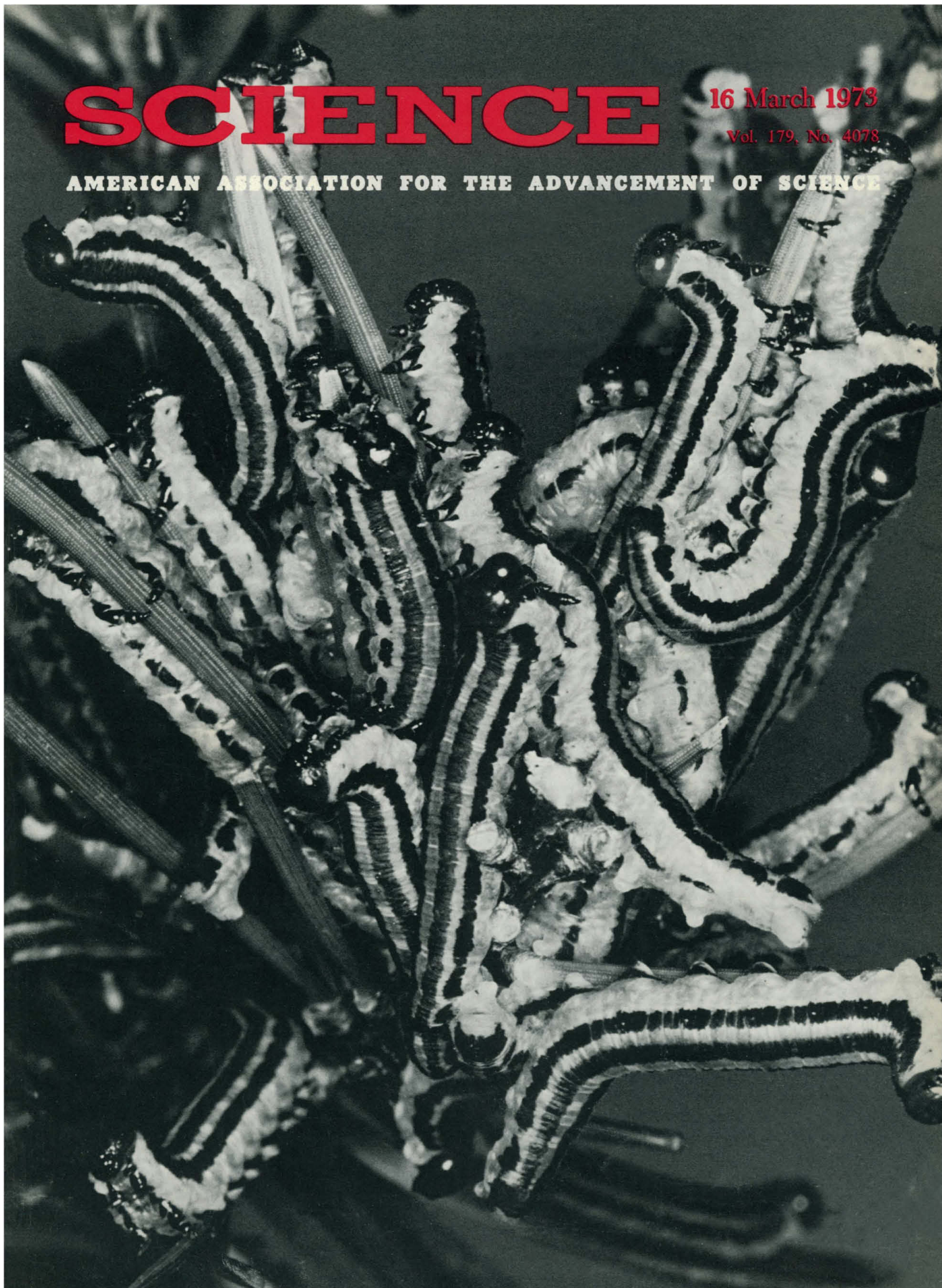


SCIENCE

16 March 1973

Vol. 179, No. 4078

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



CUT IT OUT!

FOR ANY TYPE OF GRADIENT — that is all you have to do when you program the LKB ULTROGRAD® gradient mixer. A pair of scissors is all you need to cut the gradient profile for exactly the type of gradient you require. Our technician has just cut three, and he now indicates that he will use the one in the scanning window. When he has set the scanning rate and the duration of the run, he will

switch on and the ULTROGRAD will take over—automatically producing the gradient. He can program any type of gradient you like to name, from as many as three liquids at once.

With an optional level sensor, you can also monitor absorbance levels in an eluate and automatically vary the gradient, to provide greater separation of eluted components.

see the new LKB at FASEB


LKB

IN THE SERVICE OF SCIENCE

LKB Instruments Inc. 12221 Parklawn Drive, Rockville MD. 20852
11744 Wilshire Blvd. Los Angeles Calif. 90025
6600 West Irving Park Road, Chicago Ill. 60634
260 North Broadway, Hicksville N.Y. 11800

Circle No. 5 on Readers' Service Card





**This Swiss-made
rotating evaporator
has made a
great name for
itself.**

**Now we're giving
it a new one.**

Recognize this popular Rotating Evaporator? Precision-made in Switzerland, its outstanding design, unusual versatility and ease of operation have made it world famous. In fact, these Swiss Evaporators outsell every other brand.

Even though you may be using one yourself, the name 'Büchi' may not be familiar, because until recently they were marketed by someone else under a different name in the USA and Canada. Now that they are Brinkmann products, we're giving these evaporators a new name, Büchi, the same name they're so well known by everywhere else.

To find out more about the complete Büchi line, including the Model EL Super Rotavapor with electronic speed control and patented duct system, get the new Büchi/Brinkmann brochure. For your free copy, please write: Büchi Division, Brinkmann Instruments, Westbury, N.Y. 11590. In Canada, write: Brinkmann Instruments (Canada) Ltd., 50 Galaxy Boulevard, Rexdale (Toronto), Ont.

**B Büchi/
Brinkmann**

Circle No. 3 on Readers' Service Card

16 March 1973

Volume 179, No. 4078

SCIENCE

LETTERS	Herbicides in Vietnam: <i>M. Chipman; V. C. Runeckles; H. Rose and S. Rose;</i> Methadone Treatment: <i>N. B. Gordon; S. G. Bild; R. L. Marcus; H. L. Lennard et al.</i>	1075
EDITORIAL	Enclaves of Pluralism: The Private Universities: <i>N. Hackerman</i>	1081
ARTICLES	Propagation of Environmental Noise: <i>R. H. Lyon</i>	1083
	Diprionid Sawflies: Polymorphism and Speciation: <i>G. Knerer and C. E. Atwood</i> . .	1090
	Symbols in African Ritual: <i>V. W. Turner</i>	1100
NEWS AND COMMENT	Technology Incentives: NSF Gropes for Relevance	1105
	Endangered Species: Moving toward a Cease-Fire	1107
	Psychosurgery: Legitimate Therapy or Laundered Lobotomy?	1109
RESEARCH NEWS	X-ray Astronomy (III): Searching for a Black Hole	1113
	Physics at a Turning Point?—Interview with Freeman Dyson	1114
	Solar Energy: Proposal for a Major Research Program	1116
BOOK REVIEWS	Schizophrenia and Genetics, reviewed by <i>D. Rosenthal</i> ; Fun-Zhi Schistosomiasis Shou Chai, <i>L. Wong Chi</i> ; Introduction to the Theory of Normal Metals, <i>R. E. Prange</i> ; Thermal Expansion, <i>J. A. Morrison</i> ; Science and Technology as an Instrument of Soviet Policy, <i>R. W. Davies</i> ; Waves on Beaches and Resulting Sediment Transport, <i>C. Wunsch</i> ; Rattlesnakes, <i>C. Gans</i> ; The Mosquito, <i>H. E. Evans</i>	1117

BOARD OF DIRECTORS		GLENN T. SEABORG Retiring President, Chairman	LEONARD M. RIESER President	ROGER REVELLE President-Elect	RICHARD H. BOLT LEWIS M. BRANSCOMB	BARRY COMMONER EMILIO Q. DADDARIO			
CHAIRMEN AND SECRETARIES OF AAAS SECTIONS	MATHEMATICS (A) Lipman Bers F. A. Ficken	PHYSICS (B) Edwin M. McMillan Rolf M. Sinclair	CHEMISTRY (C) Thomas E. Taylor Leo Schubert		ASTRONOMY (D) Frank D. Drake Arlo U. Landolt				
	PSYCHOLOGY (J) Carl P. Duncan William D. Garvey	SOCIAL AND ECONOMIC SCIENCES (K) Robert K. Merton Harvey Sapolsky			HISTORY AND PHILOSOPHY OF SCIENCE (L) Ernest Nagel Dudley Shapere				
	INDUSTRIAL SCIENCE (P) Jacob E. Goldman Jordan D. Lewis	EDUCATION (Q) Gordon Swanson Phillip R. Ferdycie	DENTISTRY (R) Martin Cattoni Sholom Pearlman		PHARMACEUTICAL SCIENCES (S) William Heller John Autian				
DIVISIONS		ALASKA DIVISION Gunter E. Weller President		IRMA DUNCAN Executive Secretary		PACIFIC DIVISION John D. Isaacs President	ROBERT T. ORR Secretary-Treasurer	SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION J. Linton Gardner President	MARLOWE G. ANDERSON Executive Secretary
SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with <i>The Scientific Monthly</i> ®. Second-class postage paid at Washington, D.C. Copyright © 1973 by the American Association for the Advancement of Science. Annual subscription \$20; foreign postage: Americas \$3; overseas \$5; air freight to Europe, North Africa, Near East \$16; single copies \$1 (back issues, \$2) except <i>Guide to Scientific Instruments</i> which is \$4. School year subscription: 9 months, \$15; 10 months, \$16.75. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the <i>Reader's Guide to Periodical Literature</i> .									

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORTS	Lunar Permafrost: Dielectric Identification: <i>R. Alvarez</i>	1122
	Purine Overproduction in Man Associated with Increased Phosphoribosylpyrophosphate Synthetase Activity: <i>M. A. Becker et al.</i>	1123
	DNA Content and DNA-Based Centromeric Index of the 24 Human Chromosomes: <i>M. L. Mendelsohn et al.</i>	1126
	Chromosome Assignments in Man of the Genes for Two Hexosephosphate Isomerases: <i>F. A. McMorris et al.</i>	1129
	Cholesterol Hydroperoxide Formation in Red Cell Membranes and Photohemolysis in Erythropoietic Protoporphyrin: <i>A. A. Lamola, T. Yamane, A. M. Trozzolo</i> . .	1131
	Strychnine- and Pentylene-tetrazol-Induced Changes of Excitability in <i>Aplysia</i> Neurons: <i>M. R. Klee, D. S. Faber, W.-D. Heiss</i>	1133
	Detection of Inborn Errors of Metabolism: Galactosemia: <i>H. Z. Hill and T. T. Puck</i>	1136
	Fluid Shifts Associated with Gas-Induced Osmosis: <i>M. J. Halsey and E. I. Eger, II</i> . . .	1139
	Menkes' Kinky Hair Disease: Further Definition of the Defect in Copper Transport: <i>D. M. Danks et al.</i>	1140
	<i>Technical Comments:</i> Biological Activity of Insulin-Sepharose?: <i>H. M. Katzen and G. J. Vlahakes</i> ; <i>P. Cuatrecasas</i> ; Generation Time and Genomic Evolution in Primates: <i>V. M. Sarich and A. C. Wilson</i> ; Fragile Ecosystems: <i>P. W. Bretsky et al.</i>	1142
ASSOCIATION AFFAIRS	Earthquakes and Earthquake Engineering: <i>D. Tocher</i> ; Archaeoastronomy in Pre-Columbian America; Geodynamics: <i>C. Lomnitz</i> ; Volcanism in Mexico and Central America: <i>R. W. Decker</i>	1148

WARD H. GOODENOUGH
CARYL P. HASKINS

DANIEL P. MOYNIHAN
PHYLLIS V. PARKINS

WILLIAM T. GOLDEN
Treasurer

WILLIAM BEVAN
Executive Officer

GEOLOGY AND GEOGRAPHY (E)
Helmut Landsberg
Ramon E. Bisque
ENGINEERING (M)
Raynor L. Duncombe
C. Towner French
INFORMATION AND
COMMUNICATION (T)
Jordan Baruch
Scott Adams

BIOLOGICAL SCIENCES (G)
Dorothy Bliss
Richard J. Goss
MEDICAL SCIENCES (N)
Robert A. Good
F. Douglas Lawrason
STATISTICS (U)
Frederick Mosteller
Ezra Glaser

ANTHROPOLOGY (H)
Richard N. Adams
Anthony Leeds
AGRICULTURE (O)
Roy L. Lovvorn
Michael A. Farrell
ATMOSPHERIC AND HYDROSPHERIC
SCIENCES (W)
Max A. Kohler
Louis J. Battan

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

COVER

Larval aggregation of the sawfly *Neodiprion rugifrons* on its host, *Pinus banksiana*. The mature larvae are displaying one of the alarm reactions that reduce attacks by parasites and predators: a raising of the anterior and posterior segments from the needle surface, at the same time exuding orally a drop of gummy fluid. Mature larvae are about 20 millimeters long. See page 1090. [G. Knerer, University of Toronto]

LET'S MAKE ONE THING PERFECTLY CLEAR: THE AIR YOUR ANIMALS BREATHE.



Carworth and your animals' environment

Carworth has pioneered environmental control in the laboratory animal field because of the need to reduce the exceptional vulnerability of small animals to airborne contamination. This vulnerability, with its potential for jeopardizing your research—or even your entire animal colony, can now be significantly minimized or even totally eliminated with one or more of the Carworth products described below.

The STAY-CLEAN™ laminar flow rack

This rack provides the animals housed in it with horizontal flow pathogen-free air through primary and HEPA filtration. The animals are constantly bathed in a continuous stream of ultra-clean laminar flow air. In effect, this is unidirectional air filtered to remove potentially harmful particles 0.3 microns or larger. The result: virtual elimination of microbial

(bacteria, viruses, fungi, molds, spores, etc.) or non-viable particulate matter that can jeopardize animal colonies and/or research programs.

The STAY-CLEAN laminar flow conversion unit

This newest Carworth pathogen control product provides any standard rack unit with ultra-clean vertical flow pathogen free air. The multiple advantages of the STAY-CLEAN rack described above are now readily available to any laboratory at modest cost.

The ISOSYSTEM™ housing system for mice

The ISOSYSTEM easily and effectively provides a separate protected environment anywhere. This inexpensive system isolates animals from harmful environmental influences such as viruses, insects, dust, dirt, light, noise, and sudden temperature changes. The

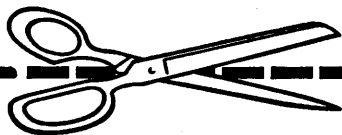
complete ISOSYSTEM—consisting of an Isocage™ plastic cage, cage lid, and an Isocap™ disposable filter cap—takes minimal space (12¾" long X 7¾" wide X 8¼" high).

For further information on these and other Carworth products

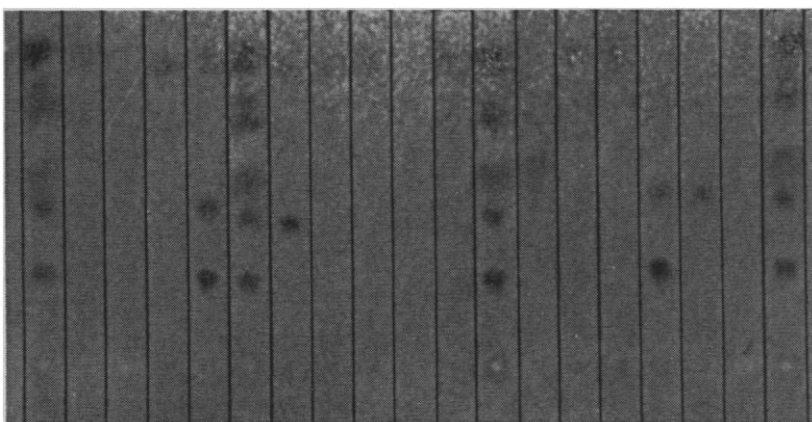
Write Carworth, New City (Rockland County), New York 10956 and request the new Carworth Animal Environmental Care Catalog covering these products plus a full line of plastic and stainless steel cages, racks, detergents (including a special detergent for plastic cages), disinfectants, and odor control products. Also let us know if you'd like a copy of our new Animal Catalog too. Thanks.

Carworth 
Division of Becton, Dickinson
and Company 

Circle No. 9 on Readers' Service Card



Fill yourself in on new products for TLC



New addition to the family of EASTMAN CHROMAGRAM Sheets...

EASTMAN CHROMAGRAM Sheet (Scribed Silica Gel), with or without fluorescent indicator. All the features of the family it joins . . . uniform, abrasion-resistant coating; flexible polyester base; scissorable; easy and safe to handle and store, both before and after use. And some important features all its own . . . 19 channels to make sample application and identification easier; no chance for wandering migration and cross contamination of samples; separated zones are more concentrated, so identification and quantitation are simpler.

Standard packages hold twenty 20 by 20-cm sheets. For large-volume users, sheefs are also packed 400 to the box, at a lower cost per sheet. Catalog Nos. 13191 (with fluorescent indicator) and 13197 (without fluorescent indicator).

The KODAK Laboratory Sprayer, No. 13173, with dip tube and orifice designed for spraying TLC visualization reagents. Only 3

ounces of propellant, but a propellant-to-reagent spray ratio of 1:5, so you can spray approximately a pint of visualization reagent. More economical to use than many larger units which have higher propellant-to-reagent ratios.

Prepare your visualization reagents in advance. When you're ready to spray, simply screw the aerosol unit directly onto the bottle; no separate spray heads to buy or replace. The slim aerosol unit is easy to hold and easy to clean after use.

The spray is sold singly at \$4.00 each and in convenient four-packs at \$12.50 and, along with the scribed chromatographic sheet, is stocked locally by:

**Curtin • Fisher • North-Strong • Preiser •
Sargent-Welch • Scientific Products •
VWR Scientific (East)**

For more information, return the coupon below.

(These list prices are net FOB Rochester, N.Y. and are subject to change without notice.)

Eastman Kodak Company
Dept. 412-L
Organic Chemical Markets
Rochester, N.Y. 14650



☐ Please send me information on scribed sheet and the laboratory sprayer (JJ-36).

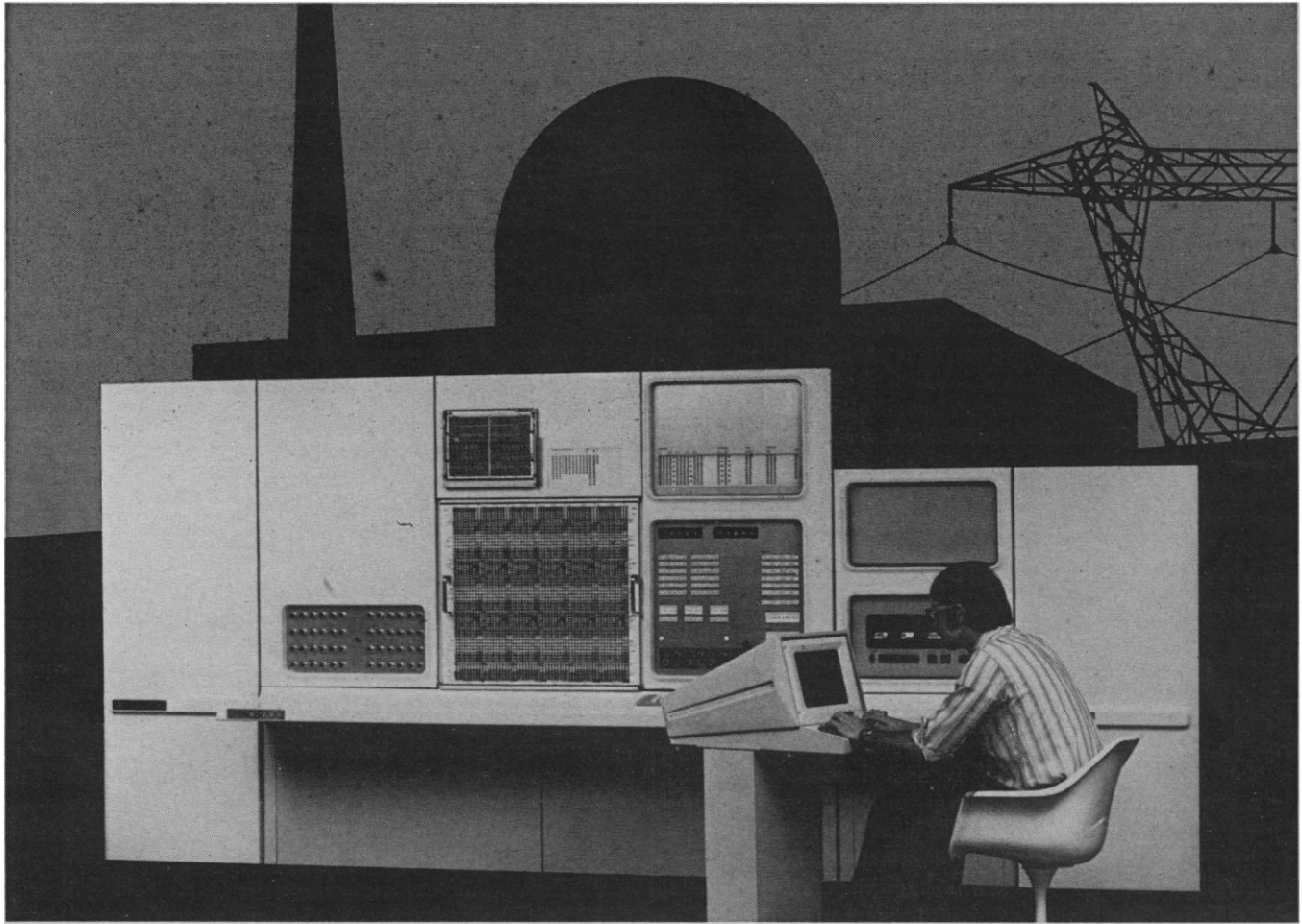
Name

Company Address

City State Zip



3-65



Funny. It Doesn't Look Like a Nuclear Power Plant.

The new PACER™ 700 just acts like one. This new computer system can simulate a full-scale nuclear power plant or other large physical systems. In real time. Or faster than real time. For design, analysis and operator training. At a cost that is just a small fraction of any other form of simulation.

Because our PACER 700 series of systems combines new, fourth-generation, stored-program digital processing with high-speed parallel processing.

So it'll take on practically any group of multivariable processes you might think of putting together—on line or off.

And you can wind up with far more solutions for scientific and engineering design problems—per day and per dollar—than with any alternative computing system.

Nothing else even comes close. For instance, price/performance ratios for PACER systems run to over 100 times those of purely digital computers.

To let you zero in on your optimum efficiency level, we offer three series of systems—each with three sets of options. That gives you nine clear choices of computational capability.

So you can select a system ideal for controlling a

small-scale lab process. Or a system for power plant and system simulation. Or for any project in between.

And we can help you get even more out of your system. With software that may be all but ready-made for your project. We have the most comprehensive and useful library available. And we've got thousands of applications in the file to prove it.

Our 700 system definitely doesn't look like a power plant, but it, like all PACER systems, is a computational powerhouse and well worth looking into. For details, call or write today.



Electronic Associates, Inc.
185 Monmouth Parkway
West Long Branch, New Jersey 07764
(201) 229-1100

30 MHz

for only \$225*?



Prove it to yourself with the Heath/Schlumberger 30-day trial offer

- Auto-ranging
- 5 Hz to 30 MHz range
- 10 mV input sensitivity
- 6-digit LED readout with leading zero blanking

Heath/Schlumberger does it again...with the new SM-118A. Compare features and price against the competition. The new 118A provides 5 Hz to 30 MHz guaranteed range...2 Hz to 40 MHz typical...10 mV sensitivity guaranteed over the entire range...5-8 mV typical. Plus features not found on other low cost counters: Autoranging with four automatically selected ranges of 10 sec., 1 sec., 100 ms or 10 ms., plus switch-selected time base ranges of 1 sec. and 10 msec. ...1 MHz time base provides stability of 1 part in 10^6 /mo...plus a rear panel input to allow use of an external time base oscillator for extreme accuracy or frequency ratio measurements. Other features include 6-digit LED readout with leading zero blanking...combination carrying handle/tilt stand...small size and light weight...120/240 VAC operation.

A value? You decide. Check the details of our trial offer at right and put one to work for 30 days. We think you'll keep it.

Factory assembled & calibrated SM-118A, 7 lbs.\$225.00*



Send for our FREE 1973 Electronic Instruments catalog and get complete details on this and other high performance, low cost instruments. Use the coupon to receive your FREE copy now.

How we can sell high performance instrumentation at low cost. Heath/Schlumberger sells direct to you, through the mail. No salesmen, no distributors. Result? Lower selling costs...lower prices. Heath/Schlumberger is a division of the Heath Company, the world's largest manufacturer of electronic kits, one of the

world's largest buyers of electronic components. That means real purchasing power for us, lower costs for you.

And we're not a small company struggling with high overhead, but a small division of a very large company, getting the benefit of sharing some other very important (and expensive) facilities. Again, this means lower costs for us...and for you.

Take advantage of our 30-day trial offer and prove it to yourself.

The Heath/Schlumberger 30-day trial offer.

We're so sure that our products can deliver on our claim of high performance and low cost that we make this offer: try this or any other Heath/Schlumberger product in your lab for 30 days. Just send us your purchase order with the statement below typed on it.

"This order is placed for 30-day evaluation. The equipment ordered may be returned within 30 days if, in the buyer's opinion, it is not suitable. The buyer agrees to pay transportation costs in both directions."

If, in *your* opinion, the product is not suitable for *any* reason, just return it to us within the 30-day limit and pay the shipping costs. After the 30-day limit we'll process your PO and bill you for the product. Send your PO now...and prove it to yourself.

Heath/Schlumberger Scientific Instruments		HEATH Schlumberger	
Dept. 531-194			
Benton Harbor, Michigan 49022			
<input type="checkbox"/> Please send 1973 Electronic Instruments catalog			
<input type="checkbox"/> Enclosed is my purchase order for a 30-day trial evaluation			
Name _____			
Title _____			
Company/Institution _____			
Address _____			
City _____		State _____	Zip _____
*Mail order prices; FOB factory.			EK-370

SCIENCE REPRINTS

The following reprints are available for 25¢ per copy. Minimum order of \$2.50. Check or money order, no cash.

- | | |
|--------------------|---|
| Biology-Medicine | <p>213) R. D. Allen et al., "Capillary Suction Test of the Pressure Gradient Theory of Ameboid Motion," 18 Aug. 1972 (4)</p> <p>110) F. H. Bach, "Transplantation: Pairing of Donor and Recipient," 5 June 1970 (12)</p> <p>241) H. Barlow et al., "Visual Pattern Analysis in Machines and Animals," 18 Aug. 1972 (12)</p> <p>115) G. Berke et al., "Tumor Immunity In Vitro: Destruction of a Mouse Ascites Tumor Through A Cycling Pathway," 4 Aug. 1972 (2)</p> <p>3) J. H. U. Brown and J. F. Dickson III, "Instrumentation and the Delivery of Health Services," 17 Oct. 1969 (8)</p> <p>214) L. P. Brower et al., "Variation in Cardiac Glycoside Content of Monarch Butterflies from Natural Populations in Eastern North America," 4 Aug. 1972 (4)</p> <p>124) W. N. Charman, "Eye Marks in Vertebrates as Aids in Vision," 28 July 1972 (2)</p> <p>5) A. Crancer, Jr., et al., "Comparison of the Effects of Marihuana and Alcohols on Simulated Driving Performance," 16 May 1969 (4)</p> <p>126) J. C. Crawhall et al., "Fabry's Disease: Differentiation Between Two Forms of α-Galactosidase by Myoinositol," 11 Aug. 1972 (2)</p> <p>6) B. D. Davis, "Prospects for Genetic Intervention in Man," 30 April 1971 (2)</p> <p>7) B. D. Dinman, "'Non-Concept' of 'No-Threshold': Chemicals in the Environment," 4 Feb. 1972 (4)</p> <p>8) N. I. Dishotsky et al., "LSD and Genetic Damage," 30 April 1971 (2)</p> |
| Environment | <p>239) R. Boyd, "World Dynamics: A Note," 11 Aug. 1972 (4)</p> <p>111) K. C. Barrons, "Some Ecological Benefits of Woody Plant Control with Herbicides," 1 Aug. 1969 (4)</p> <p>121) R. A. Carpenter, "Information for Decisions in Environmental Policy," 12 June 1970 (8)</p> <p>4) and 27) A. J. Coale, "Man and His Environment," 9 Oct. 1970 (8)</p> <p>28) B. L. Crowe, "The Tragedy of the Commons Revisited," 28 Nov. 1969 (8)</p> <p>29) P. R. Ehrlich and J. P. Holdren, "Impact of Population Growth," 26 March 1971 (8)</p> <p>30) A. W. Eipper, "Pollution Problems, Resource Policy, and the Scientist," 3 July 1970 (8)</p> <p>31) M. Eisenbud, "Environmental Protection in the City of New York," 13 Nov. 1970 (8)</p> <p>139) R. S. Foote, "Mercury Vapor Concentrations inside Buildings," 11 Aug. 1972 (2)</p> <p>32) M. I. Goldman, "The Convergence on Environmental Disruption," 2 Oct. 1970 (8)</p> <p>142) A. Gomez-Pompa et al., "The Tropical Rain Forest: A Nonrenewable Resource," 1 Sept. 1972 (8)</p> <p>33) G. Hardin, "The Tragedy of the Commons," 13 Dec. 1968 (8)</p> <p>34) R. K. Hare, "How Should We Treat Environment?," 23 Jan. 1970 (6)</p> <p>35) H. L. Harrison et al., "Systems Studies of DDT Transport," 30 Oct. 1970 (8)</p> |
| Man and Technology | <p>1) D. Alpert and D. L. Bitzer, "Advances in Computer-Based Education," 20 March 1970 (12)</p> <p>2) R. C. Atkinson and H. A. Wilson, "Computer-Assisted Instruction," 4 Oct. 1968 (8)</p> <p>54) M. S. Baram, "Social Control of Science and Technology," 7 May 1971 (4)</p> <p>55) L. M. Branscomb, "Taming Technology," 12 March 1971 (8)</p> <p>56) J. Brooks, "Can Science Survive in the Modern Age," 1 Oct. 1971 (4)</p> <p>58) J. D. Carroll, "Participatory Technology," 19 Feb. 1971 (8)</p> <p>57) J. D. Carroll, "Science and the City: The Question of Authority," 28 Feb. 1969 (12)</p> <p>122) M. A. Cartter, "Scientific Manpower for 1970-1985," 9 April 1971 (8)</p> <p>210) R. A. Cellarius et al., "Councils of Urgent Studies," 25 Aug. 1972 (8)</p> <p>127) W. W. Cooley et al., "The Computer and Individualized Instruction," 31 Oct. 1969 (12)</p> <p>211) T. A. Cowan, "Paradoxes of Science Administration," 15 Sept. 1972 (4)</p> <p>59) L. A. DuBridge, "Science Serves Society," 6 June 1969 (4)</p> <p>60) A. Etzioni, "Agency for Technological Development for Domestic Programs," 4 April 1969 (8)</p> <p>137) A. Etzioni, "Understanding of Science," 4 Aug. 1972 (2)</p> <p>61) A. Etzioni and R. Remp, "Technological 'Shortcuts' to Social Change," 7 Jan. 1982 (8)</p> <p>138) A. F. Findeis, "Graduate Education in Science and Engineering in Japan," 18 Aug. 1972 (8)</p> |
| Population | <p>75) B. Berelson, "Beyond Family Planning," 7 Feb. 1969 (12)</p> <p>76) J. Blake, "Abortion and Public Opinion: The 1960-1970 Decade," 12 Feb. 1971 (12)</p> <p>77) J. Blake, "Population Policy for Americans: Is the Government Being Misled?," 2 May 1969 (8)</p> <p>78) I. Bumpass and C. F. Westoff, "The 'Perfect Contraceptive' Population," 18 Sept. 1970 (8)</p> <p>79) D. Callahan, "Ethics and Population Limitation," 4 Feb. 1972 (12)</p> <p>80) C. Djerassi, "Birth Control after 1984," 4 Sept. 1970 (12)</p> <p>81) C. Djerassi, "Prognosis for the Development of New Chemical Birth Control Agents," 24 Oct. 1969 (8)</p> <p>82) S. Enke, "Birth Control for Economic Development," 16 May 1969 (8)</p> <p>143) A. B. Grobman, "Shortchanging the Disadvantaged Student," 23 July 1972 (2)</p> <p>83) F. S. Jaffe, "Toward the Reduction of Unwanted Pregnancy," 8 Oct. 1971 (10)</p> <p>84) L. W. Kangas, "Integrated Incentives for Fertility Control," 25 Sept. 1970 (8)</p> <p>162) A. Lomax et al., "The Revolutionary Taxonomy of Culture," 21 July 1972 (12)</p> <p>165) E. Mayr, "The Nature of the Darwinian Revolution," 2 June 1972 (12)</p> <p>85) N. McArthur, "The Demography of Primitive Populations," 20 Feb. 1970 (8)</p> <p>170) L. E. Moses, "The Response of Graduate Enrollment to Placement Opportunities," 11 Aug. 1972 (4)</p> <p>171) C. A. Mosher, "Needs and Trends in Congressional Decision-Making," 13 Oct. 1972 (8)</p> |
| Psychology | <p>87) P. H. Abelson, "Death from Heroin," 12 June 1970 (1)</p> <p>108) H. P. Albert et al., "Facilitation of the Long-Term Store of Memory with Strychnine," 25 Aug. 1972 (4)</p> <p>120) R. C. Bryant et al., "Synthetic Scotophobin in Goldfish: Specificity and Effect on Learning," 18 Aug. 1972 (4)</p> <p>88) M. Cabanac, "Physiological Role of Pleasure," 17 Sept. 1971 (8)</p> <p>230) V. A. Casagrande et al., "Superior Colliculus of the Tree Shrew: A Structural and Functional Subdivision into Superficial and Deep Layers," 4 Aug. 1972 (4)</p> <p>89) F. E. Check et al., "Deceptions in the Illicit Drug Market," 27 Feb. 1970 (1)</p> <p>129) E. C. Crawford, Jr., "Brain and Body Temperatures in a Panting Lizard," 4 Aug. 1972</p> <p>231) Peter Dallos et al., "Cochlear Inner and Outer Hair Cells: Functional Differences," 28 July 1972 (4)</p> <p>90) C. A. Doxiadis, "Ekistics, the Science of Human Settlements," 23 Oct. 1970 (12)</p> <p>91) C. A. Doxiadis, "Man's Movement and His City," 18 Oct. 1968 (12)</p> <p>92) H. F. Eichenwald and P. C. Fry, "Nutrition and Learning," 14 Feb. 1969 (8)</p> <p>93) L. Eisenberg, "The Human Nature of Human Nature," 14 April 1972 (8)</p> |

Archeology

- 94) L. Eisenberg, "Student Unrest: Sources and Consequences," 27 March 1970 (8)
- 135) L. Erlenmeyer et al., "Genetics and Intelligence: A Review," 13 Dec. 1963 (2)
- 136) A. Etzioni, "Sex Control, Science and Society," 13 Sept. 1968 (8)
- 95) R. Fischer, "A Cartography of the Ecstatic and Meditative States," 26 Nov. 1971 (8)
- 96) U. G. Foa, "Interpersonal and Economic Resources," 29 Jan. 1971 (8)
- 232) David S. Forman et al., "Axonal Transport of Gangliosides in the Goldfish Optic Nerve," 18 Aug. 1972 (4)
- 97) M. J. Gilula and D. N. Daniels, "Violence and Man's Struggle to Adapt," 25 April 1969 (12)
- 145) B. C. Griffith, "Coherent Social Groups in Scientific Change," 15 Sept. 1972 (8)
- 146) J. C. Hafele et al., "Around-the-World Atomic Clocks: Predicted Relativistic Time Gains and Around-the-World Atomic Clocks: Observed Relativistic Time Gains," 14 July 1972 (8)
- 107) P. H. Abelson, "The New Physics Report," 11 Aug. 1972 (2)
- 238) P. W. Anderson, "More Is Different Broken Symmetry and the Nature of Hierarchical Structure of Science," 4 Aug. 1972 (4)
- 112) F. A. Beach, "Pioneer," 4 Aug. 1972 (4)
- 113) K. Becker, "Progress in Luminescence Dosimetry," 11 Aug. 1972 (2)
- 114) E. D. Becker and T. C. Farrar, "Fourier Transform Spectroscopy," 27 Oct. 1972 (8)
- 118) R. G. Brewer, "Nonlinear Spectroscopy," 20 Oct. 1972 (12)
- 119) W. Brostow, "Between Laws of Thermodynamics and Coding of Information," 13 Oct. 1972 (4)
- 125) A. D. Code et al., "Orbiting Astronomical Observatory: Review of Scientific Results," 21 July 1972 (12)
- 133) L. D. Eicher et al., "Limitations of the Hildebrand-Batschinski Shear Viscosity Equation," 28 July 1972 (2)
- 140) D. Gabor et al., "Holography," 2 July 1971 (16)
- 144) P. Greguss et al., "Multiplexing Ultrasonic Wave Fronts by Holography," 4 Aug. 1972 (4)
- 147) H. D. Hagstrum, "Electronic Characterization of Solid Surfaces," 20 Oct. 1972 (8)
- 148) B. Hapke, "Reflection Spectra of Lunar Dust Grains with Amorphous Coatings," 11 Aug. 1972 (2)
- 151) R. Howard, "Recent Solar Research," 29 Sept. 1972 (8)
- 153) M. V. Isaila et al., "Acceleration of Argon Ions to 1.17×10^{10} Electron Volts," 4 Aug. 1972 (2)
- 233) M. J. Klein, "Aspects of a Revolution," 4 Aug. 1972 (2)
- 166) W. D. Metz, "Gravity Waves: Are They Real and What Do They Mean?," 11 Aug. 1972 (2)
- 177) M. A. Nicolet, "Microanalysis of Materials by Backscattering Spectrometry," 8 Sept. 1972 (12)
- 184) P. B. Price and R. M. Walker, "Particle Track Etching," 20 Oct. 1972 (8)
- 234) J. R. Wait, "Project Sanguine," 20 Oct. 1972 (4)
- 109) S. Arnott, "Nucleotide Conformations," 4 Aug. 1972 (2)
- 116) F. E. Bloom et al., "Adenosine 3', 5'-Morphosphate Is Localized in Cerebellar Neurons: Immunofluorescence Evidence," 4 Aug. 1972 (4)
- 128) E. A. Cornelius, "Rapid Immunological Induction of Murine Lymphomas: Evidence for Viral Etiology," 11 Aug. 1972 (2)
- 141) S. D. Glick et al., "Facilitation of Recovery by α -Methyl-p-Tyrosine after Lateral Hypothalamic Damage," 11 Aug. 1972 (2)
- 235) E. Habermann, "Bee and Wasp Venoms," 28 July 1972 (12)
- 152) D. R. Idler, "Hormonal Action," 11 Aug. 1972 (2)
- 156) D. C. Klein et al., "Rapid Light-Induced Decrease in Pineal Serotonin N-Acetyltransferase Activity," 11 Aug. 1972 (2)
- 179) R. Novick, "Two-Photon Decay of Metastable Hydrogenic Atoms," 28 July 1972 (2)
- 188) J. Rubin et al., "Nucleotide Conformation," 4 Aug. 1972 (2)
- 189) M. A. Ruttenberg, "Human Insulin' Facile Synthesis by Modification of Porcine Insulin," 18 Aug. 1972 (4)
- 191) R. W. Shchevitz et al., "An Isomorphous Heavy-Atom Derivative of Crystalline Formylmethionine Transfer RNS," 4 Aug. 1972 (4)
- 236) N. Sharon and L. Halina, "Lectins: Cell-Agglutinating and Sugar-Specific Proteins," 15 Sept. 1972 (12)
- 237) B. A. Zitko et al., "Water-Soluble Derivatives of Δ^1 -Tetrahydrocannabinol," 4 Aug. 1972 (2)
- 117) V. Bouska et al., "Double Moldavites in Southern Bohemia," 11 Aug. 1972 (2)
- 131) E. M. Dickson, "Mercury and Lead in the Greenland Ice Sheet: A Reexamination of the Data," 11 Aug. 1972 (2)
- 132) R. H. Dott, Jr., "Roots of Geology," 11 Aug. 1972 (2)
- 134) W. Elders et al., "Crustal Spreading in Southern California," 6 Oct. 1972 (12)
- 173) J. Namias et al., "Sea Level at Southern California: A Decadal Fluctuation," 28 July 1972 (2)
- 186) J. S. Rinehart, "18.6-Year Earth Tide Regulates Geyser Activity," 28 July 1972 (4)
- 194) W. D. Scott et al., "Open Channels in Sea Ice (Leads) as Ion Sources," 4 Aug. 1972 (2)
- 202) G. Leonard Tyler et al., "Second Order Scattering from the Sea: Ten-Meter Radar Observations of the Doppler Continuum," 28 July 1972 (2)
- 184) P. B. Price and R. M. Walker, "Particle Track Etching," 20 Oct. 1972 (8)
- 234) J. R. Wait, "Project Sanguine," 20 Oct. 1972 (4)
- 123) A. Chandrasekharam, "Spongy Meophyll Remains in Fossil Leaf Compressions," 28 July 1972 (2)
- 130) H. A. Davis, "The Crisis in American Archeology," 21 Jan. 1972 (8)
- 201) R. E. Taylor, "Dating Techniques for the Archeologist," 4 Aug. 1972 (2)
- 240) D. M. Raup, "Taxonomic Diversity During the Phanerozoic," 22 Sept. 1972 (8)

American Association for the Advancement of Science, Dept. HA, 1515 Massachusetts Ave., NW, Washington, D.C. 20005

REMEMBER MINIMUM ORDER \$2.50

Please send me _____ of the following _____
copies number of reprint

Name _____

Address _____

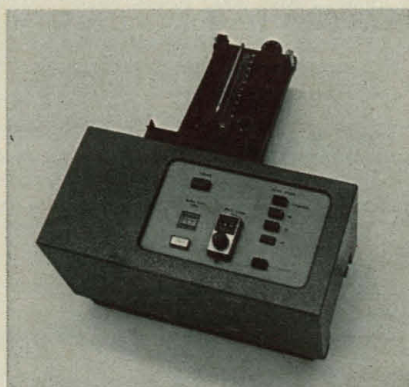
Zip

Now there is a better way to look at gel separations.

For some applications eyeballing is a perfectly adequate method for obtaining all the information you need to know about your gel electrophoretic separations. But there are other times when you would like to have a permanent record of the separation pattern. Or you need more accurate quantitative and qualitative information. Possibly, you just want to verify your own visual observations by getting an unbiased opinion.

That's when the new Techtron Gel Scanner can do it better than your eyeballs. As an accessory for the popular Varian Techtron 635 UV-VIS Spectrophotometer, it offers the life scientist a high performance yet economical means for evaluating gel separations. It's fast, accurate, reliable. A brief look at the spectrum will show you the type of performance to expect from this high resolution, double-beam gel scanner.

To satisfy the resolution requirements encountered in any biochem-



Varian Techtron Gel Scanner

ical laboratory, the scanner has four fixed slitwidths and four gel transport speeds. And because the 635

Gel separation of extracted E coli protein.

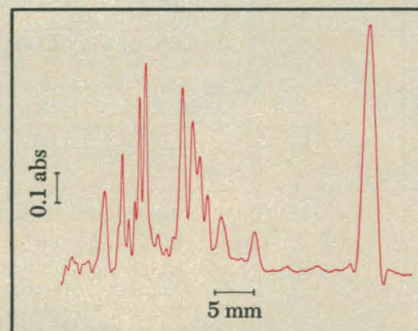


spectrophotometer has a range of 190 to 900 nm, the color of the stain used in the gel is irrelevant. In fact, selecting a wavelength at which the macromolecule of interest preferen-

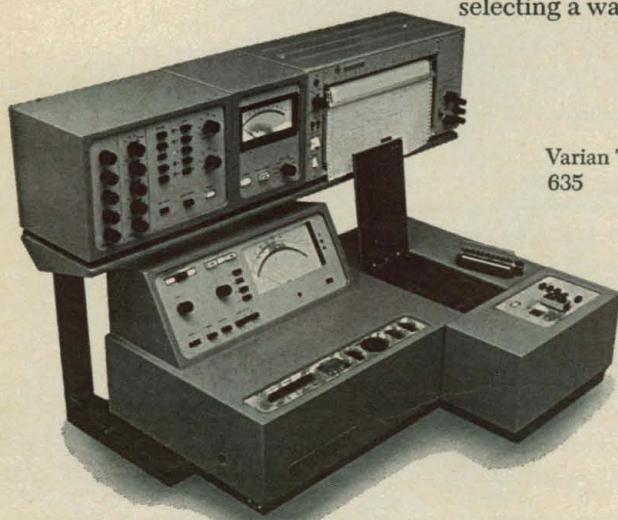
tially absorbs eliminates the need to stain the gel at all.

As a first step toward solving your gel scanning problems, let us send you some free literature.

Write to Varian Instrument Division
611 Hansen Way, Box D-070
Palo Alto, California 94303.



This spectrum of an SDS polyacrylamide gel separation of extracted E coli protein was recorded using the Techtron 635 spectrophotometer and new gel scanner to demonstrate the resolution to be expected with a typical gel separation. Wavelength setting: 550 nm; slit: 0.05 mm; transport speed: 5 mm/minute.



Varian Techtron 635

Varian Life Science Seminars

A series of in-depth UV-Vis seminars will be held during May. For information on dates and locations, write us directly or circle the reader service number.



varian instruments

Brand names: ANASPECT™ • CARY® • MAT • VARIAN®
VARIAN AEROGRAPH® • VARIAN TECHTRON

Circle No. 2 on Readers' Service Card

that methadone is "... legal, a 'medicine' prescribed by physicians, whereas heroin is illegal, a 'drug'..." A more accurate answer would be that methadone is better because of its longer period of action and oral effectiveness. Stabilization can be achieved with a daily dose of a constant amount. The patient is able to function normally without euphoria or other narcotic effects and therefore can live a normal life. The authors state only the similarities between the effects of heroin and methadone in single doses while ignoring the essential differences between their long-term effects.

Methadone patients are described as "somewhat somnolent," they "tire more easily," "require more sleep than do nondrugged individuals," have reflex reactions that are "somewhat abnormal," "perspire more profusely," are often constipated, and suffer from impotence. Some patients have reported these symptoms during the early months of methadone treatment, but this is not the long-term picture presented by the thousands of patients who are being maintained. The authors ignore the detailed studies that have shown reaction time and motor coordination (1-3), vigilance (2), and intellectual functioning (1) to be in

the normal range in patients stabilized on methadone (4).

The statement that the blockade effect of methadone does not have any effect on nonopiate drug use is true, but certainly not relevant to a discussion of its value in treating heroin addiction. Neither methadone nor any other medication could be a panacea for all drug abuse problems.

NORMAN B. GORDON

*Ferkauf Graduate School of
Humanities in Social Science,
Yeshiva University, New York 10003*

References

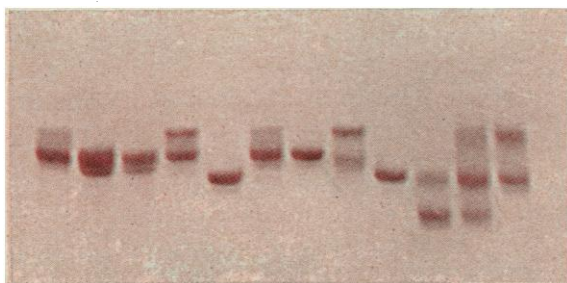
1. N. B. Gordon, A. Warner, A. Henderson, in *Report to the Committee on Problems of Drug Dependence* (National Academy of Sciences-National Research Council, Washington, D.C., 1967).
2. N. B. Gordon, *Psychopharmacologia* 16, 337 (1970).
3. — and P. Appel, in *Proceedings of the Fourth National Conference on Methadone Treatment* (National Association for the Prevention of Addiction to Narcotics, New York, 1972), pp. 425-427.
4. A compilation of the various studies on the behavioral effects of methadone treatment is given by N. B. Gordon in *Discrimination and the Addict*, L. R. Simmons and M. B. Gold, Eds. (Sage, Beverly Hills, Calif., in press).

The treatment of drug addicts is too important to both the addicts themselves and to the society in which they live to let the article by Lennard *et al.* go unanswered. To my knowledge, no

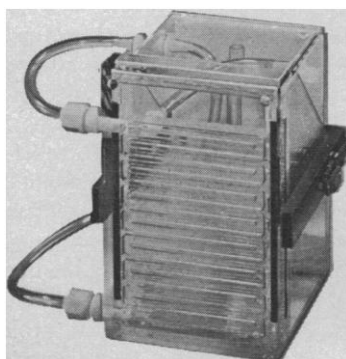
physicians actively engaged in using methadone as a therapeutic aid in the treatment of heroin addiction believe methadone to be a "solution" to heroin addiction. It does give real assistance to the heroin addict in relieving narcotic hunger. This tangible relief is the biggest asset methadone offers. For the vast majority of heroin victims, group therapy, a closed residential setting, and role model activity are simply not enough. But with methadone in the therapeutic setting, actual changes can and do occur.

It is absurd to ask whether methadone is better or worse than heroin. Can there be any question of the potential danger of regular intravenous and subcutaneous injections of heroin, usually with unsterilized equipment? There is a rapid buildup of tolerance to heroin, but not to methadone (1). Methadone dissolved in fruit-flavored liquid is rarely sold in the black market, and its abuse can be almost completely controlled. My experience and that of other clinicians affiliated with the Illinois Drug Abuse Program is that an individual whose methadone dosage has been constant for four or more weeks cannot be identified as a methadone patient, with the following exceptions: (i) constipation (which can be relieved

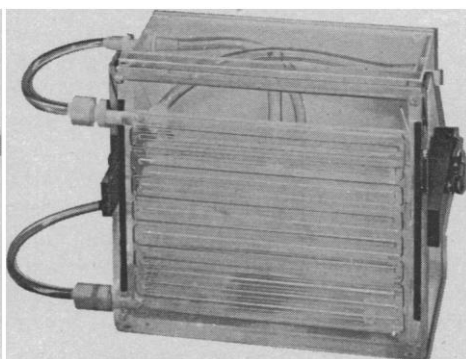
SEPARATE-COMPARE-IDENTIFY ...with an E-C Gel Electrophoresis System



Separation of Hemoglobins



EC470



EC490

- ☐ two cell models
- ☐ 1 to 30 samples
- ☐ uniform sample cooling
- ☐ two-dimensional technique
- ☐ fast clinical screening
- ☐ uses all gel media
- ☐ safe and easy to operate
- ☐ preparative/analytical work

You get *all* these advantages with the E-C Total Vertical Gel Electrophoresis System from the pioneers of Polyacrylamide Gel Electrophoresis. For details, call collect (813) 344-1644 or write:

E-C APPARATUS CORPORATION,
3831 Tyrone Blvd., N.,
St. Petersburg, Florida 33709.





The complete aqueous cocktail

For liquid scintillation counting

The PCS™ (Phase Combining System) cocktail delivers a one-two punch in dissolving aqueous samples: complete organic-inorganic versatility and higher counting efficiency. For PCS is uniquely designed for hundreds of different solutions: acids, bases, buffers, salts, sucrose, and urine, to mention a few. (In most cases, just add the radioactive sample to the counting vial, shake vigorously, and count.)

PCS not only mixes well, but counts with higher efficiency and holds more water than almost any cocktail you can make or purchase. (Compare values in the table.) This also means you can run samples in a shorter time and improve counting reproducibility.

Product	Sample Vol. (Ml)	Cocktail Vol. (Ml)*	% of Sample	H3 Counting Efficiency (%)**
PCS	0.5	14.5	3.3	42.7
	5.0	10.0	33.3	28.4
	6.0	9.0	40.0	26.7
Brand A	0.5	15.0	3.2	33.0
	5.0	15.0	25.0***	28.0

*Manufacturers' recommended volumes. Comparative information is available on request.

**PCS's counting efficiency was determined on a Nuclear-Chicago Mark II LSC; Brand A's on a Packard Tri-Carb.

***Maximum sample is 25%—40% is not recommended.

And as if versatility, high water capacity, and higher efficiency weren't enough to whet your interest, PCS is strong on economy. It costs less, you use less, and you purchase less (good for almost all solutions) than most other cocktails.

Contact our technical service department for detailed information. Our staff will

not only solve problems concerning cocktails and sample preparation, but help with any of your particular counting problems.



Amersham/Searle

AMERSHAM / SEARLE CORPORATION
An Activity of G. D. Searle & Co. and the Radiochemical Centre

2636 S. Clearbrook Drive
Arlington Heights, Illinois 60005
Telephone: 312-593-6300—Telex: 28-2452

Our specific activity is service

In Canada: 400 Iroquois Shore Road • Oakville, Ontario • Telex: 069-82216 • Telephone: (416) 364-2183

A GELMAN FIRST
MAGNETIC



FILTER FUNNEL

47mm MAGNETIC FILTER FUNNEL
Product No. 4200, each \$24.50

Patent Applied For.

THE POWER OF MAGNETISM is harnessed for Chemical, Biological, and Water Testing. Never before has there been a filter funnel like this one. The difference is MAGNETISM. Magnetic coupling (it seals without clamps) makes this the finest, the easiest to use, the most reliable filter funnel available . . . at a lower price than you pay for conventional filter funnels. Consider these special features:

- **Transparent, unbreakable Lexan®** for rugged durability.
- **Two-Piece Construction** for easier use, cleaning, autoclaving.
- **Fits existing manifolds**, is fully adaptable.
- **One Year Warranty.**
- **Teflon Coated Ceramic Magnet** assures non-reactive, corrosion-free magnetic surface.

Write today for more information on the 47 mm Magnetic Filter Funnel, and the Gelman catalog offering over 30 types of filter hardware plus a complete line of Metrice® and Acropor® Membrane Filters & Prefilters.

GELMAN
INSTRUMENT COMPANY
600 South Wagner Road
Ann Arbor, Michigan 48106

Circle No. 87 on Readers' Service Card

with diet and regular laxative) and (ii) diminution of the sex drive (a variable effect).

The symptoms of muscle cramps, diaphoresis, tachycardia, and insomnia reported by Lennard, Epstein, and Rosenthal are signs of abrupt withdrawal or occur during the initial phase of giving up heroin and during the adjustment of the methadone dose level. I currently oversee more than 70 persons in a methadone withdrawal program which began over 3 months ago, and no patient has yet required hospitalization for withdrawal symptoms. At this point approximately 20 percent of this group has been abstinent for at least 6 weeks. In a properly run withdrawal group the physician in attendance can usually handle any symptomatology.

In the Illinois Drug Abuse Program there is no derogation of the work of therapeutic communities. Indeed, much inspiration comes from the Gateway House in Chicago. But only the most highly motivated addicts can gain access to these facilities. The vast majority of addicts are unable to qualify because they cannot "clean up," that is, abstain from heroin. This is the Catch-21 of drug abuse programs. Those who are ready to give up heroin and are able to endure heroin withdrawal constitute a small, select population. But the many thousands of addicts who have come to the point of wanting to stop deserve the assistance methadone can afford. That such assistance is required is attested to by the fact that there are many more people in methadone programs than in therapeutic communities.

A valid case can and must be made against perpetual methadone maintenance. It is a callous, cost-accounting approach to human life, ethically wrong, and based on the unsupported belief that the addict's physiology is permanently altered.

SYDNEY G. BILD

4819 South Kimbark Street,
Chicago, Illinois 60615

References

1. L. S. Goodman and A. Z. Gilman, Eds., *The Pharmacological Basis of Therapeutics* (Macmillan, New York, ed. 4, 1970), p. 261.

It would have been much more informative and helpful to *Science* readers if co-author Mitchell S. Rosenthal, who was noted as being the director of the Phoenix House programs in New York, had described the successful efforts of Phoenix House in helping narcotic addicts. I, for one,

would view any favorable results with a feeling of pleasure. It would not trouble me to hear that a program that I was not personally involved with had produced favorable results.

Unfortunately Rosenthal and his associates do not appear to feel the same way. They seem determined that the addict must be helped in the special way that is of particular interest and importance to them. The religious fervor of their article makes it clear that no report of favorable results with methadone would alter their antidrug dogma. This dogma appears to be more important to the authors than either the well being of the community or of the addict.

I sincerely hope for the success of the Phoenix House programs. I have read and heard mixed reports on their effectiveness, but have never questioned their usefulness or worth as long as there are addicts who are motivated to achieve abstinence and who demonstrate a readiness to remain in Phoenix House-type treatment programs.

The addiction problem is going to be with us for a long time and we cannot wait for a panacea that will be the perfect answer. Not all addicts have the same needs or similar motivation. There is plenty of room in the drug treatment field for a broad spectrum of treatment programs. Scientific study of these possible programs can only be hampered by moralistic arguments and an antidrug crusade.

ROBERT L. MARCUS

50 West 96 Street, New York 10025

Those who persist in ignoring history are dooming themselves to repeat it. The arguments in the preceding letters in support of the use of methadone to control heroin addiction were advanced 70 years ago to support use of heroin to control morphine addiction.

We find ourselves in the same position today, having to speak out against the use of methadone, as those who seven decades ago warned against the use of heroin for this purpose. As the discussion of seven decades ago extolling the virtues of heroin and its hazards seems to be virtually identical with that heard on the subject of methadone, we thought it would be useful to recall the former discussion.

A letter that appeared in the *New York Medical Journal* (1) from Maurice B. Ahlborn in 1901 advised:

That heroine will take the place of morphine without its disagreeable qualities, I am convinced, as I have repeatedly

quieted morphinomanics whose cravings were awful, with a few injections of it which did not nearly represent the amount of morphine craved for. There seems to be no craving for the heroine awakened by its continued use, as the subsequent gradual withdrawal after its substitution for the morphine has been attended with no particular craving and only in one case of twenty-three years' standing have I seen any tendency to increase the dose of the substituted drug. . . .

Heroin was listed in *Squibb's Materia Medica* (2) as "a remedy of much value . . . and it is also used as a mild anodyne and as a substitute for morphine in combating the morphine habit" (2).

As for the side effects of heroin, James R. L. Daly reported in the *Boston Medical and Surgical Journal* of 22 February 1900 (3):

It [heroin] possesses many advantages over morphine . . . it is not a hypnotic; there is no danger of acquiring the habit . . . it does not weaken the respiratory apparatus . . . it does not cause unpleasant disturbance of the stomach or intestines . . . [and] the ratio of the therapeutic dose to the toxic dose is considerably smaller than that of morphine.

There were many advocates of heroin at that time. E. H. Sickler, writing in *Medical Age* in January 1902, said of heroin, "Its continued administration does not give rise to any craving" (4). E. Y. Johnson said in the *American Practitioner and News* of December 1901 that heroin "given to a morphine habitue in place of the usual drug satisfies the craving and seems to destroy it finally without any longing for the new drug" (5).

The argument advanced against heroin in an article written in 1902, "The heroin habit another curse" by George E. Pettey (6), applies equally well to those who are presently defending and justifying the use of methadone.

. . . Many articles have appeared in medical literature during the last two years lauding this new agent . . . but some who have written in its praise seem to have been misled by the claim of its promoters, that even its prolonged use does not result in the formation of a habit.

When we consider the fact that Heroin is a morphine derivative, being the diacetyl of morphine, and that in this form it retains almost all of the properties of the salt from which it is derived, it does not seem reasonable that such a claim could be well founded. It is strange that such a claim should mislead any one or that there should be found among the members of our profession those who would reiterate and accentuate it without first subjecting it to the most critical tests, but such is the fact.

16 MARCH 1973

We cannot ignore, as do the enthusiastic proponents of methadone, the considerable effects of the adoption of the methadone maintenance model on a large scale. Reports are mounting that the expansion of methadone programs has been accompanied by an increase in deaths due to methadone. In some cities (Washington, D.C.; Buffalo; and Minneapolis), mortality related to the use of methadone approaches or equals that attributed to heroin (7). Methadone is readily available in the streets of New York and is replacing heroin as the opiate drug most widely bought and sold illegally (8). Unhappy consequences will surely follow unless we consider more carefully the long-range effects of a policy that undertakes to introduce potent psychoactive drugs into the community on a wide scale. Once the machinery to carry out a policy has been set in motion, it may not be possible to reverse its course before it is too late. How can physicians, policy-makers, and others who opt for such a policy justify their contribution to such outcomes?

Strategies and approaches that permit "no exit" need special scrutiny. The use of chemical solutions (methadone and its addicting potential) to solve chemical problems surely falls into this category. Problems that have diverse roots in social, economic, and human conditions require the development of social, economic, and human strategies for their solution. Phoenix House represents one such strategy (9). The use of chemical agents to combat the use of other chemical agents treats the problem as if it were its own solution.

HENRY L. LENNARD

LEON J. EPSTEIN

Department of Psychiatry, University of California, San Francisco 94122

MITCHELL S. ROSENTHAL

Phoenix House Programs, New York 10024

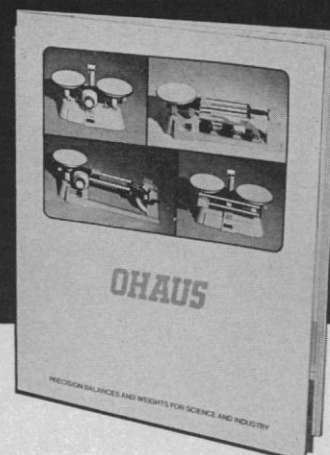
ARNOLD BERNSTEIN

Department of Psychology, Queens College of the City University of New York, Flushing 11367

References

1. M. B. Ahlborn, *N.Y. Med. J.* 74, 235 (1901).
2. *Squibb's Materia Medica* (E. R. Squibb, Brooklyn, N.Y., 1906).
3. J. R. L. Daly, *Boston Med. Surg. J.* 142, 190 (1900).
4. E. H. Sickler, *Med. Age* 20, 52 (1902).
5. E. Y. Johnson, *Amer. Pract.* 32, 413 (1901).
6. G. E. Pettey, *Alabama Med. J.* 15, 174 (1902).
7. *Los Angeles Times*, 5 October 1972, p. 1.
8. R. J. Bazell, *New York Post*, 8 January 1973, p. 33; *ibid.*, 9 January 1973, p. 37.
9. J. DeLeon, S. Holland, M. S. Rosenthal, *J. Amer. Med. Ass.* 222, 6 (1972); J. DeLeon, A. Skodal, M. S. Rosenthal, *Arch. Gen. Psychiat.* 28, 121 (1973); J. DeLeon, M. S. Rosenthal, K. Brodney, *Psychol. Rep.* 29, 11 (1971).

NEW OHAUS CATALOG DESCRIBES INNOVATIONS IN LABORATORY BALANCES



■ New or improved Ohaus precision balances and systems for the classroom laboratory and classroom facility are described in a 24-page, 4-color catalog now available on request. These balances represent the latest advances in precision weighing equipment, designed to meet the requirements of modern science and education for faster, simpler, more accurate and durable instruments at the lowest possible cost.

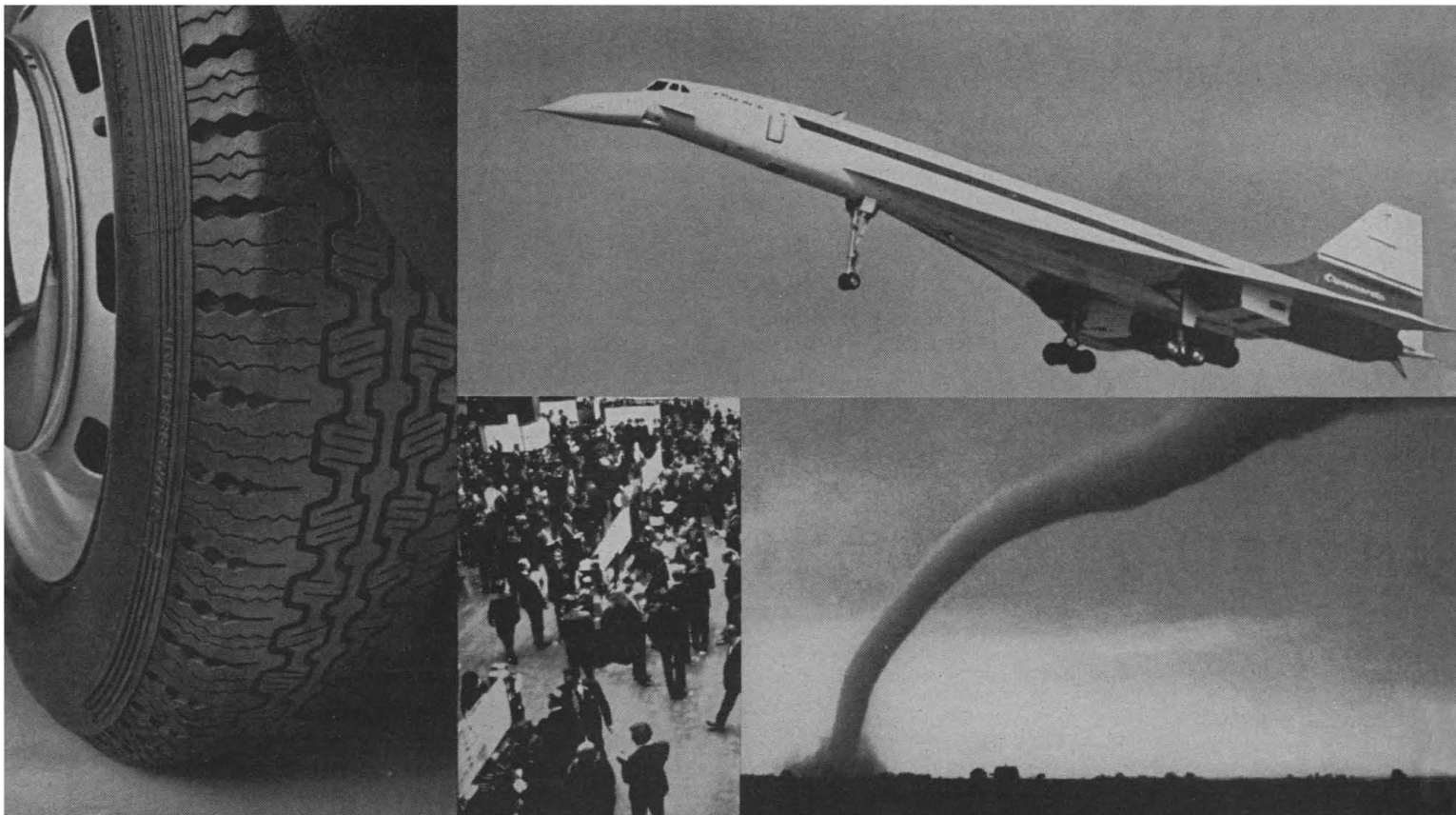
The NEW Ohaus Catalog '73 includes complete specifications on such proven Ohaus products as the Dial-O-Grams, Triple Beam, and Harvard Trip Balances; as well as a full complement of laboratory weights and accessories.

All represent the unique Ohaus capability for solving specific weighing problems and for introducing new concepts in laboratory balances. Send for your copy of the NEW Ohaus Catalog '73 now.

OHAUS SCALE CORPORATION

29 Hanover Road
Florham Park, N. J. 07932
(201) 377-9000

Circle No. 82 on Readers' Service Card



The plot changes. The story stays the same.

On Monday morning in Offenbach, Germany, a CalComp flatbed plotter charts a weather map for the national weather service.

At the same time, Hoare & Company, stock brokers of London, begin their week with trend analysis graphs plotted for their customers on CalComp drum plotters.

During the week, Pirelli of Italy will use a CalComp plotter to design tire treads. The Concorde supersonic jet will fly, thanks in part to engineering drawings

produced by a CalComp plotter. And map makers all over the world can draw maps with a speed and precision man cannot approach.

The plots change.

Wherever in the world a new need for computer graphics arises, CalComp will assuredly have the hardware and the software to meet the need.

We set the standards for our industry. We service what we sell around the world.

The plot changes. But our

reputation for innovation and our concern for excellence —those stay the same.

For information on plotters, call your local CalComp office, or contact California Computer Products, Inc., SM-M3-73, 2411 West La Palma Avenue, Anaheim, California 92801. (714) 821-2011.



CALCOMP

Circle No. 12 on Readers' Service Card

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

1973

H. S. GUTOWSKY	GARDNER LINDZEY
AUTHUR D. HASLER	RAYMOND H. THOMPSON
RUDOLF KOMPFFNER	EDWARD O. WILSON
DANIEL E. KOSHLAND, JR.	

1974

ALFRED BROWN	FRANK W. PUTNAM
JAMES F. CROW	MAXINE SINGER
SEYMOUR S. KETY	GORDON WOLMAN
FRANK PRESS	

Editorial Staff

Editor

PHILIP H. ABELSON

Publisher

WILLIAM BEVAN

Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

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

Assistant to the Editor: NANCY TEIMOURIAN

News and Comment: JOHN WALSH, LUTHER J. CARTER, DEBORAH SHAPLEY, ROBERT GILLETTE, NICHOLAS WADE, CONSTANCE HOLDEN, BARBARA J. CULLITON, SCHERRAINE MACK

Research News: ALLEN L. HAMMOND, WILLIAM D. METZ, THOMAS H. MAUGH II, JEAN L. MARX

Book Reviews: SYLVIA EBERHART, KATHERINE LIVINGSTON, ANN SELTZ-PETRASH

Cover Editor: GRAYCE FINGER

Editorial Assistants: MARGARET ALLEN, ISABELLA BOULDIN, BLAIR BURNS, ELEANORE BUTZ, MARY DORFMAN, JUDITH GIVELBER, CORRINE HARRIS, NANCY HARTNAGEL, OLIVER HEATWOLE, CHRISTINE KARLIK, MARSHALL KATHAN, MARGARET LLOYD, DANIEL RABOVSKY, JEAN ROCKWOOD, PATRICIA ROWE, LEAH RYAN, JOHN SCHAUER, LOIS SCHMITT, YA LI SWIGART

Guide to Scientific Instruments: RICHARD SOMMER

Membership Recruitment: LEONARD WRAY; *Subscriptions:* BETTE SEEMUND; *Addressing:* THOMAS BAZAN

Advertising Staff

Director

EARL J. SCHERAGO

Production Manager

PATTY WELLS

Advertising Sales Manager: RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Herbert L. Burkland, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: John P. Cahill, Room 2107, 919 N. Michigan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phones: (Area code 202) Central Office: 467-4350; Book Reviews: 467-4367; Business Office: 467-4411; Circulation: 467-4417; Guide to Scientific Instruments: 467-4480; News and Comment: 467-4430; Reprints and Permissions: 467-4483; Research News: 467-4321; Reviewing: 467-4440. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 29 September 1972. **ADVERTISING CORRESPONDENCE:** Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

Enclaves of Pluralism: The Private Universities

The survival of predominantly private universities may not be critical to the survival of civilization, yet their importance to higher education for the last 1000 years—their position and their purpose—makes their future worthy of deliberate decision rather than happenstance.

Any such consideration must recognize that completely private universities no longer exist. The convergence of public and private institutions started years ago and accelerated significantly in the last decade. For example, almost all universities now use public funds, private philanthropy, endowment income, and revenue from services they render to pay their expenses. Further, most provide a wide variety of undergraduate and graduate programs and strain to the utmost to add "new" ones. They select faculty in about the same manner, they have similar systems of governance, and they are subject to the same legal constraints (for example, unemployment compensation). Thus, each institution is, at best, more or less private or more or less public.

But significant differences do remain.

The predominantly private institutions have the potential for greater flexibility. They can exercise greater or lesser selectivity in assembling their study body. They can choose fewer programmatic variations or can limit themselves to scholarship. They can exert considerable leadership for change if they wish to do so.

By doing some or all of these things, private universities provide a pluralism matching that of the society they serve. So far, they have been doing this at little cost to society, although that cost has risen in recent years. Indeed, it is the problem of rising costs that has created the need to examine the future of private universities. If there were no need for subsidy, there would be no problem—private universities could continue to maintain a respectable profile among institutions of higher education.

An argument has been made that private universities, with their available open places, could take care of the overflow of students in the growing (1960's) pressure for higher education for all. A more pertinent point is that every student at a public university is offered a scholarship, regardless of need. This scholarship equals the difference between cost per student and actual charges. In principle, this difference could be made available to each student to use as tuition wherever desired; some 18 states have already adopted this practice.

Finally, we must not overlook the strong historic roots that tie private universities to the very beginning of higher education in America. Private universities are no longer the sole avenues of higher education, constituting just under half of the number of institutions in the country and enrolling only 30 percent of the students. Yet they continue to provide important contacts between faculty and students. Their small size and selectivity in faculty and student body have given private universities an elitist connotation. Size is not to be confused with quality—it goes without saying that many scholarly attainments stem from large institutions. Nor should elitism be equated with social superiority, greater wisdom, or a higher degree of humanity. The small, elite, quality university simply provides a community of scholarship for some people of high intellectual capacity.

Thus the diversity offered by the private institution, mirroring the makeup of society, should make the case for its survival. It is difficult to foresee society abandoning such an important reflection of its own image.—NORMAN HACKERMAN, *President, Rice University, Houston, Texas 77001*

Really, the only way to dispense dangerous reagents



L/I's patented REPIPETS® are the only dispensers completely safe to use with any reagent except HF. That's because only glass and Teflon® contact your reagent. (No other precision dispenser offers this important advantage.) Concentrated acids, concentrated alkalis, chlorinated hydrocarbons, and volatiles such as chloroform and toluene pose no problems for REPIPETS. No odors can escape from the completely enclosed transparent REPIPET. Furthermore, L/I supplies REPIPETS to fit any container up to

5 gallon carboys! That's why over 150,000 REPIPETS are now in daily use . . . including the first one made 11 years ago!

REPIPET facts and figures. Accuracy 1%. Reproducibility 0.1%. Integral air filters protect reagent purity. Magnifying indicators standard. Stocked in 0.5, 1, 5, 10, 20 and 50 ml sizes. Prices range from \$59.50 for Standard REPIPETS with container to \$87.50 for the 50 ml Universal REPIPET. Order from your distributor or Labindustries.

Circle No. 6 on Readers' Service Card

LABINDUSTRIES

1802 Second Street/Berkeley, California 94710/ Phone (415) 843-0220 Cable LABIND

FORTHCOMING EVENTS

April

16-18. Anglo-American Conf. on **Drug Abuse**, jointly by Royal Soc. of Medicine and Royal Soc. of Medicine Foundation Inc., London, England. (Conf. Office, Royal Soc. of Medicine, 1 Wimpole St., London, W1M 8AE)

16-18. **Liquid State—Van der Waals Centenary**, Kent, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London SW1X 8QX England)

16-18. **Nonlinear Elasticity**, Madison, Wis. (G. G. Moran, Mathematics Research

Center, Univ. of Wisconsin, 610 Walnut St., Madison 53706)

16-20. American Soc. for **Experimental Pathology**, Atlantic City, N.J. (G. B. Mider, ASEP, 9650 Rockville Pike, Bethesda, Md. 20014)

16-20. American **Geophysical Union**, 54th annual, Washington, D.C. (A. F. Spilhaus, Jr., AGU, 1707 L St., NW, Washington, D.C. 20036)

16-20. American Assoc. of **Immunologists**, Atlantic City, N.J. (H. Metzger, AAI, 9650 Rockville Pike, Bethesda, Md. 20014)

16-20. American Inst. of **Nutrition**, Atlantic City, N.J. (AIN, 9650 Rockville Pike, Bethesda, Md. 20014)

16-20. American Soc. for **Pharmacology and Experimental Therapeutics**, Atlantic City, N.J. (E. B. Cook, ASPET, 9650 Rockville Pike, Bethesda, Md. 20014)

18-20. **Great Lakes Research**, 16th conf., Intern. Assoc. for Great Lakes Research, Columbus, Ohio. (C. E. Herdendorf, College of Biological Sciences, Ohio State Univ., Columbus 43210)

19-20. Symposium on **Controlled Release of Biologically Active Agents**, Birmingham, Ala. (A. C. Tanquary, Southern Research Inst., 2000 Ninth Ave. S., Birmingham 35205)

19-21. Southern Soc. for **Philosophy and Psychology**, Knoxville, Tenn. (M. Loeb, Dept. of Psychology, Univ. of Louisville, Louisville, Ky.)

20-21. Illinois State Acad. of Science, Urbana. (N. R. Brewer, ISAS, 5757 S. Drexel Ave., Chicago)

22-26. American **Radium Soc.**, Colorado Springs, Colo. (F. N. Rutledge, 4828 Caroline St., Houston, Tex. 77004)

22-27. Council for **Exceptional Children**, 51st annual intern., Dallas, Tex. (P. W. Stavros, CEC, 1411 S. Jefferson Davis Hwy., Arlington, Va. 22202)

23-25. **Instrument Soc. of America**, 19th analysis instrumentation symp., 14th chemical and petroleum instrumentation symp., Process Measurement and Control Div. symp., St. Louis, Mo. (J. L. Kern, Monsanto Co., 800 N. Lindbergh St., St. Louis 63166)

23-28. American Acad. of **Neurology**, Boston, Mass. (S. A. Nelson, AAN, 4005 W. 65 St., Minneapolis, Minn. 55435)

23-30. American Soc. for **Clinical Investigation**, Atlantic City, N.J. (P. Calabresi, Roger Williams General Hospital, Providence, R.I. 02908)

24-25. Association for **Population/Family Planning Libraries and Information Centers**, 6th natl. conf., New Orleans, La. (R. Versteeg, APLIC, c/o Carolina Population Center Library, University Sq., Chapel Hill, N.C. 27514)

24-27. International **Magnetics Conf.**, Magnetic Soc. of the Inst. of Electrical and Electronics Engineers, Washington, D.C. (D. H. Looney, Bell Labs., Whippany Rd., Whippany, N.J. 07981)

25-26. American **Geriatrics Soc.**, Beverly Hills, Calif. (E. Henderson, 10 Columbus Circle, New York 10019)

25-27. **Nondestructive Evaluation**, 9th symp., Southwest Research Inst. and South Texas Section, American Soc. for Nondestructive Testing, Inc., San Antonio. (G. Matzkanin, SRI, P.O. Drawer 28510, San Antonio 78284)

25-27. **The Ocean, Nuclear Energy, and Man**, American Nuclear Soc. and Marine Technology Soc., Palm Beach Shores (Singer Island), Fla. (M. J. Ohanian, Dept. of Nuclear Engineering, Univ. of Florida, Gainesville 32601)

25-28. International **Communication Assoc.**, Montreal, P.Q., Canada. (M. Z. Sincoff, Center for Communication Studies, Ohio Univ., Athens 45201)

25-28. National Council of **Teachers of Mathematics**, Houston, Tex. (J. D. Gates, NCTM, 1201 16th St., NW, Washington, D.C. 20005)

26. **Sigma Pi Sigma**, Washington, D.C. (D. W. J. Shea, State Univ. of New York, Stony Brook 11790)

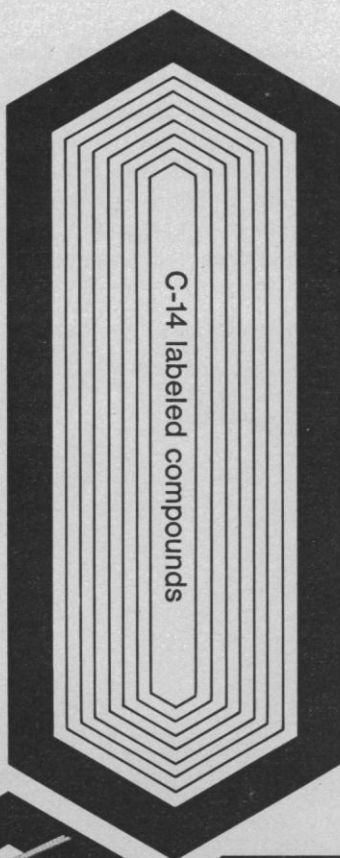
Our catalog line of carbon-14 labeled compounds isn't large enough to make us complacent. But it is big. In fact it's about the largest selection of C-14 labeled compounds you will find anywhere available from a catalog.

And it's always growing larger. There are over 700 research chemicals labeled with carbon-14 in 10 product groups, including amino acids, bile acids, drugs and related chemicals, insecticides and pesticides, nucleosides, nucleotides, organic intermediates, polynuclear aromatics, steroids, purines and pyrimidines. We also feature a growing list of tritium labeled compounds, to round out our product line.

A large and growing line is fine — but it's not enough. Each Mallinckrodt product comes to you in a revolutionary see-thru protective package, with thorough documentation of purity. Radiochromatographic profiles from at least two different chromatography systems are included with each labeled compound. And with each product in Mallinckrodt's guarantee-of-purity certificate.

Sound like too much to hope for? Try us. Write or phone (314) 291-8191 for our new catalog. See for yourself.

Check these catalog C-14 labeled compounds — many available only from Mallinckrodt.



Growth Rings



Mallinckrodt

labeled compounds

P. O. Box 5439
St. Louis, Mo. 63160
(314) 291-8191

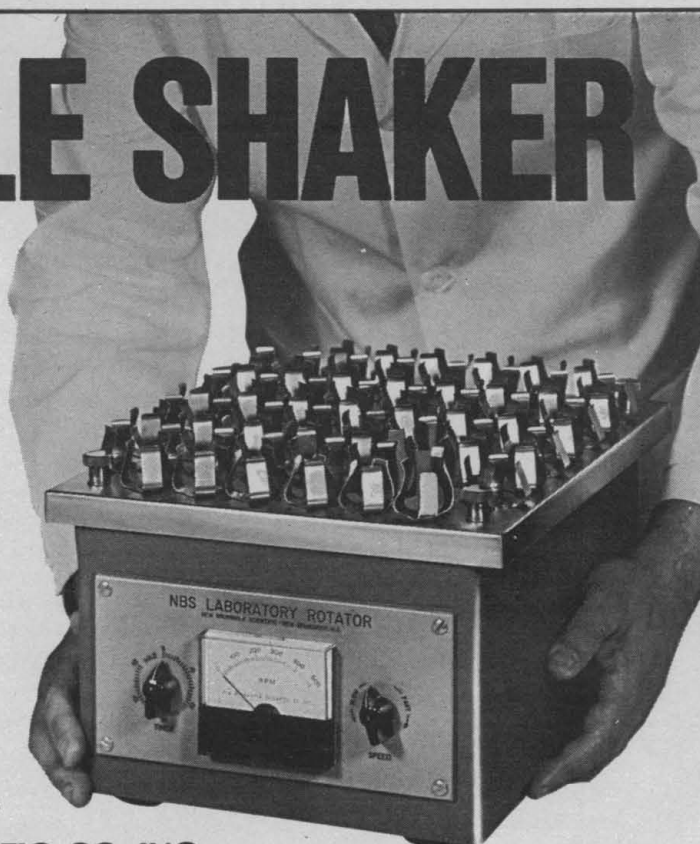
Circle No. 62 on Readers' Service Card

PORTABLE SHAKER

This Gyrotory shaker plugs in right where you want it—in a bench-top incubator, in a refrigerator, or in any corner of your lab. It is small in size, low in price, yet built with the same power and precision that drives large New Brunswick Shakers. The rugged rotator provides low agitation rates for tissue culture studies, and can be "revved" up to 400 rpm for prolonged studies requiring vigorous aeration and mixing.

The G2 Rotator not only shakes continuously, it shakes accurately. Speed is controlled electronically and is indicated on an electrical tachometer. Rate of agitation remains constant even with unbalanced loads or normal voltage fluctuations.

Choose from 18 different shaker platforms for Erlenmeyer flasks, test tubes and beakers.



Write for Bulletin No. G2S/373

NEW BRUNSWICK SCIENTIFIC CO., INC.
1130 SOMERSET ST. • P.O. BOX 806, NEW BRUNSWICK, NEW JERSEY 08903

Circle No. 63 on Readers' Service Card

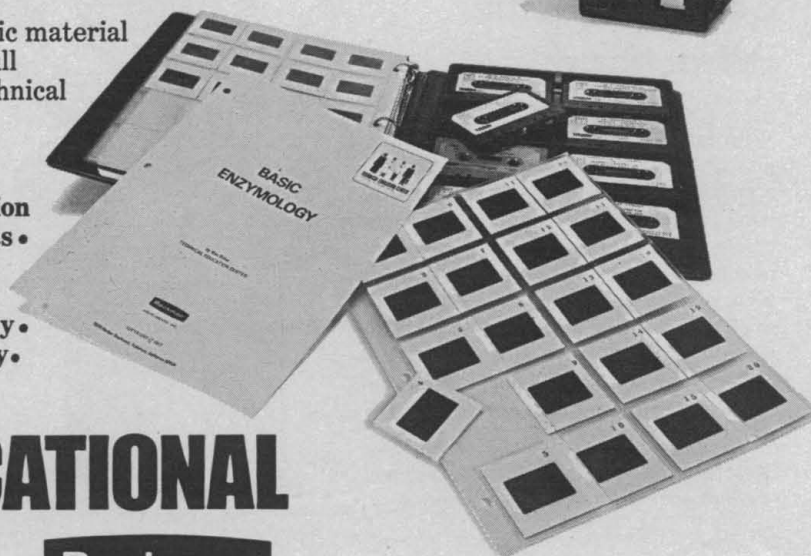
HOW TO GET THE SHOW ON THE ROAD.

Now you have the Beckman New Dimension Series of audio-visual technical programs available for your own lab, plant, or classroom...the same professionally acclaimed courses offered nationwide in Beckman Training Centers.

Each program, in a special album, consists of printed script, set of 35mm slides, and tape cassettes automatically keyed to the slides.

Courses listed below range from basic material to advanced instruction. For prices and full information, call or write to Beckman Technical Education Center, 2500 Harbor Blvd., Fullerton, Calif. 92634.

Enzymatic Analysis • Instrumental Method in Cell Biology • Liquid Scintillation Counting • Electrochemical Measurements • Physiological Measurements • UV-Visible Spectroscopy • Infrared Techniques • Radioimmunoassay • Gas Chromatography • Electrophoresis • Electroencephalography.
And many more.



BUY OUR EDUCATIONAL PROGRAMS.

Beckman®

INSTRUMENTS, INC.

Circle No. 65 on Readers' Service Card

What in the world ARE you doing with a Brinkmann Micromanipulator?



First and foremost, Brinkmann micromanipulators were designed for biological applications, so it's no surprise they are widely used in microsurgery and neurophysiology.

What is surprising is that they have so many other uses. For example, in microchemistry, they're used to handle radioactive samples; in electronics, to probe microcircuits, and by physicists to align laser systems.

What could you be doing more efficiently with a Brinkmann micromanipulator? Over 40 different models permit precise movement in magnification ranges up to 750X. There are inverted models, models with calibrated high sensitivity drives, tilting and rotating devices, and a full range of accessories. Let our free catalog start you thinking of some novel new uses. Just write: Brinkmann Instruments, Cantiague Rd., Westbury, New York 11590.



Circle No. 84 on Readers' Service Card

PARR® CELL DISRUPTION BOMB

For Rapid Cell and Tissue Extractions

With samples held under an inert nitrogen blanket, rapid decompression from a reliable PARR® bomb offers the ideal way to release the contents of cells, tissues and micro-organisms without heating, without ionization and without high mechanical stress. Either large or small samples can be treated easily with the action varied to produce either partial rupture or complete homogenization by simply adjusting the nitrogen pressure.

Ask for Product Sheet 4635 describing this convenient extraction method.



PARR INSTRUMENT COMPANY
211 Fifty-Third St. Moline, Ill. 61265
Telephone (309) 762-7716

26-27. **Scanning Electron Microscope Symp.**, 6th annual, Chicago, Ill. (O. Johari, IIT Research Inst., 10 W. 35 St., Chicago 60616)

26-28. **Louisiana Acad. of Sciences**, Monroe. (B. F. Dowden, Dept. of Biological Sciences, Louisiana State Univ., Shreveport 71105)

26-28. **Ohio Acad. of Science**, Cleveland. (J. H. Melvin, OAS, 445 King Ave., Columbus 43201)

26-28. **Population Assoc. of America**, New Orleans, La. (J. W. Brackett, PAA, P.O. Box 14182, Benjamin Franklin Sta., Washington, D.C. 20044)

27-28. **Georgia Acad. of Science**, Atlanta. (E. A. Stanley, Dept. of Geology, Univ. of Georgia, Athens 30601)

27-28. **Iowa Acad. of Science**, Grinnell. (R. W. Hanson, Dept. of Chemistry, Univ. of Northern Iowa, Cedar Falls 50613)

27-28. **Missouri Acad. of Science**, Columbia. (R. G. Combs, 206 Electrical Engineering Bldg., Univ. of Missouri, Columbia 65201)

27-28. **North Carolina Acad. of Science**, Charlotte. (J. A. Yarbrough, Dept. of Biology, Meredith College, Raleigh 27602)

27-28. **North Dakota Acad. of Science**, Grand Forks, N.D. (A. W. Johnson, University Station, P.O. Box 8123, Univ. of North Dakota, Grand Forks 58201)

27-28. **American Assoc. of University Professors**, St. Louis, Mo. (B. H. Davis, AAUP, Suite 500, 1 Dupont Circle, NW, Washington, D.C. 20036)

27-28. **Wisconsin Acad. of Sciences, Arts and Letters**, Prairie du Chien. (J. R. Batt, WASAL, 5001 University Ave., Madison 53705)

28. **Society for Investigative Dermatology**, Atlantic City, N.J. (J. S. Strauss, Boston Univ. Medical Center, 80 E. Concord St., Boston, Mass. 02118)

28. **Societal Problems of Water Resources**, 2nd annual symp., Illinois Earth Science Assoc., Chicago. (M. Qutub, Northeastern Illinois Univ., Bryn Mawr at St. Louis Ave., Chicago 60625)

28-29. **Montana Acad. of Sciences**, Dillon. (R. E. Juday, Dept. of Chemistry, Univ. of Montana, Missoula 59801)

28-30. **International Symp. on the Genetics of Cyanophytes**, Pittsburgh, Pa. (E. Raizen, Dept. of Biological Sciences, Duquesne Univ., Pittsburgh 15219)

29-30. **Congress on Environmental Health**, American Medical Assoc., Chicago, Ill. (F. W. Barton, AMA, 535 N. Dearborn St., Chicago 60610)

29-1. **Classification Soc.**, North American Branch, 4th annual, Atlanta, Ga. (F. J. Rohlf, Dept. of Biology, State Univ. of New York, Stony Brook 11790)

29-2. **Off-Shore Technology**, Inst. of Electrical and Electronics Engineers, Houston, Tex. (Technical Activities Bd., 345 E. 47 St., New York 10017)

29-3. **American Ceramic Soc., Inc.**, Cincinnati, Ohio. (F. P. Reid, ACSI, 65 Ceramic Dr., Columbus 43214)

29-3. **American Oil Chemists Soc.**, New Orleans, La. (J. Lyon, AOCS, 508 S. 6 St., Champaign, Ill. 61820)

30-12. **Lindau Psychotherapy Weeks**, Assoc. for Psychotherapeutic Training, Lindau, Germany. (H. Stolze, D-8 München 81, Adalbert-Stifter-Strasse 31)

Vive La Différence!

ITLC BY GELMAN

"Logically different ITLC does make a difference. ITLC (Instant Thin Layer Chromatography) is Gelman's distinctive improvement on classic TLC (Thin Layer Chromatography).

A Difference You Can See

Just compare them:

ORDINARY TLC



The adsorbent coating is on the front of the glass, plastic, or metal sheet.

GELMAN ITLC™



The adsorbent saturates and surrounds the glass micro-fiber cloth of the ITLC sheet.

WITH ITLC THE SOLVENT & DETECTION SYSTEMS PENETRATE FROM BOTH SIDES!

This Difference Means:

- RAPID SPOTTING
- FASTER SEPARATIONS
- SHARPER SEPARATIONS
- EASIER HANDLING
- ECONOMY

In addition to unique ITLC SHEETS, Gelman's Chromatography line offers CHROMATOGRAPHY CHAMBERS . . . CHROMATOGRAPHY DYES . . . U.V. LAMPS . . . AND THE SPECIAL GELMAN DRUG IDENTIFICATION SET, including Extraction, Separation, and Developing Reagents.

Try ITLC in your laboratory . . . See the difference!

Order through your Regular Gelman Supplier or write for information:



GELMAN
INSTRUMENT COMPANY
600 South Wagner Road
Ann Arbor, Michigan 48106

May

1-2. **Electron Device Techniques Conf.**, Inst. of Electrical and Electronics Engineers, New York, N.Y. (D. Slater, Advisory Group on Electron Devices, 9th Floor, 201 Varick St., New York 10014)

1-3. **Industrial Waste**, 28th annual conf., West Lafayette, Ind. (D. W. Hawkins, Room 308, Civil Engineering Bldg., Purdue Univ., West Lafayette 47907)

1-4. **Virginia Acad. of Science**, Williamsburg. (R. C. Berry, 5907 Brookfield Rd., Richmond, Va. 23227)

2-4. **International Conf. on Surgical Care**, Royal College of Surgeons, Dublin, Ireland. (H. O'Flanagan, Irish Medical Assoc., 10 Fitzwilliam Pl., Dublin 2)

2-5. **Midwestern Assoc. of Forensic Scientists**, Lansing, Mich. (R. E. Bisbing, Div. of Crime Detection, Michigan Dept. of Public Health, 3500 N. Logan St., Lansing 48914)

2-6. **Protides of Biological Fluids**, 21st colloquium, Brugge, Belgium. (Colloquium on Protides of the Biological Fluids, Simon Stevin Instituut, Jerusalemstraat 34, B-8000 Brugge)

3-4. **National Information Retrieval Colloquium**, 10th annual, Philadelphia, Pa. (M. Nussbaum, Computamation, 2955 Kensington Ave., Philadelphia 19134)

3-5. **Society for American Archaeology**, San Francisco, Calif. (R. E. W. Adams, Univ. of Texas, Suite 250, 4242 Piedras Dr., San Antonio 78228)

3-5. **American Assoc. for the History of Medicine**, Cincinnati, Ohio. (G. Miller, Howard Dittrick Museum of Historical Medicine, 11,000 Euclid Ave., Cleveland, Ohio 44106)

3-5. **Eastern Psychological Assoc.**, Washington, D.C. (M. Benimoff, Dept. of Psychology, Glassboro State College, Glassboro, N.J. 08028)

3-6. **Christian Medical Soc.**, Dallas, Tex. (H. W. Robinson, 3909 Swiss Ave., Dallas 75214)

3-6. **Association of Clinical Scientists**, Tampa, Fla. (F. W. Sunderman, Jr., Univ. of Connecticut, School of Medicine, Box G, Farmington 06032)

3-6. **National Assoc. of Social Workers**, Atlanta, Ga. (C. A. Alexander, NASW, 600 Southern Bldg., 15th and H Sts., NW, Washington, D.C. 20005)

3-7. **American Psychoanalytic Assoc.**, Honolulu, Hawaii. (S. Goodman, 3021 Telegraph Ave., Berkeley, Calif. 94705)

3-7. **Association for Research in Vision and Ophthalmology**, Sarasota, Fla. (R. D. Reinecke, Albany Medical College, Albany, N.Y. 12208)

4-5. **Minnesota Acad. of Science**, Northfield. (M. I. Harrigan, MAS, 3100 38th Ave., S., Minneapolis, Minn. 55406)

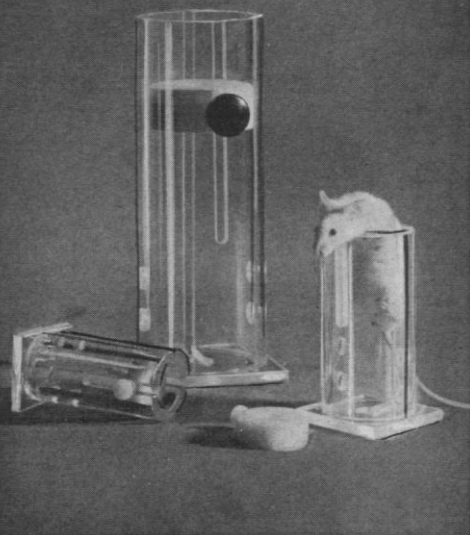
4-5. **North Dakota Acad. of Science**, Grand Forks. (B. G. Gustafson, Div. of Continuing Education, Univ. of North Dakota, Grand Forks 58201)

4-6. **American College of Apothecaries**, St. Louis, Mo. (D. C. Huffman, Jr., 5291 Rock Ridge Rd., Memphis, Tenn. 38128)

4-6. **Drosophila Research Conf.**, De Kalb, Ill. (S. Mittler, Dept. of Biological Science, Northern Illinois Univ., De Kalb 60115)

4-6. **American Acad. of Psychoanalysis**, Honolulu, Hawaii. (J. Barnett, AAP, 40

Slip Into Something Comfortable



PLAS■LABS® Broome Style Rodent Restrainers

We know you have been having problems restraining your small laboratory animals effectively. You've told us. Now, we are offering the first significant design development in this field in the last decade. The cylindrical design of our Broome Style Rodent Restrainer completely solves the problem of rodents turning around or reversing themselves once they are introduced into the restrainer. This new restrainer is perfect for injection or blood samplings. Three sizes are available for rodents ranging from 25 grams to 600 grams.

From Plas-Labs, a growing Company of innovative people to meet your needs in animal restraint systems and specialized plastic research equipment. For your copy of our catalog, write or call Plas-Labs, 917 Chilson, Lansing, Michigan 48906. Phone (517) 372-7177.

PLAS■LABS®

Circle No. 88 on Readers' Service Card

Circle No. 86 on Readers' Service Card

Gramercy Park North, New York 10024)

6-11. American Soc. for Microbiology, Miami Beach, Fla. (R. W. Sarber, ASM, 1913 I St., NW, Washington, D.C. 20006)

7-9. Rocky Mountain Bioengineering Symp., 10th annual, Boulder, Colo. (N. B. Kindig, Dept. of Electrical Engineering, Univ. of Colorado, Boulder 80302)

7-9. Society of Economic Paleontologists and Mineralogists, Anaheim, Calif. (Mrs. R. Tener, SEPM, Box 979, Tulsa, Okla. 74101)

7-10. Aerospace Medical Assoc., Las Vegas, Nev. (M. H. Goodwin, AMA, Washington National Airport, Washington, D.C. 20001)

7-11. Society of Manufacturing Engineers, Detroit, Mich. (R. W. Taylor, SME, 20501 Ford Rd., Dearborn, Mich. 48128)

7-11. Society of Plastics Engineers, Montreal, P.Q., Canada. (C. C. Campbell, SPE, 656 W. Putnam Ave., Greenwich, Conn. 06830)

8-9. Fluvial Processes and Sedimentation, 9th Canadian Hydrology Symp., Edmonton, Alta., Canada. (C. R. Neill, Research Council of Alberta, 303 Civil-Electrical Engineering Bldg., Univ. of Alberta, Edmonton T6G 2E1)

9-11. Operations Research Soc. of America, Milwaukee, Wis. (J. R. Borsting, Dept. of Operations Research and Administrative Science, Naval Postgraduate School, Monterey, Calif. 93940)

9-11. Midwestern Psychological Assoc.,

Chicago, Ill. (W. F. Hill, Dept. of Psychology, Northwestern Univ., Evanston, Ill. 60201)

9-11. International Symp. on Thrombosis and the Molecular Biology of the Platelet and Other Interacting Cells, Chicago, Ill. (F. M. Booyse, Dept. of Biochemistry, Rush Medical College, 1753 W. Congress Pkwy., Chicago 60612)

9-12. Society for Technical Communication, Houston, Tex. (C. T. Youngblood, STC, Suite 421, 1010 Vermont Ave., NW, Washington, D.C. 20005)

10-11. Polymer and Fiber Microscopy, 12th symp., Textile Research Inst., Raleigh, N.C. (D. C. Felty, Chemstrand Research Center, Research Triangle Park, Durham, N.C. 27702)

11-12. American Assoc. of Clinical Urologists, New York, N.Y. (R. B. Carson, AACU, 708 E. Broward Blvd., Fort Lauderdale, Fla. 33301)

13-17. Radiation Research Soc., St. Louis, Mo. (R. J. Burk, Jr., RRS, 4211 39th St., NW, Washington, D.C. 20016)

13-18. Electrochemical Soc., Chicago, Ill. (E. G. Enck, ES, P.O. Box 2071, Princeton, N.J. 08540)

13-18. Electronics Div., Electrochemical Soc., Chicago, Ill. (H. R. Huff, Texas Instruments, Inc., Mail Station 202, Dallas, Tex. 75222)

13-18. Society for Experimental Stress Analysis, Los Angeles, Calif. (B. E. Rossi, SESA, 21 Bridge Sq., Westport, Conn. 06880)

14-16. American Assoc. of Petroleum

Geologists, Anaheim, Calif. (T. L. Bear, Bear & Kistler, 1052 W. 6 St., Los Angeles, Calif. 90017)

14-17. Irregularities in the Equatorial Ionosphere, American Geophysical Union, Dallas, Tex. (A. F. Spilhaus, Jr., AGU, 1717 L St., NW, Washington, D.C. 20036)

14-18. Symposium on Environmental Behaviour of Radionuclides Released in the Nuclear Industry, Intern. Atomic Energy Agency, Aix-en-Provence, France. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

14-18. American Psychiatric Assoc., Montreal, P.Q., Canada. (B. W. Hogan, APA, 1700 18th St., NW, Washington, D.C. 20009)

15-17. American Inst. of Chemists, Houston, Tex. (P. B. Slawter, Jr., AIC, 79 Madison Ave., New York 10016)

15-17. Electrical and Electronic Measurement and Test Instrument Conf., Ottawa, Ont., Canada. (G. R. Symonds, 4-261 Fifth Ave., Ottawa K1S 2N4)

15-20. American Physiological Soc., Atlantic City, N.J. (R. G. Daggs, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

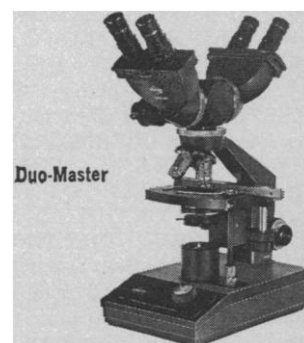
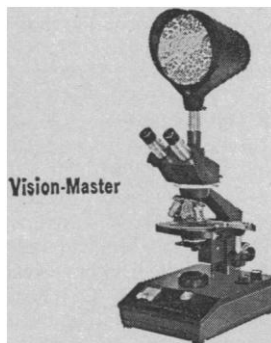
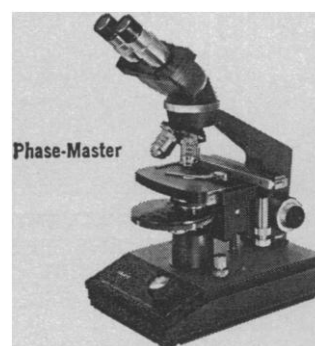
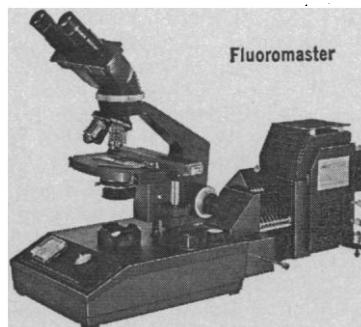
16-18. National Soc. for the Prevention of Blindness, New York, N.Y. (W. D. David, NSPB, 79 Madison Ave., New York 10016)

16-19. Society of Technical Writers and Publishers, Houston, Tex. (C. T. Youngblood, STWP, Suite 421, 1010 Vermont Ave., NW, Washington, D.C. 20005)

16-20. American Pediatric Soc., San

Straight to the point of the matter - SWIFT Laboratory-Research Microscopes

Modular concept, custom assembly, and immediate interchangeability are keynote characteristics of the SWIFT line of laboratory-research microscopes. Applicable to every area of microscopy, including photo-micrography, they will accommodate all types of illumination, critical through Koehler, and optical combinations for brightfield, darkfield, or phase. In the case of the Fluoromaster, the special SWIFT Illuminator provides for the full range of fluorescence microscopy for pure scientific investigation and evaluation.



WRITE TODAY FOR LITERATURE AND NAME OF NEAREST DEALER FOR DEMONSTRATION



SWIFT INSTRUMENTS, INC.

(MAIN OFFICE: Boston, MA)

Technical Instrument Division, Dept. S-3

P.O. BOX 562, SAN JOSE, CA 95106 • 408/293-2380

SWIFT AGENCIES are located throughout the U.S. and in most foreign countries.

DENTON means Reliability in ELECTRON MICROSCOPY EQUIPMENT

DV-502
High Vacuum
Evaporator



- Fast pumping . . . to 55×10^{-5} Torr within 4 minutes.
- Functional, convenient cabinet with full accessibility
- Minimum contamination
- Stainless steel baseplate-valve-trap
- Wide range of accessories and factory modifications available

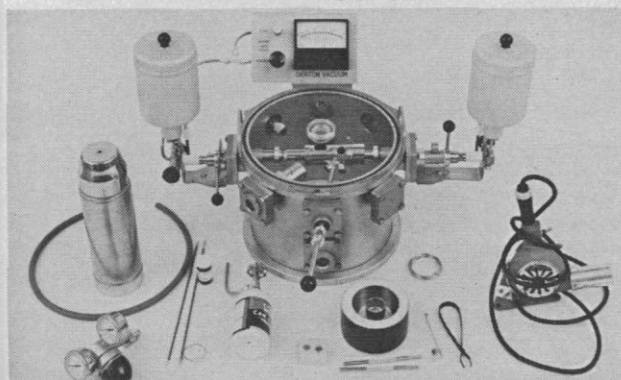
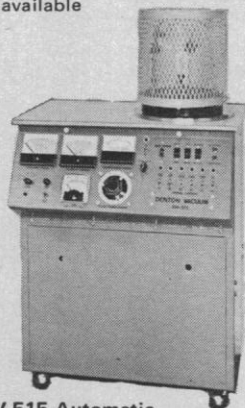


DCP-1 Critical Point Dryer

- Multi-fluid capability, including CO_2 , Freon N_2O
- Distortion-free drying in rapid cycle
- Operational simplicity . . . with no tools required
- Stainless steel construction
- For processing specimens on grids, SEM stubs, slides, etc.

DV-515 Automatic
Air Cooled Evaporator

- Fast pumping . . . to 2×10^{-5} Torr within 5 minutes
- Complete automatic cycle in 8 minutes
- Full components and controls accessibility
- Compact design, full mobility, plug-in installation
- Consistent results, batch-after-batch



DFE-3 Freeze Etch Apparatus

- Will fracture, etch, and replicate both sides of the fracture of quick-frozen specimens
- Complete shroud prevents contamination
- Rapid operation — 1/2-hour cycle
- 10^{-6} Torr vacuum when mounted on DV-502
- Modular, compatible with LN_2 trapped systems

All Denton Vacuum components are interchangeable with existing systems to optimize your equipment investment.

Call on the specialists in equipment for electron microscopy . . .

DENTON
VACUUM, INC.

Cherry Hill Industrial Center, Cherry Hill, N.J. 08003
(609) 424-1012

REQUEST
FREE
CATALOG
INFORMATION

MOLECULAR GENETIC MECHANISMS IN DEVELOPMENT AND AGING

edited by MORRIS ROCKSTEIN, Ph.D., and GEORGE T. BAKER III, Ph.D.

This book summarizes some of the most important research now being done on nucleic acids and protein metabolism in development and aging.

Contents: M. ROCKSTEIN: The Role of Molecular Genetic Mechanisms in the Aging Process. M. BLUMENFELD: The Replication of Satellite DNA's during *Drosophila* Development. U. CLEVER: The Control of Cellular Growth and Death in the Development of an Insect. C. A. LANG: A DNA Replication Intermediate in Mosquito Development. RUTH R. PAINTER: Biochemical Changes in Nucleic Acids and Proteins during Ovarian Maturation and Egg Development. H. V. SAMIS, M. B. BAIRD, and H. R. MASSIE: Senescence and the Regulation of Catalase Activity and the Effect of Hydrogen Peroxide on Nucleic Acids. N. G. PATEL: Hormonal Regulation of Protein Synthesis in Insects. P. S. CHEN: Amino Acid Pattern and Rate of Protein Synthesis in Aging *Drosophila*. J. D. STIDHAM: The Occurrence, Incorporation, and Fate of Amino Acids during Development and Aging in the Yellow Fever Mosquito, *Aedes aegypti* (L.).

1972, 264 pp., \$8.50

GROWTH, NUTRITION, AND METABOLISM OF CELLS IN CULTURE

edited by GEORGE H. ROTHBLAT and VINCENT J. CRISTOFALO

This two-volume treatise provides a comprehensive and up-to-date review of the current research on the physiology and biochemistry of vertebrate, invertebrate, and plant cells in culture. The first volume—dealing exclusively with mammalian cells—discusses the various components of tissue culture medium, and explores the role of serum in cell growth and metabolism. It also covers the metabolism of the major components of cells and medium—e.g., carbohydrates, lipids, amino acids, purines, pyrimidines, oxygen, and carbon dioxide. Volume 2 deals with specialized mammalian, plant, and invertebrate cell systems and techniques. It discusses the culturing of specific classes of cells, including the establishment of their special nutritional requirements and metabolic features.

VOLUME 1/1972, 486 pp., \$24.00

VOLUME 2/1972, 454 pp., \$24.00

SPECIAL TWO-VOLUME SET PRICE: \$40.00

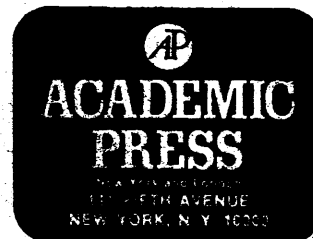
PRINCIPLES OF BIOLOGICAL REGULATION

An Introduction to Feedback Systems

by RICHARD W. JONES

This book introduces the basic concepts of feedback control as they relate to physiological regulation and homeostatic systems. It begins with a consideration of the steady-state and dynamic properties of physical systems, emphasizing the changes brought about by the addition of feedback to an already existing system. It treats the relevant behavior of linear systems from the standpoint of exponential and oscillatory modes of vibration, with chapters devoted to sinusoidal signals, frequency spectra, and stability. Finally, it contrasts the behavior of nonlinear systems with that of linear systems.

1973, 372 pp., \$16.00



prices subject to change without notice

TLC

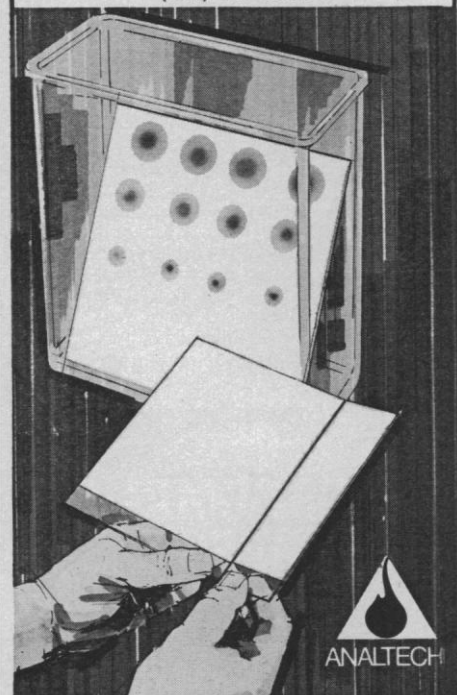
PRE-COATED THIN LAYER CHROMATOGRAPHY PLATES (Ready-For-Use)

Analtech offers the widest range of pre-coated TLC plates available. Absolute uniformity assures reproducibility whether your application is in **research, quality control, clinical TLC tests or drug screening.**

■ **Delivery is from stock on all coatings and sizes.**

■ **Low cost—write for catalog, prices.**
ANALTECH, INC.

75 BLUE HEN DRIVE,
NEWARK, DELAWARE 19711
(302) 737-6960



Circle No. 85 on Readers' Service Card

Francisco, Calif. (C. D. Cook, 333 Cedar St., New Haven, Conn. 06510)

20-22. Council of **Biology Editors**, Bethesda, Md. (K. F. Heumann, Federation of American Socs. for Experimental Biology, 9650 Rockville Pike, Bethesda, Md. 20014)

20-23. American **Thoracic Soc.**, New York, N.Y. (R. G. Weymueller, ATS, 1740 Broadway, New York 10019)

20-23. National **Tuberculosis and Respiratory Disease Assoc.**, New York, N.Y. (R. J. Anderson, NTRDA, 1740 Broadway, New York 10019)

20-25. Conference on **Mass Spectrometry and Allied Topics**, 21st, San Francisco, Calif. (F. E. Saalfeld, Naval Research Lab., Code 6110, Washington, D.C. 20390)

20-26. American **Gastroenterological Assoc.**, New York, N.Y. (J. A. Benson, Jr., 3181 SW Sam Jackson Park Rd., Portland, Ore. 97201)

20-26. American Soc. for **Gastrointestinal Endoscopy**, New York, N.Y. (J. A. Rinaldo, Jr., ASGE, 16001 W. Nine Mile Rd., Southfield, Mich. 48075)

21-23. **Biomedical Perspectives of Agglutinins of Invertebrate and Plant Origins**, New York Acad. of Sciences, New York, N.Y. (E. Cohen, Roswell Park Memorial Inst., Buffalo, N.Y.)

21-23. American Soc. for **Quality Control**, Cleveland, Ohio. (R. W. Shearman, ASQC, 161 W. Wisconsin Ave., Milwaukee, Wis. 53203)

21-24. American College of **Obstetricians and Gynecologists**, Bal Harbour, Fla. (M. Newton, ACOG, 79 W. Monroe St., Chicago, Ill. 60603)

21-25. American **Industrial Hygiene Assoc.**, Boston, Mass. (G. D. Clayton, AIHA, 25711 Southfield Rd., Southfield, Mich., 48075)

21-26. World Congr. of **Otorhinolaryngology**, 10th, Venice, Italy. (M. Arslan, Clinica ORL, Policlinico, Univ. of Padua, Padua, Italy)

23-25. American Inst. of **Industrial Engineers**, Chicago, Ill. (J. F. Jericho, AIIE, 345 E. 47 St., New York 10017)

24-25. **Fluorescence: Microscopy, Measurements and Photochemistry**, intern. symp., Lisbon, Portugal. (A. de Lemos Bastos, Instituto Portugues de Oncologia de Francisco Gentil, Palhava-Lisboa 4)

27-30. International Congr. of **Bronchoesophagology**, 14th, Lausanne, Switzerland. (J. P. Taillen, Clinique ORL, Hopital Cantonal, 1011 Lausanne)

28-30. American **Ophthalmological Soc.**, Hot Springs, Va. (R. W. Hollenhorst, AOS, 200 First St., SW, Rochester, Minn. 55901)

29-1. American **Orthopsychiatric Assoc.**, 50th annual, New York, N.Y. (M. F. Langer, AOA, 1790 Broadway, New York 10019)

30-1. Canadian **Meteorological Soc.**, 7th annual congr., Halifax, N.S. (Miss N. Waller, Maritime Command Headquarters, FMO Halifax, N.S.)

30-1. **Laser Engineering and Applications**, 4th biennial joint sponsorship of the Inst. of Electrical and Electronics Engineers and the Optical Soc. of America, Washington, D.C. (D. Edgar, Courtesy Associates, Suite 700, 1629 K St., NW, Washington, D.C. 20006)

"Must be the definitive history"*

Mathematical Thought from Ancient to Modern Times by MORRIS KLINE

"Clearly written and handsomely produced... The most comprehensive account of mathematical history we have yet had."

—*Saturday Review
1,255 pages • Diagrams & equations • \$35

A MAIN SELECTION OF THE
LIBRARY OF SCIENCE BOOK
CLUB

Oxford University Press
New York

Circle No. 102 on Readers' Service Card

"The Estuary—

Septic Tank of the Megalopolis"

This is but one of 71 scientific papers making up the comprehensive volume

ESTUARIES

published by AAAS in 1967 and reprinted in 1968. Based on the 1964 Conference on Estuaries, Jekyll Island, Georgia, the volume treats basic considerations, physical factors, geomorphology, sediments and sedimentation, microbiota, nutrients and biological production, ecology and populations, physiology and evolution, fisheries, human influences; a summary is included. 776 pages. 2036 literature citations, 525 illustrations, 85 tables, over 14,000 index entries.

Cash orders by AAAS members, \$24; regular price, \$27.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

1515 Massachusetts Ave., NW
Washington, D.C. 20005

SCIENCE, VOL. 179