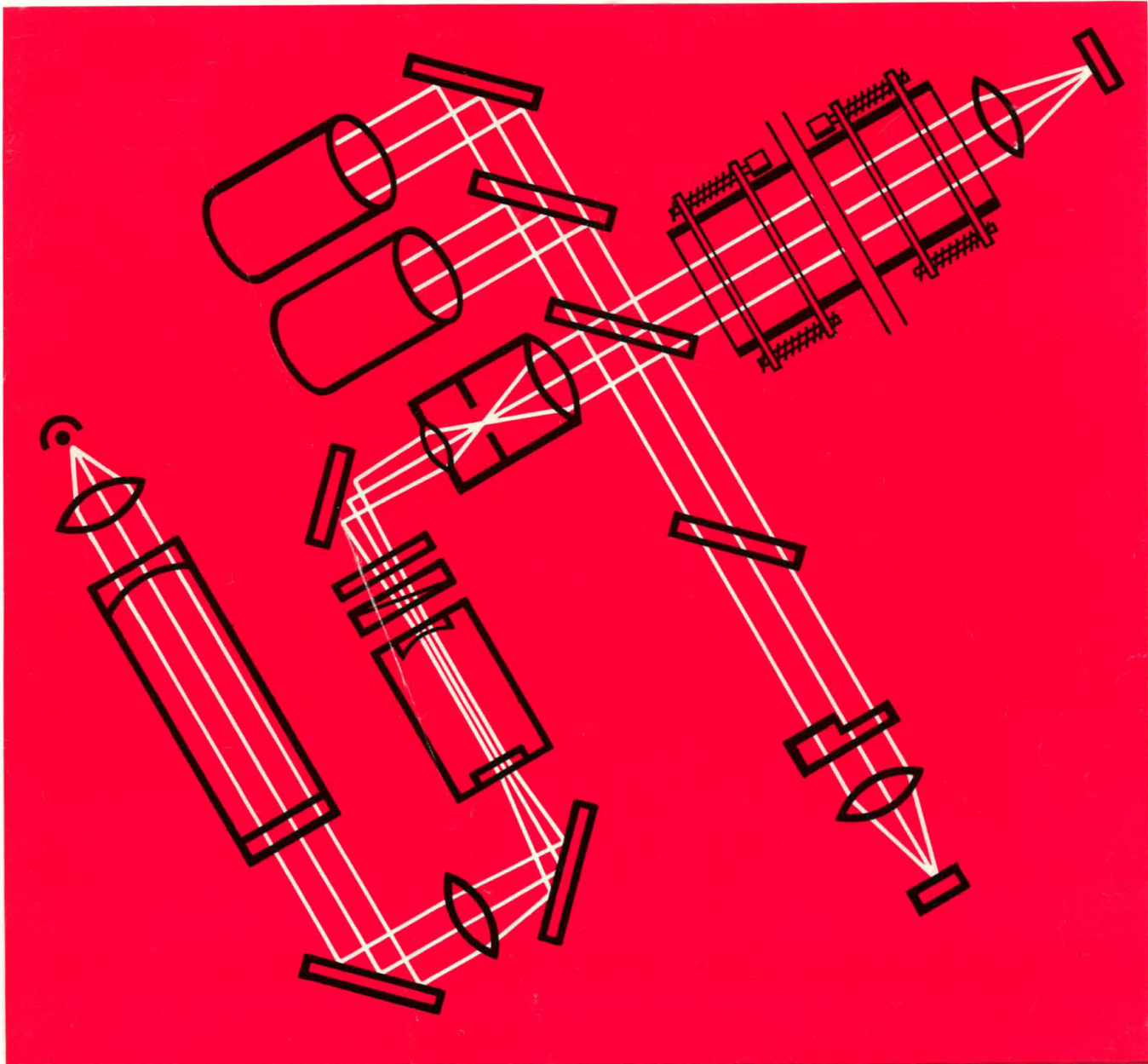


SCIENCE

16 October 1970

Vol. 170, No. 3955

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Siemens

This Model 101 electron microscope provides consistent performance whether you produce ten or ten thousand plates a year.

If there's one area we are especially proud of in the forty years since we introduced the commercial electron microscope, it's the reputation we've earned for building dependable instrument systems. A typical example is the new Model 101. The Siemens "101" is a total system concept. Each component is engineered to provide consistent performance—plate after plate, year after year—whether you produce 10 plates, or 10,000 plates a year.

Selecting components to match high performance standards, however, is only part of our reliability story. Siemens microscopes are also backed by one of the best service organizations and maintenance programs available. Maintenance designed to let you virtually eliminate unscheduled downtime, and service you'll find responsive and ready to provide complete assistance as near as your telephone.

Write for details on the "101" and other Siemens units. Siemens Corporation, 186 Wood Avenue South, Iselin, New Jersey 08830. (201) 494-1000.

Circle No. 40 on Readers' Service Card



*New visual aids & standard texts—
the best in laboratory science
from SAUNDERS*

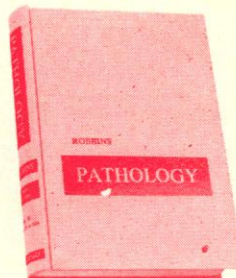
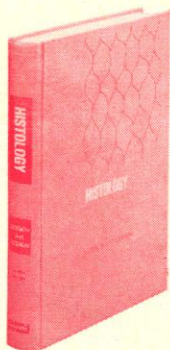


Hyun, Blank, & Custer
A Filmstrip Presentation
HEMATOLOGY
A Morphologic Study

These 35 mm. filmstrips on hematology offer 289 full-color views that will help your students to understand the correlation of blood and bone marrow findings in the anemias, leukemias, hemorrhagic disorders, and other conditions. Multiple-view frames like those shown at left allow easy comparison of samples and provide contrast between various stages of the development of disease. A 84-page guide is provided.

Three 35 mm. filmstrips, 50 frames each. About \$25. Just Ready.

Available for filmstrips: Standard Viewer Model #1995 (x7), \$25.00; Viewlex Pre-viewer Jr. #V-131 (x3), \$20.



Robbins:
PATHOLOGY 3rd Edition

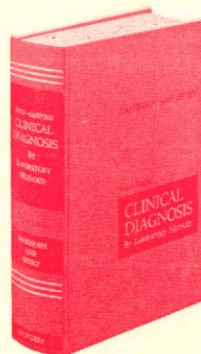
This standard text, designed specifically for students and clinicians, is the most widely used in its field. It provides in-depth study of pathogenesis, dynamics, phases, alterations, and variations of disease, and correlates them with clinical medicine. New chapters cover *Genetics and Disease* and *Diseases of the Aging*.

1462 pp. 1061 figs. Two-vol. set \$25., single \$20.50. June, 1967.

Davidsohn-Henry:
Todd-Sanford
**CLINICAL DIAGNOSIS
BY LABORATORY
METHODS 14th Edition**

The 14th edition of this classic text provides the student with the latest concepts and techniques in laboratory science, as outlined by the editors and 27 contributors. Additions include a chapter on cytogenetics, data on radioactive isotopes, and new material on blood and urine.

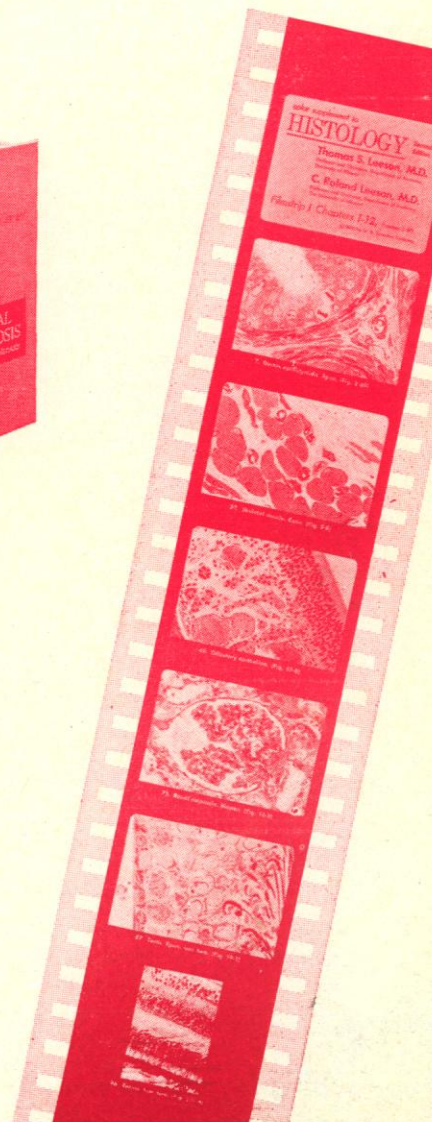
1308 pp. 698 figs., 94 color. \$24. Jan., 1969.



Leeson & Leeson: **HISTOLOGY 2nd Edition**

This text is a storehouse of essential histological information, offering a firm understanding of the three major aspects of microanatomy—cell biology, basic tissues, and systematic histology of the organ systems. This edition includes many new illustrations of Epon sections, transmission electron micrographs, and scanning micrographs. Two 35 mm. text-keyed filmstrips featuring 100 full-color photomicrographs are also available.

525 pp. 470 figs. \$11. Jan., 1970. Films, \$15.



Write Education Department

W. B. SAUNDERS COMPANY

West Washington Square, Philadelphia, Pa. 19105
1835 Yonge Street, Toronto 7, Ontario

16 October 1970

Vol. 170, No. 3955

SCIENCE

LETTERS	Choices of Parenthood: <i>M. Nag; G. D. Webb; J. Berkhout; P. Butler, Jr.; W. Jöchle; R. McClenon; C. S. Rebert; D. J. Weber; G. Hardin</i> ; Wasting Waste: <i>M. E. Perkus; M. Lieb</i> ; Vigor of Northern Hardwoods: <i>S. M. Filip</i>	257
EDITORIAL	"Pieces of the Action"	265
ARTICLES	Underground Power Transmission: <i>P. H. Rose</i>	267
	Measurement of Fast Biochemical Reactions: <i>A. N. Schechter</i>	273
	Semiconductor Radiation Detectors: <i>F. S. Goulding and Y. Stone</i>	280
	Air Pollution Surveillance Systems: <i>G. B. Morgan, G. Ozolins, E. C. Tabor</i>	289
	Earth Strain Measurements with a Laser Interferometer: <i>J. Berger and R. H. Lovberg</i>	296
NEWS AND COMMENT	Cancer Research: Senate Consultants Likely to Push for Planned Assault	304
	Faculty Status: 1969-70 Year May Have Ended an Era for Academe	306
	Bureau of Mines: Long Search Ends for New Director	309
BOOK REVIEWS	<i>Basic Mechanisms of the Epilepsies</i> , reviewed by <i>H. G. Vaughan, Jr.</i> ; other reviews by <i>N. G. Smith, R. H. Weimore, J. K. Hulm</i> ; Books Received	311
REPORTS	Atmospheric Aerosol: Does a Background Level Exist?: <i>W. M. Porch, R. J. Charlson, L. F. Radke</i>	315
	Humic Substances: Fulvic Acid-Dialkyl Phthalate Complexes and Their Role in Pollution: <i>G. Ognier and M. Schnitzer</i>	317
	Sulfur: Simulated Long-Range Transport in the Atmosphere: <i>H. Reiquam</i>	318
	Chemically Induced Porphyria: Prevention by Prior Treatment with Phenobarbital: <i>L. Kaufman, A. L. Swanson, H. S. Marver</i>	320

BOARD OF DIRECTORS	H. BENTLEY GLASS Retiring President, Chairman	ATHELSTAN SPILHAUS President	MINA REES President-Elect	DAVID BLACKWELL RICHARD H. BOLT	LEWIS M. BRANSCOMB BARRY COMMONER
VICE PRESIDENTS AND SECTION SECRETARIES	MATHEMATICS (A) R. P. Boas F. A. Ficken	PHYSICS (B) R. G. Sachs Albert M. Stone	CHEMISTRY (C) Herman S. Bloch Leo Schubert	ASTRONOMY (D) Helmut A. Abt Arlo U. Landolt	
	ANTHROPOLOGY (H) Margaret Mead Anthony Leeds	PSYCHOLOGY (I) Frank W. Finger William D. Garvey	SOCIAL AND ECONOMIC SCIENCES (K) Robert M. Solow Harvey Sapolsky		HISTORY AND PHILOSOPHY OF SCIENCE (L) George Wald Raymond J. Seeger
	PHARMACEUTICAL SCIENCES (Np) Don E. Francke Joseph A. Oddis	AGRICULTURE (O) Matthias Stelly Michael A. Farrell	INDUSTRIAL SCIENCE (P) Sherwood L. Fawcett Burton V. Dean	EDUCATION (Q) Frederic B. Dutton Phillip R. Fordyce	
DIVISIONS	ALASKA DIVISION		PACIFIC DIVISION		SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION
	T. Neil Davis President	Irma Duncan Executive Secretary	George E. Lindsay President	Robert C. Miller Secretary	Loren D. Potter President Marlowe G. Anderson Executive Secretary
<p>SCIENCE is published weekly on Friday and on the fourth Wednesday in September 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 © 1970 by the American Association for the Advancement of Science. Annual subscription \$12; foreign postage: Americas \$3; overseas \$5; single copies, 50¢ (back issues, \$1) except <i>Guide to Scientific Instruments</i> which is \$3. School year subscription: 9 months, \$9; 10 months, \$10. 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>.</p>					

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Pigeon Control by Chemosterilization: Population Model from Laboratory Results: <i>J. Sturtevant</i>	322
Water Transport in the Cloaca of Lizards: Active or Passive?: <i>D. E. Murrish</i> and <i>K. Schmidt-Nielsen</i>	324
Demonstration of Biological Activity of a Murine Leukemia Virus of New Zealand Black Mice: <i>J. A. Levy</i> and <i>T. Pincus</i>	326
Cytokinin Activity of Ureidopurine Derivatives Related to a Modified Nucleoside Found in Transfer RNA: <i>W. H. Dyson</i> et al.	328
Amygdaloid Nucleus: New Afferent Input from the Vomeronasal Organ: <i>S. S. Winans</i> and <i>F. Scalia</i>	330
Hemagglutination Assay for Antigen and Antibody Associated with Viral Hepatitis: <i>G. N. Vyas</i> and <i>N. R. Shulman</i>	332
Microelectrophoresis of Biogenic Amines on Hypothalamic Thermosensitive Cells: <i>A. L. Beckman</i> and <i>J. S. Eisenman</i>	334
Estrogenic Induction of Ornithine Decarboxylase in vivo and in vitro: <i>S. Cohen</i> , <i>B. W. O'Malley</i> , <i>M. Stastny</i>	336
Apospory in <i>Sorghum bicolor</i> (L.) Moench: <i>W. W. Hanna</i> , <i>K. F. Schertz</i> , <i>E. C. Bashaw</i>	338
Fine Structure of the Exoerythrocytic Stage of <i>Plasmodium cynomolgi</i> : <i>T. Sodeman</i> et al.	340
Acetylcholine Concentrations in Rat Brain: Diurnal Oscillation: <i>I. Hanin</i> , <i>R. Massarelli</i> , <i>E. Costa</i>	341
Brain Enhancement in Tadpoles: Increased DNA Concentration after Somatotrophin or Prolactin: <i>R. K. Hunt</i> and <i>M. Jacobson</i>	342
<i>Technical Comments: Mammalian Evolution: Is It Due to Social Subordination?: M. D. F. Udvardy; J. J. Christian</i>	344
ASSOCIATION AFFAIRS Advances in Human Genetics and Their Impact on Society: <i>D. S. Borgaonkar</i> and <i>S. A. Shah</i>	347
MEETINGS History of Biochemistry and Molecular Biology: <i>J. T. Edsall</i> ; Nucleic Acid Structure Function Relations: <i>R. M. Bock</i> ; Bioresources of Shallow Water Environments: <i>P. E. Greenson</i> ; Forthcoming Events	349

GERALD HOLTON PHYLLIS V. PARKINS	LEONARD M. RIESER KENNETH V. THIMANN	WILLIAM T. GOLDEN Treasurer	WILLIAM BEVAN Executive Officer
GEOLOGY AND GEOGRAPHY (E) Richard H. Mahard William E. Benson	ZOOLOGICAL SCIENCES (F) David Bishop Richard J. Goss	BOTANICAL SCIENCES (G) William A. Jensen Arthur W. Cooper	
ENGINEERING (M) Newman A. Hall Raynor L. Duncombe	MEDICAL SCIENCES (N) Leon O. Jacobson F. Douglas Lawrason	DENTISTRY (Nd) Robert C. Likins Richard S. Manly	
INFORMATION AND COMMUNICATION (T) R. M. Hayes Scott Adams	STATISTICS (U) Douglas Chapman Ezra Glaser	ATMOSPHERIC AND HYDROSPHERIC SCIENCES (W) Robert M. White Louis J. Battan	

COVER

(Top) Schematic of the optical configuration of the Laser Strain Meter. (Bottom) Eight-hundred-meter, evacuated tube installed at Elliott Physical Observatory, San Diego, California. See page 296 [Robert Winsett, University of California, San Diego]

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.

Philips announce a new electron microscope



The Philips EM 201 is a high resolution electron microscope designed for routine investigations rather than advanced experimental work. It derives from experience gained from engineering techniques that have made the Philips EM 300 the world's most advanced and most successful microscope. The EM 201 is intended for day to day use where high reliability, high stability and ease of operation are more important than extreme resolution. It sets a new standard for electron microscopes — it is the first of a new class of instruments with far higher resolution than the conventional middle range models but without the extreme versatility and resolution of the EM 300.

9 AU resolution

The EM 201 has a guaranteed point to point resolution of nine ångstrom units and can attain seven ångstroms in favourable circumstances. The resolving power of any microscope is set by its objective lens, and however advanced the design no magnetic lens obtains its theoretical limits in practise. Philips have pioneered in the EM 300 a degree of practical engineering which gives the objective lens sufficient mechanical and electrical stability to guarantee a high resolving power under normal operating conditions without the need for special alignments. This unique expertise is now available for the first time in a regular price instrument. — the EM 201.

Easy to operate

Advances in electronic and mechanical design make the EM 201 simple to use. Complicated start-up procedures have been completely eliminated. Camera handling is simplified by motorised film and plate transport devices which operate as soon as the exposure is completed.

When changing the magnification the objective lens current is varied automatically to keep a roughly focussed image on the screen. All electrical controls are on two panels at the operators fingertips. Magnification is variable from 1500x to 200 000x in 14 steps and is presented on a digital readout to make exposure logging easier.

Clean vacuum

A completely automatic fail-safe vacuum system uses a stainless steel diffusion pump filled with polyphenyl ether backed by a two stage rotary pump. A water cooled baffle valve minimises back-streaming from the pump but the greatest contribution to a clean vacuum is made by using a thinwalled stainless steel tube around the beam path, so that all magnetic circuits apart from the objective lens pole-pieces are outside vacuum. Most dynamic O-rings are replaced by metal bellow seals. This means that the EM 201 can maintain an exceptionally clean vacuum.

Advanced operational facilities

□ The EM 201 is equipped for selected area electron diffraction with a selection magnification of 14000x and two fixed camera lengths. It also provides 200x magnification for rapid scanning of the specimen.

□ Photographic recording is handled by a 35 mm, a 70 mm and a plate camera giving a total of 106 exposures in vacuo.

□ Various TV and image intensifier systems can also be fitted.

□ The unique Goniometer stage and the wide range of specimen holders developed for the EM 300 can also be used in the EM 201.

Unique condenser system

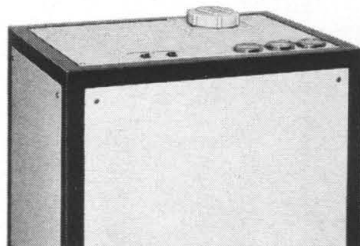
Philips have developed a special minilens illumination system for the EM 201 based on a totally new condenser lens which is small enough to fit in the upper bore of the objective lens. It can demagnify the beam to a 6 µm spot.

Simplified alignment

The EM 201's condenser and the intermediate and projector lens are permanently aligned and should never be touched. The objective never needs adjustment unless the column is dismantled and the gun is aligned electromagnetically on two straightforward criteria.

A new service for microscopists

The modern electron optics lab does not depend on microscopes alone; peripheral equipment is increasingly needed to exploit the technology of electron beams to the full. In order to meet this need Philips have inaugurated a special Electron Optics Division at Eindhoven, to handle all Philips Electron Microscopes, to provide specially designed or adapted equipment, and to supply associated apparatus.



□ The initial range include an instrument to provide scanning microscopy on the EM 300, the Edwards E12E Vacuum Coating Unit and the ZEM 1A closed circuit water cooler.

□ Future plans for Electron Optics Division include the adaptation of the Imanco image analysing computer for electron microscopes and the provision of a virtually complete range of apparatus for the electron optics lab from one source.



Eliminate Water Worries

Cooling water for electron microscopes can be a problem, especially in difficult climates. If local water is expensive or scarce, contaminated or naturally too hot, the Zephyr ZEM 1A closed circuit cooling unit can be used. Specially designed for Philips electron microscopes, it regulates water temperature, pressure and flow rate automatically. The entire installation is protected against damage by high pressure surges or frost. If the internal supply of water fails the ZEM 1A switches automatically to a standby supply.

Solve coating problems

Vacuum coating units have become indispensable in the preparation of

specimens for electron microscopes and Philips can supply the Edwards E12E unit for this purpose. The E12E has reduced pump-down time, all stainless chamber and pump and a liquid nitrogen trap. In addition to a full range of chamber fittings, various electron bombarding sources and a new freeze etching device are available.

Convert to scanning

Philips have developed a special attachment for the EM 300 which makes it a scanning electron microscope. Called the EM 300 SEM Attachment, it is designed to operate with the Goniometer stage and its holders for rotating, heating, cooling or stressing the specimen. It works in transmission or reflection so thick specimens can be used and has two detectors for the primary electron backscatter. Resolutions of 250 AU have been demonstrated and frame and line

rates can be controlled from 0.2 to 50 seconds. The resulting image is displayed on two 5 inch display tubes. Magnification is variable from

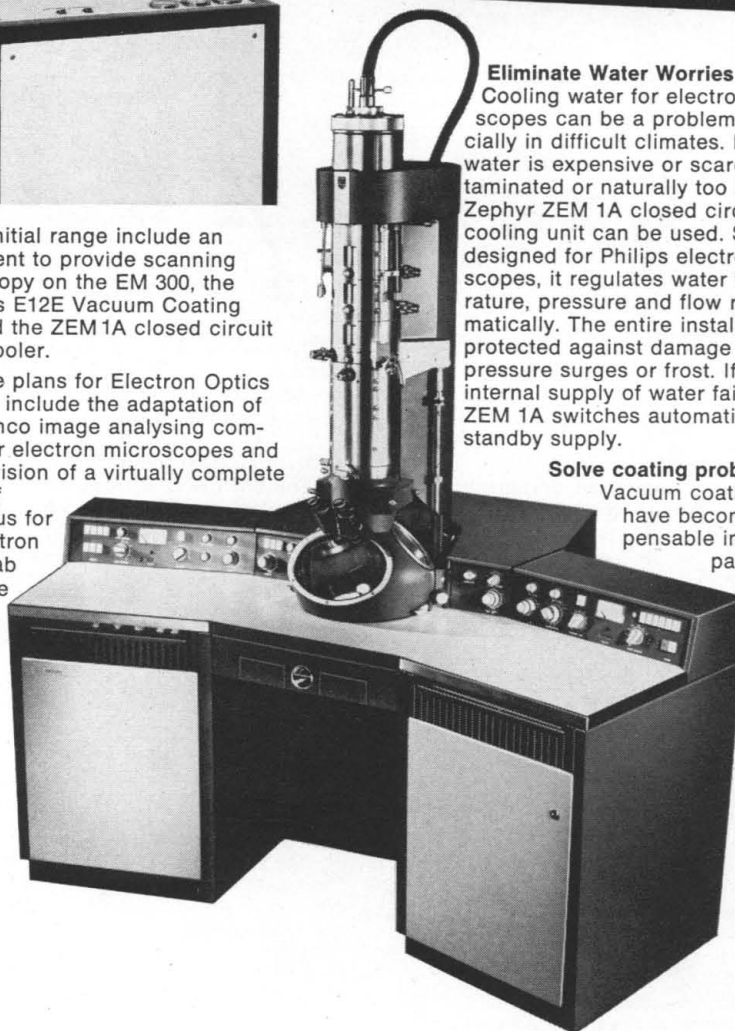


1000x to 1000 000x. Once the attachment is installed the microscope can easily be converted for transmission microscopy.

If you would like a full technical briefing on any Philips Electron Optics product or simply a brochure, please write to

Philips Electronic Instruments,
Electron Optics Division,
750 South Fulton Avenue,
Mount Vernon, N.Y. 10550.

or contact your local Philips office. Philips equipment is backed by a world wide sales and service organisation.



**PHILIPS
ELECTRONIC
INSTRUMENTS**

750 S. FULTON AVE., MT. VERNON, N.Y. 10550
A DIVISION OF PEPI, INC.

Circle No. 13 on Readers' Service Card

spectronic 100...where else can you get this much spectrophotometer for the money?

Splendid singularity



The Spectronic® 100 overwhelms everything in its price range—on every count.

Non-stop wavelength

The Spectronic 100 goes uninterrupted from 325-925nm. Phototubes, stray light and second order filters interchange automatically. You turn the wavelength knob, the Spectronic 100 does the rest.

Multi-Mode readout

The Spectronic 100 has a four-place digital readout in all three modes: Linear Absorbance, Transmittance and Concentration, with selectable positioning of the decimal point, and scale expansion in Concentration.

Substantial stability

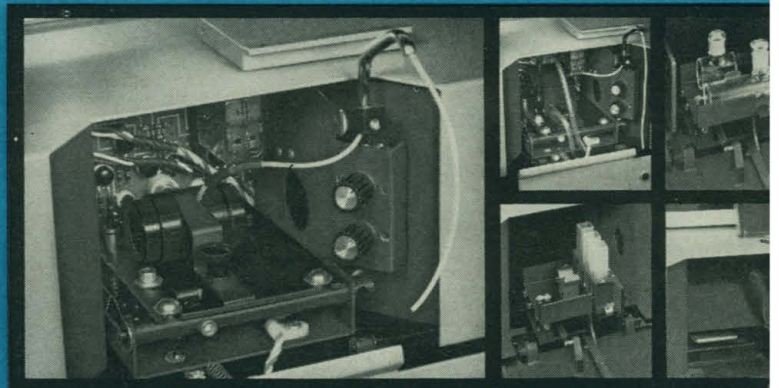
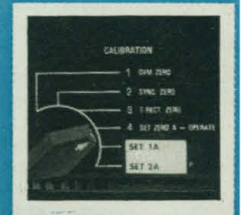
We designed the Spectronic 100 as an a-c system and gave it some hard-to-beat stability specs, such as better than 0.001A short term, and less than 0.001A/hr. long term. And less than 0.2% T/day electronic zero drift.

Laudable linearity

Who else can smooth a curve like this? Linearity specs are 0.2% in Transmittance, 0.001A from 0.000A-0.500A, 0.002A from 0.500A-1.000A, 0.003A from 1.000A-1.500A, 0.004A from 1.500A-2.000A.

Instrument know thyself!

We built into the Spectronic 100 a unique and exclusive Function Control System. It provides a quick and easy performance checkout. Run through the six steps and you'll know you're getting electronic performance—right to specification.



Unsurpassed scope of sampling options

There's never been this much sampling versatility before. Choose from a universal test tube adapter, interchangeable single-cell, multiple-cell, standard micro flow-thru and water-jacketed micro flow-thru compartments. There's virtually no glassware restrictions either. It'll take test tubes up to 22mm; semi-micro, short path, water-jacketed, flow-thru, rectangular or square cuvettes; long path cylindrical cells up to 100mm. And regardless of cell used—it's always precisely positioned in the optical path.

Status symbols

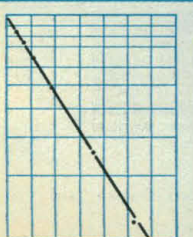
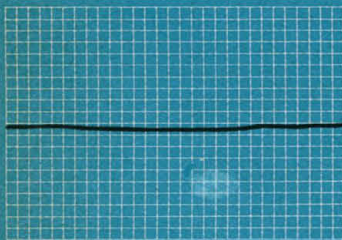
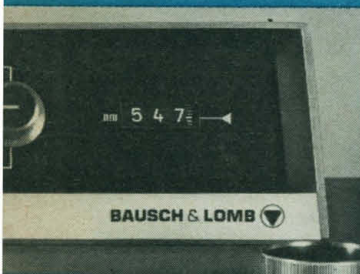
A real human engineering touch on the Model 100-8—the two status lights that provide positive immediate sampling mode identification. They tell you at a glance whether your sample is in, out, or ready to be purged.

The urge to purge

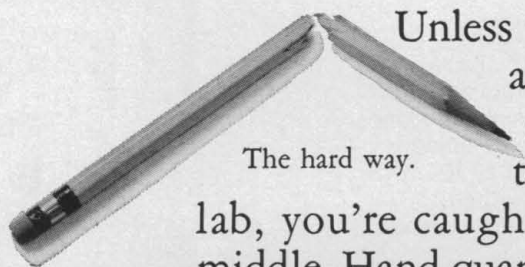
Our Model 100-8 also has a unique self-purging sampling system with zero-error logic that eliminates cross contamination of samples.

And that's only part of the story of the splendid singularity of the Spectronic 100.

We'll gladly send you Catalog 33-6031 listing all outstanding specifications. Or, you might enjoy an enlightening demonstration. Write Analytical Systems Division, Bausch & Lomb, 9010-12 Linden Avenue, Rochester, New York 14625.

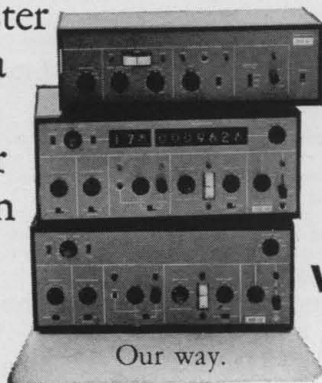


We figured out how you can spend more for our digital integrator than you did for your GC and still save money.



The hard way.

Unless you run a big gas chromatography lab, you're caught in the middle. Hand quantitating is getting out of hand. And the price of a computer is out of reach. That leaves the GC digital integrator. A very fast, very accurate calculating instrument that will work even when you're not around to watch. The only problem is that people think they're expensive. That's where our three GC digital integrators come in. And, in technician labor savings alone, they'll pay for themselves in a year. Or less. In the end, you get better, faster data for a lot less. And your technician spends



Our way.

more time being just that.

Take a good look at our three GC Digital Integrators soon. Then you'll understand why they only seem expensive at first glance. For complete details and a free copy of our helpful 40-page book,



The expensive way.

How To Get the Most Out of Your Digital Integrator, write Varian Aerograph, Walnut Creek, California 94598; Crows Nest, N.S.W., Australia; Tokyo, Japan; Malton, Ontario, Canada; or Zug, Switzerland.

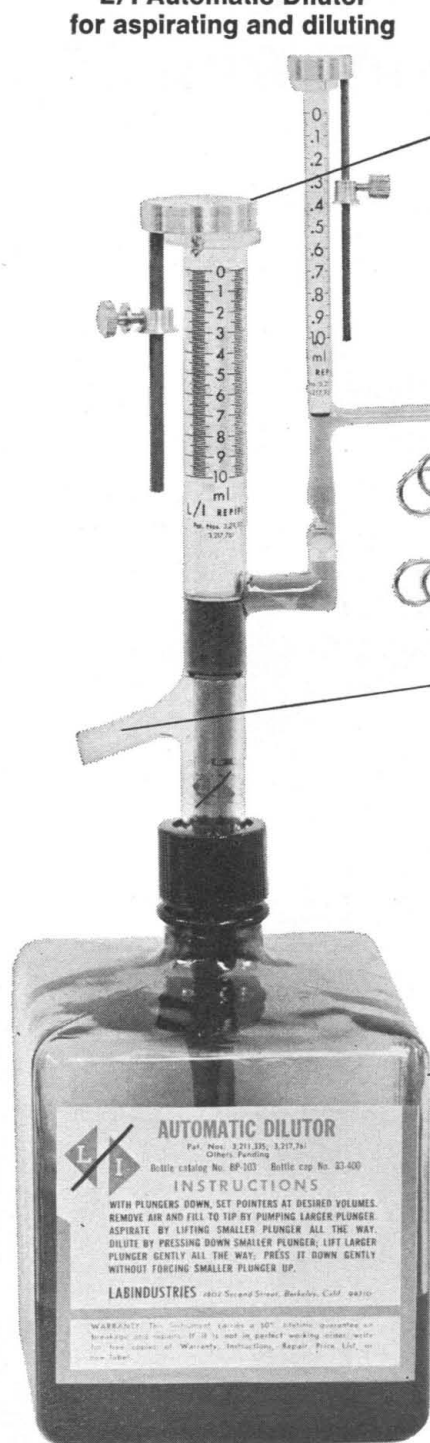
varian aerograph



What? Never used REPIPETS® and Dilutors?

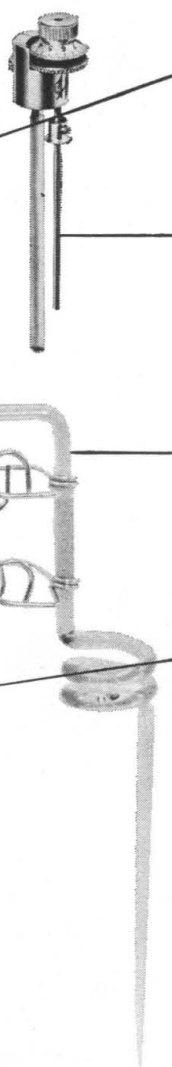
Did you know more than 70,000 L/I instruments are now used in research and clinical labs? Here's why:

L/I Automatic Dilutor for aspirating and diluting



8. Wide selection. L/I stocks REPIPETS and Dilutors in 1/2, 1, 5, 10, 20 and 50 ml sizes. Micro and macro Teflon tips included. Amber round or square bottles optional at no extra charge.

Prices: REPIPETS \$52.50; Dilutors \$99.50; LAMBDA-DIALS \$49.50; GRUNBAUM Pipets: \$6 to \$10.



1. Simple operation. Just set volume with knife-edge pointer, lift plunger to aspirate, and depress plunger to deliver. (No mouth pipeting!)

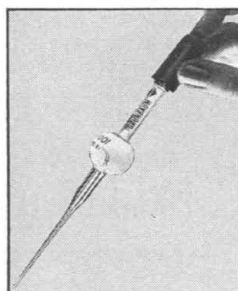
2. LAMBDA-DIAL® increases accuracy. Replacing any 1 ml REPIPET or Dilutor plunger, the LAMBDA-DIAL boosts accuracy to a phenomenal 1% at 10 lambdas! Reset to 0.1 lambda at 100 lambdas. 1 division = 0.1 lambda.

3. All PYREX Construction. Handle any reagent, including concentrated acids, concentrated alkalis, chlorinated hydrocarbons, etc. Closed system eliminates odors and all contact with dangerous reagents.

4. Reagents stay pure. Integral filters keep out the atmosphere and protect valuable reagents.

5. High accuracy (1%) and reproducibility (0.1%). Each instrument is adjustable and accurate over its entire range.

6. Fit any reagent container. All REPIPETS and Dilutors can be supplied with caps and washers to fit your reagent containers. Or we will furnish containers to suit.



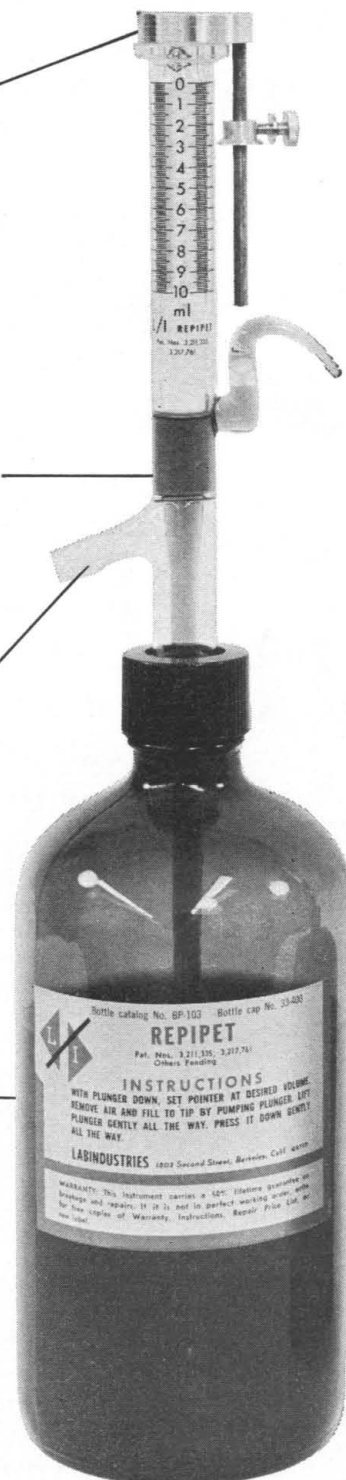
7. GRUNBAUM® Pipet extends versatility. Supplements REPIPETS and Dilutors by allowing you to transfer and store reagents. Self-cleaning, non-dripping, self-adjusting GRUNBAUM Pipets are available from 1 to 1,000 µl in 18 sizes.

In the U.K. and Europe, contact Chemlab Instruments, 1b Seven Kings Road, Ilford, Essex, England; P. Block et Cie, 209 Route De Colmar, 67 Strasbourg-Meinue, France; Bio-Rad Laboratories GmbH, 8 München 66-Limesstra, 71, Postfach 2260, West Germany; Biotronik Wissenschaftliche Geräte GmbH, Dachauer Str. 511, 8 München 50, West Germany; Van Oortmerssen, N.V., P.O. Box 501 - The Hague, Netherlands.

Order from Labindustries or your distributor.

LABINDUSTRIES The Error Eliminators

1802M Second Street, Berkeley, California 94710
Phone (415) 843-0220. Cable LABIND, Berkeley, CA (USA)



L/I Automatic REPIPET for dispensing

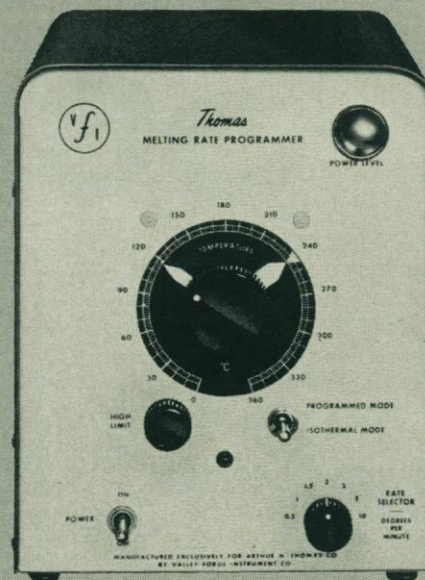
Thomas Melting Rate Programmer

for Thomas-Hoover Melting Point Apparatus

automatically controls temperature rise to comply with U.S.P. specifications



- ▶ eliminates subjective operator error
- ▶ promotes inter-plant and inter-shift uniformity



For automatically controlling rate of temperature rise in Thomas-Hoover Melting Point Apparatus. Ensures compliance with U.S.P. specifications for melting point determination on pharmaceutical products. Increases accuracy of m.p. determinations by eliminating subjective operator error in establishing and maintaining constant melting rate.

Frees analyst for other duties by making it unnecessary for him to remain at the instrument during bath warm-up. Assures inter-shift and inter-plant uniformity in technique and results. Usable with all Thomas-Hoover units now in service.

Specifications

Range 0 to 360°C.

Heating Rate Options ½, 1, 1½, 2, 3, 5 and 10 degrees per minute.

Heating Rate Accuracy within 1% of selected rate.

Installation. No modification of Thomas-Hoover unit is required. Platinum resistance thermometer probe mounts in standard melting bath unit. Plug-in harness completes necessary circuitry; no re-wiring required. Locking clamp secures autotransformer rotor at maximum input position.

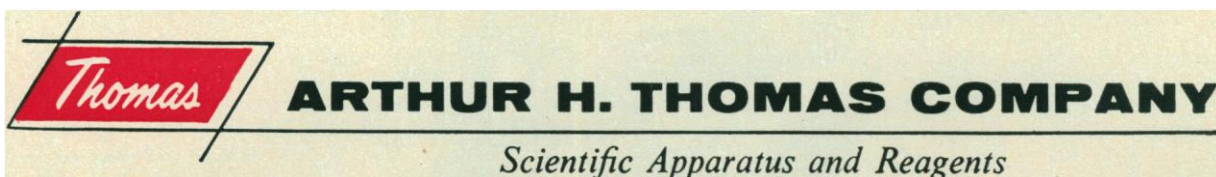
Operation. Operator sets program starting point to a few degrees below, and high temperature limit to a few degrees above, the expected melting point. Programmer is switched to isothermal mode, desired heating rate is selected, and power switches are turned on. When bath reaches the selected program start point, the isothermal control maintains this temperature.

The operator, who has been free to perform other duties during the heat-up period, now switches unit to programmed mode, and begins observing sample. The bath temperature increases at the selected rate, as indicated by the advancing white pointer.

After recording the melting point the operator may permit the temperature to rise to the temperature preset as high limit, if samples of higher melting point are to be subsequently programmed. Alternatively, operator may return programmer to isothermal mode, reset the program start point, and allow the bath to cool to this point for repetition of the determination. Rate of temperature rise may be changed, stopped, or started, at any time during operation.

6406-R10. Programmer, as described. For 115 volts, 60 cycles, a.c. *Without Melting Point Apparatus* . . . **800.00**
6406-R20. Ditto, for 115 volts, 50 cycles, a.c. . . . **800.00**

Bulletin 155 sent upon request.



VINE STREET AT 3RD • P.O. BOX 779 • PHILADELPHIA, PA. 19105, U.S.A.

Circle No. 43 on Readers' Service Card

Help A Fellow Scientist!

Pass along this coupon for the new Cyclo Chem catalog. Its 106 pages describe over 3,500 biochemicals and research organics and include prices. Probably the most complete catalog in its field. And it's free.

 **Cyclo Chemical**

Division Travenol Laboratories, Inc.
1922 East 64th Street
Los Angeles, California 90001

MAIL TO: SC 10

Cyclo Chemical
Division Travenol Laboratories, Inc.
1922 East 64th Street
Los Angeles, California 90001

NAME _____

INSTITUTION _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

And Help Yourself As Well!

If you don't have a new Cyclo Chem catalog, send in for your own. It's really indispensable.

MAIL TO: SC 10

Cyclo Chemical
Division Travenol Laboratories, Inc.
1922 East 64th Street
Los Angeles, California 90001

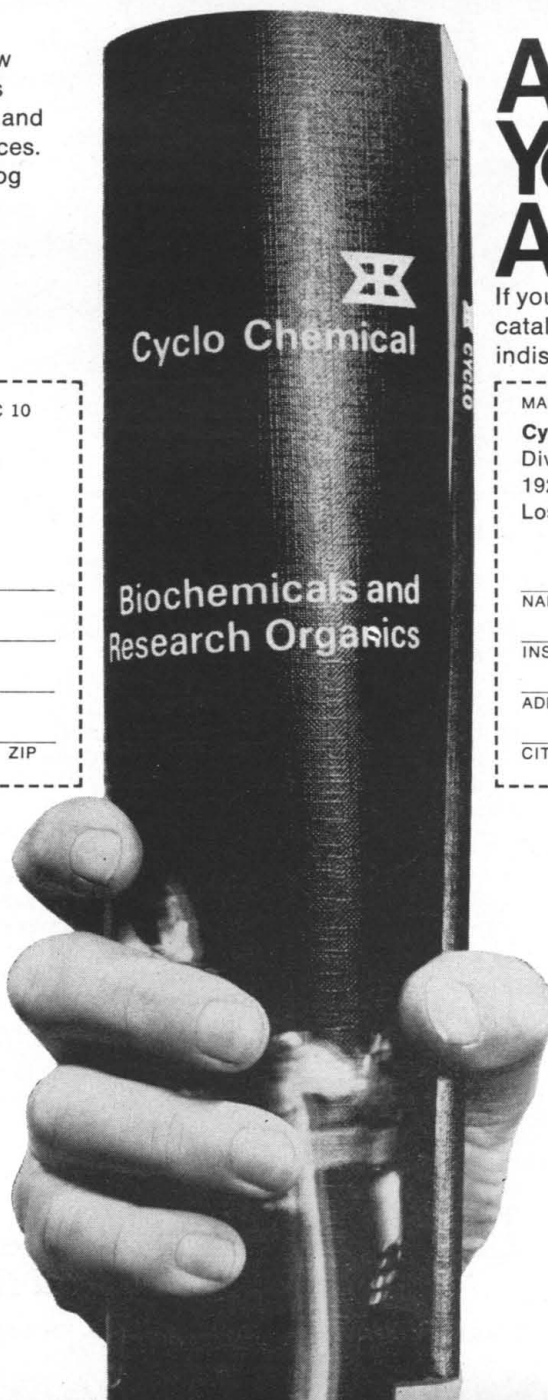
NAME _____

INSTITUTION _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Circle No. 14 on Readers' Service Card



Circle No. 7 on Readers' Service Card →

Just add the Nikon Type R Differential-Interference Attachment to any Nikon Microscope. This attachment translates the peaks and valleys of your surface into well-defined contrast or color differences to give you highly informative, finely detailed images.

The applications for surface investigations with the Type R Attachment

are unlimited. Opaque metallic surfaces, curved as well as flat, reveal their microscopic substructure to the viewer. Every step in IC manufacture—crystal growth, etching, coating—can be kept under observation. IC process variations, previously imperceptible by conventional reflected light microscopic methods, can be seen clearly.

Even your highly polished glass surfaces yield their secrets to a Nikon Microscope with a Type R Attachment.

To start exploring the true dimensions of your surfaces, write.

Nikon, Inc., Instrument Division, Subs., Ehrenreich Photo-Optical Industries, Inc., Garden City, N.Y. 11530. (In Canada: Anglophoto, Ltd., Ont.)



Bring your surface to the surface.

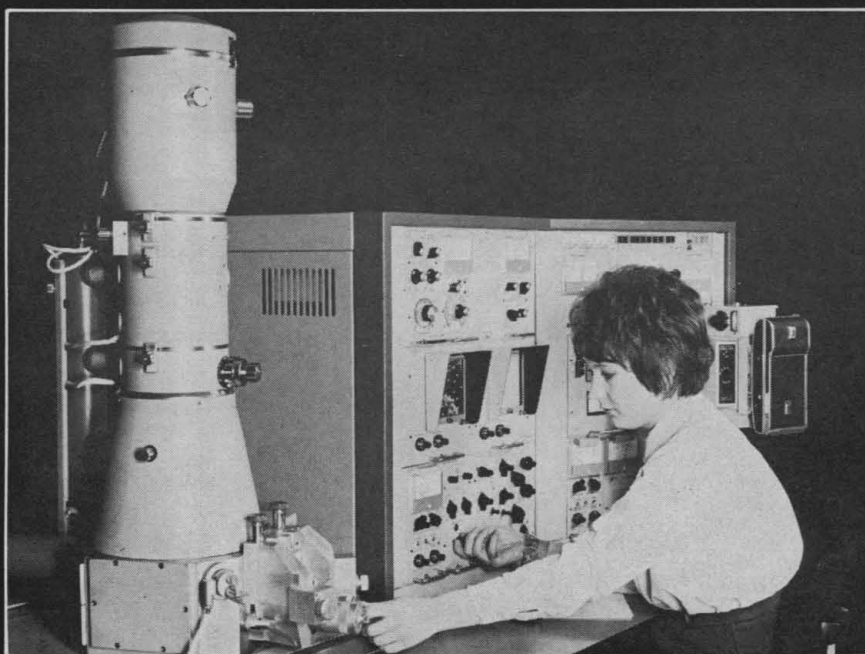


Nikon Differential Interference Attachment

Photographs courtesy of Dr. Robert Hoffman and Dr. Leo Gross of Waldemar Medical Research Foundation.

The world's latest Scanning Electron Microscope

WHEN QUALITY COUNTS...



K-136

You need the capabilities and features
that only the
STEREOSCAN S4
has to offer.

Stereoscan S4 is the latest product in the Stereoscan series which has dominated the SEM field since its commercial introduction. All the world superior proven features are retained, plus new capabilities.

- Highest guaranteed resolution (150 Å) • Unique capability to study crystal orientation patterns . . . with crystals as small as 10 μm • Clean, logical vacuum system • Widest range of specimen stages.

Stereoscan's functional versatility has been designed

to offer the instrument's qualities to the widest possible range of research scientists. Isn't this what pioneers in the many disciplines of science and technology using scanning microscopy are looking for today? To

learn more about the Stereoscan S4, send for our new brochure. Complete specifications and details are given. Papers presented in the proceedings of the "Third Annual Stereoscan Colloquium" sponsored by Kent Cambridge Scientific, Inc., are now also available.

STEREOSCAN® . . . helping science to expand the world of inner space.

KENT CAMBRIDGE SCIENTIFIC, INC.

8020 AUSTIN AVE., MORTON GROVE, ILLINOIS 60053 (312) 966-1010

Tiens, une revue scientifique française.



En 6 mois, "La Recherche" est devenue la première revue scientifique de langue française en Europe.

Et nous avons tout fait pour cela.

Nous nous sommes délibérément orientés vers l'innovation scientifique et technologique.

Nous avons diversifié nos sommaires pour aborder tous les aspects de la recherche fondamentale ou appliquée.

Et nous avons choisi, pour chaque discipline, de dégager l'essentiel d'une actualité souvent surabondante : vous ne pouvez pas lire les deux millions d'articles originaux qui paraissent chaque année dans le monde.

Aujourd'hui, "La Recherche" a pris place parmi les grands de l'information scientifique internationale.

Maintenant, nous pouvons venir chez vous.

Après tout, nous parlons le même langage.

Même si nous écrivons en français.

Au sommaire du n° 5 :

Les frontières de la biologie
par Jacques Monod

Les membranes par B.A. Pethica et M. Cambrai

Les constantes physiques fondamentales par B. M. Taylor, D.N. Langenberg et W.H. Parker

La guerre chimique par N.D. Tam

- Informatique : une passe difficile.
- Des matériaux nouveaux pour la navette spatiale.
- Les choix nucléaires et la restructuration industrielle.
- Comment miniaturiser les lasers de grande puissance. etc.



Je désire profiter d'un abonnement d'un an (11 numéros) à "La Recherche", au prix spécial de lancement de \$ 16.00.

M

Profession

Fonction ou spécialité

Rue

Ville

Adressez ce bon, accompagné de votre règlement, à :

Etats-Unis & Canada : Periodica, 7045 avenue du Parc, Montréal 303 - Québec, Canada.

Autres pays : "La Recherche", 4 Place de l'Odéon 75-Paris 5^e, France.

Offre valable jusqu'au 1^{er} Décembre 1970 et réservée aux lecteurs non encore abonnés à "La Recherche".

Now there's a 19" long x 10½" wide plastic cage that allows an adult rat to assume a normal standing position. A cage that meets all published standards for breeding or housing rats, hamsters and guinea pigs. Even a female guinea pig with a litter.

It's the new Series 140 permanent plastic Econo-Cage. A full 8-inches high, the Series 140 is 2-inches taller than any previously available cage with the same area.

Like all permanent plastic Econo-Cages, Series 140 cages are available in materials to match your animal housing system requirements. Polycarbonate cages are the ultimate. They can be autoclaved, withstanding the complete sterilization cycle up to 290°F. Polypropylene cages resist temperatures to 250°F and can be autoclaved. Polystyrene cages are rated at 170°F which covers most wash cycles.

Special stacking lugs provide convenient nesting and assure free flow of air for drying. The integral lip around the perimeter of the cage increases structural rigidity and facilitates use with hanging as well as stacking systems. Econo-Cage walls are 20% thicker than competitive cages; this means added strength and greater durability in actual laboratory use. These cages are compatible with most disinfectants, cleaning agents and animal wastes and are highly resistant to most toxic chemicals. Either stainless steel, or zinc-plated rust-resistant lids are available.

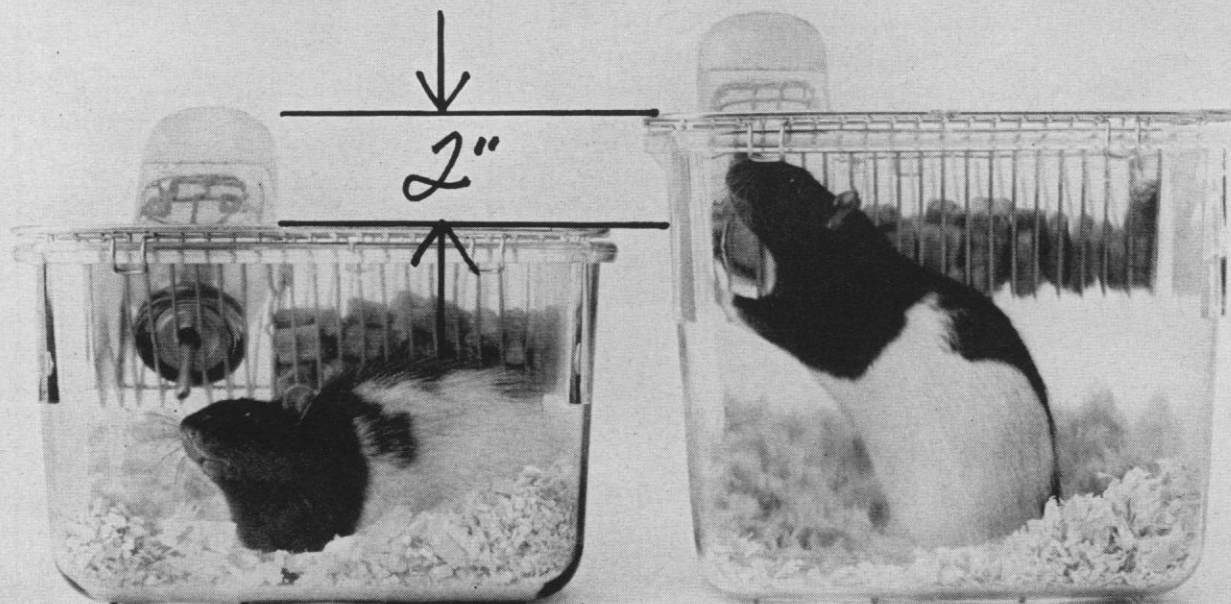
Series 140 cages are only part of the permanent plastic Econo-Cage line. They all meet NIH, AALAS, and Public Law 89-544 standards and specifications.

For a complete catalog of cages and accessories contact your Econo-Cage Distributor, or write Scientific Division, Maryland Plastics, Inc.

9 East 37th Street, New York, N. Y. 10016.



Introducing the extra two inches that give a rat room to stand up and breed.



EC-P-2

UNITRON... your complete source for Microscopes with the Metallurgists' Stamp of Approval



**STUDENT
MODEL MMA
\$154**

**LABORATORY
MODEL MMU
\$312**

**INVERTED
Series MEC**

Monocular Model \$416
Binocular Model \$719

**SERIES TM
UNIVERSAL
MEASURING
\$1070 up**

**ROLLSCOPE
DMR
For large
surfaces
\$415**

"SERIES N" METALLOGRAPHS

New budget-priced models with flatfield objectives, widefield eyepieces, coaxial stage controls, and many optional accessories. Models with combined xenon-tungsten or tungsten illumination available.

**From
\$1398 up**

MICROGONIOMETER

Measures orientation of individual grains

**HTL HIGH TEMPERATURE
LABORATORY INSTALLATION**

UNITRON'S HIGH-TEMPERATURE RESEARCH METALLOGRAPH

DESK MODEL HM

Write for prices and specifications.

**HHS Vacuum
Heating Stage for
1500°C\$625**

**Austenite Grain
Size Eyepieces:
Turret Type \$76
Ke10X\$25**

**Widefield Filar
Micrometer \$105**

**Stereoscopic
MSL.....\$110**

**Stereoscopic
MSF\$145**

**Stereoscopic
MSHL.....\$267**

**PILLAR STAND FOR
STEREOSCOPIC MODELS.....\$75**

10 DAY FREE TRIAL

A salesman's demonstration gives you only about 30 minutes to examine a microscope . . . hardly the best conditions for a critical appraisal. But UNITRON's Free 10 Day Trial allows you to evaluate the microscope in your own lab, and prove its value to you, in your own work, before you decide to purchase.

WRITE FOR OUR FREE CATALOG

The UNITRON catalog is your buying guide to a complete line of microscopes and accessories for every application. Write for your copy and see why UNITRON Microscopes have The Metallurgists' Stamp of Approval.

Please send UNITRON's Microscope Catalog No. Y-4

I want a FREE, no-obligation, trial of Model . . .

NAME _____ DEPT. _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

MICROSCOPE SALES DIVISION
UNITRON
INSTRUMENT COMPANY

66 NEEDHAM STREET
NEWTON HIGHLANDS
MASS. 02161

The Cary 16.

The world's best manual spectrophotometer costs \$9,000.

Scanning and Kinetics are a touch more.

When you combine its price and performance, there's really nothing quite like the Cary 16 manual spectrophotometer. But that's only part of the story. By adding a few well-chosen, reasonably priced accessories, the 16 becomes a very precise scanning instrument. A few other peripherals make it a kinetics system nobody else can come close to.

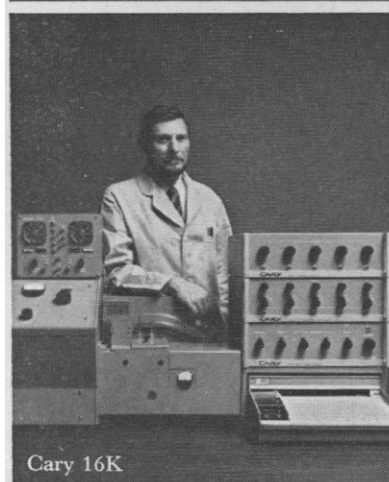
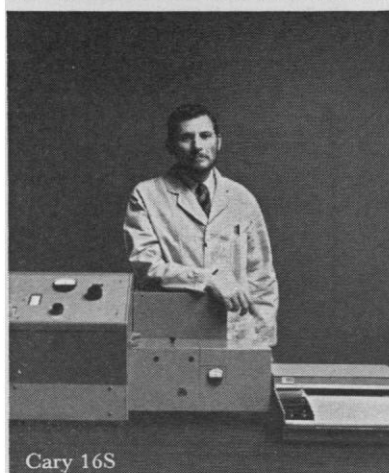
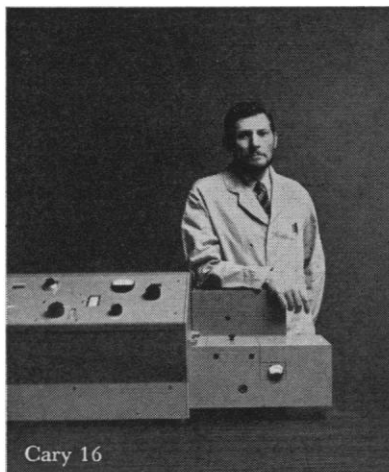
And so, you can end up with three research-quality spectrophotometers without having to buy three research-priced instruments.

THE BASIC 16

The heart of any spectrophotometer is its optical system. Ours has no equal. It combines a double-beam photometer, a double monochromator and a unique V-beam system of cell space optics. The result is high resolution, extreme photometric accuracy and negligible stray light. But, performance is no good if it's difficult to attain. So, in the manual Cary 16, we've reduced most analyses to a few simple steps.

SCANNING

To the basic 16 add a scan motor, slit servo mechanism, baseline compensator, and log recorder and it's the Cary 16S: a double-beam scanning spectrophotometer which uses a single detector photometric system and offers high accuracy and long term stability.



Both essential to recording meaningful spectra.

KINETICS

For automatic kinetics studies, the Cary 16K achieves a level of performance and convenience never before possible with commercially available equipment. Again, starting with the basic Cary 16, you select from a wide range of available kinetics accessories to tailor a system to suit your exact needs. These include a fully automatic five-cell sample changer with dwell and cycling timers, a recorder, an interface with individual scale expansions from 0.1 to 2.0 absorbance full scale, a dual wavelength drive, and a multi-balance accessory to permit individual zeroing of each sample.

HANDY GUIDE

In addition to complete operating specs, we'd like to send you a copy of our handy new *Cary 16 Systems & Accessories Guide*. It explains how you can start with a \$9,000 Cary 16 and end up with three research-quality spectrophotometers for a touch more. For your copy, or to arrange a demonstration, write Cary Instruments, a Varian subsidiary, 2724 South Peck Road, Monrovia, Calif. 91016. Ask for data file E006-100.

cary
instruments 

Draw your own conclusions with this new time-share terminal.

Now you can have a time-share terminal that lets you see your data graphically— instantly — as it prints out on your Teletypewriter. Now you can plot for comprehension, for meaningful report illustrations, for permanent records. And do it while the time-share data's coming in.

The HP 7200A Graphic Plotter is the first major advance in time-share flexibility since the Teletypewriter itself. The Graphic Terminal feeds from standard EIA ASCII inputs and automatically plots computer data in points, lines, curves, bar graphs, pie

charts, or any other useful engineering, mathematical or business graphics you need. Plot directly from the Teletype keyboard, too, or silence the Teletypewriter and use the plotter alone. It's the end of the graphic time lag.

The HP 7200A is easy to use and requires no special operating or programming/language knowledge. It plots smooth lines, not the staircase drawn by the incremental recorder. And it lets you position the graph where you want it on any type or size of graph paper up to 11" x 17".

Talk to your time-share service about

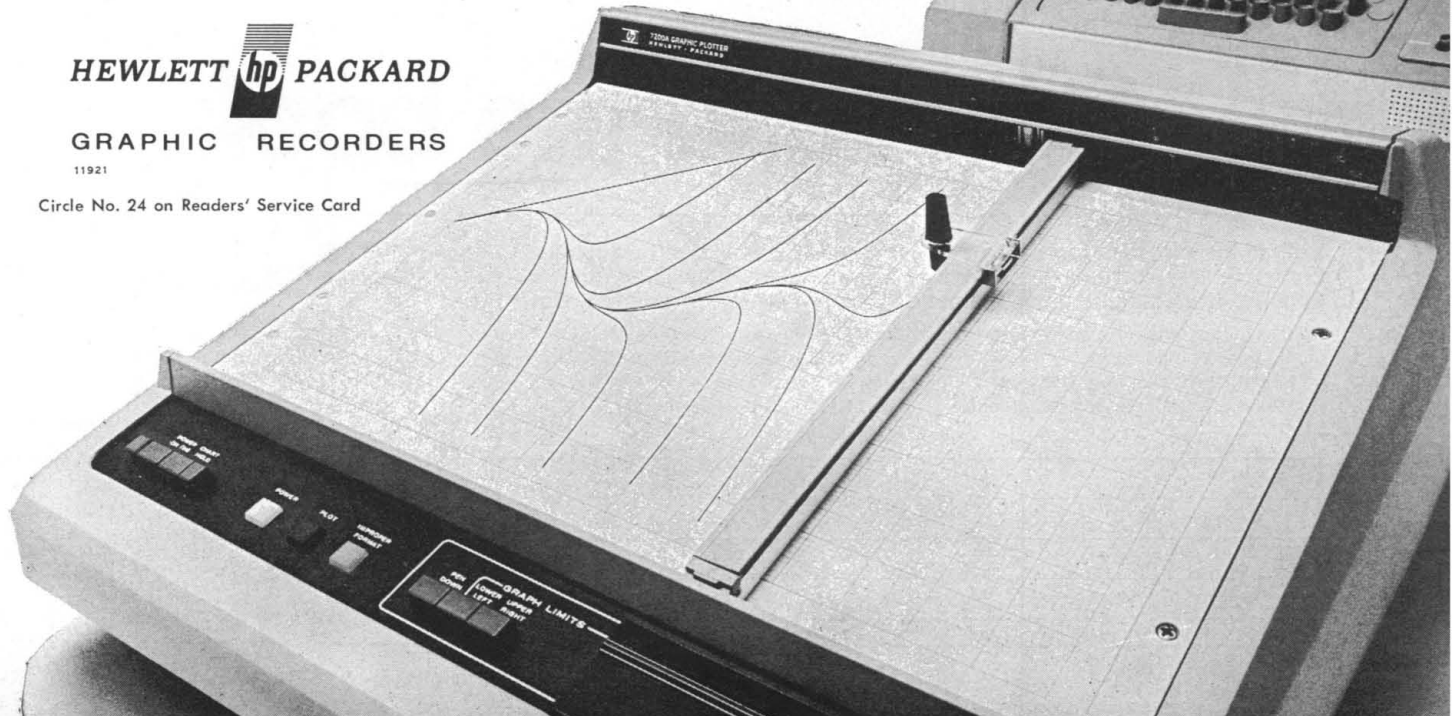
Hewlett-Packard's new 7200A Graphic Plotter. If your service doesn't offer it yet, have them give us a call. The Graphic Terminal. For people who can benefit from a dash of art with their cold hard data.

HEWLETT  PACKARD

GRAPHIC RECORDERS

11921

Circle No. 24 on Readers' Service Card



Potentiometric recorders: here's the picture.

Shown here, a portrait of all there is to know about potentiometric recorders. All from Sargent-Welch. And each deserves its own personality profile:

Model SRG: The basic recorder, distinguished by its advanced performance. Seven pre-calibrated spans. Three chart speeds. Guarded circuits and filtered inputs. Accuracy: $\pm 0.25\%$. Reproducibility: $\pm 0.1\%$. Full-scale pen response: Less than one second. Basic price: \$975.

Model DSRG: The SRG times two. That is, a dual-pen recorder, with two linear channels, for recording two time-related variables, side by side or overlapping, on the same chart. Same matchless performance as the SRG, but only a few inches wider. Think of it as a space- and paper-saver. Basic price: \$1675.

Model SRLG: The SRG taken one step further, with the addition of a logarithmic function. Eminently suited, therefore, for recording (say) the log of absorbance with a spectrophotometer. Precision, non-circular gears — which do the job much better than electrical approxi-

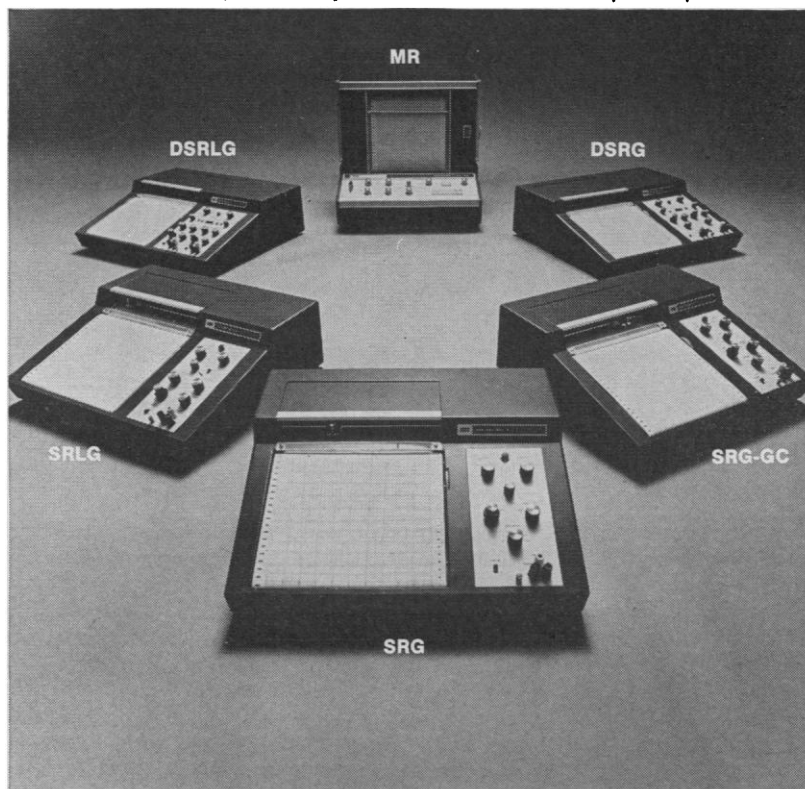
mations to the log function. Basic price: \$1225.

Model DSRLG: Another logical move. Two SRLG's in one dual-pen recorder. Think of what that means if you work with a spectrophotometer, photometer, or densitometer — simultaneous recording of both transmittance and absorbance. Or linear/log recording of any two time-synchronized variables. Basic price: \$2075.

Model SRG-GC: Something special, for use with a gas chromatograph. Fast response, high AC rejection, floating input, three chart speeds, and continuously variable wide-rangespans. Optional integrator for precise measurement of areas under recorded curve. Basic price: \$975 (with integrator, \$1660).

Model MR: The ultimate recorder? Perhaps. Few can match it for precision, speed, sensitivity, and versatility. Measures and records (vs. time) any variable that can be translated into voltage or current, or that can be time-related by synchronous drive. Twelve ranges, twelve speeds. Basic price: \$2650.

As we said, a complete picture of a complete line.



Now read the book.

0-214

Still, in all fairness, one picture and these few words don't do justice to our complete line of recorders. So we've prepared a fully illustrated, 30-page catalog. It's yours, without obligation, for returning the coupon. Do it now.

I'd like a copy of your recorder catalog. I'm especially interested in:

- Model SRG Recorder Model DSRLG Dual-Pen Linear-Log Recorder
 Model DSRG Dual-Pen Recorder Model SRG-GC Recorder for Gas Chromatographs
 Model SRLG Linear-Log Recorder Model MR Multi-Range Recorder

SARGENT-WELCH

Scientific instruments, apparatus, chemicals.
Sargent-Welch Scientific Company
7300 N. Linder Ave., Skokie, Illinois 60076

Chicago/Anaheim/Birmingham/Cincinnati
Cleveland/Dallas/Denver/Detroit
Springfield, N.J./Toronto/Montreal/Vancouver

Name _____ Title _____
 Organization _____
 Address _____
 City _____ State _____ Zip _____
 Telephone _____

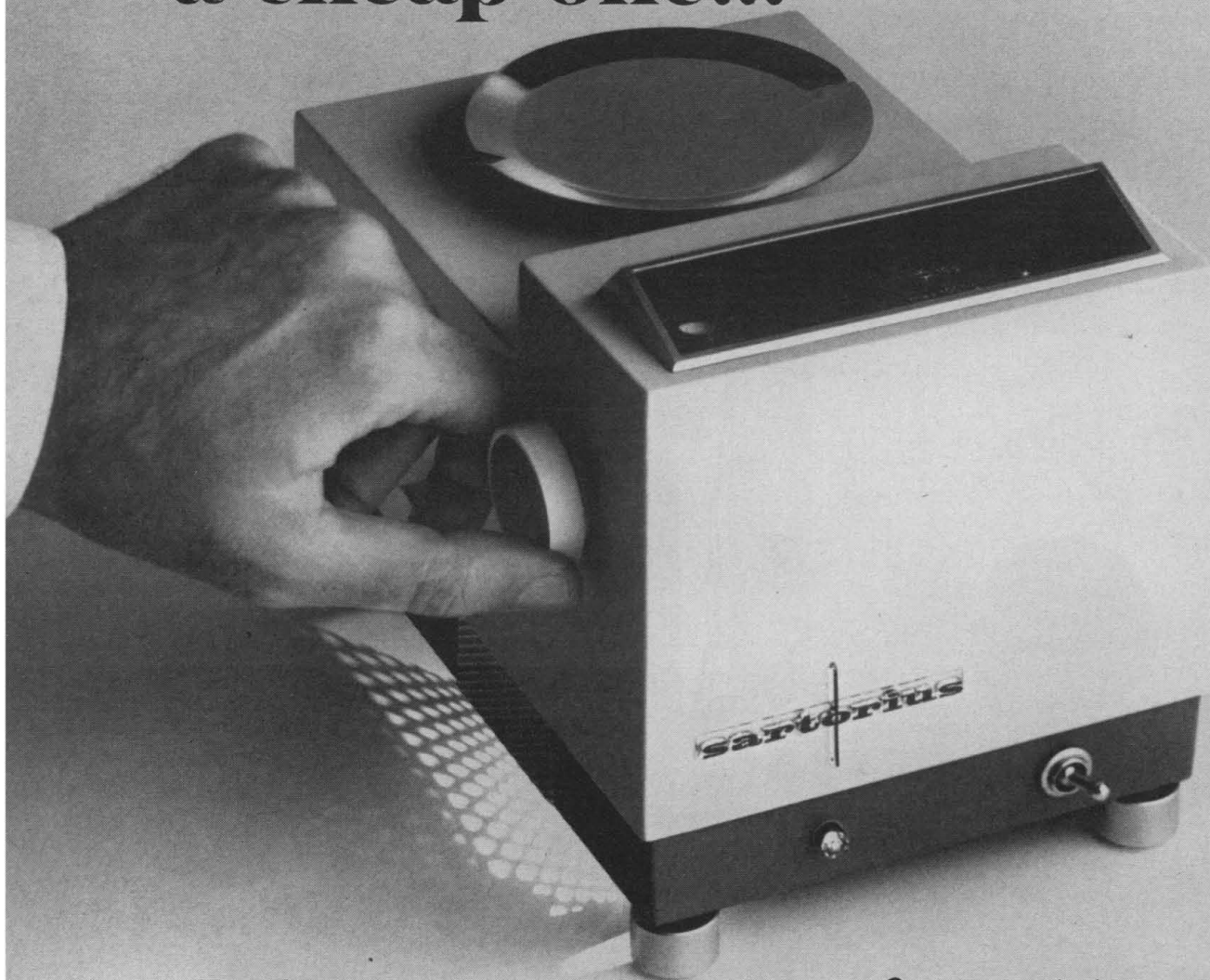
Announcing a scanning electron microscope that puts scanning capability within reach of every laboratory. JSM-S1 from Jeolco.

□ Jeolco's new S1 scanning electron microscope. Which puts quality, high-volume scanning capability in only 3 x 4 feet of laboratory floor space. □ Our unique way of getting right down to the surface of specimens. □ At a price you can afford. With TV scan to help you quickly find the area you're looking for. Continuous magnification from 19 to 100,000X with direct display readout in 8 fixed steps. □ And guaranteed resolution of 250 angstroms. □ With a unique goniometer stage tilting -5 to +45°, 360° continuous rotation. Air locks. 4 x 5" Polaroid camera. And a fully automatic vacuum system. □ With color-coded controls that work like people do. So the JSM-S1 is far simpler to learn and operate. □ With completely solid-state modular design that provides high reliability and low maintenance. With a solid-state high-voltage power supply built right into the column. □ Which all helps make the Jeolco S1 compact. And simple. □ Give it a little room in your lab. □ Never will so many owe so much to so little. □ For details, please write Jeolco (U.S.A.) Inc., 477 Riverside Avenue, Medford, Massachusetts 02155, Telephone (617) 396-6021.

Jeolco.
Putting
the 70's
into
focus.



**For laboratories that
don't need an 'expensive'
top loader, yet can't use
a 'cheap' one...**



The new Sartorius 1100. Only \$425.

Why pay for an expensive balance your lab may not really need? Why buy slower and cruder equipment that doesn't meet today's standards? Sartorius solves the dilemma with its new Series 1100 top-loaders — the first balances to bridge the gap between modern design and low price.

At only \$425, the Series 1100 offers many features usually found only on more expensive, sophisticated weighing instruments. For example: all-digital readout; results in less than 3 seconds; wide-range mechanical taring; fast, easy operation with no weights to handle and not even any dialing of built-in weights. It's a torsion-type balance, and the optical scale covers the entire weighing range.

Available in three different capacity/accuracy

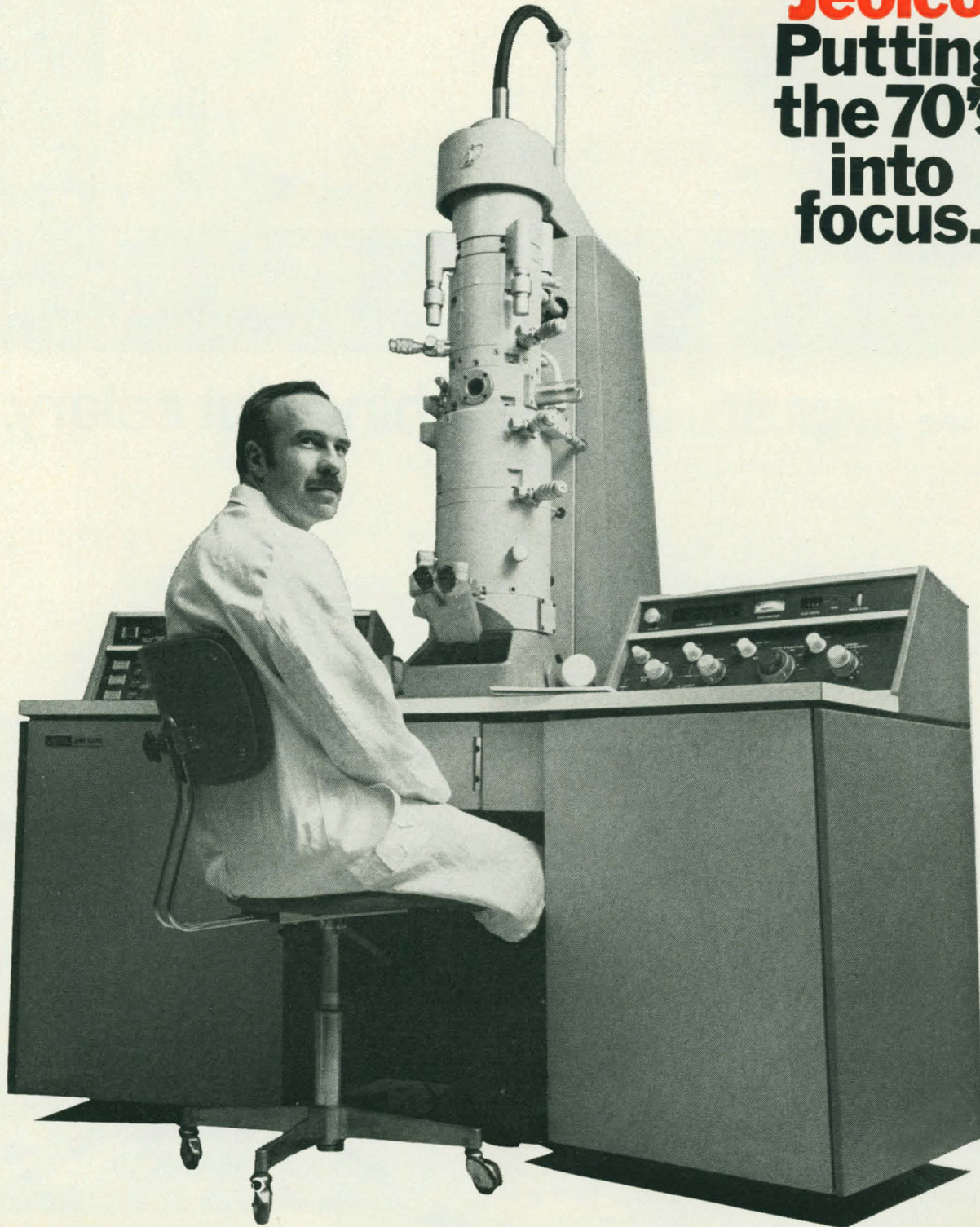
ratios—1000g/0.1g, 200g/0.015g and 100g/0.01g —these new, reasonably priced balances are ideal for a variety of applications, from student use and research to quality control weighings.

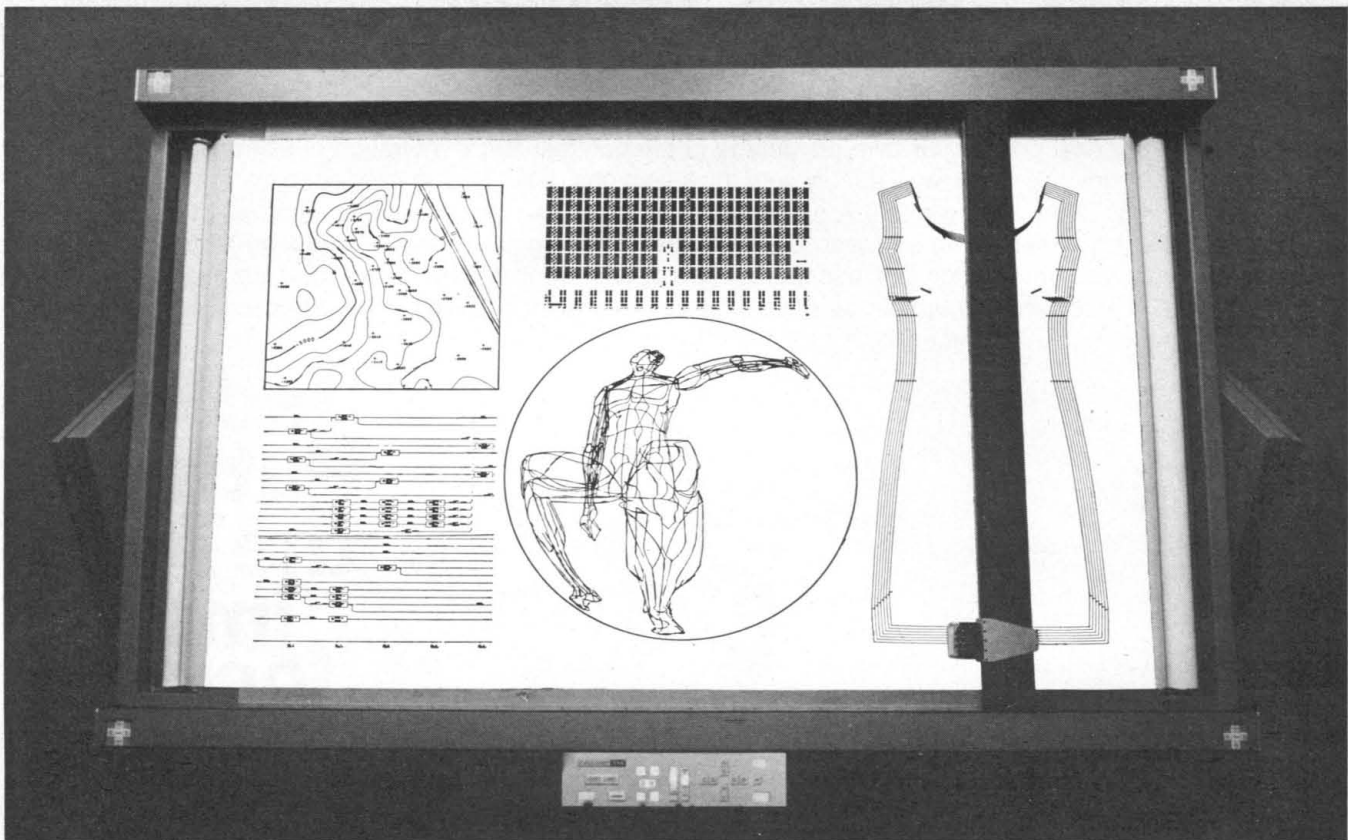
If you're in the market for a new balance for weighing in the range from less than 100 grams up to 1500 grams, you really ought to find out more about the new Series 1100. We'll be happy to send you complete literature and our free 52-page catalog. Just write: Sartorius Division, Brinkmann Instruments, Cantiague Rd., Westbury, N.Y. 11590.

sartorius balances

Jeolco's JEM-100B. Two of the best electron microscopes you'll ever see. □ You already know part of our story. Our JEM-100B transmission electron microscope. 2 Å resolution guaranteed. A guarantee already proven in laboratories throughout the world. □ And now we've added scanning capability to make the 100B two of the most capable electron microscopes you'll ever use. □ So now you can put the third dimension to work on your next project. Or take advantage of the contrast and penetration of scanning transmission microscopy, which provides the image quality with thick sections described at this year's International Electron Microscopy Meeting. □ By adding a 200 Å guaranteed secondary electron capability and a 100 Å guaranteed scanning transmission capability to a proven 2 Å transmission microscope, we've produced the most versatile and complete transmission electron microscope available. Best of all, these capabilities are available without continual change of hardware and without sacrifice of basic performance. □ To bring these capabilities into view, send for our new brochure. □ Jeolco (U.S.A.) Inc., 477 Riverside Ave., Medford, Mass. 02155, Tel. (617) 396-6021.

Jeolco.
Putting
the 70's
into
focus.





It draws about everything but salary.

Being versatile has done a lot to make CalComp's 718 flatbed plotter the world's most popular.

Being accurate hasn't hurt, either.

And in many applications, you'll never need finer resolution.

But if you do, there's our new 728 flatbed plotter. With the same huge 27 square foot drafting area.

But with laser-calibrated accuracy. *Guaranteed.*

Naturally, when you choose from six different CalComp flatbed plotters and 25 separately-defined systems, you pay for only the precision you need. On jobs like these.

Mapping. For resource exploration, highway design, and all government and civil engineering.

Mask design and cutting. For integrated circuit packaging.

CPM/PERT networks. For space, military and construction applications.

NC simulation. For numerical control program verification.

CalComp is the leader in computer graphics. With sales, service and comprehensive software support in 34 cities around the world.

And with the greatest variety of computer-controlled plotters anywhere. Drum plotters, COM plotters, and since 1966, Flatbed plotters.

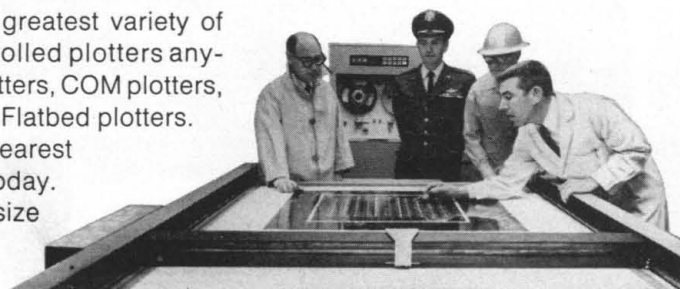
So call your nearest CalComp man today. And ask him to size up your drafting requirements.

Maybe our versatile 718 flatbed plotter is exactly what you need.

If not, there's our exact 728.

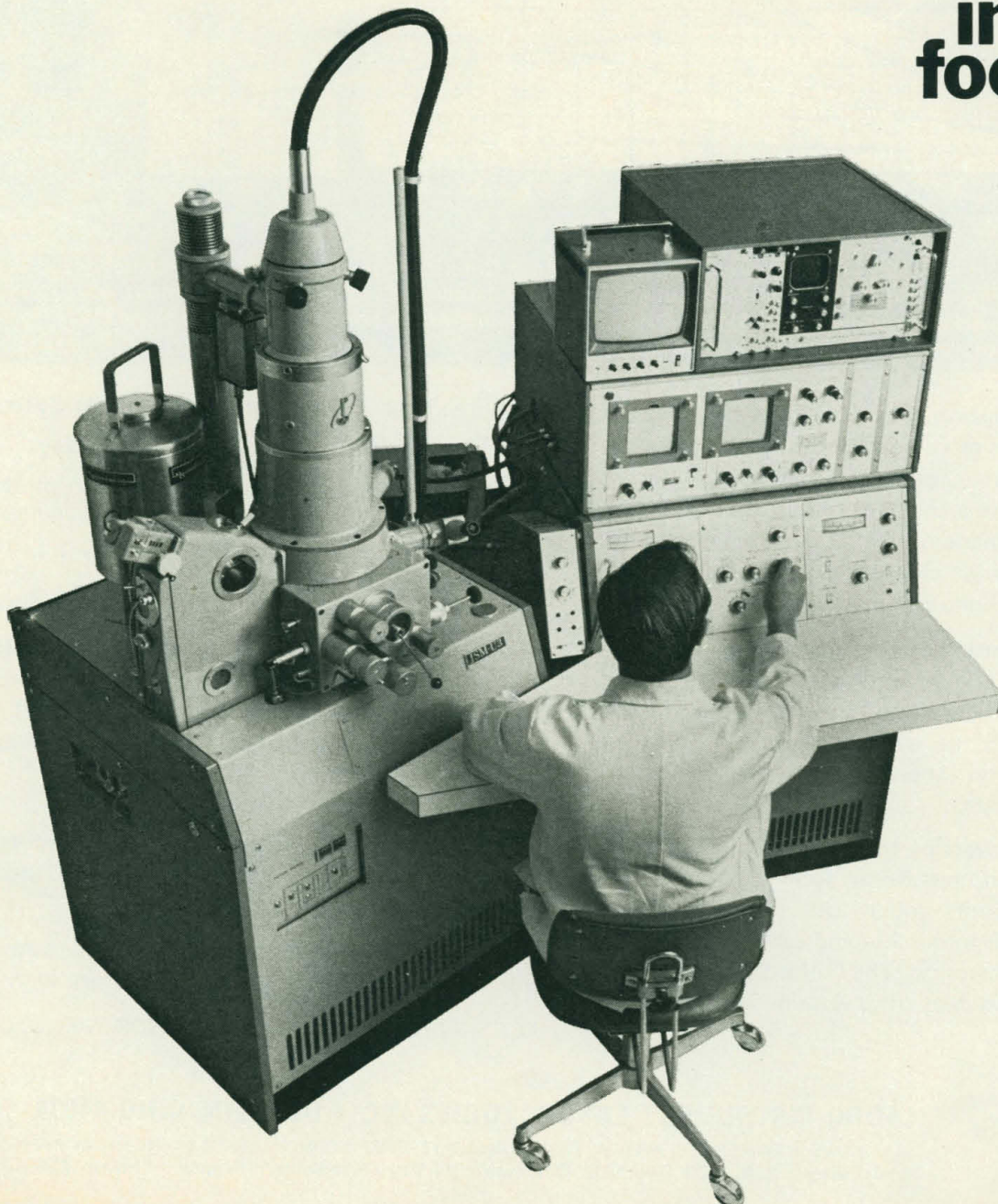
CALCOMP
TEACH YOUR COMPUTER TO DRAW.

California Computer Products, Inc.,
Dept. T-10, 2411 West La Palma Avenue,
Anaheim, California 92801.



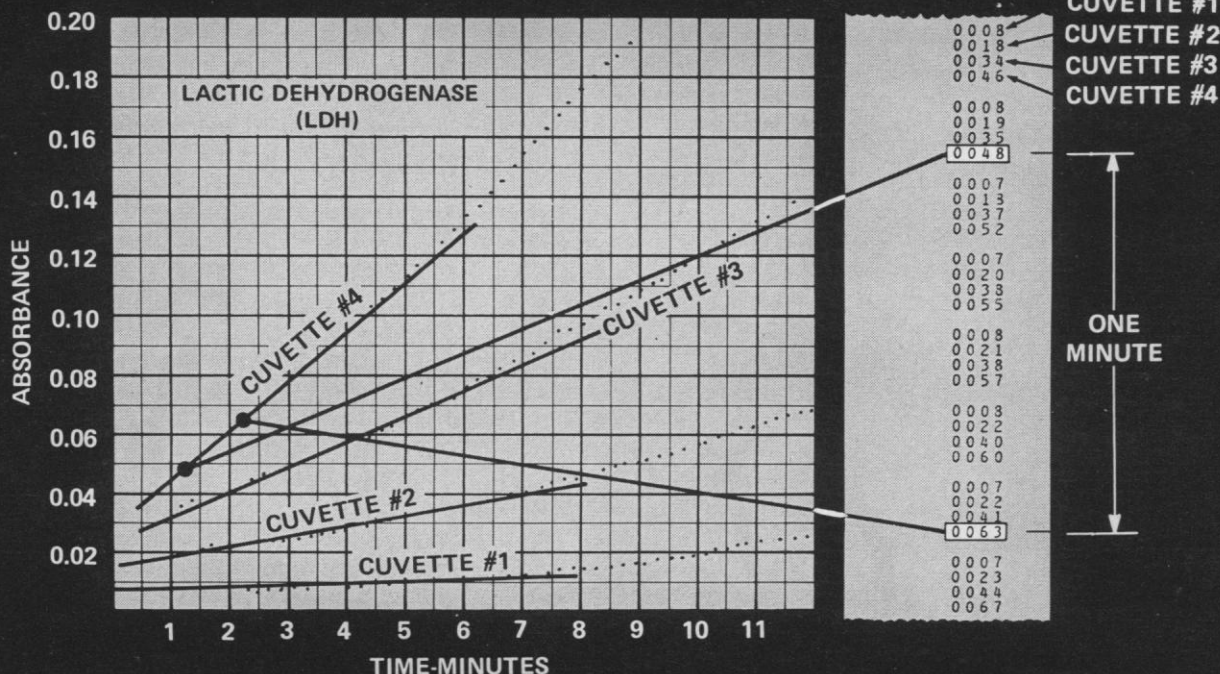
Today. It's still Jeolco accomplishments vs. competition's good intentions. □ Everyone knows a full range of accessories makes a good scanning electron microscope an even more valuable investment. □ Provided the accessories are really available. □ Jeolco's are. □ Take our JSM-U3. As you read this ad, 37% of all U3 owners have added our energy dispersive x-ray analyzers. 75% are using our TV scan. 10% are now heating specimens under test to 450° or 1100°C. 10% can apply stress to 10 kg or 200 kg. 25% are using a transmitted electron detector. □ And all enjoy the extraordinary reliability, 200 angstrom guaranteed resolution, universal goniometer stage, state-of-the-art 2 lens optical system, and automatic vacuum control that are proven U3 features. □ To find out more about the ways Jeolco accessories make your investment more productive, visit one of our demonstration centers and give the JSM-U3 a good workout yourself. Or just watch one of the TV tapes we've prepared on our dynamic accessories. □ Either way, you'll discover there's more to Jeolco than promises, promises. □ Jeolco delivers. □ Jeolco (U.S.A.) Inc., 477 Riverside Ave., Medford, Mass. 02155, Tel. (617) 396-6021.

Jeolco.
Putting
the 70's
into
focus.



Simplified Interpretation of Enzyme Rate Data

WITH THE GILFORD DIGITAL ANALYSIS SYSTEM



The chart recording in the figure above was made with a Gilford Automatic Recording Spectrophotometer equipped with the Gilford Automatic Sample Handling System. The tape printout was produced simultaneously on a Gilford Data Lister equipped with a precision Timer. Compare the ease with which the tape printout can be interpreted.

0.001 A Resolution. The new Gilford System for digital analysis gives you a printed numerical record of enzyme rate information *directly in absorbance* with a constant resolution of 0.001 A — accuracy made possible by the sensitivity, linearity and wide measuring range of the unique Gilford Spectrophotometric System.

Eliminate Chart Interpretation and Analysis. There are no adjustments of chart controls nor any off-scale readings. You get as many data points digitally as with a recorder. And you avoid errors in the transcription and interpretation of data.

Fast, Easy Conversion to Enzyme Concentration. Absorbance printout on an accurately controlled time base permits you to use a convenient enzyme template to quickly and easily convert ΔA data to concentration. The Gilford Enzyme Template contains tables of $\Delta A/\text{min.}$ vs. IU/liter for many enzymes.

Acquire Your Digital Enzyme Analysis System The Flexible Gilford "Building Block" Way:

If you already have a Gilford Spectrophotometric System*, you simply add the Gilford Absorbance/Concentration Meter and Data Lister with Time Base.

*Model 2000 ... 220, 222 or 222-A ... 240 or 2400.

If you have an Outmoded Spectrophotometer*, you can update it, using your optics. Just add a Gilford Photometer, Automatic Sample Handling System, Digital Absorbance/Concentration Meter and Data Lister/Timer.

*Littrow single-beam type.

Or, invest in a new Gilford Spectrophotometer. Enjoy the advantages and versatility of Gilford UV-VIS true linear absorbance systems.

Let a Gilford representative show you how a Gilford System can serve your laboratory with —

FLEXIBILITY TO MATCH YOUR GROWING NEEDS

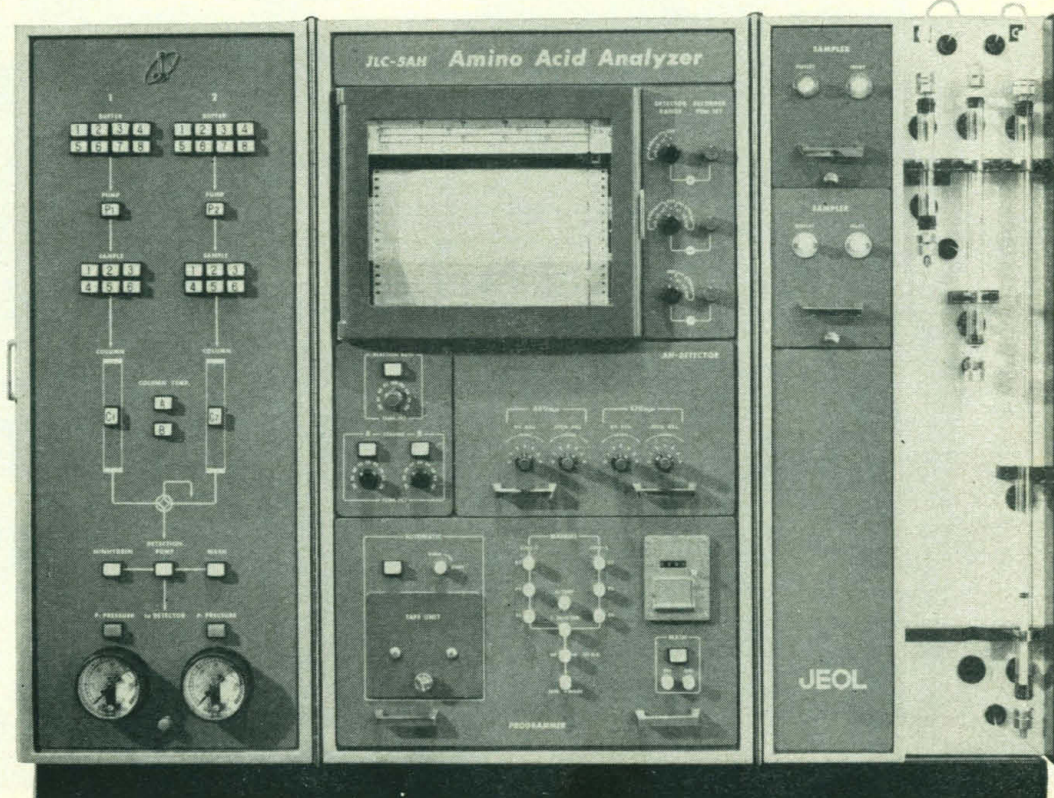
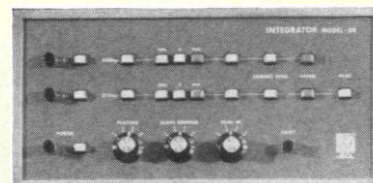
gilford[®]

GILFORD INSTRUMENT LABORATORIES INC. • OBERLIN, OHIO 44074

EXCLUSIVE REPRESENTATION THROUGHOUT THE WORLD ... IN EUROPE CONTACT:
Gilford Europe, S.A. • 74 Rue M.S. Defresne • 94-Vitry-Sur-Seine • France • Phone: 726 43 70

Now . . . Jeolco offers a TOTALLY automatic AAA SYSTEM. □ For less than the price of competitor B's AAA only, you can have a Jeolco 5AH TOTALLY automatic AAA System (including integrator). □ \$27,340 □ And you will still have the world's most sensitive AAA. □ 1×10^{-9} mol. □ It performs peptide analysis without any extra accessory. □ It is also adaptable for nucleotide analysis. □ Adaptable for sugar analysis, too! □ This gives you the most versatile and universally adaptable automatic amino acid analysis system on the market today. □ Send for all of the details or call for immediate demonstration. □ Jeolco (U.S.A.), Inc., 477 Riverside Avenue, Medford, Massachusetts 02155 Tel. (617) 396-8620.

Jeolco.
Putting
the 70's
into
focus.



This is the first new nuclear counting system in over ten years. It's the General Electric NUCLE-EYE™ Monitor System, an entire nuclear laboratory in a 10 x 14 x 3" case.

With a built-in power supply and carrying handle, the eight-pound GE NUCLE-EYE Monitor goes everywhere your rack of nuclear instruments can't.

But don't think we've sacrificed capability for compactness. Fact is, General Electric's NUCLE-EYE System competes with far costlier systems when it comes to ultra sensitivity. Even low radiation counting is practical because the NUCLE-EYE Monitor features a semi-conductor detection system with high gain.

The heart of this amazing Monitor System is its solid-state "front end." It contains a silicon "avalanche" diode, the world's

first solid-state proportional detector. And it also features high speed tunnel diode circuitry.

Detection by the NUCLE-EYE Monitor is extremely fast. In fact, almost as fast as a nuclear particle can create a signal in a solid. The result? Background noise is virtually eliminated. You can count low energy radiations with low background at elevated temperatures or count at the highest rates with no loss of precision.

With General Electric's NUCLE-EYE System, you easily detect nuclear radiation from the softest betas to high energy gamma radiation. Interchangeable heads are available, optimized for beta or gamma radiation.

What applications do we foresee for our exciting new system? Here are just a few:

Nuclear biology and physics

- Ultra soft x-ray and low energy beta research

General Electric introduces the first fully portable, ultra-sensitive nuclear counting system. And, it's under \$3,000.





- Non contamination radiotracing
- Ultra low-level counting
- Electron microprobe fluorescence detectors
- High temperature radiation detection
- Fast timing of nuclear events

Analysis and control

- X-ray fluorescence probes
- Beta particle backscatter probes
- Portable tritium monitors
- Density gauging
- Radioisotope production

Medicine and dentistry

- In-vivo probing
- X-ray fluorescence scanning and analysis
- Dental enamel studies
- Bone density scanning with isotopes
- Health physics instrumentation
- Carbon-14 research and experiments
- Ophthalmological tumor detection

The portable model (illustrated) is equipped with an x-ray detection head sensitive to energies greater than 1 keV, digital readout, sampling time control and a rechargeable nickel-cadmium battery system. Provisions are made for driving external rate meter, printer, comparator or other data systems.

**For more information, contact
Space Technology Products,
P. O. Box 8439, Philadelphia, Pa.
19101 Phone: (215) 962-8300**

162-48



ACTUAL SIZE

This page contains everything you need to do life sciences GC extraordinarily well.

Our Model 2100 is the best "U" column gas chromatograph ever made. It was designed specifically for life science and bio-medical applications. By people who know what they — and you — are doing.

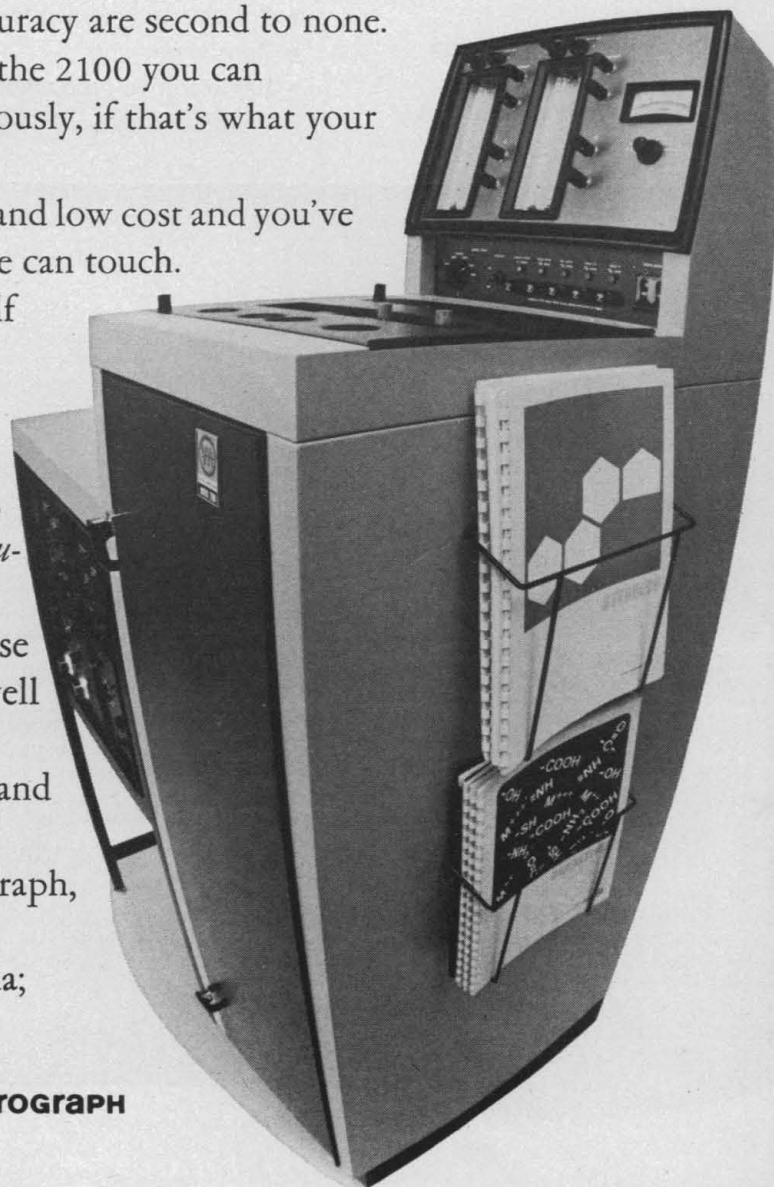
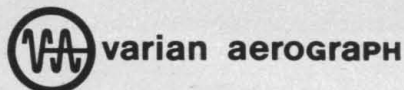
The 2100 is an all-glass system with on-column injection so that you can analyze even the most labile compounds with complete confidence. You get virtually no dead volume and precision and accuracy are second to none.

Then there's versatility. With the 2100 you can operate up to four columns simultaneously, if that's what your workload calls for.

Add fast, personalized service and low cost and you've got a life sciences GC that nobody else can touch.

But our instrument is only half the story. The other half is a series of unique life sciences GC methodology books. Each a procedural "cook book" in itself. Our titles include: *Fatty Acids*, *Steroids*, *Lipids*, *Carbohydrates*, *Pharmaceuticals & Drugs* and *Alcoholic Beverages*.

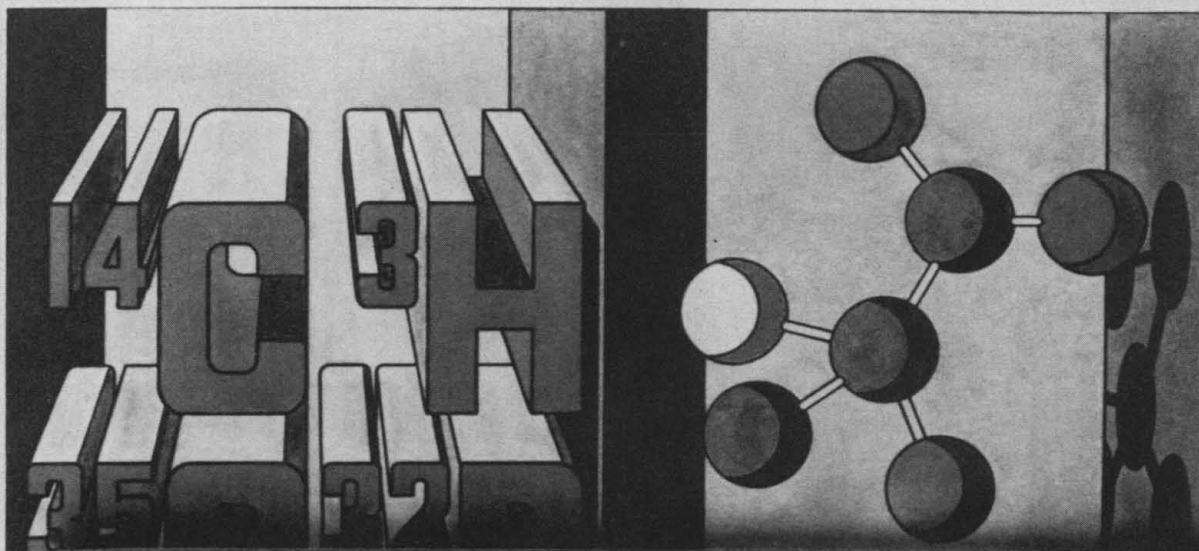
You can have any or all of these fine books with our compliments as well as a detailed product bulletin on the Model 2100. Simply write your name and the books you want on your company letterhead and mail it to Varian Aerograph, Walnut Creek, California 94598; Tokyo, Japan; Malton, Ontario, Canada; Crows Nest, N.S.W., Australia; or Zug, Switzerland.



Free: Two New Encyclopedias.

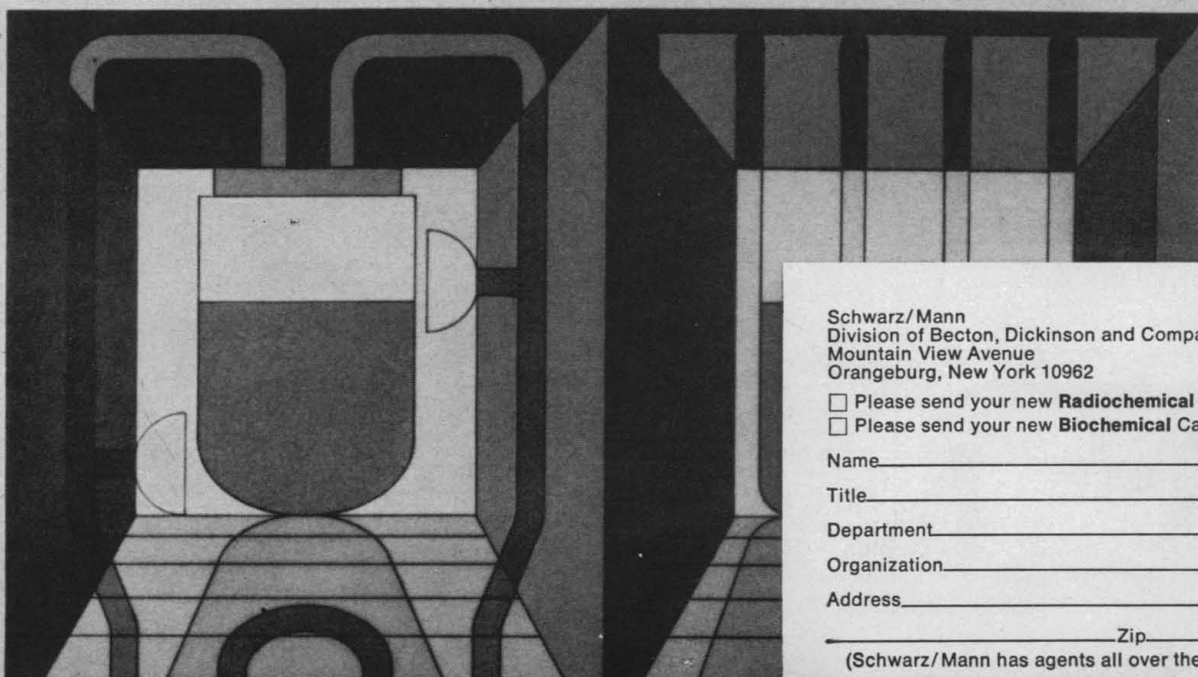
SM Schwarz/Mann

Radiochemical Catalog 1970/71



SM Schwarz/Mann

Biochemical Catalog 1970/71



Schwarz/Mann
Division of Becton, Dickinson and Company
Mountain View Avenue
Orangeburg, New York 10962

- Please send your new **Radiochemical** Catalog.
 Please send your new **Biochemical** Catalog.

Name _____

Title _____

Department _____

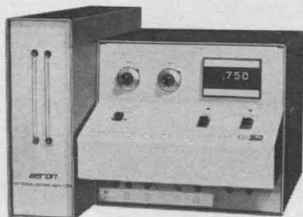
Organization _____

Address _____

_____ Zip _____

(Schwarz/Mann has agents all over the world.)

Aeron Air Quality Instruments



Aeron Continuous NO₂ Monitor—Correlates with ASTM D 2012. Gives continuous measure of NO₂ (or NO) in the atmosphere. Sensitivity is 0.02 ppm or better.



Thelco® Glassware Dryer

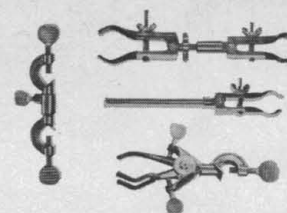
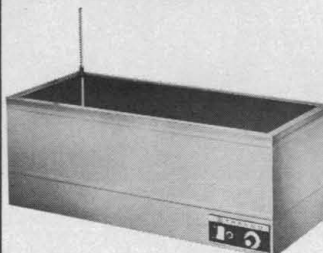
Handles up to 6 times the glassware drying work load of a comparably sized gravity convection oven. Can keep up with glassware washers. Saves technician time—hundreds of hours annually. Reduces glassware inventory. Pays for itself in one year or less!

Circle No. 68 on Readers' Service Card

Thelco® Baths

Gravity convection gives gentle mixing and long service—no moving parts to wear out. Temperatures from ambient to 100°C with uniformity an excellent ± 0.3 or better at 56°C. Six models—Sero-Utility and Low Profile Serological.

Circle No. 71 on Readers' Service Card



Laboratory Clamps

You name it... Precision's got it! A complete line with the right clamp for every laboratory need. Also unique Lab-Frames® for sturdy, versatile set-ups. All constructed of PS Alloy® for unsurpassed strength, durability and corrosion resistance.

Circle No. 74 on Readers' Service Card

Problem Solvers from Precision Scientific

The Precision Aeron group is the most complete line of air quality sampling and monitoring equipment available from a single manufacturer... Continuous NO₂ Monitor, Sequential Sampler, Automatic Tape Sampler/Recorder, Tape Spot Evaluator, High Volume Air-Sampler, SO₂ Dust-Fall Monitoring Station and Sulphation Plate Holders.



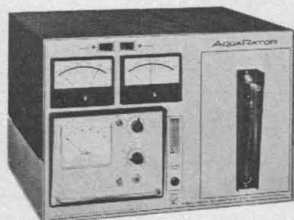
Aeron Sequential Sampler—Complies with ASTM D 1605, D 1607, D 1609. Has 12 stations, each accommodating 3 tubes. Operates unattended—up to 4 days.

Circle No. 66 on Readers' Service Card

AquaRator® for COD Determinations

Two-minute COD determinations! Repeatable data (to $\pm 3\%$ or better) on water quality in time to take immediate corrective action. Uses inexpensive CO₂ and saves hours of personnel time. Results easily correlated with standard COD methods prescribed by APHA.

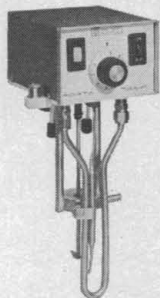
Circle No. 67 on Readers' Service Card



Thelco® Ovens and Incubators

Featuring the traditional built-in quality and guaranteed uniformity that has made Thelco a leader in constant temperature equipment for fifty years. Check "Best by Thermocouple Test" tables in Bulletin 320—actual performance figures guaranteed!

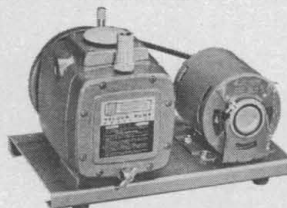
Circle No. 69 on Readers' Service Card



Porta-Temp®

Constant temperature bath heater, controller, stirrer and circulator... all this versatile performance ability is packed into a conveniently portable unit only 6 1/4" x 7 1/4" x 13" high and weighing only 8 pounds. Maintains temperatures to 100°C with $\pm 0.13^\circ\text{C}$ uniformity.

Circle No. 70 on Readers' Service Card



Vacuum Pumps and Fittings

Quieter, more compact, more efficient, yet less expensive than anything on the market today. Seven two-stage models, capacities from 25 to 1500 liters/minute. Guaranteed ultimate vacuum runs to 0.1 micron of mercury— 1×10^{-4} Torr.

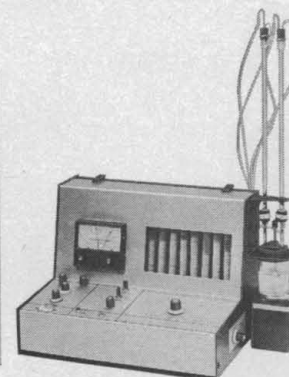
Circle No. 72 on Readers' Service Card

Time-It®



You can't beat it for accuracy, dependability, durability or economy. Time any program, process or procedure with ease—ten thousand 1/10 seconds with accuracy to 5/100 of a second, alternate model reads 1/100 minutes to 1,000 whole minutes.

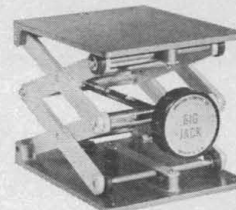
Circle No. 73 on Readers' Service Card



Auto-Aquatrator®

Performs KF titrations automatically. In a broad range of applications, the Auto-Aquatrator handles any organic or inorganic giving quick, accurate and consistent results—reproducible to ± 0.025 ml of titrant. Non-automatic Aquatrator® offers same accuracy—plus economy.

Circle No. 75 on Readers' Service Card



Big Jack®/Little Jack®

Sturdy, adjustable platform for heavy flasks, hot plates, heating mantles, baths or complicated glassware set-ups... precisely controlled lifting up to 100 lbs. Little Jack is designed for micro and semi-micro work.

Circle No. 76 on Readers' Service Card



Precision Scientific Company

3737 W. Cortland Street

Chicago, Illinois 60647



Erroneous Weighing

Erroneous weighing always happens when the milligram is taken lightly.

During the 6000 years that the old two-pan balance was around, errors like these were common. But for the last 25 years, we at Mettler have been waging an all-out crusade against such weighing errors.

Our strategy has been to construct Mettler balances in such a way that it is extremely difficult to weigh incorrectly.

Take the Mettler H10Tw, for instance. It is impossible to interpret the digital readout incorrectly. You can't make mistakes in arithmetic because

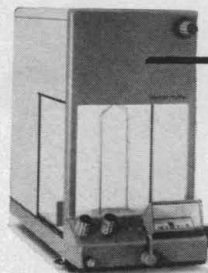
you don't use arithmetic. The sample weight indication and the tare weight indication are separate. And weighing-in correctly is easy and enjoyable with the filling guide.

At Mettler we have also been waging a war against wasted time. The arrangement and position of the ring weights in our balances save time by reducing the pendulum effect. The Mettler air damping system also annuls the time required for the optical scale to come to rest. With automatic preweighing across the entire weighing range, you don't waste precious time in a trial-and-error search

for the correct weight control. The wide optical scale range makes it unnecessary to use a lot of separate weights. Add to this the rapid taring feature. This lets you bring the optical scale back to zero with lightning speed. And so on.

Every year there are a few tens of thousands more Mettler balances and a few tens of thousands less inaccurate and unreliable weighing results around. After a while, inaccurate balances will be an extinct species.

Until that moment arrives, we will continue with our crusade for the scrupulously correct milligram.



Mettler

Mettler Instrument Corporation
Princeton, New Jersey, USA
Greifensee-Zurich, Switzerland
Giessen, West Germany
Arnhem, Netherlands

12 6022 72

We could call ourself

Acme • Advanced Instrument • Ainsworth • Alconox • American Optical • Ames • H. Reeve Angel • BBL • Barnstead • Bausch & Lomb • Becton, Dickinson • Bioquest • Blue M • Bronwill • Browne-Morse • Buchler • Buehler • Cahn • Cambridge • Clay-Adams • Coleman • Coors • Corning • Coulter • Dade • Difco • Dillon-Lilly • Eaton-Dikeman • Edmont-Wilson • ERTCo • Falcon • Federal Pacific • Fermentation Design • Forma • Foster • Gelman • Glas-Col • Hamilton • Harleco • Hausser • Hycel • Instrumentation Laboratory • IEC • Jewett • Kimble • Labconco • Lab-Line • Lab-Tek • Lakeside • LaMotte • Leco • Lindberg • Lourdes • Magnuson • Mallinckrodt • Market Forge • Markham • Maryland Plastics • Matheson Coleman & Bell • Mettler • Nalge • Napco • Ohaus • Orion • Oxford • Pharmaseal • Photovolt • Polyscience • Precision • Revco • Rinco • Roehr • Sage • S & S • Scientific Industries • Sherwood • Sylvania • TekPro • Thermolyne • Torsion Balance • Turner • Tyler • Ultra Violet • VirTis • Voland • Wampole • Warner-Chilcott • Welch • Westinghouse • Wheaton • Wilmot Castle • Worthington Biochemicals • Yellow Springs, Inc.

You can call us S/p for short

Our Founders called us Scientific Products. Our friends call us S/P. Our competitors call us lots of names, with good reason. We represent over 100 leading laboratory equipment manufacturers and stock over 100,000 items in 17 regional sales and distribution centers with 5,415,000 cubic feet of space and our 230-man field representative organization virtually blankets the industry and we service every item we sell and that's a mouthful



nobody else can say. If you're not yet a friend, you'll find us listed under the name Scientific Products in the Yellow Pages in most major cities. Once we get to know one another, it won't take long before you're calling us S/P for short. S/P... the single source for laboratory equipment, supplies, scientific instruments. Scientific Products, a division of American Hospital Supply Corporation, 1210 Leon Place, Evanston, Illinois 60201.

Emancipate your time...



New HP Stat-Pac Makes System 9100 Your Personal Statistician

You have some tough decisions to make. The data is ready but the big computer is booked up for the rest of the day. An educated guess is too risky. What to do? Put the decision-making power of statistical analysis on your desk or bench. The HP System 9100 Computing Calculator puts answers to important questions just a touch away — no need to wait for the services of a programmer or wait in line to get on the big computer.

The new Stat-Pac, latest addition to the 9100 software, contains 100 *applied* statistical programs that you use for decision-making in every field, from business to scientific

research. Areas covered are general statistics, distribution functions, test statistics, curve fitting, harmonic analysis, sampling theory, analysis of variance, operations research, and reliability and quality control. These programs are formatted and ready for entry into your 9100. For instantaneous entry, store often-used programs on the exclusive magnetic card. Since many of these programs include the HP 9125A X-Y Plotter, you will be free from tedious (and inefficient) hand plotting of graphs and charts.

How's this for a vital statistic? Users tell us that the System

9100 is solving 58% of their problems for \$1.11 per computing hour. Lease, rent, and purchase options available. For further information, or to arrange a "hands-on" demonstration at your desk, write: Hewlett-Packard, P.O. Box 301, Loveland, Colorado 80537 In Europe: Hewlett-Packard, 1217 Meyrin-Geneva, Switzerland.

090/32

HEWLETT  PACKARD

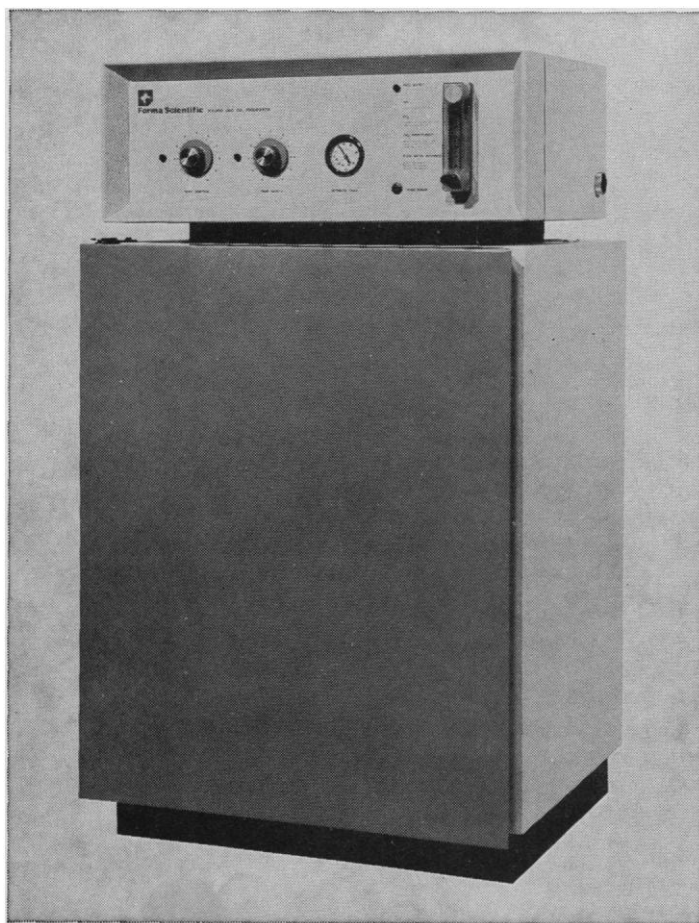
HP CALCULATOR SYSTEM 9100

Circle No. 62 on Readers' Service Card

Inside are optimum conditions for your tissue cultures.

You'll discover there is more to our new single-door, water-jacketed incubator than meets your eye. Including an exciting price—available from \$895.00.

The incubating chamber is designed especially for tissue culturing procedures. There,



the precise CO₂ tension is maintained by our exclusive Un-i-trol system. Air, of constant pressure and flow, is provided by the built-in supply. While a built-in water reservoir maintains the ideal elevated relative humidity.

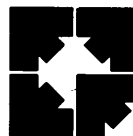
A controlled, stable water mass in five jacketed walls creates exceptional temperature stability and uniformity.

After door openings, independent "Kwik-Purge" elements rapidly reestablish the pre-selected CO₂ tension. A full-view inner glass door closes against a tight-sealing silicone gasket, and the outer door closes softly to avoid shocking cultures.

We also increased shelf capacity. With special no-tip shelves. And a stainless steel interior. The exterior is finished in tangerine and cream colored baked enamel.

This remarkable incubator is also available in a double-door unit. Choose from four models. Write for Bulletin WJ-100.

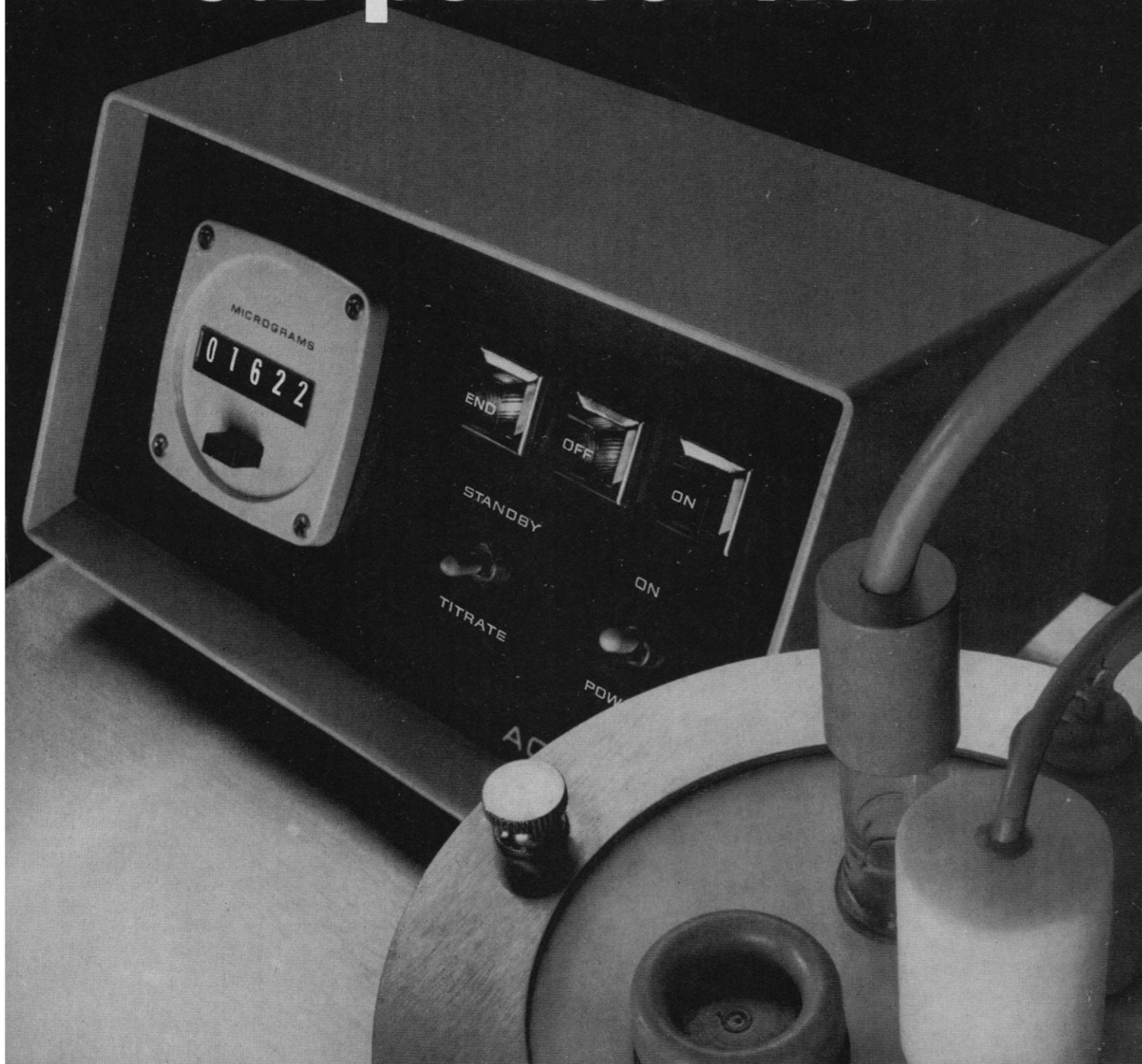
Forma Scientific, Box 649, Marietta, Ohio 45750.



Forma Scientific

Circle No. 11 on Readers' Service Card

our point of view!



Finding a drop in a bucket is a lead pipe cinch... with AQUATEST

AQUATEST is the only truly automatic Karl Fischer titrator.

Just inject sample... flip switch... step back... read answer!

Digital readout... no standardization... no drying system... no burettes... no measuring... no computations



Accuracy, reproducibility, and sensitivity all within 25 micrograms of water... that's 10 ppm in a 2.5 ml sample!

Our point of view is that "drop in the bucket" water determinations are really a cinch with our **AQUATEST**. Try one and let us know your point of view.



PHOTOVOLT CORPORATION 1115 Broadway, New York, N.Y. 10010 • (212) 989-2900

Circle No. 50 on Readers' Service Card



A different kind of weapon

Once known only as a golden fruit, the pineapple has also given its name to the deadly "pineapple." Now this fruit whose name was used for the grenade of war is rapidly becoming a versatile source of articles of peace.

One of these promising products of the pineapple plant is a protein-splitting enzyme called bromelain. It has already proved its worth as a meat tenderizer . . . as an anti-gellant that keeps gelatine drinks free-flowing . . .

as an ingredient in a variety of pharmaceutical products . . . in chill-proofing beer.

How will this plant protease continue to meet its high promise in the field of new products? As a digestive aid? As a miracle cleanser? As a cure for the common cold?

How can your company use bromelain? Dole will supply technical supporting data and research samples if you think there may be an application

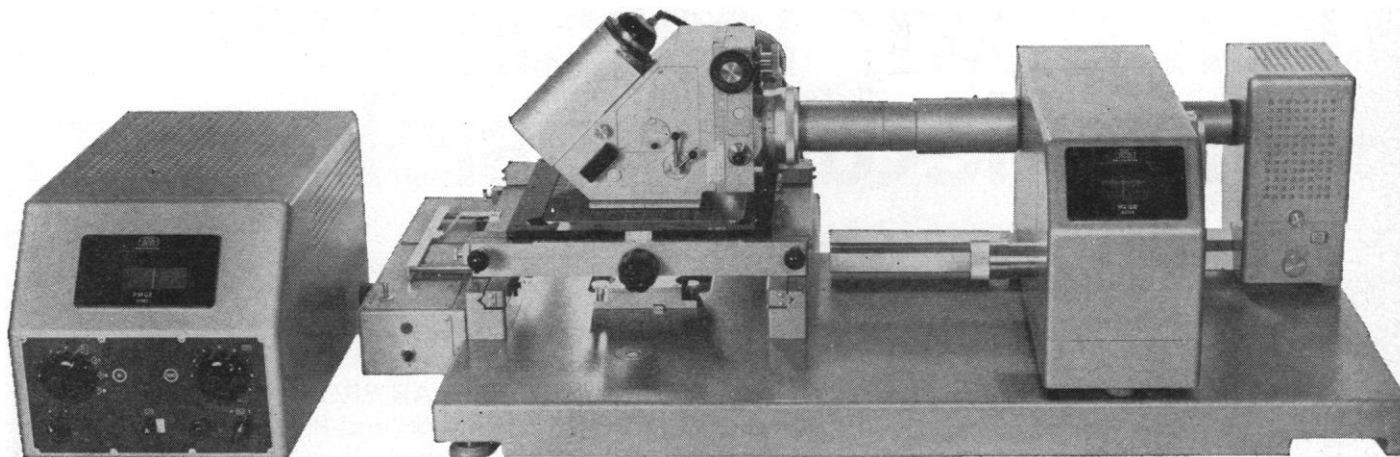
in your business. Just write. We'll send you all the facts. Or, if you are ready to try your idea on a larger scale, bromelain is also available in commercial quantities.

You may find the kind of explosion you're looking for by releasing the potential in bromelain.

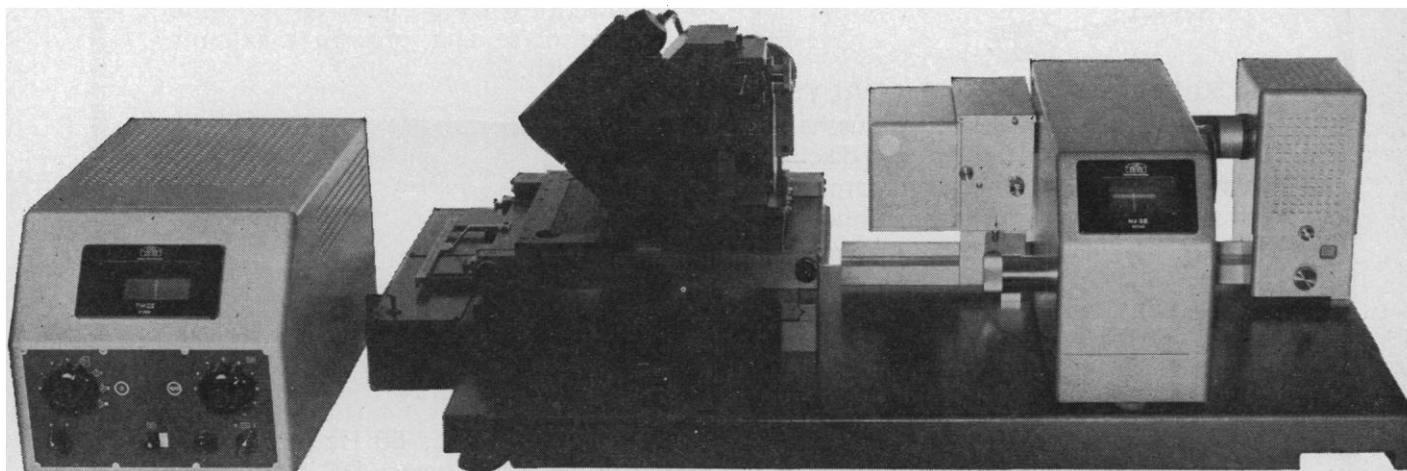
Dole COMPANY

CHEMICAL DIVISION, P.O. BOX 5130,
SAN JOSE, CALIFORNIA 95150
A DIVISION OF CASTLE & COOKE, INC.

When money is tight—



look for the extra value
you get from the Zeiss Chromatogram
Spectrophotometer for TLC...



... it can be converted easily to
the universal PMQ II Spectrophotometer
by the addition of units costing only \$726.
2 instruments for just a little more
than the price of 1.

Just because funds are hard to come by is no reason not to have the best. And the Zeiss TLC Spectrophotometer *is* the best. It offers accuracy and sensitivity significantly better than you can find elsewhere. A demonstration will prove it, and we'll be glad to arrange one for you. But right now we'd like to emphasize its versatility—the versatility that gives it extra value in these cost-conscious times.

First, over a wavelength range of 200-2500 nm, this spectrophotometer measures chromatographic separations by transmission, reflectance or fluorescence. And not only can it accommodate larger TLC plates

than any other instrument, but also paper chromatograms, electrophoresis strips and film negatives. Provision is also made to measure gel discs and slabs, and to attach the recorder of your choice.

Moreover, because it operates by direct examination in the UV range, it eliminates the need for staining. Resolution is infinitely high. And you have a choice of continuously variable round and rectangular apertures.

But that only begins the story of its versatility. Chapter 2 starts with our picture caption—please read it. With that slight extra investment, you'll reward yourself with the world's most reliable and accurate universal

spectrophotometer, and have two great instruments for little more than the price of one. The arithmetic is simple, and it all adds up in your favor.

For complete data, or to arrange a demonstration, write Carl Zeiss, Inc., 444 Fifth Avenue, New York, N.Y. 10018.

Nationwide service.

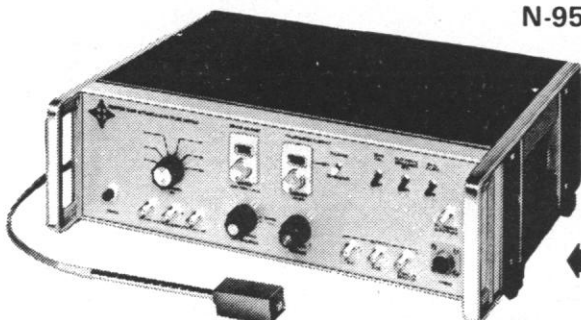
ZEISS

THE GREAT NAME IN OPTICS



Mentor Instruments for electrophysiology

Mentor's growing line of sophisticated electronic instruments provide you with far greater capability than ever before. Incorporating the latest semiconductor technology, these instruments bring new versatility, accuracy and reliability to specific physiological research applications.

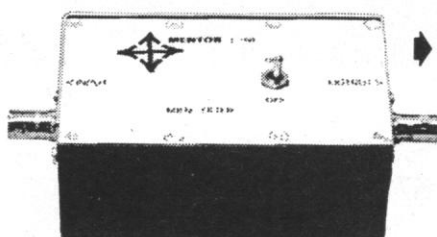
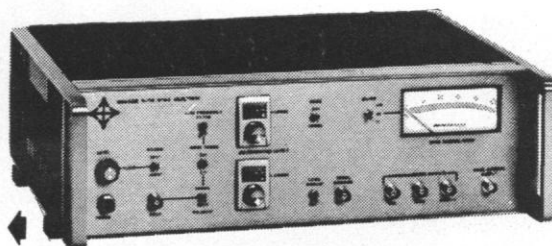


N-950 INTRACELLULAR PROBE SYSTEM

The N-950 Intracellular Probe System is used with a single barrelled micro-pipette to perform intracellular electrical measurements. The instrument allows simultaneous cell stimulation and measurement of membrane impedance and potential. Electrode mounts directly on guarded probe to reduce noise and provide maximum bandwidth.

N-750 NEURONAL SPIKE ANALYSER

The Model N-750 is an enormous help in the analysis of extracellular unit discharge patterns. A window discriminator sorts spikes of differing amplitudes while a timing section measures the time interval between spikes. Inter-spike interval is displayed continuously on the panel meter, and is available as an analog signal for plotting on a chart recorder.

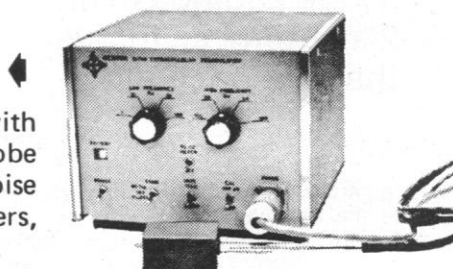


F-60 FILTER

Model F-60 Filter eliminates 60 Hz noise problems. Active notch filter passes DC to 1 MHz, with 40 db rejection of 60 Hz line frequency pickup. This completely self-contained filter is compatible with all recording systems.

N-740 EXTRACELLULAR PREAMPLIFIER

Designed specifically for extracellular recording with glass or metal microelectrodes, the N-740 has a probe preamplifier for direct electrode mounting. Low noise combined with high gain and selectable active filters, make the N-740 the ideal microelectrode amplifier.



Delivery is from stock on all Mentor instruments. Send now for complete information.



MENTOR CORPORATION
biomedical systems

2512 Delaware Street S.E. Minneapolis, Minn. 55414 (612) 331-5177

What would you ask for in a complete Photomicrographic and Photomacrographic Lab?

1. The first thing you'd ask for would be an easily operated 4x5 camera system. You'd want it to be completely automatic—exposure, film counting, frame-imprinting, everything—so that all you have to do to take a picture is focus and push a button. You might need, too, a fully automatic 35mm camera that's easily and rapidly interchangeable. You'd definitely want utmost stability—the kind that the Zeiss Ultraphot III, with its sliding mirror system (rather than bulky bellows) and its strong shock mounting, gives you. You'd want to use Polaroid® and have a projection head available, and, for metallographic work, special disks for grain size determinations. You might also need a Micro-Hardness Tester and a movie camera. So you'd make sure there was provision for all these.

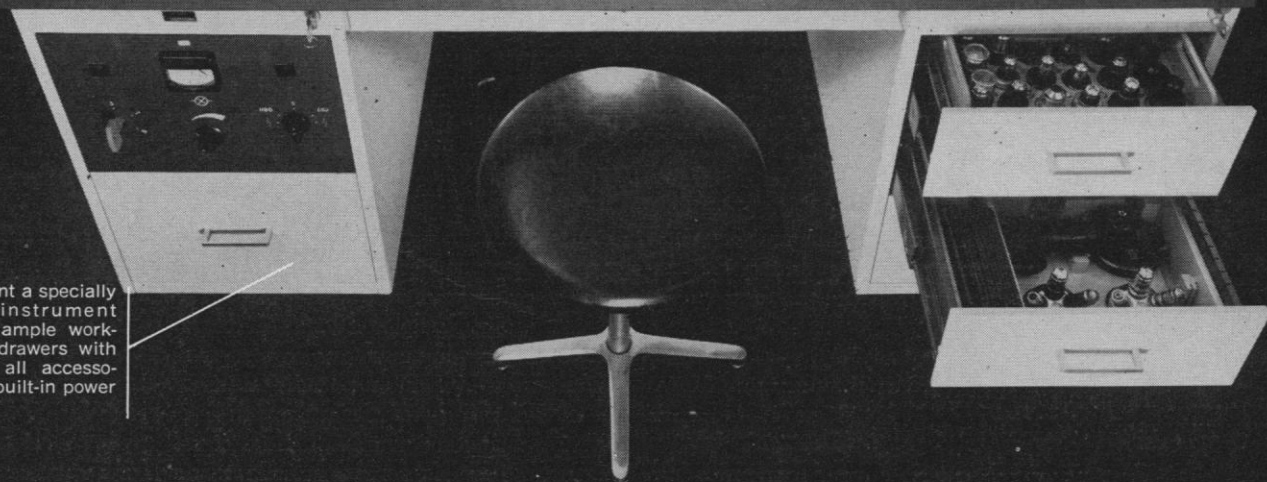
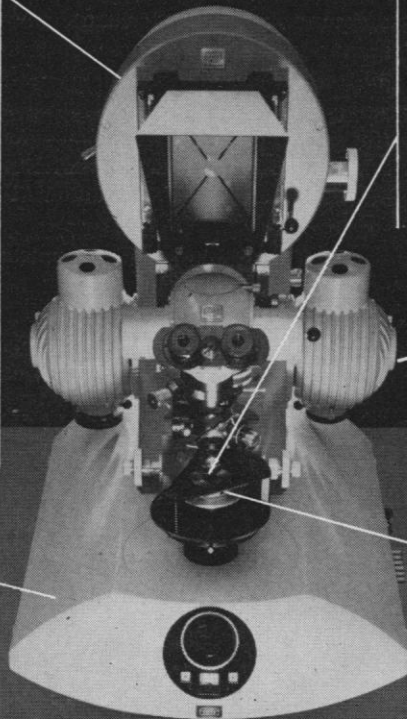
6. You'd make sure everything was built into a sturdy and compact stand. And "everything" means "everything": filters, ASA selector for speeds from 2.5 to 8,000, exposure readout window, push-button for exposure, photo-multiplier, beam splitter (so that the light can be directed 100% to the camera, or 100% to the eyepieces, or 1/3 to the eyepieces and 2/3 to the 4 x 5 camera, or 100% to the 35mm camera with its own focusing eyepiece.)

2. You'd insist on the highest quality optics—in other words, Zeiss optics. And you'd want them to be *completely* interchangeable with those on any other Zeiss microscope you may have or plan to add. So you'd have available to you the "world's widest line of Planapochromats, Planachromats, Plan-Neofluars, Neofluars, Ultrafluars, Achromats, Epi-plans, and Pol objectives for transmitted and reflected light—not to mention the unequaled Luminars and Epi-Luminars for photomicrography. You'd want, in short, capability for 4 x 5 and 35mm photography at continuous magnifications from 2.5X to the limits of light microscopy, through the finest flat-field optics ever made.

3. You'd require a choice of light sources—CSI, Mercury, Xenon, Quartz Iodide, and Tungsten. And you'd find it very convenient that the Ultraphot holds three at the same time so you can switch from one to the other, or combine Mercury and Tungsten for phase-fluorescence, all by a simple flip of a lever.

4. You'd expect it to be a simple matter to exchange stages so that you can switch from reflected light, or vice-versa, in a matter of seconds. You'd want the same easy exchangeability, too, of eyepieces and condensers.

5. You'd want a specially designed instrument table, with ample working space, drawers with fittings for all accessories, and a built-in power supply.



You'd ask for Ultraphot III.

That's what Zeiss calls it, and it does everything but develop the film. And, if you use Polaroid® film, it does that too. For all light-microscope techniques—brightfield, darkfield, fluorescence, polarization, phase contrast, Nomarski interference contrast and quantitative interference microscopy

(Jamin—Lebedeff)—in both reflected and transmitted light—photomicrography and photomacrography—the Ultraphot III is the supreme instrument. Write Carl Zeiss, Inc., 444 Fifth Avenue, New York, New York 10018.
Nationwide Service

ZEISS
THE GREAT NAME IN OPTICS



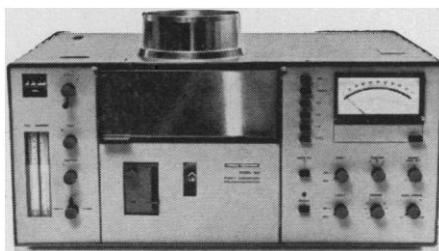
ATLANTA, BOSTON, CHICAGO, COLUMBUS, DENVER, HOUSTON, KANSAS CITY, LOS ANGELES, PHILADELPHIA, SAN FRANCISCO, SEATTLE, WASHINGTON, D.C.

Very simply,
we'd like to say
that we are introducing
a new low cost
atomic absorption spectrophotometer
and that we'd like to emphasize
the combination of price,*
performance** and features***
Thank you.

* Under \$3,000.

** The new Varian Techtron Model 1000 is not only fully able to handle trace, major constituent and quantitative analyses for more than 66 elements, but is also an excellent teaching tool. With extreme sensitivity in just about any concentration units you need.

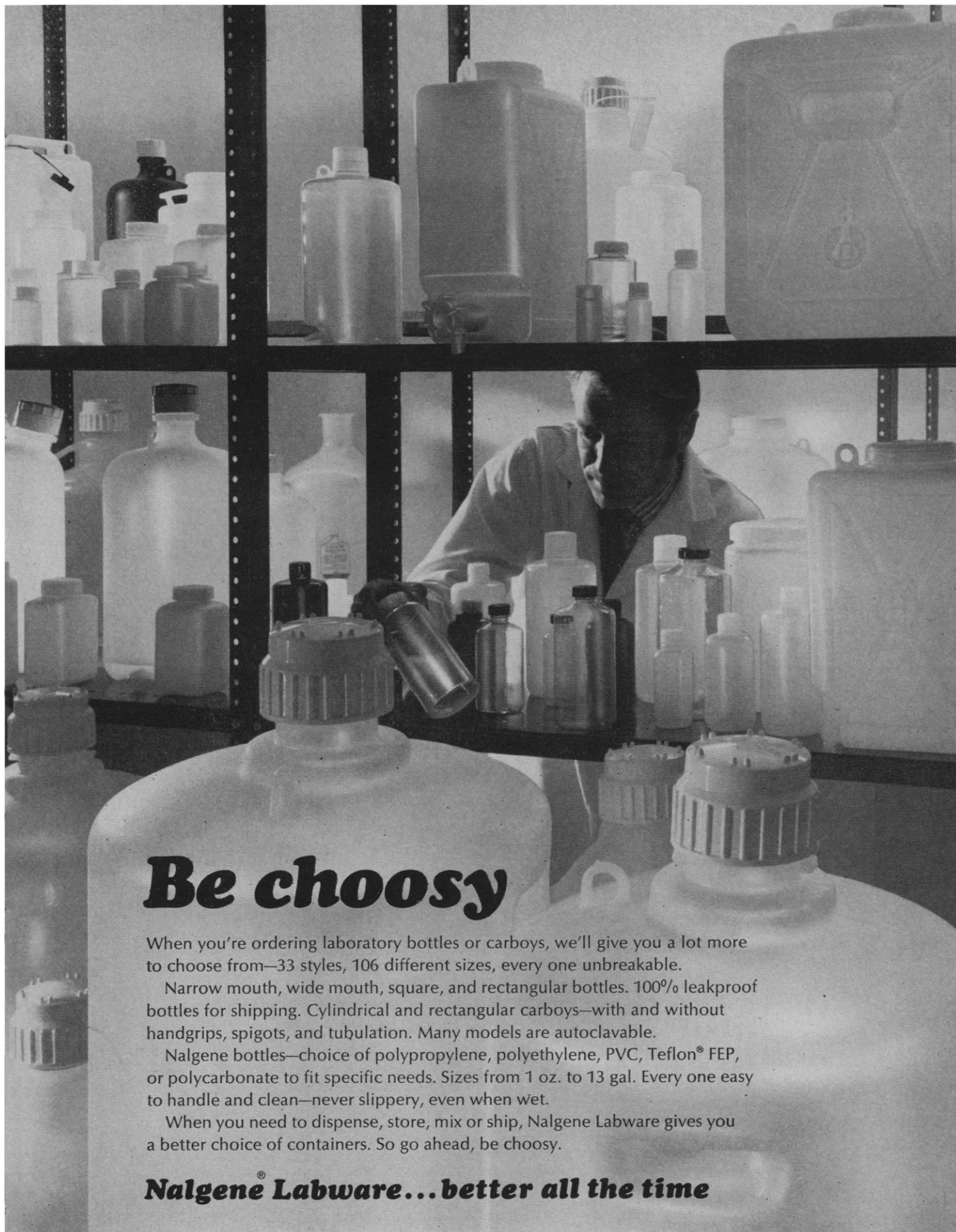
*** Built-in features include flame emission chopper, variable slits, four-lamp turret, tilt-out meter and automatic baseline correction.



The 1000.

For complete details, or a demonstration, write Varian Techtron, Walnut Creek, California 94598; NEVA Azabudai Bldg., Tokyo, Japan; Malton, Ontario, Canada; Crows Nest, N.S.W., Australia; or Zug, Switzerland.

 **varian techtron**



Be choosy

When you're ordering laboratory bottles or carboys, we'll give you a lot more to choose from—33 styles, 106 different sizes, every one unbreakable.

Narrow mouth, wide mouth, square, and rectangular bottles. 100% leakproof bottles for shipping. Cylindrical and rectangular carboys—with and without handgrips, spigots, and tubulation. Many models are autoclavable.

Nalgene bottles—choice of polypropylene, polyethylene, PVC, Teflon® FEP, or polycarbonate to fit specific needs. Sizes from 1 oz. to 13 gal. Every one easy to handle and clean—never slippery, even when wet.

When you need to dispense, store, mix or ship, Nalgene Labware gives you a better choice of containers. So go ahead, be choosy.

Nalgene® Labware...better all the time

Order from your Laboratory Supply Dealer. Ask him for our Catalog or write Dept. 85221, Nalgene Labware Division, Nalge Company, Rochester, N.Y. 14602.

Circle No. 37 on Readers' Service Card

NALGENE LABWARE DIVISION



NALGE
SYBRON CORPORATION

Facts.

The Brush 260 delivers more of them...with less fuss, bother and cost...than any other oscillograph you can buy.

Facts start with accuracy.

And the Brush 260 is about as accurate as you can get. We guarantee 99½% linearity. So when you're looking at the chart of a Brush 260, what you see, is fact. We owe it all to a fool-proof position feedback system that enforces pen position all the way across the chart. There are no springs, no strings. Or any of the other tricky mechanisms that you'll suffer with in other recorders.

Those traces you see are a lot more than just accurate. They're crisp and clear and reliable from one edge of the chart to the other. They won't smudge or smear. (And you can chalk

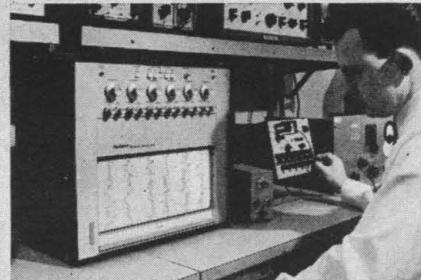
that up to a patented pressurized ink-writing system that puts the trace into the paper and not just on it.)

You can forget about recalibration problems, too. We took care of that little nuisance at the factory. So change those settings to your heart's delight. The Brush 260 will keep right up with you. And save you piles of time and piles of chart paper in the bargain.

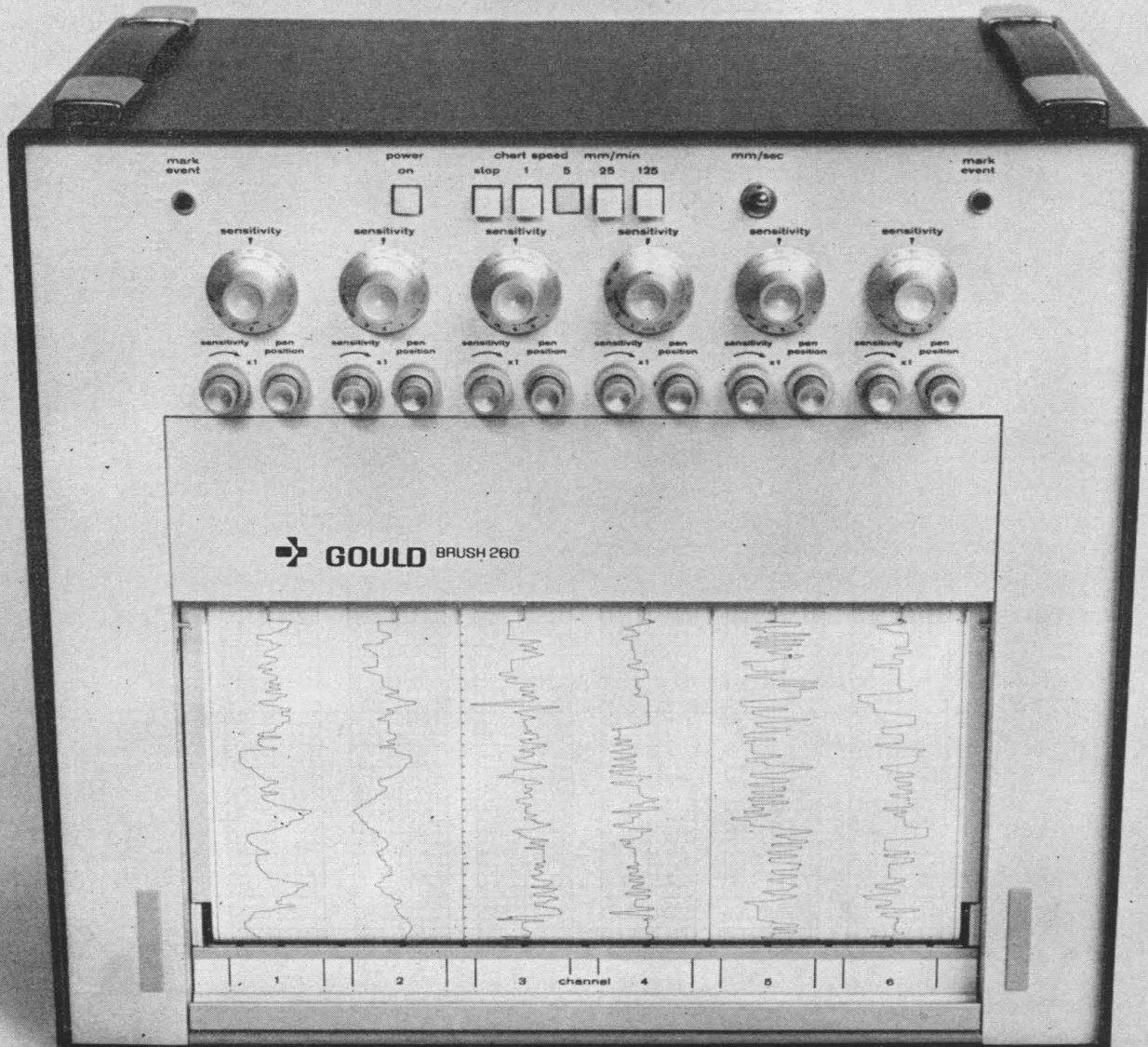
That's what you get with a Brush 260. It's the go-anywhere, do-anything 6-channel recorder by Brush. At a price per channel that will surprise you.

More facts. Less fuss, bother and cost.

Ask your Brush representative for a demonstration. Or write for Brush 260 Bulletin 942-2: Brush Division, Gould Inc., 3631 Perkins Avenue, Cleveland, Ohio 44114.



 **GOULD BRUSH**



<p>Agencies</p> <p>garance \$150 onibility \$125 \$135 \$135</p> <p>orker 120W42ST 8</p>	<p>Situation Wanted</p> <p>Friendly, honest, forty-eight page rare and specialty gas catalog lists over two hundred different pure gases, mixed gases and gas handling equipment and accessories. Seeks home in your file cabinet. References on request. Why not send now—so you'll have it when you need it. If you'd like this catalog, just tear off the bottom of this column and leave on your secretary's desk.</p>	<p>Situa</p> <p>BOOKKEEPER taxes long 691-3420.</p> <p>BKPR. F/ taxes \$200</p> <p>CHAUFFEUR or out of city.</p> <p>CPA per die cial engagem estates, speci HI 4-3152 or</p>
<p>PISTS</p> <p>n, downtown work bkgrd 227-5515</p>	<p>Dear Secretary, Please fill in this coupon. When the catalog comes in, don't even bother showing it to me, just file under "gases." Thank you.</p>	<p>CHEMICAL sition Bio-M trochemical tions. Av Eastern U.</p>
<p>d. Female</p> <p>highly exper. e procedures. 5. 544-0598.</p>	<p>Airco Industrial Gases Mr. Hank G. Grieco 575 Mountain Ave. Murray Hill, N.J.</p> <p>Name _____</p> <p>Address _____</p> <p>City _____</p> <p>State _____ Zip _____</p>	<p>Interior an idental; MU 9-4177.</p> <p>DRIVER with \$225 wk. Days</p>
<p>Female</p> <p>Research Dir Ted Bates. ility. Present 680-9244</p>	<p>TYPIST efficient seeks job in office or receptionist. 669-3417.</p>	<p>ENGINEER, ele ment, X-ray se or different field N.Y. 11804.</p> <p>ENGR CONSULT sm prec, med serv free lance</p>
<p>expd con- hr 25 hrs times</p> <p>exp thru 15.</p> <p>nced, seeks</p>	<p>HOUSEKEEPER CONNECTICUT Friendly Westport family with one young child needs pleasant person for childcare and light housekeeping. Permanent. Start to \$125 per week. No fee.</p>	<p>FOREMAN-SHE All phases, Hi prod meth</p> <p>HANDICAP ing; resp</p>
<p>entious ma- Prefer Penn</p>	<p>ng, general, MU 7-1158.</p>	<p>MAN ministrat J152 Tig</p> <p>MAN w age del</p> <p>MAN part tir</p>
<p>woman, ac- y exper. as Interest in st, lab work.</p>		<p>MAN packin PR</p>

Circle No. 10 on Readers' Service Card

Problem seem unsolvable? Try Perkin-Elmer's new kind of UV/VIS Spectrophotometer: the Model 356.

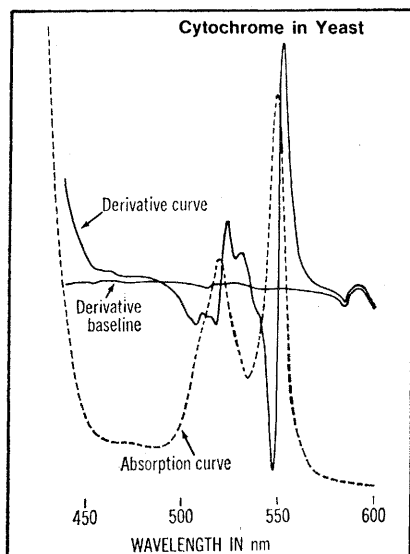
Combine conventional double-beam performance with highly versatile double-wavelength capabilities and you have the Model 356. Problems usually considered too difficult to solve by UV analysis are done easily and reliably by the Model 356. This *different kind* of instrument will solve your analytical problems better than any other instrument if you're:

a biochemist or biophysicist and your samples are highly *turbid*; or

a plant physiologist and your samples are plant leaves; or

a physiologist whose samples are microtomed tissue sections; or
a textile or paper chemist who must measure dyes or inks on paper or textiles; or

an analytical chemist who must make measurements on overlapped absorption bands; or



CYTOCHROMES IN YEAST — This absorption spectrum of a yeast cell suspension clearly shows the absorption bands of the various cytochromes. To compensate for high turbidity, 8 sheets of filter paper were required in the reference beam. The sampling geometry and the sensitivity of the Model 356 are such that the transmitted light has been measured through fifteen sheets of Whatman® No. 2 filter paper at 600 m μ with 1 m μ bandpass.

concerned with environmental pollution problems requiring measurement of pesticides, herbicides, polynuclear aromatics and other types of organic and inorganic pollutants; or

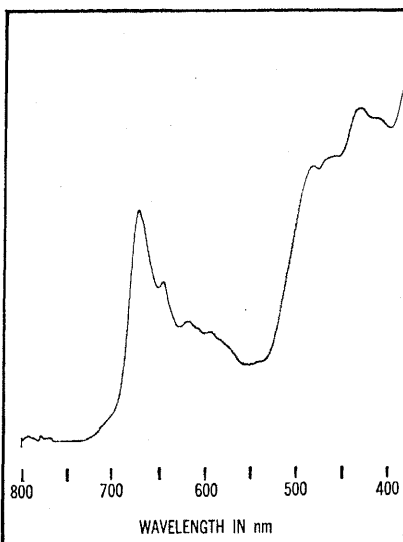
required to measure the rate of change of *two components* in a reaction cell *simultaneously*; or
measuring the rates of reactions that produce absorbance changes as small as 0.006A/hr.

The Model 356 solves such problems when other spectrophotometers can't for a number of reasons.

Analyses of turbid samples are done with the large photomultiplier of the Model 356 only 3mm from the sample—light scattering losses are minimized.

Band overlap problems are minimized by direct recording of the *first derivative curve* of the absorption spectrum.

Trace analyses are done by using the 100X scale expansion to achieve lower detection limits.



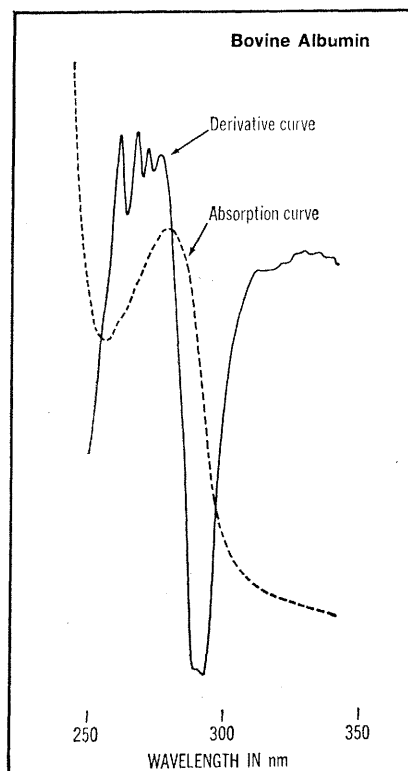
LEAVES — This is the absorption spectrum of a lettuce leaf at liquid nitrogen temperature. Note the shoulder at approximately 700 m μ . This may arise from a component referred to as P700 and is quite difficult to detect *in vivo*.

Simultaneous measurement of concentration changes of two components in a single reaction cell can be done by using the *Double-Wavelength mode*.

Kinetics of slow reactions or reactions at *high dilution* are made using the low noise 100X scale expansion and the *Double-Wavelength mode*.

For full details, write for our Model 356 brochure to: Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Connecticut 06852.

PERKIN-ELMER



MILK — These curves illustrate the relationship between the absorption spectrum of a milk sample containing added bovine albumin, and its first derivative curve. The presence of bands hidden in the absorption spectrum is clearly shown in the first derivative curve.



Step up to new levels
of enzyme purity . . .

Turn to the new Worthington catalog

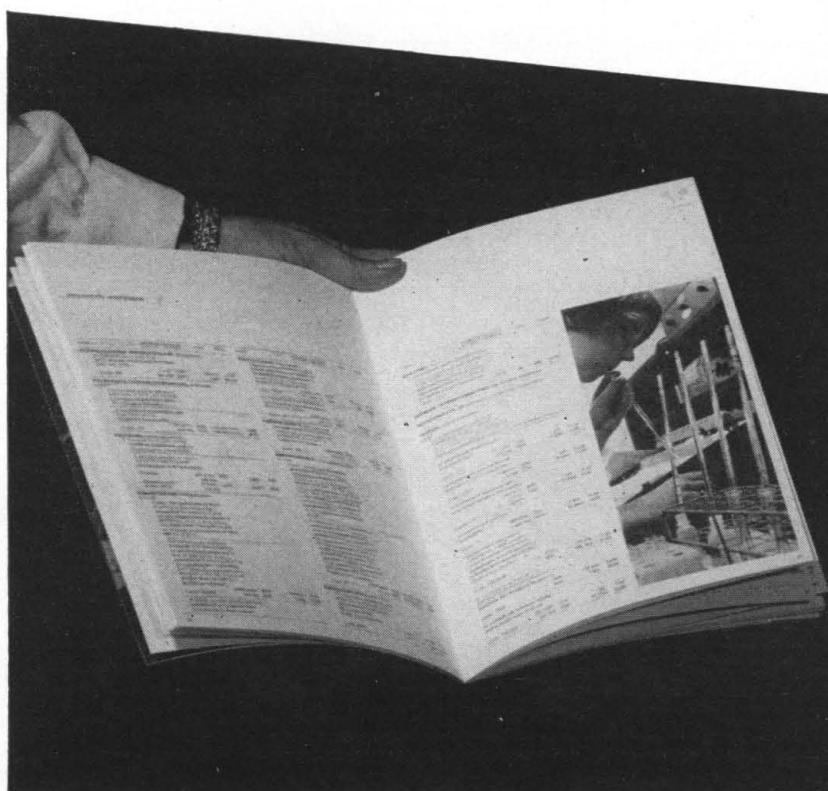
for research enzymes
enzyme reagents, nucleotides and
new analytical services

Our new catalog contains what you would expect—hundreds of high-purity enzymes for research, and our complete group of enzyme reagents for the clinical laboratory.

And it contains a lot more that is completely new:

- **Nucleotides**, comprised of a group of 73 basic compounds frequently required in biochemical and clinical laboratories.
- **Premium enzymes**, consisting of 18 fully-characterized enzyme products of outstanding purity and activity.
- **Radioactive enzymes**, including seven hydrolytic enzymes and four tritiated substrates, which make highly sensitive analytical tools.
- **Enzymes in quantity**, comparable to Worthington research enzymes in quality, offered for use in other products or processes.
- **Analytical services**, including complete amino acid and ultracentrifugal analysis, available to individual researchers and institutions on a contract basis.

All told, our catalog offers the most complete range of products and services related to the multiple aspects of enzymology. Use the attached coupon to request your personal copy and another one for an associate.



Worthington Biochemical Corporation

Freehold, New Jersey 07728

Please send the following:

___ copies of catalog, Products and
Services of Worthington
Biochemical Corporation

Product literature on Worthington
enzyme reagents for the clinical
laboratory

Name _____

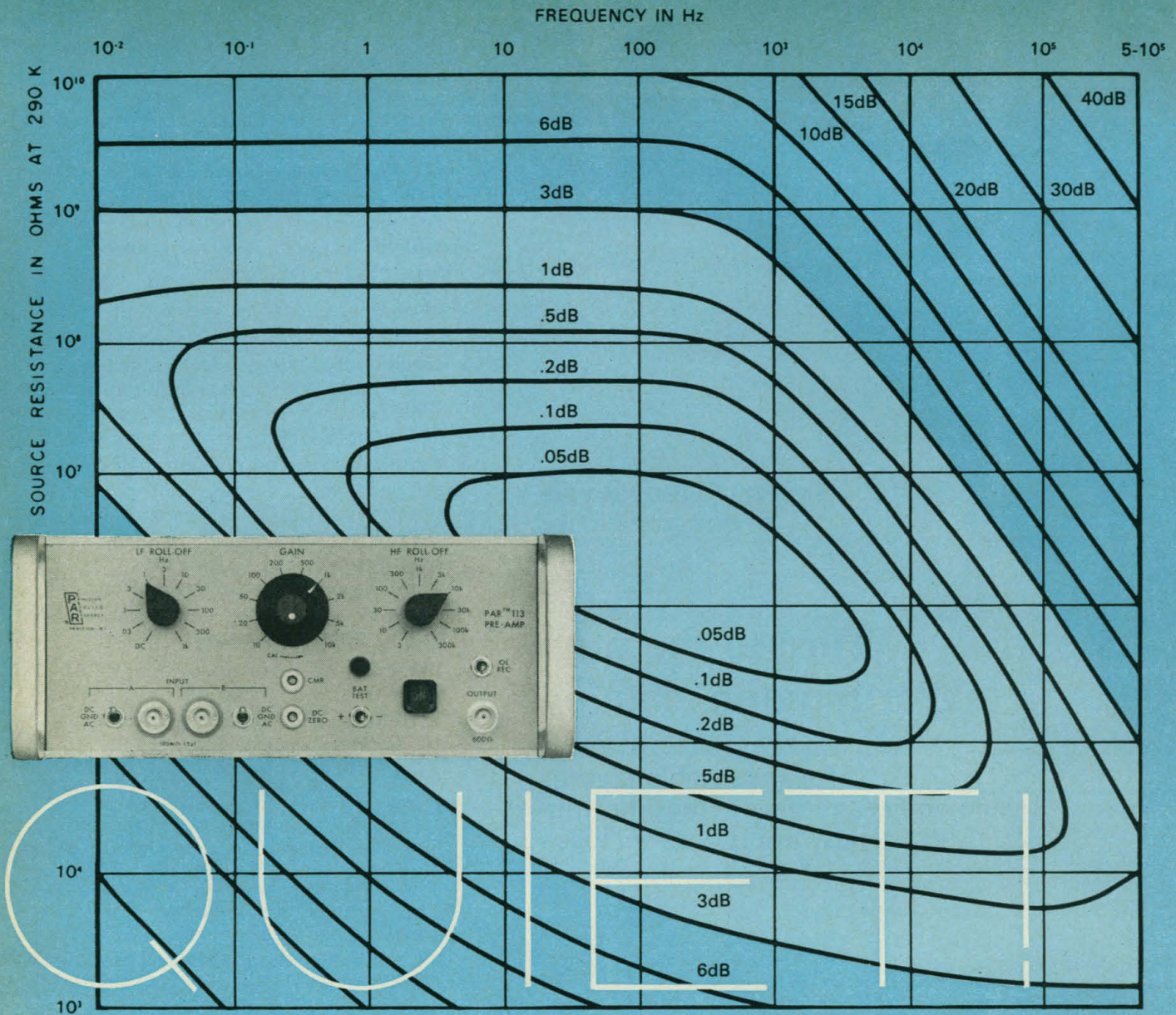
Title _____

Organization _____

Address _____

City _____

State _____ Zip _____



How quiet? At 10 Hz, with a 2 megohm source resistance, our new Model 113 Low-Noise Preamplifier has a noise figure of less than 0.3 dB. Or at 1 kHz, with a 1 megohm source resistance, its noise figure is only 0.2 dB maximum. Shorted input noise from dc to 100 kHz is typically 1 μ V referred to the input.

Model 113 also offers:

- Switch selectable ac or dc coupling in either single ended or differential input mode
- High rejection of common mode signals
- Low- and high-frequency rolloff controls for attenuation of signals outside the range of interest
- High input impedance: Ac coupled: 100 megohms through 0.1 μ F shunted by 15 pF; Dc coupled: 1 gigohm shunted by 15 pF

- Gain continuously variable from 10 to 25,000
- Battery operation to eliminate 60 Hz pickup. Provides 30 hours of continuous operation between charges. Built-in charger automatically recharges battery when plugged into 110/220 V ac line. Front panel test lamp indicates battery condition.

Ask us to demonstrate our quiet new \$795 Model 113 Preamplifier for you now. Then you'll see why we're making so much noise about it. Contact your local PAR representative or write Princeton Applied Research Corporation, Box 565, Princeton, New Jersey 08540. Telephone: (609) 924-6835.



PRINCETON APPLIED RESEARCH CORPORATION

Contact P.A.R. for details of new rental program

Only Waring makes Blenders®



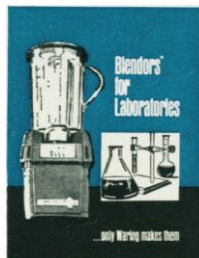
just for laboratories

... with the one-gallon Waring's exclusive cloverleaf shape, hydrodynamically designed for perfect blending action . . . with a solid one-piece cover plus molded gasket for a perfect seal . . . and with our 3-speed, 1725-watt motor — you can grind, emulsify, disintegrate, homogenize, shred, blend, or mix with power to spare, and in seconds!

Waring's one-gallon container, cover, and blending assembly are stainless steel, easy to clean and trouble free. There's a marvelous adapter that lets you use the smallest container on a one-gallon motor base.

There are explosion-proof models . . . one-quart models, some with timers, some with 7-speed controls . . . and accessories from 12 ml "Mini Containers" to ice crusher attachments. All are heavy duty construction and warranted for one year of commercial use.

Waring Blenders are unique — no wonder we copyrighted the name!



Write for our new catalog and see for yourself.

 **waring**

Waring Products Division
Dynamics Corporation of America
New Hartford, Conn. 06057

Circle No. 31 on Readers' Service Card

make sense to hold women solely responsible? If the privilege has to be granted, or if the right for a child can be claimed, does it not make sense to take advantage of the semen depot readily available in sterilized men, samples of which can even be checked for their biological value by numbers, morphology, and biochemistry? Artificial insemination is highly successful, as long as the mother's genital tract can function unimpaired. How successful the procedure will be to gain eggs by laparotomy, to fertilize them in vitro, and transfer them to the mother's uterus in time, nobody knows. And even if successful, cost and procedures involved are highly in favor of artificial insemination to an unimpaired female.

If it is true that mankind is entering the age of equal rights and responsibility for both sexes, it is inconceivable to put burdens on one sex or the other as long as alternatives exist. The widely discussed and proposed punitive actions any elected government or society can impose on those breaking newly established laws or moral codes should leave the choice of the method open to responsible parents, but should give them all possible advice and tell them of the other side of any method involved. Any method with the assurance of reasonable safety and true reversibility should have priority.

WOLFGANG JÖCHLE

27133 Adonna Court,
Los Altos Hills, California 94022

Garrett Hardin is to be commended for recognizing that appeals to conscience are self-defeating as a means of population control, and that the concept of a right to have children is responsible for our inability to control our population . . . [but he] seems to discount the value of economic pressure exerted through the tax structure. It is true that under a system of tax incentives "noncooperators" will outbreed "cooperators." But this is less important than might be thought, since parents of large families will, through their taxes, be defraying the government's cost of caring for and educating their children. What is important is the overall effect, which will be a reduced birthrate.

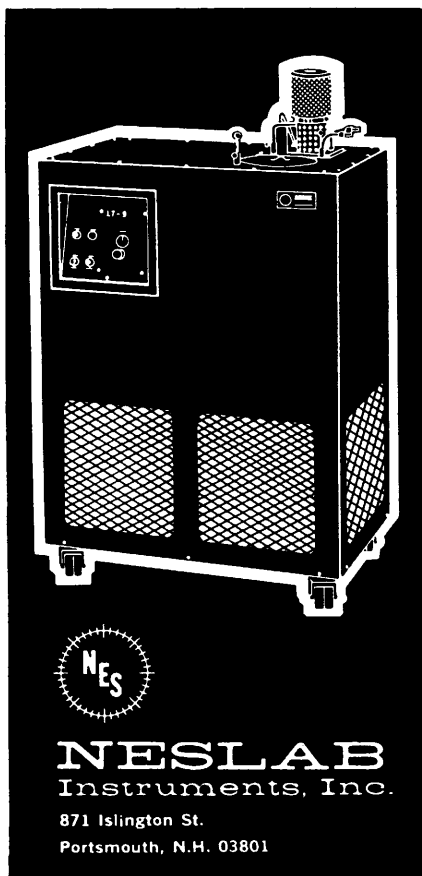
Not only is taxation less obnoxious to a libertarian than compulsory sterilization, since it influences the individual's freedom of choice rather than superseding it, but it is also more flexible. The versatility of tax law as a policy

COOLS TO MINUS 70°C

This LT9 Low Temperature Circulating Bath handles loads up to 600 watts. Provides external circulation of bath liquid plus a work area for immersion use.

**Temperature Range
+ 10 to -70°C**

± 0.05°C Control



Circle No. 100 on Readers' Service Card

instrument can be seen from many ingenious ways in which powerful and greedy persons have redesigned it for their own benefit. It can equally be written to serve social needs.

ROBERT McCLENON

1732 Dixwell Avenue,
Hamden, Connecticut 06514

... If parenthood is only a privilege, then choice in general is only a privilege, and if choice is to be the special advantage of government bureaucrats and Garrett Hardins, pulpy bipeds may continue to roam the earth, but there is little hope for the continued existence of a free, thinking, striving, rational mankind.

CHARLES S. REBERT

Stanford Research Institute,
Menlo Park, California 94025

... Hardin could benefit the world much more if he would concern himself with the quality of parenthood. Problems of crime, moral dissent, and lack of convictions to help society could be corrected, in my mind, through better home life and by better-qualified parents. Divorce and unhappy homes to me are critical problems in terms of human suffering and welfare. Should not the criteria of training people to be better parents and to care properly for their children be more important than whether they have one, two, or three children? In fact, in my association it has often been the parents of larger families that seem to concentrate more heavily on caring for the children and instilling in them a sense of responsibility to society... parenthood is not a question of right or privilege, but a problem of responsibility.

DARRELL J. WEBER

Department of Botany and Range
Science, Brigham Young University,
Provo, Utah 84601

We will not achieve population control overnight. Progress will be made in stages, and I agree with Berkhout that abortion should first be made freely and instantly available to any woman who wants it. Contraception, never perfect, always leaves open the possibility of an "accident"; freely available abortion eliminates both the tragedy and the excuse. Since 1963, I have been heavily engaged in writing and speaking in favor of elective abortion.

Cash rewards for nonreproduction are also a fine idea. I believe R. B. Cowles was the first to propose a non-baby bonus, in 1959. It would not be

Circle No. 123 on Readers' Service Card →

see how
clearly
you can see
how deep
our new
cage
is?



You're looking through our new deep plastic cage for rodents. It clearly anticipates new public law requirements. It all adds up to new convenience for you: More room under the feed hopper. More usable floor space for your research animals. Or more room for additional animals.

It's from Lab Products, Inc., a new company of experienced people with new ideas for your animal care needs. We offer a broad-line of plastic cages, accessories, bedding (e.g., **ab-sorb-dri**®), and special animal care systems.

We've got them all in a new catalog. For your copy, write or phone Doug Anderson, Lab Products, Inc., 633 Midland Avenue, Garfield, N.J. 07026. Phone: 201-478-3000.

lab products



Plug-in TITRATION SYSTEMS OF THE 70's

ANOTHER FIRST FROM

**RADIOMETER
COPENHAGEN** 

TTT2 Plug-in Versatility

Replace a module - change technique. It's a simple plug-in operation. Start with basic TTT2 for normal pH or potentiometric titrations . . . Then add plug-in modules as desired.

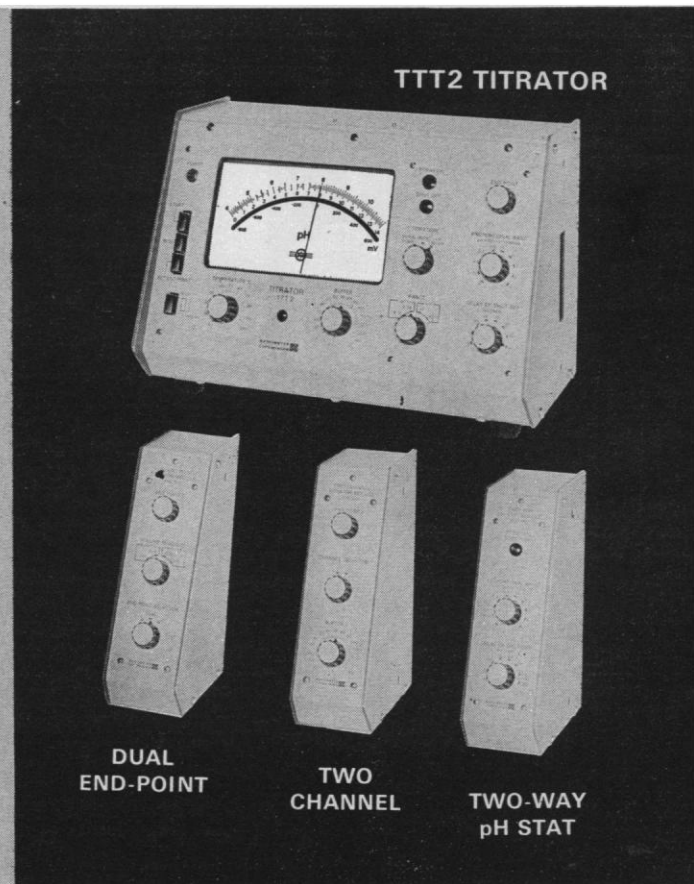
DUAL END-POINT module: Provides convenient titrations for two end points often encountered in complex solutions . . . Determines either total titrant consumed or differential amounts for each end point.

TWO-CHANNEL module: Eliminates need for 2 complete systems . . . Saves time! Permits one titration to proceed while second sample is being prepared . . . Individual end point and electrode calibration controls for each channel.

TWO-WAY pH STAT module: Provides precise 2 way control of pH. Separate proportional bands for both directions result in finer control of pH without sacrificing speed of recovery to control value.

TTT2 . . . A basic element of Radiometer's *Dynamic* New TITRATION SYSTEMS OF THE 70's.

Write or call for details, today!



TTT2 TITRATOR

DUAL
END-POINT

TWO
CHANNEL

TWO-WAY
pH STAT



THE LONDON COMPANY, 811 Sharon Drive, Cleveland, Ohio 44145
Telephone (216) 871-8900
In Canada: Bach-Simpson Limited

necessary to continue it until the climacteric, as Webb implies: probably to age 25 would be far enough. Young women are dangerously fertile for both physiological and psychological reasons; they often seek to solve their psychiatric problems by conceiving. By the time they are 25 they have a better understanding of the costs of motherhood, and are less tempted by this "solution."

Tax penalties for excessive reproduction may help, but they have several shortcomings. (i) They cannot have much effect on people who pay no taxes anyway. McClenon rather surprisingly assumes that parents of large families are necessarily taxpayers. (ii) Insofar as taxes hurt the parents this hurt may be passed on to the children, whom the community does not want to harm. (iii) Highly "philoprogenitive" parents will be less affected by such measures, and will produce more of their own kind, thus instituting an unwanted selective system, as Charles Galton Darwin pointed out in 1959.

Positive control is distasteful to everyone, including me. But I think we will someday have to accept it as the price for other changes already made. Two centuries ago there was no need for the state to interfere with family breeding because the community allowed surplus children to starve. [See, for instance, Linnaeus' account of the acceptance of such starvation in K. Hagberg's *Carl Linnaeus* (Dutton, New York, 1953), p. 118.] The family was responsible for making the correct breeding decision. Now, welfare economics has freed the family of much of the responsibility, while leaving it the full power of breeding. Power without responsibility produces an unstable system, always.

Twenty years ago I was sterilized after my wife and I had produced what we regarded as our n th child. I watched the doctor perform the vasectomy; I found nothing horrifying in the operation. I have since recommended sterilization to thousands of people. Rational couples usually settle for male sterilization as the cheaper and simpler of the two possibilities. I think this is usually the best *individual* decision.

Population control would probably be least irksome if it involved two steps: (i) a directive to have no more than n children, control to be achieved by whatever means individual couples preferred; coupled with (ii) positive community action after $n + 1$ children have been born to prevent the appearance of

$n + 2$ *et al.* Our experience with Prohibition has taught us that positive control is not feasible unless the vast majority is convinced of its necessity; when this stage is reached the recalcitrant minority that would have to be sterilized would be small.

If community control ever comes—and it may not—it will be far easier to build the controlling mechanisms around the female than the male. The reasons for this conclusion escaped many of my critics, so let me spell them out.

Whether control is exerted by sterilization or by punitive taxation is of secondary importance. The point is, we want to make it difficult or impossible for a person or a couple to produce more than their share of children. Suppose we decide that it is the couple's joint responsibility, that each child counts against their quota. How should we deal with the following cases?

1) Mary and John get divorced, after having two children. Mary takes the children. Both remarry, their new partners having had no children previously. Suppose Mary's new husband wants a child "of his own"—can he have one? If so, Mary must exceed *her* quota. What if John's new wife wants to be a mother—is she forbidden to do so because John has twice fathered children? If she promised to conceive extramaritally, would that make it all right?

2) A young woman has intercourse with several men in one month and becomes pregnant. She doesn't know who the father is, and "paternity tests," which can only exclude some of the candidates, do not tell us. Should each of the nonexcluded men be charged with one child? Or only a fraction of a child?

3) Five men and three women join in a group marriage. If a quota is to be assigned to the group, what is it? $3 \times 2 = 6?$ $5 \times 2 = 10?$ $[(5 + 3) \div 2] \times 2 = 8?$

We haven't even considered the complications introduced by extramarital affairs, and the legal consequences of condonation. I'm afraid there are more patterns of marriage and sex than are dreamt of in Doris Day's philosophy. The law ignores this variety at its peril.

The chain of legal evidence that establishes maternity is really quite good. The evidence for paternity is always shaky, and putting a policeman under every bed really wouldn't help. "It's a wise father that knows his own child," said Shakespeare, and the science of immunology hasn't helped much.

ab-sorb-dri®
the
long-life
bedding.



With ab-sorb-dri, you can go a week without changing your bedding. Reasons? Prime heat-treated wood particles are highly absorbent, hold down odor and have low coliform content. Screened to uniform particle size. No matting, easy on animals. At distributors near you.

Comes to you through Lab Products, Inc., a new company of experienced people with new ideas for your animal care needs. We offer a broad-line of plastic cages, accessories, and special animal care systems.

We've got them all in a new catalog. For your copy, write or phone Doug Anderson, Lab Products, Inc., 633 Midland Avenue, Garfield, N.J. 07026. Phone: 201-478-3000.

lab products
inc

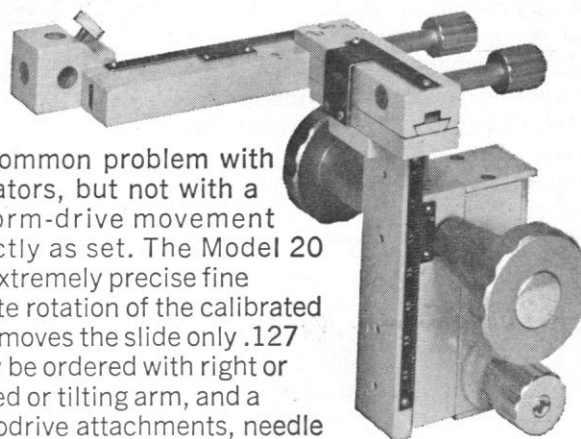
Fight backlash with a Prior Micromanipulator.

Backlash is a common problem with many micromanipulators, but not with a Prior. Its robust, worm-drive movement always remains exactly as set. The Model 20 shown here features extremely precise fine adjustment; a complete rotation of the calibrated fine adjustment knob moves the slide only .127 mm. The Prior 20 may be ordered with right or left-hand controls, fixed or tilting arm, and a variety of bases. Microdrive attachments, needle holders and other accessories are available.

Prior Micromanipulators are made in England, with much the same care and expert craftsmanship as goes into a Rolls-Royce. Every instrument is thoroughly tested and individually adjusted before delivery. For literature on the Prior 20, write: E. Sobotka Co. Inc., 110 Finn Court, Farmingdale, N.Y. 11735.

sobotka

Circle No. 97 on Readers' Service Card



LIGHT (18 ounces) AND SMOOTH (ball bearings)... OUR MM-33 MINIATURE MICROMANIPULATOR.

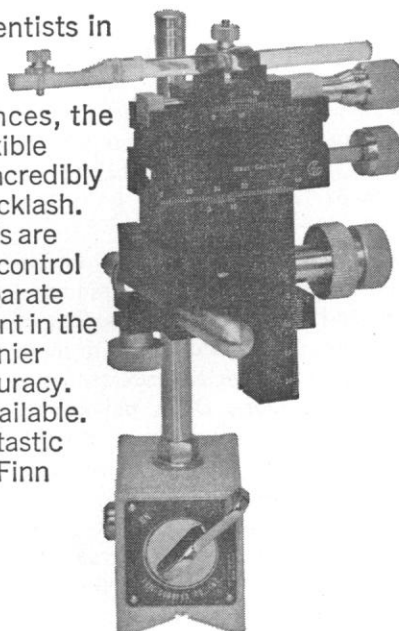
We designed the MM-33 for scientists in need of a lightweight micromanipulator with ultra-precision. Crafted of aluminum and weighing only 18 ounces, the MM-33 eliminates swaying, even on flexible stands. Ball-bearing slideways assure incredibly smooth, wear-free operation without backlash.

For ease of adjustment, all controls are aligned in a linear plane. Coaxial knobs control vertical and horizontal movements. Separate knobs control coarse and fine adjustment in the X plane, with micrometer drum and vernier readings to 0.1 mm with 10 micron accuracy. For mounting, a variety of stands are available.

For complete literature on the fantastic MM-33, write: E. Sobotka Co. Inc., 110 Finn Court, Farmingdale, N.Y. 11735.

sobotka

Circle No. 98 on Readers' Service Card



To achieve community control of breeding, would it "be just as effective," as Webb says, "to sterilize all men as to sterilize all women"? *By definition*, yes; but there has been no proposal to sterilize *all* of either sex. If only some are sterilized, and those only after they have had children, the effectiveness of the two alternatives is not the same.

Debaters tend to forget that we are not a perfectly monogamous people. Extramarital intercourse is not rare; and divorce and remarriage create what has been called "serial polygamy." For these reasons the sterilization of *x* men can be expected to be less effective in reducing births than the sterilization of *x* women.

My statement that women "want more children than the community needs" was based on the evidence assembled by Kingsley Davis [*Science* **158**, 730 (1967)]. But it must be admitted that "wants" are not permanent facts of life like chemical valence and specific chromosome numbers. We may be able to modify wants; we should seek to do so.

I do not think my identifying women as the intrinsically responsible sex in reproduction is the result of "blatant but possibly unconscious male supremacy," as Butler put it. Once women have at their command a perfect system of birth control (contraception plus elective abortion as a backstop), they will have almost complete power over the reproductive process. A woman who wants a child can easily find a man to furnish spermatozoa.

When women can completely avoid having children they do not want, men become powerless to "have children" by a unilateral decision. The sexes are not equal.

Power and responsibility need to go together; there really is no defensible reason why women should reject responsibility once they possess—and realize they possess—power.

GARRETT HARDIN

*Department of Biological Sciences,
University of California, Santa Barbara*

Wasting Waste

In "Waste-water treatment: The tide is turning" (31 July, p. 457), Robert Holcomb comments on the problems of disposing of the sludge produced by sewage treatment plants. He writes that the "sale [of sludge] as fertilizer or soil conditioner . . . will probably decrease

as disposal by incineration increases." If true, this is very sad, for the land in this country is in need of the organic material which the sludge would provide, while the air is abundantly full of the pollution caused by incineration.

MARION E. PERKUS

4 Division Street,
Oneonta, New York 13820

. . . Perhaps my ignorance makes me unduly alarmed, but can we really afford to continue to destroy the potential soil-conditioning and fertilizing components of sewage? What do the ecologists say—are we wasting waste?

M. LIEB

Department of Medical Microbiology,
University of Southern California
School of Medicine, Los Angeles 90033

Vigor of Northern Hardwoods

In his article "Effects of pollution on the structure and physiology of ecosystems" (24 Apr., p. 429), G. M. Woodwell mentions that nutrient losses from cutting all trees on a watershed "will cause a large reduction in the potential of the site supporting living systems as complex as that destroyed—until nutrients accumulate again." I hope readers of this portion of Woodwell's article are not misled into believing that total tree removal per se (or "clearcutting" as referred to by foresters) will consistently bring about a deleterious change in the terrestrial plant community (1).

When a mature stand of timber is clearcut, an almost identical living system as that removed can be regenerated immediately (2). Silvicultural studies at the Barlett Experimental Forest in New Hampshire show that northern hardwoods renew themselves when the mature stand is completely removed in small blocks, patches, or strips. In fact, species composition and tree quality of the regenerated stand in many cases are better than that found in the natural ecosystem.

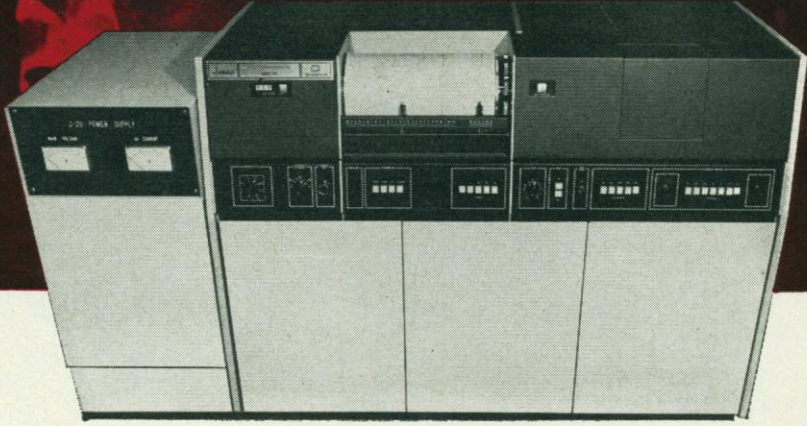
STANLEY M. FILIP

USDA Forest Service,
Post Office Box 640,
Durham, New Hampshire 03824

References

1. W. B. Leak, D. S. Solomon, S. M. Filip, "A Silvicultural Guide for Northern Hardwoods in the Northeast," *U.S. Dep. Agr. Forest Serv. Res. Pap. NE-143* (1969).
2. D. A. Marquis, "Clearcutting in Northern Hardwoods: Results after 30 Years," *U.S. Dep. Agr. Forest Serv. Res. Pap. NE-85* (1967).


The newest activist on campus



Durrum-Jasco J-20 Spectropolarimeter

Here's a campus cause that gets results . . . high accuracy ORD and CD measurements . . . from an instrument with unprecedented new convenience features: pushbutton controls, expanded recording chart, spacious cell compartment, front-panel scale expansion, all solid-state electronics.

To join in the action, write for Bulletin 54, a 20-page report on the all-new Durrum-Jasco J-20 Spectropolarimeter. If dollars are your problem, ask us to send along Bulletin 53, which describes our J-5 ORD, J-10 CD, and the economy J-15 ORD/CD.



DURRUM

Durrum Instrument Corporation
3950 Fabian Way
Palo Alto, Calif., 94303
Circle No. 38 on Readers' Service Card



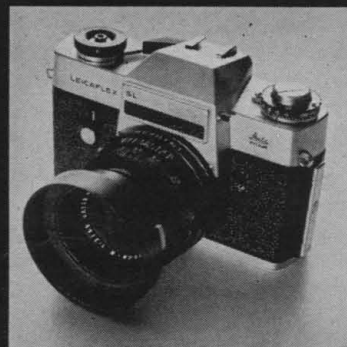
...by Leicaflex[®] (and a very proud father).

Catching a child's expression, and the feeling it portrays, takes a very special talent . . . and equipment to match.

The proudest fathers (and mothers), who take pride in their insight and their own photographic know-how, insist on Leicaflex SL.

The only camera for people who take photographs, not "pictures." The Leicaflex has a special way of recording those "fleeting memories."

Leica[®] E. Leitz, Inc., Rockleigh, New Jersey 07647 77870



Leica[®]

LEITZ[®] OPTICS • LEICA CAMERA

Circle No. 41 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

1970

GUSTAF O. ARRHENIUS	RICHARD C. LEWONTIN
FRED R. EGGAN	ALFRED O. C. NIER
HARRY F. HARLOW	FRANK W. PUTNAM
MILTON HARRIS	

1971

THOMAS EISNER	NEAL MILLER
AMITAI ETZIONI	BRUCE MURRAY
EMIL HAURY	JOHN R. PIERCE
DANIEL KOSHLAND, JR.	

Editorial Staff

Editor

PHILIP H. ABELSON

Publisher	Business Manager
WILLIAM BEVAN	HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

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

Assistant to the Editor: NANCY TEIMOURIAN

News Editor: DANIEL S. GREENBERG

Foreign Editor: JOHN WALSH

News and Comment: LUTHER J. CARTER, PHILIP M. BOFFEY, CONSTANCE HOLDEN, ROBERT BAZELL, SCHERRAINE MACK

Book Reviews: SYLVIA EBERHART, KATHERINE LIVINGSTON, ANN BARKDOLL

Cover Editor: GRAYCE FINGER

Editorial Assistants: JOANNE BELK, ISABELLA BOULDIN, ELEANORE BUTZ, NANCY HAMILTON, CORINE HARRIS, OLIVER HEATWOLE, ANNE HOLDSWORTH, MARSHALL KATHAN, MARGARET LLOYD, VIRGINIA NUESSELE, DANIEL RABOVSKY, PATRICIA ROWE, LEAH RYAN, LOIS SCHMITT, BARBARA SHEFFER, YA LI SHWARTZ, ALICE THEILE, MARIE WEBNER

Membership Recruitment: PATRICIA CAESAR; Subscriptions: BETT SEEMUND; Addressing: THOMAS BAZAN

Advertising Staff

Director	Production Manager
EARL J. SCHERAGO	VERA JUCHNOWICZ

Advertising Sales Manager: RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Robert S. Bugbee, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); MEDFIELD, MASS. 02052: Richard M. Ezequelle, 4 Rolling Lane (617-444-1439); CHICAGO, ILL. 60611: Herbert L. Burkland, 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. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. See also page xv, *Science*, 25 September 1970. ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

"Pieces of the Action"

*Pieces of the Action** was written by Vannevar Bush, who at 80 draws on wide experience gained while successfully tackling problems at least as rough as those we face today. Bush was this nation's scientific leader during World War II. Never before or since have science and technology been so effectively employed to meet national purposes. The book draws on memories of events spread over the past 60 years. It surveys the present scene but gives particular attention to events that occurred during World War II. Bush does not systematically outline the key elements of his successful leadership, but a reading of the book provides clues and some lessons applicable to today or tomorrow.

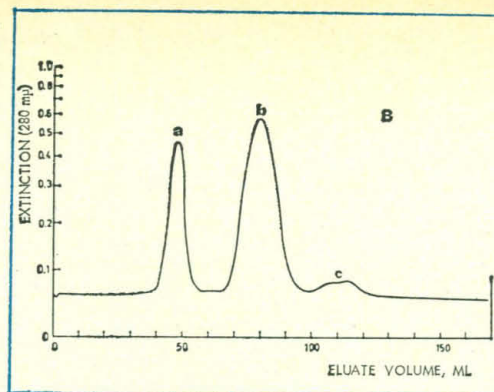
In part, Bush's genius lay in organization. During the late 1930's he and a small group of associates could foresee the coming war, and they realized that, if science and technology were to be used effectively, a new organization partaking of the powers of the White House would be required. Bush at that time was president of the Carnegie Institution of Washington and chairman of the National Advisory Committee for Aeronautics. He had access to President Roosevelt and especially to Harry Hopkins, the President's special adviser. Bush had established an excellent working relationship with Harry Hopkins and was ready with a plan of action at the time of the fall of France, in 1940. Very quickly the National Defense Research Committee was authorized and began its remarkably successful work. Bush retained primary responsibility for important external contacts, such as those with Congress and the military, although he delegated responsibility for the scientific and engineering efforts. He saw to it that decisions were made rapidly and that there was excellent two-way communication throughout the organization. Once ideas crystallized they were quickly implemented in prototypes, and these were speedily tested. Getting the military to adopt new devices or methods was sometimes difficult. However, though Bush is naturally combative, he was careful not to use improperly his special relationship to the White House. In his description of incidents where his qualities of leadership were involved, Bush makes his actions seem logical and obvious. It really wasn't all easy. Some excellent judgment and self-discipline were required. For example, Roosevelt sometimes demanded opinions on subjects with which Bush was not entirely conversant. Bush would give an immediate answer but would subsequently consult expert opinion on the matter. If he learned that his answer had not been entirely sound, he would so inform the White House.

Throughout the book one has the impression of listening to an interesting conversationalist, and an optimistic one. In fact, he says, "we take ourselves too seriously these days. Something sad appears to have happened to our sense of humor. It is true that our outlook is grim; we face many tough problems. We have to tackle them with determination, and we will do a better job at it if we do not let them get us down—pitch us into gloom and frantic despair . . . Life can be gay even as it is grim."

We have come to recognize that our future is inextricably dependent on our management of science and technology. Talk of doom and disaster are in the air because many people fear that neither individuals nor society as a whole have the gumption to live comfortably with, and to manage, the changing technological problems. It is therefore refreshing to read a book dealing with science and technology that is optimistic in tone while not dodging the troublesome issues.—PHILIP H. ABELSON

* V. Bush, *Pieces of the Action* (Morrow, New York, 1970).

SEPARATION ON POLYACRYLAMIDE GEL.
 Column stabilised with 5% polyacrylamide. Cross circulation of buffer.
 Continuous elution 10 ml/hr. Temperature 4° C.
 SAMPLE: 0.25 ml 20 % albumin solution 0.04-M with respect to acetyl-
 tryptophane + 0.75 ml electrode buffer.

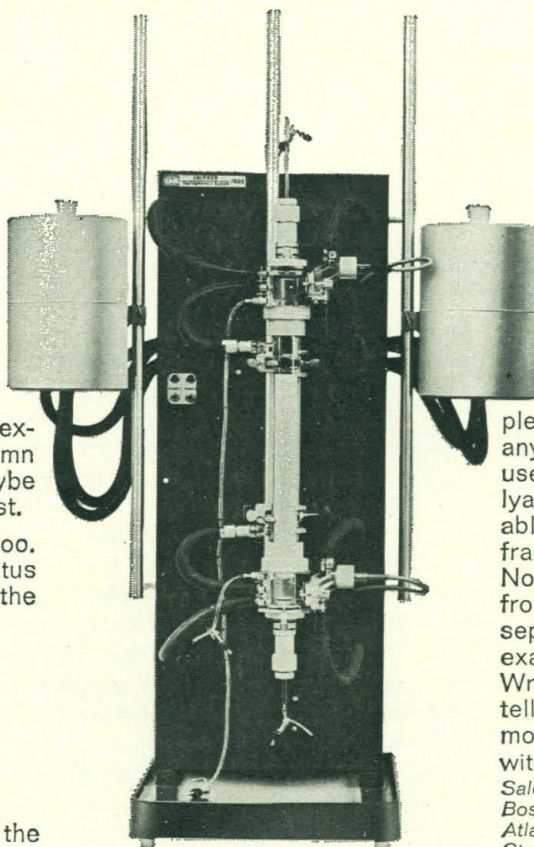
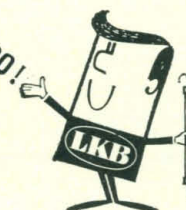


IN THE SERVICE OF SCIENCE

LKB INSTRUMENTS INC. 12221 PARKLAWN DRIVE, ROCKVILLE MD. 20852
 11744 WILSHIRE BLVD. LOS ANGELES CALIF. 90025
 6600 WEST IRVING PARK ROAD, CHICAGO, ILL. 60634

One Instrument for Four - UNIPHOR

POLYACRYLAMIDE SEPARATIONS TOO!



The LKB Uniphor can save the expense of four other sets of column electrophoresis apparatus, maybe more, but we don't want to boast.

Consider the convenience too. With one piece of LKB apparatus protein chemists can now use the following techniques:

- Powder stabilization
- Sucrose Density Gradient
- Isoelectric Focusing
- Polyacrylamide Gel
- Agarose Gel
- Sephadex

Unique on the market today, the LKB Uniphor permits a free choice of method and provides a com-

pletely flexible system in which any stabilization medium can be used. The Elution Stopper, for Polyacrylamide Gel separations, enables the continuous removal of fractionated zones.

No need to remove the gel column from the Uniphor and cut out the separated components for further examination.

Write LKB today for **one** brochure telling you in detail about **four**, and more, methods that you can use with the Uniphor.

Sales and service in USA: New York, Boston, Washington, Chicago, St. Louis, Atlanta, Houston, Los Angeles; in Europe: Stockholm, The Hague, Copenhagen, Rome, Vienna, London; and throughout the world.

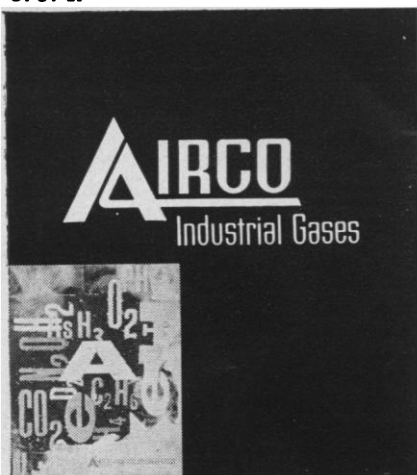
7900 - A1-II

Circle No. 48 on Readers' Service Card

N KRYPTON r

Krypton. We have it for you pure or ultra pure or radioactive. In all kinds and sizes of containers.

For this year's catalog, write: Rare and Specialty Gases Dept., Airco Industrial Gases, 575 Mountain Avenue, Murray Hill, N.J. 07974.



Circle No. 77 on Readers' Service Card

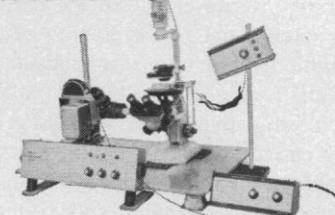
controversies on nutrition and metabolism that involved Magendie, Liebig, Dumas, Claude Bernard, and others in the second quarter of the 19th century. A. J. Ihde outlined his extensive studies on the history of nutrition. Stanley Becker presented the early history of vitamin A, including the intense rivalry between E. V. McCollum and the team of T. B. Osborne and L. B. Mendel. R. E. Kohler considered the series of crucial biochemical discoveries which occurred in the last decade of the 19th century and led to the rapid development of biochemistry in our own time: The separation of the zymase system from the yeast cell, demonstrating that fermentation could proceed outside of the living cell, was probably the most crucial event of a whole network of discoveries. John Parascandola reported on his studies on the work of Lawrence J. Henderson, an influential biochemist, physiologist, sociologist, and philosopher of science.

There was much discussion of the opportunities and needs for gathering and preserving the documents that will be essential to future historians of science. Charles Weiner described the research in the history of modern physics being conducted by the American Institute of Physics. The extensive collections of the Niels Bohr Library include, in addition to published material, the correspondence and other unpublished documents deposited by physicists, autobiographies from a considerable number of physicists, a film library, and about 10,000 photographs. Weiner emphasized the importance of coupling research efforts with the collection of documents and the value of holding small, carefully prepared conferences which bring together scientists, historians, and others. Whitfield Bell of the American Philosophical Society agreed that it is generally best for individuals, especially in universities, to deposit their unpublished papers in the archives of their own institutions, provided that these materials are given proper care. When such arrangements are not possible, he indicated that the American Philosophical Society is prepared to receive material from biochemists and molecular biologists for deposit and care in its archives. If these documents are to prove genuinely useful, archives must be well organized and the material must be properly filed and cataloged. Controls on the use of papers must be carefully considered and specified; the library may see fit to impose its own restrictions, even if the

SAGE ADDS VERSATILITY TO YOUR MICROSCOPE

Complete Cinemicrography Systems

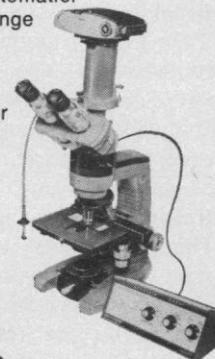
Complete systems for taking time lapse and normal speed 16 mm motion pictures through up-right and inverted microscopes. Assure sharp, clear pictures of living materials at high magnifications. Table-top and console models available.



Series 500 Models (shown) — from \$1,810
For information, circle #90 on reader service card.

Photomicrography Exposure Meters

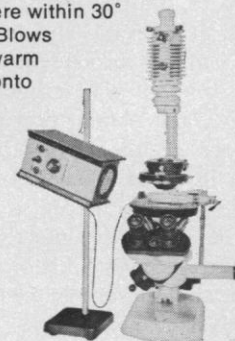
Pre-calibrated and direct-reading, Sage exposure meters make photomicrography, swift, sure, semi-automatic. Cover film speed range of ASA 20-3000. All camera backs may be used. Models available for A-O, B&L Zeiss microscopes and Leitz Aristophot Stand.



Model 297 (shown) for A-O Series 10 & 20 — Price \$350
For information, circle #91 on reader service card.

Air Curtain Incubator

The incubator without an enclosure! Holds temperature of biological specimens under the microscope to $\pm 0.3^\circ\text{C}$ anywhere within 30° to 40°C range. Blows soft stream of warm or ambient air onto a specimen as demanded by a thermistor attached to specimen.



Model 279 (shown) — \$395
For information, circle #92 on reader service card.

SAGE INSTRUMENTS, INC.

Subsidiary of Orion Research Incorporated
230 Ferris Avenue, White Plains, N.Y. 10603
914 949-4121

donor of the material does not specify them himself.

Those present at the conference agreed on the importance of urging leaders in biochemistry and molecular biology to preserve such material from their own files. It was recommended that a statement emphasizing the importance of preservation be sent out in the near future to a selected list of leading scientists in the field. Also, it would be highly desirable to issue a newsletter, perhaps once or twice a year, reporting on the location of such material and on other information useful for scholars. Both the American Institute of Physics and the American Philosophical Society publish such a newsletter. Saul Benison urged the compilation of lists of biographical and autobiographical articles that have already appeared. Everett Mendelsohn pointed out that the *Journal of the History of Biology* could publish at least some of the information for a newsletter among its "Notes." J. S. Fruton spoke of the possible role of the American Society of Biological Chemists in promoting these developments. It was agreed that action should be taken on several of these proposals in the near future and that the American Academy and its Committee should endeavor to implement them.

JOHN T. EDSALL

*Biological Laboratories,
Harvard University,
Cambridge, Massachusetts 02138*

Nucleic Acid

Structure Function Relations

At a United States-Japan Science Co-operation Seminar in Tokyo, 20-24 April 1970, 7 American scientists and 14 Japanese scientists exchanged details of recent progress in their experiments to determine structure and function relations in nucleic acids. Some 15 additional Japanese research workers attended the discussions as observers. The National Science Foundation of the United States and the Japan Society for Promotion of Science co-sponsored this conference at which both new knowledge and elegant research techniques were exchanged.

T. Tsuboi and K. Imahori of Tokyo described how infrared spectroscopy and circular dichroism can be calibrated with model polynucleotides and pure natural ribonucleic acids. The techniques are complementary in revealing

You Mean I Can Get \$50,000 of TIAA Life Insurance for LESS THAN \$100?

That's what an Assistant Professor asked us when he heard about TIAA's low life insurance costs.

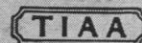
It's true. At his age 30 the annual premium for a 20-Year Home Protection policy providing \$50,000 initial amount of insurance is \$159.00. The first-year dividend, based on our current dividend scale, is \$61.00, making a net payment of \$98.00. Dividends, of course, are not guaranteed.

The Home Protection plan is level premium Term insurance providing its largest amount of protection initially, reducing by schedule each year to recognize decreasing insurance needs. This is just one example of the many low-cost TIAA plans available. If you need more protection for your family, ask us to mail you a personal illustration with figures for a policy issued at your age. We'll also send the Life Insurance Guide describing other TIAA policies.

ELIGIBILITY

Eligibility to apply for this or other TIAA life insurance is limited to persons employed at the time of application by a college, university, private school, or other nonprofit educational or scientific institution that qualifies for TIAA eligibility.

TEACHERS INSURANCE AND ANNUITY ASSOCIATION
730 Third Avenue, New York, N. Y. 10017



li

Please mail the new Life Insurance Guide and a personal illustration.

Name _____ Your Date of Birth _____

Address _____ Street _____

City _____ State _____ ZIP _____

Dependents' Ages _____

Nonprofit Employer _____ college, university, or other educational or scientific institution

Circle No. 34 on Readers' Service Card



CARVER LABORATORY PRESS

World's most widely used press for R & D, testing compounds, laminating, shear and break tests, pilot runs, etc. New features include air operated quick-closer, constant pressure devices, complete motorization package. Capacities to 25 tons.

NEW BULLETIN AVAILABLE
Contains complete details and prices. Send for free copy today.

FRED S. CARVER INC.
52 River Road
Summit, New Jersey 07901
a subsidiary of
Sterling, Inc.
Milwaukee, Wisconsin



Circle No. 112 on Readers' Service Card

COMPACT Low Flow PUMP

Infinitely Variable Throughout Range

Capacity 1.5 to 900 ML/hr.


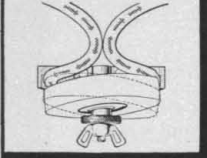
As used in

- infusion
- chromatography
- sampling
- metering

**No Corrosion
No Contamination**

Sigmamotor AL-E pumps provide precise volume control by means of speed of shaft rotation. Speed is varied by a solid state converter operating on regular 115 volt A.C. line.

Complete with motor and speed control. Model AL-2-E, 1.5 to 120 ML/hr. Model AL-4-E, 10 to 900 ML/hr.

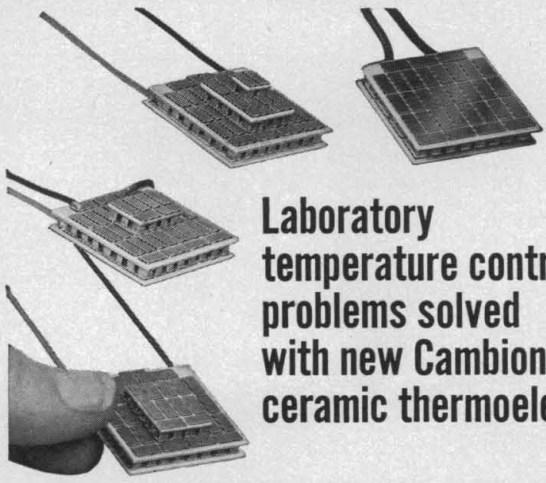



Front plate, eccentrically mounted, tilts as shaft rotates and compresses tubing forcing liquid around loop.

1. Flow rate can be recorded and repeated exactly.
2. Equipment is lightweight, 10 lbs., and portable.
3. Set-up and calibration is quick and easy.

SIGMAMOTOR INC.
68 NORTH MAIN STREET • MIDDLEPORT, NEW YORK

Circle No. 108 on Readers' Service Card



Laboratory temperature control problems solved with new Cambion® ceramic thermoelectrics

New single stage and multiple stage, cascaded ceramic thermoelectric devices allow precise temperature control over a broad temperature range. Temperatures exceeding those of dry ice are obtainable, thus extending the useful medical and laboratory applications for which CAMBION thermoelectrics are the ideal solution.

Designed to be used separately or in combination (series parallel arrays), these units are compact, rugged and reliable with a broad selection of heat pumping capacities and temperature operating ranges (from below -78° to +125°C).


Detailed information is available on the entire CAMBION line with a postcard. Send one today to Gordon Bird, Manager, TE Div., Cambridge Thermionic Corporation, 445S Concord Avenue, Cambridge, Mass. 02138. Phone: (617) 491-5400.

Standardize on

CAMBION®
The guaranteed Thermoelectrics

Circle No. 105 on Readers' Service Card


Jack the Dropper



If your research involves DNA-RNA, or DNA-DNA Hybridization studies, NBS has the answer. A Universal Membrane Filtration Apparatus, equipped with reversible washing assembly and individual reservoirs, can now be employed for hybridization studies as well as rapid and complete filtration and/or collection of bacteria and precipitates; and protein-DNA-binding studies. To eliminate handling of individual reservoirs, a 10-cavity loading block can be quickly set in place for efficient filling and filtration. The entire battery of filters, clamped and sealed together, can be inverted at one time so that both sides of the 25 mm membranes can be repeatedly washed.

For complete information, ask for catalog DNA-10 S/1070

NBS
NEW BRUNSWICK SCIENTIFIC CO., INC.
1130 SOMERSET ST., NEW BRUNSWICK, N. J. 08903 201•846-4600



Circle No. 103 on Readers' Service Card

base pair content and helix content of transfer RNA (tRNA), purified fragments of tRNA, and native and denatured RNA's. R. Bock reported the progress in x-ray diffraction studies of six tRNA species crystallized at the University of Wisconsin. Three-dimensional Patterson projections are available for two species of tRNA, and unit cell dimensions were reported for several other species. Tsuboi reported the crystallization of formylmethionine (fMet) acceptor tRNA from *Escherichia coli*.

Two of the world's leading groups for purification of tRNA were represented by D. Novelli of Oak Ridge and S. Nishimura of Tokyo. Novelli described the strategy and procedures that have made possible the isolation of gram quantities of five species of *E. coli* tRNA. Nishimura described a program that has produced pure samples of *E. coli* tRNA for 11 different amino acid acceptor activities. He reported a series of discoveries of minor bases made possible by this purification.

Ukita presented evidence that one of these newly discovered bases, a 2-thio-uridine derivative, causes a codon-reading pattern different from those predicted by the "wobble" hypothesis. It causes glutamyl-tRNA^{III} to recognize only the code word GAA, whereas the only previous report of a tRNA able to read only a single code word was restricted to certain code words ending in the base G. Another new codon recognition pattern was reported by S. Nishimura for tRNA's containing uridine-5-oxyacetic acid in their anticodon. Serine tRNA containing this nucleoside reads the three code words: UCU, UCG, and UCA. Thus, depending on the state of modification of uridine in the anticodon, a given tRNA may read one, two, or three different code words.

H. Ishikura presented a preliminary model for the sequence of this *E. coli* serine acceptor tRNA and pointed out that, in spite of many differences elsewhere, the dihydrouracil-containing loop of serine tRNA is common to samples isolated from yeast, *E. coli*, and rat liver. However, T. Seno presented strong evidence that the dihydrouracil-containing loop was not essential for recognition of tRNA^{Met} by methionyl tRNA synthetase or by methionyl tRNA formylase. He was able to remove the dihydrouracil loop by carefully controlled nuclease digestion with only slight reduction of amino acid acceptor function in the tRNA.

D. Söll of Yale elaborated details on the specificity of the aminoacyl-tRNA

synthetases. It is known that a single synthetase is capable of recognizing the several tRNA species in *E. coli* which accept that particular amino acid. He showed that K_m (Michaelis constant) was identical for four different separable serine tRNA species even though they read different codons and have substantial composition differences. Six separable leucine tRNA's are all charged by one single enzyme.

An assembly of experts on tRNA genetics and RNA sequencing had much that was new to discuss and share with those attending the meeting. M. L. Gefter (Columbia), J. E. Dahlberg (Wisconsin), and J. Abelson (San Diego) demonstrated the technique of oligonucleotide mapping, as pioneered in Sanger's laboratory. The experiments were both instructive and successful, even though begun the day after the group arrived in the Japanese laboratory. In addition to teaching the mapping technique, they each described important new concepts of RNA sequence related to RNA function. Gefter showed how the tRNA gene introduced into phage $\phi 80$ was a useful tool for obtaining tRNA defective in the modifications that convert adenosine to methylthioisopentenyladenosine. He summarized evidence relating mutant changes to function in the $\phi 80$ -Su^{III}-induced tyrosine tRNA. Abelson discussed the leucine tRNA induced by phage T4 and reported on efforts to develop this system into a tool for the study of tRNA structure and function as related to both protein synthesis and metabolic regulation in the phage-infected cell. Dahlberg outlined the strategy and results of sequencing large RNA molecules. The results suggest special structures at the beginnings of RNA messages not unlike the loops found in tRNA.

H. Ozeki and K. Shimura (Kyoto) had good reason to note the experimental details of tRNA sequencing methodology. They have used elegant genetic strategies to obtain a set of interesting mutants of tyrosine suppressor tRNA. One of these mutants gives evidence that the tRNA has mutated so that it is enzymically recognized as a glutamate acceptor instead of a tyrosine acceptor. We are now anxiously awaiting news that will relate a structural change in tRNA to this dramatic functional change.

The great utility of pure tRNA species to serve as substrates for nucleotide methylases was illustrated by Y. Kuchino of Kyushu University. He

this instrument can make the gradient

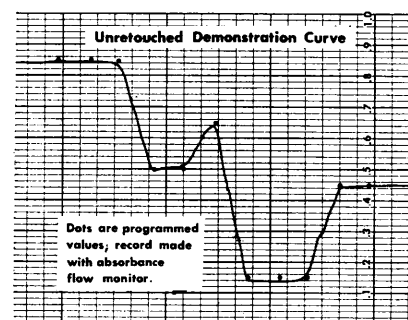


FOR CHROMATOGRAPHIC ELUTION OR FILLING ZONAL ROTORS

With a capacity of 3200 ml/hr, the Model 380 DIALAGRAD Programmed Gradient Pump is especially suited for filling zonal rotors as well as forming liquid chromatographic elution gradients and similar applications. Almost any two component gradient can be formed by simply setting a series of dials. There are no cams to cut or multiple solutions to mix at estimated concentrations. The shape of the curve is determined by setting eleven 0 to 100% dials which represent the initial, final, and nine evenly spaced intermediate ratios. This gives 10 program intervals, each of which are automatically subdivided by five linear interpolations to produce a smooth gradient.

Calibrated flow rates from 1 to 3200 ml/hr and program durations from 5 minutes to 16 days are set with positive stop switches. The DIALAGRAD will produce linear or curved gradients with equal accuracy and the program will be perfectly reproducible run after run. The instrument takes but a few minutes to program and requires no attention during a program run.

For more information, please request Brochure DP 37.

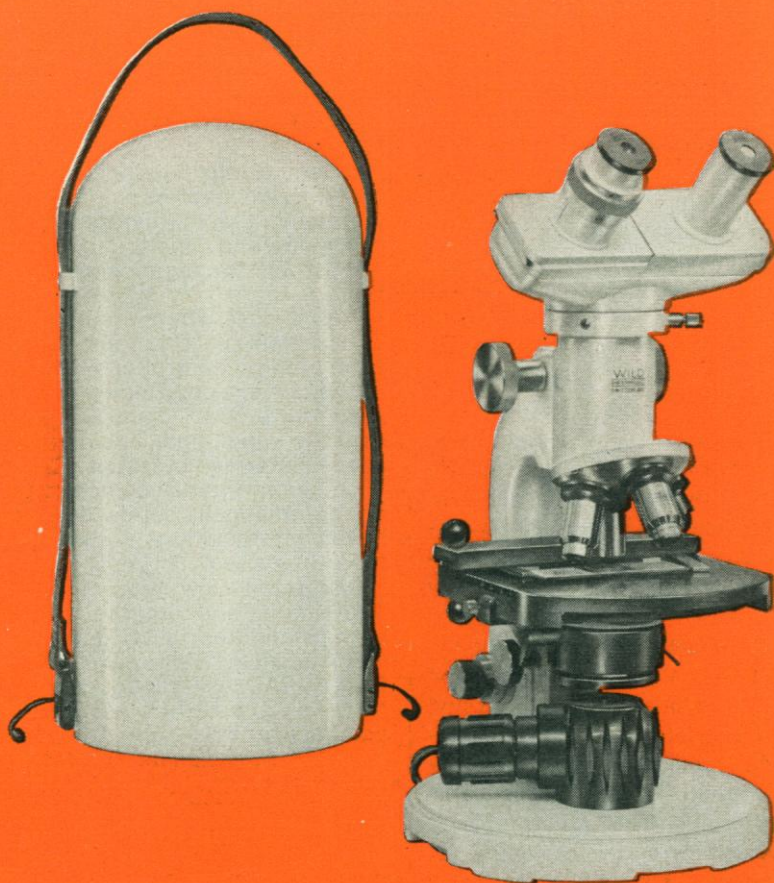


**INSTRUMENTATION
SPECIALTIES COMPANY**

4700 SUPERIOR LINCOLN, NEBRASKA 68504
PHONE (402) 434-0231 CABLE: ISCOLAB LINCOLN

Circle No. 82 on Readers' Service Card

**Where can you find
high precision,
versatility and
ruggedness in a
moderately priced
microscope?**



IN THE WILD M-11.

Features: Superb Swiss optics, lasting mechanical precision, light weight, protective steel hood. Base accepts various light sources, including 6v/20w Koehler lamp, and low voltage lamp, for car battery hook-up. The M-11 also accepts photomicrographic cameras, phase contrast attachments, and binocular camera lucida.

Applications: Medical schools, scientific expeditions, biomedical and industrial laboratories.

Price: About that of a good one-track routine microscope. The M-11 is in a class by itself. Write for Booklet M-11.

WILD[®]
HEERBRUGG

WILD HEERBRUGG INSTRUMENTS, INC.
FARMINGDALE, NEW YORK 11735

WILD OF CANADA, LTD., 881 LADY ELLEN PLACE, OTTAWA 3, ONTARIO
WILD DE MEXICO, SA, LONDRES 256, MEXICO 6, D.F.

purified from animal tissue a G-specific methylase which methylates only one unique locus in *E. coli* tRNA^{Met}.

High-molecular-weight RNA received much attention at the conference. Ando and Takagi brought the audience up to date on the function and specificity of nucleases they have isolated. One nuclease in T4 phage-infected *E. coli* was shown to be essential for repair of photochemical damage. K. Miura summarized his work on the organization of RNA in viruses from the silkworm, human respiratory tissue, and the rice plant. These double-stranded RNA viruses contain, respectively, 10, 10, and 12 discrete pieces of RNA. The 5' termini of these chains were masked from phosphomonoesterase digestion until the RNA double strands were denatured. Some progress on the separation and characterization of these discrete RNA pieces was described.

J. Krakow of Berkeley and M. Takanami of Kyoto presented new findings on the nature and role of protein factors which influence the initiation and termination of RNA synthesis from DNA templates. Krakow's use of acrylamide-gel electrophoretic separations of RNA polymerase and its control factors made possible a description of the cyclic process of initiation, propagation, and termination of synthesis as influenced by "sigma" factor. Because he was able to subdivide the cycle, he could pinpoint the action of antibiotics such as rifampicin and streptolydigin. Sigma factor is not released upon formation of the first internucleotide bond. However, synthesis of a nascent RNA chain of less than 40 nucleotides was sufficient to displace the sigma factor from a complex of deoxyadenylate-thymidylate and enzyme. Takanami's experiments demonstrated that "rho" factor causes guanosine triphosphate-initiated messages from $\phi 80$ DNA to terminate at characteristic places, whereas in the absence of rho the messages synthesized terminate at other places and are severalfold larger. *Escherichia coli* RNA polymerase is stable until sigma factor is separated from the enzyme. In the presence of sigma factor, 90 percent of the new chains started with pppApPyr while only 50 percent had this initiation sequence when sigma factor was withheld.

After the conference, the U.S. participants arranged individual visits to the universities of Chiba, Sendai, Nagoya, Kyoto, and Osaka. At these we learned of detailed progress and aspirations in research and graduate training.

The Japanese workers share our concern for finding balanced solutions to academic evolution and reform. The ability to conduct meaningful basic science research in a well-planned and painstakingly equipped facility may be sacrificed by oversights in hastily adopted solutions in the name of reform. Some Japanese "reformed" universities are now learning of problems that were unforeseen or ignored and are seeking ways that a liberated, equalized student-faculty community can attack nontrivial scientific problems which depend on multiyear development of skills and facilities by a group dedicated to a common goal.

The conference was an efficient and productive mechanism for exchange of current research concepts and techniques. It also produced or strengthened at least four United States-Japan collaborative research efforts. Our information channels are now quite adequate in the literature because of the use of European and U.S. journals by Japanese scientists and the continued improvement of the *Japanese Journal of Biochemistry*. The exchange of professional scientists for extended periods of study needs much better balance. Any well-qualified U.S. scientist who trains himself in the language and arranges to study in one of the several excellent research centers in Japan deserves encouragement and support by our foundations and professional societies. The U.S. science community and our whole society have much to learn from such an exchange.

ROBERT M. BOCK

*Laboratory of Molecular Biology,
University of Wisconsin, Madison 53706*

Bioresources of Shallow Water Environments

A national symposium on hydrobiology was conducted under the sponsorship of the American Water Resources Association in Miami Beach, Florida, during 24-27 June 1970. The theme of the symposium was directed to shallow waters that supply vast amounts of harvestable materials. The objectives of the meeting were especially pertinent inasmuch as the biological aspects of water resources are becoming increasingly important as greater demands are placed on total water resources by national and international economies.

The first day of technical sessions emphasized the use and potential of bio-

A hare raising tale.

You've been asking for it.

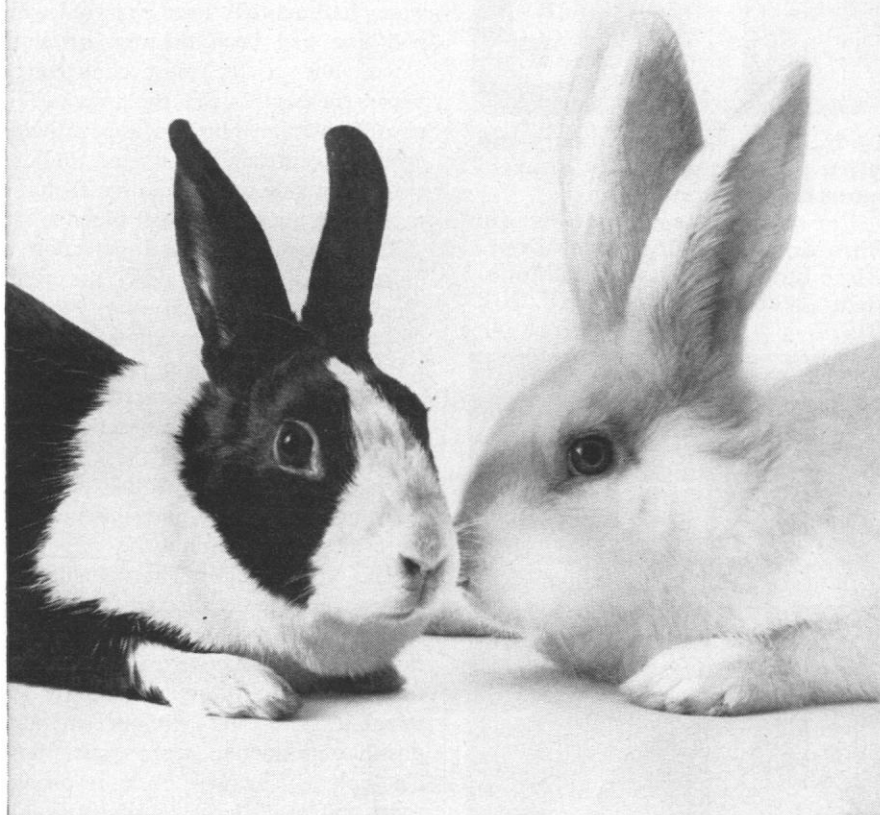
A Charles River COBS® (caesarean-originated, barrier-sustained) rabbit. With the same high quality you find in our other Charles River animals.

So in February, 1969, we started raising two germfree strains of rabbits by caesarean technique: the New Zealand albino and the black and white Dutch belt. Now, our rabbit-breeding facilities are nearing completion. By 1971 we should be in full production.

Through our new facilities, we will be able to offer the fields of teratology, toxicology and dermatology the first research rabbits produced from a germfree nucleus. A better animal for better research.

If you'd like more information, please write us at: Charles River Breeding Laboratories, Wilmington, Mass. Or call (617) 658-3333. If a rabbit answers, hang up.

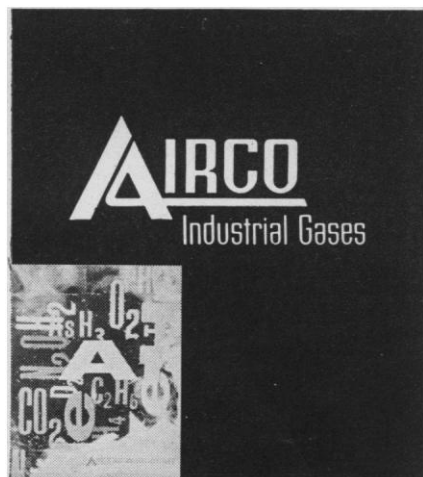
Charles River  FROM THE
HAND OF THE
VETERINARIAN
TO RESEARCH
BREEDING LABORATORIES, INC.
WILMINGTON, MASSACHUSETTS 01887



Neon

Neon. We have it for you pure and ultra pure. In a variety of pressures and containers.

For this year's catalog, write: Rare and Specialty Gases Dept., Airco Industrial Gases, 575 Mountain Avenue, Murray Hill, N.J. 07974.



Circle No. 78 on Readers' Service Card

resources through harvesting, conservation, and development. Early in the discussions the importance of shallow water environments (fresh water, estuarine, and marine) was established. Over 90 percent of the world fish catch is taken from shallow marine waters, which constitute only 7.6 percent of the ocean's surface. One-half of all marine fisheries are in the near-coastal regions, which are dependent upon estuaries for their sustained stability.

Other general discussions during the first day included such topics as the economic importance of freshwater algae and aquatic invertebrates as new sources of drugs and biologically active agents. The distribution of coastal biota as related to commercial and recreational fishery resources was also discussed. Other speakers discussed engineering aspects in protection of the aquatic environment and the need for the conservation of marine species and areas. A change in political attitudes was listed as a necessary first step toward conservation and development.

During the second day aquatic bioresources were considered in relation to their environment. A general concept conveyed by ten of the twelve speakers was that changes in environmental quality produced by the cultural activities of man were the greatest threat to bioresources. In an excellent paper on eutrophication, several cases were indicated in which the aging of a body of water had actually been reversed when pollution had been diverted or eliminated. One of the most controversial papers de-emphasized the presence of phosphorus and nitrogen as a principal agent in eutrophication and indicted carbon dioxide as a causative factor in promoting growth of algal blooms.

The measurement and detection of bioresources were considered during the third day of the symposium. Methods of remote sensing were introduced by informative papers on aerial photographic methods and infrared and multi-spectral techniques. The practical application and accuracy of these methods were illustrated by five other speakers. New procedures in bioresources study were described during the afternoon.

The production of harvestable materials from the oceans and fresh waters has tripled in the past two decades, and the present production can be substantially increased without exceeding sustainable yield and without including possible production from aquaculture. The potential increase in ocean production will result largely from utilization

of presently unexploited and underexploited species and areas and in international cooperation for the prevention of overexploitation.

Even though it is generally agreed that the "seas" can furnish vastly more food and materials for humans than is presently being taken, there are limits to production as there are limits to shallow-water environments. A definite threat exists to aquatic bioresources in the impact of the ever-expanding human population on the delicate ecological balance. The maintenance and improvement of environmental quality is a must for the continuation of increased aquatic production.

PHILLIP E. GREESON
Water Resources Division,
U.S. Geological Survey,
P.O. Box 948,
Albany, New York 12201

Note

1. The proceedings of the symposium will be available from the American Water Resources Association, P.O. Box 434, Urbana, Illinois 61801.

Forthcoming Events

November

11-13. **Geological Soc. of America**, 83rd annual, Milwaukee, Wis. (L. M. Cline, GSA, P.O. Box 1719, Boulder, Colo. 80302)

11-14. **Seismological Soc. of America**, Milwaukee, Wis. (D. Tocher, P.O. Box 826, Berkeley, Calif. 94701)

12-15. **American Heart Assoc.**, 43rd annual scientific sessions, Atlantic City, N.J. (AHA, 44 E. 23 St., New York 10010)

15-19. **Engineering in Medicine and Biology**, 23rd conf., Washington, D.C. (R. Johns, 522 Traylor Bldg., Johns Hopkins School of Medicine, Baltimore, Md. 21205)

15-19. **American Nuclear Soc.**, Washington, D.C. (J. Stouky, NUS Corp., 2351 Research Blvd., Rockville, Md. 20850)

16-17. **American Petroleum Inst.**, 50th annual, New York, N.Y. (H. A. Fondu, 1271 Avenue of the Americas, New York 10020)

16-18. **Chemical Marketing Research Assoc.**, San Francisco, Calif. (C. W. Slade, Jr., Chemical Marketing Research Assoc., 100 Church St., New York 10007)

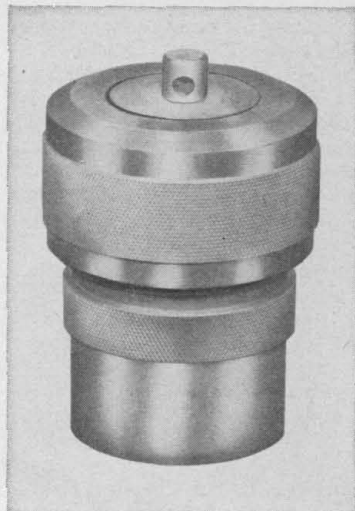
16-19. **Society of Vertebrate Paleontology**, Toronto, Ont., Canada. (J. H. Osstrom, Yale Peabody Museum, 170 Whitney Ave., New Haven, Conn. 06520)

17-19. **Fall Joint Computer Conf.**, 7th annual, Houston, Tex. (B. Pollard, RCA-NPL, 200 Forest St., Marlboro, Mass. 01752)

17-20. **Magnetism and Magnetic Materials**, 16th annual conf., Miami Beach, Fla. (H. C. Wolfe, American Inst. of Physics, 335 E. 45 St., New York 10017)

ACID DIGESTION BOMB

New from
PARR

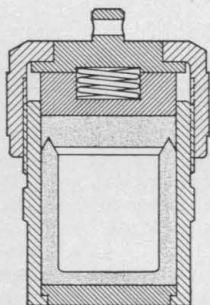


The acid charge is held in a 25 ml. thick walled Teflon* cup within a sturdy metal bomb. The cup can be removed for convenient sample recovery and easy washing. No wrenches or clamps are needed to produce a tight seal.

*duPont TFE fluorocarbon resin

Write for Data Sheet 4745

Provides a rapid and safe method for dissolving glass, silicates, nitrides, rocks and other refractory materials in HF, HCl and other strong mineral acids at temperatures to 150° C. and pressures to 1200 psig. Acids do not attack this bomb and complete recovery is assured, including any trace elements.

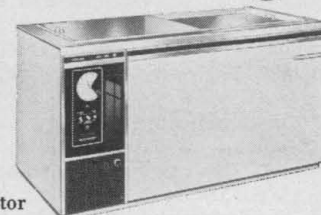


Cross-Section Diagram

PARR INSTRUMENT COMPANY
211 Fifty-Third St. Moline, Illinois 61265

Circle No. 110 on Readers' Service Card

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



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

Upright UC-105 (-76°C/-105°F) Chest UC-520 (-85°C/-120°F)
Chest UC-540 (-96°C/-140°F)

Kelvinator

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

One of the White Consolidated Industries

WCI

Circle No. 104 on Readers' Service Card

Need slewing speeds 1½ times faster than most X-Y recorders deliver? You need the Esterline Angus X-Y.

It gives you slewing speeds of 35 inches per second in the X axis; 50 inches per second in the Y axis. That's fast!

With the Esterline Angus X-Y Recorder, you get 0.1 MV per inch sensitivity. That's five times more sensitive than most competitive units.

You get common mode rejection of 140 db at DC and 120 db at 60 Hz line frequency. That's 20 db better than most other X-Y recorders, which leads to greater

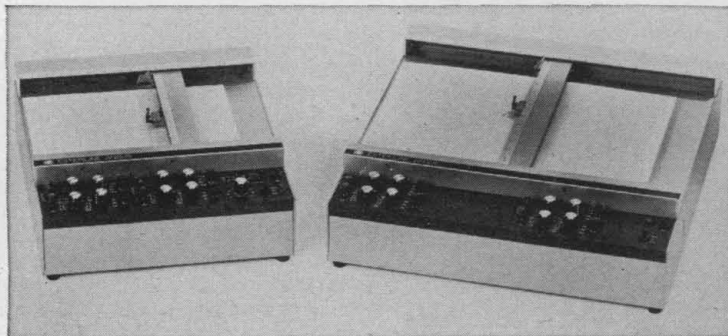
noise reduction, elimination of trace jitter and better stability.

You can customize sensitivity and rangability because the Esterline Angus X-Y has interchangeable plug-in modules. One module, for example, offers 17 sensitivities ranging from 0.1 MV per inch to 20 V per inch with continuous between-span vernier and zero offset up to ±5 V with any span sensitivity.

With an Esterline Angus X-Y, you can start with a basic unit. By simply interchanging inexpensive plug-in units, your recorder can grow to meet your changing requirements.

You can order either the Model X-Y 8511 (accepts 8½" by 11" paper) or the Model X-Y 1117 (accepts 11" by 17" paper).

Get more information. Call or write:



ESTERLINE ANGUS

Division of Esterline Corporation
Box 24000 • Indianapolis, Ind. 46224
Telephone 317/244-7611

17-22. Pan American Medical Assoc., 45th, Hollywood Beach, Fla. (J. Eller, 745 Fifth Avenue, New York 10022)

18-20. Eastern Analytical Symp., New York, N.Y. (D. A. Pragay, P.O. Box 38, Buffalo, N.Y. 14215)

18-20. Brain Chemistry and Mental Disease, 4th annual intern. symp., Houston, Tex. (B. T. Ho, TRIMS, 1300 Moursund Ave., Houston 77025)

18-20. National Assoc. for Mental Health, Los Angeles, Calif. (NAMH, 10 Columbus Circle, New York 10019)

18-20. Hamster Pathology, Boston, Mass. (F. Homburger, Bio-Research Inst., Inc., 9 Commercial Ave., Cambridge, Mass. 02141)

18-20. National Assoc. of Police Labs. and the Bureau of Narcotics and Dangerous Drugs, New York, N.Y. (Lt. F. Fernandez, Suffolk County Police Dept. Lab., Veteran's Highway, Hauppauge, N.Y. 11787)

19-20. American Assoc. for Automotive Medicine, Ann Arbor, Mich. (J. L. Weygandt, 716 Monroe St., Sheboygan Falls, Wis. 53085)

19-20. Biomedical Materials, London, England. (Meetings Officer, Inst. of Physics and The Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

19-20. Cancer Conf., Houston, Tex. (F. Goff, M. D. Anderson Hospital, Univ. of Texas, Houston)

19-20. Conflicts in Water Resources Planning, What are the Remedies?, Aus-

tin, Tex. (S. Ferguson, Center for Research in Water Resources, Balcones Research Center, Route 4, Box 189, Austin 78757)

19-22. American Anthropological Assoc., San Diego, Calif. (E. J. Lehman, Executive Director, AAA, 1703 New Hampshire Ave., NW, Washington, D.C. 20009)

19-22. Society for Psycho-physiological Research, New Orleans, La. (L. H. Miller, Louisiana State Univ. Medical Center, 1542 Tulane Ave., New Orleans 70112)

20-21. Tennessee Acad. of Science, Memphis, Tenn. (J. D. Caponetti, Dept. of Botany, Univ. of Tennessee, Knoxville 37916)

20-23. American Speech and Hearing Assoc., New York, N.Y. (K. O. Johnson, ASHA, 9030 Old Georgetown Rd., Washington, D.C. 20014)

21-24. Association of Schools of Allied Health Professions, 3rd annual, Chicago, Ill. (J. Von Bargen, Suite 300, 1 Dupont Circle, NW, Washington, D.C. 20036)

23-25. American Physical Soc., Div. of Fluid Dynamics, 23rd, Charlottesville, Va. (Y. H. Pao, Boeing Scientific Research Labs., P.O. Box 3981, Seattle, Wash. 98124)

25-28. International Symp. on Chemotherapy of Tuberculosis, 2nd, Buenos Aires, Argentina. (J. L. Marchese, Sanchez de Bustamante Str., 2144, Buenos Aires)

26-28. Central Assoc. of Science and Mathematics Teachers, Chicago, Ill. (D. R. Winslow, P.O. Box 246, Bloomington, Ind. 47401)

26-29. National Council for Geographic Education, Detroit, Mich. (L. Mitchell, NCGE, 111 W. Washington St., Chicago, Ill. 60602)

27-29. Abortion, Family Planning and Sex Education, 5th annual intern. symp., Boston, Mass. (H. Ratner, Natl. Commission on Human Life, Reproduction and Rhythm, P.O. Box 31, Oak Park, Ill. 60303)

29-30. International Exchange of Technology, Research Triangle Park, N.C. (G. R. Herbert, Research Triangle Inst., P.O. Box 12194, Research Triangle Park 27709)

29-2. American Medical Assoc. (clinical conv.), Boston, Mass. (E. B. Howard, AMA, 535 N. Dearborn St., Chicago, Ill. 60610)

29-3. American Inst. of Chemical Engineers, Chicago, Ill. (F. J. Van Antwerpen, AICE, 345 E. 47 St., New York 10017)

29-3. Association of Military Surgeons of the United States, Washington, D.C. (F. E. Wilson, AMSUS, 8502 Connecticut Ave., Chevy Chase, Md. 20015)

29-4. American Soc. of Mechanical Engineers, New York, N.Y. (A. B. Conlin, Jr., Technical Dept., ASME, 345 E. 47 St., New York 10017)

29-4. Radiological Soc. of North America, Chicago, Ill. (M. D. Frazer, RSNA, Inc., 713 E. Genesee St., Syracuse, N.Y. 13210)

30-2. Conference on the Fatigue Problem, Detroit, Mich. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio)

30-3. Entomological Soc. of America, Miami Beach, Fla. (W. P. Murdoch, 4603 Calvert Rd., College Park, Md. 20740)

30-4. Engineering Materials and Design, intern. exhibition and trade fair, London, England. (Industrial and Trade Fairs, Ltd., Commonwealth House, New Oxford St., London, W.C.1, England)

December

1-3. Problems of Electroplating, 3rd symp., Budapest, Hungary. (Scientific Soc. of Mechanical Engineers, Szabadsag Ter. 17, Budapest)

1-6. Radiological Soc. of North America, Chicago, Ill. (M. D. Frazier, 713 E. Genesee St., Syracuse, N.Y. 13210)

1-7. International Hospital Federation, 2nd, San Jose, Costa Rica. (J. Gonzalez, Pan American Office, 1 Farragut Sq., South, Washington, D.C. 20006)

1-8. International Symp. on the Results of Research on Representative and Experimental Basins, Wellington, New Zealand. (L. A. Heindl, Royal Soc. of New Zealand, P.O. Box 196, Wellington)

2-3. Materials/Process Selection, Phase II, Cleveland, Ohio. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

2-4. Vehicular Technology, 21st conf., Washington, D.C. (P. M. Kelly, Kelly Scientific Corp., 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

2-9. Management of Emotional Problems in the Older Person, New York, N.Y.

New toploading balance is fast, accurate...yet RUGGED!

New Torbal ET-1 toploader (160g capacity, 1 mg accuracy) makes accurate weighing easier and more foolproof than ever before.

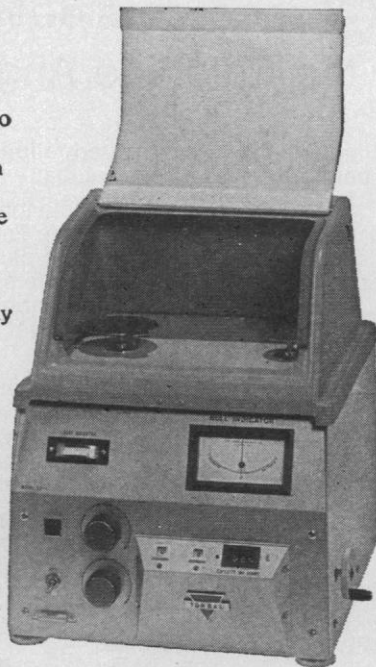
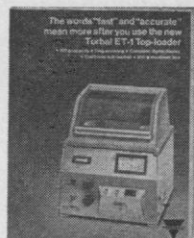
NEW EASE thanks to complete digital display without the use of optical projections or verniers to read, no estimating.

NEW EASE because the one piece construction of the exclusive Torsion weighing mechanism has no knife edges to chip, wear or collect dust—hence there's no loss in accuracy.

NEW EASE—thanks to the electronic null readout feature, the ET-1 is not affected by sensitivity changes—from temperature or humidity variations or effects of foreign matter or wear. As long as you can see the null needle move for a 1.0 mg weight change, then a difference of 1.0 mg in weight-reading means 1.0 mg—today, tomorrow, next month, next year.

NEW EASE because the ET-1's Torsion mechanism is far less affected by vibration than optical balances. You can use an ET-1 in conditions other balances can't take.

NEW EASE thanks to out-of-level accuracy. For minor changes in level of the ET-1, zero point does not change.



← WRITE FOR FREE BROCHURE.

THE TORSION BALANCE COMPANY Department S, Main Office and Factory: Clifton, N.J.; Sales Offices: Birmingham, Ala.; Chicago, Ill.; San Mateo, Cal.; Pittsburgh, Pa.; Plants and Offices in Montreal, Quebec, London, England and Waterford, Ireland

Circle No. 122 on Readers' Service Card



**Sigma is pleased to offer
D(-)-3-PHOSPHOGLYCERIC ACID**

Sodium Salt
Approx. 99% pure
Essentially free of 2,3-Diphosphoglyceric Acid
Suitable for the determination of
red cell 2,3-Diphosphoglycerate¹

In the reaction

*Phosphoglycerate
Mutase*

A) 3-Phosphoglycerate \longleftrightarrow 2-Phosphoglycerate the
initial rate of the reaction is proportional to the concentra-
tion of the cofactor 2,3-Diphosphoglycerate. Reaction A)
is coupled with the reaction

Enolase

B) Phospho(enol)pyruvate \longleftrightarrow 2-Phosphoglycerate
The rate of reaction A) is measured by the decrease in
optical density at 240 m μ due to the removal of Phospho-
(enol)pyruvate in reaction B).²

We offer:

D(-)-3-PHOSPHOGLYCERIC ACID

P 0259 Grade I, Sodium salt, approx. 99%
50 mg \$2.00 250 mg \$6.50 1 g \$18.00 5 g \$60.00
We also offer our older Grades which contain up to approx. 2% 2,3-DPG:
P 8877 Grade II, Sodium salt, approx. 98%
P 8752 Grade II, Tricyclohexylammonium salt, approx. 98%
P 8627 Grade II, Barium salt, approx. 98%
P 8502 Grade II, Calcium salt, approx. 98%

2,3-DIPHOSPHOGLYCERIC ACID

D 3258 Ditrils salt
D 6006 Pentacyclohexylammonium salt

2-PHOSPHOGLYCERIC ACID

P 0257 Sodium salt, approx. 95%
P 8377 Barium salt, approx. 80%

PHOSPHO(ENOL)PYRUVATE

P 7002 Trisodium salt, crystalline, hydrate
P 7127 Potassium salt, crystalline
P 7252 Tricyclohexylamine salt, crystalline
P 7377 Barium salt, hydrate

PHOSPHOGLYCERATE MUTASE

P 8252 Crystalline, from rabbit muscle, Ammonium Sulfate suspension.
Activity: approx. 200 units per mg protein (One unit will convert 1 μ mole of
3-PG to 2-PG per minute at pH 7.3 at 25°C)
2 mg \$3.10 10 mg \$13.60 25 mg \$31.90

ENOLASE

E 6126 Type III, lyophilized powder, 50 mg \$16.20 250 mg \$54.00
from yeast. 500 mg \$90.00
Activity: approx. 60 units per mg protein (One unit will convert 1
 μ mole of 2-PG to Phosphoenol) pyruvate per min. at pH 7.4 at
25°C). Contains approx. 20% Buffer salts.
10 mg \$ 5.00 100 mg \$27.00
E 2500 Type I, crystalline, from rabbit muscle, Ammonium Sulfate suspension. Activity: approx. 30 units per mg protein (Unit definition same as for Type III).
2 mg \$4.10 50 mg \$ 71.50
10 mg \$16.55 100 mg \$115.25

¹ Benesch, R. and Benesch, R. E., Nature, 618, 221 (1969).

² Krinsky, I. in H. U. Bergmeyer, Methods of Enzymatic Analysis, p. 238, Academic Press, N.Y. (1965).

For further details, please consult our latest (April 1970) catalog.

IT'S A PLEASURE DOING BUSINESS WITH SIGMA.

ORDER DIRECT

TELEPHONE COLLECT

from ANYWHERE in the WORLD

Day, Station to Station, 314/771-5750

Night, Person to Person,

Dan Broida, 314/993-6418

TWX (Teletype) Day or Night: COLLECT-910-761-0593

TELEGRAM: SIGMACHEM, St. Louis, Missouri



SIGMA  **CHEMICAL COMPANY**
The Research Laboratories of

MAILING ADDRESS: P. O. BOX 14508, ST. LOUIS, MO., 63178, U.S.A.

MANUFACTURERS OF THE FINEST BIOCHEMICALS AVAILABLE

Distributed in the United Kingdom through
SIGMA LONDON Chem. Co. Ltd., 12, Lettice St., London, S.W.6, Eng.
Phone 01-736-5823 (Reverse Charges)

Circle No. 51 on Readers' Service Card

**DETECT
NARCOTICS
TRANQUILIZERS
AMPHETAMINES
BARBITURATES
WITH
REEVE ANGEL SA-2**



Because of its unique properties, Reeve Angel SA-2 Ion Exchange Resin Loaded Paper is an integral part of an important new technique for the detection of narcotics in urine. SA-2 is the ideal medium for this technique because it contains a strong acid resin which is active over the pH range 1-14...it permits the extraction of a wide variety of drugs and drug metabolites, including acid components from urine.

If you are involved with the identification of narcotic drugs, amphetamines, barbiturates, or tranquilizers, you'll want to know more about SA-2 and this technique. Use the coupon below.

9 Bridewell Place, Clifton, N.J. 07014

Reeve angel

Please send me your free Data Sheet
"Narcotics Detection with Reeve Angel SA-2".

Name _____

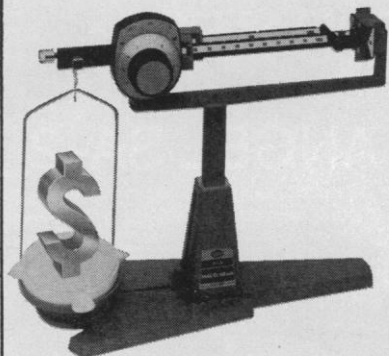
Institution _____

Address _____

City _____ State _____ Zip _____

Circle No. 52 on Readers' Service Card

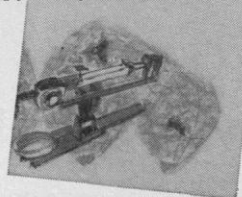
**weighing
expenditures
too?**



**your best buy is
Ohaus
Performance**

The fastest, simplest, most accurate and durable balances at the lowest possible cost come from Ohaus. Don't take our word for it. Get a copy of our comprehensive new catalog. Compare what it offers with what others offer in their catalogs. Then choose the equipment that gives you the most for your hard-fought dollar. We think you will pick an Ohaus instrument—the one that best fits your needs. The choice is wide—geared to fill the many requirements of today.

But remember, too, that Ohaus is an innovator. Many of the balances covered in our new catalog can be modified to solve special problems. If you need something you don't see in our catalog let us know about it. If the potential is broad enough we'll produce it. Because our designers know their business, you will get the most for your money. First study our new catalog. Then let's hear from you. Send for your copy today.



OHAUS SCALE CORPORATION
29 HANOVER ROAD
FLORHAM PARK, NEW JERSEY
07932

Circle No. 94 on Readers' Service Card

(H. Gershman, American Inst. for Psychoanalysis, 329 E. 62 St., New York 10021)

3-4. Conference on **Clinical Pharmacology**, Washington, D.C. (L. I. Goldberg, Emory Univ. School of Medicine, Atlanta, Ga.)

4. American Assoc. of **Physicists in Medicine**, Chicago, Ill. (M. Rozenfeld, Argonne Hospital, 950 E. 59 St., Chicago 60637)

4-6. American Acad. of **Psychoanalysis**, New York, N.Y. (J. B. Miller, AAP, 510 E. 86 St., New York 10028)

5-10. American Acad. of **Dermatology**, Chicago, Ill. (F. A. J. Kingery, 2250 Northwest Flanders, Portland, Ore. 97201)

6. American Soc. of **Hospital Pharmacists**, 5th annual, Anaheim, Calif. (W. E. McConnell, Dept. of Education and Training, 4630 Montgomery Ave., Washington, D.C. 20014)

6-8. American Soc. of **Hematology**, San Juan, Puerto Rico. (F. H. Gardner, Presbyterian-Univ. of Pennsylvania Medical Center, Philadelphia 19104)

6-10. Association of **State and Territorial Health Officers**, Washington, D.C. (N. J. Swearingen, 128 C St., NE, Washington, D.C. 20002)

6-11. International **Clean Air Congr.**, 2nd, Washington, D.C. (A. Arch, Air Pollution Control Assoc., 4400 Fifth Ave., Pittsburgh, Pa. 15213)

6-11. Pan American Congr. of **Rheumatology**, 5th, Punta del Este, Uruguay. (H. Havranek, Hospital Maciel, Calle 25 de Mayo 174, Montevideo, Uruguay)

7-8. **Myasthenia Gravis**, New York, N.Y. (R. J. Johns, Johns Hopkins Univ. Baltimore, Md.)

7-9. **Adaptive Processes Decision and Control Symp.**, Austin, Tex. (D. G. Lainiotis, Electrical Research Center, Univ. of Texas, Austin 78712)

7-9. **Ceramics in Severe Environments**, Raleigh, N.C. (W. W. Kriegel, Engineering Information Office, North Carolina State Univ., Box 5125, Raleigh 27607)

7-9. National **Electronics Conf. and Exhibition**, 26th annual, Chicago, Ill. (R. Klich, Natl. Electronics Conference, Inc., Oakbrook Executive Plaza No. 2, 1211 W. 22 St., Oak Brook, Ill. 60521)

7-9. Southern **Surgical Assoc.**, Boca Raton, Fla. (D. C. Sabiston, Duke Univ. Medical Center, Durham, N.C. 27706)

7-10. American **Astronomical Soc.**, Tampa, Fla. (H. M. Gurin, 211 Fitz Randolph Rd., Princeton, N.J. 08540)

7-10. American **Geophysical Union**, San Francisco, Calif. (A. F. Spilhaus, Jr., AGU, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

7-11. **Elements of Ferrous Metallurgy**, 4th, Toronto, Canada. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

7-11. Greater New York **Dental Mtg.**, 46th annual, New York, N.Y. (H. M. Harrison, Room 106-A, Statler Hilton, New York 10001)

7-12. **Plant Growth Substances**, 7th intern conf., Canberra, Australia. (P. D. O'Connor, Australian Acad. of Science, Gordon St., Canberra City, A.C.T. 2601)

8-10. North Central **Weed Control Conf. Inc.**, Lexington, Ky. (E. L. Knake, Agronomy Dept., Univ. of Illinois, Urbana 61801)

**GREAT FOR DEPOSITS
AND WITHDRAWALS...**



**AND YOU CAN
BANK ON IT!**

**NEW FROM BUCHLER
Auto DENSI-FLOW™
for density gradients**

The Auto Densi-Flow is ideal for depositing generated gradients or in the automatic withdrawal of centrifuged samples. It eliminates the need to push up the formed gradient with a heavy solution which might cause diffusion of bands and a spoiled experiment. This new automated instrument also deposits a generated gradient in a linear fashion into all commercially available centrifuge tubes.

Additional advantages are: speed of operation; elimination of piercing of centrifuge tubes and compatibility with all types of centrifuge tubes without the need for adapters. Write today for complete information on the Auto Densi-Flow—the modern tool for density gradient work.

Request Bulletin S2-5160A

**BUCHLER INSTRUMENTS DIVISION
NUCLEAR-CHICAGO CORP.**

A SUBSIDIARY OF G. D. SEARLE & CO.

1327 SIXTEENTH ST., FORT LEE, N. J. 07024

Circle No. 93 on Readers' Service Card

8-11. American Soc. of **Agricultural Engineers**, Chicago, Ill. (J. L. Butt, P.O. Box 229, St. Joseph, Mich. 49085)

9-11. Conference on **Application of Simulation**, New York, N.Y. (M. Araten, Celanese Chemical Co., 245 Park Ave., New York 10017)

9-12. American Acad. for **Cerebral Palsy**, Houston, Tex. (G. Solomons, University Hospitals, Iowa City, Iowa 52240)

10. American Acad. of **Optometry**, Miami Beach, Fla. (C. C. Koch, 214-215 Foshay Tower, Minneapolis, Minn. 53402)

10-11. Symposium on **Molecular Mechanism of Drug Action**, Lucknow, India. (C. R. Krishna Murli, Div. of Biochemistry, Central Drug Research Inst., Chattar Manzil Palace, Lucknow)

10-12. American Heart Assoc. Council of **Clinical Cardiology**, 11th, Miami, Fla. (Mrs. J. Baxter, 5080 Biscayne Rd., Miami, Fla. 33137)

10-16. New York State Soc. of **Anesthesiologists** (Postgraduate Assembly), New York, N.Y. (Mrs. E. C. Sinsi, 30 E. 42 St., New York 10017)

11-12. American Federation for **Clinical Research**, New York, N.Y. (R. A. Rifkind, College of Physicians and Surgeons, 630 W. 168 St., New York 10032)

11-15. National Federation of **Catholic Physicians**, Washington, D.C. (H. R. Herzog, 2825 N. Mayfair Rd., Milwaukee, Wis. 53222)

14-15. British **Biophysical Soc.**, London, England. (E. M. Bradbury, Biophysics Lab., Physics Dept., College of Technology, Park Rd., Portsmouth, England PO1 2DZ)

14-16. Institute of Electrical and Electronics Engineers, intern. symp. on **Circuit Theory**, Atlanta, Ga. (I. T. Frisch, Network Analysis Corp., Beechwood, Old Tappan Rd., Glen Cove, N.Y., 11542)

14-16. **Flow Properties of Metals**, Chicago, Ill. (J. A. Fellows, American Soc. for Metals, Metals Park, Ohio 44073)

14-18. Texas Symp. on **Relativistic Astrophysics**, 5th, Austin. (L. C. Shepley, Physics Dept., Univ. of Texas, Austin 78712)

14-18. **Solid State Physics**, 6th conf., Reading, England. (Inst. of Physics and the Physical Soc., 47 Belgrade Sq., London S.W.1, England)

17-20. American **Psychoanalytic Assoc.**, New York, N.Y. (Mrs. H. Fischer, APA, 1 E. 57 St., New York 10022)

26-29. Society for the **History of Technology**, Chicago, Ill. (M. Kranzberg, Crawford Hall, Case Western Reserve Univ., Cleveland, Ohio 44106)

26-30. Western Soc. of **Naturalists**, Honolulu, Hawaii. (D. H. Montgomery, Dept. of Biological Sciences, California Poly State College, San Luis Obispo 94301)

26-30. Society of **Systematic Zoology**, Chicago, Ill. (G. I. Stage, Dept. of Entomology, Natl. Museum of Natural History, Washington, D.C. 20560)

26-31. American Assoc. for the **Advancement of Science**, 137th annual, Chicago, Ill. (D. W. Thornhill, AAAS, 1515 Massachusetts Ave., NW, Washington, D.C. 20005)

26-31. Society for **General Systems Research**, Chicago, Ill. (R. F. Ericson, 2100 Pennsylvania Ave., NW, Rm 818, Washington, D.C. 20006)



If you can't find the ion exchange resin you want here, it must be pretty special.

The 31 jam-packed catalog pages you see here (barely) describe the widest selection of ion exchange resins available anywhere. For example, BIO-RAD offers by far the broadest line of extensively purified AG[®] anion and cation resins for reproducible laboratory experimentation. They're available from stock in the widest range of particle sizes and ionic forms you'll find anywhere. What about DOWEX[®] resins? BIO-RAD stocks them— anion and cation—in 44 types and bead sizes. Where can you get these 31 pages? Just ask us for your *free* copy of new Price List V. Contact:

BIO-RAD Laboratories
32nd & Griffin Avenue
Richmond, CA 94804
Phone (415) 234-4130

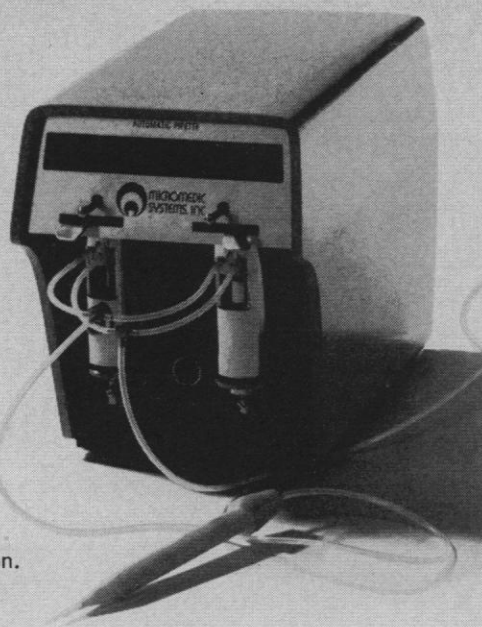
Circle No. 27 on Readers' Service Card

Fast, accurate delivery to the last μ l.

The new Micromedic Automatic Pipette was designed specifically to handle fluid volumes under 20 μ l. Its two motor-driven pumps perform simple dilution or reagent dispensing operations on a 6-second cycle with better than 2% accuracy. Sample repeatability is 0.1% or better.

Five interchangeable pumps give the unit a sample capability from 1 μ l to 5000 μ l. Their sinusoidal action assures smooth, precise operation. Just dial the percentage of stroke desired, with any pump combination, for any reagent—all critical parts are corrosion resistant and, in diluting procedures, the line is flushed clean with delivery.

Model 25000 is available with hand or foot switch and all accessories. Reliability has been established by over 24 months of trouble-free operation in out-of-house laboratory testing. For complete specifications write:

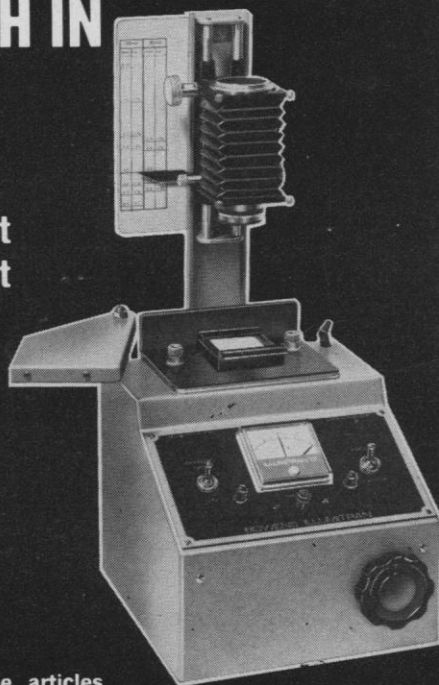


Rohm and Haas Building
Independence Mall West
Philadelphia, Pa. 19105

Circle No. 89 on Readers' Service Card

THE BOWENS ILLUMITRAN ACHIEVES A MAJOR BREAKTHROUGH IN COLOR SLIDE DUPLICATION—

continuously variable light
output coupled to a direct
reading exposure
meter, constant
color temperature
electronic flash,
no reciprocity
failure... plus a range
from half frame 35mm
to 4x5. And that's not all.



WRITE for brochure and magazine articles
which will give you useful ideas.

BOGEN PHOTO CORP. 232 So. Van Brunt St.
Englewood, N. J. 07631

Circle No. 121 on Readers' Service Card

26-31. American Nature Study Soc. Chicago, Ill. (Mrs. J. Geisler, Milewood Rd., Verbank, N.Y. 12585)

26-31. American Soc. of Zoologists, Chicago, Ill. (G. Sprugel, Jr., Illinois Natural History Survey, 179 Natural Resources Bldg., Urbana 61801)

27. National Assoc. of Science Writers, Chicago, Ill. (Mrs. R. Arctander, Box H, Sea Cliff, N.Y. 11579)

27-30. Archaeological Inst. of America, 72nd annual, New York, N.Y. (J. S. Ord, AIA, 260 West Broadway, New York 10013)

27-30. Biometric Soc., eastern North American regional, Detroit, Mich. (D. G. Gosslee, P.O. Box 713, Oak Ridge, Tenn. 37830)

27-30. Sigma Delta Epsilon, Chicago, Ill. (M. A. Myers, 6234 Mary Lane Dr., San Diego, Calif. 92115)

27-30. American Statistical Assoc., 130th, Detroit, Mich. (J. W. Lehman, ASA, 806 15th St., NW, Washington, D.C. 20005)

28-30. American Economic Assoc., Detroit, Mich. (H. F. Williamson, 629 Noyes St., Evanston, Ill. 60201)

28-30. History of Science Study, Chicago, Ill. (J. C. Greene, Dept. of History, Univ. of Connecticut, Storrs 06268)

28-30. Linguistic Soc. of America, Washington, D.C. (T. A. Sebeok, Patton House, Indiana Univ., 516 E. Sixth St., Bloomington, Ind. 47401)

28-31. Metric Assoc., Chicago, Ill. (L. F. Sokol, 624 N. Drury Lane, Arlington Heights, Ill. 60004)

28-31. American Physical Soc., Stanford, Calif. (W. W. Havens, Jr., 335 E. 45 St., New York 10017)

28-31. Symposium on Upper Mantle Project, 2nd, Hyderabad, India. (S. Balakrishna, Natl. Geophysical Research Inst., Hyderabad-7)

January

2-21. American College of Surgeons, scientific winter cruise, San Juan, Puerto Rico; Caracas, Venezuela; and Panama City (American College of Surgeons, 55 E. Erie St., Chicago, Ill. 60611)

3-8. Symposium on Hibernation-Hypothermia, Snowmass (Aspen), Colo. (F. E. South, Space Sciences Research Center, Univ. of Missouri, Columbia 65201)

3-9. Indian Science Congr. Assoc., 58th annual, Calcutta. (M. Nagaraj, Dean, Faculty of Science, Bangalore Univ., Bangalore-1, India)

4-7. Solid State Physics and Applications, Boca Raton, Fla. (J. S. Blakemore, Physics Dept., Florida Atlantic Univ., Boca Raton 33432)

5-7. Solid State Physics, 8th annual, Manchester, England. (Meetings Officer, Inst. of Physics and The Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

6-9. American Rheumatism Assoc., Washington, D.C. (Miss M. M. Walsh, Arthritis Foundation, 1212 Avenue of the Americas, New York 10036)

7-9. National Conf. on Cancer of the Colon and Rectum, San Diego, Calif. (R. N. Grant, American Cancer Soc., 219 E. 42 St., New York 10017)

11-15. Society of Automotive Engineers, Detroit, Mich. (W. I. Marble, 2 Pennsylvania Pl., New York 10001)

SCIENCE, VOL. 170

REVCO IS THE ULTIMATE IN ULTRA-LOW TEMPERATURE EQUIPMENT

REVCO pioneered ultra-low temperature equipment, and REVCO engineering has made the name synonymous with reliability and dependability around the world.

REVCO provides quality ULT refrigeration units from 1-1/2 to 25 cubic feet.

REVCO's custom accessories can tailor any unit to your specifications for storage, research or testing in any discipline.

For more information write for our fact file and our list of customers served.



REVCO, INC.

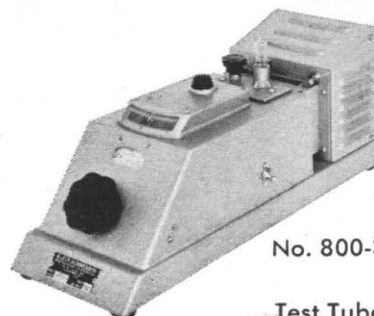
1100 Memorial Drive, West Columbia, S.C. 29169

"The world's leader in ultra-low temperature equipment."

Circle No. 109 on Readers' Service Card

TO
-140°F
(-96°C)

Klett Summerson Photoelectric Colorimeter

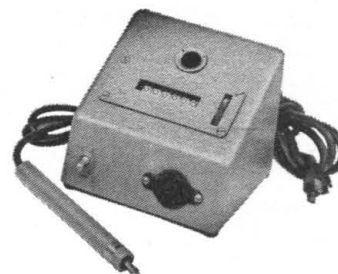


No. 800-3

Test Tube
Model

KLETT COLONY MARKER and TALLY

This instrument takes the drudgery and error out of the counting of bacterial colonies.



Klett MANUFACTURING CO., INC.,
179 East 87th Street, New York, 28, N.Y.

Circle No. 102 on Readers' Service Card

Put exclusion chromatography's sharpest cutoffs in your lab.

With Corning® CONTROLLED-PORE GLASS granules, you get molecular weight exclusions accurate to ±10%. You also get permeation chromatography's highest flow rates. Pore size and bed volume are unaffected by pressure, temperature or pH changes. Granules are immune to biological attack, easily sterilized and re-used. For biological or chemical separations, polymer analysis, purification of viruses, enzymes, drugs, chemicals and additives. You get eight pore sizes,

75 to 2000 Å, complete with column and instructions in a Test Kit for \$95.

Call your dealer or write for information and an applications bibliography.

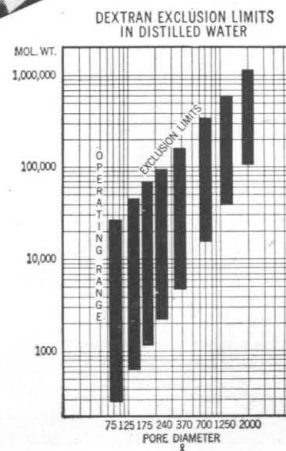
Chromatography Products,
Corning Glass Works,
Corning, N.Y. 14830.

CORNING
CORNING GLASS WORKS



AUTHORIZED DEALERS AND REPRESENTATIVES FOR CORNING® CONTROLLED-PORE GLASS

UNITED STATES: Analabs, Applied Science Laboratories, Brinkmann Instruments, Inc., Chemical Research Services, Inc., Perco Supplies, Sigma Chemical Company, Supelco, Incorporated, Waters Associates, Inc.
INTERNATIONAL: Belgium, O.I.P.; Canada, Chromatographic Specialties, Ltd.; Denmark, Meda S.A.; England, BDH Chemical Ltd.; Finland, G. W. Berg & Company; Italy, Prodotti Gianni S.R.L.; Japan, Asahi Glass Co., Ltd.; The Netherlands, P. M. Tamson N.V.; New Zealand, Watson Victor Ltd.; Norway, Nerliens Kemisk-Tekniske A/S; Republic of Ireland, Sirmac Ltd.; South Africa, Protea Physical & Nuclear Instrumentation (Pty.) Ltd.; Spain, Giral S.A.; West Germany, H-Technik, Hupe Apparatebau.



Circle No. 56 on Readers' Service Card

A Really Small Dew Point Sensor

It's shown here actual size and is used with the YSI Model 91 Dew Point Hygrometer to measure dew point temperature and vapor pressure in small spaces and static gas environments.



2¼" long
⅜" diameter

A second, slightly larger sensor, measures in moving air and at low ambient temperature.

The sensors are interchangeable and will operate remotely on long leads. And with YSI thermistor probes you also can read ambient temperature.

Both dew point and ambient temperatures are available for continuous, simultaneous recording.

This is the lowest priced of YSI's new humidity instruments. Write, and we'll send specifications on the full line.

YELLOW SPRINGS INSTRUMENT CO.
YELLOW SPRINGS, OHIO 45387

11-15. **Water Resources Engineering**, Phoenix, Ariz. (Executive Secretary, American Soc. of Chemical Engineers, 345 E. 47 Street, New York 10017)

11-22. **Science, Society, and Our World**, Medford, Mass. (K. A. McCarthy, Graduate School of Arts and Sciences, Tufts Univ., Medford 02155)

12-14. **Institute of Electrical and Electronics Engineers, Reliability and Quality Control**, 17th annual symp., Washington, D.C. (Executive Secretary, IEEE, 345 E. 47 St., New York 10017)

12-14. **System Sciences**, intern. conf., Honolulu, Hawaii. (R. Chattopadhyay, Univ. of Hawaii, 2565 The Mall, Honolulu 96822)

12-16. **National Soc. of Professional Engineers**, Memphis, Tenn. (P. H. Robbins, 2029 K St., NW, Washington, D.C. 20006)

12-18. **Marine Biological Assoc. of India**, Cochin. (E. G. Silas, Jyothi Building, Gopala Prabhu Rd., Ernakulam, Cochin, 11)

17. **Human Factors in the Design and Operation of the Highway Transportation System**, 4th annual, Washington, D.C. (B. W. Stephens, Dept. of Transportation, Federal Highway Administration, Office of Research and Development, 35-41.2, Washington, D.C. 20591)

17-21. **Pan-American Conf. on Adolescence**, Buenos Aires, Argentina. (S. C. Feinstein, American Soc. for Adolescent Psychiatry, 741 St. Johns, Highland Park, Ill. 60035)

18-19. **Nucleic Acid-Protein Interaction**, Miami, Fla. (F. Huijing, Dept. of Biochemistry Univ. of Miami School of Medicine, P.O. Box 875, Biscayne Annex, Miami 33152)

18-20. **Society of Thoracic Surgeons**, Dallas, Tex. (W. G. Purcell, 333 N. Michigan Ave., Chicago, Ill. 60610)

18-22. **Highway Research Board**, 50th annual, Washington, D.C. (H. M. Gillespie, Natl. Research Council, 2101 Constitution Ave., NW, Washington, D.C. 20418)

18-22. **Metallographic Interpretation**, Dallas, Tex. (J. A. Fellows, American Society of Metals, Metal Park, Ohio 44073)

18-25. **Pathological Wilting in Plants**, intern. symp., Madras, India (T. S. Sadasivan, Univ. of Madras, Botany Lab., Madras-5)

19-21. **Systems, Networks, and Computers**, intern. conf., Oaxtepec, Mexico. (M. A. Murray-Lasso, Instituto de Ingenieria, Ciudad Universitaria, Mexico 20 DF, Mexico)

21-22. **Nucleic Acid Synthesis in Viral Infection**, Miami, Fla. (F. Huijing, Dept. of Biochemistry, Univ. of Miami School of Medicine, P.O. Box 875, Biscayne Annex, Miami 33152)

21-25. **American Mathematical Soc.**, Atlantic City, N.J. (G. L. Walker, P.O. Box 6248, Providence, R.I. 02904)

21-31. **North American Conf. on Fertility and Sterility**, Puerto Vallarta, Mexico. (Mrs. F. Royce, 112-44 69th Ave, Forest Hills, N.Y. 11375)

22. **Bibliographical Soc. of America**, New York, N.Y. (T. R. Adams, John Carter Brown Library, Brown Univ., Providence, R.I. 02912)

Call on the new ICN-Tracerlab— one complete source for radioactive compounds, nuclides, and services

The price is right

The purity is perfect

ICN now offers the combined capabilities and technical knowledge of Tracerlab and ICN. This provides you, our customers, with broader technical support due to an exchange of know-how by our chemists at both facilities. Not only do you get more technical support, but improved quality control, and thereby a better value for the price.

Test our improved communications by placing your order at either facility. Our range of services includes labeled compounds, sources, accessories, film badge services, plus many other related product lines.

WRITE FOR
NEW CATALOG No. 5

ICN TRACERLAB
Chemical & Radioisotope Division
International Chemical & Nuclear Corporation
Waltham, Massachusetts (617) 894-6600
Irvine, California (800) 854-3288

Circle No. 84 on Readers' Service Card

BOOKS RECEIVED

(Continued from page 314)

York, 1969. xviii, 300 pp., illus. \$7.75. Concepts in Geography, vol. 2.

Anatomies of America. Sociological Perspectives. Philip Ehrensaft and Amitai Etzioni, Eds. Macmillan, New York; Collier-Macmillan, London, 1970. xii, 500 pp. Paper, \$9.95.

Animals in Migration. Robert T. Orr. Macmillan, New York; Collier-Macmillan, London, 1970, xvi, 304 pp., illus. \$12.50.

Approaching the Benign Environment. The Franklin Lectures in the Sciences and Humanities. First Series. R. Buckminster Fuller, Eric A. Walker, and James R. Killian, Jr. Published for Auburn University by University of Alabama Press, University, 1970. xii, 124 pp. \$6.

An Archeological Survey of Southwest Virginia. C. G. Holland. Smithsonian Institution Press, Washington, D.C., 1970 (available from the Superintendent of Documents, Washington, D.C.). xviii, 196 pp., illus. + plates. \$4.75. Smithsonian Contributions to Anthropology, No. 12.

The Barabaig. East African Cattle-Herders. George J. Klima. Holt, Rinehart and Winston, New York, 1970. xiv, 112 pp., illus. Paper, \$2.25. Case Studies in Cultural Anthropology.

Basic Biology. Alfred M. Elliott and Bruce R. Voeller. Appleton-Century-Crofts, New York, 1970. xii, 660 pp., illus. \$8.95.

Basic Mathematics Review. Text and Workbook. James A. Cooley and Ralph Mansfield. xii + 416 pp. Vol. 1, Arithmetic (xii, 178 pp.); vol. 2, Elementary Algebra (xii, pp. 179-416, illus.) Paper, each \$3.95. Macmillan, New York; Collier-Macmillan, London, ed. 2, 1970.

Behavior in New Environments. Adaptation of Migrant Populations. Based on a conference, Dorado Beach, Puerto Rico, November 1968. Eugene B. Brody, Ed. Sage, Beverly Hills, Calif., 1970. 480 pp., illus. \$12.50.


Beliefs and Values. Karl E. Scheibe. Holt, Rinehart and Winston, New York, 1970. xii, 164 pp. Paper, \$2.95. The Person in Psychology Series.

Bibliography of Publications. As of 30 June 1969. Human Resources Research Organization, Alexandria, Va., 1969. viii, 314 pp. Paper.

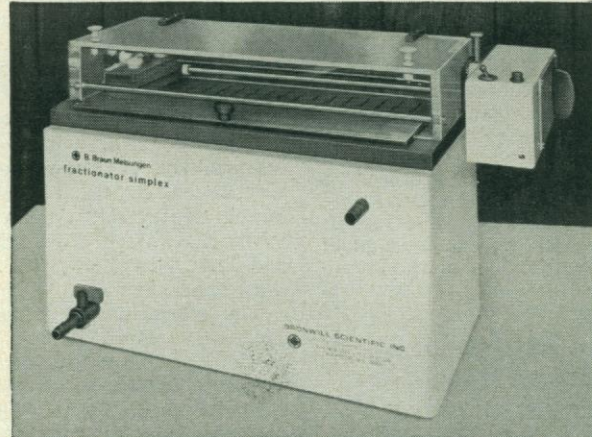
Bibliography on Smoking and Health. 1969 Cumulation. With English language abstracts of foreign items. National Clearinghouse for Smoking and Health, Health Services and Mental Health Administration, Arlington, Va., 1969 (available from Superintendent of Documents, Washington, D.C.). vi, 322 pp. Paper. Public Health Service Publ. No. 1124, Bibliography Series No. 45.

Bibliography on the Urban Crisis. The Behavioral, Psychological, and Sociological Aspects of the Urban Crisis. Jon K. Meyer. National Institute of Mental Health, Chevy Chase, Md., 1969 (available from the Superintendent of Documents, Washington, D.C.). viii, 452 pp. Paper, \$3.75. Public Health Service Publication No. 1948.

Biochemistry of the Phagocytic Process. Localization and the Role of Myeloperoxidase and the Mechanism of the Halogena-




**—while you collect it
Use the Bronwill
Fractionator Simplex
for separation with
column chromatography/density
gradient centrifugation**



it's adaptable—10 collection rates: from 1 fraction every 20 hrs. to 50 fractions per hr.
it's cool—102 tubes in an insulated bath; cold water can be circulated; crushed ice added. With water jacketed columns no refrigeration is needed.
it's enclosed—prevents introduction of contaminants; minimizes sample evaporation. Clear plexiglass cover lets you see what's going on
it's compact—takes less than 1 sq. ft. of bench space

Bronwill = reliability
Ask for a demonstration. Call your Bronwill dealer or write



Bronwill Scientific, Inc.
A leader in scientific instrumentation
Box 7824—Rochester, New York 14606
Circle No. 36 on Readers' Service Card

Oxford



A Strategy for Education

By HERMAN T. EPSTEIN, *Brandeis University*. A new and stimulating method of teaching is introduced in this volume. The method, developed by Dr. Epstein for his introductory science and biology courses, has spread to a dozen major universities in three countries, and has been applied to courses in the social sciences and engineering. By reading original papers, students are encouraged to intellectually re-create the research as it was experienced by the scientist. In this way the excitement of discovery is vividly communicated. \$4.95

Molecular Quantum Mechanics

AN INTRODUCTION TO QUANTUM CHEMISTRY

By P. W. ATKINS, *Lincoln College, Oxford*. This book presents the construction and application of a theory of the spectra and the electric and magnetic properties of atoms and molecules. Part I introduces the ideas of quantum mechanics. Part II discusses the mathematics of the theory. Part III covers atomic and molecular structure and spectra, and the electric and magnetic properties of molecules. *One-volume edition (Parts I, II & III), cloth, \$17.75. Volume I (Parts I, II), paper, \$5.50. Volume II (Part III), paper, \$5.50*

The Distribution of the Blood Groups in the United Kingdom

By ADA C. KOPEC, *Medical Research Council Serological Population Genetics Laboratory*. In some ways blood groups are even more useful to anthropologists than the more conventional and visible characteristics of the body. Of medical importance is the discovery that certain diseases attack persons of one blood group more readily than those of another. To aid researchers in both fields, Dr. Kopec has analyzed topographically the records of the ABO and Rhesus groups of more than half a million blood donors in England, Wales, Scotland, and Northern Ireland. *Tables, maps, charts.* \$27.25

Marriage and Fertility of Women Suffering from Schizophrenia or Affective Disorders

By BARBARA C. STEVENS, *The Maudsley Hospital, London*. This survey describes the probability of marriage and fertility of psychiatric patients since the development of community-oriented psychiatry. Over a thousand cases were followed up to determine the probability of marriage of these patients compared with that of normal women of corresponding age observed during identical calendar periods. (*Institute of Psychiatry, Maudsley Monographs, No. 19.*) \$9.75

OXFORD UNIVERSITY PRESS

200 Madison Avenue,
New York, N.Y. 10016

Circle No. 79 on Readers' Service Card

tion Reaction. Julius Schultz, Ed. North-Holland, Amsterdam; Elsevier, New York, 1970. 142 pp., illus. \$8.

Biology and the Future of Man. Philip Handler, Ed. Oxford University Press, New York, 1970. xxiv, 936 pp., illus. \$12.50.

The Biology of Twinning in Man. M. G. Bulmer. Clarendon (Oxford University Press), New York, 1970. x, 206 pp., illus. \$6.40.

A Brief Guide to Sources of Scientific and Technical Information. Saul Herner. Information Resources Press, Washington, D.C., 1969. x, 102 pp. Paper, \$4.25.

Cardiovascular Disease. A Matter of Prevention. Kenneth L. Briney. Wadsworth, Belmont, Calif., 1970. xiv, 82 pp., illus. Paper. Basic Concepts in Health Science Series.

Catalogue of the Neotropical Squamata. Part 1, Snakes. James A. Peters and Braulio Orejas-Miranda, with the collaboration of Roberto Donoso-Barros. viii, 348 pp., illus. Part 2, Lizards and Amphisbaenians. James A. Peters and Roberto Donoso-Barros, with the collaboration of Braulio Orejas-Miranda. viii, 296 pp., illus. Paper, \$6.75 the set. Smithsonian Institution Press, Washington, D.C., 1970 (available from the Superintendent of Documents, Washington, D.C.).

Century of Mismatch. Simon Ramo. McKay, New York, 1970. xiv, 210 pp. \$5.95.

Changing Patterns. An Atypical Autobiography. Macfarlane Burnet. Elsevier, New York, 1969. x, 282 pp. + plates. \$8.50.

Chemical Thermodynamics. Principles and Applications. Peter A. Rock. Macmillan, New York; Collier-Macmillan, London, 1969. xvi, 512 pp., illus. \$11.95.

Chemicals and Life. Kenneth E. Maxwell. Dickenson, Belmont, Calif., 1970. x, 374 pp., illus. Paper. Dickenson Series in Biology.

Chemistry: A Comprehensive Laboratory Course. B. Richard Siebring, Georgia Strack Moczynski, Arlene Hetzel Constant, and Mary Ellen Schaff. Harper and Row, New York, 1970. viii, 312 pp., illus. Paper, \$6.50.

The Chemistry of Matter. James B. Pierce. Houghton Mifflin, Boston, 1970. xvi, 800 pp., illus. \$10.50.

Chimie Industrielle. Henri Guérin. Vol. 2, Du Sel au Téflon: Le Chlorure de Sodium et les Industries Dérivées ou Connexes. Presses Universitaires de France, Paris, 1969. 568 pp. + plates. 60 F. Euclide: Introduction aux Etudes Scientifiques.

China at Work. An Illustrated Record of the Primitive Industries of China's Masses, Whose Life Is Toil, and Thus an Account of Chinese Civilization. Rudolf P. Hommel. M.I.T. Press, Cambridge, Mass., 1969. xii, 372 pp., illus. Cloth, \$10; paper, \$3.95. Reprint of the 1937 edition.

Chronological Analysis of Tsegi Phase Sites in Northeastern Arizona. Jeffrey S. Dean. University of Arizona Press, Tucson, 1969. xiv, 210 pp., illus. Paper, \$8.50. Papers of the Laboratory of Tree-Ring Research, No. 3.

Circuits, Signals, and Networks. Cyrus W. Cox and William L. Reuter. Macmillan, New York; Collier-Macmillan, London, 1969. xviii, 590 pp., illus. \$12.95.

Clinical Nursing. Pathophysiological and Psychosocial Approaches. Irene L. Beland. Macmillan, New York; Collier-Macmillan, London, ed. 2, 1970. x, 950 pp., illus. \$13.95.

College Algebra and Trigonometry. Steven J. Bryant, Jack Karush, Leon Nower, and Daniel Saltz. Goodyear, Pacific Palisades, Calif., 1970. xii, 468 pp., illus. \$10.95.

College Zoology. Karl A. Stiles, Robert W. Hegner, and Richard A. Boolootian. Macmillan, New York; Collier-Macmillan, London, ed. 8, 1969. viii, 600 pp., illus. \$9.95.

The Computation and Theory of Optimal Control. Peter Dyer and Stephen R. McReynolds. Academic Press, New York, 1970. x, 246 pp., illus. \$13.50. Mathematics in Science and Engineering, vol. 65.

Computer Math Experiences. Programs and Exercises for Use in the Computer-Equipped Classroom. Melvin Serisky. Olcott Forward, Hartsdale, N.Y., 1970. 320 pp., illus. Paper, \$7.85.

Computer Research in Palynology Demonstrated by Use of Oklahoma University General Information Processing System (GIPSY). Permian Palynology of North America and Some Associated Problems. L. R. Wilson, Jack L. Morrison, and William E. Reid. University of Oklahoma, Norman, 1969. viii, 143 pp. Paper. Information Science Series, Monograph No. 2.

Computing and Computer Science. A First Course with FORTRAN IV. T. D. Sterling and S. V. Pollack. Macmillan, New York; Collier-Macmillan, London, 1970. xvi, 400 pp., illus. \$9.95.

Conference on Health Services for Children and Youth. Chapel Hill, N.C., March 1969. American Public Health Association, New York, 1970. viii, 136 pp., illus. Paper, \$2. Supplement to April 1970 *Journal of Public Health*, vol. 60, No. 4.

The Conflict between Atomism and Conservation Theory. 1644-1860. Wilson L. Scott. Macdonald, London; Elsevier, New York, 1970. xiv, 314 pp. + plates. \$16. History of Science Library.

Control of Gastrointestinal Function. An Introduction to the Physiology of the Gastrointestinal Tract. Frank P. Brooks. Macmillan, New York; Collier-Macmillan, London, 1970. xii, 228 pp., illus. Cloth, \$7.95; paper, \$5.95. Modern Concepts in Medical Physiology.

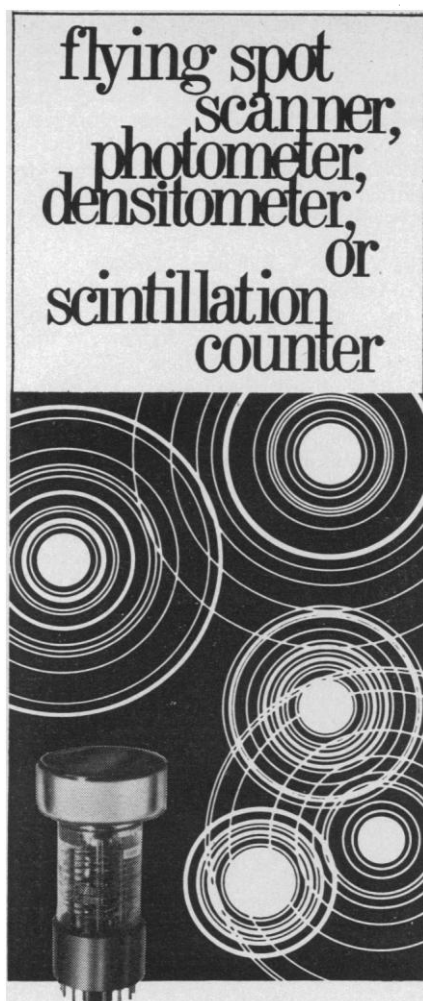
Control Techniques for Particulate Air Pollutants. National Air Pollution Control Administration, Washington, D.C., 1969. xxvi, 218 pp., illus. Paper. NAPCA Publ. No. AP-51.

The Course of American Economic Growth and Development. Louis M. Hacker. Wiley, New York, 1970. xxviii, 388 pp. Cloth, \$8.95; paper, \$4.95. Wiley Series in American Economic History.

Craig and Faust's Clinical Parasitology. Ernest Carroll Faust, Paul Farr Russell, and Rodney Clifton Jung. Lea and Febiger, Philadelphia, ed. 8, 1970. viii, 896 pp., illus. + plates. \$25.50.

Cryogenic Laboratory Equipment. A. J. Croft. Plenum, New York, 1970. x, 182 pp., illus. \$11.50. International Cryogenics Monograph Series.

Culture Worlds. Richard Joel Russell, Fred Bowerman Kniffen, and Evelyn Lord



The new range of EMI photomultipliers with "SUPER" S-11 photocathodes will enhance your project performance. High quantum efficiency, (23/24%) high gain at relatively low overall voltage, and low dark current at the rated overall sensitivity are typical of these types. They maintain the EMI standard of excellent gain stability and linearity. The narrow spread in characteristics makes these types ideal for systems or for multiple installations. The table below gives the typical values for the significant parameters.

Dia.	Type No.	Amps/Lumen	Volts/Overall	Anode Dark Current Nanoamps
2"	9656R	50	1150	2
3"	9708R	50	1250	5
3.5"	9531R	200	1300	25
4"	9732R	50	1250	10
5"	9709R	50	1350	15

Note that the anode dark current is given for the overall voltage at the specified overall sensitivity. The maximum overall sensitivity is 10 times the values given above. Each Tube is individually calibrated and data is supplied with the tube.

Send for our new 64 page catalog giving data and technical information on the complete range of EMI photomultipliers.

GENCOM DIVISION varian/EMI

80 EXPRESS STREET, PLAINVIEW, N. Y. 11803
TELEPHONE: (516) 433-5900

Circle No. 88 on Readers' Service Card

Pruitt. Macmillan, New York; Collier-Macmillan, London; brief edition, revised, 1969. xviii, 558 pp., illus. \$9.95.

Daylight and Its Spectrum. S. T. Henderson. Elsevier, New York, 1970. x, 278 pp., illus. \$15.75.

Defense against Famine. The Role of the Fertilizer Industry. A. V. Slack. Doubleday, Garden City, N.Y., 1970. viii, 232 pp. Cloth, \$5.95; paper, \$1.95. Chemistry in Action Series.

The Development and Organization of Scientific Knowledge. Harold Himsforth. Heinemann, London, 1970. viii, 180 pp. 63s.

Diagnostic Microbiology. A Textbook for the Isolation and Identification of Pathogenic Microorganisms. W. Robert Bailey and Elvyn G. Scott. C. V. Mosby, St. Louis, Mo., ed. 3, 1970. x, 386 pp., illus. \$8.75.

Discovering Science in the Elementary School. Edith M. Selberg, Louise A. Neal, and Matthew F. Vessel. Addison-Wesley, Reading, Mass., 1970. xxx, 498 pp., illus. \$9.95. Addison-Wesley Series in Education.

Dissection of the Rat. Warren F. Walker, Jr. Freeman, San Francisco, 1970. Six loose-leaf exercises, illus. Each 25¢.

Documents on Disarmament 1968. U.S. Arms Control and Disarmament Agency, Washington, D.C., 1969 (available from the Superintendent of Documents, Washington, D.C.). xviii, 894 pp. Paper, \$3.75. USACDA, Publ. No. 52.

Dream Studies and Telepathy. An Experimental Approach. Montague Ullman and Stanley Krippner. Parapsychology Foundation, New York, 1970. 120 pp. + plates. Paper, \$3. Parapsychological Monographs, No. 12.

Driving and Connotative Meanings. E. Belvin Williams and James L. Malfetti. Teachers College Press, Columbia University, New York, 1970. xiv, 60 pp., Paper.

The Dynamics of Aggression. Individual, Group, and International Analyses. Edwin I. Megargee and Jack E. Hokanson, Eds. Harper and Row, New York, 1970. xiv, 274 pp. Paper, \$3.95.

L'électricité en France. Henri Rousseau. Presses Universitaires de France, Paris, 1970. 128 pp., illus. Paper, 3.50 F. "Que Sais-Je?," No. 59.

Electrochemistry of Molten and Solid Electrolytes. Vol. 8, Mechanism and Kinetics of Electrode Processes. S. F. Pal'guev, Ed. Translated from the Russian edition (Sverdlovsk, 1968) by Halina Wroblowa. Consultants Bureau (Plenum), New York, 1970. viii, 84 pp., illus. Paper, \$15.

The Electrodynamics of Magneto-electric Media. T. H. O'Dell. North-Holland, Amsterdam; Elsevier, New York, 1970. xvi, 304 pp., illus. \$19.25. Selected Topics in Solid State Physics, vol. 11.

Elementary Particle Physics and Scattering Theory. Brandeis University Summer Institute in Theoretical Physics, Waltham, Mass., 1967. Vol. 1. M. Chretien and S. S. Schweber, Eds. Gordon and Breach, New York, 1970. xii, 464 pp., illus. Cloth, \$29.50; paper, \$13.50.

Elementary Particle Theory. A. D. Martin and T. D. Spearman. North-Holland, Amsterdam; Elsevier, New York, 1970. xvi, 528 pp., illus. \$27.50.

Oxford



The Face of the Deep

By BRUCE C. HEEZEN, *Lamont-Doherty Geological Observatory, Columbia University*, and CHARLES D. HOLLISTER, *Woods Hole Oceanographic Institution*. This volume offers a vivid picture of the bottom of the sea in more than 500 photographs, many of which are in color. Text and captions provide a full description of this nearly unexplored area. In discussing such features as the mid-oceanic ridge, turbidity currents, bottom currents, and abyssal tracks and trails, the authors present a highly readable and current introduction to physical oceanography.
March 1971 650 pp. 558 illus.
cloth \$25.00 paper \$12.50

Exploring the Universe

SECOND EDITION

Edited by LOUISE B. YOUNG, *Science Editor, American Foundation for Continuing Education*. This book of readings provides an orientation for understanding the principles on which the space age has been built and suggests the methods and nature of man's exploration of the Universe. The reader is introduced to the attitudes and motivations of scientists through use of original writings ranging from Newton's description of the refraction of light to the modern cosmologist's debate on theories of creation. Emphasis is placed upon the relation of science to other fields such as art, philosophy, and literature.
Spring 1971 650 pp. illus.
cloth \$12.00 paper \$6.50

An Introduction to Stellar Atmospheres and Interiors

By EVA NOVOTNY, *Staff Scientist, Astronomy Branch, Manned Spacecraft Center, Houston*. Written at the intermediate level, this introduction to astrophysics explores the basic theoretical concepts of stellar atmospheres and interiors. It includes such topics as radiation transfer theory, model atmospheres, absorption-line formation, energy generation, degenerate matter, and stellar evolution.
Spring 1971 approx. 350 pp. \$9.50

Models in Structural Inorganic Chemistry

By A. F. WELLS, *University of Connecticut*. Describing the construction of three-dimensional models of the major inorganic compounds, this book begins with a discussion of general principles. It is further divided into five sections: polyhedra and other finite systems; repeating patterns; two- and three-dimensional nets; sphere packings; and structures built from tetrahedra and octahedra. A Model-Building Kit is separately available at \$60.00.
1970 200 pp. 133 text figs.
cloth \$8.00 paper \$4.00

OXFORD 
UNIVERSITY 
PRESS 

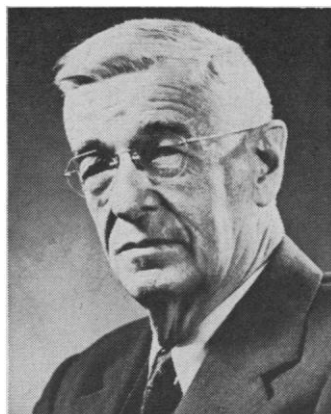
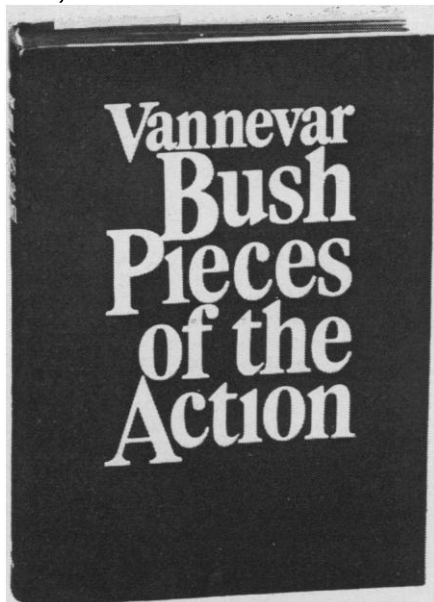
200 Madison Avenue,
New York, N.Y. 10016

Circle No. 81 on Readers' Service Card

"A great book by an extraordinary man."

—DR. JAMES B. CONANT

A personal record of the last sixty years . . . by the distinguished scientist-engineer-inventor who was a chief architect of the changes those years have made in our way of life, our attitudes, our values.



"A reading of this book makes it clear that one is meeting with the mind of a genius."

—ERIC HODGINS

"A most vivid, wise, and exciting work."

—CARYL P. HASKINS, President,
The Carnegie Institution of Washington

Frontis. Index. \$8.95



Circle No. 83 on Readers' Service Card

concentrate or fractionate non-dilute biologicals quickly

NEW HIGH-PERFORMANCE
ULTRAFILTER FOR PROCESSING OF
HIGH-SOLIDS-CONTENT SOLUTIONS

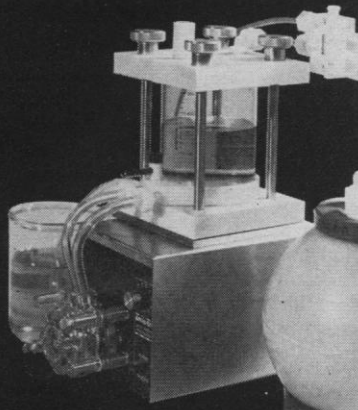
Use the TCF10 thin-channel system for quick processing of your macro-molecular solutions and suspensions. It incorporates a gentle peristaltic pump and can use any DIAFLO® membrane.

- Very high concentration rates, even with increased solids (e.g. 5% human albumin to 50% at 1.5 ml/min. overall rate)
- Rapid dialysis
- Fractionation of binary and complex mixtures

For especially delicate biologicals, convert unit to single-pass flow with an optional accessory.

Extend your laboratory capabilities and versatility with Amicon Systems. Send for catalog data, application information and prices.

amicon SCIENTIFIC SYSTEMS DIVISION
21 Hartwell Avenue, Lexington, Mass. 02173



Circle No. 96 on Readers' Service Card

Elements of Meteorology. Richmond W. Longley. Wiley, New York, 1970. xiv, 318 pp., illus. \$10.95.

Encyclopedia of Polymer Science and Technology. Plastics, Resins, Rubbers, Fibers. Vol. 10, Phenolic Resins to Polyelectrolytes. Herman F. Mark, Norman G. Gaylord, and Norbert M. Bikales, Eds. Interscience (Wiley), New York, 1969. xiv, 866 pp., illus.

The English Lepidoptera: Or, the Aurelian's Pocket Companion. Containing a Catalogue of Upward of Four Hundred Moths and Butterflies. Moses Harris. Classey, Hampton, Middlesex, England, 1969 (U.S. distributor, Entomological Reprint Specialists, Los Angeles, Calif.). xviii, 67 pp. \$9.60.

Essentials of Histology. Gerrit Bevelander. Mosby, St. Louis, ed. 6, 1970. viii, 328 pp., illus. \$8.75.

Experiences in Life Science. A Laboratory Guide. Eugene H. Kaplan. Macmillan, New York; Collier-Macmillan, London, 1969. x, 230 pp., illus. Paper, \$3.95.

Experiments in Physical Organic Chemistry. Neil S. Isaacs. Macmillan, New York; Collier-Macmillan, London, 1969. xii, 324 pp., illus. \$9.95.

Flora of Guatemala. Paul C. Standley and Louis O. Williams. The Loganiaceae. Dorothy N. Gibson. Field Museum of Natural History, Chicago, 1969. Illus. Paper. Fieldiana: Botany, vol. 24, part 8, No. 4, viii, pp. 263-476.

A Framework for Evaluation Study. Fourth Annual Report of the Center for the Study of Evaluation. Marvin C. Alkin, Director. Graduate School of Education, University of California, Los Angeles, 1969. 139 pp. Paper.

Geographic Perspectives on Urban Systems. With Integrated Readings. Brian J. L. Berry and Frank E. Horton. Prentice-Hall, Englewood Cliffs, N.J., 1970. xii, 564 pp., illus. \$10.95.

Guide to Cambridge Architecture. Ten Walking Tours. Robert Bell Rettig. M.I.T. Press, Cambridge, Mass., 1969. Unpagged, illus. Paper.

A History of the British Medical Administration of East Africa, 1900-1950. Ann Beck. Harvard University Press, Cambridge, Mass., 1970. xvi, 272 pp., illus. \$8. A Commonwealth Fund Book.

Human Relations in Business. Fred J. Carvell. Macmillan, New York; Collier-Macmillan, London, 1970. x, 358 pp., illus. \$8.95.

Immunologia Generale. Enrico Clerici and Maria Luisa Villa. Unione Tipografico-Editrice Torinese, Torino, Italy, ed. 2, 1970. xx, 688 pp., illus. + plates. L. 15,000.

An Introduction to Industrial Mycology. George Smith. St. Martin's, New York, ed. 6, 1969. x, 390 pp., illus.

Introductory Soil Mechanics and Foundations. George B. Sowers and George F. Sowers. Macmillan, New York; Collier-Macmillan, London, ed. 3, 1970. xvi, 560 pp., illus. \$8.95.

Iron Working in Ancient Greece. Radoimíř Pleiner. National Technical Museum, Prague, 1969. 56 pp. + plates. Paper, \$3.

Klinefelter's Syndrome and the XYY Syndrome. A genetical, endocrinological and psychiatric-psychological study of 33 severely hypogonadal male patients and 2

patients with karyotype 47, XYY. Johannes Nielsen. Munksgaard, Copenhagen, 1969. 354 pp., illus. Paper. *Acta Psychiatrica Scandinavica*, Suppl. 209 (vol. 45, 1969).

A Laboratory Survey of Biology. William A. Cooper and Lawrence S. Dillon. Macmillan, New York; Collier-Macmillan, London, ed. 2, 1969. viii, 296 pp., illus. Paper, \$5.95.

The Lake Winnebago Sauger. Age, Growth, Reproduction, Food Habits and Early Life History. Gordon R. Priegel. Department of Natural Resources, Madison, Wis., 1969. 64 pp., illus. Paper. Technical Bulletin No. 43.

Linear Analysis and Differential Equations. Richard MacCamy and Victor J. Mizel. Macmillan, New York; Collier-Macmillan, London, 1969. xiv, 562 pp., illus. \$11.95. Textbooks in Applied Mathematics.

Magnetic Resonance. Proceedings of an international symposium, Melbourne, August 1969. C. K. Coogan, Norman S. Ham, S. N. Stuart, J. R. Pilbrow, and G. V. H. Wilson, Eds. Plenum, New York, 1970 xii, 386 pp., illus. \$16.

Man: A Remarkable Animal. A Study of Man's Development and Interaction with His Environment. John S. Schweppe. Research and Education Fund, Chicago, 1969. viii, 136 pp., illus. Paper.

Massachusetts Institute of Technology Wavelength Tables. With intensities in arc, spark, or discharge tube of more than 100,000 spectrum lines most strongly emitted by the atomic elements under normal conditions of excitation between 10,000 Å. and 2000 Å. arranged in order of decreasing wavelengths. Measured and compiled under the direction of George R. Harrison. M.I.T. Press, Cambridge, Mass., ed. 2, 190. xxviii, 434 pp. \$25.

Mathematical Methods in Science and Engineering. J. Heading. Elsevier, New York, ed. 2, 1970. xii, 692 pp., illus. \$12.

Medical Sociology. A Selective View. David Mechanic. Free Press, New York; Collier-Macmillan, London, 1968. x, 504 pp. \$9.95.

Mitochondria. Structure and Function. Vol. 17 of the Fifth Meeting of the Federation of European Biochemical Societies, Prague, July 1968. L. Ernster and Z. Drahota, Eds. Academic Press, New York, 1969. viii, 396 pp., illus.

Modern Algebra with Trigonometry. John T. Moore. Macmillan, New York, Collier-Macmillan, London, ed. 2, 1969. xx, 428 pp., illus. \$7.50.

Modern Physics and Antiphysics. Adolph Baker. Addison-Wesley, Reading, Mass., 1970. x, 262 pp., illus. Paper, \$3.95.

Molecular Asymmetry in Biology. Vol. 2. Ronald Bentley. Academic Press, New York, 1970. xvi, 568 pp., illus. \$27.50.

Moon History's Missing Pages Imagined. Glenn J. Potter. Published by the author, 1332 S. Hope St., Los Angeles, 1968. viii, 92 pp. + plates.

Multiple Molecular Forms of Enzymes. A conference, New York, 1966. Elliot S. Vesell, Ed., New York Academy of Sciences, New York, 1968. 692 pp., illus. Paper. *Annals of the New York Academy of Sciences*, vol. 151, art. 1.

The National Executive Branch. An Introduction. James W. Davis, Jr. Free Press, New York; Collier-Macmillan, Lon-



NEW
MODELS
OPEN A
WHOLE
NEW WORLD
IN LASER
VERSATILITY



HADRON/TRG
Model 104 Series
Laser System

You're involved in atmospheric studies, or ballistic research, or chemistry. Maybe you're a medical and biological researcher. Or any one of dozens of other scientific or industrial activities for which you need lasers. Like micro-welding, high speed photography, holography or hole-drilling.

The HADRON/TRG Model 104 series now provides up to twenty-four different basic configurations to meet your requirements today, next year, and for a long time to come. Characteristics include normal mode output to 10 joules, peak power output to 100 megawatts, and repetition rates to 30 ppm. Rugged, simple, modular design is the reason for such unprecedented flexibility and versatility.

Plus the most complete line of accessories you can find in any medium power laser system.

Tell us your laser problem or requirement. We'll come up with the best answer... for you.



800 SHAMES DRIVE, WESTBURY, N.Y. 11590 • 516-334-4402

plenum
PUBLISHING CORPORATION

Announcing . . .

ARCHIVES OF SEXUAL BEHAVIOR

Devoted to current studies in the field of human sexual behavior, this quarterly journal will be the first scientific publication to bring together consistently high-quality papers from the various academic disciplines engaged in sex research today.

The journal will cover such subjects as: the development of masculinity and femininity in children, the etiology of psychosexual psychosis, the therapeutic techniques of the behaviorist and psychoanalytic schools, animal research that bears directly on our understanding of human sexuality, the interrelation of sex hormones and behavior, and case studies of patients with various physiosexual and psychosexual disturbances, frigidity, nymphomania, transvestism, homosexuality, transsexuality, and anatomical intersexuality.

Although the journal emphasizes original research, it will also contain critical review articles and book reviews. Prospective contributors are asked to submit their manuscripts to the editor, Dr. Richard Green. The first volume of four issues will appear in 1971; examination copies will then be available from the publisher.

SUBSCRIPTION RATES:
Volume 1, 1971 (4 issues) \$26.00; Personal subscription \$16.00

ORIGIN AND MECHANISMS OF HALLUCINATIONS

Edited by **Wolfram Keup**, Research Institute, Brooklyn State Hospital, State University of New York, Downstate Medical Center, College of Medicine, Department of Psychiatry, Brooklyn, New York.

This important and timely book is the first systematic presentation of all the knowledge that exists in the origins and mechanisms of hallucinations. The authors examine all possible conditions that might lead to hallucinations: sensory deprivation, chemical effects of psychopharmacological compounds, anatomical brain lesions and endogenous psychoses, REM sleep suppression, and oxygen deficiency.

Proceedings of the 14th Annual Meeting of the Eastern Psychiatric Research Association, held in New York City, November 14-15, 1969
Approx. 470 pages November 1970 \$18.50
SBN 306-30515-1

plenum press/consultants bureau

Divisions of Plenum Publishing Corporation
227 W. 17th ST., NEW YORK, NEW YORK 10011
Circle No. 80 on Readers' Service Card

don, 1970. xii, 228 pp., illus. Cloth, \$7; paper, \$2.95.

Natural Substances Formed Biologically from Mevalonic Acid. Biochemical Society Symposium No. 29, Liverpool, April 1969. T. W. Goodwin, Ed. Academic Press, New York, 1970. viii, 186 pp., illus.

Navajo Political Process. Aubrey W. Williams, Jr. Smithsonian Institution Press, Washington, D.C., 1970 (available from the Superintendent of Documents, Washington, D.C.). xii, 76 pp., illus. + plates. \$3.75.

Neurophysiological and Behavioral Aspects of Psychotropic Drugs. A. G. Karczmar and W. P. Koella, Eds. Thomas, Springfield, Ill., 1969. xviii, 206 pp., illus.

Neutrino Meeting. Geneva, Switzerland, January 1969. J. B. M. Pattison, C. A. Ramm, and W. A. Venus, Eds. CERN, Geneva, 1969. vi, 170 pp., illus. Paper.

New Curriculum Perspectives for Junior High School Science. Paul DeHart Hurd. Wadsworth, Belmont, Calif., 1970. xii, 210 pp. Paper, \$3.25.

Olfaction and Taste. Proceedings of the third international symposium, New York, August 1968. Carl Pfaffmann, Ed. Rockefeller University Press, New York, 1969. xvi, 648 pp., illus. \$23.

The Optimum Population for Britain. Proceedings of a symposium, London, September 1969. L. R. Taylor, Ed. Published for the Institute of Biology by Academic Press, New York, 1970. xxiv, 184 pp., illus. \$5.25.

Organosilicon Heteropolymers and Heterocompounds. S. N. Borisov, M. G. Voronkov, and E. Ya. Lukevits. Translated from the Russian edition (Leningrad, 1966) by C. Nigel Turton and Tatiana I. Turton. Plenum, New York, 1970. xxii, 634 pp., illus. \$40.

The Pathology of Memory. Based on the proceedings of a symposium, Boston, October 1967. George A. Talland and Nancy C. Waugh, Eds. Academic Press, New York, 1969. xx, 292 pp., illus.

Patterns and Principles of Animal Development. John W. Saunders, Jr. Macmillan, New York; Collier-Macmillan, London, 1970. xvi, 288 pp., illus. \$8.95. Macmillan Biology Series.

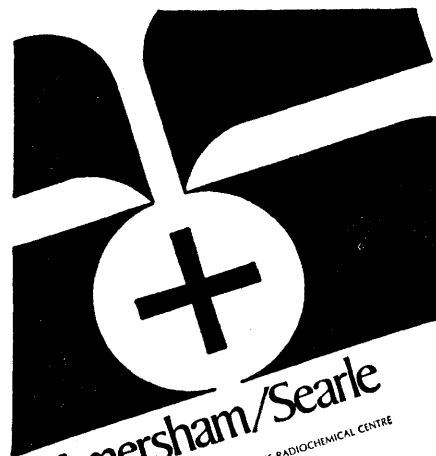
Paul Ehrenfest. Vol. 1, The Making of a Theoretical Physicist. Martin J. Klein. North-Holland, Amsterdam; Elsevier, New York, 1970. xvi, 330 pp. + plates. \$9.50.

Personnel. The Management of People at Work. Dale S. Beach. Macmillan, New York, ed. 2, 1970. xvi, 844 pp. \$10.95.

Philosophers and Kings. Studies in Leadership. Dankwart A. Rustow, Ed. Braziller, New York, 1970. viii, 528 pp. Cloth, \$7.50; paper, \$3.75. Daedalus Library.

Physical Activity and Aging. With special reference to the effect of exercise and training on the natural history of arteriosclerotic heart disease. Proceedings of symposia, Tel Aviv, Israel, October 1966. D. Brunner and E. Jokl, Eds. Karger, Basel, 1970 (U.S. distributor, University Park Press, State College, Pa.). xii, 316 pp., illus. Medicine and Sport, vol. 4.

Physics. Understanding Our Physical Environment. Charles H. Bachman. Borden and Quigley, Croton-on-Hudson, N.Y., 1970. xii, 460 pp., illus. Paper, \$7.95.



Amersham/Searle
AMERSHAM/SEARLE CORPORATION
AN ACTIVITY OF G. D. SEARLE & CO. AND THE RADIOCHEMICAL CENTRE
2636 S. Clearbrook Drive
Arlington Heights, Illinois 60005
Telex: 72-6444
Telephone: (312) 593-6300

TWO BETTER LABELLED INULINS NO KIDNEYING.

Labelled inulin (polyfructosan) is widely used in the determination of glomerular filtration rate and extracellular space.

Amersham/Searle's two new labelled inulins (hydroxymethyl-C14) inulin and inulin-H³ are the only labelled inulins which do not contain any reactive groups other than those in native inulin. They also have very high chemical and radiochemical purities and a known narrow range of molecular weight (~5,000).

(Hydroxymethyl-C14) Inulin

Order No.: CFA-400
Specific Activity: 5-15mCi/mmole
50uCi...\$55 0.1mCi...\$100
0.5mCi...\$375

Order No.: CFA-400P
Specific Activity: 1.5-5mg/ml
(5uCi/ml)
50uCi Vial...\$40 then \$30/50uCi

Inulin-H³

Order No.: TRA-324
Specific Activity: 100-300mCi/mmole
0.25mCi...\$30 1mCi...\$70
5mCi...\$210

Order No.: TRA-324P
Specific Activity: 100-300mCi/mmole
0.1mCi Vial...\$20

OUR SPECIFIC ACTIVITY IS SERVICE

Circle No. 95 on Readers' Service Card

SCIENCE, VOL. 170

Plants and Civilization. Herbert G. Baker. Wadsworth, Belmont, Calif., ed. 2, 1970. xii, 196 pp., illus. Paper.

Post-Pleistocene Man and His Environment on the Northern Plains. Proceedings of the first annual Paleo-Environmental Workshop, Calgary, 1969. University of Calgary Archaeological Association. Students' Press, University of Calgary, Calgary, Alberta, Canada, 1969. iv, 222 pp. Paper.

Progress in Biophysics and Molecular Biology. Vol. 21. J. A. V. Butler and D. Noble, Eds. Pergamon, New York, 1970. vi, 414 pp., illus. \$20.

Propagation of ELF and VLF Waves near the Earth. Yakov L. Al'pert and Dora S. Fligel'. Translated from the Russian edition (Moscow, 1967) by James S. Wood. James R. Wait, Transl. Ed. Consultants Bureau (Plenum), New York, 1970. vi, 174 pp., illus. Paper, \$22.50.

Protein-Nucleic Acid Interaction. A symposium, Gatlinburg, Tenn., March-April 1969. Wistar Institute of Anatomy and Biology, Philadelphia, 1969. viii, 266 pp., illus. Paper.

Psychiatry and the Deaf. A Workshop for Psychiatrists on Extending Mental Health Services to the Deaf, New York, 1967. John D. Rainer and Kenneth Z. Altshuler, Eds. Social and Rehabilitation Service, U.S. Department of Health, Education, and Welfare, Washington, D.C., 1969. xiv, 162 pp., illus.

Public Policy for the Seas. Norman J. Padelford. M.I.T. Press, Cambridge, Mass., 1970. viii, 344 pp. Paper, \$5. Revised edition.

Quantitative Chemical Analysis. I. M. Kolthoff, E. B. Sandell, E. J. Meehan, and Stanley Bruckenstein. Macmillan, New York; Collier-Macmillan, London, ed. 4, 1969. xii, 1202 pp., illus. \$14.95.

Quantum Chemistry. Elementary Principles and Methods. N. V. Riggs. Macmillan, New York; Collier-Macmillan, London, 1969. x, 246 pp., illus. \$9.95.

Radical Man. The Process of Psycho-Social Development. Charles Hampden-Turner. Schenkman, Cambridge, Mass., 1970. xii, 436 pp., illus. Paper, \$4.95.

The Recognition of Systems in Health Services. Proceedings of a symposium, Washington, D.C., May 1969. George K. Chacko, Ed. Health Applications Section, Operations Research Society of America, Arlington, Va., 1969. vii, 416 pp., illus. \$10.

The Recovery of Confidence. John W. Gardner. Norton, New York, 1970. 192 pp. \$5.

Research and Resources of Haiti. A conference, New York, November 1967. Richard P. Schaedel, Ed. Research Institute for the Study of Man, New York, 1969. iv, 624 pp. Paper.

Review of Biochemistry. Nathan H. Sloane and J. Lyndal York. Macmillan, New York; Collier-Macmillan, London, 1969. x, 278 pp., illus. \$9.

Sandpaintings of the Navaho Shooting-way and the Walcott Collection. Leland C. Wyman. Smithsonian Institution Press, Washington, D.C., 1970 (available from the Superintendent of Documents, Washington, D.C.). xvi, 102 pp., illus. + plates. \$3.75. Smithsonian Contributions to Anthropology, No. 13.

One-shot macro with Bausch & Lomb's 35mm

Bausch & Lomb's 35mm Micro/Macro System for Technical Photography saves you time and money. The Canon through-the-lens spot-metering system assures convenient and accurate exposure measurements under all conditions. Most correction calculations have been eliminated. Time and film used in bracketing exposures are saved for more productive work. It surely is a "one shot" operation.

With extension tubes, rings or adjustable bellows you can get down close to your subject for 1:1 same size images on the film. Or, you can back off for an infinite number of magnifications, up to 15X without a microscope.

The right angle viewer makes for convenient observation of the specimen with the camera in the vertical position. For extreme, low-light level conditions there's a Light Meter Amplifier for exposures longer than one second. In effect, this optional attachment amplifies the available light by a factor of sixty-four.

Suggested list prices start at approximately \$500. Compare Bausch & Lomb with other less complete systems. Your checkbook will love you.

There's much more to the story and it's all in our new catalog 42-2326. Write for it and our free demonstration offer. 20934 Bausch Street, Rochester, N. Y. 14602



BAUSCH & LOMB 
SCIENTIFIC INSTRUMENT DIVISION

We make the hum-drum drum hum.

We take a rotating cylinder to the frontiers of science. And go to the depths of your problem.

With the Scandig®. Our high-speed digital scanning microdensitometer.

It converts pictorial information to digital information. And transmits it to magnetic tape. Or transfers the data in real-time to your computer.

The Scandig is extremely accurate. Optical density can be measured through 256 levels. With a resolution of 0.012D. In reflection or transmission modes.

It is versatile and repeatable. Work in X-ray crystallography, cytology, electron microscopy and an entire range of industrial applications.

Our literature, like the instrument, repeats this story in greater detail. And explains our other Image Analysis Instruments as well. Write for your copy. Dept. K-2, Tech/Ops Instruments, Northwest Industrial Park, Burlington, Mass. 01803. Tel. (617) 272-2000. In Europe contact our subsidiary Joyce, Loebel & Co. Ltd., Gateshead, England NE11 0UJ.



TECH/OPS INSTRUMENTS



Circle No. 26 on Readers' Service Card

Schering Workshop on Pharmacokinetics. Berlin, May 1969. Gerhard Raspé, Ed. Pergamon, New York; Vieweg, Braunschweig, 1970. viii, 288 pp., illus. \$11.50. *Advances in the Biosciences*, vol. 5.

Science in Elementary Education. Peter C. Gega. Wiley, New York, ed. 2, 1970. xiv, 634 pp., illus.

Science Looks at Itself. Compiled and edited by National Science Teachers Association. Scribner, New York, 1970. xviii, 126 pp. \$5.95.

The Science of Genetics. An Introduction to Heredity. George W. Burns. Macmillan, New York; Collier-Macmillan, London, 1969. xii, 404 pp., illus. \$8.95. Macmillan Biology Series.

The Scientific Study of Religion. J. Milton Yinger. Macmillan, New York; Collier-Macmillan, London, 1970. x, 596 pp., illus. \$8.95.

Second-Order Consequences. A Methodological Essay on the Impact of Technology. Raymond A. Bauer, with Richard S. Rosenbloom and Laure Sharp. M.I.T. Press, Cambridge, Mass., 1969. xiv, 242 pp. Technology, Space, and Society.

Serendipity in St. Helena. A Genetical and Medical Study of an Isolated Community. Ian Shine, with the assistance of Reynold Gold. Pergamon, New York, 1970. xvi, 188 pp., illus. + plates, \$10.

Significance of Forest Openings to Deer in Northern Wisconsin. Keith R. McCaffery and William A. Creed. Department of Natural Resources, Madison, Wis., 1969. 104 pp., illus. Paper.

Silicone Technology. Papers prepared for seminars, Brooklyn, February 1969. Paul F. Bruins, Ed. Interscience (Wiley), New York, 1970. viii, 158 pp., illus. Paper, \$8. *Applied Polymer Symposia*, No. 14.

Statistical Reasoning in Psychology and Education. Edward W. Minium. Wiley, New York, 1970. xxii, 466 pp., illus. \$9.95.

Simsoc. Simulated Society Participant's Manual with Selected Readings. William A. Gamson. Free Press, New York; Collier-Macmillan, London, 1969. vi, 154 pp. Paper.

SIPRI Yearbook of World Armaments and Disarmament 1968/69. Almqvist and Wiksell, Stockholm; Humanities Press, New York; Duckworth, London, 1969. 440 pp., illus. Paper.

Social Stratification in Africa. Arthur Tuden and Leonard Plotnicov, Eds. Free Press, New York; Collier-Macmillan, London, 1970. viii, 392 pp. \$10.

The Sociology of the Possible. Richard Ofshe, Ed. Prentice-Hall, Englewood Cliffs, N.J., 1970. xviii, 398 pp. Cloth, \$8.50; paper, \$4.95. Prentice-Hall Sociology Series.

Space Research IX. Proceedings of open meetings of working groups of the 11th plenary meeting of COSPAR (the Committee on Space Research), Tokyo, May 1968. K. S. W. Champion, P. A. Smith, and R. L. Smith-Rose, Eds. North-Holland, Amsterdam, 1969 (U.S. distributor, Wiley, New York). xx, 772 pp., illus.

Speech-Communication. Theory and Models. Raymond G. Smith. Harper and Row, New York, 1970. xx, 236 pp., illus.

Statistical View of the United States. Embracing its territory, population—white,

SCIENCE, VOL. 170

free colored, and slave—moral and social condition, industry, property, and revenue; the detailed statistics of cities, towns and counties; being a compendium of the seventh census to which are added the results of every previous census, beginning with 1970, in comparative tables, with explanatory and illustrative notes, based upon the schedules and other official sources of information. J. D. B. DeBow. Gordon and Breach, New York, 1970. viii, 400 pp. \$19.50. Demographic Monographs, vol. 5.

Stellar Spectroscopy. Normal Stars. Margherita Hack and Otto Struve. Osservatorio Astronomico di Trieste, Trieste, 1969. iv, 204 pp., illus.

Stone Implements from Northwestern Corfu, Greece. Augustus Sordinas. Memphis State University Anthropological Research Center, Memphis, Tenn., 1970. vi, 41 pp. + plates. Paper, \$1.50. Occasional Papers, No. 4.

The Stress Analysis of Pressure Vessels and Pressure Vessel Components. S. S. Gill, Ed. Pergamon, New York, 1970. x, 594 pp., illus. \$27. International Series of Monographs in Mechanical Engineering, vol. 3.

Structural Analysis—Influence Coefficient Method. Radha Kanta Sarkar. MUKO, Munich, 1970. xxiv, 392 pp., illus. Paper.

Structure and Properties of Inorganic Solids. Francis S. Galasso. Illustrated by W. Darby. Pergamon, New York, 1970. x, 296 pp. \$13.50. International Series of Monographs in Solid State Physics, vol. 7.

Student Violence. Edward Bloomberg. Public Affairs Press, Washington, D.C., 1970. iv, 92 pp. \$3.25.

Symposia Mathematica. Vol. 2. March–May 1968. Published by Istituto Nazionale di Alta Matematica, Rome. Academic Press, New York, 1969. viii, 410 pp. 133s.

Symposium on Chromosome Mechanics at the Molecular Level. Given at the Research Conference for Biology and Medicine of the Atomic Energy Commission, Gatlinburg, Tenn., April 1967. Wistar Institute of Anatomy and Biology, Philadelphia, 1967. viii, 232 pp., illus. Paper. Reprinted from *Journal of Cellular Physiology*, vol. 70, Suppl. 1, October 1967.

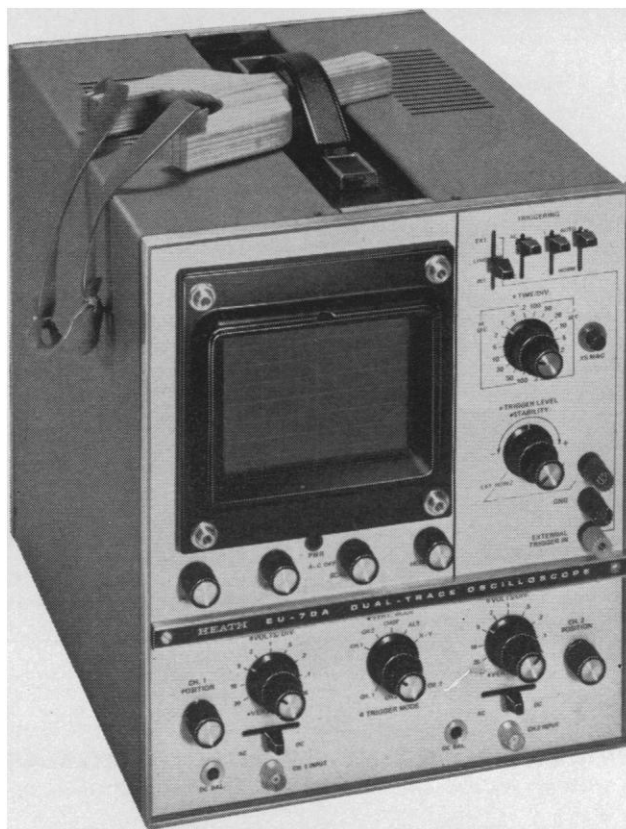
A Synonymic Catalogue of the Genera of Phycitinae (Lepidoptera Pyralidae) of the World. Paul Ernest Sutton Whalley. Trustees of the British Museum (Natural History), London, 1970. Paper, £1.25. Entomological Series of the Bulletin of the British Museum, vol. 25, No. 2, pp. 31–72.

The Synthesis and Characterization of Inorganic Compounds. William L. Jolly. Prentice-Hall, Englewood Cliffs, N.J., 1970. xiv, 594 pp., illus. \$15.95. Prentice-Hall International Series in Chemistry.

Teaching and Learning. An Introduction to New Methods and Resources in Higher Education. Norman MacKenzie, Michael Eraut and Hywel C. Jones. UNESCO and the International Association of Universities, Paris, 1970. 210 pp., illus. Paper, \$3.50.

Technopolis. Social Control of the Uses of Science. Nigel Calder. Simon and Schuster, New York, 1970. viii, 376 pp., illus. \$7.50.

the Giant Killer...



New Heath EU-70A...

\$565.00*

ASSEMBLED & TESTED

- Solid-state
- Dual trace
- Triggered
- DC-15 MHz
- X-Y
- 15" deep
- 8x10 cm flat face CRT
- Send for the free EU-70A spec sheet... and watch the giants fall

EU-70A PARTIAL SPECIFICATIONS: Frequency Response: DC-15 MHz, down 3 dB. Rise Time: 24 nsec. Time Base: Triggered with 18 calibrated rates, 0.2 usec/div to 100 msec/div in 1, 2, 5 sequence. Sweep Magnifier: X5, accuracy $\pm 5\%$. Triggering: Internal – Channel 1; Channel 2; Channels 1 / 2. External. Line. Adjustable. + or – slope. AC or DC coupled. Triggering Requirements: Internal – triggers from Channel 1, Channel 2 or Channels 1 / 2 X-Y mode capability. 8x10 cm grid, edge lighted. Dimensions: 10½" W x 12½" H x 15" D.

NEW FREE 1971 CATALOG!



The latest edition, with many new, exciting kit-building projects... over 300 kits for stereo/hi-fi, color TV, electronic organs, guitar amplifiers, ham radio, marine, educational, CB, home & hobby. Mail coupon or write Heath Company, Benton Harbor, Michigan 49022.

HEATH COMPANY, Dept. 520-19
Benton Harbor, Michigan 49022



a Schlumberger Company

Rush my new Heathkit Catalog

Enclosed is \$ _____, plus shipping.

Please send model(s) _____

Name _____

Address _____

City _____

State _____

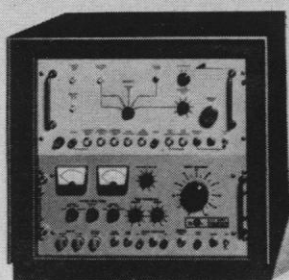
Zip _____

Prices & specifications subject to change without notice.

*Mail Order Prices; F.O.B. Factory

EK-290

AVCO LASERS



C-950 PULSED GAS LASER SYSTEM

\$9800.00

C-950 UV LASER Features

- UV output at 337.1 nm. Visible at 540.1 nm
 - Pumps dyes efficiently and easily
 - Pulsed operation, repetition rates up to 100 pps
 - High peak power, 100 kW at 337.1 nm.
 - Stable operation
 - Warranted performance and life
 - Most reliable laser in its class
- For details, circle reader's service number 85.

A laser for interferometry

- Visible output at 540.1 nm with enough energy to expose film in a single pulse
 - Pulsed operation — 3 nanosecond pulse width
 - 30 cm coherence length
- For details, circle reader's service number 87.

Dial-a-Line Tuneable Wavelength Laser

- Sealed cells, no cooling or flowing of dyes
 - Simple, fast dye cell replacement without mirror changes
 - Low operating and maintenance costs
 - Laser pumped — no flashlamp replacement
 - Warranted performance and life
- For details, circle reader's service number 86.

A laser for micromachining

- Can produce slots less than 200 micro-inches in width
 - Can machine most materials
 - Pulsed operation, high repetition rates
 - High peak power
 - Near Diffraction limited UV output
 - Test facility available
- For details, circle reader's service number 87

Write today for complete details or call collect (617) 389-3000 and ask for Dick Neal.



EVERETT RESEARCH LABORATORY

2385 REVERE BEACH PARKWAY · EVERETT, MASSACHUSETTS 02149

INSTANT CLEAN!

clean glassware,
pipettes and mechanisms
thoroughly
in just a few
seconds

sonic 5x5 \$55.00



HEAT SYSTEMS-ULTRASONICS, Inc.
38 EAST MALL, PLAINVIEW, NEW YORK 11803
516/694-9555

Circle No. 126 on Readers' Service Card

374

DISPERSE DISINTEGRATE HOMOGENIZE WITH ONE QUICK BZZZT!

SONIFIER® CELL DISRUPTOR

R. T. Branson Instruments



27 attachments available
for critical problems
MODEL 140E — \$880
TOTAL WEIGHT — 23 lbs.

HEAT SYSTEMS-ULTRASONICS, Inc.
38 EAST MALL, PLAINVIEW, NEW YORK 11803

516/694-9555

Circle No. 127 on Readers' Service Card

Topics in Mathematical Geology. M. A. Romanova and O. V. Sarmanov, Eds. Translated from the Russian edition (Leningrad, 1968) by J. P. Fitzsimmons. Consultants Bureau, New York, 1970. viii, 282 pp., illus. \$37.50.

Toward Reduction of Losses from Earthquakes. Conclusions from the Great Alaska Earthquake of 1964. Committee on the Alaska Earthquake, National Research Council. National Academy of Sciences, Washington, D.C., 1969. vi, 34 pp., illus. Paper.

Toward Unification in Psychology. The First Banff Conference on Theoretical Psychology, Alberta, Canada, April 1965. Joseph R. Royce, Ed. University of Toronto Press, Toronto, 1970, in cooperation with the Center for Advanced Study in Theoretical Psychology, University of Alberta. vi, 310 pp., illus. \$12.50.

Undergraduate Education in Environmental Studies. A conference, Hanover, N.H., November 1969. William A. Reiners and Frank Smallwood, Eds. Public Affairs Center and Dartmouth Bicentennial Year Committee, Dartmouth College, Hanover, 1970. 100 pp. Paper, \$2.50.

Undersea Vehicles and Habitats. The Peaceful Uses of the Ocean. Frank Ross, Jr. Crowell, New York, 1970. viii, 184 pp., illus. \$4.95.

Using Technical Art. An Industry Guide. George A. Magnan. Wiley-Interscience, New York, 1970. xvi, 238 pp., illus. \$9.95. Wiley Series on Human Communication.

Vector Analysis. L. Marder. Elsevier, New York, 1970. 168 pp., illus. \$7.50. Modern Studies in Physics and Applied Mathematics, No. 3.

The Vertebrate Fauna of the Selma Formation of Alabama. Part 7, The Mosasaurs. Dale A. Russell. Field Museum of Natural History, Chicago, 1970. Illus. Paper. Fieldiana: Geology Memoirs, vol. 3, No. 7, pp. 365-434.

Viscoelastic Properties of Polymers. John D. Ferry. Wiley, New York, ed. 2, 1970. xxiv, 672 pp., illus. \$29.95.

What Darwin Really Said. Benjamin Farrington. Schocken, New York, 1970. 124 pp. Paper, \$1.75. What They Really Said Series. Reprint of the 1966 edition.

Winckelmann. Wolfgang Leppmann. Knopf, New York, 1970. xxii, 328 pp. + plates. \$10.

The Wykeham Science Series for Schools and Universities. Nevill Mott and G. R. Noakes, Eds. Vol. 1, Elementary Science of Metals. J. W. Martin. xii, 136 pp., illus. Vol. 2, Neutron Physics. G. E. Bacon. xii, 144 pp., illus. Vol. 3, Essentials of Meteorology. D. H. McIntosh and A. S. Thom. xvi, 240 pp., illus. Vol. 4, Nuclear Fusion. H. R. Hulme. A. McB. Colliou, Schoolmaster Author. viii, 156 pp., illus. Vol. 5, Water Waves. N. F. Barber, assisted by G. Ghey. viii, 144 pp., illus. Vol. 6, Gravity and the Earth. A. H. Cook, xii, 96 pp., illus. Vol. 7, Relativity and High Energy Physics. W. G. V. Rossler. R. K. McCulloch, Schoolmaster Author. xii, 148 pp., illus. Paper, \$2.80 each. Vol. 9, Introduction to Polymer Science. L. R. G. Treloar. viii, 184 pp., illus. Paper, 30s. Wykeham, London, 1969 (U.S. distributor, Springer-Verlag, New York).

SCIENCE, VOL. 170