

14 April 1978 • Vol. 200 • No. 4338

\$1.50

# SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



## Simple, precise cholesterol determinations in HDL, LDL and VLDL with the new Beckman Lipoprotein Profiling System.



Whether you want to quantitate the cholesterol in HDL only, or the cholesterol in all three lipoprotein fractions, there is a simple, precise way to do it: the Beckman Lipoprotein Profiling System.

You need less than 0.5 ml of plasma or serum. A miniature ultracentrifuge makes the required lipoprotein separations in 2½ hours. An aspirator removes the appropriate volume from each tube. You then get a direct digital readout of cholesterol in 20 seconds per tube with the easy-to-operate Beckman enzymatic Cholesterol Analyzer 2.

Results: the complete lipoprotein "profile" (individual cholesterol levels in HDL, LDL and VLDL) plus total serum cholesterol on three different patient samples. Or the HDL cholesterol in each of six patient samples. Total analysis time: 3 hours. Total technician time: 45 minutes.

Send for our Lipoprotein Analysis portfolio. It has a wealth of background information on serum lipoproteins, including their clinical significance. Write Beckman Instruments, Inc., Spinco Division, 1117 California Ave., Palo Alto CA 94304.

# BECKMAN®

Circle No. 214 on Readers' Service Card

# MORE BIG TALK ON ECLIPSE SYSTEMS.



First, we brought you AOS, the most intelligent multiprogramming operating system to be found on a small computer. Now we bring you the fastest, largest and most efficient version of PL/I ever implemented on a minicomputer. And that's not just talk. It's available now on all multiprogramming Data



General ECLIPSE systems. So now you can take advantage of the sophistication and efficiency of big computer PL/I without having to buy a big computer. PL/I is just one more reason why Data General is the computer company that really talks sense. Call (617) 366-8911, Extension 4735. Or write.

 **Data General**

We make computers that make sense

Data General Corporation, Westboro, MA 01581, (617) 366-8911. Data General (Canada) Ltd., Ontario. Data General Europe, 61 rue de Courcelles, Paris, France, 766.51.78. Data General Australia, (03) 82-1361. Data General Ltda., Sao Paulo, Brazil, 543-0138 © Data General Corporation, 1978. ECLIPSE is a registered trademark of the Data General Corporation.



# SCIENCE

<b>LETTERS</b>	The LDH Virus: An Interfering Biological Contaminant: <i>V. Riley et al.</i> ; Xeroxing Life: <i>P. R. Gross</i> ; Geological Survey Director: <i>D. McGeary</i> . . . . .	124
<b>EDITORIAL</b>	Energy and Development . . . . .	133
<b>ARTICLES</b>	Fuel Conservation and Applied Research: <i>J. Grey, G. W. Sutton, M. Zlotnick</i> . . . .	135
	U.S. Energy Demand: Some Low Energy Futures . . . . .	142
	The Hobbling of Coal: Policy and Regulatory Uncertainties: <i>R. L. Gordon</i> . . . . .	153
	Brazil: Energy Options and Current Outlook: <i>J. Goldemberg</i> . . . . .	158
	Energy Options and Strategies for Western Europe: <i>W. Häfele</i> and <i>W. Sassin</i> . . . .	164
	Fusion Energy in Context: Its Fitness for the Long Term: <i>J. P. Holdren</i> . . . . .	168
<b>NEWS AND COMMENT</b>	Outbreak of Equine VD Stirs Fear in Kentucky . . . . .	181
	Academy of Engineering Elects New Members. . . . .	182
	Cryptology: A Secret Meeting at IDA? . . . . .	184
	Sun Day Seen as More Potent Politically than Earth Day . . . . .	185
<b>RESEARCH NEWS</b>	Two Superconducting Accelerators: Physics Spurs Technology . . . . .	188

## BOARD OF DIRECTORS

EMILIO Q. DADDARIO  
Retiring President, Chairman

EDWARD E. DAVID, JR.  
President

KENNETH E. BOULDING  
President-Elect

ELOISE E. CLARK  
MARTIN M. CUMMINGS

RENEE C. FOX  
BERNARD GIFFORD

## CHAIRMEN AND SECRETARIES OF AAAS SECTIONS

MATHEMATICS (A)  
Mark Kac  
Ronald Graham

PHYSICS (B)  
D. Allan Bromley  
Rolf M. Sinclair

CHEMISTRY (C)  
William E. McEwen  
William L. Jolly

ASTRONOMY (D)  
Paul W. Hodge  
Donat G. Wentzel

PSYCHOLOGY (J)  
Brenda Milner  
Meredith P. Crawford

SOCIAL AND ECONOMIC SCIENCES (K)  
Kurt W. Back  
Gillian Lindt

HISTORY AND PHILOSOPHY OF SCIENCE (L)  
Robert S. Cohen  
Diana L. Hall

ENGINEERING (M)  
Robert B. Beckmann  
Donald E. Marlowe

EDUCATION (O)  
Marjorie H. Gardner  
James T. Robinson

DENTISTRY (R)  
Sholom Pearlman  
John Termine

PHARMACEUTICAL SCIENCES (S)  
John G. Wagner  
Raymond Jang

INFORMATION, COMPUTING, AND COMMUNICATION (T)  
Eugene Garfield  
Madeline M. Henderson

## DIVISIONS

### ALASKA DIVISION

Donald H. Rosenberg  
President

Keith B. Mather  
Executive Secretary

### PACIFIC DIVISION

Mildred Mathias  
President

Alan E. Leviton  
Secretary-Treasurer

### SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

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 third Tuesday in September, 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 © 1978 by the American Association for the Advancement of Science. Member rates on request. Annual subscriptions: \$65; foreign postage: Canada \$10; other surface \$13; air-surface via Amsterdam \$30. Single copies \$1.50; \$2 by mail (back issues \$3) except **Guide to Scientific Instruments** \$6. School year subscriptions: 9 months \$50; 10 months \$55. 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 two general periodical indexes—**Readers' Guide to Periodical Literature** and **Monthly Cumulating Periodical Index**—and in several specialized indexes.



# AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

<b>BOOK REVIEWS</b>	Social Limits to Growth, <i>reviewed by F. T. Juster</i> ; The Coastline, <i>M. O. Hayes</i> ; Exploratory Data Analysis, <i>J. B. Kadane</i> ; Granivorous Birds in Ecosystems, <i>R. E. Ricklefs</i> ; The Biology of Diatoms, <i>S. Golubic</i> ; Books Received and Book Order Service . . . . .	192
<b>REPORTS</b>	Atmospheric Input of Carbon Dioxide from Burning Wood: <i>C. S. Wong</i> . . . . .	197
	Gyrate Atrophy of the Retina: Inborn Error of L-Ornithine:2-Oxoacid Amino-transferase: <i>J. J. O'Donnell, R. P. Sandman, S. R. Martin</i> . . . . .	200
	Prostaglandin E <sub>1</sub> Inhibits Platelet Aggregation by a Pathway Independent of Adenosine 3',5'-Monophosphate: <i>A. K. Sinha and R. W. Colman</i> . . . . .	202
	Sex Ratio: Adaptive Response to Population Fluctuations in Pandalid Shrimp: <i>E. L. Charnov, D. W. Gotshall, J. G. Robinson</i> . . . . .	204
	5-Thio-D-Glucose Selectively Potentiates Hyperthermic Killing of Hypoxic Tumor Cells: <i>J. H. Kim et al.</i> . . . . .	206
	Bicarbonate Ion Transport: A Mechanism for the Acidification of Urine in the Turtle: <i>T. P. Schilb</i> . . . . .	208
	Frog Perspective on the Morphological Difference Between Humans and Chimpanzees: <i>L. M. Cherry, S. M. Case, A. C. Wilson</i> . . . . .	209
	Oral Cocaine: Plasma Concentrations and Central Effects: <i>C. Van Dyke</i> . . . . .	211
<b>PRODUCTS AND MATERIALS</b>	Rotary Microtome; Recording Spectrophotometer; Research Microscope; Dish for Tissue Culture; Platelet Aggregation Measurement; Oscillating Ball Flowmeter; Thermistor Probe Holder; Literature . . . . .	214

MIKE MC CORMACK FREDERICK MOSTELLER	RUSSELL W. PETERSON CHEN NING YANG	WILLIAM T. GOLDEN Treasurer	WILLIAM D. CAREY Executive Officer
GEOLOGY AND GEOGRAPHY (E) Gerald M. Friedman Ramon E. Bisque	BIOLOGICAL SCIENCES (G) Ursula K. Abbott Walter Chavin	ANTHROPOLOGY (H) June Helm Priscilla Reining	
MEDICAL SCIENCES (N) Leon O. Jacobson Leah M. Lowenstein	AGRICULTURE (O) James B. Kendrick Coyt T. Wilson	INDUSTRIAL SCIENCE (P) David B. Hertz Robert L. Stern	
STATISTICS (U) Samuel W. Greenhouse Ezra Glaser	ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W) Kenneth C. Spengler Glenn R. Hilst	GENERAL (X) Allen V. Astin 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 foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

## COVER

Comparison of body shapes. The half chimpanzee-half human drawing illustrates the morphological differences between ape and human. The half *Xenopus*-half *Rana* diagram illustrates the morphological differences between representatives of two different sub-orders of frogs. The ape-human difference is at least as large as that between the two frogs. This contrasts with the biochemical picture. Biochemically, the two frogs are at least 30 times further apart than humans are from apes. See page 209. [Diagram, S. L. Washburn, University of California, Berkeley]

# Latest in



# an evolutionary line:

## Versatility, high performance and reliability make the new Sorvall® RC-5B the best-buy superspeed centrifuge.

---

### Multi-rotor versatility

An exceptional variety of applications is possible with a selection of 12 rotors—including DuPont's patented Sorvall® vertical rotors\* in addition to fixed angle, swinging bucket, zonal and continuous flow types.

---

### Dramatically improved performance

Sorvall® vertical rotors enable the RC-5B to give ultracentrifuge performance in some density gradient separations in less time and with larger volumes. Long the established leader for pelleting, the RC-5B now provides improved performance for density gradient runs and other demanding jobs.

---

### Automatic rate control

The performance of Sorvall® vertical rotors has been further

enhanced by an Automatic Rate Controller that provides controlled acceleration and soft stops.

---

### 5-year refrigeration system warranty

A warranty unmatched in the field backs up an efficient, reliable refrigeration system. Rotors are warranted for 7 years.

---

### Widest selection of accessories

DuPont offers the widest range of tubes, bottles and adapters available from any centrifuge manufacturer for superspeed applications.

---

Get details on these and other features of the new Sorvall® RC-5B system by writing to DuPont Company, Room 36006, Wilmington, DE 19898.

\*U.S. Patent 3,998,383

With Sorvall® Centrifuges the spin times are changing.

---

## DuPont Instruments



Circle No. 205 on Readers' Service Card



# Science for Listening

## A special sale while the supply lasts

### Cancer

Why? This most baffling question is asked every day by over 1000 Americans. Cancer is a disease of fear, anxieties, and of the unknown. On four hour-long cassettes, science journalists interview 19 leading physicians and cancer researchers. Listen to what the experts in medical science know now and the hope that future research holds. The album is accompanied by a 40-page booklet condensing information contained in the series of tape-recorded narratives. Order the entire package or the booklet alone.

List price: ~~\$49.95~~ **35<sup>00</sup>**

Booklet alone: \$2.50

### Energy: A Dialogue

A six-tape album and booklet focus 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 interrelationships of energy, the environment and politics and how these affect our lifestyles and personal finances.

List price: ~~\$49.95~~ **35<sup>00</sup>**

### Origins

What is the genesis, life, and death of a star? How was the universe created? What are the origins of our own existence? Four leading scientists probe these and other questions in four 50-minute cassettes and accompanying booklet. For the inquisitive mind, for the science student, for all those who want to expand their inner view of the infinite reaches of time and space.

List Price: ~~\$49.95~~ **35<sup>00</sup>**

### The Physical World

Intended for the professional, *The Physical World* contains six lectures which explore 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<sup>00</sup>**

### Speaking of Science

AAAS created this series to help you understand the world through science. Conversations between well-known scientists and science writers explore pertinent scientific issues, discoveries and topics of research. Designed for listening both at home and in the classroom, each volume contains 12 scintillating half-hour conversations certain to spark hours of interesting and informative discussions.

A partial listing of the conversations

Volume I: Health Care and Policy; Technology Today; the Finite Earth.

List price: ~~\$39.95~~ **35<sup>00</sup>** *sold out*

Volume II: The Dilemma of Prisons; New Dimensions in Human Genetics; Energy Rationing.

List price: ~~\$39.95~~ **35<sup>00</sup>**

Volume III: The Science of Violence; Population Policy and Human Development; The Earth's Fire.

List price: ~~\$39.95~~ **35<sup>00</sup>**

### Order Form

Please send the following at the reduced prices:

- ☐ Cancer Album—\$35.00
- ☐ Cancer Booklet—\$2.50
- ☐ Energy: A Dialogue—\$35.00
- ☐ Origins—\$30.00
- ☐ The Physical World—\$55.00
- ☐ Speaking of Science (Vol. II)—\$35.00
- ☐ Speaking of Science (Vol. III)—\$35.00

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., NW  
Washington, DC 20005

(Please allow 6 to 8 weeks for delivery.)

# at home in your lab



For 3500 years all fabricated glass was soft; then Corning originated the hard, borosilicate glass used in PYREX® products in our kitchens and our labs. This special edition beaker underlines the fact that all PYREX brand products come from Corning and only from Corning. Corning also originated VYCOR® 96% silica beakers, PYREX low actinic beakers, beakers with Teflon® lips, and beakers with handles.

PYREX® and VYCOR® are registered trademarks of Corning Glass Works. TEFLON® is a registered trademark of the E.I. du Pont de Nemours & Co. (Inc.)

## PYREX®

ONLY FROM CORNING

PYREX

CORNING

**TOTAL VALUE**

We try diligently to see that you get the **total** of Corning's many capabilities in every product we make. We know that's how we earn your trust and retain your business. We know you would never settle for less than **Total Value** from Corning.

**Free catalog.** If you don't own the 42nd edition

of the Corning catalog of total value labware, clip this coupon to your letterhead for a free copy.

**Free special edition beaker.** You'll get this special beaker with the catalog — for beaker only, use the reader service card in this magazine.

S-B-4

**CORNING**  
Science Products Division  
Building 21-5  
Corning Glass Works, Corning, N.Y. 14830

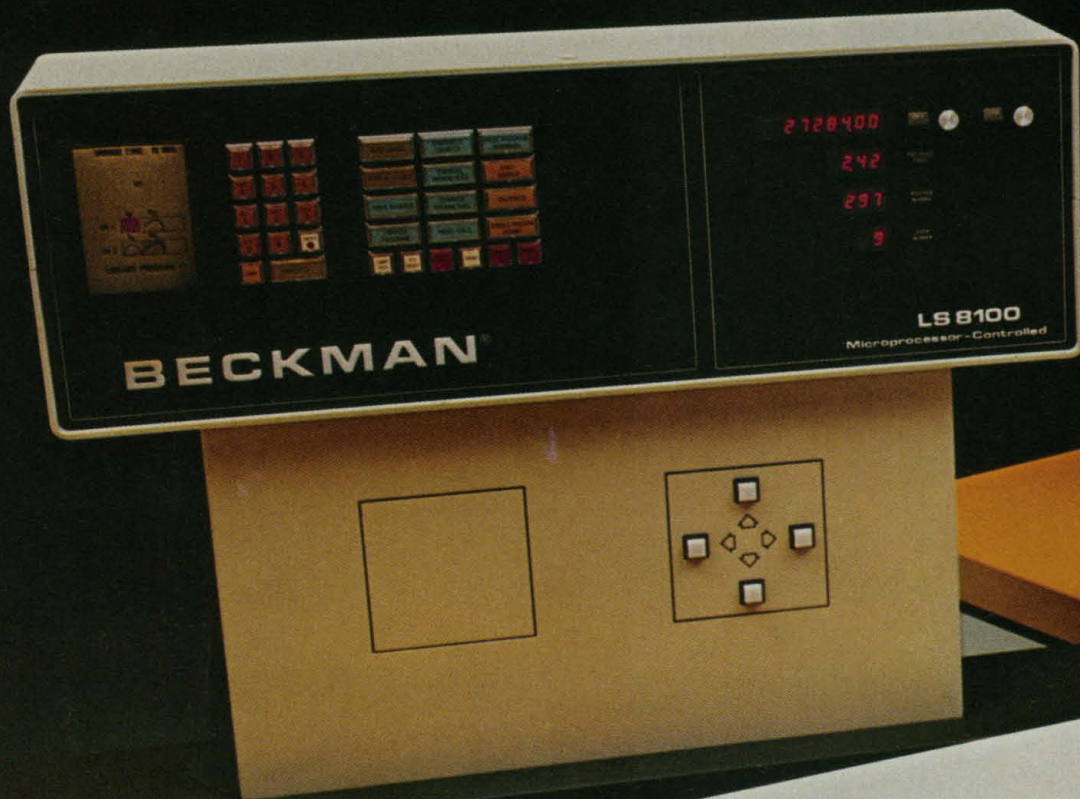
CORNING

PYREX

Circle No. 244 on Readers' Service Card



# Why will more than half of purchasing LS instruments





# all researchers select Beckman?



A decade of technical innovation dedicated to improving both the simplicity of instrument operation and data quality is the main reason.

For example, today's Beckman LS counters feature microprocessor control centers that blend true one-button operation for workhorse throughput, with on-line data reduction capability for a multiplicity of independent users.

Other design improvements, though less dramatic than full microprocessor control, have significantly advanced the state of the art. Automatic quench compensation. Quench monitoring by H<sup>#</sup> technique. Random coincidence monitoring for the detection of chemiluminescence. Counts per minute and two sigma error data handling procedures. True ambient counting capability. Single photon monitoring. And most recently, built-in instructional displays which eliminate operational guesswork and simplify user training. All these have been developed by Beckman in the last research-intensive ten-year period.

As you might expect, this genuine commitment to nuclear counting technology has also paid off for the user group with very high instrument reliability rates. While service, when necessary, has been fast, precise and readily available from a nationwide support network.

And thus, in the final analysis better final answers through a more reliable and innovative technology have made Beckman the leading manufacturer of liquid scintillation instruments.

Give yourself the chance to evaluate one of the three microprocessor-controlled instruments shown here or one of the other full capability instruments in the complete Beckman line.

You might be surprised to find that the very highest LS technology has a most reasonable cost.

For full information, contact your Beckman representative or Scientific Instruments Division, Beckman Instruments, Inc., P.O. Box C-19600, Irvine, CA 92713.

**Innovation you can count on.**

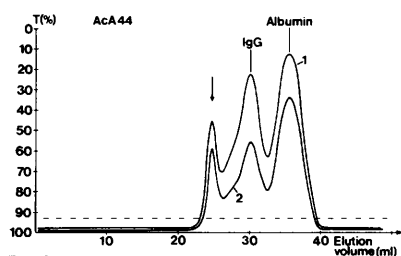
## BECKMAN®

Circle No. 213 on Readers' Service Card

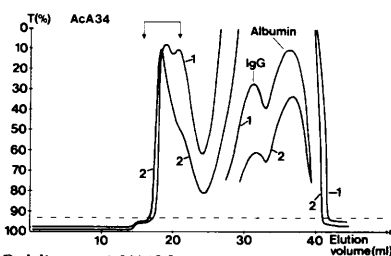
# See what LKB Ultrogel® will do for your separations!

LKB Ultrogel® is a new kind of gel filtration medium, which now turns gel filtration into a high-resolution technique. High resolution because of the inherent characteristics of Ultrogel: small, rigid, uniform beads with a narrow size-distribution.

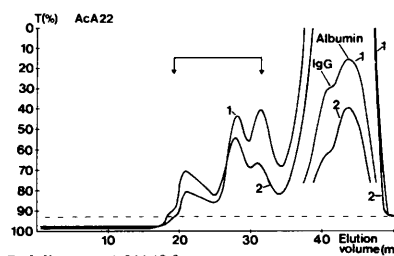
When different Ultrogel types are used for serum fractionation, they can do this for you:



Bed dimen.: 1.2 × 55.6 cm  
Flow rate: 5.0 cm/h  
UV-detection: Curve 1, 280 nm T × 1 Curve 2, 254 nm T × 1



Bed dimen.: 1.2 × 46.8 cm  
Flow rate: 5.0 cm/h  
UV-detection: Curve 1, 280 nm T × 5 Curve 2, 254 nm T × 5



Bed dimen.: 1.2 × 48.8 cm  
Flow rate: 2.6 cm/h  
UV-detection: Curve 1, 280 nm T × 5 Curve 2, 254 nm T × 5

**Buffer:** 0.05M phosphate, pH 7.0, containing 0.171M NaCl and 0.02% NaN<sub>3</sub>

**Sample:** 0.3 ml human serum (70 mg protein/ml)

**Uvicord III**

**monitoring:** For AcA 44, 100—0% transmission (T);

for AcA 34 and AcA 22, 100—80% T with automatic switching to 100—0% T

## HUMAN SERUM PROTEINS SEPARATED ON LKB ULTROGEL.

IgG and albumin are indicated for the Ultrogel types AcA 44, AcA 34 and AcA 22. It is seen that AcA 44 is the best gel for separating IgG and albumin; with AcA 34 and AcA 22 the separation is reduced.

The void peak (arrowed) in AcA 44, containing proteins much bigger than IgG, is resolved into two peaks on AcA 34, and further resolved into three peaks on AcA 22.

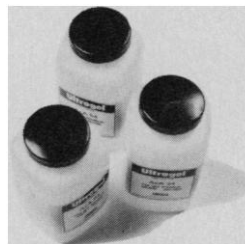
Thus, for separating high-molecular weight proteins, AcA 22 is recommended, whereas AcA 44 is more suitable for fractionation of proteins with molecular weights around 100,000.

Ultrogel type	Effective fractionation range*
AcA 22	100,000 — 1,200,000
AcA 34	20,000 — 350,000
AcA 44	10,000 — 130,000
AcA 54	5 000 — 70 000

\*Globular proteins

Ultrogel is a pre-swollen polyacrylamide/agarose gel which can be used straight from the bottle. No time-consuming swelling procedures are needed.

If you really want high resolution in gel filtration, write to the address below for more information, or order Ultrogel directly from the types listed in the table.



**LKB**

LKB Instruments Inc.  
12221 Parklawn Drive, Rockville, Maryland 20852  
Tel: (301) 881-2510

Circle No. 246 on Readers' Service Card

IF YOU THINK IT DOESN'T MAKE MUCH DIFFERENCE  
WHERE YOU BUY YOUR LIFE INSURANCE...

# please look at this cost comparison for \$50,000 5-Year Renewable Term Policies issued by TIAA and the ten largest U.S. life insurance companies!

20-Year Average Annual Costs\* for \$50,000 5-Year Renewable Term Policies

	Policies Issued To Men			Policies Issued To Women		
	Issue age 25	Issue age 35	Issue age 45	Issue age 25	Issue age 35	Issue age 45
<b>TIAA</b>	<b>\$102.50</b>	<b>\$213.50</b>	<b>\$497.00</b>	<b>\$ 81.50</b>	<b>\$142.50</b>	<b>\$316.50</b>
<i>10 Largest U.S. Companies:</i>						
Aetna	216.00	352.00	814.00	210.00	301.00	644.50
Connecticut General	223.00	378.50	816.50	204.00	313.00	673.00
Equitable	187.00	343.50	754.00	163.50	297.50	677.50
John Hancock	200.50	344.00	750.00	192.00	307.50	659.00
Massachusetts Mutual	196.00	337.50	737.00	184.50	313.00	683.00
Metropolitan	188.50	347.00	779.50	162.50	267.00	565.00
New York Life	189.00	337.50	751.00	171.00	281.00	602.00
Northwestern Mutual	163.00	300.00	684.00	147.00	264.00	592.00
Prudential	164.00	300.00	592.00	146.00	242.00	462.00
Travelers	200.50	360.50	820.00	182.00	281.00	603.00
<b>Mean Cost for 10 Companies</b>	<b>192.75</b>	<b>340.05</b>	<b>749.80</b>	<b>176.25</b>	<b>286.70</b>	<b>616.10</b>

\*Based on 1977 premium rates and dividend scales, adjusted for interest (4%) to recognize the time value of money; dividends not guaranteed.

You can see from these figures that owners of TIAA policies enjoy substantial cost advantages over persons insured by the country's largest commercial life insurance companies—companies that sell one in every three policies purchased by Americans each year. As a staff member (either full-time or part-time) of a nonprofit educational institution you are one of the limited group that qualifies for TIAA and the big savings this eligibility can bring.

To give you an idea of savings possible, the figures show that, as compared to TIAA:

the mean cost for \$50,000 5-Year Renewable Term

policies issued to 35-year old men by the ten largest companies is 59% higher, a dollar difference favoring TIAA, adding up to more than \$2,500 over the next 20 years; even the company in the group that appears to offer the best bargain demands a cost 40% higher than TIAA's; the mean cost for \$50,000 policies issued to 35-year old women by the ten companies is double that of TIAA, indicating savings close to \$2,900 for the person choosing TIAA; for the most attractive commercial policy shown, women will pay 70% more over the years than for a TIAA policy giving them the same benefits.

**You can get all the facts about a TIAA 5-Year Renewable Term policy that can help secure the future for your family by contacting the TIAA LIFE INSURANCE ADVISORY CENTER. Either telephone collect 212-490-9000 and ask for one of the Insurance Counselors**



Alan L. Fox, C.L.U. Joan Scott, C.L.U. Kenneth Sawyer Robert Cassidy

**Or mail this coupon. In either case there are no strings attached and no one will call on you.**

**Life Insurance Advisory Center  
TEACHERS INSURANCE & ANNUITY ASSOCIATION  
730 Third Avenue, New York, N.Y. 10017**

Li

Yes—I'd like to know more about TIAA 5-Year Renewable Term Insurance policies. Please send personal illustrations for my age.

Name and Title \_\_\_\_\_ Date of Birth \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Nonprofit Employer (College, University, Private School, Etc.) \_\_\_\_\_

If your spouse is also eligible according to the rules described, please provide:

Spouse's Name \_\_\_\_\_

Date of Birth \_\_\_\_\_

*Eligibility for TIAA is extended to employees of colleges, universities, private schools, and certain other nonprofit educational or scientific institutions, and to the employee's spouse when more than half of their earned income is from an eligible institution.*

# **TIAA** *The College World's Insurance Association*



# Book Us Into Your Spring Schedule

Seventeen selected symposium volumes are now being offered at a special, reduced price.

☐ **Separation and Depression**

Edited by John Paul Scott and Edward C. Senay. 256 pages, 1974.

Was \$19.95      **Reduced to \$12.00**

☐ **The Maturing of American Science**

Edited by Robert H. Kargon. 250 pages, 1974.

Was \$15.95      **Reduced to \$6.00**

☐ **Research in the Antarctic**

Edited by Louis O. Quam. 784 pages (oversized map included), 1971.

Was \$24.95      **Reduced to \$13.00**

☐ **Apollo 11 Lunar Science Conference**

Papers presented at the Lunar Science Conference, Houston, Texas. 336 pages, 1970.

Was \$14.00      **Reduced to \$9.00**

☐ **Biology of the Mouth**

Edited by Philip Person. 320 pages, 1968.

Was \$10.00      **Reduced to \$7.00**

☐ **Folk Song Style and Culture**

Edited by Alan Lomax. 384 pages, 1968; second printing 1971.

Was \$16.75      **Reduced to \$10.00**

☐ **Ground Level Climatology**

Edited by Robert H. Shaw. 408 pages, 1967; second printing 1970.

Was \$12.50      **Reduced to \$6.00**

☐ **Agriculture & the Quality of Our Environment**

Edited by Nyle C. Brady. 476 pages, 1967; second printing 1970.

Was \$13.50      **Reduced to \$8.00**

☐ **Civil Defense**

Edited by Henry Eyring. 136 pages, 1966.

Was \$4.00      **Reduced to \$3.00**

☐ **Environmental Variables in Oral Disease**

Edited by Seymour J. Kreshover and F. J. McClure. 328 pages, 1965.

Was \$8.75      **Reduced to \$6.00**

☐ **Science in Japan**

Edited by Arthur H. Livermore. 475 pages, 1965.

Was \$13.00      **Reduced to \$8.00**

☐ **Air Conservation**

The Report of the AAAS Air Conservation Commission. 348 pages, 1965; third printing 1970.

Was \$8.00 casebound, \$4.95 paperback;

**Reduced to \$4.00 casebound, \$2.00 paperback.**

☐ **Arid Lands in Transition**

Edited by Harold E. Dregne. 538 pages, 1965; third printing 1970.

Was \$15.75      **Reduced to \$9.00**

☐ **Mechanisms of Hard Tissue Destruction**

Edited by Reidar F. Sognaes. 695 pages, 1963.

Was \$13.00      **Reduced to \$8.00**

☐ **Oceanography**

Edited by Mary Sears. 654 pages, 1961; fifth printing 1969.

Was \$14.75      **Reduced to \$8.00**

☐ **Symposium on Basic Research**

Edited by Dael Wolffe. 281 pages, 1959.

Was \$3.00      **Reduced to \$2.00**

☐ **System of Units**

Edited by Carl F. Kavan. 295 pages, 1959.

Was \$6.75      **Reduced to \$5.00**

## ORDER FORM

Please send the following at the reduced prices:

- \_\_\_ Separation and Depression—\$12.00
- \_\_\_ The Maturing of American Science—\$6.00
- \_\_\_ Research in the Antarctic—\$13.00
- \_\_\_ Apollo 11 Lunar Science Conference—\$9.00
- \_\_\_ Biology of the Mouth—\$7.00
- \_\_\_ Folk Song Style and Culture—\$10.00
- \_\_\_ Ground Level Climatology—\$6.00
- \_\_\_ Agriculture & the Quality of Our Environment—\$8.00
- \_\_\_ Civil Defense—\$3.00
- \_\_\_ Environmental Variables in Oral Disease—\$6.00
- \_\_\_ Science in Japan—\$8.00
- \_\_\_ Air Conservation (CB)—\$4.00
- \_\_\_ Air Conservation (PB)—\$2.00
- \_\_\_ Arid Lands in Transition—\$9.00
- \_\_\_ Mechanisms of Hard Tissue Destruction—\$8.00
- \_\_\_ Oceanography—\$8.00
- \_\_\_ Symposium on Basic Research—\$2.00
- \_\_\_ Systems of Units—\$5.00

TOTAL AMOUNT ENCLOSED \_\_\_\_\_

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

Name \_\_\_\_\_

Address \_\_\_\_\_


State/Zip \_\_\_\_\_

Mail to:



AAAS Dept. J1  
1515 Massachusetts Ave., N.W.  
Washington, D.C. 20005

(Please allow 6 to 8 weeks for delivery)



**Whatever you have that needs watching,  
the NV-8030 will watch it for you  
for up to 108 hours on one reel of tape.**

The NV-8030 is the Panasonic 1/2" time lapse video tape recorder. And no matter what kind of business you're in, the NV-8030 will work the early shift, the day shift, and the night shift non-stop for 4 1/2 days on one reel of tape.

Scientists at a major university use it for microscopic time lapse studies of blood cells. Prison officials use it to keep an eye on inmates in jail cells. Major corporations use it for everything from assembly line time and motion studies, to time lapse recordings of electronic welding. And meat packers use it to make sure that steaks are properly trimmed—so you don't have to chew too much fat.

Banks use the NV-8030 to help catch thieves. While TV stations use it to stop false claims for advertising make-goods. The fact is, the NV-8030 will keep an eye on people, places and things the way your eyes can't: For 108 hours, 72 hours, 18 hours, 9 hours, or 1 hour at normal speed. On just one reel of tape.

You can even be at more than one place at a time. Because when used with Panasonic sequential switchers (optional), the NV-8030 will accept inputs from 6 to 10 different cameras.

In playback you can even get a blood cell to pose for you. Push the one field button for a revealing still frame and stop action.

So whatever you have that needs watching, let Panasonic watch it for you. With cameras, camera housings, monitors, remotes, switchers, time date generators and, of course, the NV-8030. Panasonic. The one-stop-shop for video systems.

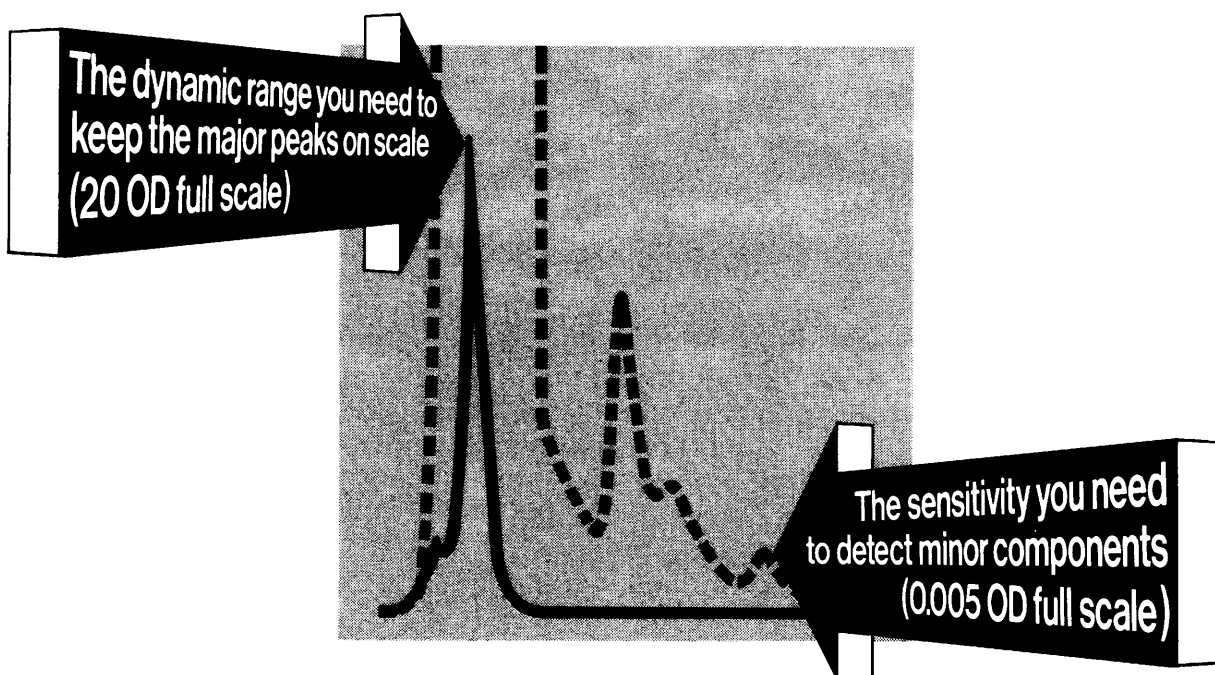
For more information, write: Panasonic Company, Video Systems Division, One Panasonic Way, Secaucus, N.J. 07094.

In Canada, contact Panasonic Video Systems Department, 40 Ronson Drive, Rexdale, Ontario M9W 1B5.

**Panasonic®**  
just slightly ahead of our time.

Circle No. 258 on Readers' Service Card

# Now you can have it both ways!



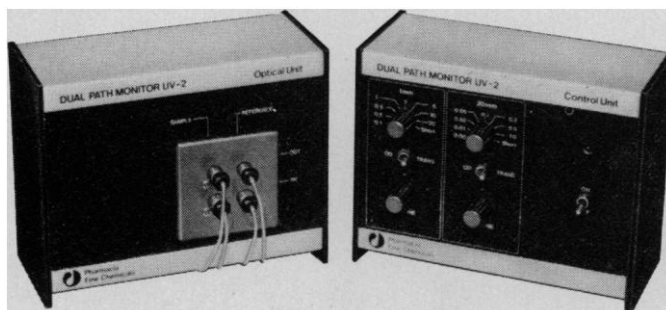
## Pharmacia Dual Path Monitor UV-2

has a unique flow cell with two optical path-lengths for new versatility in UV-monitoring.

- Monitor absorbance quantitatively up to 20 OD units full scale with a sensitivity of 0.005 OD units full scale at the same time, in the same run.
- Monitor at 254 nm and/or 280 nm with two completely independent measuring systems.

The Dual Path Monitor UV-2 has all the other features you expect of a high performance monitor: stability, cold room operation convenience and compact design. For less-demanding applications you can choose the Pharmacia Single Path Monitor UV-1 with a choice of 3 mm or 10 mm flow cell and operation at 254 nm or 280 nm.

Find out more about the practical advantages of column monitoring with the UV-2 and UV-1 Monitors. Ask about the Pharmacia Recorders too.



**Pharmacia Fine Chemicals**  
Division of Pharmacia, Inc.  
Piscataway, New Jersey 08854  
Phone (201) 469-1222







## The Computer for the Professional

No matter what kind of professional you are, the System 8813 will make you more productive in your profession. Use it to do scientific, engineering, or financial analysis, to edit reports and proposals, or to collect data in the laboratory.

Reliable hardware and sophisticated software make this system a useful tool. A powerful BASIC interpreter allows you to solve sophisticated problems quickly. Scientific features built into BASIC include trig, inverse trig, exp, log, hyperbolic, and gamma functions, multi-dimensioned arrays, maximum and minimum value in an array, array

functions, string arrays, and more. An easy-to-use text editor allows you to write and update programs, reports, lists, schedules, and letters conveniently. A complete assembler lets you write and debug machine language programs, such as controllers and drivers, and connect them into BASIC.

Complete systems (without printer) start at less than \$4000. (Prices and specifications subject to change without notice.)

See the System 8813 at your local computer store or contact us at 460 Ward Dr., Santa Barbara, CA 93111, (805) 967-0468.

PolyMorphic  
Systems



# Brinkmann's got it all together to make separations easier.

We're the people who first introduced TLC in the United States. Today, our name is synonymous with virtually every popular separation technique, including column chromatography, electrophoresis, isoelectric focusing, and of course thin layer chromatography.

For each separation procedure, Brinkmann offers a complete line of equipment, chemicals and accessories. We can supply everything for your separation needs, from the entire system to any of its components.

If you're working with any of these separation techniques, why not order all your materials from the same, single, dependable source?

For more information on the systems (and accessories) shown, just write: Brinkmann Instruments, Inc., Cantiague Road, Westbury, N.Y. 11590. In Canada: Brinkmann Instruments (Canada) Ltd.

## CC-HPLC

For Column Chromatography and High Pressure Liquid Chromatography, Brinkmann has one of the most extensive selections of pre-packed columns, apparatus and sorbents in a variety of types and particle size distributions.

**CC:** Choose from 3 sizes of pre-packed Lobar™ columns filled with silica gel 60. An injector stand is available that fits all three columns and incorporates an injection port, pump and column connection.

**HPLC:** Brinkmann's High Pressure Liquid Chromatography line features pre-packed stainless steel Hibar™ columns, available in 11 types, including adsorption, reverse phase, polar and weak polar phases.

Circle No. 184 on Readers' Service Card

## TLC

A complete line of high quality pre-coated glass plates, aluminum and plastic backed sheets in a wide variety of sizes, as well as loose sorbents. Also the apparatus to help perform the separation, including developing tanks, streaking devices, applicators and spot collectors.

Circle No. 185 on Readers' Service Card

## TLIEF

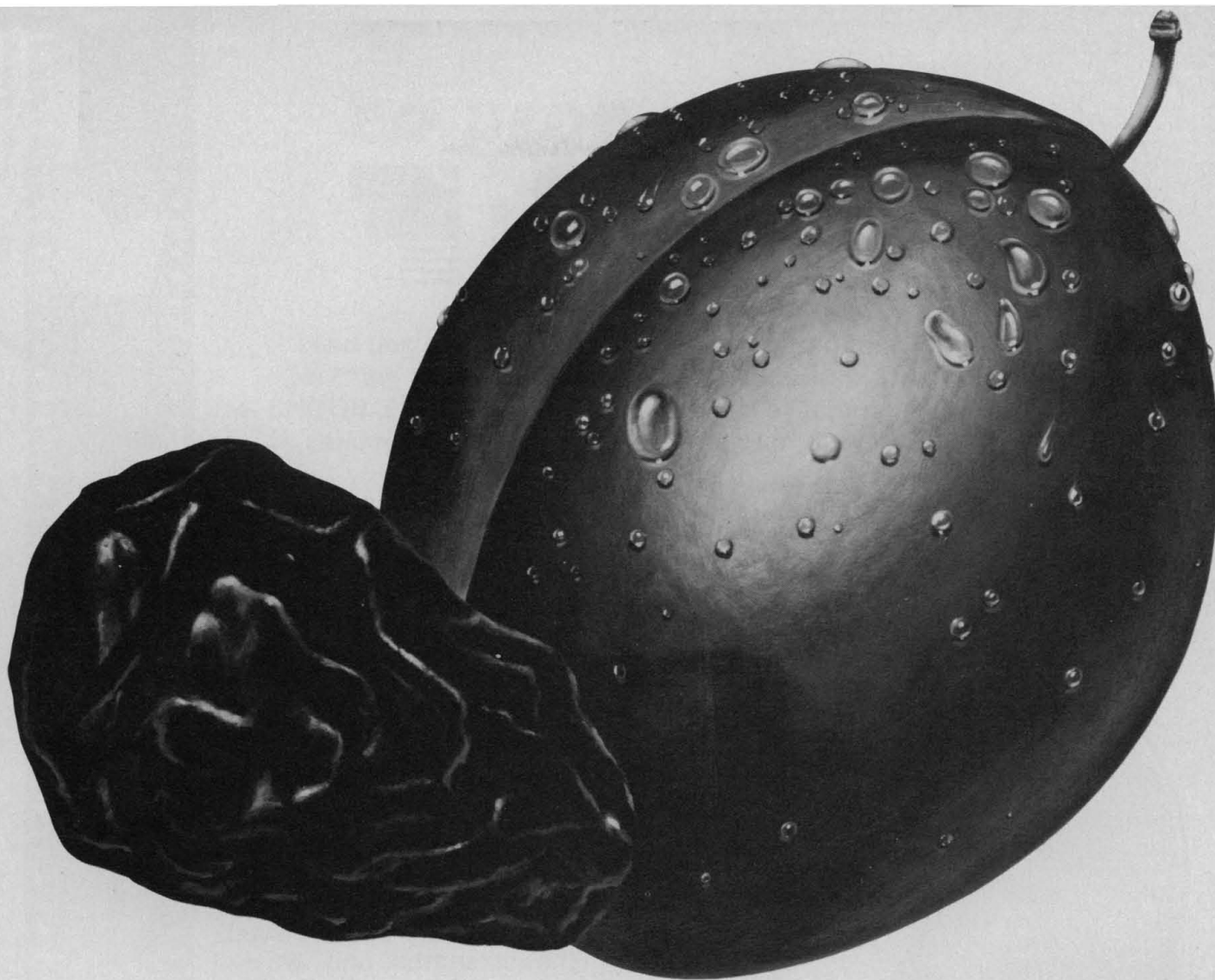
Brinkmann TLE Single and Double Chambers let you perform the entire range of electrophoretic separations, both analytical and preparative. The Double Chamber handles separations as large as 20 x 40cm, or as small as a microscope slide, with outstanding resolution and reproducibility. For Isoelectric Focusing, carrier ampholytes are available in one general and eight individual pH ranges encompassing pH 2-11. A combination electrode permits direct pH readings.

Circle No. 186 on Readers' Service Card

**Brinkmann**

Lobar™ and Hibar™ are trademarks of EM Laboratories, Inc.





## How much moisture loss changes a plum into a prune?

Moisture loss or content of substances can be determined with milligram accuracy by combining a Mettler electronic balance with a Mettler infrared dryer. As the sample is heated and loses moisture, the balance displays the weight change. The balance can be connected to a number of accessories such as recorders – to show the process graphically – programmable desk-top calculators or teletype systems.



Mettler helps solve problems in analytical laboratories and on the production floors of industry. We market a variety of weighing and measuring instruments. All of them made with world-renowned Mettler craftsmanship. All of them backed by a worldwide team of highly-competent service specialists who can be there whenever you need them.

Mettler – instruments and people you can depend on.

## Depend on Mettler for the answer.

*Mettler*

Electronic balances and weighing systems · Thermoanalytical instruments · Automatic titration systems · Laboratory automation

Mettler Instrumente AG, CH-8606 Greifensee-Zürich, Switzerland · Mettler-Waagen GmbH, D-63 Giessen 2, Postfach 2840, BRD  
Mettler Instrumenten B.V., Postbus 68, Arnhem, Holland · Mettler Instrument Corporation, Box 100, Princeton, N.J. 08540, USA

Circle No. 133 on Readers' Service Card



**ORDER NOW AND  
SAVE!**  
Subscription rates going up in May!

it's as easy as  
**S B & F**

You can find the science books and films you need —  
quickly, easily, and inexpensively! For just \$16,  
you can get a year's subscription to **SCIENCE BOOKS &  
FILMS**, and here's what you'll get for your money . . .

- four quarterly issues that will bring you reviews of more than 1200 books and 16mm films in the pure and applied sciences, social and behavioral sciences, archaeology, science education — almost everything, in fact, except religion and literature
- reviews of books and films for readers and viewers at all levels, from kindergarten through college
- reviews prepared by specialists from many fields — critical evaluations you can *rely* on to let you know the strengths and weaknesses of each book and film *before* you buy it
- reviews arranged in Dewey decimal order for easy use, with title index in each issue and annual author/distributor indexes

# Science Books & Films

the quarterly review that can save you  
time and money

One year subscription \$16 (AAAS members \$15), two years \$28  
Contact your subscription agency  
or order directly from

**American Association for the Advancement of Science  
SCIENCE BOOKS & FILMS**

1515 Massachusetts Avenue, N.W.  
Washington, D.C. 20005

# The Bausch & Lomb SPECTRONIC® 21 Spectrophotometer

In the next century, testing will require the highest degree of simplicity and reliability. You will need a spectrophotometer that delivers a continuous wavelength of 200nm to 1000nm for uninterrupted testing. One that has an automatic 0%T feature to eliminate readjustment between tests. And one that has impeccable quality to assure fast output and accurate results.


But you don't have to wait that long. The Bausch & Lomb SPECTRONIC 21 Spectrophotometer lives up to these tests now. What's more, it is available in four different models, visible and UV-visible in meter and digital.

It is the greatest spectrophotometer value available today. And because it's from Bausch & Lomb, it will live up to the test of tomorrow.

Call your nearest Bausch & Lomb representative, or one of our dealers, VWR or Fisher Scientific. Or call us at (716) 385-1000, ext. 325.

## Up to the test of the 21st century



**BAUSCH & LOMB** 

ANALYTICAL SYSTEMS DIVISION  
ROCHESTER, NEW YORK 14625

Circle No. 259 on Readers' Service Card







# DECLAB-11/60.

## The price/performance leader for your lab.

Until now, if you wanted a mid-range computer system, you could either pay for performance. Or settle for price. Now there's a system that offers the best of both: Digital's DECLAB-11/60.

**It comes with standard features that are anything but standard.**

For less than \$65,000, you get our powerful PDP-11/60 central processor with integral floating point and cache memory. 128K of MOS memory with error correction code for accuracy and reliability. Two independent disk drives for handling raw and processed data. Interactive graphic display that combines our processing power with your intuition. Software support that includes our RSX-11M real time, multi-user operating system, FORTRAN-IV Plus language compiler. And full FORTRAN support for each system component. You also get a library of more than 200 lab application subroutines.

In fact, the DECLAB-11/60 is so complete, it comes with standard

features other systems offer as options. It even comes with standard features other systems don't offer at all.

**Introducing the new LPA 11-K intelligent controller for lab peripherals.**

Combined with the A-D converter, our LPA 11-K lets you acquire data at speeds up to 75,000 samples per second. Without tying up your central processor.

With the LPA 11-K you can acquire analog or digital samples from a mix of instruments and experiments faster than ever before. And simultaneously analyze them. So you can get more throughput than ever before.

**And you can add options for even more power.**

You can add a fast floating point parallel processor. More powerful graphics. Even a user-programmable control store that lets you write and run your own microprograms.

In addition, you can add more disk and more ECC/MOS memory anytime you need more. You can also add printers and terminals for more users. In fact, the DECLAB-11/60 gives you the flexibility you need to make its power work for you. You can do Fast Fourier Transform. Power spectrum analysis. Signal processing. Image processing. And you have the power for laboratory database

management applications as well.

Best of all, you can do all this, and a whole lot more, without spending a lot in the process.

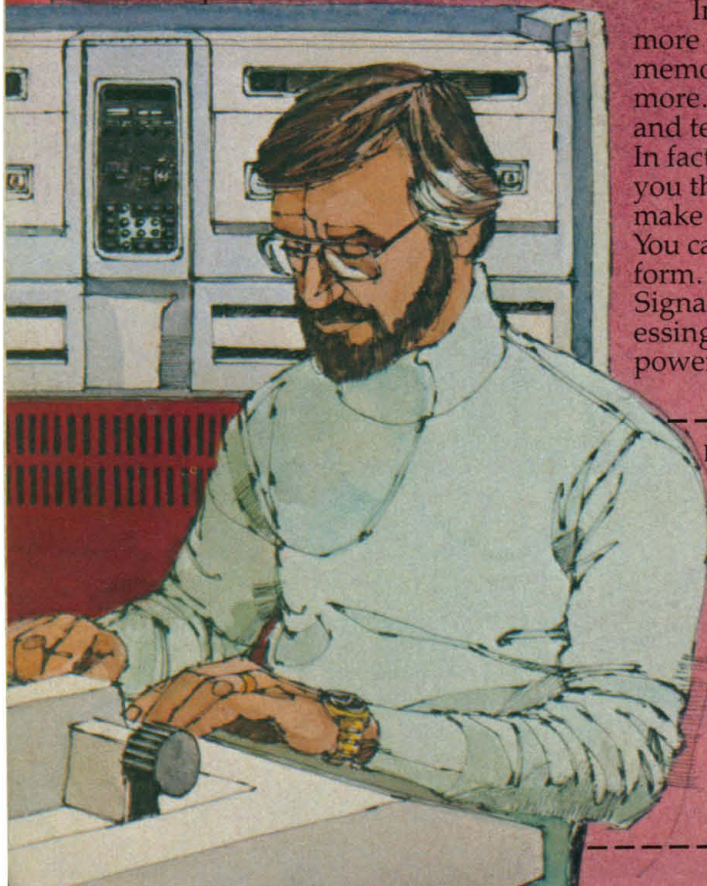
**DECLAB-11/60. Just one member of the DECLAB family.**

You can also choose our easy-to-use, low-cost DECLAB-11/03. Our versatile DECLAB-11/34. Our large-scale, multifunctional DECLAB-11/70. Or our new 32-bit VAX 11/780.

No matter whether you want a system for dedicated or multi-task applications, concurrent program development, high-speed computation or lab networking, the DECLAB Family offers you the right system for your lab. And since they're all compatible, you never have to worry about today's DECLAB becoming too small for tomorrow's needs.

To find out more about the DECLAB-11/60 or any of our other systems, fill out the coupon and send it to Laboratory Data Products, MR2-4 M16, Digital Equipment Corporation, Marlborough, MA 01752. Telephone: (617) 481-9511, ext. 5751. European headquarters: 12, av. des Morgines, 1213 Petit-Lancy/Geneva. Tel: 93 33 11. In Canada: Digital Equipment of Canada, Ltd.

**digital**  
Computers in Research.



Digital Equipment Corporation, MR2-4 M16, Marlborough, MA 01752.

Please send me information on:

- ☐ DECLAB-11/60. ☐ The DECLAB Family.  
☐ Please have a Digital lab system specialist contact me.

Name \_\_\_\_\_

University or Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Ext. \_\_\_\_\_

Applications \_\_\_\_\_

S4148



# TRIS AMINO<sup>®</sup> TRIS AMINO<sup>®</sup>·HCl

Both come from Brae Labs, so each represents the highest purity reagent grade available. Virtually devoid of heavy metals.

And now you can get both in laboratory quantities!

The usefulness of TRIS AMINO\* as an effective buffer in sensitive biochemical

reactions is well known.

So compare Brae purity with products you've used in the past. We think you'll like the results... and the price.

But to prove it, you'll need a supply. So contact us now for a free sample, specifications and complete information.



Brae Laboratories, Inc.  
230 Centre St.  
Nutley, N.J. 07110  
(201) 661-1061

\*A brand of tris (hydroxymethyl) aminomethane

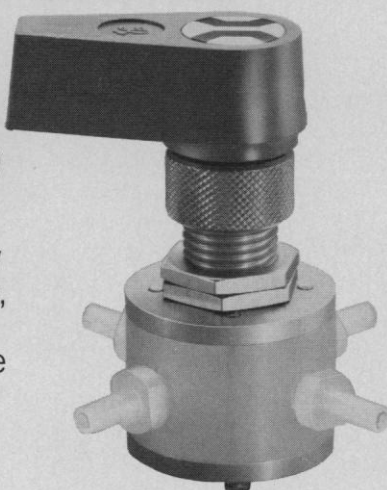
Circle No. 26 on Readers' Service Card

## MINIATURE INERT VALVES

Inert valves for ultra-pure or corrosive fluids. Wide variety of styles and sizes, leak-tight, chemically inert...for panel mounts, table mounts, or free standing systems.

**Free Catalog**...write to  
Hamilton Company,  
P.O. Box 10030,  
Reno, Nevada 89510.

**HAMILTON**



Circle No. 190 on Readers' Service Card

### LETTERS

#### The LDH Virus: An Interfering Biological Contaminant

The lactate dehydrogenase-elevating virus (LDH virus) is widely distributed in nature, having been found in wild and laboratory mice in North America, Australia, England, and Europe (1-4).

Of special relevance to the biological research community is the inconspicuous and thus unappreciated presence of this "silent" virus in many of the mouse-passaged materials used in biomedical research. Known contaminations have occurred in more than 100 transplantable mouse tumors, many of the oncogenic virus preparations, and other viral, bacterial, and *Bartonella*-like materials that have been or are being serially passed in mice (1-4).

We wish to call attention to the interpretative hazards associated with the wide variety of physiological alterations that this ubiquitous agent is capable of inducing in experimental mice. Some of the host alterations that are known to be associated with this viral infection have been erroneously ascribed to implanted tumors, oncogenic viruses, or to other experimentally imposed factors or conditions. Thus, certain immunological changes or manifestations observed in mice after tumor transplants or inoculation with other oncogenic materials may result, either largely or in part, from the concomitant LDH viral infection. The presence of the LDH virus is therefore capable of modifying and compromising otherwise carefully acquired biological data.

Following is an abridged list of host alterations and influences that are associated with the LDH viral infection and have caused or are capable of causing distortion, misinterpretation, or confusion of experimental data:

1) Immunological effects: lymphocyte trapping; thymus involution; changes in T cells, B cells, and macrophages; moderate splenomegalia and lymph node enlargement; enhancement or depression of humoral immunity; depression of cellular immunity; and production of virus-antibody complexes (1-6).

2) Endocrinological alterations: two- to tenfold increases in plasma corticosterone levels during the acute phase of viral infection (1, 6, 7).

3) Host enzyme changes: two- to hundredfold increases in plasma LDH and some other plasma enzymes, some of lifelong persistence (1-4).

4) Modifications of cancer therapy: potentiation of asparaginase and glutaminase effectiveness (8).

5) Alterations of host clearance capabilities: decreases in the rate of clearance of many naturally occurring or injected enzymes and other proteins and two- to tenfold increases in their half-life (9).

6) Changes in tumor behavior: increases in the incidence and growth rates of certain tumors and reduction of the percentage of regressions and of host survival times (6, 10).


7) Alterations in oncogenic viral expression: increases in tumor incidence; reduction of spontaneous regressions; increases in the number of spleen foci; and production of interferon (6, 11). Suppression of the incidence of mouse mammary tumor viruses or of tumors induced by the Moloney sarcoma virus under special conditions (12).

Investigators working with biological materials that have a high probability of carrying this silent virus are urged to establish its presence or absence. Editors and reviewers charged with monitoring the accuracy of published material should challenge submitted manuscripts that are appropriately suspect. As a minimum, the presence or absence of the virus in recipient mice and in mouse-passaged preparations should be clearly stated in all reports of research in which such materials were used.

However, to cope most effectively with this problem, it is also necessary to remove the passager LDH virus, when present, from the classical, as well as newer, transplantable mouse tumors, from oncogenic and other virus preparations, and from miscellaneous mouse-passaged materials such as experimental murine pathogens and *Eperythrozoon coccoides*. Protective housing, quarantine procedures, and appropriate sanitary safeguards should also be used to prevent uncontrolled reinfection (12, 13).

The LDH virus produces a lifelong persisting viremia in infected animals. There is no known therapeutic means capable of eliminating the virus from the host. It is possible, however, by utilizing either special tissue culture techniques or appropriate heterotransplantation procedures to delete the LDH virus from specific tumors, mouse-passaged bacterial and viral materials, or other contaminated preparations, and then to transplant such virus-free materials back into "clean" mice (2, 4).

While it is possible for each laboratory to test and "purify" their own contaminated preparations, in practice this is time-consuming and requires special expertise and appropriate research facilities. Since LDH viral contamination will be a continuing problem for the foreseeable future because of recontaminations, individual solutions to the problem



## From tissue to homogenate in 30 seconds!

For homogenization, dispersion, defibrination and emulsification, nothing works quite like a Polytron. Utilizing the Willems "High Frequency Principle", the Polytron combines ultrasonic energy with mechanical shearing action to homogenize virtually any type of tissue . . . small organs, soft bones, muscle, cartilage, even an entire mouse.

Because of its unique shearing effect, the Polytron outperforms any blender, mixer or similar homogenizer, and requires only 30-60 seconds to do what other instruments do in 15 minutes or more. This rapid action is an important advantage when working with heat-sensitive biological materials.

The Polytron system offers a wide selection of models, generators and speeds to provide ideal conditions for homogenization as dictated by type of material, experimental conditions and desired end result. For an informative brochure, write: Polytron Division, Brinkmann Instruments, Cantiague Road, Westbury, N.Y. 11590. In Canada: 50 Galaxy Boulevard, Rexdale (Toronto), Ont.

**Brinkmann Polytron®**



**EMI**

**EMI 9789QB**  
**PHOTOMULTIPLIERS**



**FOR**  
**MEASUREMENTS**  
**AT THE LOWEST**  
**LIGHT LEVELS**

For D.C. or pulse counting applications where only a small number of photons are available, EMI offers the 9789 Photomultiplier with a 10mm high efficiency bialkali cathode and a unique front end geometry. This tube typically operates at 1350 V overall for  $4 \times 10^7$  gain with a corresponding dark current of  $10^{-10}$  A at 20°C. Total dark counts are typically 50 counts/sec. at 20°C with a further reduction to 10 counts/sec. at -20°C. The 9789 is available with a quartz (fused silica) window as the 9789QB or with a pyrex window as the 9789B. The 9789 is a direct plug in replacement for the well known 6256/9502.



Detailed data from:  
**EMI GENCOM INC.**  
 80 Express St.  
 Plainville, New York 11803  
 Tel (516) 433-5900  
 TWX 510-221-1889

are not consistent with realistic research economics. Such a special technical need of a significant section of the biological and biomedical research community could be more effectively accomplished by establishing a central laboratory within or sponsored by the National Institutes of Health or an appropriate institute or foundation. The establishment of such a center for both the detection and elimination of the virus would provide greater assurance that costly research studies in which mice are used would not be subject to misinterpretation as a consequence of the presence of an uncontrolled agent that alters immunological and other basic physiological parameters.

VERNON RILEY

DARREL H. SPACKMAN

GEORGE A. SANTISTEBAN

*Pacific Northwest Research Foundation  
and Fred Hutchinson Cancer Research  
Center, Seattle, Washington 98104*

GILBERT DALLDORF

*Oxford, Maryland 21654*

INGEGERD HELLSTROM

KARL-ERIC HELLSTROM

*Fred Hutchinson Cancer Research  
Center*

EUGENE M. LANCE

*Cancer Center of Hawaii, University of  
Hawaii at Manoa, Honolulu 96822*

K. E. K. ROWSON

*University of London,  
London WC1 8EE, England*

B. W. J. MAHY

*University of Cambridge,  
Cambridge CB2 2QQ, England*

PETER ALEXANDER

*Royal Cancer Hospital,  
Belmont, Sutton, Surrey, England*

C. CHESTER STOCK

*Memorial Sloan-Kettering Cancer  
Center, New York 10021*

HANS O. SJÖGREN

*Department of Medical Microbiology,  
University of Lund, Lund, Sweden*

VINCENT P. HOLLANDER

*Research Institute for Skeletomuscular  
Disease, Hospital for Joint Diseases,  
New York 10035*

M. C. HORZINEK

*Instituut voor Virologie, Faculteit der  
Diergeneeskunde, Rijksuniversiteit te  
Utrecht, Utrecht, Netherlands*

#### References

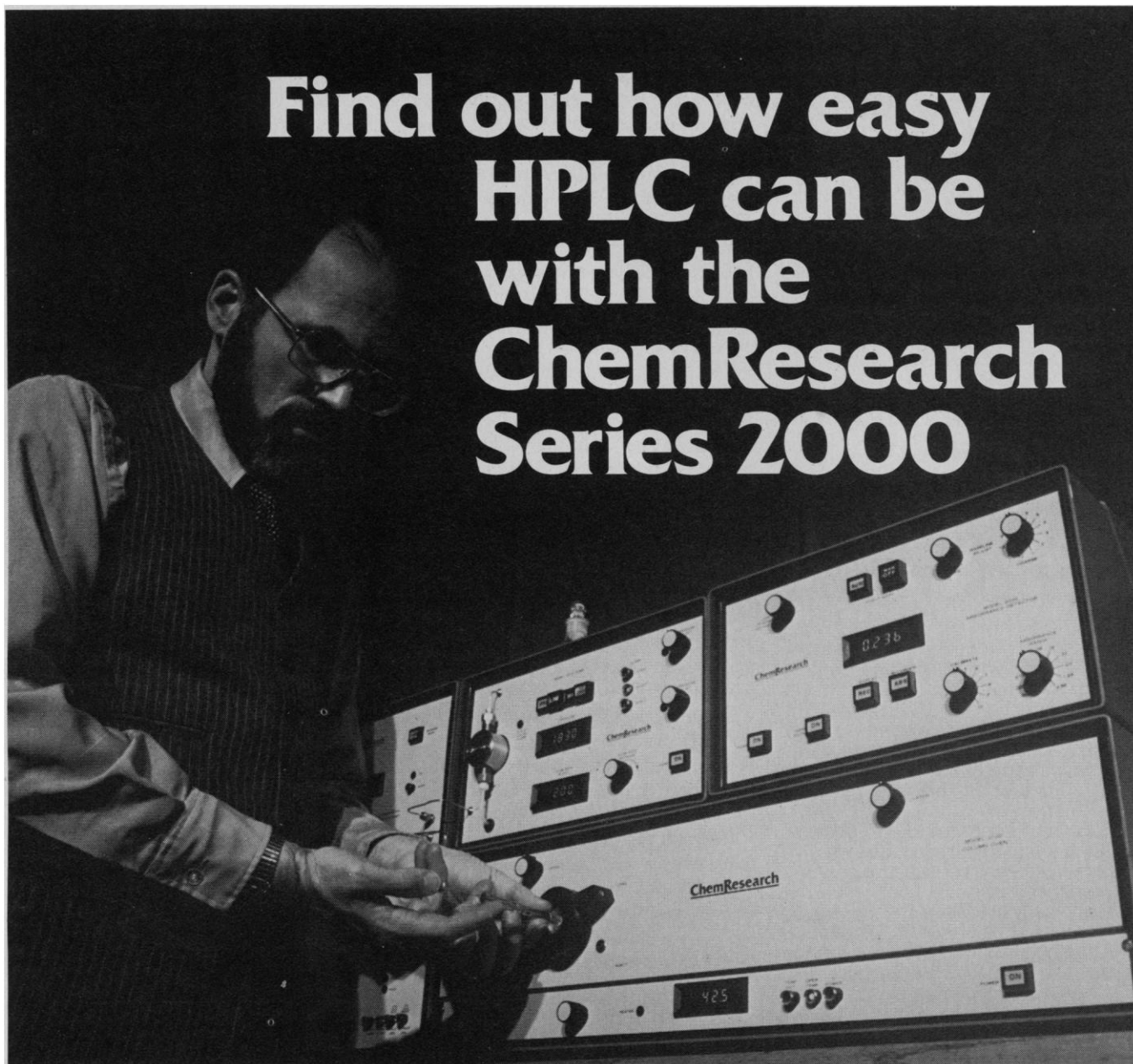
1. V. Riley, *Prog. Med. Virol.* **18**, 198 (1974).
2. ———, in *Busch Methods in Cancer Research* (Academic Press, New York, 1968), vol. 4, pp. 493–618.
3. ———, F. Lilly, E. Huerto, D. Bardell, *Science* **132**, 545 (1960); A. L. Notkins, *Bacteriol. Rev.* **29**, 143 (1965).
4. K. E. D. Rowson and B. W. J. Mahy, in *Lactic Dehydrogenase Virus*, S. Gard and C. Hallaver, Eds. (Virology Monograph 13, Springer-Verlag, New York, 1975).
5. M. B. A. Oldstone and F. J. Dixon, *J. Immunol.* **106**, 1260 (1971); A. L. Notkins, S. Mahar, C. Scheele, J. Goffman, *J. Exp. Med.* **124**, 81 (1966); S. E. Mergenhagen, A. L. Notkins, S. F. Dougherty, *J. Immunol.* **99**, 578 (1967); K. E. K. Rowson and B. W. J. Mahy, *J. Gen. Microbiol.* **39**, xi (1965); M. J. Snodgrass and M. G. Hanna, Jr., *J. Nat. Cancer Inst.* **45**, 741 (1970); R. J. Howard, A. L. Notkins, S. E. Mergenhagen, *Nature (London)* **221**, 873 (1967); V. Riley, W. Braun, M. Ishizuka, D. Spackman, *Proc. Natl. Acad. Sci. U.S.A.* **73**, 1707 (1976).
6. V. Riley and D. Spackman, in *Modulation of Host Immune Resistance in the Prevention or Treatment of Induced Neoplasias*, M. A. Chirigos, Ed. (Government Printing Office, Washington, D.C., 1977), pp. 319–336.
7. D. Spackman and V. Riley, *Proc. Am. Assoc. Cancer Res.* **16**, 170 (1975); G. A. Santisteban, V. Riley, M. A. Fitzmaurice, *Proc. Soc. Exp. Biol. Med.* **139**, 202 (1972).
8. V. Riley, *Nature (London)* **220**, 1245 (1969); D. Spackman and V. Riley, *Proc. Am. Assoc. Cancer Res.* **14**, 113 (1973); V. Riley, *Pathol. Biol.* **18**, 757 (1970); ———, D. Spackman, M. A. Fitzmaurice, J. Roberts, J. S. Holcenberg, W. C. Dolowy, *Cancer Res.* **34**, 429 (1974); V. Riley, H. A. Campbell, C. C. Stock, *Proc. Soc. Exp. Biol. Med.* **133**, 38 (1970).
9. V. Riley, J. D. Loveless, M. A. Fitzmaurice, W. M. Siler, *Life Sci.* **4**, 487 (1965); A. L. Notkins and C. Scheele, *J. Nat. Cancer Inst.* **33**, 741 (1964).
10. V. Riley and D. Spackman, in *The Pigment Cell; Melanomas: Basic Properties and Clinical Behavior*, V. Riley, Ed. (Karger, Basel, 1976), pp. 163–173.
11. W. Turner, P. S. Ebert, R. Bassin, G. Spahn, M. A. Chirigos, *Proc. Soc. Exp. Biol. Med.* **136**, 1314 (1971); R. Evans and V. Riley, *J. Gen. Virol.* **3**, 449 (1968).
12. V. Riley, *Science* **153**, 1657 (1966).
13. ——— and D. Spackman, *Lab. Anim.* **6**, 16 (1977).

#### Xeroxing Life

Barbara J. Culliton's excellent summary of the burgeoning controversy over human cloning (News and Comment, 24 Mar., p. 1314) suggests that once it is full-blown, this one will be dominated by arguments even more specious than those advanced (on both sides) by recombinant DNA research extremists. I am concerned here with only one of the possibilities: doubtless there will be opportunity in the future for ventilation of the others. At issue is the false notion, thus far undisputed by scientists responding to the press, that the product of a single successful nuclear transplantation is a "clone," that is, an *identical copy* (I avoid Jeremy Rifkin's plug for Xerox) of the individual donating the transplanted nucleus. My concern with this specific point is that, more than any other, the idea of mass production of identical persons is repugnant to the laity, perhaps because it is so obvious a departure from the organic way of doing things.

There is, however, no possibility in principle of making copies identical to an individual donor by the method being discussed. All animal ova studied so far, including those of mammals, contain a population of "maternal" messenger RNA molecules, laid down in the egg cytoplasm during oogenesis, and functioning in protein synthesis during development proper (1, 2). Protein synthesis is indispensable for development, and a

# Find out how easy HPLC can be with the ChemResearch Series 2000



Designed with the operator in mind, the ChemResearch Series 2000 has many conveniences to make high performance liquid chromatography easy. LED readouts monitor 15 operating parameters. Valve and column plumbing are mounted on the oven door, providing easy access for column or sample loop changes. A precisely reproducible injection mark is made automatically every time the valve is operated. Pressure and temperature limit controls with alarms protect the instrument and operator. And a valve protects against air locks during solvent changes.

Modular construction makes it easy to adapt the Series 2000 to your HPLC needs. You can choose from two high-sensitivity detectors, giving you the option of multi-wavelength or

variable UV/visible absorbance. You can choose an isocratic version and later add a single gradient module that's programmable for concave, convex, or linear gradients for both solvent and flow. Easy choices that give you the versatility you need for practically any separation.

Solvent delivery is monitored by an advanced feedback control which produces an exceptionally smooth flow by compensating for valve

action, system compressibility, and other irregularities. In fact, the single piston ChemResearch pump delivers solvent as smoothly as most dual piston pumps.

The solvent, injection valve, and column are maintained at the same temperature in the forced-air oven to provide better reproducibility and to prevent precipitation of samples which require heat to remain in solution. Temperatures are precisely controlled within  $\pm 1^\circ\text{C}$  throughout the oven chamber, which accommodates two 25 or 50 cm columns.

Make your HPLC easier—send for ChemResearch literature today. Or dial direct, toll free (800) 228-4250 (continental U.S.A. except Nebraska). Instrumentation Specialties Company, P.O. Box 5347, Lincoln, Nebraska 68505.

## **ChemResearch**



## Our Sample Injector: it's the standard.

When we introduced the Rheodyne Model 7120 Syringe Loading Sample Injector in early 1976, we knew it was a good product.

Now, we suspect, it might be a great product. According to the best educated guesses we can make, it's the best selling sample injector around by a factor of three to one. Why?

Because it does the job well, because we keep improving it, because we give you good delivery, because we give you good service.

Technically the Model 7120 gives you maximum versatility in HPLC sample injection. You load the sample by syringe through a built-in needle port. For maximum precision use conventional loop filling or partial loop filling with only 0.5  $\mu$ l sample loss. Removable sample loops are available from 10  $\mu$ l to 2 ml. The valve will withstand 7000 psi operating pressure. And at \$490, there's simply no better price/performance value on the market.

Over the years, the product gets better. With thousands in the field, it's more reliable. It's easier to turn too. And if you need parts or new valves, we can give you same day service.

If you want us to repair or rework the valve, we'll usually have it on the way back to you within 24 hours.

### More information

Our technical bulletin tells the whole story. For your copy, please address Rheodyne, Inc., 2809 Tenth St., Berkeley, CA 94710. Phone (415) 548-5374.

  
**RHEODYNE**

THE LC CONNECTION COMPANY  
Circle No. 229 on Readers' Service Card

very large fraction of it—perhaps all in some species—is directed during the critical early stages by maternal RNA templates. The maternal messages are not genes, to be sure, but they are immediate products of genes, and they carry an enormous amount of genetic information. A conservative average might be the equivalent of 10,000 structural genes. The DNA from which these templates are copies is that of the *mother's* genome, and in the particular cases most likely to be of interest here, it is specifically DNA of the oocyte that is transcribed into RNA during the period of growth in the ovary (2, 3).

The force of this is that an ovum is *not* a genetic tabula rasa; it is not the indifferent branch upon which a foreign shoot is grafted, nor yet the single somatic plant cell induced by a surrogate ovular fluid to produce an entire plantlet. The animal egg is a highly specialized and comparatively huge cell that contains not only a nuclear genome but also a complex (approximately  $10^7$  nucleotides) derivative genome in the form of very stable messenger RNA, the function of which is to direct the protein synthesis by which divergences of cell type, central to morphogenesis, eventually appear (3). This derivative genetic information is specifically the mother's, *not* the father's nor, obviously, that of a donor cell selected in the laboratory.

It is still too early to say what identifiable features of the adult phenotype are regularly the unique products of maternal messages, but it is certain that they are not trivial features (2); in addition to the universal processes of cleavage, germ-layer formation, and morphogenetic movements in early development, there are certain to be maternally determined external adult characteristics, for example, the equivalent of left-versus right-handed spiraling in some molluscan shells. The mother's genes therefore make in oogenesis a critical and individual contribution to the outcome of animal development, and must do so even if the zygotic nucleus is removed from the fertilized egg.

There is therefore no possibility that a *literal* copy of the donor individual can be produced by the insertion of a somatic nucleus into recipient cytoplasm of a conveniently available egg. A roughly similar individual, yes; but a carbon copy, no. Only the nuclear genes are likely to be pretty accurate copies of the transplanted set. Yet it will be, I predict, the symbolic and emotional content of the carbon copy idea that most excites the popular imagination.

None of this is meant to cast doubt upon the possibility nor the inherent inter-

est of animal cloning. There are other methods than the one about to be sprung on an unsuspecting world by Rorvik's *oeuvre*. Some of those can work in principle, but nobody has come close to succeeding with them, and there isn't much serious effort anyway. None of the alternatives has been mentioned in the press as yet. There are also variations of the nuclear insertion method, involving more than one generation of recipients, that can work in principle, but they are nearly as remote in practical terms. It takes exquisite skill and knowing how to deal with a preponderance of failures to apply such methods even to amphibian eggs. The mammalian egg is an order of magnitude smaller and more fastidious about its environment; its development is an order of magnitude more complex, and each generation requires gestation in utero.

We have, therefore, a long way to go. It is, however, a way that should not be blocked nor impeded by hysterical appeals to Stop Xeroxing People. Besides, the Xerox Corporation is having enough trouble as it is with its common stock.

PAUL R. GROSS

University of Rochester,  
Rochester, New York 14627

### References

1. P. R. Gross, *Curr. Top. Dev. Biol.* 2, 1 (1967); —, K. W. Gross, A. I. Skoultschi, J. V. Ruderman, *Karolinska Symp. Res. Methods Reprod. Endocrinol.* 6, 244 (1973).
2. E. Davidson, *Gene Activity in Early Development* (Academic Press, New York, ed. 2, 1976).
3. W. H. Rodgers and P. R. Gross, *Cell*, in press.

### Geological Survey Director

Deborah Shapley (News and Comment, 10 Mar., p. 1054) has cast an unwarranted slur on the selection of Henry W. Menard as Director of the U.S. Geological Survey.

The headline of her article ("Old boy system produces Geologic Survey chief") implies that Menard was selected by the clandestine pick-up-the-phone-and-call-old-friends method of filling unadvertised positions that is so rightly decried today for shutting out qualified candidates.

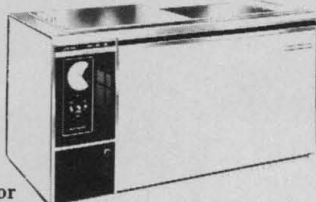
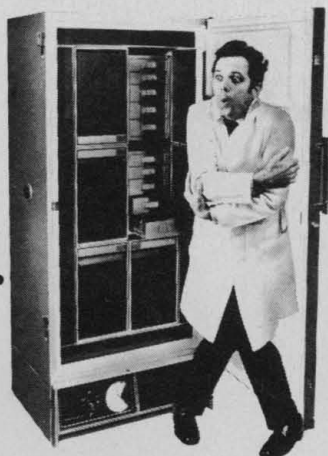
Nothing in the article supports this implication. Menard is described as being "one of the boys," and it is noted that his name was not on the original list of five candidates. But isn't there a difference between being one of the boys and being selected for a position through an unjust old-boy network?

DAVID McGEARY

Geology Department, California  
State University, Sacramento 95819



**-76°C  
Ultra-Cold.**  
**-96°C  
Ultra-Colder.**



Both from Kelvinator Commercial. Upright drops to -76°C. Ultra-cold. Chest model dips to -96°C. Ultra-colder. Upright's six French doors open individually. And you can label each door to know what's inside. Easy labeling for what's under the chest's stainless steel sliding lids, too. Want more? Automatic alarm systems? 2" portholes for recorders? The Kelvinator Commercial name? You got them. Don't be caught in the cold without ultra-cold. Contact J. E. Hirssig at Kelvinator Commercial, the company that knows how to give you 12 cubic feet of the best cold you ever had.

Upright UC-110 (-76°C/-105°F) Chest UC-522 (-85°C/-120°F)  
Chest UC-542 (-96°C/-140°F)

**Kelvinator**

621 Quay Street • Manitowoc, Wisc. 54220 • (414) 682-0156

*One of the White Consolidated Industries*



Circle No. 27 on Readers' Service Card

**HMG-CoA**  
**Highest specific activity.**

FOR MEASURING HMG-Co A  
REDUCTASE ACTIVITY

**CoA,DL-3-[methyl-<sup>3</sup>H]-Hydroxy-3-methylglutaryl** 2-10Ci/mmol  
Aqueous HCl solution, pH~3, in dry ice.  
NET-560 50μCi 250μCi

also:

**CoA,DL-3-[glutaryl-3-<sup>14</sup>C]-Hydroxy-3-methylglutaryl** 40-60mCi/mmol  
Aqueous solution, in dry ice.  
NEC-642 10μCi 50μCi

Twelve additional Coenzyme A derivatives available. Send for our new Lipids Brochure.

Not for use in humans or clinical diagnosis.



**New England Nuclear**

549 Albany Street, Boston, Mass. 02118

Call toll-free: 800-225-1572

(In Massachusetts and International: 617-482-9595)

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

Circle No. 217 on Readers' Service Card

# In Case You're Interested HEM has it - Available Now Human Fibroblast INTERFERON



**Quality  
First**

- Produced in Diploid Fibroblast Cells
- Supplied in Three Forms
  - Crude
  - Purified (in 50% Ethylene Glycol)
  - Purified/Lyophilized

**HEM RESEARCH, INC.**

**5451 RANDOLPH ROAD, ROCKVILLE, MD. 20852**

**Also Providing**

- Cells
- Tissue Culture Media
- Sera
- Research Services



**Area  
Code 301  
770-5700**



# DuPont announces the most

If you want the GC/MS/DS with the best combination of sensitivity, speed, resolution, reproducibility, stability, data handling capability, versatility and ease of operation, you want the new DuPont DP-1 Mass Spectrometer. Here's why:

## **Unmatched control and data processing**

Fully integrated system controls the GC/MS and acquires data faster than any analytical GC/MS. Dynamic range is unequalled. Special software

assures proper abundance and true mass spectra that are comparable with reference data.

Total data display on a single screen with foreground/background processing gives automatic real-time display of routines simultaneously with data acquisition. Selective ion monitoring is standard and quantitative. Routines are written in FORTRAN IV to facilitate user programming. Storage capability is the highest available today—up to 15 megabytes of disc storage, plus provision for archival storage.

## **Simple and fast operation**

Human engineering for mass spectrometers is at a dramatic new level. Operation and control are greatly simplified, with tuning prompted by the data system. Diagnostic software pinpoints malfunctions and suggests corrective action.

## **Instant EI to CI switching**

The DP-1 uniquely integrates instant EI to CI switching with





# advanced GC/MS/DS ever built.

data acquisition and programming. Unique ability to program ionization mode and reagent gas during a run helps you use CI to best advantage.

## **Automatic source revitalization**

Innovative gold sputtering process renews critical ion source surfaces, restores source

performance without shutting down, reduces frequency of cleaning.

## **Outstanding capillary column interface**

Available capillary column inlet provides optimum resolution for high performance GC columns.

To get full details on the DP-1, and explore the potential of mass spectrometry in your work, write to DuPont Instruments, Room 36267, Wilmington, DE 19898. For immediate assistance call our hotline, (302) 772-5429.

## **Mass Spectrometers**

Scientific & Process Instruments Division



Circle No. 270 on Readers' Service Card



# "The 4051 enables an ideal learning technique: one-to-one dialogue with graphic examples."

**Alfred Bork**  
**University of California, Irvine**

**Imagine a teaching assistant who continually involves students with intriguing graphic demonstrations.** Who stays close enough to each student to critique answers and review material immediately after testing. Who tutors according to individual interests and learning rates.

**Dr. Alfred Bork brings that kind of assistance into his physics classes.**

**It's Tektronix Computer Graphics.** For example, the 4051, pictured here, works as a low-cost, off-line or on-line learning device to help students study energy, gravity, momentum, and dozens of other subjects via fascinating simulations and graphic metaphors. It's a big assist to self-paced methods. To testing. Even to course management.

**Whatever your subject matter, whoever your students, the 4051 makes learning a very memorable experience.** For a video tape

on Computer Graphics in Learning, application or product literature, please write: Institutional Market Manager

**Tektronix, Inc.**  
Information Display Group  
P.O. Box 500  
Beaverton, Oregon 97077

**Tektronix Datatek NV**  
P.O. Box 159  
Badhoevedorp  
The Netherlands

**Tektronix®**  
COMMITTED TO EXCELLENCE



# 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

1978: RICHARD E. BALZHISER, JAMES F. CROW, HANS LANDSBERG, EDWARD NEY, FRANK W. PUTNAM, MAXINE SINGER, PAUL E. WAGGONER, F. KARL WILLENBROCK

1979: E. PETER GEIDUSCHEK, WARD GOODENOUGH, N. BRUCE HANNAY, MARTIN J. KLEIN, FRANKLIN A. LONG, NEAL E. MILLER, JEFFREY J. WINE

## Publisher

WILLIAM D. CAREY

## Editor

PHILIP H. ABELSON

## Editorial Staff

*Managing Editor* ROBERT V. ORMES *Business Manager* HANS NUSSBAUM

*Assistant Managing Editor* JOHN E. RINGLE *Production Editor* ELLEN E. MURPHY

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

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

*Associate Editors:* ELEANORE BUTZ, MARY DORFMAN, SYLVIA EBERHART, JUDITH GOTTLIEB

*Assistant Editors:* CAITILIN GORDON, RUTH KULSTAD, LOIS SCHMITT, DIANE TURKIN

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

*Letters:* CHRISTINE KARLIK

*Copy Editors:* ISABELLA BOULDIN, OLIVER HEATWOLE

*Production:* NANCY HARTNAGEL, JOHN BAKER; YA LI SWIGART, ELEANOR WARNER; JEAN ROCKWOOD, LEAH RYAN, SHARON RYAN

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

*Guide to Scientific Instruments:* RICHARD SOMMER

*Assistant to the Editors:* RICHARD SEMIKLOSE

*Membership Recruitment:* GWENDOLYN HUDDLE

*Member and Subscription Records:* ANN RAGLAND

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Area code 202. General Editorial Office, 467-4350; Book Reviews, 467-4367; Guide to Scientific Instruments, 467-4480; News and Comment, 467-4430; Reprints and Permissions, 467-4483; Research News, 467-4321; Cable: *Advances*, Washington. For "Instructions for Contributors," write the editorial office or see page xv, *Science*, 30 September 1977.

BUSINESS CORRESPONDENCE: Area Code 202. Business Office, 467-4411; Circulation, 467-4417.

## Advertising Representatives

*Director:* EARL J. SCHERAGO

*Production Manager:* MARGARET STERLING

*Advertising Sales Manager:* RICHARD L. CHARLES

*Marketing Manager:* HERBERT L. BURKLUND

Sales: NEW YORK, N.Y. 10036: Steve Hamburger, 1515 Broadway (212-730-1050); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-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)

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

# Energy and Development

The United Nations Conference on Science and Technology for Development to be held in Vienna in September 1979 could be an important constructive event. Many observers, however, fear that it will be just another confrontation of politicians from developed and less developed countries. Transfer of science and technology cannot be accomplished by the interaction of politicians or by gifts of black boxes or tons of blueprints—a prerequisite is human interaction at an expert level.

The organizers of the U.N. conference might well draw lessons from a symposium entitled "Energy and Development in the Americas," held from 13 to 17 March near Santos, Brazil.\* Participants came from 16 countries and included about 110 scientists, engineers, and government representatives. They brought to the meeting different backgrounds of knowledge and experience, and found mutual pleasure and benefit in friendly interchanges. Topics covered included nuclear energy, oil, oil shale, coal, synthetic fuels, hydropower, windmills, hydrogen, solar energy, biomass, efficient use of energy, and energy for rural peoples. The participants shared the belief that the days of cheap oil are over and the conviction that each country must survey its own energy resources and move toward an energy independence based on indigenous supplies.

For Latin America in general, this means an emphasis on solar energy, biomass, and the development of large hydropower potentials. Venezuela has a great oil resource in its Orinoco tar sands; Brazil, oil shale; Colombia, substantial coal reserves; and Mexico, newly discovered oil; but the region as a whole is lacking in fossil fuels.

A problem much on the minds of participants was the continuing crowding into cities of the peoples of Latin America. There was a search for a means of slowing this trend by making rural life more attractive. Ways of creating cheap, small, practical energy sources were discussed. A problem of the cities is to provide electricity. Today, Argentina, Brazil, and Mexico are proceeding with nuclear power plants. Some of their neighbors are considering following this path.

From the standpoint of energy research programs, the United States is clearly the leader in terms of quantity and scope. This country is also becoming expert at building "demonstration plants." But with respect to converting research into production facilities that make a difference to the country's energy supply, the United States lags.

Brazilians are moving ahead with the production of alcohol for motor fuel and of charcoal from eucalyptus trees for steel mills. The use of palm oil to supplement diesel fuel is on the horizon, and the development of hydropower is continuing.

Two speakers from outside the Western Hemisphere provided additional perspectives. The French are proceeding with the operation of a nuclear reprocessing plant and with practical means of disposing of nuclear wastes. They have developed and are implementing long-range plans for their energy future. If one takes into account the skimpy resources of the Indian subcontinent, the United States is put to shame by the Indians. They are building a large number of biomass converters to produce methane from cow manure. The heating value of the methane is five times that of the cow dung. Sludge from the digesters makes excellent fertilizer.

This international meeting, sponsored jointly by the Brazilian Society for the Progress of Science and Interciencia, was organized in less than 6 months. In the year and a half remaining before the Vienna meeting, the United Nations still has time to create sessions and an atmosphere in which significant interchange can occur.—PHILIP H. ABELSON

\*The Proceedings of the Interciencia—SBPC Symposium, "Energy and Development in the Americas," including 35 presentations, will be published in July 1978 by the Sociedade Brasileira para o Progresso da Ciencia, Caixa Postal 11008, 01000 São Paulo, S.P., Brazil. Reports and recommendations of the five workshops of the symposium will be published in the May-June issue of *Interciencia*, available at \$2.50 (postpaid) from Interciencia, Apartado 51842, Caracas 105, Venezuela.

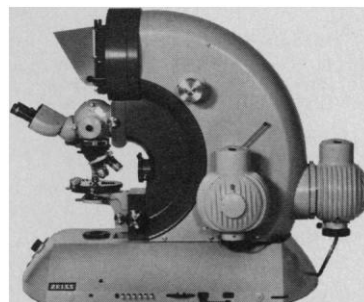
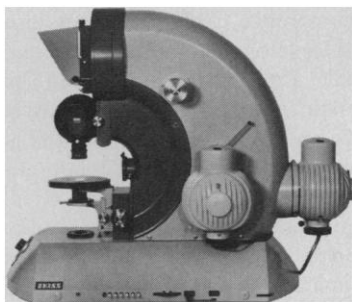


# Macro and Micro

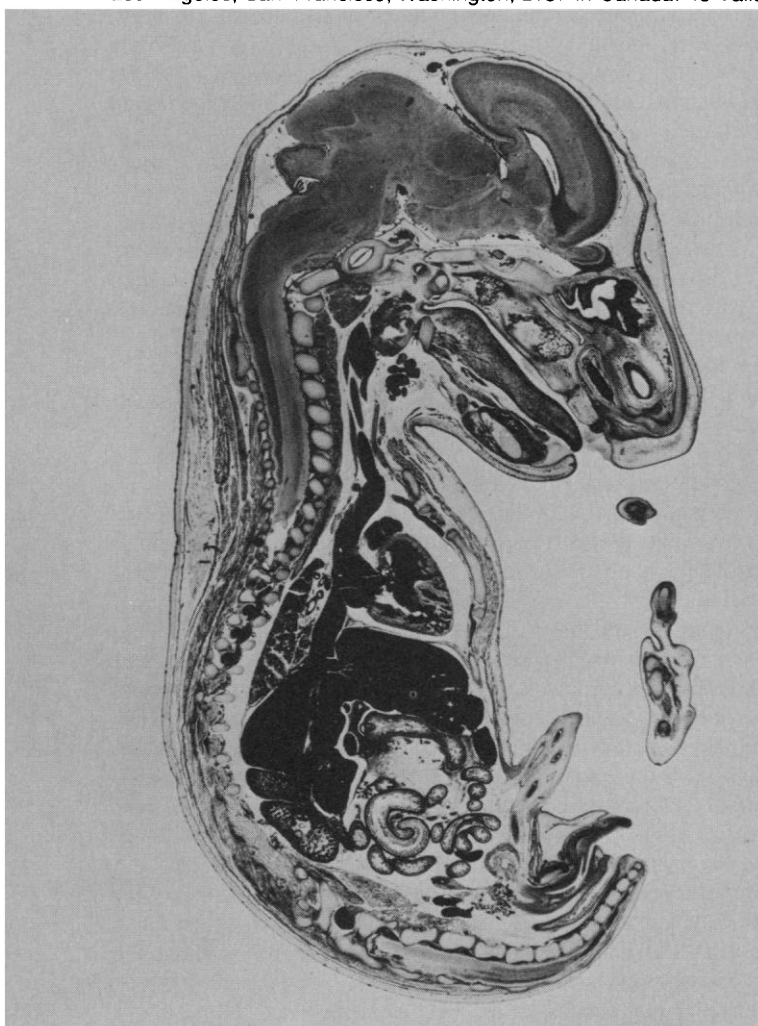
With the Zeiss Ultraphot Fully Automatic Camera Microscope using LUMINARS and Epi-LUMINARS, you can do photomacrography from 2.5x to 30x on 4x5" film. In less than two minutes, the Ultraphot can be converted from macro to micro or vice-versa.

The micro setup takes over where macro lets off, and gives continuous magnifications up to the limits of light microscopy. Perfect photomicrographs in all microscope techniques in transmitted and reflected light through great Zeiss optics. Send for our catalog.

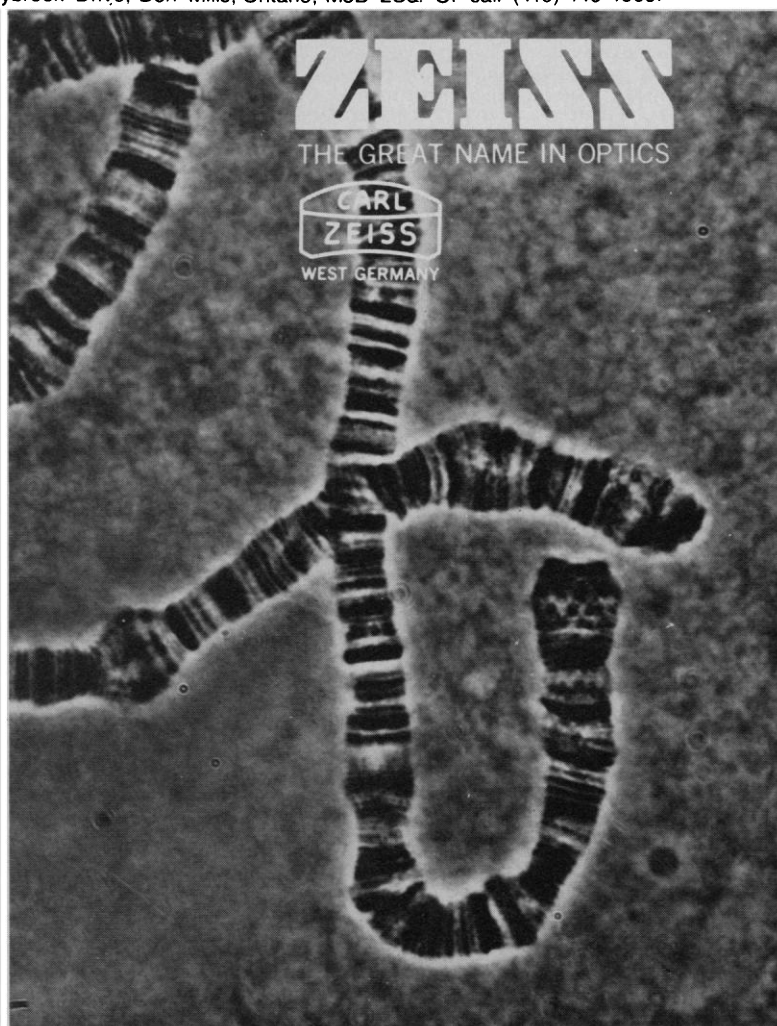
## Only possible with Ultraphot



**Carl Zeiss, Inc., 444 5th Avenue, New York, N.Y. 10018** (212) 730-4400. Branches: Atlanta, Boston, Chicago, Houston, Los Angeles, San Francisco, Washington, D.C. In Canada: 45 Valleybrook Drive, Don Mills, Ontario, M3B 2S6. Or call (416) 449-4660.



Ultraphot Macrophoto, Macro Luminar, transmitted light brightfield, original magnification 4X; as shown 5X. Human embryo.



Ultraphot Microphoto, Neofluar 100X, phase contrast, original magnification 1000X; as shown 1500X. Drosophila chromosome.



### Rotary Microtome

Model 1512 is a corrosion-protected device for producing serial sections of specimens embedded in paraffin. This microtome may be equipped with a motor for cutting hard objects such as bone. The thickness desired may be selected in steps from 1 to 25 micrometers with click stops for precise setting. Connection to an appropriate cryostat provides for preparation of sections from frozen specimens. E. Leitz. Circle 705.

### Recording Spectrophotometer

Model 554 is a microcomputer-controlled recording device operating in ultraviolet and visible wavelengths from 190 to 900 nanometers. Standard features include an integral recorder, first and second derivative, and baseline correction. Wavelength values for repetitive scanning and programming may be stored. Ordinate, abscissa, and selected parametric values may be transmitted to external processors. Perkin-Elmer. Circle 707.

### Research Microscope

The Phase Star is a phase microscope that offers the viewing of live, transparent, or unstained specimens in a 20-millimeter-wide field of view. The substage turret condenser accommodates four annular diaphragms. Once the annuli are centered to corresponding objectives, the turret may be rotated from one position to another without the need for recentering. Bright-field viewing is accomplished by turning the substage con-

denser to the open aperture for use with stained specimens. The tungsten-halogen illuminator features a high-intensity, 100-watt lamp and three filter turrets with eight filters. American Optical. Circle 704.

### Dish for Tissue Culture

The Petriperm dish has a bottom constructed from a plastic foil. The foil, 25 micrometers thick, may be permeated by gases. Cells grow on this hydrophilic surface at the boundary of liquid and gas phases. Because the liquid medium's action as a diffusion barrier is circumvented, any depth of medium may be used. Oxygen supply is optimum, even in rapidly growing cultures and more nutrient may be added in the form of more medium. The foil facilitates transmittance of light, even below 300 nanometers. Heraeus. Circle 706.

### Platelet Aggregation Measurement

The Aggregometer automatically determines zero (base line) and upper datum reference for two samples simultaneously. Temperature may be controlled from 32° to 42°C and stirring speed may be adjusted from 200 to 1200 revolutions per minute. The device will drive any recorder with a range from 0 to 10 millivolts and an input impedance greater than 200 kilohms. Samples as small as 0.2 milliliter may be tested. The dual sample feature permits comparison of test samples to control samples. Payton Associates. Circle 708.

### Oscillating Ball Flowmeter

The oscillating ball flowmeter electronically measures ultra-low flow rates. A flow transducer consists of a vertically positioned borosilicate glass tube containing a magnetic ball; the tube has an electromagnet at the top and a light source and optical sensor at the bottom.

At zero flow the ball is made to oscillate in the tube at 20 hertz; as the rate of flow increases, the frequency of oscillation is reduced. The signal related to the rate of flow detected by the transducer is processed and the rate of flow is displayed. Lab-Crest Scientific Glass. Circle 703.

### Thermistor Probe Holder

The PH09 secures temperature probes during extended or short-term measurement to ensure a constant, repeatable pressure. Air circulation around the probe and adjacent skin is allowed by the probe holder's design. This prevents false readings due to localized buildups. The holder may be attached with a Velcro strap or with tape. Both the holder and the strap may be autoclaved or sterilized in solutions. Yellow Springs Instrument. Circle 709.

### Literature

*Computing Quantitative Infrared Analyzer* describes the Miran 80 analyzer for solid, liquid, or gas samples. Foxboro/Wilks. Circle 710.

*Science Tools* has a special issue devoted to whole-body autoradiography that details techniques, instrumentation, and references. LKB-Produkter. Circle 711.

*Laboratory Instruments* features a line of apparatus for chemical and biochemical research. Instrumentation Specialties (ISCO). Circle 712.

*Temperature-EMF Tables for Thermocouples* includes calibration graphs, wire codes, limits of error, and other useful parameters. Nanmac. Circle 713.

*Gel-Filled Electrode* describes the GX combination electrode that features a lifetime supply of gelled electrolyte in a sealed chamber. Orion Research. Circle 721.

*Membrane Filter Selection Guide* summarizes the characteristics of such filters for a variety of research applications and includes a chemical compatibility chart. Schleicher & Schuell. Circle 722.

*Automated Peptide Synthesizers* is devoted to three models and includes a price list for chemicals and accessories for bench-top and fully automated systems. Vega Biochemicals. Circle 723.

*Guide to Searching the Biological Literature* includes 72 slides and two cassettes. It compares several search methods for the same subject to illustrate relative strength and weakness. Science Media. Circle 724.

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 page 118A and 214A) and placing it in the mailbox. Postage is free.

—RICHARD G. SOMMER





Each lot is tested in a specific assay to ensure immunoreactivity. Available from stock. Prepared fresh monthly.

**Prolactin, [<sup>125</sup>I]-(rat)**

20-50  $\mu$ Ci/ $\mu$ g

Shipped frozen in 0.05M phosphate-buffered saline solution, containing a stabilizer and proteolytic enzyme inhibitor.

NEX-108	10 $\mu$ Ci	2x10 $\mu$ Ci
	50 $\mu$ Ci	2x50 $\mu$ Ci

Send for our complete catalog of <sup>125</sup>I-labeled products.

**NEN New England Nuclear**

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

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

Circle No. 218 on Readers' Service Card



**Hellma—the largest assortment of highest precision glass and quartz cells.**

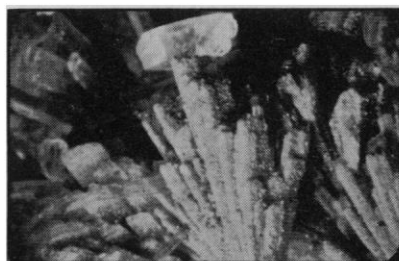
Standard · Flow-through · Constant-temperature  
Anaerobic · Special Designs

Also available—ULTRAVIOLET LIGHT SOURCES  
Deuterium Lamps · Mercury Vapor Lamps  
Hollow Cathode Lamps · Power Supplies

**HELLMA  
CELLS, INC.**

Write for literature  
Box 544  
Borough Hall Station  
Jamaica, New York 11424  
Phone (212) 544-9534

Circle No. 25 on Readers' Service Card



Calcite, courtesy of  
Dr. Julius Weber.

For the photomicrographic requirements of the industrial and scientific communities, a reasonably-priced zoom stereo microscope with full camera capability: Olympus SZ-III-Tr.

A wide field of view over its 5.7:1 zoom range is controlled by a smooth-working zoom ring, with standard 7x to 40x magnification; or 3.5x to 160x with optional wide field eyepieces and auxiliary objectives.

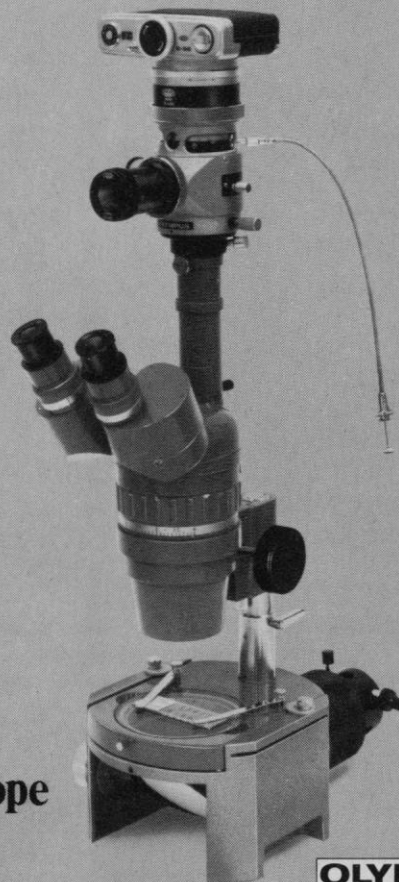
The Olympus PM-6 and PM-10 photomicrographic cameras are speedily and easily mounted for precision photomicrography, through the vertical phototube.

Olympus SZ-III-Tr provides the practical solution to a pressing need, with the first low cost system of its kind. For details, write to Olympus Corporation of America, 2 Nevada Drive, New Hyde Park, New York 11040.

## The Olympus SZ-III-Tr.

Low-cost zoom stereo trinocular microscope with photomicrographic capabilities.

In Canada: W. Carsen Co., Ltd., Ontario.



**OLYMPUS**  
SEEING BEYOND MAN'S VISION

# Does your glassware washer leave hidden contamination ?

There are just two kinds of laboratory glassware washers.

Most makes are "dump and fill" like the home dishwasher. This means that the same plumbing is used for pre-wash, detergent and rinse cycles, with their inevitable residual contamination from one cycle to another.

The other kind of laboratory washer is the Heinicke. Dr. Kurt Heinicke knew that the exacting cleanliness requirements of the laboratory demanded a glassware washer that was free of this contaminant backwash from each preceding cycle.

He decided that the answer must lie in separate plumbing for each cycle. He invented and patented the famous Heinicke washer. Its

three separate plumbing systems eliminated cross contamination entirely. And to insure even distribution of the water over and inside every test tube, beaker and pipette from both top and bottom, he conceived the moving jet spray, with its three separate units for the pulsating wash, rinse and final rinse cycles.

Today Dr. Heinicke's washer still stands alone. No other washer meets the meticulous criteria of the lab like the Heinicke.

Find out about it for yourself. Call or write.



**Heinicke  
Instruments  
Company**

3000 Taft Street  
Hollywood, Florida 33021  
Phone 1-800-327-9783  
or (305) 987-6101

If you should ever have an equipment breakdown...  
**a Heinicke Minute Man will be on his  
way to you in 48 hours!**

You'll seldom need the Minute Man service, because Heinicke and Napco instruments are built to work. But if you do, just dial toll-free 800-327-9783.

## BOOKS RECEIVED AND

## BOOK ORDER SERVICE

(Continued from page 196)

**Applied Mineral Exploration with Special Reference to Uranium.** Robert V. Bailey and Milton O. Childers. Westview Press, Boulder, 1977. xx, 542 pp., illus. \$65.

**Biological Oceanographic Processes.** Timothy R. Parsons, Masayuki Takahashi, and Barry Hargrave. Pergamon, New York, ed. 2, 1977. xii, 332 pp., illus. Paper, \$15.90. Pergamon International Library. To order this book circle No. 376 on Readers' Service Card

**A Catalog of the Mosquitoes of the World.** (Diptera: Culicidae). Kenneth L. Knight and Alan Stone. Entomological Society of America, College Park, Md., ed. 2, 1977. xii, 612 pp. \$12.50. Thomas Say Foundation, vol. 6.

**Cells, Molecules and Temperature.** Conformational Flexibility of Macromolecules and Ecological Adaptation. V. Ya. Alexandrov. Translated from the Russian by V. A. Bernstam. Springer-Verlag, New York, 1977. xii, 330 pp., illus. \$39.60. Ecological Studies, vol. 21. To order this book circle No. 377 on Readers' Service Card

**A Change in the Weather.** Fitzhugh Green. Norton, New York, 1977. 248 pp., illus. \$9.95.

**Chemical and Engineering Thermodynamics.** Stanley I. Sandler. Wiley, New York, 1977. xx, 588 pp., illus. \$21.

**Chemical Engineering.** J. M. Coulson and J. F. Richardson. Vol. 4, Solutions to the Problems in *Chemical Engineering, Volume 1*. J. R. Backhurst and J. H. Harker. Pergamon, New York, 1977. viii, 208 pp. \$15.50. To order this book circle No. 378 on Readers' Service Card

**Cross-National Comparative Survey Research.** Theory and Practice. Proceedings of a conference, Budapest, July 1972. Alexander Szalai and Riccardo Petrella, Eds. Pergamon, New York, 1977. xviii, 498 pp. \$28. To order this book circle No. 379 on Readers' Service Card

**Deeper Pathways in High-Energy Physics.** Proceedings of a meeting: Coral Gables, Fla., Jan. 1977. Arnold Perlmutter and Linda F. Scott, Eds. Plenum, New York, 1977. viii, 744 pp., illus. \$59.50. Studies in the Natural Sciences, vol. 12.

**Dimensional Instability.** An Introduction. Charles W. Marshall and Robert E. Maringer. Pergamon, New York, 1977. xviii, 324 pp., illus. \$25. Series on Materials Science and Technology, vol. 22. Pergamon International Library. To order this book circle No. 381 on Readers' Service Card

**Dynamics of Rotors.** Papers from a symposium, Varanasi, India, Dec. 1975. J. S. Rao, Ed. Pergamon, New York, 1977. vi + pp. 259-372, illus. Paper, \$15. *Mechanism and Machine Theory*, vol. 12, no. 4. To order this book circle No. 380 on Readers' Service Card

**Dynamics of Solids and Liquids by Neutron Scattering.** S. W. Lovesey and T. Springer, Eds. Springer-Verlag, New York, 1977. xii, 380 pp., illus. \$31.70. Topics in Current Physics, vol. 3. To order this book circle No. 382 on Readers' Service Card

**Education for Traditional Food Procurement in the Orinoco Delta.** Kenneth Ruddle and Ray Chesterfield. University of California Press, Berkeley, 1977. x, 172 pp. + plates. Paper, \$9.50. Ibero-Americana: 53.

**Energy Conservation: A National Forum.**



## Restriction Nucleases

ALL AVAILABLE FROM STOCK AT REDUCED PRICES

Cat. No.	Product	Specificity	Package Sizes	Prices*
0884	<i>Alu</i> I	AG↓CT	50 units	\$ 22.50
0868	<i>Bam</i> H-I	G↓GATCC	100 units	22.50
0854	<i>Eco</i> RI	G↓AATTC	100 units	22.50
0866	<i>Hae</i> III	GG↓CC	25 units	22.50
0888	<i>Hha</i> I	GCG↓C	100 units	22.50
0858	<i>Hinc</i> II	GTPy↓PuAC	20 units	32.50
0860	<i>Hind</i> III	A↓AGCTT	100 units	22.50
0862	<i>Hpa</i> I	GTT↓AAC	20 units	32.50
0864	<i>Hpa</i> II	C↓CGG	50 units	22.50
0908	<i>Kpn</i> I	Unknown	200 units	22.50
0886	<i>Pst</i> I	CTGCA↓G	20 units	32.50
0882	<i>Sal</i> I	G↓TCGAC	20 units	32.50

\* One unit is the amount required to degrade 1.0 microgram of lambda DNA in 60 minutes at 37° in 0.05 ml.

Insulated container and refrigerant charge — \$6.00.

excellence in biochemistry



**PL Biochemicals, Inc.**

1037 WEST MCKINLEY AVENUE, MILWAUKEE, WIS. 53205

® Call 414/347-7442 TWX 910-262-1111

Circle No. 137 on Readers' Service Card

# GUIDE

## to Scientific Instruments

A special issue of *Science* published in the fall of each year, the *Guide to Scientific Instruments* gives you the names and addresses of over 1900 manufacturers of laboratory instruments and equipment. If you are not a subscriber to *Science* and you would like to order the *Guide*, send your name and address plus \$6.00 to

AAAS

**Guide to Scientific Instruments**  
1515 Massachusetts Ave., NW  
Washington, DC 20005

14 APRIL 1978

## Savant Speed Vac Concentrator and Evaporator

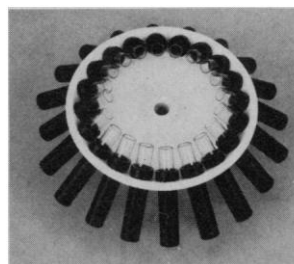
for rapid solvent phase elimination.



## MAXIMIZE DRUG ANALYSES

**A 20 fold increase in sensitivity\* in GLC is possible when the sample is dried thoroughly before silylation.**

- Up to 100 samples (tubes) capacity when evaporating tissue extracts, hydrolysates, eluates, etc. for Amino Acid, Gas Chromatography, Enzyme Recovery, Mass Spectrometry, Sensitive Analytical, Radioimmunoassay, Clinical and Screening Procedures.
- Volume reduction and sample concentration by vacuum evaporation and centrifugal action without "bumping".
- 100% sample recovery.



Hold 20 Tubes (12 x 75mm)

\*Reference: GLC Microanalyses of Phenacetin and Acetaminophen Plasma Levels — M.A. Evans & R.D. Harbison — J. Pharmaceutical Sciences Vol. 66 Nr 11 (Nov. 1977) Pages 1628-1629 (Write for Reprint)

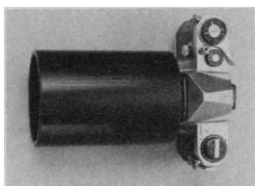
## Savant

Request Catalog from: Savant Instruments, Inc.  
221 Park Ave., Hicksville, N.Y. 11801 (516) 935-8774.

Circle No. 273 on Readers' Service Card

217

## HIGH SPEED LENS EXTREME ULTRAVIOLET



THE LYMAN-ALPHA I LENS

**Spectral Transmission:** 1000 Å° to I.R.  
(200 Å on special order)  
**200 mm F/2.8**

**Type:** Computer Derived Reflective

**Weight:** 14 ounces **Length:** 5 inches

**Focusing Range:** 12 inches to infinity

**Angular Field:** 12° (linear 43 mm)

**Resolution:** @ 12 inches 60 L/mm  
@ infinity 25 L/mm

**Back Focus:** 2 inches

**Base Price:** \$395.00

Adapters available for most 35 mm SLR cameras, 16 mm movie, TV cameras, image intensifiers, photo detectors etc.

Other Nye Optical lenses available—  
from 60 mm to 1000 mm.  
Catalog available upon request

**NYE OPTICAL CO.**

8781 Troy Street  
Spring Valley, Calif. 92077  
Phone 714/466-2200

Circle No. 267 on Readers' Service Card

## Now Available:

the tool for  
selecting all your  
science books

## Science Book List Supplement 1970-1977

Retail: \$16.50

AAAS Members: \$15.00

American Association for the  
Advancement of Science



Dept. C-6  
1515 Mass. Ave., N.W.  
Washington, D.C. 20005

Proceedings of a symposium, Fort Lauderdale, Fla., Dec. 1975. T. Nejat Veziroğlu, Ed. University of Miami Clean Energy Research Institute, Miami, 1977 (distributor, Pergamon, New York). xii, 680 pp., illus. Paper, \$65. *To order this book circle No. 383 on Readers' Service Card*

**Group Theory for Social Workers.** An Introduction. Ken Heap. Translated from the Norwegian edition (Oslo). Pergamon, New York, 1977. xiv, 252 pp., illus. \$15. Social Work Series. Pergamon International Library. *To order this book circle No. 384 on Readers' Service Card*

**Handbook of Dam Engineering.** Alfred R. Golzé, Ed. Van Nostrand Reinhold, New York, 1977. xiv, 794 pp., illus. \$54.50. *To order this book circle No. 385 on Readers' Service Card*

**Handbook of Solid Waste Management.** David Gordon Wilson, Ed. Van Nostrand Reinhold, New York, 1977. x, 752 pp., illus. \$39.50. *To order this book circle No. 386 on Readers' Service Card*

**International Symposium on Solid Ionic and Ionic-Electronic Conductors.** Rome, Sept. 1976. R. D. Armstrong, Ed. Pergamon, New York, 1977. xii + pp. 677-810, illus. \$20. Also published as *Electrochimica Acta*, vol. 22, no. 7. *To order this book circle No. 387 on Readers' Service Card*

**An Introduction to Chemical Engineering Kinetics and Reactor Design.** Charles G. Hill, Jr. Wiley, New York, 1977. xiv, 594 pp., illus. \$22.95.

**An Introduction to Organic Chemistry.** William H. Reusch. Holden-Day, San Francisco, 1977. xxviii, 818 pp., illus. \$19.95.

**Kreskin's Mind Power Book.** Kreskin. McGraw-Hill, New York, 1977. xii, 212 pp. \$8.95.

**Land Policy and Urban Growth.** Haim Darin-Drabkin. Pergamon, New York, 1977. viii, 444 pp., illus. \$16.50. Urban and Regional Planning Series, vol. 16. *To order this book circle No. 388 on Readers' Service Card*

**Large Engineering Systems.** Proceedings of a symposium, Winnipeg, Canada, Aug. 1976. Alvin Wexler, Ed. Pergamon, New York, 1977. xii, 710 pp., illus. \$60. *To order this book circle No. 389 on Readers' Service Card*

**Lectures on Selected Topics in Statistical Mechanics.** D. ter Haar. Pergamon, New York, 1977. viii, 124 pp. \$15. International Series in Natural Philosophy, vol. 92. *To order this book circle No. 390 on Readers' Service Card*

**Neurometrics.** Clinical Applications of Quantitative Electrophysiology. E. Roy John. Erlbaum, Hillsdale, N.J., 1977 (distributor, Halsted [Wiley], New York). xxii, 292 pp., illus. \$19.95. Functional Neuroscience, vol. 2.

**Neuropeptide Influences on the Brain and Behavior.** Papers from a conference. Lyle H. Miller, Curt A. Sandman, and Abba J. Kastin, Eds. Raven, New York, 1977. xii, 298 pp., illus. \$25. Advances in Biochemical Psychopharmacology, vol. 17.

**Neurophysics.** Alwyn C. Scott. Wiley-Interscience, New York, 1977. xii, 340 pp., illus. \$24.95.

**A New Era in Space Transportation.** Proceedings of a congress, Anaheim, Calif., Oct. 1976. L. G. Napolitano, Ed. Pergamon, New York, 1977. viii, 452 pp., illus. \$50. *To order this book circle No. 391 on Readers' Service Card*

**The Nonclassical Ion Problem.** Herbert C. Brown with comments by Paul von R. Schleyer. Plenum, New York, 1977. xxii, 302 pp., illus. \$24.95.

**Organophosphorus Pesticides.** Criteria

(Dose/Effect Relationships) for Organophosphorus Pesticides. R. Derache. Published for the Commission of the European Communities by Pergamon, New York, 1977. xii, 200 pp., illus. Paper, \$19.50. *To order this book circle No. 401 on Readers' Service Card*

**Pensions and Industrial Relations.** A Practical Guide for All Involved in Pensions. Harry Lucas. Pergamon, New York, 1977. xiv, 192 pp. \$15. *To order this book circle No. 392 on Readers' Service Card*

**Pesticide Handbook-Entoma.** 1977-78. Robert L. Caswell, Ed. Entomological Society of America, College Park, Md., ed. 27, 1977. 248 pp. Cloth, \$9; paper, \$7.50.

**Photosynthesis I.** Photosynthetic Electron Transport and Photophosphorylation. A. Trebst and M. Avron, Eds. Springer-Verlag, New York, 1977. xxiv, 732 pp., illus. \$89.50. Encyclopedia of Plant Physiology, New Series, vol. 5. *To order this book circle No. 402 on Readers' Service Card*

**Physiology of the Heart.** Arnold M. Katz. Raven, New York, 1977. xiv, 450 pp., illus. \$24.50.

**Point Mapping Stability.** Jacques Bernussou with the collaboration of J. L. Abatut, J. P. Babary, A. Giraud, Liu Hsu, and F. Roubelat. Pergamon, New York, 1977. xii, 104 pp., illus. \$12.50. *To order this book circle No. 394 on Readers' Service Card*

**The Politics of Policy Making in America.** Five Case Studies. David A. Caputo, Ed. Freeman, San Francisco, 1977. xiv, 90 pp., illus. Cloth, \$11.95; paper, \$5.95.

**Pollutant Effects on Marine Organisms.** Proceedings of a workshop, College Station, Tex., May 1976. Lexington (Heath), Lexington, Mass., 1977. xii, 214 pp., illus. \$16.

**Portrait of Nature.** The World as Seen by Modern Science. Alan Cottrell. Scribner, New York, 1977. 236 pp., illus. Paper, \$4.95. Reprint of the 1975 edition.

**Pottery and Early Commerce.** Characterization and Trade in Roman and Later Ceramics. D. P. S. Peacock, Ed. Academic Press, New York, 1977. xvi, 340 pp., illus. \$25.

**Problems in Metallurgical Thermodynamics and Kinetics.** G. S. Upadhyaya and R. K. Dube. Pergamon, New York, 1977. xvi, 252 pp. Cloth, \$15; paper, \$7.50. Materials Science and Technology, vol. 25. *To order this book circle No. 393 on Readers' Service Card*

**Progress in Ape Research.** Proceedings of a conference, 1976. Geoffrey H. Bourne, Ed. Academic Press, New York, 1977. xiv, 300 pp., illus. \$16.

**Protein Metabolism of the Brain.** A. V. Paladini, Ya. V. Belik, and N. M. Polyakova. Translated from the Russian edition (Kiev, 1972) by Basil Haigh. Abel Lajtha, Transl. Ed. Consultants Bureau (Plenum), New York, 1977. xii, 336 pp., illus. \$35. Studies in Soviet Science.

**Proteins of Iron Metabolism.** Papers from a meeting, New York, Apr. 1977. Elmer B. Brown, Philip Aisen, Jack Fielding, and Robert R. Crichton, Eds. Grune and Stratton, New York, 1977. xxxiv, 444 pp., illus. \$35. *To order this book circle No. 405 on Readers' Service Card*

**Psychology in Australia.** Achievements and Prospects. Mary Nixon and Ronald Taft. Pergamon, New York, 1977. xii, 318 pp. \$16. *To order this book circle No. 395 on Readers' Service Card*

**Psychology of Learning.** Readings. William L. Mikulas, Ed. Nelson-Hall, Chicago, 1977. xvi, 592 pp., illus. \$19.95. *To order this book circle No. 396 on Readers' Service Card*

**Pulmonary Function Testing.** Reuben M.



## Gilson Spectra/Glo Fluorometer

—for liquid chromatography  
column monitoring of  
Fluorescence-labeled compounds

- MUCH GREATER SENSITIVITY
- SPECIFICITY OF MEASUREMENT
- NEWEST L.C. TECHNIQUE

More sensitive measurement  
than UV or visible absorption  
monitoring



More specific method of measurement because fewer compounds exhibit fluorescing property • **Fluorophors** are stable for L.C. uses • **As little as 10 to 40 nanograms** of protein can be detected.

Call or write

**Gilson Medical Electronics, Inc.**  
Box 27, Middleton, WI 53562  
Phone 608/836-1551 • Telex: 26-5478

Circle No. 6 on Readers' Service Card

## 170-210Ci mmol Dihydrotestosterone [1,2,4,5,6,7,16,17-<sup>3</sup>H(N)]

**EXCEPTIONALLY HIGH SPECIFIC ACTIVITY  
STERIODS [<sup>3</sup>H] FOR RECEPTOR STUDIES**

<b>Dexamethasone</b>	35-50Ci/mmol
<b>Dihydrotestosterone</b>	110-150Ci/mmol
<b>Estradiol</b>	130-170Ci/mmol
<b>Prednisolone</b>	35-50Ci/mmol
<b>Progesterone</b>	90-115Ci/mmol
<b>Testosterone</b>	135-180Ci/mmol
<b>Triamcinolone acetonide</b>	30-50Ci/mmol

Send for our new Steroids Brochure.

Not for use in humans or clinical diagnosis.

**NEN 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. 219 on Readers' Service Card

## Need more light at the end of the tunnel?

SWIFT Y-5 Illuminator—used in conjunction with SWIFT Y-4 Base—gives two superb Swift instruments, the SRL Vision-Master and Duo-Master Microscopes, exceptional capabilities where high light levels are imperative.

Halogen Illumination (12 volt, 100 watt) provides truer color rendition, closely approximating daylight, particularly effective in microphotography. Producing more light with longer life potential, it affords greater operational efficiency for:

- Photography—constant burning at 3200° K temperature (without darkening).
- Phase contrast and/or darkfield procedures.
- All high intensity brightfield requirements.
- FITC fluorescent applications using darkfield condensers and FITC excitation filters.

Also available with standard research quality Y-4 Koehler tungsten illumination.

Write or call now for literature and name of your nearest dealer for demonstration.

SWIFT Y-5 Illuminator and Transformer in use with Y-4 Base on Duo-Master Microscope.



**SWIFT INSTRUMENTS, INC.**

Scientific Instrument Division  
P.O. BOX 562, SAN JOSE, CA 95106 • 408/293-2380  
(MAIN OFFICE: Boston, MA)

Announcing the 3rd AAAS  
Colloquium on

# Research & Development in the Federal Budget and in Industry

June 20-21, 1978

*The third annual AAAS report on R&D in the federal budget for FY 1979 and including a special section on R&D in industry and its impact on the economy will be the subject of an*

**AAAS  
Science & Public Policy  
Colloquium  
Washington, D.C.  
June 20 and 21, 1978**

*The AAAS R&D analysis project, sponsored by the AAAS Committee on Science and Public Policy and initiated in 1976, has resulted in two well-received books on research and development in the federal budgets for FY 1977 and FY 1978, and two highly successful colloquia in June of 1976 and 1977, attended by 200-250 AAAS members, government officials, and others.\* The June 20-21, 1978 colloquium will offer a forum for constructive discussion of current issues in federal and industry R&D with officials of the Executive and Legislative branches and from industry and universities. **Research & Development: AAAS Report III** by Willis H. Shapley and Don I. Phillips will be available in book form for the June 1978 colloquium.*

*Specific topics this year will be the impact of the first complete Carter budget on R&D, trends and problems of R&D in industry, and the impact of R&D on the economy. For information and reservations, write to*

**Ms. Patricia S. Curlin  
AAAS Office of Public  
Sector Programs  
1776 Massachusetts Ave., N.W.  
Washington, D.C. 20036**

\*Research and Development in the Federal Budget: FY 1977 and Research and Development in the Federal Budget: FY 1978 (\$5.50 each; AAAS members, \$4.95) and the 1976 and 1977 Colloquium Proceedings (\$5.25 each; AAAS members, \$4.75) may be purchased from AAAS.

Cherniack. Saunders, Philadelphia, 1977. vi, 292 pp., illus. Spiral bound, \$8.50.

**Pupillometry.** The Psychology of the Pupillary Response. Michel Pierre Janisse. Hemisphere, Washington, D.C., and Halsted (Wiley), New York, 1977. xiv, 204 pp., illus. \$22.50. The Series in Clinical and Community Psychology.

**Recent Advances in Cancer Treatment.** Papers from a symposium, Brussels, Sept. 1976. Henri J. Tagnon and Maurice J. Staquet, Eds. Raven, New York, 1977. xvi, 360 pp., illus. \$26. Monograph Series of the European Organization for Research on Treatment of Cancer, vol. 3.

**The Rise of American Philosophy.** Cambridge, Massachusetts, 1860-1930. Bruce Kuklick. Yale University Press, New Haven, Conn., 1977. xxviii, 674 pp., illus. \$17.95.

**The Science and Practice of Welding.** A. C. Davies. Cambridge University Press, New York, ed. 7, 1977. xiv, 714 pp., illus. \$13.95.

**Science with Young Children.** Bess-Gene Holt. National Association for the Education of Young Children, Washington, D.C., 1977. viii, 136 pp., illus. Paper, \$3.25. To order this book circle No. 398 on Readers' Service Card

**Sedimentary Petrology.** W. v. Engelhardt, H. Füchtbauer, and G. Müller. Part 3, The Origin of Sediments and Sedimentary Rocks. Wolf v. Engelhardt. Translated from the German edition (Stuttgart, 1973) by William D. Johns. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, and Halsted (Wiley), New York, 1977. viii, 360 pp., illus. \$49.50.

**Selective Heat Sensitivity of Cancer Cells.** A. Rossi-Fanelli, R. Cavaliere, B. Mondovi, and G. Moricca, Eds. Springer-Verlag, New York, 1977. xii, 190 pp., illus. \$26.40. Recent Results in Cancer Research, vol. 59. To order this book circle No. 397 on Readers' Service Card

**Shock.** Pathology, Metabolism, Shock Cell, Treatment. Iuliu Şuteu, Traian Băndilă, Atanasie Căfriţă, Alexandru I. Bucur, and Vasile Căndea. Translation and revision of the Romanian edition (Bucharest, 1973). Abacus Press, Tunbridge Wells, Kent, England, 1976 (U.S. distributor, ISBS, Forest Grove, Ore.). xxiv, 448 pp., illus. + plates. \$49. To order this book circle No. 400 on Readers' Service Card

**Social Policy and Its Administration.** A Survey of the Australian Literature, 1950-1975. Joanna Monie and Adrienne Wise. Pergamon, New York, 1977. xvi, 594 pp. \$28.50. To order this book circle No. 403 on Readers' Service Card

**The Solar Planets.** V. A. Firsoff. David and Charles, Newton Abbot, England, and Crane, Russak, New York, 1977. 184 pp., illus. \$10.50.

**Spatial Organization of Cerebral Processes.** M. N. Livanov. Translated from the Russian edition (Moscow, 1973). Halsted (Wiley), New York, and Israel Program for Scientific Translations, Jerusalem, 1977. vi, 182 pp., illus. \$25.

**The Thames Transformed.** London's River and Its Waterfowl. Jeffrey Harrison and Peter Grant. Photographs by Pamela Harrison. Deutsch, London, 1976 (U.S. distributor, Transatlantic Arts, Levittown, N.Y.). 240 pp. + plates. \$15.

**Two-Phase Flow and Heat Transfer Symposium-Workshop.** Fort Lauderdale, Fla., Oct. 1976. T. Nejat Veziroğlu, Ed. Pergamon, New York, 1977. xii, 318 pp., illus. Paper, \$35. To order this book circle No. 399 on Readers' Service Card

# Personnel Placement

Personnel advertising is accepted only with the understanding that the advertiser does not discriminate among applicants on the basis of race, sex, religion, age, color, national origin, or handicap.

**Positions Wanted:** 40¢ per word; \$4 extra for use of box number. \$10 minimum charge, per insertion. Prepayment required. This rate is available only to individuals; personnel agencies, companies, colleges, and universities take display rate for all advertising.

**Display (Positions Open, Market Place, and so forth):** \$5.80 per millimeter; \$145 minimum charge, per insertion (covers 25 millimeters on single column; 25 millimeters equals 10 lines of 50 spaces per line). No charge for use of box number. No agency commission for ads under 103 millimeters (4 inches). No cash discount. Prepayment required for foreign advertising. Purchase orders and billing information required for all other ads.

SCIENCE is published weekly, on Friday. Copy must be received in writing by Wednesday, 3½ weeks before Friday issue date required. Send copy for all positions wanted ads and display ads under 5 inches to:

**SCIENCE, Room 207  
1515 Massachusetts Ave., NW  
Washington, D.C. 20005  
Telephone: 202-467-4456**

Send copy for display ads, 1/6 page and larger, to:

**Scherago Associates, Inc.  
1515 Broadway  
New York, N.Y. 10036  
Telephone: 212-730-1050**

Blind ad replies should be addressed as follows:

**Box (give number)  
SCIENCE  
1515 Massachusetts Ave., NW  
Washington, D.C. 20005**

## POSITIONS WANTED

**Chemist.** M.S. Experience in analytical toxicology, marine and analytical chemistry. Broad background in AA, GC, GC/MS, and electrochemistry. Seeking challenging position in government, university, or private firm, anywhere. Box 126, SCIENCE. 4/14, 28

**Earth Scientist.** Employment interests, credentials, and ice-sheet-tectonics synthesis are detailed in SUBDUE THE EARTH (Delacorte). R. F. Walworth, P.O. Box 11711. St. Petersburg, Fla. 33733. Telephone: 813-360-4947. 4/14, 21, 28; 5/5, 12, 19, 26; 6/2

**Electron Microscopist/Vision Researcher:** Ph.D. 1971. Looking for permanent research-teaching position, fall 1978 or 1979. Broad scientific experience: SEM/TEM/LM, shared EM facility, biomedical laser, interdisciplinary collaboration, comparative anatomy, physiology. Publications. Budget and personnel management. Interested in regional city of 350,000 or fewer. Box 130, SCIENCE. 4/14, 21

**Natural Resource Statistician.** Ph.D. 1975. Strong background in sample design, survey methodology, and data analysis. Five years of experience in natural resource and agriculture surveys with federal government. Experienced teacher. Sound programmer experienced in statistical packages. Seeking responsible position in survey organization collecting natural resource or agriculture information. Box 110, SCIENCE. X

**Neurochemist.** Ph.D. 1972. Expertise in glycolipids, synaptosomes, and neurotransmitters. Experience includes TLC, GC, HPLC, electrophoresis, enzymology, organic synthesis, methods development, supervision in research, clinical chemistry, and teaching. Desires growth position in research or research/teaching. Availability flexible. Box 127, SCIENCE. X

**Pharmacologist.** Ph.D. Postdoctoral, teaching, and research experience. Strong background in gastrointestinal and hepatic pharmacology, biological transport, and drug toxicity studies. Publications. Seeks industrial, government, or academic position. Box 128, SCIENCE. 4/14, 28

**Radiation Biologist/Cancer Biologist.** Ph.D. 1970. Expertise in DNA repair and DNA replication in human cells in culture (as well as in *E. coli*). Current research: hyperthermia and DNA repair in human cells. Seeking stable research position. Box 129, SCIENCE. X