switching. Central Office Systems of the World. Amos E. Joel, Jr., Ed. IEEE Press, New York, 1976 (distributor, Wiley, New York). viii, 278 pp., illus. Cloth, \$17.95; paper, \$8.95. IEEE Press Selected Reprint Series. To order this book circle No. 363 on Readers' Service Card

EMP Radiation and Protective Techniques.



SAVE ON STERILIZERS

Savings...often as high as 40%... can be realized on steam or ETO sterilizers and autoclaves built to your specific requirements by Scientific Industries. You can specify automatic or manual operation, temperature/humidity parameters, high or low pressure controls. Sizes range from small 4 cu. ft. laboratory sterilizers to large bulk sterilizers with capacities of thousands of cubic feet.

3 YEAR WARRANTY.

Satisfactory performance is guaranteed for one full year on all parts and labor; parts guaranteed for two additional years. This is the most comprehensive warranty in the industry.

Scientific Industries maintains a fully staffed engineering/design department, a complete machine shop and parts inventory. Sterilizer operation and performance in compliance with pending FDA regulations can be assured.

Call or write for complete information.



Scientific Industries, Inc.

70 Orville Drive, Airport International Plaza
Bohemia, New York 11716, (516) 567-4700



Circle No. 225 on Readers' Service Card

L. W. Ricketts, J. E. Bridges, and J. Miletta. Wiley-Interscience, New York, 1976. xvi, 380 pp., illus. \$27.50. To order this book circle No. 364 on Readers' Service Card

Essentials of Bacterial Physiology. W. W. Umbreit, Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1976 (distributor, Burgess, Minneapolis). xii, 304 pp., illus. \$14.95. Revision of *An Introduction to Bacterial Physiology*.

Evaluated Kinetic Data for High Temperature Reactions. Vol. 3, Homogeneous Gas Phase Reactions of the O_2O_3 System, the $CO-O_2-H_2$ System and of Sulphur-Containing Species. D. L. Baulch, D. D. Drysdale, J. Duxbury, and S. J. Grant. Butterworths, Boston, 1976. xiv, 594 pp., illus. \$39.95.

Experimental Methods in Catalytic Research. Vol. 2, Preparation and Examination of Practical Catalysts. Robert B. Anderson and Peter T. Dawson, Eds. Academic Press, New York, 1976. xiv, 286 pp., illus. \$26.50. Physical Chemistry, vol. 15-II.

The Fine Structure of the Nervous System. The Neurons and Supporting Cells. Alan Peters, Sanford L. Palay, and Henry DeF. Webster. Saunders, Philadelphia, 1976. xxii, 406 pp., illus. \$31.

Focus on Meaning. Vol. 1, Explorations in Semantic Space. Charles E. Osgood. Mouton, The Hague, 1976. xii, 236 pp., illus. Paper, \$20.30. *Janua Linguarum*, 225/1.

Fourier Transform N.M.R. Spectroscopy. Derek Shaw. Elsevier, New York, 1976. xviii, 358 pp., illus. \$49.75.

Function Theoretic Methods in Differential Equations. R. P. Gilbert and R. J. Weinacht, Eds. Pitman, San Francisco, 1976. x, 310 pp. Paper, \$19.50. *Research Notes in Mathematics*, 8.

Fundamentals of Clinical Chemistry. Norbert W. Tietz, Ed. Saunders, Philadelphia, ed. 2, 1976. xxvi, 1264 pp., illus. \$39.50.

The Future of World Oil. Paul Leo Eckbo. Ballinger (Lippincott), Cambridge, Mass., 1976. xiv, 144 pp. \$15.

General Hospital. A Model. John M. Champion. University Park Press, Baltimore, 1976. xii, 252 pp., illus. \$12.50.

The General Theory of Alternating Current Machines. Application to Practical Problems. Bernard Adkins and Ronald G. Harley. Chapman and Hall, London, 1975 (U.S. distributor, Halsted [Wiley], New York). xvi, 280 pp., illus. \$22.50. To order this book circle No. 365 on Readers' Service Card

The Generation of Antibody Diversity. A New Look. A. J. Cunningham, Ed. Academic Press, New York, 1976. x, 212 pp., illus. \$19.75.

Genetic and Malformation Syndromes in Clinical Medicine. William L. Nyhan and Nadia O. Sakati. Year Book Medical Publishers, Chicago, 1976. xiv, 500 pp., illus. \$62.95.

Gout and Hyperuricemia. James B. Wyngaarden and William N. Kelley. Grune and Stratton, New York, 1976. xvi, 512 pp., illus. \$39.50.

Government Credit Allocation. Where Do We Go from Here? George Benston and six others. Institute for Contemporary Studies, San Francisco, 1975. viii, 208 pp. Cloth, \$12.50; paper, \$3.95.

The Great American Medicine Show. The Unhealthy State of U.S. Medical Care, and What Can Be Done about It. Spencer Klaw. Penguin, New York, 1976. xx, 316 pp. Paper, \$2.95. Reprint of the 1975 edition.

Guide to Basic Information Sources in Engineering. Ellis Mount. Halsted (Wiley), New

8 APRIL 1977

OXFORD

The Selfish Gene

RICHARD DAWKINS, University of Oxford.

Clearly and engagingly written, this book takes up major themes in social theory based on natural selection. It treats the concepts of altruistic and selfish behavior; the genetic definition of self-interest; issues in kinship theory; the evolution of aggressive behavior, and other subjects of lively interest. A work of "admirable clarity and style."—Robert L. Trivers, Harvard University

1976 224 pp. \$8.95

Textbook of Human Genetics

Second Edition

MAX LEVITAN, Mount Sinai School of Medicine, City University of New York; and ASHLEY MONTAGU.

From reviews of the First Edition: "The book is designed for students of variegated backgrounds and contains both the most elementary and advanced material. The clarity and superb quality of the prose exposition render the book remarkable in its readability. . . Its virtues are considerable and make it the text of choice for this topic."—*Yale Journal of Biology and Medicine*

1977 1,080 pp.; 279 illus. \$20.00

Human Biology

An Introduction to Human Evolution, Variation, Growth and Ecology Second Edition

G. A. HARRISON, University of Oxford; J. S. WEINER, London School of Hygiene and Tropical Medicine; J. M. TANNER, University of London; (the late) N. A. BARNICOT; and V. REYNOLDS, University of Oxford.

Acclaimed in its first edition, this text offers the latest research findings, particularly in the sections on primate and human evolution, molecular and biochemical genetics, and growth and adaptation processes. The chapter on primate behavior is completely new.

Spring 1977 516 pp.; 103 illus. cloth \$22.00 paper \$10.00

Pesticides and Human Welfare

Edited by DONALD L. GUNN and JOHN G. R. STEVENS.

This text presents a balanced view of the advantages and disadvantages of pesticides. Organized in three parts, it considers the problems, available solutions, and the strategies in use with their complications, as well as alternative methods. The authors discuss conservation needs, legal aspects, and risks to mankind to put the subject of pesticides into perspective.

Spring 1977 240 pp.; 36 illus. cloth \$11.00 paper \$4.00

Principles of Physical Chemistry

ROBERT M. ROSENBERG, Lawrence University.

A clear exposition of the principles of physical chemistry, this text maintains a proper balance between the molecular and the macroscopic aspects of the subject. It assumes a background of one year of differential and integral calculus and one year of calculus-based physics. Exercises are provided to encourage student participation in the subject's development.

1977 768 pp.; 301 illus. \$18.00

Solutions Manual 200 pp. paper \$4.00

Kinetics of Chemical and Enzyme-Catalyzed Reactions

DENNIS PISZKIEWICZ, University of California, Irvine.

"It is readable, well organized, and stresses not only the fundamentals of kinetics but also practical, graphical means of analyzing raw data.

The problems are, on the whole, excellent."—Robert Holwerda, Texas Tech University, Lubbock

1977 288 pp.; 65 illus. cloth \$12.50 paper \$6.00



OXFORD UNIVERSITY PRESS

200 MADISON AVENUE
NEW YORK, N.Y. 10016

Prices and publication dates are subject to change.

Circle No. 126 on Readers' Service Card

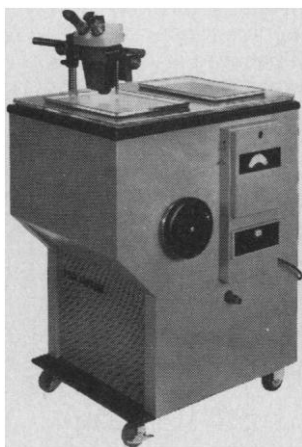
The First Wide Range Microtome-cryostat... Temperatures from —15°C to —50°C... Frozen Sections from 40 μ to 2 μ .

The Harris LoTemp model WRC is two microtome-cryostats in one. A single unit that can do both routine diagnostic procedures and such sophisticated research procedures as thin section light microscopy, autoradiography, fluorescence microscopy and other histological procedures, at a cost comparable to presently available routine cryostats.

The Harris model WRC is compact... can be moved anywhere it's needed. The cold chamber has extra room for tissue handling, storage or freeze drying. Full opening top with special access ports combines the features of a totally closed system with the easy accessibility of open top models.

Available equipped with International Equipment Corp. microtomes, or cryostat only prepared for installation of your present I.E.C. microtome. Installed stereo zoom microscope also available.

For a full description of the Harris WRC and its wide range of additional features write or call...



Harris Manufacturing Co., Inc.
14 Republic Road
Treble Cove Industrial Park
North Billerica, Mass. 01862
(617) 667-5116

York, 1976. viii, 196 pp. \$11.95. Information Resources Series.

A Guide to the Vitamins. Their Role in Health and Disease. John Marks. University Park Press, Baltimore, 1976. xii, 208 pp., illus. \$19.50.

Handbook of Measurement and Evaluation in Rehabilitation. Brian Bolton, Ed. University Park Press, Baltimore, 1976. xxii, 362 pp. \$18.50.

A Handbook of Treatment. H. W. Proctor and P. S. Byrne, Eds. University Park Press, Baltimore, 1976. x, 434 pp. \$19.50.

Health and Disease in Farm Animals. For Those Concerned with Animal Husbandry. W. H. Parker. Pergamon, New York, ed. 2, 1976. x, 306 pp., illus. Cloth, \$14; paper, \$8. Pergamon International Library.

Hearing Aids. Current Developments and Concepts. Papers from a conference, Jackson Heights, N.Y., May 1975. Martha Rubin, Ed. University Park Press, Baltimore, 1976. xxii, 294 pp., illus. \$16.50.

Hormone-Receptor Interaction. Molecular Aspects. Gerald S. Levey, Ed. Dekker, New York, 1976. xii, 474 pp., illus. \$45.75. Modern Pharmacology-Toxicology, vol. 9.

Hypertension. A Policy Perspective. Milton C. Weinstein and William B. Stason with contributions by David Blumenthal, Barbara J. McNeil, Albert L. Nichols, and Donald S. Shepard. Harvard University Press, Cambridge, Mass., 1976. xxiv, 244 pp., illus. \$15. To order this book circle No. 366 on Readers' Service Card

Implantation of the Ovum. Papers from a workshop, Washington, D.C., June 1972. K. Yoshinaga, R. K. Meyer, and R. O. Greep, Eds. Harvard University Press, Cambridge, Mass., 1976. xii, 162 pp., illus. \$15. To order this book circle No. 367 on Readers' Service Card

Innovation in the Pharmaceutical Industry. David Schwartzman. Johns Hopkins University Press, Baltimore, 1976. xvi, 400 pp. Cloth, \$16; paper, \$4.95.

Introduction to Elementary Molecular Orbital Theory and to Semiempirical Methods. Georges Henry Wagnière. Springer-Verlag, New York, 1976. vi, 110 pp., illus. Paper, \$6.10. Lecture Notes in Chemistry, 1.

Land Use and the Pipe. Richard D. Tabors, Michael H. Shapiro, and Peter P. Rogers. Lexington (Heath), Lexington, Mass., 1976. xviii, 184 pp., illus. \$15.50.

Light Microscopic Techniques in Biology and Medicine. J. James. Martinus Nijhoff Medical Division, The Hague, 1976. xii, 336 pp., illus. Dfl. 90.

The Macrophage in Neoplasia. Papers from a workshop, Woods Hole, Mass., Oct. 1975. Mary A. Fink, Ed. Academic Press, New York, 1976. x, 266 pp., illus. \$12.50.

McGraw-Hill Dictionary of the Life Sciences. Daniel N. Lapedes, Ed. McGraw-Hill, New York, 1976. xiv, 908 pp., illus. + appendix. \$19.95. To order this book circle No. 368 on Readers' Service Card

Nutrition Reviews' Present Knowledge in Nutrition. Nutrition Foundation, New York, ed. 4, 1976. xxii, 606 pp., illus. Paper, \$8.50.

Occupational Therapy for Mentally Retarded Children. Guidelines for Occupational Therapy Aides and Certified Occupational Therapy Assistants. Mildred Copeland, Lana Ford, and Nancy Solon. University Park Press, Baltimore, 1976. xiv, 226 pp., illus. Paper, \$13.75.

Ordered Vector Spaces and Linear Operators. Romulus Cristescu. Translated from the

plenum
the language of science

Mechanism and Regulation of DNA Replication

edited by Alan R. Kolber
Virus Research Institute,
Heidelberg
and Masamichi Kohiyama
University of Paris

In this book, the world's most pre-eminent geneticists — A. Kornberg, D. Glaser, F. Bonhoeffer, D. Comings, A. Levine, J. Huberman, M. Schacter, Y. Hirota, and others—demystify DNA replication for both students and researchers in the field of biochemistry.

459 pp., \$32.50

Mechanisms in Recombination

edited by Rhoda F. Grell
Oak Ridge National Laboratory

"... essential reading for anyone wishing to know the current state of knowledge in the field of genetic recombination."—H. K. L. Whitehouse, *Science*

459 pp., \$32.00

Genetics and the Law

edited by Aubrey Milunsky
Harvard Medical School
and George J. Annas
Boston University Schools of Law
and Medicine

"This provocative and absorbing collection of papers should be required reading for those interested in genetics as it affects society. Highly recommended..."—D. T. Curtis, *Library Journal*

544 pp., \$22.50

Genetic Responsibility

On Choosing Our Children's Genes

edited by Mack Lipkin, Jr.
and Peter T. Rowley
University of Rochester

This timely book explores the complex and highly controversial problems associated with genetic engineering.

176 pp., \$18.50

PLENUM PUBLISHING CORPORATION,

227 West 17th Street,
New York, N.Y. 10011

In United Kingdom:

Black Arrow House,
2 Chandos Road,
London, NW10 6NR, England

Prices subject to change without notice.

Prices slightly higher outside the U.S.