

# SCIENCE

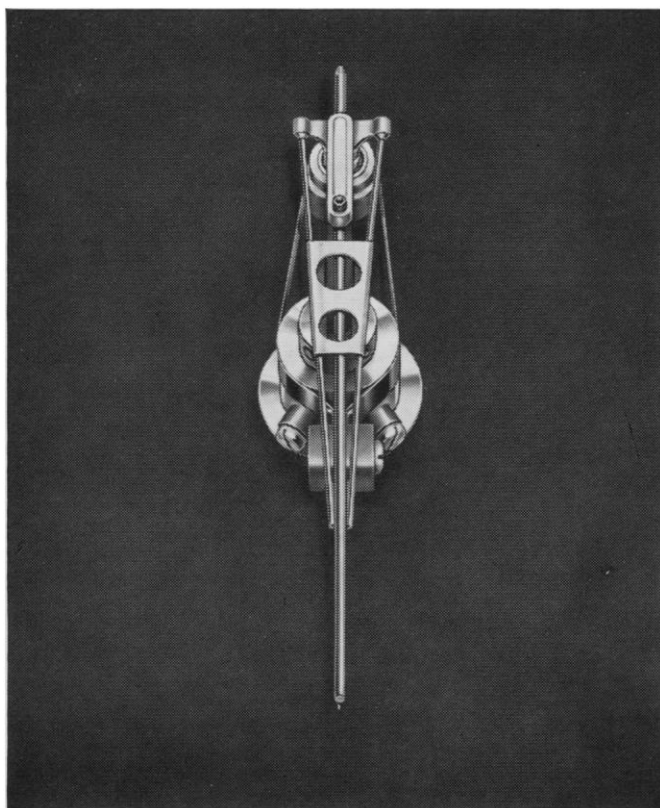
8 May 1964  
Vol. 144, No. 3619

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

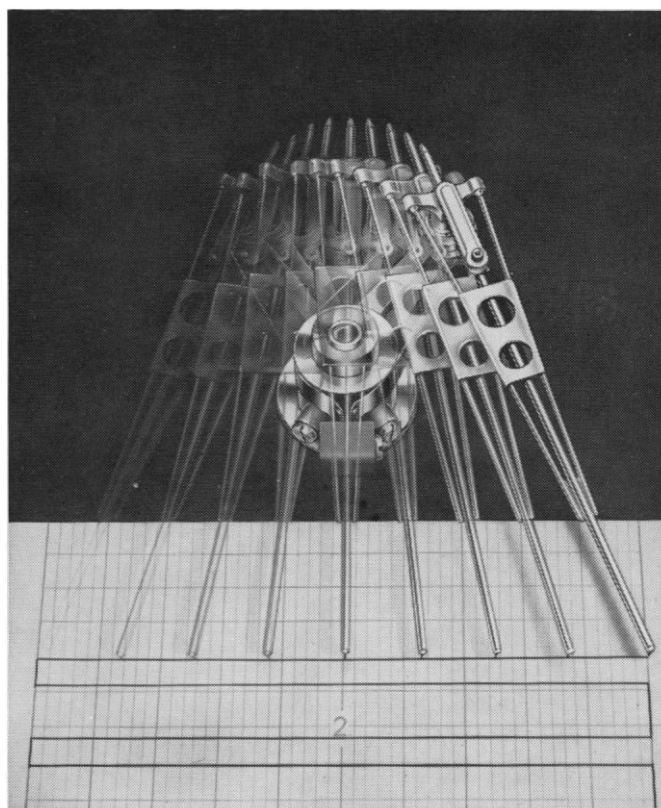


EROSION PATTERN

Book Issue



This is a ***brush***  
Magnetic Pen Recorder,  
Rotary-to-Linear  
Mechanism.



It goes in circles  
to draw a  
straight line to  
**0.1% ACCURACY!**

(modern oscillography will never be the same)

This unique pen-linkage is one of several innovations that change some notions about direct writing recorders. It's one of the reasons why no other recorder can approach the new portable Mark 280. Nowhere else can you find such perfect rectilinear traces—so uniform and crisp that you cannot misjudge what you see. Recording channels are *80 millimeters* wide . . . not the usual 40. Yet speed of response is not sacrificed . . . as high as 200 cps at useable amplitude and better than 30 cps full scale. In effect, resolution is *doubled*. And, it's all done with a system accuracy of  $\frac{1}{2}\%$ ! There's more. The pen position is constantly "policed" by a Brush super-sensor that provides instant self-correction with no mechanical gadgets involved. Add a pressurized ink system that completely eliminates spatter or smear . . . and you'll understand why modern oscillography will never be the same. It's all in a package only  $10\frac{1}{2}''$  x  $18\frac{3}{4}''$  x  $11\frac{1}{2}''$ . Your letterhead request will bring you the complete story.



***brush*** INSTRUMENTS  
DIVISION OF CLEVITE 37TH AND PERKINS, CLEVELAND 14, OHIO

# NEW PURITY STANDARDS

*two important biochemicals for clinical determination*

## BILIRUBIN

Serum Bilirubin determinations in infants suffering from erythroblastosis fetalis have proved an important criteria for the use of exchange transfusions. The accuracy of this measurement has always been open to question because of uncertainty about the purity of bilirubin (1).

Our specifications for Bilirubin are:

- (1) Millimolar extinction coefficient of  $60.1 \pm 0.2$  in Chloroform at 453 mu.
- (2) Complete and rapid solubility at room temperature (for concentration of 6mg/100ml.) in chloroform or 0.2% solution of  $\text{Na}_2\text{CO}_3$ .

The problem of finding an accurate method for bilirubin determination has occupied clinical chemists for 50 years. For determinations of new-born plasma, the most useful procedure is the Lathe and Rutheven (2) modification of the Malloy-Evelyn method (3). Stoner and Weisberg have recently reported an excellent micro-method for bilirubin (4).

For accurate determinations of low values of bilirubin, methods of choice are those of Bruckner (5) and Jendrassik and Grof (6). The methods of Meites and Hogg (7), and Powell (8) have the advantage of rapidity and involve few manipulative steps for the laboratory that does not have access to specialized equipment.

### PRICE SCHEDULE:

5 gram bottle . . . . .	gm.	\$14.90
1 gram bottle . . . . .	gm.	17.90
500 mg. bottle . . . . .	btl.	10.90

**References:** (1) R. J. Henry, S. L. Jacobs, N. Chiamori, Clin. Chem. 6, 529, (1960). (2) G. H. Lathe and C. R. J. Rutheven, J. Clin. Pathol. 11, 155, (1958). (3) H. T. Malloy, and K. A. Evelyn, J. Biol. Chem. 119, 481, (1958). (4) R. E. Stoner and H. F. Weisberg, Clin. Chem. 3, 22, (1957). (5) J. Bruckner, Am. J. Clin. Path. 32, 513, (1957). (6) L. Jendrassik and P. Grof, Biochem. Z. 297, 81, (1938). (7) S. Meites and C. F. Hogg, Clin. Chem. 5, 470, (1959). (8) W. N. Powell, Am. J. Clin. Path. Tech. Sect. 8, 55, (1944).

**PHONE COLLECT, 216-662-0212.**  
**NUTRITIONAL BIOCHEMICALS CORP.**  
**GUARANTEES SHIPMENT WITHIN 60**  
**MINUTES OF YOUR CALL. ONE DAY DELIV-**  
**ERY ANYWHERE IN CONTINENTAL U.S.A.**

## CHOLESTEROL S.C.W.

Cholesterol S.C.W. (standard for clinical work) was developed in our laboratories by the intensive purification of Cholesterol U.S.P. to fill the need for a reliable, pure clinical standard.

Our specifications for Cholesterol S.C.W. are: Molar absorptivity values, Lieberman-Buchard method:  $1750 \pm 30$ , Sulphuric Acid iron method:  $11,500 \pm 100$ . To the best of our knowledge, this is the first time that cholesterol of this purity has been available commercially.

When Cholesterol U.S.P. is used as a standard an error of approximately 6% in concentration is introduced, and can run as high as 14% in molar absorptivity. This depends upon the amount of such impurities as cholestanol cholest-7-en-3-beta ol, and 7 dehydrocholesterol that are contained in the cholesterol.

### PRICE SCHEDULE:

100 grams . . . . .	gm.	\$.80
25 grams . . . . .	gm.	.90
5 grams . . . . .	gm.	.95

**References:** (1) J. J. Carr and I. J. Drekter, Clin. Chem. 2, 353, (1956). (2) H. L. Rosenthal, M. L. Pfluke, S. Buscaglia, J. Lab. & Clin. Med. 50, 318, (1957). H. L. Rosenthal, L. Jud, Ibid. 51, 143, (1958).

THE LITERATURE REFERENCES SHOULD NOT BE INTERPRETED AS EITHER AN ENDORSEMENT OR DISAPPROVAL OF THE BIOCHEMICAL BY THE CITED INVESTIGATOR.

## NUTRITIONAL BIOCHEMICALS CORPORATION



21010 Miles Avenue • Cleveland, Ohio 44128

Send for free May 1964 catalog containing more than 3,000 items. Fill out coupon and mail today for your copy.

Name \_\_\_\_\_  
 Organization \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_  
 State \_\_\_\_\_ Zip No. \_\_\_\_\_



# SCIENCE

<b>LETTERS</b>	Life on Other Planets: <i>J. Pfeiffer, H. F. Blum, M. F. Halasz, L. Ornstein, G. G. Simpson</i> ; Boycott: <i>D. N. Baron</i> ; South African Attitude: <i>H. W. Hofstetter</i> ; Information Programs about Environmental Contamination: <i>E. L. Tatum</i> ; Japanese Names: <i>H. B. Hamilton</i> .....	613
<b>EDITORIAL</b>	For Better Schools .....	619
<b>ARTICLES</b>	Mechanical Translation and Related Language Research: <i>R. See</i> .....	621
	Automatic Information Processing in Western Europe: <i>G. Salton</i> .....	626
	Scientific Publishing: <i>T. Crowder</i> .....	633
	Malpractice and the Clinical Laboratory: <i>D. H. Mills</i> .....	638
	Curriculum Reform: <i>J. Walsh</i> .....	642
	The Information Explosion—Real or Imaginary?: <i>J. C. Green</i> .....	646
	"Science Citation Index"—A New Dimension in Indexing: <i>E. Garfield</i> .....	649
	Ethics of Scientific Publication: <i>D. J. de Solla Price</i> .....	654
<b>NEWS AND COMMENT</b>	San Diego—New University; Nuclear Stockpile—How It Grew .....	658
<b>BOOK REVIEWS</b>	General	
	On Recruiting Federal Officials: <i>J. J. Corson</i> .....	663
	A Great Encyclopedia Doesn't Have To Be Good?: <i>D. J. de Solla Price</i> .....	665
	Form or Substance: A Matter of Precedence: <i>M. Kranzberg</i> .....	666
	Reviews by <i>F. M. Earle, I. DeVore, P. C. Fraley, J. H. Thompson, N. J. G. Pounds, M. Graubard, W. A. D. Jackson, C. W. Gartlein, P. M. Kier</i> .....	667

## BOARD OF DIRECTORS

ALAN T. WATERMAN,  
Retiring President, Chairman

LAURENCE M. GOULD,  
President

HENRY EYRING,  
President Elect

JOHN W. GARDNER,  
H. BENTLEY GLASS

DAVID R. GODDARD,  
DON K. PRICE

## VICE PRESIDENTS AND SECTION SECRETARIES

MATHEMATICS (A)  
R. W. Hamming  
Wallace Givens

PHYSICS (B)  
Ralph A. Sawyer  
Stanley S. Ballard

CHEMISTRY (C)  
Roland Rivest  
S. L. Meisel

ASTRONOMY (D)  
Walter Orr Roberts  
Frank Bradshaw Wood

ANTHROPOLOGY (H)  
Anthony F. C. Wallace  
Eleanor Leacock

PSYCHOLOGY (I)  
Lorrin A. Riggs  
Frank W. Finger

SOCIAL AND ECONOMIC SCIENCES (K)  
Harold D. Lasswell  
Ithiel de Sola Pool

HISTORY AND PHILOSOPHY OF SCIENCE (J)  
John Murdoch  
N. Russell Hanson

PHARMACEUTICAL SCIENCES (Np)  
Lee H. Macdonald  
Joseph P. Buckley

AGRICULTURE (O)  
Edward F. Knipling  
Howard B. Sprague

INDUSTRIAL SCIENCE (P)  
Allen T. Bonnell

EDUCATION (Q)  
Herbert S. Conrad  
Frederic B. D. ...

## DIVISIONS

ALASKA DIVISION  
Charles J. Eagan  
President

George Dahlgren  
Executive Secretary

PACIFIC DIVISION  
Phil E. Church  
President

Robert C. Miller  
Secretary

SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION  
Edwin R. Helwig  
President

Marlowe G. Anderson  
Executive Secretary

SCIENCE is published weekly by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with Scientific Monthly. Second-class postage paid at Washington, D.C. Copyright © 1964 by the American Association for the Advancement of Science. Annual subscription: \$9.50; foreign postage, \$1.50; Canadian postage, 75¢; single copies, 35¢. School year subscriptions: 9 months, \$7; 10 months, \$7.50. Provide 4 weeks' notice for change of address, giving new and old address and zip numbers. Send a recent address label. SCIENCE is indexed in the Reader's Guide to Periodical Literature.



# AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

## Economics and the Social Sciences

On the Origins of the Neolithic Revolution: <i>R. H. Dyson, Jr.</i> .....	672
Soviet Propaganda: Its Techniques, Doctrines, and Practices: <i>D. Lerner</i> .....	675
International Order and the Dispersion of Nuclear Weapons: <i>H. Bull</i> .....	677
But What Are the Behavioral Sciences?: <i>J. L. Kennedy</i> .....	683
Reviews by <i>L. C. Briggs, A. F. C. Wallace, R. Singer, M. Deutsch,</i> <i>H. Alpert, D. R. Kaldor, E. R. Wolf, M. M. Flood</i> .....	684

## Mathematics, Physical Sciences, and Engineering

Momentum Books, an Appropriate Interface: <i>L. M. Rieser</i> .....	691
Reviews by <i>L. Dahl, A. Pabst, J. Dyer-Bennet, H. H. Schmid, F. Birch,</i> <i>A. J. Bard, W. A. Struck, R. P. Boas, Jr., E. Chinoporos, A. O. Barut,</i> <i>G. C. McVittie, E. W. Berry, E. L. Hill, B. McKee, W. R. Brode,</i> <i>S. O. Schlanger, P. E. Cloud, Jr., A. Weissberger, E. R. Van Artsdalen,</i> <i>J. G. Kay, P. Goldhammer, H. F. Walton, D. J. Dessart, M. Chodorow,</i> <i>K. B. Wiberg, D. M. Hunten, K. J. Laidler, J. E. McDonald,</i> <i>W. C. Fernelius</i> .....	692

## Biological and Medical Sciences

Biogeography of Half the World: <i>P. J. Darlington, Jr.</i> .....	708
Reviews by <i>E. L. Simons, W. D. Hartman, G. G. Simpson, R. D. Alexander,</i> <i>H. E. Wright, Jr., H. Setzer, W. Knülle, A. J. Kohn, F. S. MacNeil,</i> <i>H. N. Wood, G. Moment, J. W. Durham, N. T. Mirov, J. Gray,</i> <i>F. A. Pitelka, L. Benson, B. G. Chitwood, A. Peterson, J. E. Foster,</i> <i>G. S. Pound</i> .....	709

## History of Science

Reviews by <i>R. Pipes, A. M. Bork, C. Zirkle, J. B. Blake, C. B. Boyer,</i> <i>S. A. Bedini, B. R. Queneau</i> .....	723
--	-----

<b>MEETINGS</b>	Behavioral Pharmacology: <i>B. Weiss</i> ; Carbon-14 in Clinical Research: <i>G. V. LeRoy</i> ; Forthcoming Events .....	730
-----------------	---	-----

<b>DEPARTMENTS</b>	New Products .....	759
--------------------	--------------------	-----

PAUL REES TER ORR ROBERTS	ATHELSTAN F. SPILHAUS H. BURR STEINBACH	PAUL E. KLOPSTEG Treasurer	DAEL WOLFLE Executive Officer
LOGY AND GEOGRAPHY (E) for Lloyd ard H. Mahard	ZOOLOGICAL SCIENCES (F) Arthur D. Hasler David W. Bishop	BOTANICAL SCIENCES (G) Harriet B. Creighton Warren H. Wagner	
INEERING (M) ries F. Savage y K. Wheelock	MEDICAL SCIENCES (N) James Ebert Oscar Touster	DENTISTRY (Nd) James A. English S. J. Kreshover	
INFORMATION AND COMMUNICATION (T) Wallace R. Brode Phyllis V. Parkins	STATISTICS (U) Morris B. Ullman		

## COVER

Effects of erosion on horizontal sedimentary strata in an arid region near Marble Canyon, Arizona. The outcropping edges of the more resistant strata simulate contour lines (see review of *Geology*, page 700). [William Garnett]

American Association for the Advancement of Science was founded in 1848 and incorporated in 1849. Its objects are to further the work of scientists, to facilitate cooperation among them, to prove 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.



---

A Selection of Wiley and Interscience  
Books for Lab, Library, Desk and Study

---

New Science Editions Paperbacks

**THE AUTHORITARIAN PERSONALITY**

By T. W. ADORNO, E. FRENKEL-BRUNSWIK,  
D. J. LEVINSON, and R. N. SANFORD. In two  
parts. *Each volume:* \$2.25.

**CYBERNETICS AND MANAGEMENT**

By STAFFORD BEER. \$1.65.

**THE STORY OF FABIAN SOCIALISM**

By MARGARET COLE. \$1.95.

**UNDERSTANDING MINORITY GROUPS**

Edited by JOSEPH B. GITTLER. \$1.45.

**EVOLUTION: The Modern Synthesis**

By JULIAN HUXLEY. \$2.65.

**SUPERVISORY AND EXECUTIVE  
DEVELOPMENT**

**A Manual for Role Playing**

By N. F. MAIER, A. R. SOLEM, and A. A.  
MAIER. \$1.95.

**THE LANGUAGE OF PSYCHOLOGY**

By GEORGE MANDLER and WILLIAM KES-  
SEN. \$1.95.

**PARENTHOOD AND HEREDITY**

By SHELDON REED. \$1.65.

**MANAGEMENT AND THE WORKER**

By F. J. ROETHLISBERGER and W. J. DICK-  
SON. \$2.65.

**PHYSICS IN THE SIXTIES**

Edited by S. K. RUNCORN. \$1.45.

**OPINIONS AND PERSONALITY**

By M. B. SMITH, J. S. BRUNER, and R. W.  
WHITE. \$2.45.

**THE DEVELOPMENT OF ECONOMIC THOUGHT**

Edited by HENRY WILLIAM SPIEGEL. \$2.45.

**THEORY OF GAMES AND  
ECONOMIC BEHAVIOR**

By JOHN VON NEUMANN and OSKAR MOR-  
GENSTERN. \$2.95.

**FREE AND UNEQUAL**

By ROGER J. WILLIAMS. \$1.65.

Three Distinguished INTERSCIENCE Journals in the Field of Polymer Science

**JOURNAL OF POLYMER SCIENCE**

*Editorial Board:* R. M. FUOSS; J. J. HERMANS;  
H. MARK; H. W. MELVILLE; C. G. OVER-  
BERGER; and G. SMETS. This internationally  
recognized journal is now available in three parts:  
Part A: General Papers (issued monthly); Part B:  
Polymer Letter (issued monthly); Part C: Poly-  
mer Symposia (issued irregularly). Thus, each sub-  
scriber is able to concentrate on the particular area of  
polymer science in which he is most interested.  
Among the Polymer Symposia available to subscrib-  
ers in 1964 are RHEO-OPTICS OF POLYMERS.  
*Edited by* RICHARD S. STEIN, *Director, Polymer  
Research Institute.* THERMAL ANALYSIS OF  
HIGH POLYMERS. *Edited by* BACON KE, C. F.  
*Kettering Research Laboratory, Yellow Springs,  
Ohio.* CONFERENCE ON THE VIBRATIONAL  
SPECTRA OF HIGH POLYMERS. *Edited by* GIU-  
LIO NATTA and G. ZERBI. Subscription for calen-  
dar year 1964: \$225.00. Foreign postage: \$5.00. Back  
volumes (1946-1963): Prices on request.

**JOURNAL OF APPLIED POLYMER SCIENCE**

*Editorial Board:* L. BATEMAN; J. H. DILLON;  
N. G. GAYLORD; J. LE BRAS; H. MARK; M.  
MORTON; and F. PATAT. A bi-monthly publica-  
tion, the *Journal of Applied Polymer Science* is a  
convenient, comprehensive source of information on  
industrial polymer research. Complete, up-to-date  
coverage of progress in the systematic practical ap-  
plication of polymer science is maintained. Subscrip-  
tion for calendar year 1964 (1 volume): \$85.00.  
Foreign postage: \$2.00. Back volumes: Prices on  
request.

**BIOPOLYMERS**

*Editorial Board:* E. R. BLOUT; M. CALVIN; M.  
GOODMAN; E. KATCHALSKI; H. MARK; M.  
NIRENBERG; L. PAULING; and A. RICH. Pre-  
sents high-quality original research on biopolymers.  
Subscription includes Biopolymers Symposium #1  
—the complete Stanford University Symposium on  
Quantum Aspects of Polypeptides and Polynucleo-  
tides—will be included in the 1964 subscription  
price. Subscription for calendar year 1964: \$36.00.  
Foreign postage: \$1.00.

Send for on-approval copies.

**JOHN WILEY & SONS, Inc., 605 Third Avenue, New York, N.Y., 10016**



---

**A Selection of Wiley and Interscience  
Books for Lab, Library, Desk and Study**

---

**COLLISION PHENOMENA IN IONIZED GASES**

By EARL W. McDANIEL, *Georgia Institute of Technology, and Consultant, Oak Ridge National Laboratory*. A self-contained text that combines a thorough discussion of the fundamentals of atomic collision with transport theory and gaseous electronics. 1964. Approx. 712 pages. \$17.50.

**THE SYSTEMATIC IDENTIFICATION OF  
ORGANIC COMPOUNDS**

**A Laboratory Manual—Fifth Edition**

By RALPH L. SHRINER, *Editor, Chemical Reviews*; REYNOLD C. FUSON, *Professor Emeritus, The University of Illinois, Urbana, Ill.*; and DAVID Y. CURTIN, *The University of Illinois, Urbana, Ill.* Emphasizes the correlation of experimental observation in the laboratory with molecular structures. 1964. Approx. 432 pages. Prob. \$7.95.

**THE STRUCTURE OF ATMOSPHERIC TURBULENCE**

By JOHN L. LUMLEY and HANS A. PANOFSKY, *both of The Pennsylvania State University*. Surveys and interprets turbulence dynamics, descriptive techniques, and experimental information from the atmosphere. Volume 12 in the Interscience Monographs in Physics and Astronomy. 1964. 239 pages. \$9.50.

**ATLAS OF OUTLINE DRAWINGS FOR  
VERTEBRATE ANATOMY**

**Third Edition**

By SAMUEL EDDY, *University of Minnesota*; C. P. OLIVER; and the late JOHN P. TURNER. An atlas of unlabelled drawings of structures and systems that is designed for short laboratory courses in comparative vertebrate anatomy. 1964. 176 pages. \$3.95.

**PRINCIPLES OF GENETICS**

**Second Edition**

By ELDON J. GARDNER, *Utah State University*. Presents the basic principles of genetics in a logical sequence, with many illustrations and problems. 1964. 386 pages. \$8.00.

**COLLEGE AND CHARACTER**

**A Briefer Version of "The American College"**

Edited by NEVITT SANFORD. *Abridged by the authors, and with a new concluding chapter by the editor*. Twenty-eight social scientists report their observations on American college and university life. 1964. 308 pages. \$4.95.

**AN INTRODUCTION TO RADIATION CHEMISTRY**

By J. W. T. SPINKS and R. J. WOODS, *both of the University of Saskatchewan*. A balanced account of theory, experiment, and practical application. 1964. 477 pages. \$12.75.

**SIGNAL DETECTION AND RECOGNITION**

**BY HUMAN OBSERVERS**

**Contemporary Readings**

Edited by JOHN A. SWETS, *M.I.T.*; and Bolt Beranek and Newman Inc. Brings together forty articles from a dozen different sources to constitute a complete treatment of modern detection theory. 1964. 702 pages. \$17.50.

**THE CHEMISTRY OF IMPERFECT CRYSTALS**

By F. A. KRÖGER, *Philips Research Laboratories, Eindhoven, Netherlands*. A complete survey of the problems encountered when preparing crystals with well-defined physical properties: i.e. purification, crystal growth, doping, phase theory and imperfection chemistry. A North-Holland (Interscience) Book. 1964. 1039 pages. \$33.00.

**12TH SOLVAY CONGRESS**

**Quantum Theory of Fields**

Edited by I. PRIGOGINE, *l'Université Libre, Brussels*. Contains the reports and discussions of the 12th conference of the International Institute of Solvay Physics, held in October, 1961. An Interscience Book. 1963. 261 pages. \$8.00.

**TIDAL COMPUTATIONS IN RIVERS  
AND COASTAL WATERS**

By J. J. DRONKERS, *Netherlands Rijkswaterstaat (Public Works and Waterways Department), The Hague, The Netherlands*. Treats not only the mathematical and physical fundamentals of the theory of tides, but also its application to technical problems in tidal waters. A North-Holland (Interscience) Book. 1964. 518 pages. \$17.00.

**ATOMIC STRUCTURE AND CHEMICAL BONDING**

**A Non-Mathematical Introduction**

By FRITZ SEEL, *University of Saarbrücken*. Translated from the fourth German edition and revised by N. N. Greenwood and H. P. Stadler, *University of Newcastle upon Tyne*. A concise, straightforward account of the modern theory of chemical bonding. One of Methuen's Monographs on Chemical Subjects. 1963. 112 pages. \$2.75.

**NUMERICAL ANALYSIS**

By NATHANIEL MACON, *Auburn University*. An introduction to numerical analysis (as opposed to numerical methods) that places strong emphasis on applicability to high-speed computing. 1963. 161 pages. \$5.50.

**THE WATER RELATIONS OF PLANTS**

**A Symposium of The British Ecological Society, London, April 5-8, 1961**

Edited by A. J. RUTTER and F. H. WHITEHEAD, *both of the Imperial College of Science and Technology, London*. Emphasizes temperate vegetation. Gives new information on plant water relations. 1963. 394 pages. \$10.50.

*Send for on-approval copies.*

**JOHN WILEY & SONS, Inc., 605 Third Avenue, New York, N.Y., 10016**





---

## A Selection of Wiley and Interscience Books for Lab, Library, Desk and Study

---

### BOTANY

An Introduction to Plant Science

#### Third Edition

By W. W. ROBBINS, T. ELLIOT WEIER, and C. RALPH STOCKING, *all of the University of California, Davis*. An introductory textbook on plants emphasizing the interdependence of form and function, from DNA in a chromosome to water movement in a redwood, and the importance of this relationship for current problems of evolution. 1964. Approx. 504 pages. Prob. \$7.75.

### ATLAS OF DRAWINGS FOR CHORDATE ANATOMY

#### Second Edition

By SAMUEL EDDY, *University of Minnesota*. An atlas of unlabelled outline drawings of the systems of commonly studied chordates to aid the student in dissection and in recording his research. 1964. 318 pages. \$5.75.

### THE ELEMENTS OF STOCHASTIC PROCESSES

#### With Applications to the Natural Sciences

By NORMAN T. J. BAILEY, *University of Oxford*. An introduction to the mathematical treatment of phenomena that involve a flow of events in time, especially those which exhibit such highly variable characteristics as birth, death, transformation, evolution, etc. One of the Wiley Publications in Statistics. 1964. 249 pages. \$7.95.

### BASIC STATISTICS

#### A Primer for the Biomedical Sciences

By OLIVE JEAN DUNN, *University of California, Berkeley*. Requiring a minimum of mathematical knowledge, this book gives the student insight into the statistical methods used in modern medical research. 1964. Approx. 192 pages. Prob. \$5.50.

### STATISTICAL MECHANICS AND DYNAMICS

By HENRY EYRING, *University of Utah*; DOUGLAS HENDERSON, *Arizona State University*; BETSY JONES STOVER, *University of Utah*; and EDWARD M. EYRING, *University of Utah*. Integrates thermodynamics, statistical mechanics and reaction kinetics. 1964. Approx. 500 pages, Prob. \$15.00.

### JOURNAL OF RESEARCH IN SCIENCE TEACHING

*The official organ of The National Association for Research in Science Teaching and The Association for the Education of Teachers in Science.*

### ADVANCES IN ANALYTICAL CHEMISTRY AND INSTRUMENTATION

#### Volume 3

Edited by CHARLES N. REILLEY, *University of North Carolina*. The latest volume in a continuing series of volumes dealing with significant new ideas and techniques. An Interscience Series. 1964. Approx. 392 pages. \$15.00.

### PHYSICAL CHEMISTRY

By D. F. EGGERS, Jr., N. W. GREGORY, G. D. HALSEY, Jr., and B. S. RABINOVITCH, *all of the University of Washington*. A coherent account of the principal areas of physical chemistry that is organized around quantum mechanical principles and statistical mechanical methods. It includes a thorough discussion of classical thermodynamics. 1964. Approx. 804 pages. \$9.95.

### PHYSICAL ORGANIC CHEMISTRY

By KENNETH B. WIBERG, *Yale University*. Concentrating on the physical chemical aspects of organic chemistry, this book emphasizes quantitative understanding of the material. 1964. 591 pages. \$10.75.

### ELEMENTARY THEORY OF ELECTRIC AND MAGNETIC FIELDS

By WARREN B. CHESTON, *Deputy Scientific Attaché, The Foreign Service of the United States of America, London, England*. A thorough treatment of the theory of electric and magnetic fields that stresses the one-to-one correspondence between features of both types of theory. 1964. Approx. 400 pages. Prob. \$9.75.

### NUCLEAR AND RADIOCHEMISTRY

#### Second Edition

By GERHART FRIEDLANDER, *Brookhaven National Laboratory*; the late JOSEPH W. KENNEDY, *formerly of Washington University*; and JULIAN MALCOLM MILLER, *Columbia University*. A thoroughly modernized and expanded edition of a well-known guide to the fundamentals of nuclear science. 1964. Approx. 616 pages. Prob. \$10.75.

Now entering its second year of publication, this quarterly journal is a unique source of information on new ideas and techniques in science education. *Volume I: 1963. \$10.00. Subscription: 1964. \$10.00.*

*Send for on-approval copies.*

**JOHN WILEY & SONS, Inc.**

605 Third Avenue, New York, N. Y. 10016



---

## A Selection of Wiley and Interscience Books for Lab, Library, Desk and Study

---

### ESSAYS 1958-1962 ON ATOMIC PHYSICS AND HUMAN KNOWLEDGE

By NIELS BOHR. Contains the most important articles written by Niels Bohr during the last five years of his life—including the unfinished article "Light and Life Revisited." 1964. 100 pages. \$5.00.

### STREPTOMYCES PRODUCTS INHIBITING MYCO- BACTERIA

By KENJI MAEDA, *Head of Antibiotics Chemistry, Department of Antibiotics, National Institute of Health, Tokyo, Japan*. One in the E. R. Squibb Lectures on Chemistry of Microbial Products Series. 1964. Approx. 144 pages. Prob. \$4.25.

### ELECTROMAGNETIC SLOW WAVE SYSTEMS

By ROBERT M. BEVENSEE, *University of California, Berkeley*. Describes the electromagnetic properties of many microwave accelerator and amplifier structures and the theoretical performance characteristics of various electron beam amplifiers. Analysis is based primarily upon a powerful and widely applicable variational method for obtaining propagation constants. 1964. 464 pages. \$17.50.

### NUCLEAR INTERACTIONS

By SERGIO DeBENEDETTI, *Carnegie Institute of Technology*. Deals with low-energy and low-high-energy (Up to strange particle production threshold) nuclear physics. Interactions are stressed, but nuclear models are not excluded. The treatment covers experimental foundations and what theory is needed to understand the facts (including relativistic theory of electrons and pions, and of strong and weak interactions). There are no postulates presented without experimental evidence nor formulae written without derivation. 1964. Approx. 656 pages. \$16.00.

### PRINCIPLES AND APPLICATIONS IN AQUATIC MICROBIOLOGY

Edited by H. HEUKELEKIAN and N. DONDERO, *both of Rutgers University*. Contains the papers and discussion presented at the Rudolfs Research Conference, held at Rutgers University June 5, 6, and 7, 1963. It presents a wealth of information on a wide range of topics relating to microbes and their activities in waters, both unpolluted and polluted. In addition, several subjects from related fields are included: e.g., the papers on rumen microbiology and the microbiology of pesticides. 1964. Approx. 450 pages. *In press*.

### PREPARATIVE INORGANIC REACTIONS

#### Volume I

Edited by WILLIAM L. JOLLY, *University of California, Berkeley*. The first volume of a new Interscience series that will enable the chemist to keep pace with technical and theoretical developments in inorganic synthetic methods for compounds and compound groups. The underlying philosophy of the series is that an increased understanding of the physico-chemical structure of inorganic compounds will enable the inorganic chemist to base his preparations on rational principles, just as the organic chemist has been doing for some time. An Interscience Book. 1964. Approx. 264 pages. Prob. \$8.50.

### ORGANIC FUNCTIONAL GROUP ANALYSIS

#### By Micro and Semimicro Methods

By NICHOLAS D. CHERONIS, *formerly Professor of Chemistry*; and T. S. MA, *Professor of Chemistry, both of Brooklyn College of the City University of New York*. Treats quantitative analysis of functional groups (atom groupings) from the standpoint of microchemistry. The book teaches the student how to use the minimum amount of working material to obtain reliable analytical data, and how to interpret these data. An Interscience Book. 1964. 696 pages. \$25.00.

### APPLIED SUPERCONDUCTIVITY

By VERNON L. NEWHOUSE, *General Electric Research Laboratory, Schenectady, New York*. Provides a complete survey of superconductive devices and provides an introduction to superconductivity for readers unacquainted with advanced quantum mechanics. 1964. Approx. 296 pages. Prob. \$8.50.

### PHYSICS OF MAGNETISM

By SOSHIN CHIKAZUMI, *University of Tokyo*. *English Edition prepared with the collaboration of STANLEY H. CHARAP, IBM Thomas J. Watson Research Center*. Comprehensively describes concepts of ferro-, ferri-, and antiferro-magnetism domain structure, magnetization processes, magnetic annealing and various other topics relating to magnetism. Primary emphasis is placed on the explanation of physical concepts. 1964. Approx. 544 pages. Prob. \$12.50.

### THE PSITTACOSIS GROUP AS BACTERIA

By JAMES W. MOULDER, *The University of Chicago*. Based on three lectures delivered at the Institute of Microbiology at Rutgers in May 1963, this book summarizes the chemical and biological properties of the important psittacosis group of microorganisms. The author argues that these properties show clearly that members of the psittacosis group are bacteria, not viruses. One of the CIBA Lectures in Microbial Biochemistry Series. 1964. 95 pages. \$4.00.

*Send for on-approval copies.*

**JOHN WILEY & SONS, Inc.**

8 MAY 1964

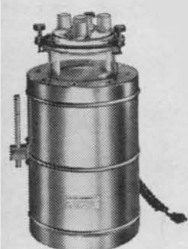
605 Third Avenue, New York, N. Y. 10016

Further proof that Glas-Col leads in the design of really safe heating mantles!

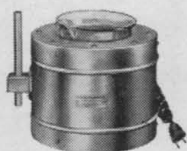
## announcing **CSA** approval Canadian Standards Association for **Glas-Col** heating mantles

Canadian Standards Association approval marks another safety milestone—not only for Glas-Col, but for every lab, pilot plant and processing plant honestly concerned about safety.

Although Glas-Col mantles have always been accepted as the only really safe method of heating flammable and other dangerous liquids, this new recognition was not gained easily. In order to meet strict CSA requirements, many refinements were made . . . improvements were tested for more than two years. These changes represent important advances in Glas-Col's continuous program for greater safety in laboratory, pilot plant and production heating of flammable liquids.



For resin reaction flasks.



For Griffin-type beakers.



For stainless steel beakers.



For Buchner funnels.



For desiccators.



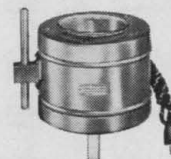
For giant Pyrex† reaction flasks.



For Pyrex† jars or bottles.



For evaporating dishes.



For fritted disc Buchner funnels.



Series TM mantle for round bottom flasks.



Series STM high wattage quartz mantles for spherical flasks, 500 to 200,000 ml, CSA Approved only when used with Poncho® safety shield which seals the flask into the mantle.

Glas-Col has pioneered safety for 24 years—developing the first, the original heating mantle, plus every major improvement since. These include zoned heating, high wattage quartz mantles and, recently, the Poncho® safety shield.

Complete Glas-Col catalog on request.

# GLAS-COL®

## HEATING MANTLES

Glas-Col Apparatus Company

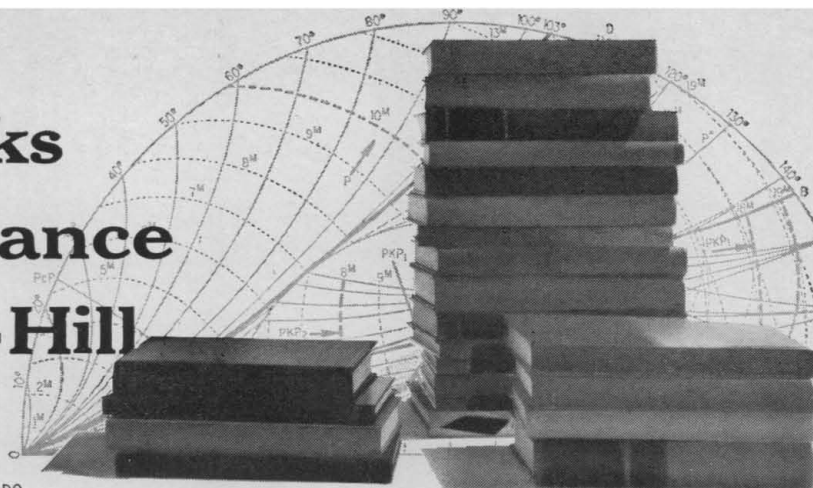
Dept. SC, 711 Hulman Street • Terre Haute, Indiana

U.S. Patents 2,231,506; 2,739,220; 2,739,221 and 2,282,078.

\*Patents pending. †Registered trademark, Corning Glass Works.



# Technical Books of First Importance from McGraw-Hill



## 1. MASERS AND LASERS HOW THEY WORK, WHAT THEY DO

Discusses key ideas, principles, and background of masers and lasers. By M. Brotherton. 207 pp., \$8.50.

## 2. MICROWAVE SOLID-STATE MASERS

Covers all current, practical aspects of maser technology. By A. E. Siegman. 581 pp., \$18.50.

## 3. INTRODUCTION TO BIOPHYSICAL CHEMISTRY

Covers within one volume the important macromolecules, proteins, and nucleic acids. By R. Bruce Martin, 356 pp., \$11.50.

## 4. ION PROPULSION FOR SPACE FLIGHT

Only comprehensive, up-to-the-minute account of this and other electronic propulsion techniques. By Ernst Stuhlinger. 375 pp., \$17.50.

## 5. SPACE EXPLORATION

A critical overall survey of current space exploration. By 15 experts. Ed. by Donald P. LeGalley and John W. McKee. 480 pp., \$17.50.

## 6. RADIO RAY PROPAGATION IN THE IONOSPHERE

Unequalled in its coverage of the geometric optics of ionospheric propagation. By John M. Kelso. 475 pp., \$17.50.

## 7. ELECTROMAGNETIC FIELDS

Applies math techniques to the calculation of electric and magnetic fields. By J. Van Bladel. 594 pp., \$13.50.

## 8. BRAINS, MACHINES, AND MATHEMATICS

Provides a stimulating introduction to the analogues between human and mechanical "brains." By Michael A. Arbib. 152 pp., \$6.95.

## 9. INTRODUCTION TO RADIOLOGICAL HEALTH

Provides a sound foundation for responsibilities in the control of and protection from radiological hazards. By Hanson Blatz. 315 pp., \$12.75.

## 10. SULFURIC ACID USE AND HANDLING

Covers every aspect of the receiving, processing, use, and disposal of sulfuric acid. By Oscar Fasullo. 355 pp., to be published June, '64.

## 11. MARINE GEOLOGY OF THE PACIFIC

Describes and explains topography, structure, sediments, resources, and geological background of the Pacific Basin. By H. W. Menard. 260 pp., \$12.50.

## 12. CRYSTALLIZATION OF POLYMERS

Thoroughly explains the phenomena of the crystallization of polymers. By Leo Mandelkern. 337 pp., \$13.50.

## 13. INFRARED PHYSICS AND ENGINEERING

Presents the complete physics, engineering and analytical information essential to design of infrared systems. By John A. Jamieson, Raymond H. McFee, Gilbert N. Plass, Robert H. Grube, and Robert G. Richards. 673 pp., \$19.00.

## 14. RETRIEVAL GUIDE TO THERMOPHYSICAL PROPERTIES RESEARCH LITERATURE VOL. II (BKS. 1, 2, AND 3)

Enables the scientist and engineer to perform his own retrieval at his desk. Ed. by Y. S. Touloukian. 436 pp., \$150.00.

**BUY THESE BOOKS AT YOUR BOOKSTORE  
OR SEND COUPON BELOW:**



**McGRAW-HILL BOOK CO., Dept. V-SC-584**  
330 West 42 Street, New York 10036

Send me the book(s) encircled below for 10 days on approval. In 10 days I will remit for book(s) I keep, plus a few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon. Same examination and return privilege.)

1	2	3	4	5	6	7
8	9	10	11	12	13	14

NAME (print) \_\_\_\_\_

ADDRESS \_\_\_\_\_

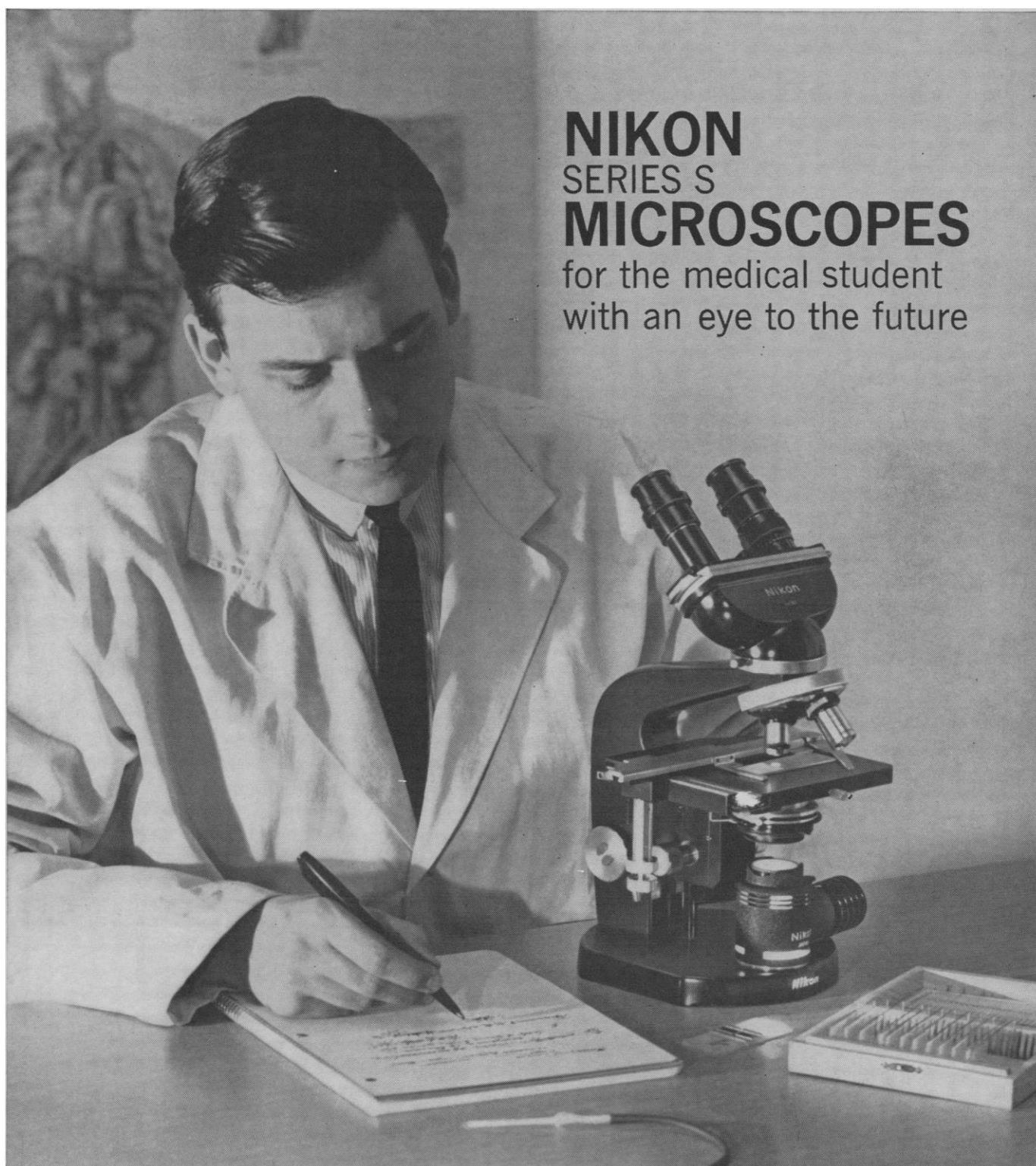
CITY \_\_\_\_\_

STATE \_\_\_\_\_

ZIP CODE \_\_\_\_\_

For price and terms outside U. S. write McGraw-Hill Int'l., NYC

V-SC-584



**NIKON**  
SERIES S  
**MICROSCOPES**  
for the medical student  
with an eye to the future

There are no Nikon *student* microscopes, as such. The same Nikon microscope which will serve the medical student through school, has the flexibility to meet his future professional needs, however specialized. Model SBR, the example shown above, is a versatile, sophisticated professional instrument, used widely in school, hospital and commercial laboratories. It is also a favorite with medical students.

*For medical student microscope catalog, write to Dept. S-5*

NIKON INC. • Instrument Division • 111 Fifth Ave., New York 3, N. Y. • Subsidiary of Ehrenreich Photo-Optical Industries, Inc.

*The Most Authoritative Texts  
Must Do a MODERN  
COMMUNICATIONS JOB  
To Be Fully Effective*



**Compare  
These Texts  
with Those  
You Now Use**

**New 8th Edition!**

**Smith**

### **MICROBIOLOGY AND PATHOLOGY**

Stressing readability, the extensively revised new 8th edition of this widely used text can provide your students with a more complete understanding of the relationship of microbiology to everyday living, food supply, water supply, sanitation, the processes of nature, manufacturing and commerce. The classification throughout has been revised in keeping with the most recent edition of Bergey's *MANUAL OF DETERMINATIVE BACTERIOLOGY*.

By ALICE LORRAINE SMITH, A.B., M.D., F.C.A.P., F.A.C.P. Published May, 1964. 8th edition, approximately 660 pages, 7" x 10", 325 illustrations. Price, \$8.50.

**New 6th Edition!**

**Braungart-Buddeke**

### **AN INTRODUCTION TO ANIMAL BIOLOGY**

This book is designed for use as one of the texts where two semester general biology courses are offered with one semester devoted to zoology and the other to botany. It discusses the majority of the animal phyla and a type or types in each, as well as functions, general biological principles and biochemistry as they apply to biological systems, genetics, human biology and evolution. This latest edition features revised and amplified material on oxidation. Both the Krebs citric acid cycle and the ATP-ADP sequence are now included in the general discussion of the life processes.

By DALE C. BRAUNGART, Ph.D.; and RITA BUDDEKE, S.N.D., Ph.D. Published March, 1964. 6th edition, 442 pages, 6¾" x 9½", 216 figures. Price, \$7.25.

**New 4th Edition!**

**Francis**

### **INTRODUCTION TO HUMAN ANATOMY**

A clear, general discussion of gross anatomy, this well-written book stresses the correlation of structure and function. A new page size, format and illustrations and a new 13-plate, full-color Trans-Vision® Insert of Human Anatomy illustrated by Ernest W. Beck add interest to this presentation. In the new 4th edition, the author uses the English equivalent of the Paris revision of the anatomic nomenclature. Distinctly superior illustrations are featured throughout.

By CARL C. FRANCIS, A.B., M.D. Published January, 1964. 4th edition, 478 pages, 6¾" x 9½", 325 text illustrations and 25 color plates and a Trans-Vision® Insert of Human Anatomy illustrated by Ernest Beck. Price, \$6.75.

**A New Book!**

**Brooks**

### **LABORATORY MANUAL AND WORKBOOK FOR INTEGRATED BASIC SCIENCE**

Designed to give greater meaning and significance to the study of science, this new book is the first to place much of the paramedical laboratory under "one roof." In a single volume, it presents the essence of physics, chemistry, microbiology, anatomy and physiology as an interrelated and integrated body of knowledge. 82 interesting and informative laboratory exercises for physics, chemistry, microbiology, anatomy and physiology are featured. It is ideally suited for laboratory courses in both the integrated and non-integrated program where the science is taught by one instructor.

By STEWART M. BROOKS, M.S. Published April, 1964. 331 pages, 7¼" x 10½", illustrated. Price, \$4.75.

**New 2nd Edition**

**Harrison**

### **MANUAL OF COMPARATIVE ANATOMY**

The new 2nd edition of this popular workbook is a well illustrated guide to the dissection of each of the five major groups of vertebrates. Much has been added to this manual including a new discussion and illustration of the deep muscles of the thigh.

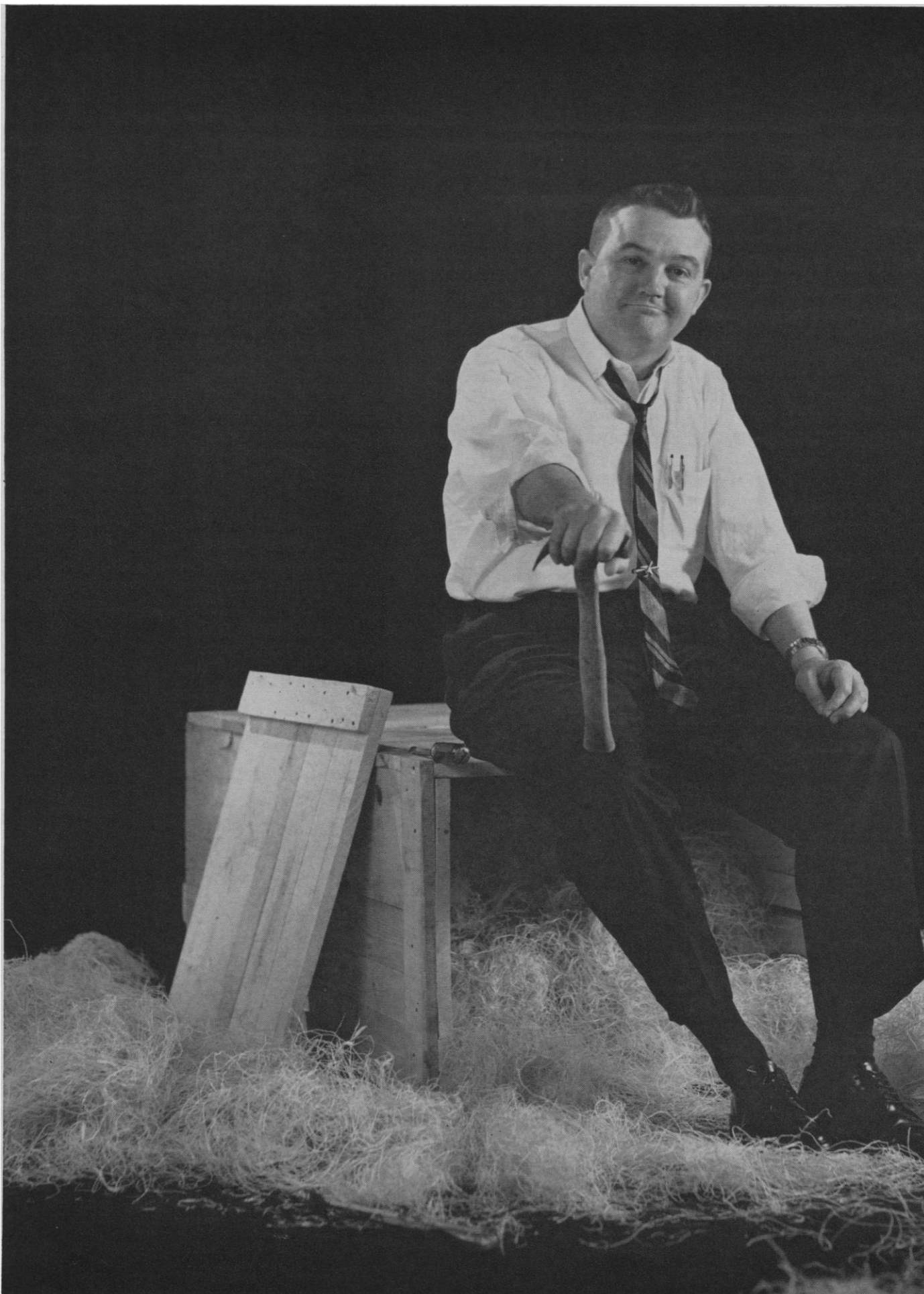
By BRUCE M. HARRISON, Ph.D., Sc.D. To be published July, 1964. 2nd edition, approximately 356 pages, 7¾" x 10½", 122 illustrations. About \$4.25-\$4.50.

**THE C. V. MOSBY COMPANY**  
3207 Washington Boulevard



**Publishers**  
St. Louis, Mo. 63103





# What's new with Nuclear Data?

*(Friend, you don't know the half of it!)*

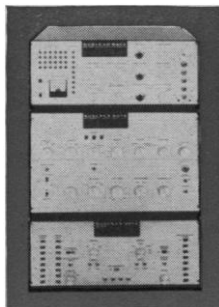
When you ask a Nuclear Data man, "What's new?", you'd better stand back. He likes to tell people how Nuclear Data is on the move—physically and technologically—with new products, new plant, new research facilities, and a new location that promises better service for everyone.

Take new products, for example. The new ND-180 512-channel pulse height analyzer system (with live display and multiscaling) has a new readout control unit that's as handy as a pocket on a shirt. It provides spectrum stripping and integrating capabilities as well as off-line, tape-to-typewriter conversion, log display, manual entry to tape, and many other functions. Signal averaging also is possible with multiscaling programmer.

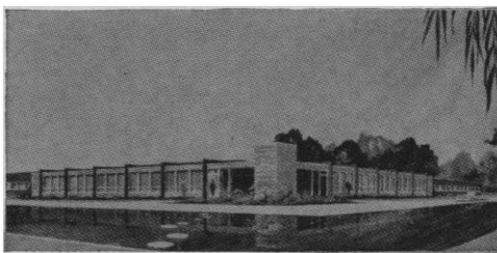
Then there's the Enhancetron 1024 (ND-800)—the portable signal-averaging digital computer that isolates the signal of interest from non-filterable noise. Impressive? You bet! It's a new major measurement tool that has immediate application in spectroscopy, analytical chemistry, bio-medicine, physics, NMR, EPR, and many other fields.

But the big news is our new plant. Just 15 minutes from Chicago's O'Hare Field, this new Palatine, Illinois address opens up faster channels for communication, shipping, and all-around better service.

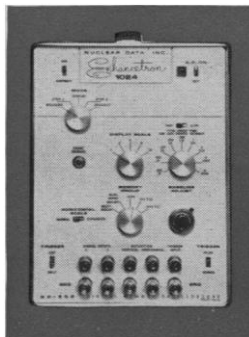
What's new with Nuclear Data? Plenty, as you can see. And behind every instrument: **the precision and reliability you've learned to expect from Nuclear Data.**



ND-180 512-Channel  
Pulse Height  
Analyzer



Beautiful new plant  
provides expanded  
facilities for research  
and development  
laboratories,  
increased  
production capacity  
and new  
executive offices.



ND-800 Enhancetron™  
1024 Portable  
Signal-Averaging  
Digital Computer

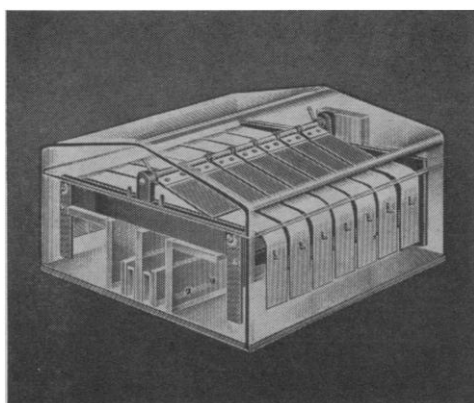
 **Nuclear Data, Inc.**

P.O. Box 451, 100 West Golf Road, Palatine, Illinois 60067

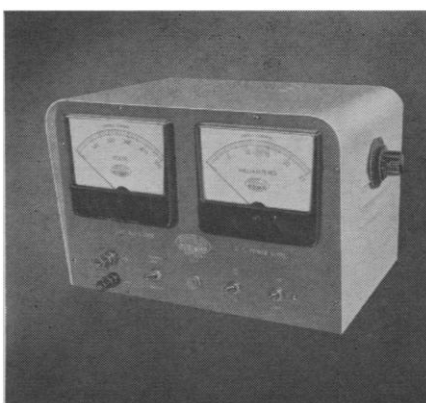
COMPLETE, COMPACT, COORDINATED

# ELECTROPHORESIS

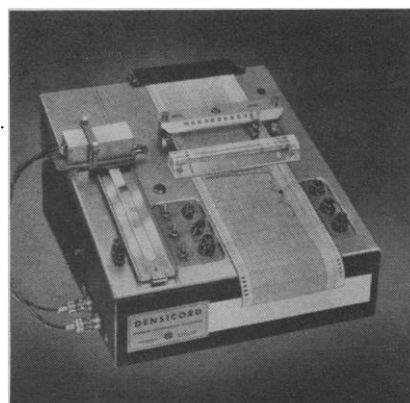
AN INTEGRATED SYSTEM BY BUCHLER



**The 3-1020 Migration Chamber** is a universally adaptable chamber—quickly changed for other media.



**The 3-1008 Power Supply**—one of three available for electrophoresis. This one is 0-500 volts, 0-20 ma and 0-200 ma.



**The 3-1600 Densitometer** for automatic scanning of electrophoresis media. A versatile research tool for any laboratory.

The Buchler Electrophoresis Apparatus "package" provides a completely integrated system for optimum performance of routine clinical or specialized research applications. These designed-to-dovetail components have been engineered for quick and simple changes to accommodate various media. With adapters, the migration chamber accommodates paper, agar, starch and cellulose acetate. One of the three power supplies is furnished to meet your requirements. The densitometer, which is capable of handling all of these media except starch, corrects automatically for absorbance variations. For more details on this "package" and the extensive array of accessories that is available write for Bulletin No. 3-1000B and 3-1600.



## BUCHLER INSTRUMENTS, INC.

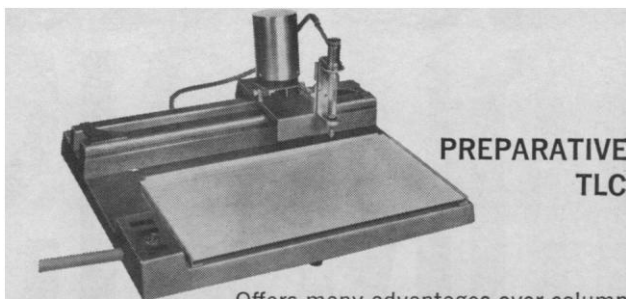
1327 16TH STREET • FORT LEE, NEW JERSEY 07025  
PHONES: N. J. (201) 945-1188 • N. Y. (212) 563-7844



news about DESAGA/BRINKMANN apparatus for

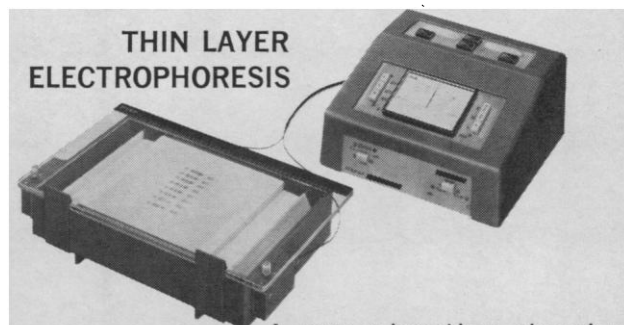
# THIN LAYER CHROMATOGRAPHY

new Equipment... new Techniques... new Adsorbents



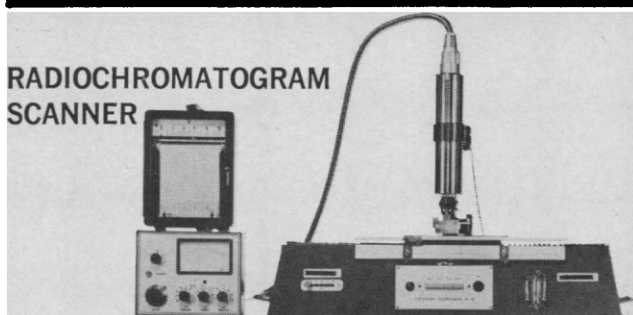
**PREPARATIVE TLC**

Offers many advantages over column procedures. Up to 40 grams of steroids can be separated on a single 400 x 200 mm plate. New developing tanks, drying racks, desiccators, recovery systems and an automatic sample-streaking instrument (illustrated) are now available for quantitative separations on layers up to 2 mm thick.



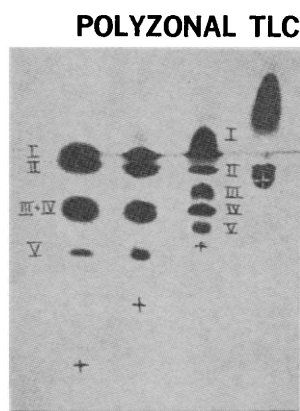
**THIN LAYER ELECTROPHORESIS**

A new migration chamber developed specifically for TLE. Unique features for saturation (chamber height only 1 mm), temperature control, and buffer flow. The power supply can, of course, be used for paper chromatography also. Have you investigated the advantages of combining TLE with TLC?



**RADIOCHROMATOGRAM SCANNER**

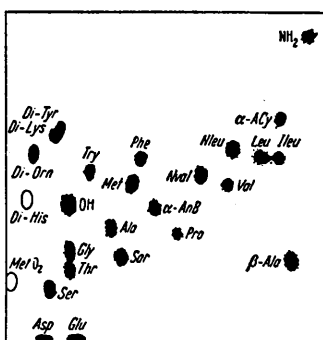
Developed for scanning TLC plates which are up to 400 mm long. The plate is automatically advanced on a motor-driven sled. Mechanical adjustments permit perfect alignment under detector head. Usable with ratemeters, scalars and recorder for paper or thin layer chromatography.



**POLYZONAL TLC**

Polyzonal TLC is a new technique which utilizes the solvent de-mixing phenomenon for a rapid determination of ideal developing conditions; a single solvent mixture provides varied results (on the same plate), which would otherwise require testing of numerous plates in different solvent systems. Illustrated are separations of the same compound (2, 4-Dinitrophenyl (I), DNP-Valine (II), DNP-Alanine (III), DNP-Glycine (IV), and DI-DNP Histidine (V)).

## CONTINUOUS SOLVENT FLOW TLC



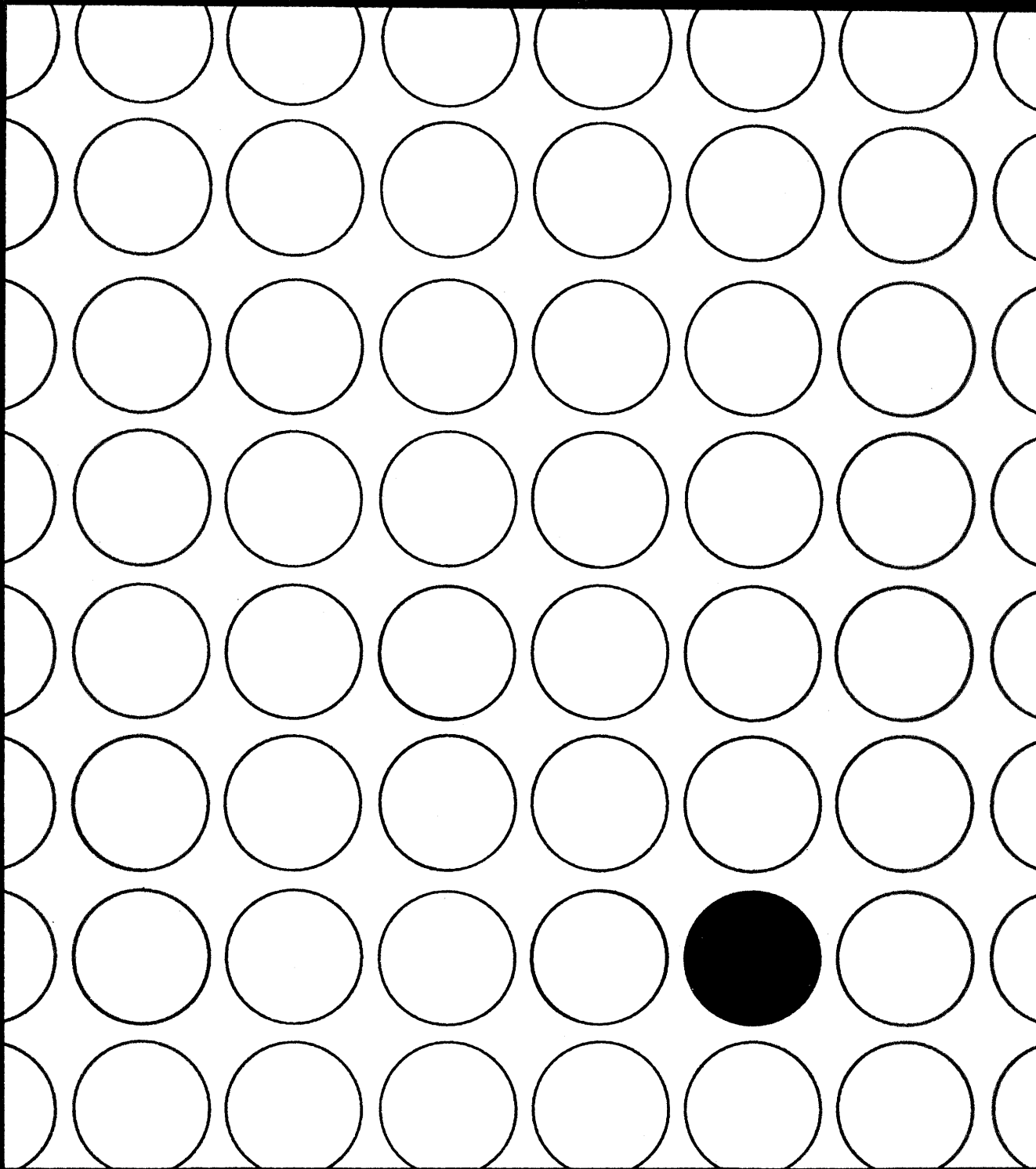
Another technique which utilizes the B-N Chamber to obtain separations not possible with standard developing procedures. Illustrated is a chromatogram of the most important 2, 4 Dinitrophenyl amino acids. Continuous solvent flow has also been applied with great success for amino acids in urine and blood; for leucine and isoleucine; and for various sugars (saccharose, galactose, fructose, ribose, etc.).

## ADSORBENTS AND ION EXCHANGERS

Over 40 different adsorbents and ion exchangers are now in stock for immediate delivery. New materials include an Ultra Pure version of Silica Gel H—the first adsorbent to offer both maximum purity and ideal separating characteristics—which is not true of competitive, washed, materials whose activity is inferior to standard grade materials. Also, PEI Cellulose for the separation of nucleotides and a new Polyphosphate Cation Exchanger.

Descriptive literature on all of the above and a revised catalog on basic accessories, featuring many new items and improved components, will be sent on request.

**BRINKMANN**  
CANTIAGUE ROAD, WESTBURY, N.Y. 11590  
ST. LOUIS • CHICAGO • HOUSTON • CLEVELAND • WASHINGTON, D.C. • SAN FRANCISCO  
**INSTRUMENTS**

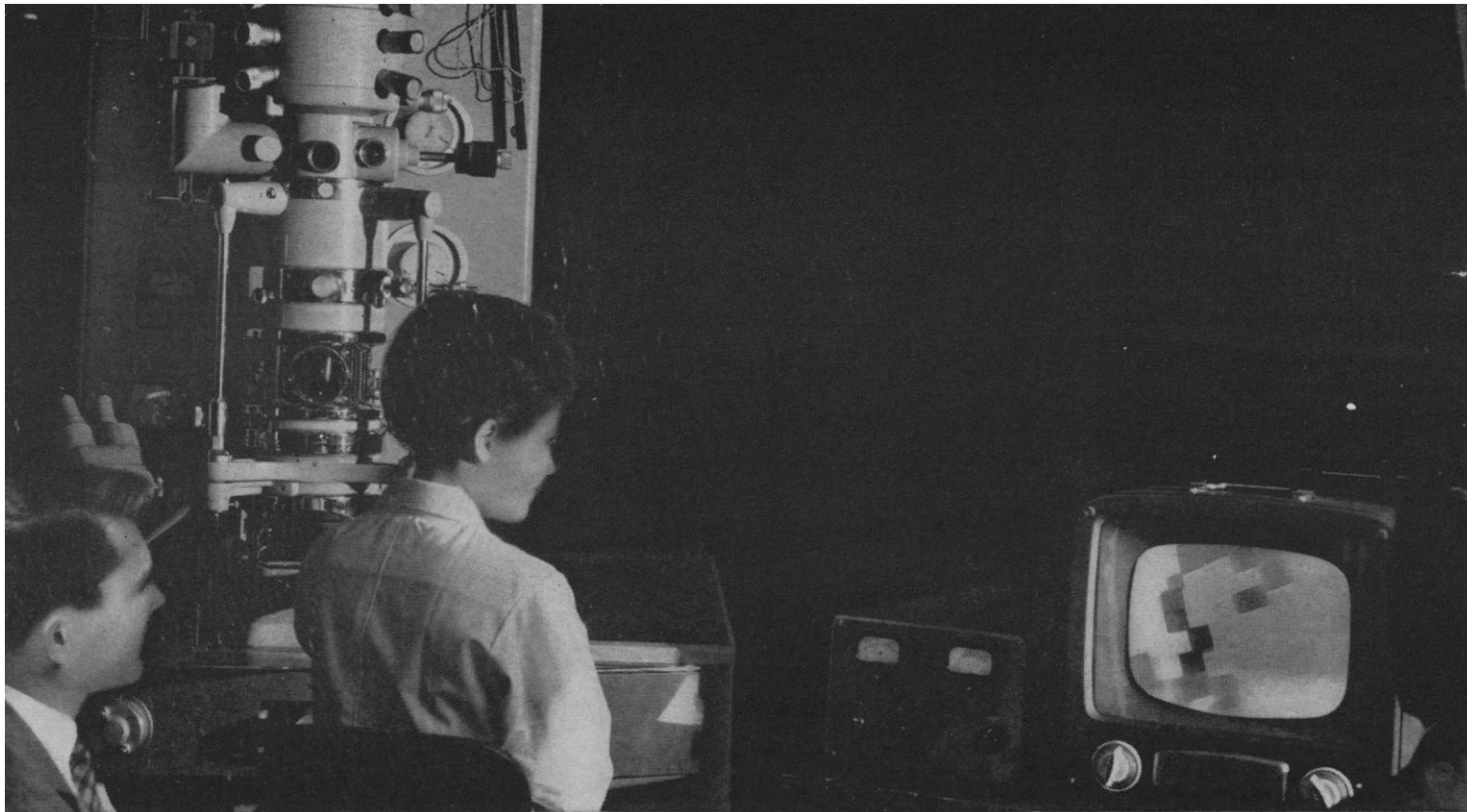


### ***Out of the ordinary...***

This is the type of sterilization problem being solved by Castle. Practical solutions are engineered for customers' requirements, based on our experience in sterilization. Our know-how and equipment have provided positive sterilization for thousands of different items. We have standard models or furnish special designs to accommodate the load—whatever the problem. Our systems have been engineered for many applications. Remember, sterilization ideas

start with Castle. And, many industries are reaping the benefits of Castle custom-designed sterilization programs. If you have a sterilization problem, take advantage of our experience. For complete information on this exclusive Castle service, write to Wilmot Castle Company, 1741 E. Henrietta Rd., Rochester 2, N. Y.

***Castle*** Subsidiary of Ritter Co. Inc.



No. 2 in a Series:

## ADVANCES IN ELECTRON MICROSCOPY

The scientists in the above photograph are using a revolutionary electron microscopy system. It amplifies by 1000 times the brightness of the image produced by the electron microscope on the left and presents it on a T.V. monitor on the right. Their specimen may have been too thick for normal electron microscopy, it might be temperature or radiation sensitive requiring an extremely weak electron beam. But they are able to view the image on the T.V. monitor with excellent brightness and contrast. The electron microscope is the Hitachi Perkin-Elmer Model HU-11A, the highest resolution microscope available today, and it is equipped with the new Image Intensifier system developed specifically for the Model HU-11A by scientists at the Hitachi Central Research Laboratory. Present electron microscopes form an enlarged image on a viewing screen which

fluoresces visible light upon electron impact. Very great magnifications and resolution are obtained when sufficient brightness and contrast are available. In some cases, such as thick specimens or heat and radiation sensitive materials, insufficient brightness limits useful work. The new Image Intensifier attachment provides more sensitive detection of electrons and electronic amplification of the image, which is presented on a standard TV receiver. Its fast response also allows motion within the specimen to be observed, enhancing electron microscope performance and flexibility. The system is ideally suited for classroom work or for group study since it permits remote viewing of the specimen. In addition, kinescope movie cameras can provide a record of rapid kinetic changes in the specimen for analysis and review.

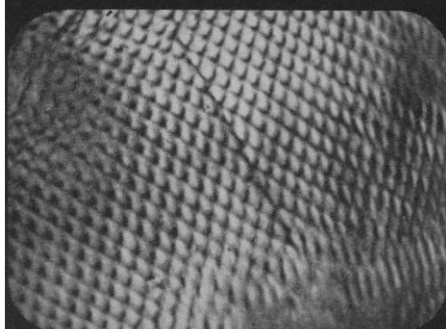
The image intensifier system consists of the electron microscope, special pick-up system, electronic control system, and television picture monitor. The pick-up is mounted under the normal viewing screen of the electron microscope in vacuum.

The current gain of the Image Intensifier is more than 1000X with electrons above 50KV in acceleration. The minimum detectable current density of bombarding electrons is lower than  $5 \times 10^{-11}$  amperes per square centimeter.

If you wish complete information on the Hitachi Perkin-Elmer HU-11A and its Image Intensifier attachment write to The Perkin-Elmer Corporation, Distributor Products Department, 910 Main Avenue, Norwalk Connecticut.

**PERKIN-ELMER**

Micrographs from TV monitor:



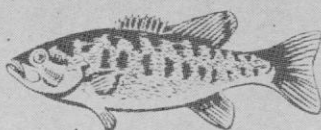
Molybdenite



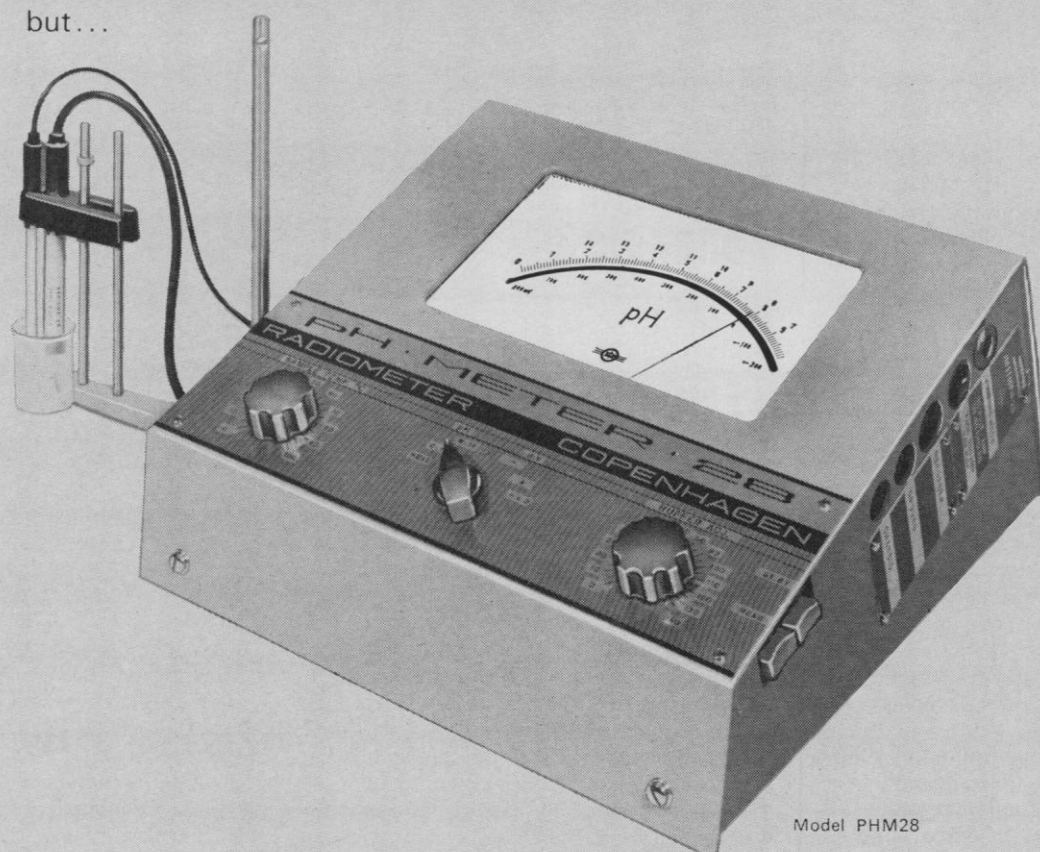
Cell Mitochondria



Proteus



You  
may  
never  
require  
pH measurements  
for fish  
but...



**the Radiometer pHM28 Meter** has many other applications for pH measurement, titration or control. It is low in cost but high in quality and stability, and completely free of zero drift. With 0.02 pH reproducibility on a large mirrored and folded scale (0-10, 6-14 pH), it can be used for redox and dead stop end point titrations (Karl Fischer), and for external recorders.

A matching control unit (Model TTT11) converts pHM28 to an automatic titrator or for pH control, and electrodes are available for many applications to match the convenient and integral electrode stand.

There are many other features —ask for literature and prices.

## THE LONDON COMPANY

811 SHARON DRIVE, WESTLAKE, OHIO

**RADIOMETER  COPENHAGEN**

In Canada: Bach-Simpson Limited, Box 2484, London





on the **OUTSTANDING** list

F. A. DAVIS COMPANY • Blackwell Scientific Publications

## PLANT BIOCHEMISTRY

By **D. D. DAVIES**. The general principles of biochemistry are discussed with special reference to higher plants. Special topics of physical chemistry are developed and emphasis is placed upon biochemical rather than physiological aspects. In addition to the traditional interest in carbohydrate metabolism, the authors attempt to reflect the expansion of research into the metabolism of lipids, isoprenoid compounds, nucleic acids and proteins.

**CONTENTS:** Proteins and Enzymes; Bioenergetics; Carbohydrate Metabolism; Organic Acid Metabolism; Oxidation and Phosphorylation; Photosynthesis; Lipid Metabolism: The Isoprenoid Compounds; Alkaloids; Amino Acid Metabolism; Nucleic Acids and the Synthesis of Proteins. 448 pages, illustrated. \$10.50

## TECHNIQUES IN PARASITOLOGY

Edited by **ANGELA E. R. TAYLOR**. Four authorities here explain the newer techniques for the study of parasitic animals and the diseases that they cause, and also many of the important results already obtained by these techniques.

**CONTENTS:** The Application of Biochemical techniques to parasitology; The use of ionizing radiation and radioisotopes in parasitology; In Vitro cultivation and serological techniques in parasitology; Electron microscopy of parasites. 116 pages, illustrated. \$3.25

## THE AUTONOMIC NERVOUS SYSTEM

By **J. HAROLD BURN**. This book deals with the autonomic nervous system particularly from the standpoint of chemical transmission, and is therefore an account of physiological processes which may interest students of physiology as well as students of pharmacology. There has been a great increase in our knowledge of the sympathetic system since 1953 when reserpine was introduced. Professor Burn seeks to provide students with the essentials of the latest discoveries in this field. 128 pages, illustrated. \$3.50

## IMMUNOLOGICAL METHODS

By **J. F. ACKROYD**. In recent years, immunological techniques have been applied to the investigation of an ever-increasing number of problems in many different branches of medicine. This volume sums up the proceedings of an international symposium held under the auspices of the C.I.O.M.S. to discuss advances in the laboratory demonstration of antigen-antibody reactions. It provides a unique collection of information about the application of immunological methods to problems in medicine. 480 pages, illustrated. \$16.00

## PROBLEMS IN ORGANIC CHEMISTRY

By **RALPH DANIELS** and **LUDWIG BAUER**. This carefully developed set of problems offers a potent supplement to courses in organic chemistry. The problems emphasize the chemical and physical properties of functional groups and are fitted to the one-year course. Fundamental concepts and theory are constantly stressed. Selected answers are furnished. Second Edition. 204 pages. \$3.75

## STEREOTACTIC ATLAS OF THE BRAIN STEM OF THE CAT

By **W. J. C. VERHAART**. In this new atlas a number of planes of the stereotactic apparatus of Jasper and Ajmone Marsan (1954) are described in detail. Tracts and fibre systems are accurately displayed. Published in two parts that are not to be sold separately. \$24.50

## CLINICAL AMOEBIASIS

By **A. J. WILMOT**. An admirably concise, clear and balanced review of present knowledge of amoebiasis. Covers: Intestinal Amoebiasis; Hepatic Amoebiasis; Other Complications of Amoebiasis and some Associated Conditions; Amoebiasis in Childhood. 176 pages, illustrated. \$6.00

## HANDBOOK OF BRITISH MAMMALS

Edited by **H. N. SOUTHERN**. The first part deals with the general biology of mammals and is designed to bring both zoologists and naturalists up-to-date with the flood of work on mammals and to describe the problems and techniques. The second part presents a compressed account in systematic order of the British mammal fauna. 480 pages, illustrated. \$6.50

## TECHNIQUES IN CHEMICAL PATHOLOGY

By **G. A. CHEYNE**. This book is specifically planned as a textbook for the technician taking this examination and is sufficiently comprehensive to be invaluable also to the experienced technician for reference in his day-to-day work. 404 pages, illustrated. \$8.00

## FUNGAL GENETICS

By **J. R. S. FINCHAM** and **P. R. DAY**. A very readable account of fungal genetics, an aspect of biology with special appeal to the mycologist; an indispensable reference aid for the geneticist, microbial or macrobial. 320 pages, illustrated. \$8.95

## TEXTBOOK OF HUMAN EMBRYOLOGY

By **R. G. HARRISON**. This is the new 1964 edition of a textbook praised as "The answer to preclinical students' prayers." 260 pages, illustrated. \$9.50

## IMMUNITY TO PROTOZOA

By **P. C. C. GARNHAM**. This fascinating symposium is devoted entirely to discussions of the battle of man and animals against their protozoal diseases. 372 pages, illustrated. \$12.75

## CLINICAL ASPECTS OF IODINE METABOLISM

By **E. J. WAYNE**. Professor Wayne and his associates describe their broad studies to obtain a complete picture of iodine metabolism in health and disease. 316 pages, illustrated. \$9.00

**F. A. DAVIS COMPANY, 1914 Cherry Street, Philadelphia, Pa. 19103**

SC

Please send and bill me:

NAME \_\_\_\_\_ ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_



**ACADEMIC PRESS**

*Publishers*  
NEW YORK AND LONDON

111 Fifth Avenue, New York 10003  
Berkeley Square House, London, W. 1

## **ELECTRON PARAMAGNETIC RESONANCE**

By **S. A. Al'tshuler** and **B. M. Kozyrev**

Translated by Scripta Technica

Edited by Charles P. Pool, Jr.

1964, 327 pp., \$13.50

This book is a comprehensive treatise on the field of electron paramagnetic resonance, covering both the theoretical background and the results of experiment.

## **MOLECULAR PHARMACOLOGY**

The Mode of Action of  
Biologically Active Compounds

Edited by **E. J. Ariëns**

Volume 2 of Medicinal Chemistry

A Series of Monographs

Edited by George deStevens

Volume 1, April 1964, 501 pp., \$17.00

Volume 2, Summer 1964, about 275 pp.

The authors consider the pharmacological aspects of their specific fields on the basis of the physicochemical interaction of the molecules of the pharmacodynamic substances with the molecules of the biological object.

## **PAPER CHROMATOGRAPHY**

A Comprehensive Treatise

Volume 1

Edited by **I. M. Hais** and **K. Macek**

April 1964, 955 pp., \$26.50

Review: "There is no doubt that this massive work is the most complete exposition of paper chromatography that exists."—*Nature*

## **SELECTED TOPICS ON ELEMENTARY PARTICLE PHYSICS**

Edited by **M. Conversi**

Course 26 of the Italian Physical Society

April 1964, 294 pp., \$10.00

Lectures on strongly interacting particles and the new resonant states, as well as form factors of the elementary particles are included.

## **DISPERSION AND ABSORPTION OF SOUND BY MOLECULAR PROCESSES**

Edited by **D. Sette**

Course 27 of the Italian Physical Society

1964, 443 pp., \$16.00

This is a study of interaction between mechanical waves and matter which has received much attention in the last forty years.

## **THE MOON**

Our Nearest Celestial Neighbour

Second Edition

By **Zdeněk Kopal**

April 1964, 131 pp., \$5.50

Updated to include all the advances since the first edition three years ago. There are numerous diagrams and twenty-five photographs.

## **CELLULAR MEMBRANES IN DEVELOPMENT**

The Twenty-Second Symposium, The Society  
for the Study of Development and Growth

Edited by **Michael Locke**

1964, 382 pp., \$12.00

The structural similarity of all membranes has led to the unit membrane concept elaborated in this volume. The properties of bi-molecular phospholipid membranes are thoroughly discussed.

## **ADVANCES IN ORGANOMETALLIC CHEMISTRY**

Edited by **F. G. A. Stone** and **Robert West**

Volume 1, April 1964, 334 pp., \$11.00

This new serial publication will publish authoritative reviews on recent developments in all aspects of the chemistry of metal-carbon compounds: structural, theoretical, synthetic, and technological.

## **PROGRESS IN PROTOZOOLOGY**

Proceedings of the First International  
Congress on Protozoology, Prague, 1961

Edited by **J. Ludvík**, **J. Lom** and **J. Vávra**

Co-published with the Czechoslovak Academy of Sciences

1964, 720 pp., \$24.00

This volume offers a comprehensive survey of theoretical protozoology and its application to hygiene, veterinary medicine, water economy, and other fields.

## **PHYSICAL ACOUSTICS**

Principles and Methods

Edited by **Warren P. Mason**

Volume 1, Part A: Methods and Devices

April 1964, 515 pp., \$18.00

*Physical Acoustics* describes high frequency sound waves in gases, liquids, and solids, in their uses as tools for analyzing the molecular, defect, domain wall, and other types of motions that can occur in these media.

## **IDENTIFICATION OF MATERIALS**

Via Physical Properties, Chemical Tests,  
and Microscopy

By **A. A. Benedetti-Pichler**

A Springer-Verlag title published in the U.S.A. and  
Canada by Academic Press

May 1964, 504 pp., \$18.00

This book emphasizes the identification of materials as they occur in nature and industry. It investigates things as they are without any limitations to the scope.

## **CYTOLOGY AND CELL PHYSIOLOGY**

Third Edition

Edited by **Geoffrey H. Bourne**

April 1964, 780 pp., \$20.00

Among the many topics under discussion are new methods of microscopy, homogenization, differential centrifugation of tissues, and the interactions of nucleus and cytoplasm.

## **THE CELL**

Biochemistry, Physiology, Morphology

Edited by **Jean Brachet** and **Alfred E. Mirsky**

Volume 6, 1964, 564 pp., \$18.00

Volume 6 includes protozoa and fungi, collagen, sensory cells, and a section on plant cells that reflects recent discoveries concerning ultrastructure and biochemical activity.

## **TENSORS IN MECHANICS AND ELASTICITY**

By **Léon Brillouin**

Translated by Robert O. Brennan

Volume 2 of *Engineering Physics*:

An International Series of Monographs

Edited by Ali Bulent Cambel and Ascher H. Shapiro

April 1964, 478 pp., \$12.50

In this book, Professor Brillouin leads the reader from elementary concepts of vectors to tensor algebra and calculus in affine space.

## **MATHEMATICAL METHODS IN CHEMICAL ENGINEERING**

By **V. G. Jenson** and **G. V. Jeffreys**

1964, 556 pp., \$15.50

Besides describing such methods as the Laplace Transformation and Finite Difference Calculus, the authors look to the future by discussing numerical solutions of Partial Differential Equations and Matrix Methods.

## **RADIATION, ISOTOPES, AND BONE**

By **Franklin C. McLean** and **Ann M. Budy**

Prepared under the direction of the American Institute of  
Biological Sciences

April 1964, 216 pp., paper bound, \$3.45, cloth bound, \$5.95

This monograph describes the ever increasing utilization by biologists of radiation and radioisotope techniques.



# ACADEMIC PRESS

*Publishers*  
NEW YORK AND LONDON

111 Fifth Avenue, New York 10003  
Berkeley Square House, London, W.1

## THE PHYSIOLOGICAL CLOCK

Endogenous Diurnal Rhythms and  
Biological Chronometry  
Second Edition

By **Erwin Bünning**

A Springer-Verlag title published in the U.S.A. and  
Canada by Academic Press

March 1964, 145 pp., \$6.50

This fascinating book emphasizes the physiological relationship of widely varied phenomena, and shows the great extent to which the physiological clock influences the behavior of unicellular organisms, higher plants, animals and human beings.

## ENZYMES

Second Edition

By **Malcolm Dixon** and **Edwin C. Webb**

April 1964, 944 pp., \$16.00

Review of the first edition "This volume will surely be the standard reference work on enzymes for a number of years to come. . ."

—*Nature*

## THE PHYSIOLOGY OF SYNAPSES

By **John Carew Eccles**

Nobel Prize Winner for Medicine, 1963

A Springer-Verlag title distributed in the U.S.A. and  
Canada by Academic Press

1964, 316 pp., \$9.00

This work covers all aspects of the physiology of synapses. It makes little reference to work earlier than 1951, apart from the historical introductions.

## COMPARATIVE NUTRITION OF MAN AND DOMESTIC ANIMALS

By **H. H. Mitchell**

Volume 2, April 1964, 840 pp., \$28.00, \* Special price, \$23.00

\* In effect until June 30, 1964

This two-volume work presents and correlates, in a quantitative fashion, the nutrient requirements of man and his domesticated animals and the factors that modify these requirements.

## THE HORMONES

Physiology, Chemistry, and Applications

Edited by **Gregory Pincus**, **Kenneth V. Thimann**,  
and **E. B. Astwood**

Volume 4, 1964, 688 pp., \$22.00

Review of earlier volumes: "It can be said with confidence that all workers in the hormone field, and many besides, will find these two volumes a most valuable work, not only for reference, but also for some enjoyable reading."—*Science Progress*

## METHODS IN CELL PHYSIOLOGY

Edited by **David M. Prescott**

Volume 1, April 1964, 456 pp., \$16.50

Volume 1 is devoted to culture methods and experimental procedures for a variety of cell types including amoeba, ciliates, mammalian tissue culture cells, unicellular algae, slime molds, and grasshopper neuroblasts.

## EXPERIMENTAL CHEMOTHERAPY

Edited by **R. J. Schnitzer** and **Frank Hawking**

Volume 2, April 1964, 614 pp., \$23.00

This treatise provides comprehensive coverage of the broad field of experimental chemotherapy, including the developments of the last 60 years, and emphasizing those advances made since 1955.

## STABILITY AND CONTROL OF AIRPLANES AND HELICOPTERS

By **Edward Seckel**

April 1964, 476 pp., \$15.00

This book is designed for advanced undergraduate and graduate courses in stability and control of aircraft in the fields of aeronautical and mechanical engineering.

## MODERN DEVELOPMENTS IN ELECTRON MICROSCOPY

Edited by **Benjamin M. Siegel**

1964, 432 pp., \$13.50

This volume contains sections covering the basic physics of the electron microscope with emphasis on current problems of high resolution.

## ELEMENTS OF NUMERICAL ANALYSIS

By **James Singer**

An Academic Press Textbook in Mathematics

Ralph P. Boas, Jr., Consulting Editor

April 1964, 395 pp., \$8.75

Here is a coherent, systematic, lucid treatment of classical mathematical computation, explaining how to obtain a numerical result, and how to judge the reliability of that result.

## COMPUTER PROGRAMMING

A Mixed Language Approach

By **Marvin L. Stein** and **William D. Munro**

April 1964, 459 pp., \$11.50

*Computer Programming* is a textbook designed to give a complete course in the three languages of computers—basic machine, symbolic machine, and problem-oriented.

## INTRODUCTION TO SYSTEM PROGRAMMING

A London School of Economics Symposium

Edited by **Peter Wegner**

1964, 316 pp., \$11.50

The volume as a whole is experimental, seeking to develop a nucleus of material which might in the future become the basis of a science of programming.

## PHYSIOLOGY OF MOLLUSCA

Edited by **Karl M. Wilbur** and **C. M. Yonge**

Volume 1, 1964, 473 pp., \$16.00

Starting with an essential preliminary account of structure and classification, the former considered from the standpoint of functional morphology, the *Physiology of Mollusca* reviews as widely as possible all modern work on living mollusca.

## PATTERNS IN THE BALANCE OF NATURE

By **C. B. Williams**

Volume 3 of *Theoretical and Experimental Biology*

An International Series of Monographs

Edited by **J. F. Danielli**

April 1964, 324 pp., \$9.50

This book draws attention to problems in statistical ecology, particularly in population balance, which have in common the property of being expressible as a frequency distribution, and so have a mathematical pattern.

## HORMONES AND THE KIDNEY

Proceedings of the 89th Meeting of the Society  
for Endocrinology held at Cambridge, 1962

Edited by **Peter C. Williams**

1964, 387 pp., \$13.50

The actions of neurohypophyseal, adrenal cortical, and parathyroid hormones on the kidney and on salt and water metabolism are fully discussed.

## ADVANCES IN NUCLEAR SCIENCE AND TECHNOLOGY

Edited by **Ernest J. Henley** and **Herbert Kouts**

Volume 2, April 1964, 378 pp., \$14.00

This volume contains such topics as—reactor transfer functions, heat exchangers in nuclear power plants, formation of free radicals in polymers by radiation, their reactions and reactivities, and some aspects of the use of digital computers in nuclear reactor design.

## ADVANCES IN PHYSICAL ORGANIC CHEMISTRY

Edited by **V. Gold**

Volume 2, 1964, 288 pp., \$10.00

Contributions to Volume 2 include important articles on the use of isotopes in mechanism studies.

## INFRARED ABSORPTION SPECTRA

Index for 1958-1962

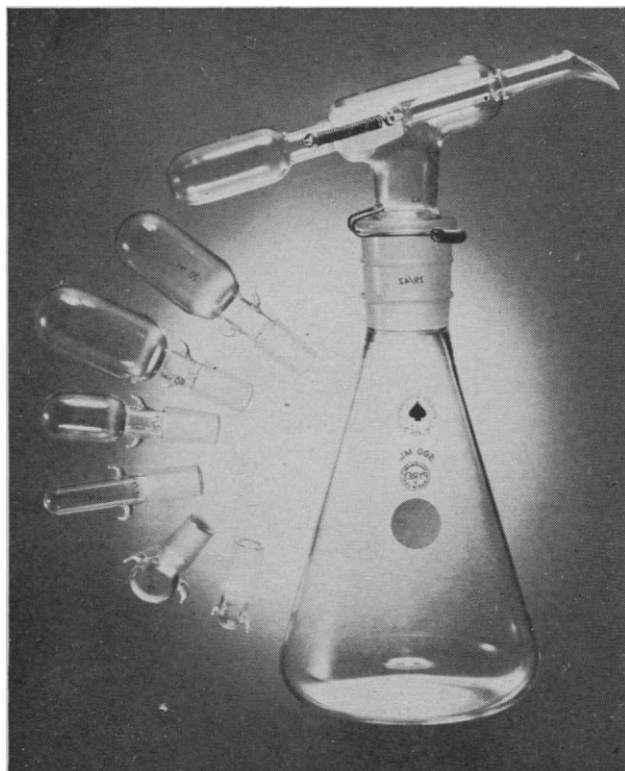
By **Herbert M. Hershenson**

1964, 153 pp., \$12.00

This volume includes 66 journals and one collection of spectra in book form. It contains approximately 20,000 references to infrared absorption spectra.

Detailed information available upon request

# ACE AUTOMATIC PIPETTER



• **Fills and Pours Automatically, Rapidly.**

• **Interchangeable: One Head For All Capacities, All Volumes.**

• **Short Tipping Angle.**

8004 DISPENSING PIPET, Automatic. Fills and pours automatically, rapidly. One head for all capacities, all volumes. Short tipping angle. Interchangeable volumetric bulbs give reproducible volumes within  $\pm 1\%$  for capacities greater than 5 ml. Smaller capacities to within  $\pm 0.1$  ml. reproducible. Bulb joint is \$ 14/ 20, head and flask \$ 29/42. Please specify volume of bulb and flask when ordering.

\$ 14/20 Interchangeable Volumetric Heads, Cap.: 1 ml.: \$3.75, 3 ml.: \$3.75, 5 ml.: \$3.75, 10 ml.: \$3.85, 15 ml.: \$3.85, 20 ml.: \$3.95, 25 ml.: \$3.95. Specials to order.

\$ 29/42 Erlenmeyer Flask, Cap. 500 ml.: \$2.60, 1000 ml.: \$3.10.

\$ 29/42 Flask Head \$11.80.

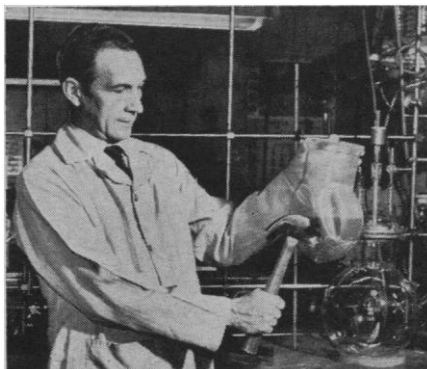
Combines the light weight the impact and shatter resistance of plastic with the transparency of glass.

## ACE DURA-VAC<sup>®</sup>

VACUUM PLASTIC DESICCATOR

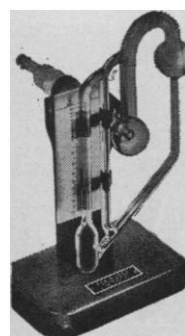
- ★ Safe—extremely implosion resistant.
- ★ Strong—spherical shape presents maximum strength, both in resistance to pressure and deflection of impact blows.
- ★ Light weight—52% lighter than glass.
- ★ Transparent—92% light transmission.
- ★ Large working area—6½" height available at center above 9¼" dia. porcelain plate. Holds 2 lbs. Drierite or similar material. Ample space for air circulation. Price complete without plate \$46.00.

Also available, Ace Dura-Vac<sup>®</sup> "Standard" with the new instant vacuum release. Send for Brochure.



## New ACE plastic coating makes glass safe has many uses

- When glass breaks during hazardous experiments, coating contains flying glass particles, prevents injury.
  - Retains valuable research results long enough to permit recovery.
  - In vacuum systems, prevents flying glass when evacuated flasks are broken.
  - Seals joints, stopcocks.
  - Increases resistance to mechanical shock, builds up handles on spatulas, coats clamps, rings, tongs.
  - Easy to apply. Directions included.
  - Economical. Price \$5.50 500 cc. Half gallon \$17.25
- Order or write for folder.



## ACE McLEOD GAUGE

accurate to within  $\pm 3\%$

The most convenient and economical instrument for measuring low pressures from 1 micron up. Ace McLeod Gauge, supplied with Hammertone green stand, has metal locking device with position holding action eliminating the need for glass hooks and springs, will hold to any position to which it is rotated. Calibrated TRUBORE<sup>®</sup> Tubing assures accuracy and changeability in each of the following pressure ranges:

Type	Pressure Range mm. Hg.	Lowest Reading mm. Hg.
A	0-1.0	0.001
B	0-5.0	0.005
C	0-10.0	0.010
D	0-15.0	0.050

For complete line of Ace gauges, see Ace Catalog 60.

For further details, see your new Ace Catalog 64 or write us for information on any specific item.



## ACE GLASS INCORPORATED

Vineland, New Jersey

LOUISVILLE, Ky.

SPRINGFIELD, MASS.



# EXTEND MOLECULAR CUTOFF LIMITS IN GEL FILTRATION

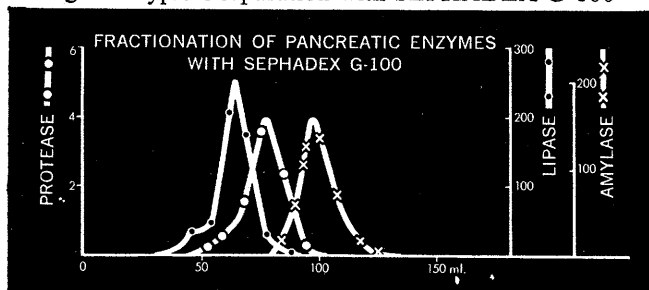
## Sephadex® G-100 G-200 “new ‘highs’ for macromolecule separation”

**What they are** SEPHADEX G-100 and G-200 are like the already well-known SEPHADEX series G-25, G-50 and G-75 dextran gels, produced by cross-linking dextran chains with random ether bonds between glucose residues in the polysaccharide chains. They have good mechanical and

chemical stability, and upon swelling they produce three dimensional networks devoid of ionic groups. Prepared in bead form, G-200 and especially G-100 offer very low flow resistance permitting the use of fine particles for good resolution of separation.

**What they do** The two new SEPHADEX types offer an important extension of the gel filtration method for the fractionation of macromolecules. SEPHADEX G-100 separates substances with molecular weights smaller than about 100,000. SEPHADEX G-200 separates substances with molecular weights smaller than about 200,000. As with the other SEPHADEX types, G-100 and G-200 act as molecular sieves. Molecules of larger dimension than the matrices of the particles do not penetrate the swollen gel.

Fig. I a typical separation with SEPHADEX G-100



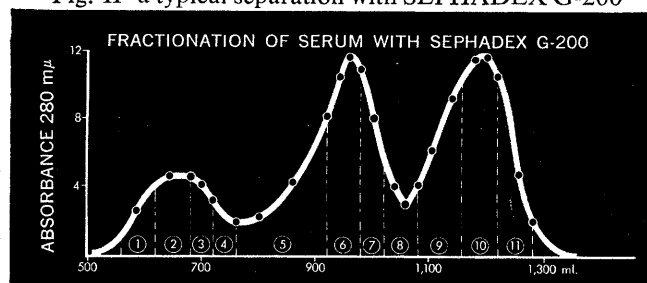
Sample: 3 ml. of an extract of powdered swine pancreas in 0.05 M acetate buffer pH 5.3 containing 0.005 M calcium acetate.

Column size: 117 ml. (2 x 37 cm.).

Elution: 0.05 M acetate buffer pH 5.3 containing 0.005 M calcium acetate.

Figure I shows a separation of pancreatic enzymes. Powdered swine pancreas was extracted with a 0.05 M acetate buffer pH 5.3 containing 0.005 M calcium acetate. A 3 ml. sample was introduced in a 2 x 37 cm. (117 ml.) column packed with SEPHADEX G-100.

Fig. II a typical separation with SEPHADEX G-200



Sample: 50 ml. swine serum.

Elution: 1 M NaCl in 0.1 M tris-HCl buffer pH 8.0.  
Column size: 1800 ml. (7.5 x 41 cm.).

Figure II shows a separation of serum proteins. A column 7.5 x 41 cm. (volume 1800 ml.) with SEPHADEX G-200 was used for gel filtration of a sample of 50 ml. swine serum. Elution was carried out with 1 M NaCl in 0.1 M tris-HCl buffer pH 8.0.

**What they promise** Evidently SEPHADEX G-100 and G-200 cover a field of enormous interest, especially for biochemical and medical research. As well as superseding earlier highly time-consuming analytical methods,

the new types of SEPHADEX make it possible to fractionate high polymers such as plasma proteins, hormones, and polysaccharides on preparative scale.

Also available: SEPHADEX G-25, G-50 and G-75.

PHARMACIA  
LEADING IN DEXTRAN  
CHEMISTRY



For full information on  
the use of SEPHADEX  
in gel filtration, send  
the coupon with your  
letterhead.

(Inquiries outside  
North America should  
be directed to  
AB PHARMACIA,  
Uppsala, Sweden.)



PHARMACIA FINE CHEMICALS, INC.

Department S, 501 Fifth Avenue, New York 17, New York

Please send the following:

☐ G-100 and G-200  
BROCHURE

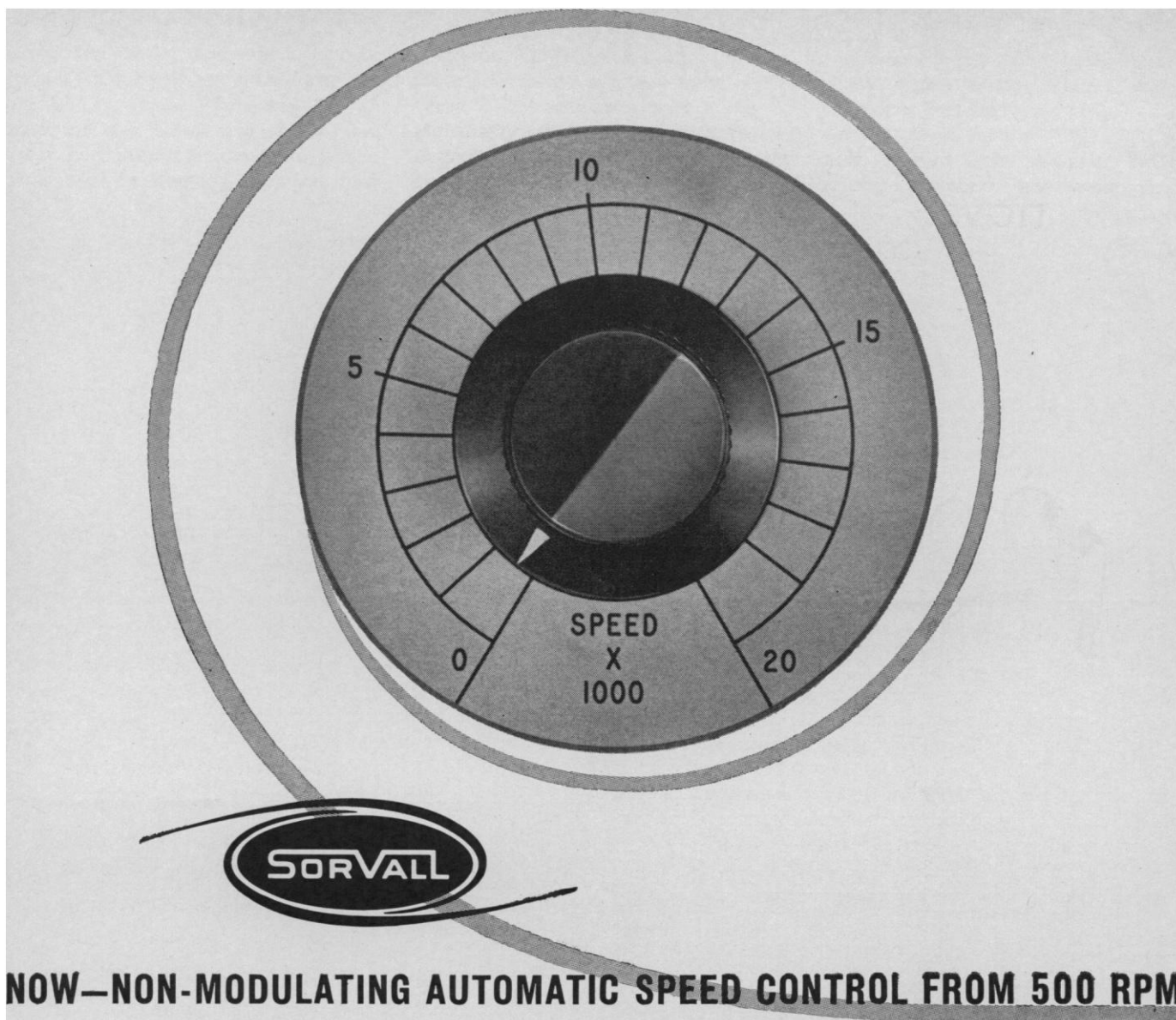
☐ "SEPHADEX": A Unique  
Substance for Modern  
Chromatography

☐ "SEPHADEX in Gel  
Filtration": Theory  
and Experimental  
Technique

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_



**NOW—NON-MODULATING AUTOMATIC SPEED CONTROL FROM 500 RPM**

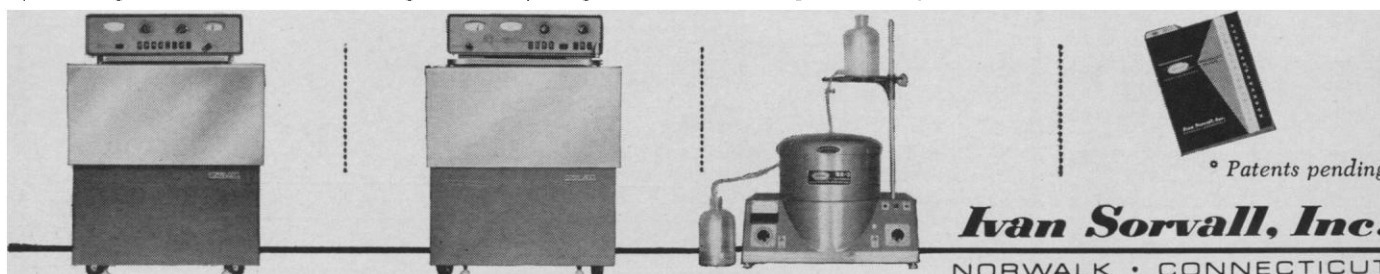
Maximum acceleration rate to any speed from 500 RPM to top speed is now obtainable automatically with the new SORVALL Speed Selector\*. Preset speeds are accurately maintained with all rotors regardless of fluctuations in line voltage. Total running time to achieve desired separation is shorter than ever — shorter than for any other centrifuges in these speed ranges. This new Speed Selector is standard equipment for the SORVALL RC-2, RC-3 and SS-3 Automatic Centrifuges (see illustrations), and can be installed on RC-2 and SS-3 units previously purchased — another example of how our continuing program of design development keeps your SORVALL Centrifuges ahead of the times. Why buy an ordinary centrifuge when you can enjoy a long-term investment for the same price.

**RC-2 Automatic Superspeed Refrigerated Centrifuge** Up to 17,500 RPM — 37,000 x G (with SS-34 Rotor) The Standard in the Superspeed Refrigerated Field

**RC-3 General-Purpose Automatic Refrigerated Centrifuge** Up to 5,000 RPM (with all rotors) — and to 5,140 x G depending upon rotor being used. Accepts Eight Rotors

**SS-3 Table-Top Automatic Superspeed Centrifuge** Up to 17,000 RPM — 34,800 x G (with SS-34 Rotor) The Most Advanced Superspeed Centrifuge in its Range

For further information, ask us for our 20-page illustrated **Product Guide of SORVALL Centrifuges and Laboratory Instruments** Number SC-5RC-S plus Price List

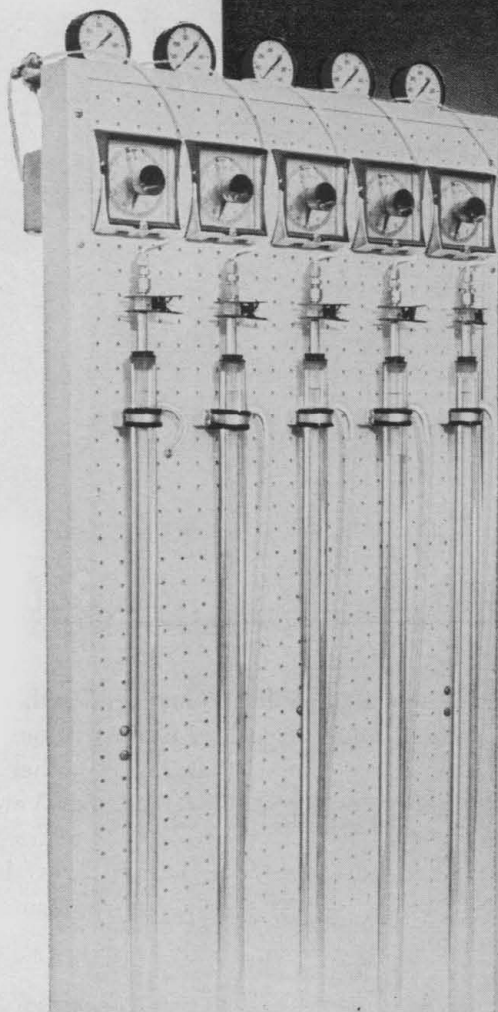


now automatically

...up to **FIVE**

amino acid chromatograms  
in 24 hours

(without human intervention)



**Load 1, 2, 3, 4 or 5...**

columns depending on your daily workload.  
What's more, you can adapt your present  
AutoAnalyzer system to this new technique.

Load it, set it and forget it...samples are automatically  
programmed one after the other...next day you'll  
have up to five complete chromatograms from a  
like number of samples. Technicon's accelerated  
Amino Acids AutoAnalyzer separates and analyzes  
the amino acids normally found in protein  
hydrolysates in less than five hours

...one machine completes the separation and  
analysis of up to *five different* samples in just one day.

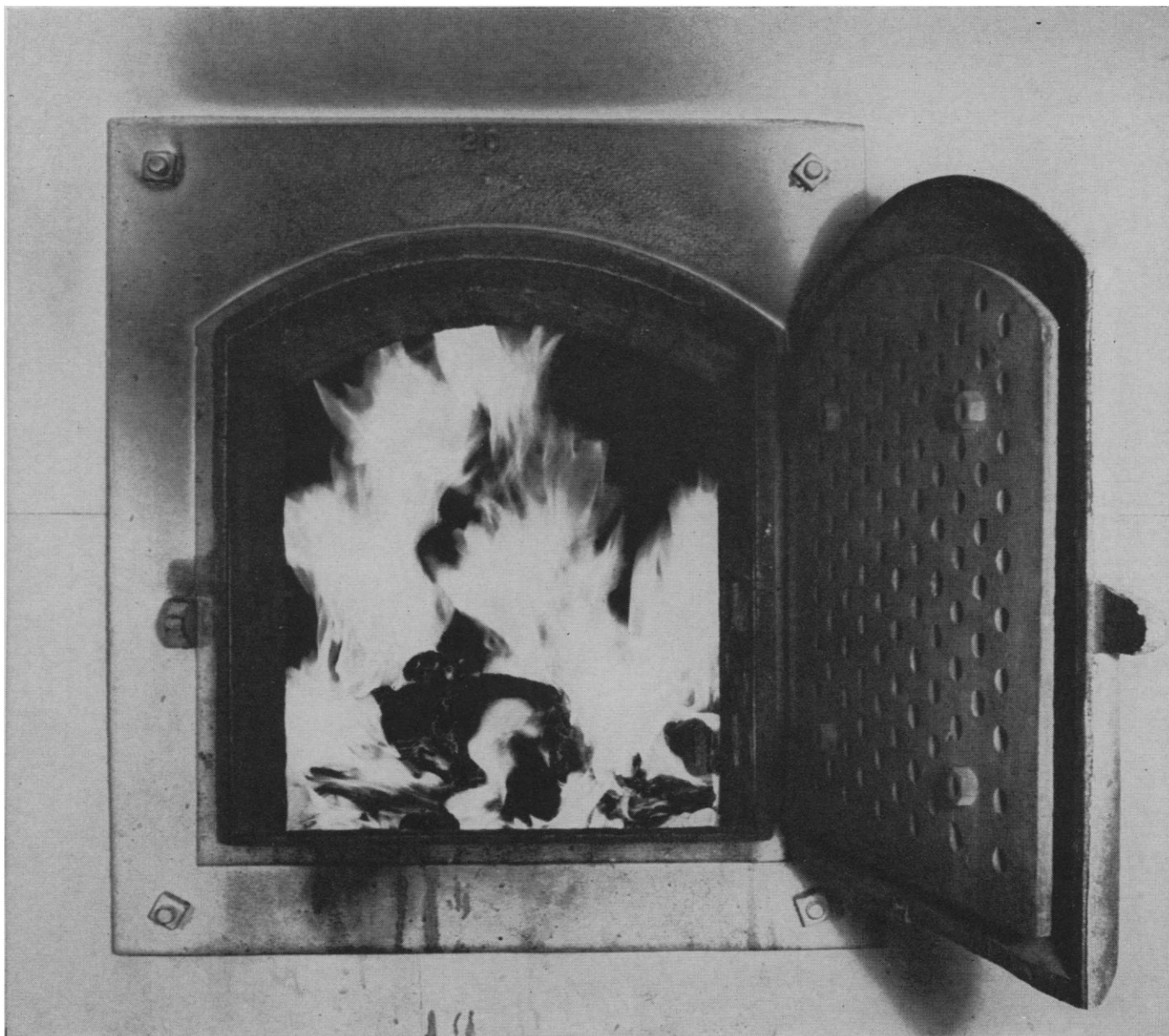
One Chromatogram automatically follows  
another from start to finish with no human  
intervention. Here's how...merely arrange the  
required chromatographic columns (up to five) in  
series and autoanalyze the column effluents in  
pre-timed sequence. This advance in ion exchange  
chromatography is made possible by the superior  
resolving power of Technicon's unique Chromobead\*  
resin...plus new chromatographic columns which  
are eluted by a very steep pH and ionic  
strength gradient.

TECHNICON®  
**AutoAnalyzer®**

\*Trade Mark

**TECHNICON**

CHROMATOGRAPHY CORP.  
Research Park • Chauncey, New York



## With S/P disposables, your washing, cleaning, sterilizing problems go up in smoke

Use them once, then incinerate. No more scraping. Or washing. Air drying. Re-assembling. Sterilization. Or cooling. All of these steps toward re-use "go up in smoke" when you use S/P disposables in your laboratory. They're convenient, time-saving and economical. They reach you chemically clean, eliminating the possibility of contamination. S/P has a wide variety of time-saving disposables. Petri

dishes, beakers, pipettes, funnels, liquid samplers, test tubes, syringes, storage bags for solids and liquids, needles and . . . well, quite a few more. Too many to list here. But we have listed our extensive line of disposables in a special illustrated brochure. Just write to our Evanston office for your copy of this comprehensive catalog. Or ask your S/P Representative to see his samples.

**sp scientific products**

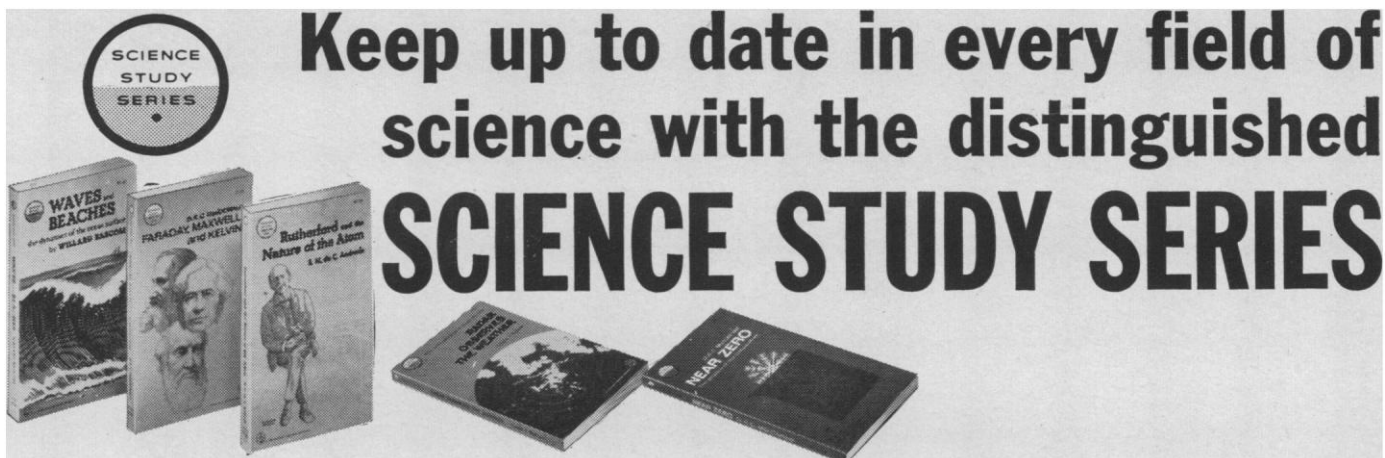
DIVISION OF AMERICAN HOSPITAL SUPPLY CORPORATION

GENERAL OFFICES: 1210 LEON PLACE, EVANSTON, ILLINOIS

Regional Stocking Locations: Atlanta • Boston • Charlotte • Chicago • Columbus • Dallas • Detroit • Kansas City  
Los Angeles • Miami • Minneapolis • New Orleans • New York • San Francisco • Seattle • Washington, D.C.

Export Department—Flushing 58, L. I., New York. In Canada: Canadian Laboratory Supplies Limited.  
In Mexico: Hoffman-Pinther & Bosworth, S.A.





Described as "a landmark in science education" when introduced six years ago, the Science Study Series, prepared by the Physical Science Study Committee at M.I.T., now includes 34 titles in the physical and life sciences.

#### Just published:

**S-34 WAVES AND BEACHES: The Dynamics of the Ocean Surface.** Willard Bascom, President, Ocean Science and Engineering, Inc. Spectacular 100 foot storm waves and the destructive tsunami, or tidal waves, are only a part of the dramatic phenomena explained in this unique synthesis of all that man has learned about the struggle between the land and the sea. 280 pp., 77 drawings, 23 photos. \$1.45

**S-33 FARADAY, MAXWELL, AND KELVIN.** D. K. C. MacDonald, National Research Council of Canada. The story of three men of varied interests whose energetic experimenting carried forth concepts that laid the groundwork for the entire electrical and electronics industry. Michael Faraday discovered the relationships governing the interaction of electricity and magnetism; James Clerk Maxwell formulated the mathematical descriptions of electromagnetism; and Lord Kelvin extended both their work and also contributed much to our understanding of heat. 160 pp., 2 drawings, 59 photos. \$1.25

**S-35 RUTHERFORD AND THE NATURE OF THE ATOM.** E. N. da C. Andrade, University of London. A brilliant biography of the great physicist whose original research provided the basis for all the central ideas of modern nuclear physics. Professor Andrade follows Rutherford's career through his investigation of the fundamental laws of radioactivity and his model of the nuclear atom, to his last years as head of Britain's renowned Cavendish Laboratory. 320 pp., 12 photos, index. \$1.25

#### Life Sciences

**S-4 ECHOES OF BATS AND MEN.** Donald R. Griffin, Harvard University. "Authoritative and thoroughly scientific, but more fascinating than most novels." — GEORGE GAYLORD SIMPSON. 156 pp., 15 line drawings, bibliog., index. \$1.25

**S-9 WAVES AND THE EAR.** Willem A. van Bergeijk, John R. Pierce and Edward E. David, Jr., Bell Telephone Laboratories. 235 pp., 65 line cuts, 5 photos, bibliog., index. \$1.45

**S-15 PASTEUR AND MODERN SCIENCE.** René Dubos, Rockefeller Institute. 159 pp., index. \$1.25

**S-23 LIFE IN THE UNIVERSE: A Scientific Discussion.** Michael W. Ovenden, Univ. of Glasgow. An examination of such basic questions as what distinguishes living matter from non-living matter; and what might exist on other planets. 160 pp., 23 line drawings, index. \$1.25

**S-25 NERVES AND MUSCLES.** Robert Galambos, Yale Univ. A splendid introduction to the field of biophysics in this engaging description of the incredible electrical networks of the human body. 158 pp., 30 line drawings, index. \$1.25

**S-31 KNOWLEDGE AND WONDER: The Natural World as Man Knows It.** Victor F. Weisskopf, M.I.T. Winner of the 1962 Edison Award. 282 pp., 57 drawings, 10 photos. \$1.45

#### Physical Sciences

**S-1 THE NEUTRON STORY.** Donald J. Hughes. 158 pp., 39 line drawings, index. \$1.25

**S-2 MAGNETS: The Education of a Physicist.** Francis Bitter, M.I.T. "A masterpiece. This combination of autobiography and popular science exposition is very rare and extraordinarily effective." — B. ALDEN THRESHER. 155 pp., 27 line drawings, index. \$1.25

**S-3 SOAP BUBBLES AND THE FORCES WHICH MOULD THEM.** Sir Charles Vernon Boys. "A superb classic... can capture the imagination of the young (and the old)." — DEREK J. de SOLLA PRICE, Yale University. 156 pp., 69 line drawings. \$1.25

**S-7 CRYSTALS AND CRYSTAL GROWING.** Alan Holden, Bell Telephone Laboratories, and Phyllis Singer. 320 pp., 150 line drawings, 56 photos (13 color), appendices, research suggestions, bibliog., index. \$1.45

**S-8 THE PHYSICS OF TELEVISION.** Donald G. Fink and David M. Lutyens. 160 pp., 44 diagrams, 4 photos, index. \$1.25

**S-10 THE BIRTH OF A NEW PHYSICS. I.** Bernard Cohen, Harvard University. "The development from Copernicus to Newton of the single most important idea in physics — the dynamics of motion... an outstanding book." — *Scientific American*. 200 pp., 34 line drawings, 8 photos, bibliog., index. \$1.25

**S-11 HORNS, STRINGS, AND HARMONY.** Arthur H. Benade, Case Institute of Technology. 271 pp., 68 line drawings, 8 photos, bibliog., index. \$1.45

**S-12 THE RESTLESS ATOM.** Alfred Romer, St. Lawrence University. 198 pp., 31 drawings and diagrams, appendices, index. \$1.25

**S-13 MICHELSON AND THE SPEED OF LIGHT.** Bernard Jaffe. 197 pp., 14 drawings, 4 photos, bibliog., index. \$1.25

**S-17 ACCELERATORS: Machines of Nuclear Physics.** Robert R. Wilson and Raphael Littauer, Cornell Univ. From the earliest X-ray tube to the atom smashers of today — "A fine example of the excellence of the series." — *Science*. 196 pp., 16 photos, 36 drawings, appendices, index. \$1.45

**S-20 NEAR ZERO: The Physics of Low Temperature.** D. K. C. MacDonald, National Research Council of Canada. 116 pp., 8 photos, 12 line drawings. \$1.25

**S-21 SHAPE AND FLOW: The Fluid Dynamics of Drag.** Ascher H. Shapiro, M.I.T. A visually and scientifically exciting exploration of the phenomena of fluid dynamics. 186 pp., 93 photos, index. \$1.25

**S-22 GRAVITY.** George Gamow, Univ. of Colorado. From Galileo to the concepts of Newton and Einstein, an eminent scientist examines the nature of gravity. 157 pp., 29 line drawings, index. \$1.25

**S-26 THE ORIGIN OF RADAR.** Robert Morris Page, U.S. Naval Laboratory. 196 pp., 12 photos, chronology, index. \$1.25

**S-27 HEAT ENGINES: Thermodynamics in Theory and Practice.** John F. Sanford, South Dakota State College. 292 pp., 56 drawings, index, appendix. \$1.45

**S-32 MATHEMATICAL ASPECTS OF PHYSICS: An Introduction.** Francis Bitter, M.I.T. 188 pp., 59 drawings, 5 photos. \$1.25

**S-28 COUNT RUMFORD: Physicist Extraordinary.** Sanborn C. Brown, M.I.T. The fas-

cinating life of the notorious eighteenth century soldier of fortune who was also an inventive physicist and prolific inventor. 200 pp., 12 photos, bibliog., index. \$1.25

**S-16 THE WATERSHED: A Biography of Johannes Kepler.** Arthur Koestler. 280 pp., 17 illus., index. \$1.45

#### General Science

**S-5 HOW OLD IS THE EARTH?** Patrick M. Hurley, M.I.T. 160 pp., 27 drawings, 8 photos, index. \$1.25

**S-14 THE UNIVERSE AT LARGE.** Hermann Bondi, University of London. "The author... can be bracketed with George Gamow as having special ability to put difficult ideas into simple language." — *Bulletin of the Atomic Scientists*. 154 pp., 52 drawings, 12 photos, index. \$1.25

**S-18 WATER: The Mirror of Science.** Kenneth S. Davis and John Arthur Day, Linfield College. A discussion of the properties of water as seen by various branches of science. "One of the best: sound and informative." — *N. Y. Herald Tribune*. 195 pp., 22 drawings and diagrams, 4 photos, index. \$1.25

**S-19 THE NATURE OF VIOLENT STORMS.** Louis J. Battan, Univ. of Arizona. 159 pp., 22 diagrams and maps, 17 photos, bibliog., index. \$1.25

**S-24 RADAR OBSERVES THE WEATHER.** Louis J. Battan, Univ. of Arizona. How radar is revolutionizing the science of meteorology through its ability to detect everything from a raindrop to the formation of hurricanes. 158 pp., 16 photos, 20 line drawings, index, appendices. \$1.25

**S-29 CLOUD PHYSICS AND CLOUD SEEDING.** Louis J. Battan, Univ. of Arizona. The structure and growth of clouds, and a lucid analysis of man's attempts to modify the weather. 160 pp., 26 linecuts, 16 photos, appendix, index. \$1.25

**S-30 LADY LUCK: The Theory of Probability.** Warren Weaver, Alfred P. Sloan Foundation. An engaging discussion of the probability theory in science, business, games, and everyday life by one of the leading mathematicians of our time. 392 pp., 49 drawings. \$1.45

Mail to any bookstore or to

**DOUBLEDAY & COMPANY, INC.**

Garden City, New York

4-JE-5

Please send me the books whose numbers I have indicated:


NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_ ZIP \_\_\_\_\_

☐ Bill me, plus shipping charges.

☐ Full payment of \$\_\_\_\_\_ enclosed.

Publisher will pay all shipping charges.



## TWO EXCELLENT REASONS WHY YOU SHOULD HAVE TWO IEC MICROTOMES

### For paraffin sections MINOT CUSTOM MICROTOME

Several outstanding features make the Minot Custom an ideal instrument for paraffin sectioning. It is truly **custom built** . . . painstakingly crafted with uncompromising precision which enables you to produce uniformly thin, undistorted sections hour after hour.

It's easy to use. Thumb screws anchor the knife in place and alter the angle of cut at will. Another thumb screw allows you to select the thickness of cut at 2 micron increments from 2 to 16 microns. A ball and socket specimen clamp allows quick orientation and you can remove the specimen plate and replace it with another without losing orientation. A direct screw-drive feed gives rigid accuracy as each turn of the balanced drive wheel advances the specimen and passes it over the knife.

You can clean this microtome with a faucet spray if you like. It is made of 100% rustproof materials in a natural metal finish that can't chip or stain. It has few moving parts and is so rugged it holds its original precision for a lifetime in the busiest laboratories.

### For frozen sections NEW CTD MICROTOME CRYOSTAT

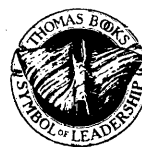
Now frozen sectioning becomes even more refined with IEC's new CTD. This instrument is an improved model of the famous International-Harris CT that revolutionized frozen sectioning. The CTD features a new **polar zone cold control** that maintains precise temperatures . . .  $\pm 1^{\circ} \text{C}$  . . . right at knife level where temperature is most critical. Just set the selector knob at any temperature between  $-10^{\circ} \text{C}$  and  $-30^{\circ} \text{C}$ . The CTD will hold this temperature and prove it with a readout device which indicates the actual temperature at knife level. A new thermal insulated clear plastic cover and special anti-fog control eliminates condensation problems regardless of ambient humidity. A drain is provided for ease in cleaning, defrosting, and decontamination when necessary. Everything necessary for precise frozen sectioning has been perfected in this compact, efficient instrument including the 100% rustproof Minot Custom Microtome. Fresh tissue to finished slide takes only minutes with the CTD. It will give you large or small, thin, undistorted sections having exceptional cytologic detail for definitive pathologic diagnosis, and histochemistry.

**New accessories including rust proof razor blade holder with attached anti-roll, rapid freeze device, new micrometer adjusted anti-roll and new microtome knife specially designed for fresh frozen tissue are now available. Send for descriptive brochure.**

**INTERNATIONAL IEC EQUIPMENT CO.**

300 SECOND AVENUE • NEEDHAM HEIGHTS, MASS., 02194

# NEW BOOKS IN SCIENCE & TECHNOLOGY



## To Be Off Press in May and June, 1964 . . .

- ☐ **STATISTICALLY SPEAKING** by Warren K. Garlington, *Long Beach State Coll., Long Beach, Calif.*, and Helen E. Shimota, *Univ. of Southern Calif., Los Angeles, Calif.* 144 pp., 48 il., about \$6.
- ☐ **PHYSIOLOGICAL PROBLEMS IN SPACE EXPLORATION** edited by James D. Hardy, *Yale Univ., New Haven, Conn.* (With 7 Contributors) 344 pp., 100 il. (Amer. Lec. Physiology), about \$12.50.
- ☐ **THE CHEMICAL ORIGIN OF LIFE** by Alexander I. Oparin, *U.S.S.R. Academy of Sciences, Moscow, U.S.S.R.* Translated from the Russian by Ann Syngé, *Stonehaven, Scotland.* About 80 pp., 33 il. (Amer. Lec. Living Chemistry edited by Newton I. Kugelmass), about \$4.75.
- ☐ **STEROID ANALYSIS BY GAS LIQUID CHROMATOGRAPHY** by A. Anne Patti and Arthur A. Stein, *both of Albany Medical College, Albany, N. Y.* About 124 pp., 17 il., about \$6.25.
- ☐ **COPPER AND PEROXIDES IN RADIOBIOLOGY AND MEDICINE** by Jack Schubert, *Buenos Aires, Argentina.* About 208 pp., 18 il., about \$8.75.
- ☐ **THE BACKGROUND TO CHEMOTHERAPY OF VIRUS DISEASES** by C. H. Stuart-Harris, *Univ. of Sheffield, Sheffield, England*, and Lois Dickinson, *Boots Pure Drug Co., Ltd., Nottingham, England.* About 184 pp., 9 il. (Amer. Lec. Living Chemistry), about \$10.50.

### 15 Early 1964 Publications . . .

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>THE SEPTUM OF THE CAT</b> by Orlando J. Andy, <i>Univ. of Mississippi, Jackson, Miss.</i>, and Heinz Stephan, <i>Max-Planck-Institut für Hirnforschung, Frankfurt, Germany.</i> 96 pp., 53 il., \$6.75</li> <li><input type="checkbox"/> <b>THE TREATMENT OF MYCOTIC AND PARASITIC DISEASES OF THE CHEST</b> edited by John D. Steele, <i>Univ. of Calif., Los Angeles, Calif.</i> (With 14 Contributors) 280 pp. (7 x 10), 161 il. (The John Alexander Monograph Series), \$14.75</li> <li><input type="checkbox"/> <b>LECTURES FOR MEDICAL TECHNOLOGISTS</b> by H. Ivan Brown, <i>The Methodist Hospital of Central Illinois, Peoria, Ill.</i> With Contributions by Naomi Buchanan, Oscar T. Monson, J. Leonard Watson and Raymond M. Zwicker. 660 pp. (7 x 10), 285 il., 33 tables, \$19.50</li> <li><input type="checkbox"/> <b>RADIOACTIVE METAL MOBILIZATION IN MEDICINE</b> by A. Catsch, <i>Institute of Radiobiology, Karlsruhe, Germany.</i> Translated from the German by B. Kavin, <i>Veterans Administration Hosp., Fort Howard, Md.</i> 184 pp., 46 il. (Amer. Lec. Living Chemistry), \$7.50</li> <li><input type="checkbox"/> <b>MATHEMATICAL ELEMENTS OF LAMELLAR BONE REMODELLING</b> by H. M. Frost, <i>Henry Ford Hosp., Detroit, Mich.</i> 140 pp., 45 il. (Henry Ford Hospital Surgical Monograph edited by Conrad R. Lam), \$6.75</li> <li><input type="checkbox"/> <b>ELASTOLYSIS AND AGEING</b> by David A. Hall, <i>Univ. of Leeds, Leeds, England.</i> 176 pp., 23 il., 15 tables (Amer. Lec. Geriatrics &amp; Gerontology edited by James E. Birren), \$6.75</li> <li><input type="checkbox"/> <b>Kabat and Mayer's EXPERIMENTAL IMMUNOCHEMISTRY</b> (2nd Ed., 2nd Ptg.) by Elvin A. Kabat, <i>Columbia Univ., New York City.</i> With chapters on "Complement and Complement Fixation" and on "Kjeldahl Nitrogen Determination" by Manfred M. Mayer, <i>The Johns Hopkins Univ., Baltimore, Md.</i> 920 pp., 458 il., \$26.50</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>URINE AND THE URINARY SEDIMENT: A Practical Manual and Atlas</b> (2nd Ed., 4th Ptg.) by Richard W. Lippman, <i>Cedars of Lebanon Hosp., Los Angeles, Calif.</i> 152 pp. (7 x 10), 97 il. (92 in full color), \$9.50</li> <li><input type="checkbox"/> <b>COMPUTER APPLICATIONS IN MEDICINE</b> by Edward E. Mason and William G. Bulgren, <i>both of State Univ. of Iowa, Iowa City, Iowa.</i> 188 pp., 7 il. (Amer. Lec. Living Chemistry), \$6.75</li> <li><input type="checkbox"/> <b>THE REDUCTION OF PATIENT DOSE BY DIAGNOSTIC RADIOLOGIC INSTRUMENTATION</b> edited by Robert D. Moseley, Jr., and John H. Rust, <i>both of The Univ. of Chicago, Chicago, Ill.</i> (With 29 Contributors) 300 pp., 145 il., \$12.50</li> <li><input type="checkbox"/> <b>CHEMISTRY AND TREATMENT OF ADRENOCORTICAL DISEASES</b> by F. T. G. Prunty, <i>Univ. of London, London, England.</i> 418 pp., 99 il. (Amer. Lec. Living Chemistry), \$14.00</li> <li><input type="checkbox"/> <b>SOME MEDICAL ASPECTS OF MATHEMATICAL BIOLOGY</b> by Nicolas Rashevsky, <i>Univ. of Chicago, Chicago, Ill.</i> 342 pp., 60 il., 31 tables, (Amer. Lec. Living Chemistry), \$12.75</li> <li><input type="checkbox"/> <b>ELECTRONIC AND COMPUTER-ASSISTED STUDIES OF BIO-MEDICAL PROBLEMS</b> edited by Otto H. Schmitt, <i>Univ. of Minnesota, Minneapolis, Minn.</i>, and Cesar A. Caceres, <i>U. S. Public Health Service, Washington, D. C.</i> 344 pp., \$12.50</li> <li><input type="checkbox"/> <b>CHELATION THERAPY</b> by Alfred Soffer, <i>Northwestern Univ., Chicago, Ill.</i> Co-authors: Herta Spencer, Martin Rubin, Maynard B. Chenoweth, Gunther L. Eichhorn, and Betty Rosoff. 176 pp., 90 il., \$8.00</li> <li><input type="checkbox"/> <b>LAW, MEDICINE, SCIENCE—AND JUSTICE</b> edited by Larry Alan Bear, <i>Univ. of Puerto Rico, Rio Piedras, Puerto Rico.</i> Assisted by Brian Parker. (With 20 Contributors) 656 pp., 38 il., \$14.50</li> </ul> |
|---|--|

CHARLES C THOMAS • PUBLISHER

301-327 East  
Lawrence Avenue

SPRINGFIELD • ILLINOIS

8 MAY 1964

611



## Take time to find out

There are three distinctly new Beckman Infrared Spectrophotometers.

**IR-10** — a precision instrument with a range of 2.5 to 33.3 microns for only \$6,800.

**IR-11** — that runs survey scans in about 10 minutes over the 12.5 to 300 micron range.

**IR-12** — the widest continuous range, automatic spectrophotometer ever... 2.5 to 50 microns.

Take a few minutes to learn more about these unusual IR instruments.

Call your local Beckman Sales Engineer or write us direct for Data File LIR-38-364.

**Beckman**

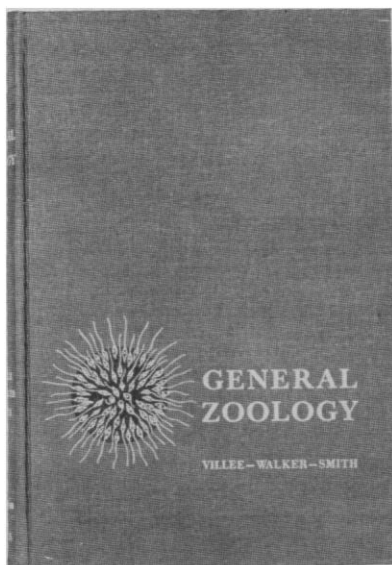
INSTRUMENTS, INC.

SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION

FULLERTON, CALIFORNIA • 92634

INTERNATIONAL SUBSIDIARIES: GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPETOWN, SOUTH AFRICA





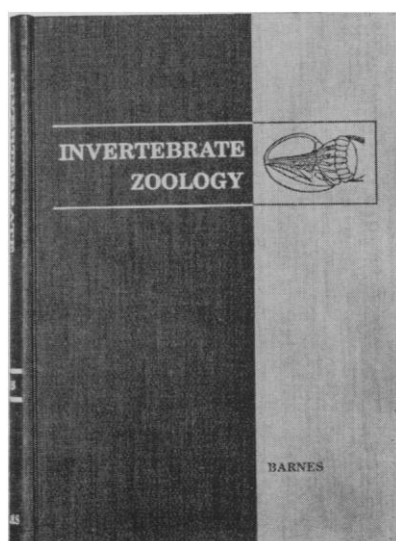
**Villee, Walker, Smith's  
General Zoology  
Second Edition!**

**Bloom & Fawcett's  
Textbook of Histology  
Eighth Edition!**

**Burrows' Textbook of  
Microbiology  
Eighteenth Edition!**

**Giese's Cell Physiology  
Second Edition!**

**Barnes'  
Invertebrate Zoology**



**Cheng's Biology of Animal  
Parasites  
New—Ready July!**

**Patton's Introductory Insect  
Physiology  
New—Published September, 1963!**

**Guyton's Function of the  
Human Body  
New (2nd) Edition—  
Published April, 1964!**

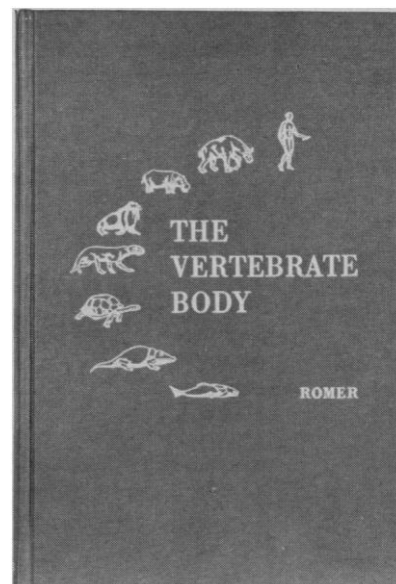
**SAUNDERS  
BOOKS  
on the  
Biological  
Sciences**

**Arey's Human Histology  
New (2nd) Edition**

*Consider These Outstanding  
Texts for Your Classes!*

**W. B. SAUNDERS  
COMPANY**

**West Washington Square  
Philadelphia 5, Pa.**

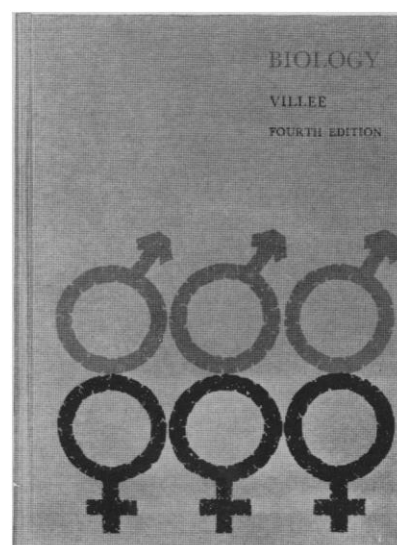


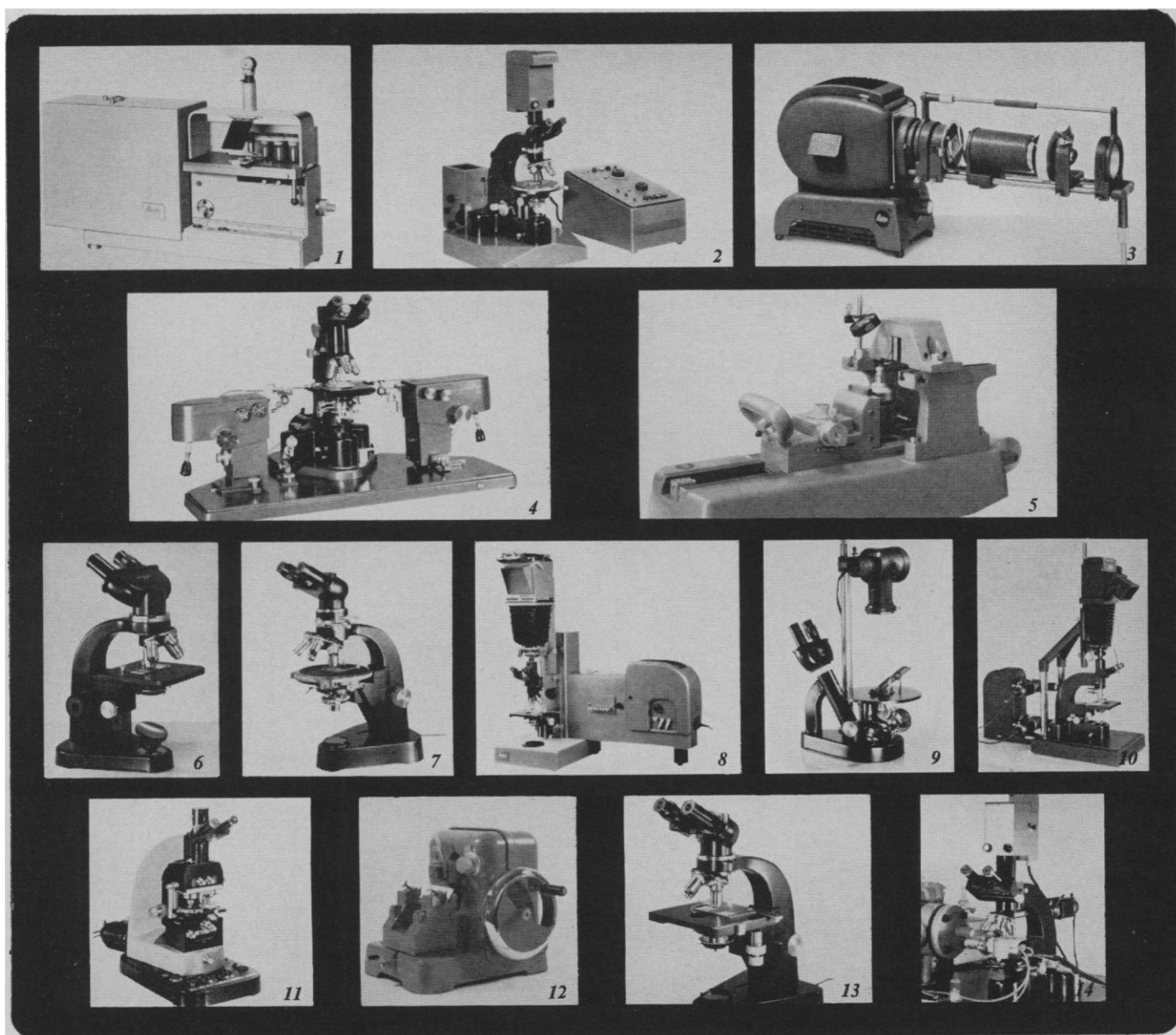
**Romer's  
Vertebrate Body  
Third Edition!**

**Romer's  
Shorter Version of  
The Vertebrate Body  
Third Edition!**

**Gardner's  
Fundamentals of  
Neurology  
Fourth Edition!**

**Villee's Biology  
Fourth Edition!**





(1) New Microprojector X1c (2) Ortholux Microscope with Orthomat Automatic Micro-camera (3) Prado Microprojector (4) Micro-manipulator (5) Base Sledge Microtome (6) SM Microscope (7) Dialux-pol Large Polarizing Microscope (8) Panphot Large Camera Microscope (9) Inverted Microscope (10) Aristophot Universal Photomicrographic and Macrophotographic Camera (11) Interference Microscope (12) Large Minot Rotary Microtome type 1212 (13) Labolux Microscope (14) Ortholux Microscope with Heating Stage

## LEITZ INSTRUMENTS FOR BIOLOGICAL RESEARCH

These are basic tools designed to assist in every area where research takes you. Biologists will find a precision Leitz instrument that exactly fits their requirements.

Every Leitz microscope, from the Universal Research Ortholux to the SM-f, is available equipped for practically limitless applications. Whether you require only bright-field viewing or fluorescent and phase contrast methods, you will find that all Leitz stands can be fitted to handle each technique easily.

Leitz laboratory instrumentation permits research in depth: —A superb micromanipulator with motion reduction to 1:1/800. —Several microtomes are available for the flawless preparation of microsections for applications in elec-

tron, phase contrast, research, and routine microscopy. —Heating and cooling stages for high- and low-temperature thermal observations. —The ultimate in microprojection for teaching and conference purposes. —A complete range of photomicrographic cameras—including the exclusive, automatic Orthomat.

These are but a few examples from the complete line of Leitz scientific instruments. Write for complete descriptive information of the individual instrument which you require.

54164



E. LEITZ, INC., 468 PARK AVENUE SOUTH, NEW YORK 16, N. Y.  
Distributors of the world-famous products of  
Ernst Leitz G.m.b.H., Wetzlar, Germany—Ernst Leitz Canada Ltd.  
LEICA AND LEICINA CAMERAS · LENSES · PROJECTORS · MICROSCOPES

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

DAVID M. BONNER	WILLARD F. LIBBY
MELVIN CALVIN	NEAL E. MILLER
ERNEST COURANT	PHILIP M. MORSE
FARRINGTON DANIELS	COLIN S. PITTENDRIGH
JOHN T. EDSALL	KENNETH S. PITZER
DAVID R. GODDARD	DEWITT STETTEN, JR.
ALEXANDER HOLLAENDER	WILLIAM L. STRAUS, JR.
ROBERT JASTROW	EDWARD L. TATUM
EDWIN M. LERNER II	JOHN R. WINCKLER
	CLARENCE M. ZENER

## Editorial Staff

## Editor

PHILIP H. ABELSON

## Publisher

DAEL WOLFLE

## Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

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

Assistant to the Editor: NANCY TEIMOURIAN

News and Comment: DANIEL S. GREENBERG, JOHN WALSH, ELINOR LANGER, MARION ZEIGER, ROSEMARY GALLI

Europe: VICTOR K. McELHENY, Flat 3, 18 Kensington Court Place, London, W.8, England (Western 5360)

Book Reviews: SARAH S. DEES

Editorial Assistants: ISABELLA BOULDIN, ELEANORE BUTZ, SYLVIA EBERHART, GRAYCE FINGER, NANCY HAMILTON, OLIVER HEATWOLE, ANNE HOLDSWORTH, MARCIA ISAAK, RUTH KINGERLEE, HOWARD NATHENSON, EDGAR RICH

## Advertising Staff

## Director

EARL J. SCHERAGO

## Production Manager

RAYMONDE SALAMA

Sales: New York, N.Y., 11 W. 42 St. (212-PE 6-1858): RICHARD L. CHARLES, ROBERT S. BUGBEE  
Scotch Plains, N.J., 12 Unami Lane (201-889-4873): C. RICHARD CALLIS

Chicago Ill., 6 W. Ontario St. (312-DE-7-4973): HERBERT BURKLAND

Los Angeles 45, Calif., 8255 Beverly Blvd. (213-653-9817); WINN NANCE

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. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

## For Better Schools

Throughout the U.S. there is interest in improving education, interest that is sincere and widespread, but that is also diffuse and sometimes competitive. Much of the effort is segmental: for a special group, such as the gifted or the handicapped; for a special area, such as mathematics; or for some specific method or device, such as films, TV, or programmed learning. Badly needed in all of this is a common cause around which the various forces for improvement can rally and unite. No segmental interest can serve as a common rallying ground, and probably no ready-made solution can either. What is needed is something broader, something that points out a promising path to follow instead of offering a specific solution to adopt, and something with enough boldness and optimism to give hope of a major surge forward.

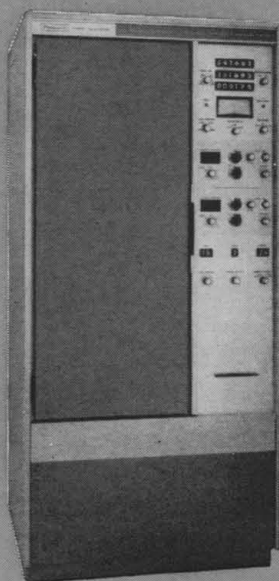
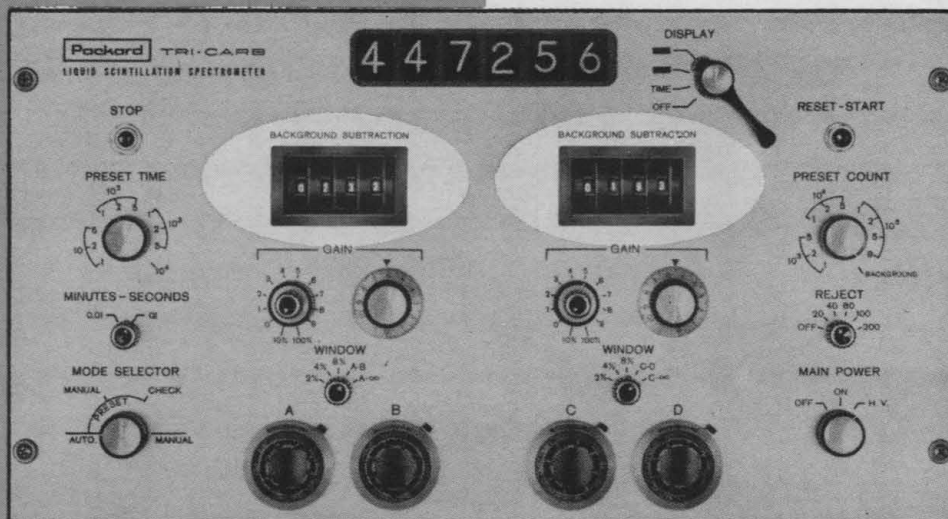
*Innovation and Experiment in Education* has these attributes. (This report was reviewed in *Science*, 24 April, p. 394.) It is available for 35 cents from the Superintendent of Documents, Washington, D.C. 20402. Perhaps this report can supply the needed rallying ground. Its authors, a panel of the President's Science Advisory Committee, included educational administrators and scholars in science, philosophy, and the humanities. It had the triple sponsorship of the President's Science Advisory Committee, the National Science Foundation, and the Office of Education. And it had a wealth of help from a wide range of consultants and critics. The result is a stimulating document that is conservative or middle-of-the-road in its realistic recognition of the complexity of the problems to be solved. But it is also bolder than most educational reports in its advocacy of sweeping, large-scale efforts to find out how major improvements can best be made, and optimistic in its confidence that such improvements are achievable.

The report proposes a continuing effort of innovation and experimentation, with emphasis along four lines: (i) We need to learn much more than we now know about the learning process, and the time is ripe for a major push in this direction. (ii) Recent experience in improving the teaching of science, mathematics, and modern languages gives reason to expect that similar efforts involving cooperation of scholars and teachers would improve education in English, social studies, and the arts. (iii) The education of teachers needs continuing attention if they are to deal intelligently with changing materials, the innovations that will result from other parts of the total program, and the variety of children who need their help and attention. (iv) The traditional school, with its middle-class values, is not well adapted to cope with the lack of motivation, the vocational expectations, and the home and social deficiencies of deprived and segregated children. Special educational opportunities are needed for these children and will surely have to be an integral part of the President's war on poverty.

Here, certainly, is a program of adequate scope and challenge to enlist a large amount of support. If it, or something close to it, is to become the rallying point for the many who are interested in educational improvement, the need now is for a ground swell of support from teachers, scholars, school officials, and public leaders. Much remains to be learned about how to improve education, but enough is known to let us take some major new steps as soon as there is general agreement on what we want to do.

—DAEL WOLFLE

# Automatic Background Subtraction IN NEW TRI-CARB<sup>®</sup> SPECTROMETERS



3000 SERIES

4000 SERIES



Background subtraction is an essential operation in data computations for most experiments involving the measurement of radioactivity. Background must be determined accurately, and subtracted from gross counts in order to achieve meaningful results.

New 3000 and 4000 Series Tri-Carb Spectrometers perform background subtraction automatically at the user's option. This eliminates the work of manual subtraction as part of the post count computations. More importantly, it ensures the accuracy of the scaler ratios which these instruments are capable of calculating automatically. In quench monitoring, for example, calculation of scaler ratios using gross counts (background not subtracted), can introduce significant errors, even for samples with count rates as much as a hundred times background.

There are several methods of performing the automatic subtraction of background. The one found to be most accurate at all count rates is *electronic subtraction of a statistically pre-determined background prior to each counting run*. In new Tri-Carb Spectrometers, the user simply dials into a four-digit register the background to be subtracted from each channel during the preset time period. This method assures complete statistical accuracy, even on low activity samples and on the blanks used to monitor background in every experiment. An informative data sheet comparing alternate methods of background subtraction is available and will be mailed on request.

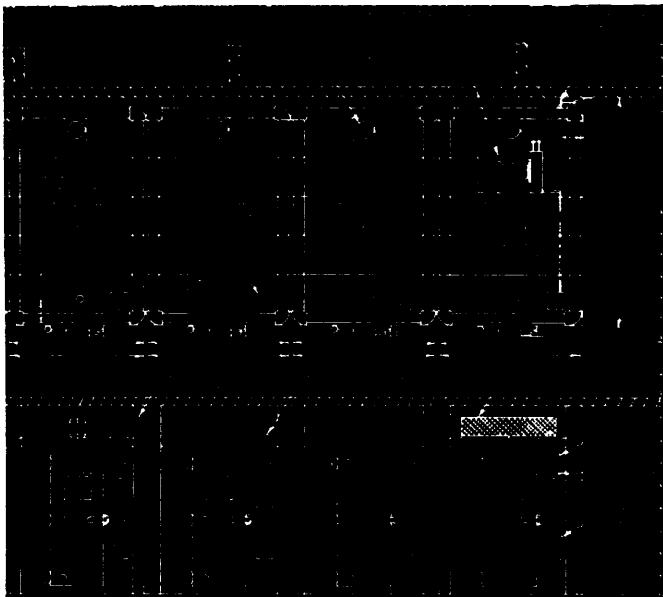
*Automatic background subtraction is just one of many significant new features available in Packard Tri-Carb Spectrometers. Ask your Packard Sales Engineer for complete details, or write for Bulletin 1030.*

**Packard**

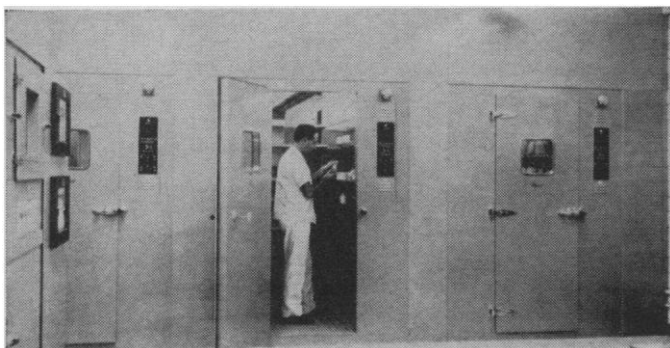
**PACKARD INSTRUMENT COMPANY, INC.**

BOX 428 • LA GRANGE, ILLINOIS • AREA CODE 312 • 485-6330





## HOTPACK'S E.P.S.\* LOWERS YOUR "BUILT-IN" COST!



### New Warm-Cold Room Planning Service

Hotpack's \*Early Planning Service offers you free consultation service for built-in working cold labs, incubators, and plant, animal or human environmental walk-in rooms!

This unique service department is staffed by experts in solving design, operating and maintenance problems for environmental rooms. We supply information in depth . . . including detailed plans for use by architect, contractor and user.

The E.P.S. department is ready to handle all details for single or multiple room installations . . . guaranteeing savings and improved equipment operation!

**WRITE TODAY FOR MORE INFORMATION**



**HOTPACK CORP.**  
5086 Cottman Ave.  
Phila. 35, Penna.  
DE 3-1700(215)

8 MAY 1964



Model G76  
above with  
Space-Saving Dolly

Overall Dimensions:  
19-5/8" Wide x 20" High x 23" Deep

## Gyrotory® Water Bath Shaker

**For Constant Temperature Control  
and Continuous-Duty Agitation**

- Large-capacity bench-top unit
- Interchangeable platforms for flasks, tubes, and beakers
- Variable speed control: 85 to 285 rpm or 140-400 rpm
- Maintains temperature thermostatically, within  $\pm 0.5^{\circ}\text{C}$ , from ambient to  $100^{\circ}\text{C}$
- Available with Plexiglass gassing hood
- Triple-eccentric drive transmission imparts smooth, reproducible agitation to all samples
- Cool, quiet performance . . . free of vibration
- Adjustable automatic water level control

**UNCONDITIONAL ONE-YEAR WARRANTY**



**New Brunswick Scientific Co., Inc.**

1130 Somerset St., New Brunswick, N.J.

Manufacturers and Distributors of Precision Laboratory Apparatus



*Send for 72-page catalog*


**New Brunswick Scientific Company, Inc.**

1130 Somerset St., New Brunswick, N.J.

Gentlemen: Please send me your Catalog G76S/584

Name \_\_\_\_\_  
Dept. \_\_\_\_\_ Title \_\_\_\_\_  
Organization \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

**IT'S CRYSTAL  
CLEAR  
WHY YOU  
SHOULD SPECIFY . . .**



**Excelon  
1060  
PURE VINYL  
FLEXIBLE TUBING**

■ Chemically Inert ■ Highly Flexible ■ Standard Diameters Available: 1/4" to 4" ■ Custom Sizes & Colors Quoted Upon Request ■ Consistent Properties . . . from Laboratory Experiments to Full Scale Production ■ Nationally Distributed

### Available Now . . .

Excelon Tubing Brochure with ☐ Chemical Resistance Chart ☐ Physical Properties Chart ☐ Pressure Chart ☐ Sizes Available ☐ Prices ☐ Samples ☐ Name of Nearest Distributor



**THERMOPLASTIC  
PROCESSES, INC.**

VALLEY ROAD • STIRLING, N. J.

(201) Millington 7-1000 • (607) Cortland 7-6220  
TWX - 201-647-4390

Dept. of Chemistry, University of Montreal, P.O. Box 6128, Montreal, P.Q.)

27-29. **Operations Research Soc. of America**, Montreal, P.Q., Canada. (G. D. Shellard, New York Life Insurance Co., 51 Madison Ave., New York, N.Y. 10010)

28-30. **American Assoc. of Museums**, St. Louis, Mo. (S. F. Borhegyi, Milwaukee Public Museum, Milwaukee 3, Wis.)

28-31. **Rockets and Space Flight**, 13th symp., Darmstadt, Germany. (A. F. Staats, Hermann-Oberth-Gesellschaft, Gesellschaft zur Förderung der Erforschung und Erschliessung des Weltraumes, Fritz-Beindorff-Allee 9, Hanover, Germany)

30-7. **Medical Surgical meetings and film festival**, 5th intern., Turin, Italy. (Minerva Medica, Corso Bramante n. 83-85, Turin, Italy)

### June

1-3. **Instrument Soc. of America, Analysis Instrumentation Div.**, symp., San Francisco, Calif. (Northern California Sec., ISA, 1341 Seventh St., Berkeley, Calif. 94710)

1-3. **Chemical Inst. of Canada**, 47th annual, Kingston, Ont. (D. G. Diaper, Royal Military College, Kingston)

1-3. **Subunit Structure of Proteins**, 17th biology symp., Brookhaven Natl. Laboratory, Upton, N.Y. (S. Lacks, Dept. of Biology, Brookhaven Natl. Laboratory, Upton 11973)

1-4. **Basic Science and Clinical Aspects of Muscle**, Edmonton, Alberta, Canada. (G. Monckton, Univ. of Alberta Hospital, Edmonton)

1-5. **Medical Library Assoc.**, 63rd annual, San Francisco, Calif. (MLA, 919 N. Michigan Ave., Chicago 11, Ill.)

1-5. **Society of the Plastics Industry**, natl. conf., New York, N.Y. (W. C. Bird, 250 Park Ave., New York 10017)

1-6. **Gastroenterology**, 7th intern. congr., Brussels, Belgium. (Assoc. of Natl. European and Mediterranean Socs. of Gastroenterology, 43, rue des Champs-Elysées, Brussels 5)

2-3. **Photovoltaic Specialists**, 4th annual conf., Cleveland, Ohio. (P. Rappaport, RCA Laboratories, Princeton, N.J.)

2-4. **Global Communications**, intern. symp. (Globcom VI), Philadelphia, Pa. (R. Guenther, RCA Communications Systems Div., Bldg. 1-3-1, Camden, N.J.)

2-4. **Telemetry**, natl. conf., Los Angeles, Calif. (W. S. Pope, 8420 Quinn St., Downey, Calif.)

2-5. **Food Microbiology**, 4th intern. symp., Göteborg, Sweden. (N. Molin, Swedish Inst. for Food Preservation Research, Göteborg 16)

2-6. **Acoustical Conf.**, 3rd., Budapest, Hungary. (Acoustics Div., Hungarian Soc. of Optics, Acoustics, and Film Techniques, Szabadság tér 17, Budapest 5)

2-6. **Ophthalmic-Optics**, intern. congr., Copenhagen, Denmark. (Danmark Special Optiker-Forening, Vesterbrogade 41B, Copenhagen 5)

3-5. **Collaborative Pesticides Analytical Committee**, 8th, Wageningen, Netherlands. (R. de B. Ashworth, c/o Plant Pathology Laboratory, Hatching Green, Harpenden, Hertfordshire, England)

3-10. **American Metalworking Technol-**

**new THERMOLYNE**

**micro size  
hot plate**

3 9/16" dia.

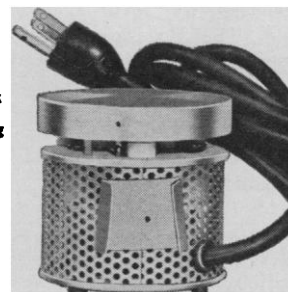


**Precise, stepless  
thermostatic control,  
from 6°C above  
ambient to 370°C (700°F)**

**Type 2300**—invaluable for those laboratory situations where a single or multiple heat source is needed, yet space and money are scarce. Ruggedly built to withstand hard, continuous usage. Takes less than nine minutes to reach 370°C top temperature (reserve power at 370°C is 46%). Perforated stainless steel case . . . well ventilated . . . long-life heating element . . . cast aluminum top. Stepless control automatically compensates for fluctuations in line voltage and ambient temperatures. Easily read control dial. 3 9/16" dia top plate . . . 3 3/4" height. 115v a-c. Price complete with 5' cord and 3-prong plug. **\$15.00**

Standard dovetail socket welded to back of case. Adapter included with 6" long aluminum rod for use as nonslip handle.

Write for literature and name of nearest dealer.



**THERMOLYNE CORPORATION**

Dept. 568, 2555 Kerper Blvd  
Dubuque, Iowa

ogy for the European Community (AMTEC), Brussels, Belgium. (E. L. Koester, ASTM, 10700 Puritan Ave., Detroit, Mich.)

7-9. National Public Relations Council of Health and Welfare Services, New York, N.Y. (The Council, 257 Park Ave. S., New York 10010)

7-9. Isotopically Labeled Drugs in Experimental Pharmacology, conf., Chicago, Ill. (L. J. Roth, Dept. of Pharmacology, Univ. of Chicago, Chicago 60637)

7-11. Special Libraries Assoc., St. Louis, Mo. (Mrs. J. North, Missile and Space Div., Lockheed Aircraft Corp., Palo Alto, Calif.)

7-12. Mass Spectrometry and Allied Topics, 12th annual conf., Montreal, Quebec, Canada. (N. D. Coggeshall, Gulf Research and Development Co., P.O. Drawer 2038, Pittsburgh, Pa. 15230)

7-13. European Ophthalmological Soc., 2nd congr., Vienna, Austria. (J. François, 15, Place de Smet de Naeyer, Ghent, Belgium)

8-9. Basic Cancer Research, 2nd Scandinavian symp., Stockholm, Sweden. (K. E. Hellström, c/o Riksföreningen mot Cancer, Postgiro 90 19 51, Stockholm)

8-10. Quasi-Optics, symp., Polytechnic Inst. of Brooklyn, 14th, New York, N.Y. (Polytechnic Inst. of Brooklyn, 55 Johnson St., Brooklyn 1)

8-11. Cardiovascular Conf., 2nd intern., St. Adele, Quebec, Canada. (D. F. M. Bunce, Dept. of Physiology, College of Osteopathic Medicine and Surgery, Des Moines, Iowa)

8-11. International Planned Parenthood Federation, conf. of region for Europe, Near East, and Africa, London, England. (J. Bettie, 6 Pembroke Rd., London W.1)

8-12. Surface Contamination, intern. symp., Gatlinburg, Tenn. (B. R. Fish, Health Physics Div., Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn. 37831)

9. International Assoc. for the Prevention of Blindness, Vienna, Austria. (J. P. Baillart, 47, rue de Bellechasse, Paris 7<sup>e</sup>, France)

9-11. Cobalt Applications, intern. meeting, Brussels, Belgium. (Cobalt Information Center, Battelle Memorial Inst., 505 King Ave., Columbus 1, Ohio)

9-11. Electromagnetic Compatibility, 6th natl. symp., Los Angeles, Calif. (J. A. Eckert, Dept. 3441/32, Northrop Norair, 3901 West Broadway, Hawthorne, Calif.)

9-12. Canadian Federation of Biological Societies, Halifax, N.S. (A. H. Neufeld, The Federation, Univ. of Western Ontario, London, Ont., Canada)

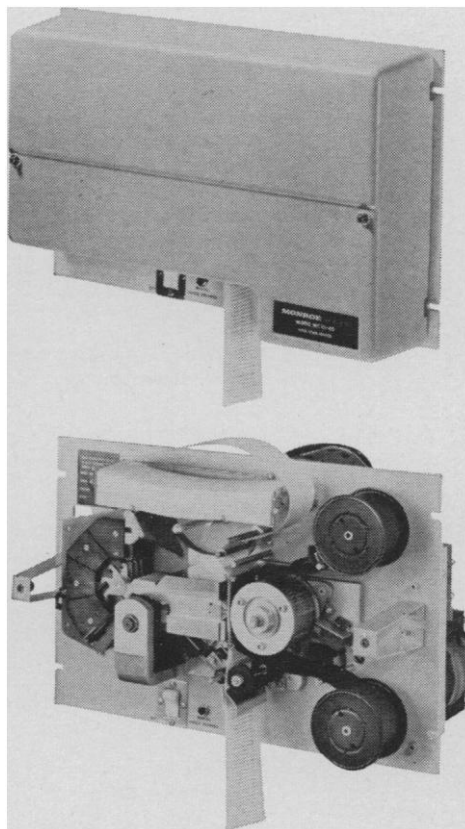
9-12. Max Planck Soc. for the Furtherance of Science, general meeting, Hamburg, Germany. (Max-Planck Gesellschaft zur Förderung des Wissenschaften e.V., Düsseldorf, Germany)

10-12. Heat Transfer and Fluid Mechanics, Berkeley, Calif., (S. Levy, General Electric Co., 150 Curtner Ave., San Jose, Calif.)

10-19. Intergovernmental Oceanographic Commission, 3rd session, Paris, France. (W. S. Wooster, Office of Oceanography, UNESCO, Place de Fontenoy, Paris 7<sup>e</sup>)

11-13. Manufacturing Chemists' Assoc., 92nd annual, White Sulphur Springs, W.

## A RUGGED AND RELIABLE HIGH SPEED STRIP PRINT HIGH SPEED STRIP PRINT



PRINT  
PRINT  
PRINT  
PRINT  
PRINT  
PRINT  
PRINT  
PRINT  
PRINT  
PRINT  
PRINT  
PRINT  
PRINT

The Monroe DATA/LOG\* MC 10-40 high speed strip printer is a rugged, reliable little monster that prints. And prints. And prints. □ If your engineers will feed data and print commands to the MC 10-40, it will convert them to legible printouts (the best printouts you've ever seen) at a rate better than 17 per second. □ If your engineer wants this little dandy to print whilst he's on his 10-minute coffee break, you will have 10,400 printouts when he returns. If he loiters for spring maneuvers with a water cooler romance, you'll have more printouts, of course. And a problem. □ Strangely, and pleasantly for Monroe, the usual tendency for engineers is to feed the MC 10-40 any 4-line code (which it accepts), print commands like mad, and then stand back. With the same sense of assured expectancy as a younger engineer who buys two guppies. □ There would seem to be an inner satisfaction and an engineer's appreciation and delight in just watching the MC 10-40 convert a pack of paper to printouts. □ Engineers are like that, bless them. □ For engineers who had only one guppy we can of course print slower. □ Forget the guppies. □ The Monroe DATA/LOG MC 10-40 is, as we said before, R and R. □ It has a year's parts and on-site service warranty. □ And the 16-column printer is \$2140. □ The practical thing to do is get in touch with the Electronics Components Division of Monroe Calculating Machine Company at 60 Main St. in San Francisco. Phone (415) EX 7-2813.

\*Registered in U.S. Patent Office

**MONROE**   
A DIVISION OF LITTON INDUSTRIES

Va. (MCA, 1825 Connecticut Ave., NW, Washington, D.C.)

11-13. **Population Assoc. of America**, San Francisco, Calif. (P. C. Glick, Bureau of Census, Washington, D.C. 20233)

13-19. **Medical Film Festival**, Helsinki, Finland. (W. M. A.-Film/Finmedicas, Ullanlinnankatu 1, Helsinki)

13-19. **World Medical Assoc.**, 18th general assembly, Helsinki, Finland. (H. S. Gear, 10 Columbus Circle, New York, N.Y. 10019)

14-17. **American Assoc. of Feed Microscopists**, 12th annual, Hot Springs, Ark. (G. M. Barnhart, Missouri Dept. of Agriculture, State Office Bldg., Jefferson City, Mo.)

14-18. **Industrial Pharmaceutical Research**, 6th natl. conf., Land O'Lakes, Wis. (L. W. Busse, 190 Pharmacy Bldg., Univ. of Wisconsin, Madison 6)

14-18. **Health Physics Soc.**, 9th annual, Cincinnati, Ohio. (H. F. Kolde, Taft Sanitary Engineering Center, Cincinnati 45226)

14-18. **American Nuclear Soc.**, 10th annual, Philadelphia, Pa. (O. J. DuTemple, 244 E. Ogden Ave., Hinsdale, Ill. 60502)

14-19. **Alpha Chi Sigma Fraternity**, Greenvale, L.I., N.Y. (M. L. Griffin, 5503 E. Washington St., Indianapolis, Ind. 46219)

14-19. **Cardiology**, 7th inter-american Congr., Montreal, P.Q., Canada. (The Congress, 2052 St. Catherine St., W., Montreal 25)

14-20. **National Speleological Soc.**, annual conv., New Braunfels, Tex. (J. H. Estes, 2818 S. 39 St., Abilene, Tex. 79605)

15-17. **Lattice Defects in Quenched Metals**, intern. conf., Argonne, Ill. (The Conference, Bldg. 212, Argonne Natl. Laboratory, Argonne)

15-17. **Institute of Navigation**, 20th annual, New York, N.Y. (P. Rosenberg, 330 Fifth Ave., Pelham, N.Y. 10803)

15-17. **American Neurological Assoc.**, 89th annual, Atlantic City, N.J. (M. D. Yahr, 710 West 168 St., New York, N.Y. 10032)

15-18. **Materials**, 2nd intern. symp., Berkeley, Calif. (T. H. Chenoweth, 276 Hearst Mining Bldg., Univ. of California, Berkeley 94720)

15-18. **American Soc. of Limnology and Oceanography**, 27th annual, Miami Beach, Fla. (G. H. Lauff, ASLO, Sapelo Island Research Foundation, Sapelo Island, Ga.)

15-19. **Antibiotics**, intern. Congr., Prague, Czechoslovakia. (V. Vlček, Antibiotics Research Inst., Roztoky near Prague, Czechoslovakia)

15-19. **Molecular Spectroscopy**, symp., Columbus, Ohio. (H. H. Nielsen, Dept. of Physics, Ohio State Univ., 174 W. 18 Ave., Columbus 43210)

15-19. **Technical Writers**, 12th annual inst., Troy, N.Y. (J. R. Gould, Rensselaer Polytechnic Inst., Troy)

15-21. **Women Engineers and Scientists**, 1st intern. conf., New York, N.Y. (E.

Eaves, 18 Third Ave., Port Washington, N.Y. 11050)

15-3. **Relativity**, teaching at undergraduate level, Arlington, Tex. (J. Ellis, Dept. of Physics, Arlington State College, Arlington)

15-4 Sept. **Gordon Research Conf.**, New Hampshire. (W. G. Parks, Dept. of Chemistry, Univ. of Rhode Island, Kingston)

16-17. **Computer Augmentation of Human Reasoning**, symp., Washington, D.C. (W. D. Orr, TRW Computer Div., 8433 Fallbrook Ave., Canoga Park, Calif. 91304)

16-18. **Entomological Soc. of America**, Pacific Branch, annual, Long Beach, Calif. (W. W. Allen, 112 Agric. Hall, Dept. of Entomology, Univ. of California, Berkeley)

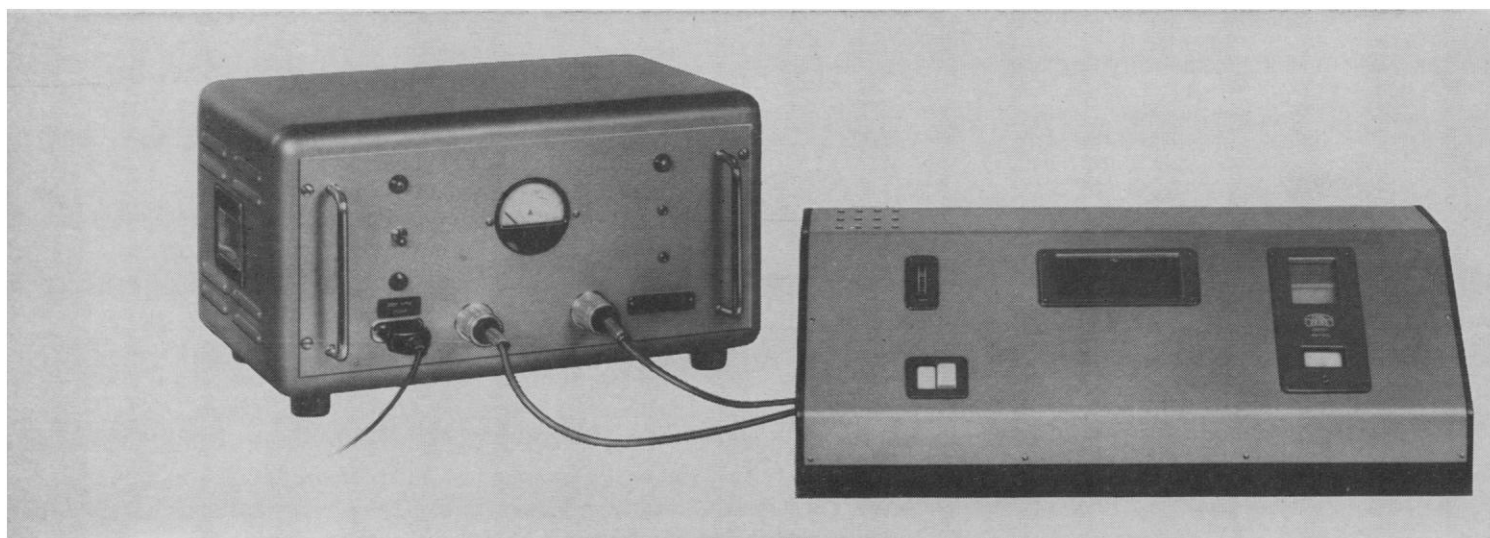
17-19. **Microscopy**, 11th intern. symp., Chicago, Ill. (MICRO-64, McCrone Research Inst., 451 E. 31 St., Chicago 60616)

17-20. **American College of Angiology**, Las Vegas, Nev. (A. Halpern, 11 Hampton Court, Great Neck, N.Y.)

18-19. **Patent, Trademark, and Copyright Research Inst.**, 8th annual conf., George Washington Univ., Washington, D.C. (PTCR Inst., George Washington Univ., Washington, D.C. 20006)

18-19. **American Rheumatism Assoc.**, San Francisco, Calif. (J. A. Coss, Jr., 20 E. 76 St., New York, N.Y. 10021)

18-20. **Community Psychiatry**, conf., Univ. of Wisconsin, Madison. (L. M. Roberts, 1300 University Ave., Madison)



What  
degree of accuracy  
do you need  
in a polarimeter?

0.005°

**PHOTOELECTRIC PRECISION POLARIMETER 0.005°** gives you the ultimate in accuracy and speed of measurement. High precision is achieved by use of a Faraday modulator and electronic circuitry. Automatic control maintains full measurement accuracy even for strongly absorbent (approx. 97%) samples. Scales of divided circles and verniers are projected onto ground-glass screens at a magnification of 20x. This assures direct, parallax-free readings. The power supply provides stabilized voltages.

Visit our showroom for a demonstration or write Dept. SC for more information. Factory trained technicians service all Carl Zeiss instruments.



18-20. **Endocrine Soc.**, San Francisco, Calif. (H. H. Turner, 200 N. Walker, Oklahoma City, Okla.)

18-20. **American Assoc. of Physics Teachers**, summer meeting, Madison, Wis. (H. R. Crane, Dept. of Physics, Univ. of Michigan, Ann Arbor)

18-20. **Space Technology**, 4th European symp., Rome, Italy. (A. Eula, Associazione Italiana Razzi, Piazza Santo Bernardo 101, Rome)

18-20. **Sulfite Pulping**, conf., Chicago, Ill. (Technical Assoc. of the Pulp and Paper Industry, 360 Lexington Ave., New York, N.Y. 10017)

18-22. **American College of Chest Physicians**, San Francisco, Calif. (M. Kornfeld, 112 E. Chestnut, Chicago, Ill.)

19. **Parenteral Drug Assoc.**, Philadelphia, Pa. (The Association, Broad and Chestnut Sts., Philadelphia 7)

19-20. **American Geriatrics Soc.**, 21st annual, San Francisco, Calif. (AGS, 10 Columbus Circle, New York, N.Y. 10019)

19-27. **Chemical Engineering**, European conv., Frankfurt am Main, Germany (Chicago Section, American Chemical Soc., 86 E. Randolph St., Chicago 1, Ill.)

21. **Surface Physics**, Providence, R.I. (W. H. Brattain, Bell Telephone Laboratories, Murray Hill, N.J. 17971)

21-23. **Society for Investigative Dermatology**, 25th annual, San Francisco, Calif. (H. Beerman, SID, 255 S. 17 St., Philadelphia, Pa. 19103)

21-24. **American Soc. of Agricultural**

**Engineers**, Fort Collins, Colo. (J. L. Butt, ASAE, 420 Main St., St. Joseph, Mich.)

21-25. **Air Pollution Control Assoc.**, 57th annual, Houston, Tex. (The Association, 4400 Fifth Ave., Pittsburgh, Pa.)

21-25. **American Medical Assoc.**, San Francisco, Calif. (F. J. L. Blasingame, N. Dearborn, Chicago, Ill. 60610)

21-26. **American Soc. for Testing and Materials**, 67th annual, Chicago, Ill. (ASTM, 1916 Race St., Philadelphia 3, Pa.)

22-24. **American Dairy Science Assoc.**, Tucson, Ariz. (H. F. Judkins, 32 Ridgeway Circle, White Plains, N.Y.)

22-24. **Medicinal Chemistry**, 9th natl. symp., Minneapolis, Minn. (A. T. Winstead, American Chemical Soc., 1155 16th St., NW, Washington, D.C. 20006)

22-24. **Association for Research in Ophthalmology**, San Francisco, Calif. (H. Kaufman, c/o Hillis Miller Health Center, Gainesville, Fla.)

22-24. **Photosensitization in Solids**, intern. conf., Chicago, Ill. (L. Grossweiner, Dept. of Physics, Illinois Inst. of Technology, Chicago)

22-24. **American Assoc. of Physical Anthropologists**, 33rd annual, Mexico City, Mexico. (T. D. Stewart, The Association, U.S. Natl. Museum, Washington, D.C.)

22-24. **Polymers**, 2nd biennial symp., American Chemical Soc., Durham, N.C. (H. N. Friedlander, Chemstrand Research Center, Inc., Box 731, Durham)

22-25. **Agricultural Pesticides Technical Soc.**, Fredericton, N.B., Canada. (W. H. Minshall, University Substation P.O., London, Ont., Canada)

22-25. **American Soc. of Pharmacognosy**, annual, Pittsburgh, Pa. (R. Blomster, Univ. of Pittsburgh School of Pharmacy, Pittsburgh 15213)

22-26. **American Soc. for Engineering Education**, Orono, Maine. (W. L. Collins, Univ. of Illinois, Urbana)

22-26. **Nobel Prize Winners**, 14th meeting, Lindau im Bodensee, Germany. (H. F. Kinderlen, Standing Working Committee for the Nobel Prize Winners, Postfach 11, 899 Lindau im Bodensee)

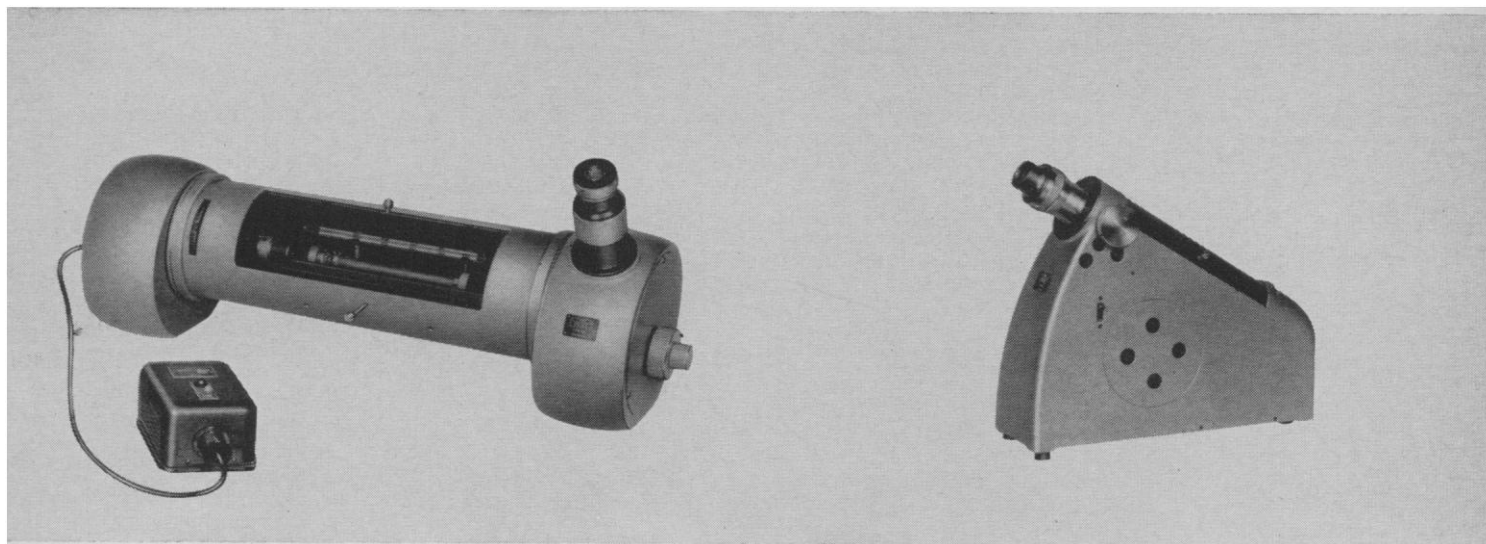
22-26. **Association of Official Seed Analysts**, Rochester, N.Y. (E. W. Sundermeyer, 329 U.S. Court House, Kansas City 6, Mo.)

22-27. **AAAS, Pacific Division**, 45th meeting, Vancouver, B.C., Canada. (R. C. Miller, California Academy of Sciences, San Francisco)

22-27. **International Organization for Pure and Applied Physics**, 2nd general assembly, Paris, France. (J. Tonnelot, Laboratoire de Biologie Physico-Chimique, Orsay, Seine-et-Oise, France)

23. **National Assoc. of Science Writers**, San Francisco, Calif. (M. D. Spencer, Buffalo Evening News, Buffalo, N.Y.)

23-25. **Precision Electromagnetic Measurements**, conf., Boulder, Colo. (National Bureau of Standards, Boulder Labs., Boulder)



0.01°

POLARIMETER 0.01° is available in two models for tubes up to 200 and up to 400mm. in length. This uniquely designed instrument is built for convenience. All controls are within easy reach. For the first time a sliding tube changer has been built in, making a change of tubes possible from the outside without having to open the instrument housing.

0.05°

POLARIMETER 0.05° is perfectly suited as a standard instrument in the medical, chemical and pharmaceutical laboratory. The dividing line of the half-shade field has uniform sharpness regardless of length of tubes or turbidity of liquids tested. No need to refocus eyepiece after zero-setting the instrument.

**CARL ZEISS, INC.**  
444 Fifth Avenue, New York, N. Y. 10018  
BRANCH OFFICES IN ATLANTA, CHICAGO, LOS ANGELES, SAN FRANCISCO, SEATTLE  
The Great Name in Optics  
IN CANADA: TORONTO, MONTREAL, WINNIPEG, VANCOUVER

# Index of Books Reviewed in Science

5 April 1963 through 27 March 1964

## Applied Science and Technology

- Advances in Materials Research in the NATO Nations*, H. Brooks, N. H. Mason, N. E. Promisel, and G. H. Cooper, Eds. (Pergamon; Macmillan), 27 Dec. 1963, 1648
- Advances in Nuclear Science and Technology*, E. J. Henley and H. Kouts, Eds. (Academic Press), 10 May 1963, 656
- Aerodynamics*, J. E. Allen (Harper and Row), 13 Dec. 1963, 1453
- The Chemistry and Physics of Rubber-Like Substances*, L. Bateman, Ed. (MacLaren; Wiley), 27 Mar. 1964, 1429
- Cryogenic Engineering*, J. H. Bell, Jr. (Prentice-Hall), 20 Dec. 1963, 1561
- Cryogenic Technology*, R. W. Vance, Ed. (Wiley), 24 Jan. 1964, 345
- The Design of Gas-Cooled Graphite-Moderated Reactors*, D. R. Poulter, Ed. (Oxford Univ. Press), 6 Dec. 1963, 1288
- Electronics in Industry*, J. S. Murphy (Oxford Univ. Press), 11 Oct. 1963, 222
- Fuel Cells*, W. Mitchell, Jr., Ed. (Academic Press), 20 Dec. 1963, 1564
- The Fundamentals of Well Log Interpretation*, M. R. J. Wyllie (Academic Press), 7 Feb. 1964, 560
- Graphs and Their Uses*, O. Ore (Random House), 21 June 1963, 1298
- High-Temperature Inorganic Coatings*, J. Huminik, Jr., Ed. (Chapman and Hall; Reinhold), 17 Jan. 1964, 233
- Hydrologie de Surface*, M. Roche (Gauthier-Villars), 10 May 1963, 659
- Infrared Physics and Engineering*, J. A. Jamieson, R. H. McFee, G. N. Plass, R. H. Grube, and R. G. Richards (McGraw-Hill), 11 Oct. 1963, 222
- Introduction to the Utilization of Solar Energy*, A. M. Zarem and D. D. Erway, Eds. (McGraw-Hill), 27 Sept. 1963, 1267
- Jet-Stream Meteorology*, E. R. Reiter (Univ. of Chicago Press), 31 Jan. 1964, 464
- Physical Chemistry of Petroleum Solvents*, W. W. Reynolds (Reinhold; Chapman and Hall), 28 Feb. 1964, 946
- Principles of Applied Geophysics*, D. S. Parasnis (Methuen; Wiley), 26 Apr. 1963, 376
- Radio Wave Propagation and the Ionosphere*, Ya. L. Al'pert (Consultants Bureau), 10 May 1963, 646
- Recent Advances in Food Sciences*, J. Hawthorn and J. M. Leitch, Eds. (Butterworth), 3 May 1963, 476
- Reviews in Engineering Geology*, vol. 1, T. Fluhr and R. F. Leggett, Eds. (Geological Soc. of America), 19 Apr. 1963, 287
- Saline Water Conversion-II*, R. F. Gould, Ed. (American Chemical Soc.), 16 Aug. 1963, 626

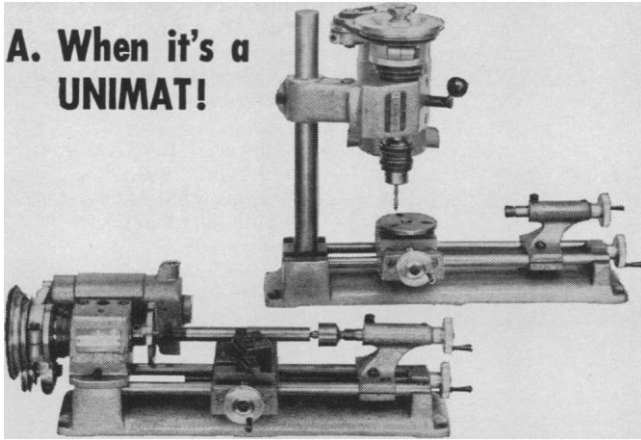
- Salt-Water Purification*, K. S. Spiegler (Wiley), 26 July 1963, 347
- Science of Ceramics*, vol. 1, G. H. Stewart, Ed. (Academic Press), 19 Apr. 1963, 288
- The Technology of Scandium, Yttrium, and the Rare Earth Metals*, E. V. Kleber and B. Love (Pergamon; Macmillan), 7 Feb. 1964, 561
- The Technology of the Treatment of Uranium Concentrates*, N. P. Galkin, A. A. Maiorov, and U. D. Veryatin (Pergamon; Macmillan), 7 Feb. 1964, 561

## Biological and Medical Sciences

- Advance in Ecological Research*, vol. 1, J. B. Cragg, Ed. (Academic Press), 10 May 1963, 636
- Advances in Immunology*, vols. 1 and 2, W. H. Taliaferro and J. H. Humphrey, Eds. (Academic Press), 28 June 1963, 1388
- Advances in Insect Physiology*, vol. 1, J. W. L. Beament, J. E. Treherne, and V. B. Wigglesworth, Eds. (Academic Press), 6 Sept. 1963, 896
- Advances in Marine Biology*, vol. 1, F. S. Russell, Ed. (Academic Press), 13 Sept. 1963, 1027
- Animal Ecology*, A. MacFayden (Pitman), 4 Oct. 1963, 41
- Animal Growth and Development*, F. Moog (Heath), 14 Feb. 1964, 668
- Animal Parasites: Their Biology and Life Cycles*, O. W. Olsen (Burgess), 5 Apr. 1963, 43
- Animal Physiology*, B. T. Scheer (Wiley), 25 Oct. 1963, 476
- Animal Populations*, T. O. Browning (Harper and Row), 24 May 1963, 885
- Animal Species and Evolution*, E. Mayr (Harvard Univ. Press), 10 May 1963, 628
- Aquatic Angiosperms*, K. Subramanyam (Council of Scientific and Industrial Research, New Delhi), 29 Nov. 1963, 1158
- Aquatic Plants of the Pacific Northwest*, A. N. Steward, L. J. Dennis, and H. M. Gilkey (Oregon State Univ. Press), 15 Nov. 1963, 946
- Biochemical Systematics*, R. E. Alston and B. L. Turner (Prentice-Hall), 23 Aug. 1963, 709
- Biological Receptor Mechanisms*, J. W. L. Beament, Ed. (Academic Press), 16 Aug. 1963, 626
- Biological Science: An Inquiry into Life*, Biological Science Curriculum Study (Harcourt, Brace, and World), 14 Feb. 1964, 668
- Biological Science: Molecules to Man*, Biological Science Curriculum Study (Houghton Mifflin), 14 Feb. 1964, 668
- Biology of Birds*, W. Lanyon (Doubleday), 7 Feb. 1964, 562
- Biology of the Seas of the U.S.S.R.*, L. Zenkevitch [Interscience (Wiley)], 3 Jan. 1964, 35
- Biophysical Science*, E. Ackerman (Prentice-Hall), 12 Apr. 1963, 168
- Biophysics: Concepts and Mechanisms*, E. J. Casey (Reinhold; Chapman and Hall), 12 Apr. 1963, 168
- Biotechnology: Concepts and Applications*, L. J. Fogel (Prentice-Hall), 9 Aug. 1963, 514
- Biotherapy of Malignant Tumors*, N. G. Klyuyeva and G. I. Roskin (Pergamon; Macmillan), 29 Nov. 1963, 1155
- The Body Cell Mass and Its Supporting Environment*, F. D. Moore, K. H. Olesen, J. D. McMurrey, H. V. Parker, M. R. Ball, and C. M. Boyden (Saunders), 21 June 1963, 1302
- Botanical Histochemistry*, W. A. Jensen (Freeman), 10 May 1963, 634
- Botanique*, P.-P. Grassé, Ed. (Masson), 27 Dec. 1963, 1647
- Botany: A Functional Approach*, W. H. Muller (Macmillan), 27 Mar. 1964, 1427
- Catalogue of the Type Specimens of Microlepidoptera in the British Museum (Natural History) Described by Edward Myerick*, vol. 4, J. F. Gates Clarke (British Museum), 20 Mar. 1964, 1320
- The Cell in Mitosis*, L. Levine, Ed. (Academic Press), 6 Dec. 1963, 1286
- Cells: Their Structure and Function*, E. H. Mercer (Doubleday), 10 May 1963, 623
- Cerveaux d'Animaux Disparus*, C. Dechaseaux (Masson), 17 May 1963, 799
- Chemical Plant Taxonomy*, T. Swain, Ed. (Academic Press), 27 Mar. 1964, 1428
- Comparative Pathology in Monkeys*, B. A. Lapin and L. A. Yakovleva (Thomas), 12 July 1963, 145
- The Complementarity of Structure and Function*, A. G. Richards (Heath), 14 Feb. 1964, 668
- Comprehensive Biochemistry*, M. Florin and E. H. Stotz, Eds. (Elsevier), vols. 1-4, 14 June 1963, 1201; vol. 5, 4 Oct. 1963, 42
- Control Theory and Biological Systems*, F. S. Grodins (Columbia Univ. Press), 26 July 1963, 345
- The Cultivation of Animal and Plant Cells*, P. R. White (Ronald), 9 Aug. 1963, 515
- Les Cyclitols*, T. Posternak (Hermann), 10 May 1963, 634
- Echinoderms*, D. Nichols (Hutchinson; Hilary House), 5 Apr. 1963, 42
- Electron-Microscopic Structure of Protozoa*, D. R. Pitelka (Pergamon; Macmillan), 29 Nov. 1963, 1158
- Elementary Genetics*, W. R. Singleton (Van Nostrand), 18 Oct. 1963, 376
- Encyclopedia of Plant Anatomy*, vol. 6, pt. 9, P. Ozenda (Borntraeger), 10 Jan. 1964, 122
- Essays on Protozoology*, H. Snadon (Hutchinson), 27 Dec. 1963, 1647
- Evolution*, J. M. Savage (Holt, Rinehart, and Winston), 20 Mar. 1964, 1318
- Fauna und Flora der Adria*, R. Riedl (Parey), 8 Nov. 1963, 659
- Flora of Missouri*, J. A. Steyermark

## Q. When is a lathe also not a lathe?

A. When it's a  
**UNIMAT!**



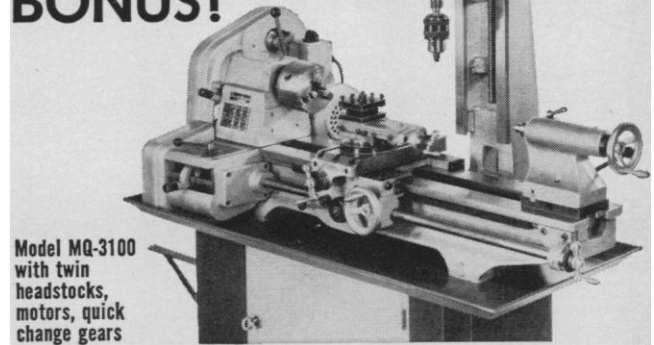
Unimat is a precision lathe, but quite often does the job as a sensitive drill press. It also serves in a variety of such chores as surface grinding, milling, gear making, jig sawing, threading, buffing, index dividing, wood turning, and tool sharpening.

About 10,000 Unimats are earning their keep in plants and labs all over the U.S., turning out product prototypes in miniature, models, small parts and a lot of electronic fancy-work. Some Unimats are sentenced to the monotony of steady production work, drilling or turning metal. The basic outfit ready to go to work either as a lathe or a vertical drill press, complete with motor and a chest full of extras is only \$139.50. Accessories are priced the same way—reasonable. Catalog is free. Or convince yourself with the 40 page illustrated manual, "Miniature Machining Techniques," \$1.00.



**AMERICAN EDELSTAAL, INC**  
Dept. B-E, 350 Broadway  
New York 13, New York

Buy a lathe  
and get a  
**BONUS!**



Model MQ-3100  
with twin  
headstocks,  
motors, quick  
change gears

MAXIMAT is a mighty fine 10" lathe that beats ASA toolroom specs. Think about it just as a lathe and it's a good buy, priced between \$857 and \$1279 depending on which outfit you select. Where's the bonus? The machine has two beds instead of one. You have the usual ground and scraped-flat lathe bed, and another matching one mounted dead true vertically. Using the same motors, chucks, headstocks and work-holders, you gain the use of a complete vertical mill and boring machine. Use it for grinding too . . . for indexing . . . make gears, locate to tight tolerances all with one machine that fits in 20 x 40 inch floor space. In R & D, Maintenance and prototype design work, it's a time-and-money saving tool. Write for free catalog and Tool-room Timesaver Tips.

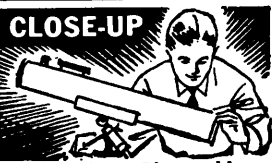


**AMERICAN EDELSTAAL, INC**  
Dept. B-E, 350 Broadway  
New York 13, New York

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS CLOSE-UP

## AMAZING SCIENCE BUYS

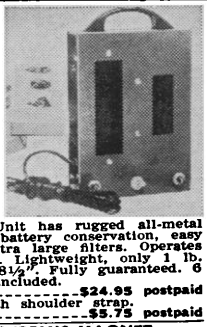
for FUN, STUDY or PROFIT



### BARGAIN! LONG & SHORT WAVE ULTRA-VIOLET LIGHT SOURCE

Small! Lightweight!  
Portable! Most Powerful  
at the Price!

Newly developed for prospecting, mineral collecting, fluorescent demonstrations, etc. Most powerful source of long and short wave ultra-violet light in one compact home-or-field unit! One source produces short wave UV radiation with peak intensity of 2537 angstroms. Other source produces long wave UV with peak intensity of 3660 angstroms. Unit has rugged all-metal housing, special circuitry for battery conservation, easy access for replacing tubes, extra large filters. Operates on house current or batteries. Lightweight, only 1 lb. 5 oz. Compact, 5 1/2" x 2" x 8 1/2". Fully guaranteed. 6 identified mineral specimens included. \$24.95 postpaid  
Stock No. 70,259-W  
BATTERY ADAPTER CASE with shoulder strap. \$5.75 postpaid  
Stock No. 70,260-W



### 'FISH' WITH A WAR SURPLUS MAGNET

Go Treasure Hunting On The Bottom  
Great idea! Fascinating fun and sometimes tremendously profitable! Tie a line to our 5-lb. Magnet—drop it overboard in bay, river, lake or ocean. Trawl it along the bottom—your "treasure" haul can be outboard motors, anchors, fishing tackle, all kinds of metal valuables. 5-lb. Magnet is war surplus—Alnico V Type—Gov't Cost, \$50. Lifts over 125 lbs. on land much greater weights under water. Order now and try this new sport.  
Stock No. 70,571-W 5lb. Magnet \$12.50 Postpaid  
Stock No. 70,570-W 3 1/2 lb. Lifts 40 lbs. \$8.75 Ppd.  
Stock No. 70,572-W 7 1/2 lb. Lifts 150 lbs. \$16.75  
Stock No. 70,573-W 15 lb. size, Lifts 250 lbs. FOB \$33.60



### HOME WEATHER STATION

New "Weather Station" is highly sensitive to weather changes. Consistently accurate thermometer to  $\pm 2\%$ ; barometer accurate to  $\pm .25\%$  and hygrometer to  $\pm 5\%$ . Foretells weather changes from 12 to 24 hours in advance. Hygrometer calibrated in percent relative humidity. Excellent for teaching weather phenomena and meteorological hobby work. Instrument mounted on handsome wood-grained wall panel 15 1/4" x 5 1/4". Meter cases heavily metallized—combines beauty and protection. Dials, in etched aluminum, of high precision. Full instructions.  
Stock No. 70,607-W \$9.95 Postpaid



### Bargain! 3" Astronomical Telescope



See the stars, moon, phases of Venus, planets close up! 60 to 180 power—famous Mt. Palomar Reflecting type. Unusual Buy! Equipped with Equatorial mount; finder telescope; hardwood tripod. Included FREE: "STAR CHART"; 272-page "HANDBOOK OF HEAVENS"; "HOW TO USE YOUR TELESCOPE" book.  
Stock No. 85,050-W \$29.95 postpd.

4 1/4" Reflecting Telescope—up to 255 Power, all-metal pedestal mount.  
Stock No. 85,105-W \$79.50 F.A.B. Barrington, N.J.



### NEW ZOOM TELESCOPE EYEPIECE

Exciting new eyepiece provides greater speed and versatility for your telescope. Does work of many and stays sharp at all powers. Magnification depends on your telescope—typically 50x to 120x. Precision construction, standard 1 1/4" O.D. Fully orthoscopic, coated lenses, focal length 8.4 mm. to 21 mm. Use of Barlow increases powers by 2 to 3 times with dramatic results.  
Stock #60,362-W \$26.50 ppd.



### American Made — Terrific Buy!

#### STEREO MICROSCOPE

Years in development. Precision American made. Used for checking, inspecting, small assembly work. Up to 3" working distance. Clear, sharp, erect image. Wide, 3 dimensional field. 2 sets of objectives on rotating turret. 25X and 40X. 10 Days Free Trial.  
Stock No. 85,056-W \$99.50 f.a.b. Barrington, N.J.

DIRECT MEASURING ATTACHMENT—with regular comparator reticle for on-the-spot checks of linear dimensions, diameters, radii and angles—in millimeters and inches.  
Stock No. 40,486-W \$10.00 Postpaid

DIRECT MEASURING ATTACHMENT—with sand measuring reticle for sand and soil analysis . . . or counting or measuring other particles of matter.  
Stock No. 40,487-W \$10.00 Postpaid

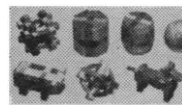
Remove Your Retaining Rings—Disassemble Lenses, Cameras, etc.



### ADJUSTABLE SPANNER WRENCH

Made for U. S. Air Force—available at a fraction of Government cost. A top grade, versatile tool that every instrument and camera repair man or just plain tinkerer should own. Adjustable for 1/4" to 1 1/2" diameter retaining rings. Complete with six different pairs of points to fit all types of slots and holes. 3", 6", and 12" main bars. All steel and nicely plated. The finest tool we have ever come across for this type of retaining ring work AND a real bargain at our low price.  
Stock No. 70,355-W \$12.50 ppd.

### WOODEN SOLID PUZZLES



12 Different puzzles that will stimulate your ability to think and reason. Here is a fascinating assortment of wood puzzles that will provide hours of pleasure. Twelve different puzzles, animals and geometric forms to

take apart and reassemble, give a chance for all the family, young or old, to test skill, patience and, best of all, to stimulate ability to think and reason while having lots of fun. Order yours now.

Stock No. 70,205-W \$3.00 Postpaid

### MAIL COUPON for FREE CATALOG "W"

COMPLETELY NEW AND ENLARGED 148 PAGES, NEARLY 4,000 BARGAINS EDMUND SCIENTIFIC CO., Barrington, New Jersey

Please rush Free Giant Catalog-W

Name .....  
Address .....  
City ..... Zone ..... State .....

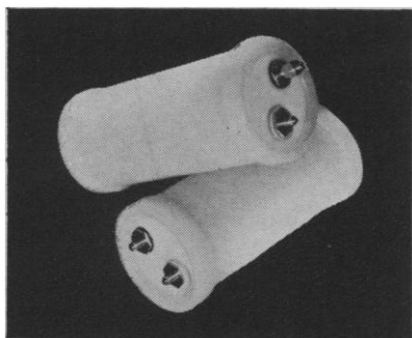


ORDER BY STOCK NUMBER . . . SEND CHECK OR MONEY ORDER . . . SATISFACTION GUARANTEED!

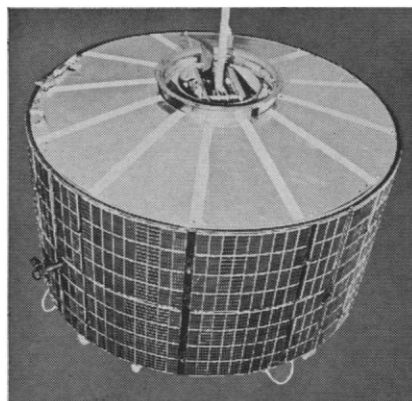
**EDMUND SCIENTIFIC CO. BARRINGTON, NEW JERSEY**



When Hughes Aircraft Company needed a plastic Hydrogen Peroxide Tank as a part for the NASA Syncom, America's newest communications satellite, they asked Bel-Art Products to fabricate this to their specifications.



Syncom was launched by a Delta booster from Cape Kennedy July 26, 1963. It is now whirling in orbit 22,300 miles above the earth providing an around-the-clock intercontinental communications link-up. This successful mission adds another important accomplishment for the United States in the space-age race.



Whether you select a stock item from Bel-Art's 64 page catalog on plasticware or need a special item, our products are available in every part of the world. In fact, with Syncom, we are actually out of this world. See your nearest laboratory supply dealer.

Write Dept. E-5 for your FREE copy.

**BEL-ART PRODUCTS,**  
PEQUANNOCK, N. J., 07440 OXbow 4-0500

**The MOST COMPLETE line  
of Plastic Laboratory Ware  
available from ONE source**

(Iowa State Univ. Press), 14 Feb. 1964, 671

*Fortschritte der Zoologie*, vol. 15, pt. 3; vol. 16, pt. 1, H. Bauer, Ed. (Fischer), 20 Sept. 1963, 1170

*Frontiers in Brain Research*, J. D. French, Ed. (Columbia Univ. Press), 31 May 1963, 972

*Fundamentals of Limnology*, F. Ruttner (Univ. of Toronto Press), 18 Oct. 1963, 376

*The Genera of Fishes and A Classification of Fishes*, D. S. Jordan (Stanford Univ. Press), 27 Mar. 1964, 1429

*The Genetic Code*, I. Asimov (Orion Press; New American Library), 10 May 1963, 627

*The Green Turtle and Man*, J. J. Parsons (Univ. of Florida Press), 24 May 1963, 885

*Growth, Including Reproduction and Morphological Development*, P. L. Altman and D. S. Dittmer, Eds. (Federation of American Societies for Experimental Biology), 10 May 1963, 638

*The Growth of Plants*, G. E. Fogg (Penguin Books), 7 June 1963, 1082

*The Hemoglobins in Genetics and Evolution*, V. Ingram (Columbia Univ. Press), 10 May 1963, 628

*Heredity and Human Life*, H. L. Carson (Columbia Univ. Press), 14 June 1963, 1203

*High School Biology*, Biological Science Curriculum Study (Rand McNally), 14 Feb. 1964, 668

*History of the Primates*, W. L. Clark [British Museum (Natural History)], 17 May 1963, 799

*Ichthyology*, K. F. Lagler, J. E. Bardach, and R. R. Miller (Wiley), 3 May 1963, 475

*Insect Pathology*, E. A. Steinhaus, Ed. (Academic Press), vol. 1, 12 Apr. 1963, 167; vol. 2, 13 Sept. 1963, 1027

*The Insects*, P. Farb and the editors of *Life* (Time), 10 May 1963, 626

*Insects in Relation to Plant Disease*, W. Carter [Interscience (Wiley)], 5 Apr. 1963, 43

*Introduction to Geological Microbiology*, S. I. Kuznetsov, M. V. Ivanov, and N. N. Lyalikova; C. H. Oppenheimer, Ed. (McGraw-Hill), 13 Mar. 1964, 1156

*An Introduction to Medical Genetics*, J. A. F. Roberts (Oxford Univ. Press), 28 Feb. 1964, 947

*An Introduction to Plant Biology*, D. C. Braungart and R. H. Arnett, Jr. (Mosby), 10 May 1963, 635

*Invertebrate Zoology*, R. D. Barnes (Saunders), 19 Apr. 1963, 286

*Learning and Instinct in Animals*, W. H. Thorpe (Methuen), 26 July 1963, 344

*The Life of Bacteria*, K. V. Thimann (Macmillan), 17 Jan. 1964, 234

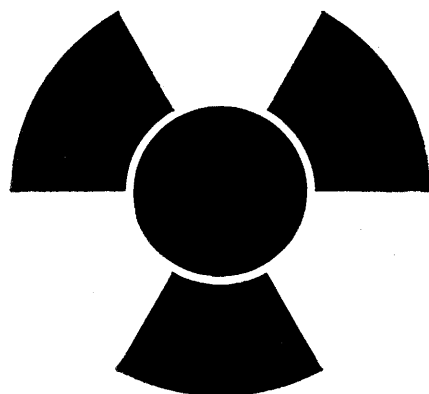
*Limnology in North America*, D. G. Frey, Ed. (Univ. of Wisconsin), 2 Aug. 1963, 420

*The Lower Tertiary Floras of Southern England*, M. E. J. Chandler [British Museum (Natural History)], 10 May 1963, 632

*Lower Upper Cretaceous Plant Microfossils from Minnesota*, R. L. Pierce (Univ. of Minnesota Press), 21 June 1963, 1300

*Manual of Vascular Plants of North-*

## Matheson Radioactive Gas Service



Radioactive Gases in Any  
Stable Background,  
any dilution

High Pressure  
Radioactive Gases

High Accuracy Analysis

Matheson offers a wide variety of radioactive gas mixtures for research and laboratory applications, including biological and medical studies, leak detection, tracers, etc. For further information, please write our Sales Engineering Department at East Rutherford, N. J. Catalog on request.

**MATHESON**

P. O. Box 85, East Rutherford, N. J.  
Plants in Forest Park, Ga., Joliet, Illinois,  
LaPorte, Texas, Newark, Calif.

Matheson of Canada, Ltd., Whitby, Ont.



eastern United States and Adjacent Canada, H. A. Gleason and A. Cronquist (Van Nostrand), 10 May 1963, 637

*Marine Distributions*, M. J. Dunbar, Ed. (Univ. of Toronto Press), 22 Nov. 1963, 1051

*Marine Microbiology*, A. E. Kriss [Interscience (Wiley)], 2 Aug. 1963, 419

*Marine Molluscan Genera of Western North America*, A. M. Keen (Stanford Univ. Press), 10 May 1963, 635

*Mechanisms of Organic and Enzymic Reactions*, S. G. Waley (Oxford Univ. Press), 17 May 1963, 799

*Mechanisms of Virus Infection*, W. Smith, Ed. (Academic Press), 6 Dec. 1963, 1284

*Methodology in Basic Genetics*, W. J. Burdette, Ed. (Holden-Day), 20 Dec. 1963, 1563

*Methodology in Mammalian Genetics*, W. J. Burdette, Ed. (Holden-Day), 5 July 1963, 36

*Mild-Moderate Forms of Protein-Calorie Malnutrition*, G. Blix, Ed. (Almquist and Wiksell), 29 Nov. 1963, 1156

*Moderne Methoden der Pflanzenanalyse*, vol. 6, B. D. Sanwal, Ed. (Springer), 6 Sept. 1963, 896

*Molecular Biology of Bacterial Viruses*, G. S. Stent (Freeman), 24 Jan. 1964, 345

*The Mosquitoes of the South Pacific (Diptera, Culicidae)*, vols. 1 and 2, J. N. Belkin (Univ. of California Press), 10 May 1963, 638

*The Mountain Gorilla*, G. B. Schaller (Univ. of Chicago Press), 7 June 1963, 1081

*Naming the Living World*, T. Savory (English Universities Press; Wiley), 4 Oct. 1963, 42

*Nerve Cells and Insect Behavior*, K. D. Roeder (Harvard Univ. Press), 10 May 1963, 633

*Newer Methods of Nutritional Biochemistry*, A. A. Albanese, Ed. (Academic Press), 15 Nov. 1963, 945

*Nutrition in a Nutshell*, R. J. Williams (Doubleday), 17 May 1963, 800

*The Organic Constituents of Higher Plants*, T. Robinson (Burgess), 10 May 1963, 633

*The Origin of Adaptations*, V. Grant (Columbia Univ. Press), 28 June 1963, 1386

*Papers on Human Genetics*, S. H. Boyer, IV, Ed. (Prentice-Hall), 27 Dec. 1963, 1646

*Parasitism*, J. F. A. Spret (Univ. of Queensland Press; Bailliere, Tindall, and Cox), 7 Feb. 1964, 561

*Physicomathematical Aspects of Biology*, N. Rashevsky, Ed. (Academic Press), 26 Apr. 1963, 374

*Physiological Measurements of Metabolic Functions in Man*, C. F. Consolazio, R. E. Johnson, and L. J. Pecora (McGraw-Hill), 5 July 1963, 35

*Physiologie*, vols. 1-3, C. Keyser, Ed. (Editions Medicales Flammarion), 13 Mar. 1964, 1158

*The Physiology of Earthworms*, M. S. Laverack (Pergamon; Macmillan), 6 Mar. 1964, 1024

*The Physiology of Mosquitoes*, A. N. Clements (Pergamon; Macmillan), 27 Mar. 1964, 1430

*Plant Metabolism*, G. A. Strafford (Harvard Univ. Press), 18 Oct. 1963, 377

## W & W books for researchers

### Abrams et al.: UNFINISHED TASKS IN THE BEHAVIORAL SCIENCES

Based on a symposium held at the Division of Behavioral Sciences of the Chicago Medical School Institute for Medical Research, this book points the way toward the search for ultimate explanations of the nature of human behavior. The 23 participants represent, in these papers, the neuroanatomical, neurophysiological, biochemical, pharmacological, psychological, psychiatric and social aspects.

1964 282 pp., 60 figs. \$10.00

### American Physiological Society: HANDBOOK OF PHYSIOLOGY, Section 4: ADAPTATION TO THE ENVIRONMENT

Divisible into three general sections, presenting (first) the history, theoretical aspects and scope of adaptation, (second) the specific organs and cells in adaptation, and (third) descriptions of principal environments followed by details of the adaptive process as seen in representative groups of animals.

1964 1066 pp., 233 figs. \$32.00

### Emmel & Cowdry: LABORATORY TECHNIQUES IN BIOLOGY AND MEDICINE, 4th ed.

An encyclopedia of several hundred biomedical techniques, arranged in alphabetical order according to the structure for which they are suitable, and thoroughly cross-referenced. New 4th edition includes latest developments and techniques.

1964 487 pp. \$15.50

### König & Klippel: THE RAT BRAIN

A stereotaxic atlas of the forebrain and lower parts of the brainstem with a series of photographs of frontal and sagittal sections, and line drawings of them, placed side by side on 8½ by 11-inch pages. By referring to the line drawing the investigator orients himself by means of an easy-to-follow 3-dimensional coordinate system, determines the precise location of specific structures, and determines the specific functions associated with these structures.

1963 170 pp., 129 figs. \$15.00

### Riggs: THE MATHEMATICAL APPROACH TO PHYSIOLOGICAL PROBLEMS

A critical primer designed to help in the application of mathematical reasoning to physiological problems, and written especially for men who are not trained to be mathematicians. Each chapter contains exemplary problems, with a solution given and fully discussed in the appendix.

1963 459 pp., 92 figs., 21 tables \$13.50



THE WILLIAMS & WILKINS COMPANY

428 E. PRESTON STREET / BALTIMORE, MARYLAND, 21202 / U.S.A.

Publishers of Books and Periodicals in Medicine and the Allied Sciences

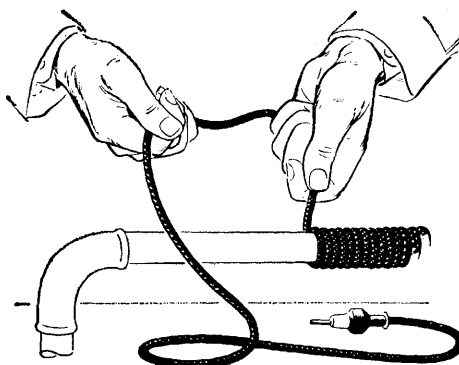
# Electrothermal ARMoured HEATERS

Exceptionally well-adapted to  
NUCLEAR RESEARCH  
TECHNIQUES

Meets the need for an electric heating cable to operate under more severe conditions than tapes and for use at temperatures of 800°C. Supplied in standard dimensions shown and in lengths to suit individual requirements. For operation on power supply from 12 to 250 volts, A.C. or D.C.

The Electrothermal Armoured Heater is constructed of a mineral core and insulated according to temperature range. Resistance alloy is moulded in wire form beneath insulation covering and then enclosed in a braided nickel alloy sheath. Nickel alloy input terminals insulated with ceramic for trouble-free operation at maximum temperature. Braiding combines flexibility with excellent mechanical strength, to withstand handling and abrasion without injuring the heating element. Ideal where a high rate of heat transfer is required. May be applied directly to metal vessels or pipes and may be lagged or close-coiled.

\* Successfully applied to  
METAL PIPES  
CATALYST TUBES  
METAL REACTION  
VESSELS, ETC.



Cat. No.	Temp. °C	Length Feet	Diam Ins.	Volts	Watts	Price
S65110						
H	800	3	5/16	115	300	44.90
I	800	3	5/16	230	300	44.90
J	800	6	5/16	115	600	64.60
K	800	6	5/16	230	600	64.60
L	800	10	5/16	115	1000	93.75
M	800	10	5/16	230	1000	93.75
N	800	16	5/16	110	2500	138.60
O	800	20	5/16	115	2000	148.00
P	800	20	5/16	230	2000	148.00
Q	800	20	5/16	110	3700	164.00
R	800	24	5/16	110	5000	189.00

## TEMPERATURE INDICATING EQUIPMENT

Cat. No.	Description	Price
S84850	Pyrometer 0-1200° C-2192° F	\$69.50
S84851	Thermocouple	11.55
S84852	Compensating lead 48 in. (122 cm.)	11.55

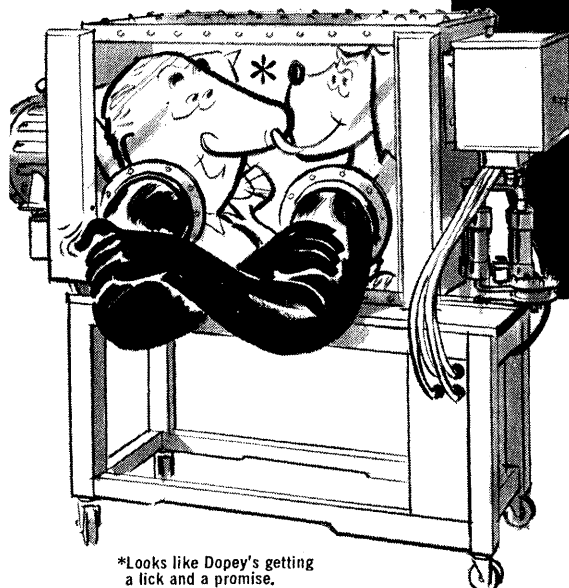


808 BROADWAY  
NEW YORK, N. Y. 10003

1321 WEST 11th STREET  
LOS ANGELES, CALIFORNIA 90015

312 HARBOR WAY  
SOUTH SAN FRANCISCO, CALIF.

LABORATORY APPARATUS • REAGENTS AND CHEMICALS



\*Looks like Dopey's getting  
a lick and a promise.

It's a pleasure to  
"Lead a Dog's Life" in  
K-S-E GERM-FREE  
ENCLOSURES...

The implication of self sufficiency, expressed by the folded arms on the stainless steel and glass rearing unit above, is most appropriate because it is completely portable.

This, as all K.S.E. equipment, is the result of over 50 years of design, engineering and manufacturing experience. There's a folder available which explains this unit in detail and, also, a new catalog showing the entire K.S.E. line of enclosures.

For complete information,  
call or write

K · S · E

KEWAUNEE  
SCIENTIFIC  
EQUIPMENT  
ADRIAN,  
MICHIGAN

4004 Logan Street

*Plants: An Introduction to Modern Botany*, V. A. Greulich and J. E. Adams (Wiley), 10 May 1963, 636

*Primates*, vols. 3-5, pt. B, W. C. Osman Hill [Edinburgh Univ. Press; Interscience (Wiley)], 10 May 1963, 631

*Primates*, vol. 2, No. 1, pt. 6, J. W. Rohen (Karger), 24 May 1963, 885

*Principles of Paleocology*, D. V. Ager (McGraw-Hill), 1 Nov. 1963, 570

*Principles of Zoological Micropaleontology*, vol. 1, V. Porkorny; J. W. Neale, Ed. (Pergamon; Macmillan), 27 Dec. 1963, 1645

*The Process of Evolution*, P. R. Ehrlich and R. W. Holm (McGraw-Hill), 20 Mar. 1964, 1318

*Radioecology*, V. Shultz and A. W. Klement, Jr., Eds. (Reinhold), 25 Oct. 1963, 478

*Range Ecology*, R. R. Humphrey (Ronald), 10 May 1963, 636

*Recent Plant Breeding Research: Svalöf, 1946-1961*, E. Åkerberg and A. Hagberg, Eds. (Wiley; Almqvist and Wiksell), 13 Dec. 1963, 1451

*Recent Progress in Microbiology*, N. E. Gibbons, Ed. (Univ. of Toronto Press), 8 Nov. 1963, 659

*Research Problems in Biology*, American Inst. of Biological Sciences (Double-day), 1 Nov. 1963, 569

*The Science of Botany*, P. B. Weisz and M. S. Fuller (McGraw-Hill), 10 May 1963, 635

*Selected Botanical Papers*, I. W. Knobloch, Ed. (Prentice-Hall), 20 Sept. 1963, 1169

*The Spores and Pollen of the Potomac Group of Maryland*, G. J. Brenner (Dept. of Geology, Mines, and Water Resources, Baltimore), 21 Feb. 1964, 795

*Stages in the Development of Ictalurus nebulosus*, P. B. Armstrong (Syracuse Univ. Press), 31 May 1963, 973

*A Stereoscopic Atlas*, section 8, D. Bassett (Sawyer's), 10 May 1963, 638

*The Structure and Function of the Membranes and Surfaces of Cells*, D. J. Bell and J. K. Grant, Eds. (Cambridge Univ. Press), 18 Oct. 1963, 375

*Studies in Genetics*, selected papers of H. J. Muller (Indiana Univ. Press), 19 Apr. 1963, 285

*Studies on Microalgae and Photosynthetic Bacteria*, edited by the Japanese Society of Plant Physiologists (Univ. of Tokyo Press), 9 Aug. 1963, 514

*Symposia of the International Society for Cell Biology*, R. J. C. Harris, Ed. (Academic Press), 26 July 1963, 346

*Systema Helminthum*, vol. 3, S. Yamaguti [Interscience (Wiley)], 6 Sept. 1963, 897

*Teacher's Handbook* (Biological Sciences Curriculum Study), J. J. Schwab, Ed. (Wiley), 14 Feb. 1964, 668

*Temperature*, vol. 3, pt. 3, J. D. Hardy Ed. (Reinhold; Chapman and Hall), 10 May 1963, 637

*Textbook of Neuroanatomy*, H. C. Elliott (Lippincott), 31 Jan. 1964, 458

*This View of Life*, G. G. Simpson (Harcourt, Brace, and World), 20 Mar. 1964, 1311

*Traité de Zoologie*, vol. 4, pt. 1, P.-P. Grassé, Ed. (Masson), 28 June 1963, 1387

*Vistas in Botany*, vol. 2, W. B. Turrill,

## Clinical Neurology

Second Edition

By LORD BRAIN, London Hospital and Maida Vale Hospital for Nervous Diseases  
Significant revisions, including the introduction of new methods of treatment and diagnosis, and over 30 new X-ray plates, make this an up-to-date and authoritative basic text for medical students and practicing neurologists. A clinical rather than an anatomical approach is used throughout, and attention is focused on the fundamentals of examination.  
1964 408 pp. 16 plates, 67 figs. \$8.75

## Human Biology

*An Introduction to Human Evolution, Variation and Growth*

By G. A. HARRISON, University of Liverpool, J. S. WEINER, Oxford University, J. M. TANNER, and N. A. BARNICOT, both of the University of London

This introduction to the mysteries of human evolution attempts to synthesize various hypotheses about the biological organization of past and present populations. Divided into five sections, the book explores basic aspects of human evolution and genetics, the history of the Primates, anthropogenesis, and the ecology of human populations in terms of climate and nutrition.

1964 526 pp. 83 figs. \$8.00

## Cunningham's Textbook of Anatomy

Tenth Edition

Edited by G. J. ROMANES, University of Edinburgh

The new Tenth Edition devotes more space to the general structure of the different tissues, and offers more detailed accounts of functional anatomy. A fixed color code has been adopted throughout the text, new half-tone illustrations have been made from the original half-tone drawings, and the Paris nomenclature is used throughout.

August 1964 1030 pp. 1204 illus. \$22.50

## An Introduction to Medical Genetics

Third Edition

By J. A. FRASER ROBERTS, Director, Clinical Genetics Research Unit

A new chapter incorporating the recent discoveries on the subject of chromosome abnormalities is the principal addition to this introduction to the field of medical genetics. The chapter on the genetics of blood groups has been largely rewritten, and new sections have been added, where relevant, dealing with biochemical genetics and drug-induced disease.

1963 296 pp. 121 illus. \$7.00

**Oxford University Press**

417 Fifth Avenue  
New York, N.Y. 10016

Ed. (Pergamon; Macmillan), 31 Jan. 1964, 459

*Wasp Farm*, H. E. Evans (Natural History Press), 18 Oct. 1963, 376

*Whales*, E. J. Slijper (Basic Books), 12 Apr. 1963, 166

*Zoologie 1*, vol. 14, P.-P. Grassé and A. Tetry (Librarie Gallimard), 27 Sept. 1963, 1268

### Chemistry

*Advances in Heterocyclic Chemistry* vol. 1, A. R. Katritzky, Ed. (Academic Press), 5 July 1963, 34

*Advances in Photochemistry*, vol. 1, W. A. Noyes, Jr., G. S. Hammond, and J. N. Pitts, Jr., Eds. [Interscience (Wiley)], 20 Mar. 1964, 1317

*Air Chemistry and Radioactivity*, C. E. Junge (Academic Press), 25 Oct. 1963, 477

*Anorganische Chemie*, vols. 2 and 3, I. Náray-Szabó (Akademiai Kiado, Budapest; Akademie Verlag, Berlin), 21 Feb. 1964, 794

*Basic Concepts of Nuclear Chemistry*, R. T. Overman (Chapman and Hall; Reinhold), 10 May 1963, 648

*Boron Hydrides*, W. N. Lipscomb (Benjamin), 20 Mar. 1964, 1318

*Chemistry Applications of Group Theory*, F. A. Cotton [Interscience (Wiley)], 20 Dec. 1963, 1562

*Chemical Bonding and the Geometry of Molecules*, G. E. Ryschkewitsch (Reinhold; Chapman and Hall), 10 May 1963, 645

*Chemistry in Three Dimensions*, L. F. Fieser (The author; order from Macalaster Scientific Corp.), 7 Feb. 1964, 559

*The Chemistry of Rhenium*, K. B. Lebedev (Butterworth), 26 Apr. 1963, 375

*The Chemistry of the Lanthanides*, T. Moeller (Reinhold; Chapman and Hall), 28 June 1963, 1388

*The Chemistry of Wood*, B. L. Brown-ing, Ed. [Interscience (Wiley)], 20 Dec. 1963, 1564

*Classics in the Theory of Chemical Combinations*, O. T. Benfey (Dover), 27 Dec. 1963, 1649

*Columbium and Tantalum*, F. T. Sisco and E. Epremian, Eds. (Wiley), 12 July 1963, 145

*Complexation in Analytical Chemistry*, A. Ringbom [Interscience (Wiley)], 27 Dec. 1963, 1648

*Electrochemistry*, G. Milazzo (Elsevier), 19 July 1963, 259

*Electronic Structure and Alloy Chemistry of the Transition Elements*, P. A. Beck, Ed. [Interscience (Wiley)], 10 May 1963, 653

*How Chemical Reactions Occur*, E. L. King (Benjamin), 28 Feb. 1964, 947

*Inorganic Chemistry*, R. B. Heslop and P. L. Robinson (Elsevier), 11 Oct. 1963, 222

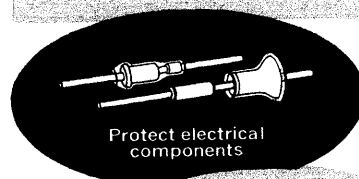
*Interfacial Phenomena*, J. T. Davies and E. K. Rideal (Academic Press), 22 Nov. 1963, 1052

*An Introduction to Clay Colloid Chemistry*, H. van Olphen [Interscience (Wiley)], 6 Mar. 1964, 1023

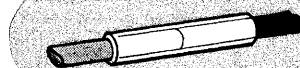
*An Introduction to Molecular Kinetic Theory*, J. H. Hildebrand (Reinhold; Chapman and Hall), 24 Jan. 1964, 347

See how much more  
you can do with

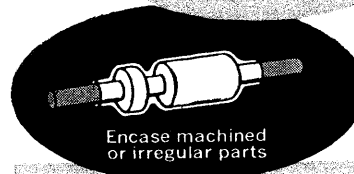
**EXPANDED  
TEFLON\*  
TUBING**



Protect electrical components



Create joints



Encase machined or irregular parts

**HOW IT WORKS:** PF expands tubing mechanically to a much larger diameter. In use, tubing is positioned and heated to gel point. On cooling, it recovers its original diameter, shrinking to form a tight fit over the part it encloses.

*Advantages of*



### EXPANDED TUBING:

- CLAMPS TIGHTLY any inserted object, including irregular shapes and other Teflon tubing
- CHEMICALLY INERT
- LOW PERMEABILITY
- LOW COEFFICIENT OF FRICTION
- TOUGH AND FLEXIBLE
- NON-FLAMMABLE
- EXCEPTIONAL ELECTRICAL PROPERTIES

PF Expanded Tubing is made in all popular thin and standard wall sizes, in 11 colors and it can be printed and cut to the lengths you require.

Send for a free sample and try it yourself or let us show you how it works and what it can do for you.

JUST WRITE,  
WIRE OR PHONE.



**PENNSYLVANIA  
FLUOROCARBON CO., INC.**

Holley St. and Madison Ave., Clifton Hts., Penna.  
MAdison 2-2300 TWX: 215-623-1577

**SAGE**

## MICRO-FLOW PUMPS

small, portable,  
battery-operated  
... for dozens  
of research and  
clinical applications

... permit uniform  
infusion at  
reproducible flow rates  
from  
1 ml/½ hr  
to  
1 ml/24 hr

Model 172    Model 127    Model 085  
10 ml size    2½ ml size    1 ml size  
\$175        \$95        \$65

Ideal for applications requiring slow, uniform infusion of fluid over long periods of time, as in chemotherapy, drug experiments on unrestrained animals, feeding nutrients to tissue cultures, etc. Model 085 is a miniature 3" long x ¾" diameter; others are comparably compact.

**The Sage Micro-Flow Pump\*** works by electrolysis, uniformly generating a gas that moves a piston which drives the fluid. Can be set to pump at various rates.

Each pump comes complete with battery, supply of electrolyte, and set of 5 interchangeable flow rate setters for different rates: 1 ml/half hr; 1 ml/hr; 1 ml/2 hr; 1 ml/8 hr; 1 ml/24 hr. Extra batteries and electrolyte are available. Rate setters are permanently re-usable.

\*Patent Pending

Also available from Sage: Line-operated Syringe Pumps covering flow rate ranges from 0.11 ml/day to 29.5 ml/min.

Send requests for catalog data to:

**SAGE INSTRUMENTS, INC.**  
2 SPRING ST., WHITE PLAINS, N. Y.  
914 WH 9-4121

*Ion Association*, C. W. Davies (Butterworth), 3 Jan. 1964, 37

*Ionic Equilibria in Analytical Chemistry*, H. Freiser and Q. Fernando (Wiley), 27 Dec. 1963, 1646

*Magnetism and the Chemical Bond*, J. B. Goodenough [Interscience (Wiley)], 3 Jan. 1964, 33

*Man-Made Transuranium Elements*, G. T. Seaborg (Prentice-Hall), 6 Dec. 1963, 1288

*Metal Ions in Aqueous Solution*, J. P. Hunt (Benjamin), 10 Jan. 1964, 123

*Modern Approach to Inorganic Chemistry*, C. F. Bell and K. A. K. Lott (Butterworth), 22 Nov. 1963, 1051

*Newer Methods of Preparative Organic Chemistry*, vol. 2, W. Foerst (Academic Press), 25 Oct. 1963, 478

*Noble-Gas Compounds*, H. Hyman (Univ. of Chicago), 27 Mar. 1964, 1425

*Nonequilibrium Thermodynamics*, D. D. Fitts (McGraw-Hill), 12 Apr. 1963, 168

*Non-Equilibrium Thermodynamics*, S. R. de Groot and P. Mazur (North-Holland; Wiley), 12 Apr. 1963, 168

*Nonstoichiometric Compounds*, R. Ward, Ed. (American Chemical Soc.), 29 Nov. 1963, 1157

*Organic Syntheses: Collective Volume IV*, N. Rabjohn, Ed. (Wiley), 11 Oct. 1963, 221

*Physical Adsorption of Gases*, D. M. Young and A. D. Crowell (Butterworth), 27 Sept. 1963, 1268

*Physical Geochemistry*, F. G. Smith (Addison-Wesley), 12 July 1963, 146

*Polymer Single Crystals*, P. H. Geil [Interscience (Wiley)], 10 Jan. 1964, 121

*Polyurethanes*, vol. 1, J. H. Saunders and K. C. Frisch [Interscience (Wiley)], 7 June 1963, 1083

*Radiation Effects on Organic Materials*, R. O. Bolt and J. G. Carroll, Eds. (Academic Press), 10 May 1963, 657

*The Role of Diffusion in Catalysis*, C. N. Satterfield and T. K. Sherwood (Addison-Wesley), 27 Mar. 1964, 1430

*The Sea*, vol. 2, M. N. Hill, Ed. [Interscience (Wiley)], 10 May 1963, 644

*Space Chemistry*, P. W. Merrill (Univ. of Michigan Press), 2 Aug. 1963, 421

*Steroid Reactions*, C. Djerassi, Ed. (Holden-Day), 16 Aug. 1963, 625

*The Structure of Molecules*, G. M. Barrow (Benjamin), 11 Oct. 1963, 219

*Synthetic Methods of Organic Chemistry*, W. Theilheimer (Karger), 11 Oct. 1963, 221

*Technique of Inorganic Chemistry*, vol. 2, N. R. Johnson, E. Eichler, and G. D. O'Kelley [Interscience (Wiley)], 17 Jan. 1964, 235

*Thermodynamic Properties of Helium*, W. J. Lick and H. W. Emmons (Harvard Univ. Press), 17 May 1963, 797

*The Thermodynamics of Gasification and Gas-Synthesis Reactions*, N. V. Lавров, V. V. Korovov, and V. I. Filippova (Pergamon; Macmillan), 20 Dec. 1963, 1565

*Topics in Organic Chemistry*, L. F. Fieser and M. Fieser (Chapman and Hall; Reinhold), 21 June 1963, 1299

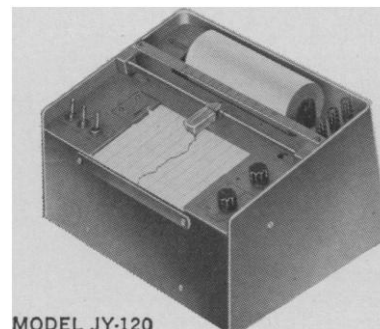
*Volatile Silicon Compounds*, E. A. V. Ebsworth (Pergamon; Macmillan), 17 Jan. 1964, 233

# NESCO

## GRAPHIC RECORDER

## MEASURES 1/100TH OF A MILLIVOLT.

Pen speed 1/2 sec.  
full scale



Here is fast, accurate potentiometric recording at a low price—only \$535.00. Both accuracy and sensitivity are ½% of span. Maximum signal source resistance, 50K ohms.

**Step selection of ranges**—from 1 MV to 10 V, provided by attenuator on front panel.

**Minimum zero drift**—due to null-balance, servo-type, potentiometric, chopper-stabilized system.

**2 other ranges available:**

10 MV fixed span, Model JY100 .....\$375.00

10 MV to 100 V, Model JY110 .....\$420.00

**10" models available:**

10 MV fixed span, Model JY150 .....\$565.00

10 MV — 100 V, Model JY160 .....\$595.00

1 MV — 10 V, Model JY170 .....\$690.00

for gas chromatography with Disc integrator  
.....from \$1150.00

## NESCO INSTRUMENTS

DIVISION OF DATAPULSE, INCORPORATED  
509 HINDRY AVE, INGLEWOOD 1, CALIFORNIA  
OR 8-3983 / TWX: 213-673-0390



## Dictionaries, Encyclopedias, Tables, and Handbooks

*Astrophysical Quantities*, C. W. Allen (Oxford Univ. Press), 1 Nov. 1963, 569  
*Basic Astronomical Data*, vol. 3, K. Aa. Strand, Ed. (Univ. of Chicago Press), 11 Oct. 1963, 217

*Concise Encyclopaedia of Electrical Engineering*, M. G. Say, Ed. (Newnes, London), 19 Apr. 1963, 285

*Consolidated Index of Selected Property Values: Physical Chemistry and Thermodynamics* (National Acad. of Sciences-National Research Council), 10 May 1963, 659

*Crystal Data*, J. D. J. Donnay and G. Donnay, Eds. (American Crystallographic Assoc.), 14 June 1963, 1203

*Crystal Orientation Manual*, E. A. Wood (Columbia Univ. Press), 1 Nov. 1963, 570

*Dictionary of Pure and Applied Physics*, vol. 1, compiled by L. de Vries and W. E. Clason (Elsevier), 27 Mar. 1964, 1426

*Elsevier's Dictionary of General Physics in Six Languages: English/American, French, Spanish, Italian, Dutch, and German*, W. E. Clason (Elsevier), 19 Apr. 1963, 288

*The Encyclopaedic Dictionary of Physics*, vols. 4-7, J. Thewlis, Ed. (Pergamon; Macmillan), 13 Sept. 1963, 1025

*The Encyclopedia of X-Rays and Gamma Rays*, G. L. Clark, Ed. (Reinhold; Chapman and Hall), 15 Nov. 1963, 943

*Handbook of Analytical Chemistry*, L. Meites, Ed. (Mc-Graw-Hill), 28 June 1963, 1390

*Infrared Band Handbook*, J. A. Szymanski, Ed. (Plenum Press), 20 Dec. 1963, 1562

*Russian-English Chemical and Polytechnical Dictionary*, L. I. Callahan (Wiley), 10 May 1963, 654

*Russian-English Physics Dictionary*, I. Emin et al. (Wiley), 10 Jan. 1964, 121

*Solar and Planetary Longitudes: For Years -2500 to +2000 by 10-Day Intervals*, W. D. Stahlman and O. Gingerich (Univ. of Wisconsin Press), 30 Aug. 1963, 796

*Structure Reports for 1953*, vol. 17, W. B. Pearson, J. Wyart, and J. M. Robertson, Eds. (Oosthoek's), 12 July 1963, 147

*Tables of Experimental Dipole Moments*, A. L. McClellan (Freeman), 31 Jan. 1964, 460

*Water Atlas of the United States*, D. W. Miller, J. J. Geraghty, and R. S. Collins (Water Information Center, Port Washington, N.Y.), 12 Apr. 1963, 169

## Economics and the Social Sciences

*Aboriginal Cultural Development in Latin America: An Interpretative Review*, B. J. Meggers and C. Evans, Eds. (Smithsonian Institution), 15 Nov. 1963, 945

*Anthropology A to Z*, C. S. Coon and E. E. Hunt, Jr., Eds. (Grosset and Dunlap), 19 July 1963, 259

*Anthropometric Survey of Turkey, Greece, and Italy*, H. T. E. Hertzberg, E. Churchill, C. W. Dupertuis, R. M.



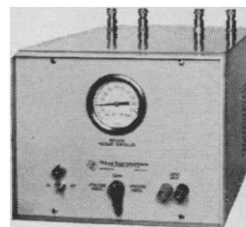
## TI Precision Pressure Gage... so simple anyone can make precision pressure measurements

The fused quartz Precision Pressure Gage has proven to be the easiest, fastest instrument for precision pressure measurement—so simple that it is now accepted for production line applications. Users can achieve resolutions to 1 part in 100,000, repeatabilities to 2 parts in 100,000 under shop conditions. Automatic servo-nulling gages can resolve pressure changes to within 2.5 microns.

The gage offers advantages in speed over conventional methods, is portable, and does not require corrections for meniscus, head, buoyancy or gravity. Analog output from the photocell readout system can be used to drive a potentiometric recorder. Manual-nulling, servo-nulling and motor-driven models are available. TI

Precision Pressure Controllers (shown below) complement the Precision Pressure Gages in providing precise automatic control of pressure. Automatic controllers provide the source and the Precision Pressure Gages provide the control measurement and readout function. They can be used in flow and non-flow systems with adjustment sensitivities to .002% of full scale.

Manual and completely automatic servo-controlled models are available to control pressures over various ranges from 0.1 in. Hg. to 500 psi, and over a wide temperature range.



Write for Bulletin S-142.

INDUSTRIAL  
PRODUCTS  
GROUP



**TEXAS INSTRUMENTS**  
INCORPORATED  
P. O. BOX 66027 HOUSTON, TEXAS 77006

# LOOK! NO TEST TUBES!

*and you run a sample in just 15 seconds!...*



with the **FAST Bausch & Lomb Data Acquisition System**. If you do clinical or quality control work and you must analyze a large number of samples—this was made for you. No more headaches from test tubes, because you don't use them.

You no longer need to match them ... or wash them ... or be careful of breaking them. Save up to 70% of your time. You can easily run 4 samples a minute. (Reproducibility is less than 1/2%) ... accuracy is substantially higher than with a completely manual system.

The Data Acquisition System is modular. Buy the whole system...or any modular component. The unique Flow-Thru Cuvette permits introducing and removing samples, without special test tubes, at an amazing rate. The transistor-regulated Spectronic-20 is the fastest, most accurate colorimeter-spectrophotometer in its price class. The V.O.M. Strip-Chart Recorder offers 17 different input ranges and 5 built-in chart speeds (with our Spectro Chart 25 Adapter). The Digi-Spec DT-20 Digital Readout gives easy, accurate readings and even permits "storing" or retaining the displayed reading.

For further information, just circle our ad number below in the magazine's reply card and mail it, or write for a demonstration in your laboratory to Bausch & Lomb Incorporated, 85605 Bausch Street, Rochester, New York 14602.

**BAUSCH & LOMB** 

In Canada, write Bausch & Lomb Optical Co., Ltd., Dept. 856, Scientific Instrument Division, 16 Grosvenor St., Toronto 5, Ont.

White, and A. Damon (Pergamon; Macmillan), 27 Mar. 1964, 1426

*Archaeology*, S. Rapport and H. Wright, Eds. (New York Univ. Press), 10 May 1963, 643

*Archaeology and the Microscope*, L. Biek (Lutterworth), 3 Jan. 1964, 36

*The Art of the Stone Age*, H.-G. Bandi, Ed. (Crown), 27 Dec. 1963, 1642

*The Behaviour of Domestic Animals*, E. S. E. Hafez, Ed. (Williams and Wilkins), 30 Aug. 1963, 795

*Birth to Maturity*, J. Kagan and H. A. Moss (Wiley), 19 Apr. 1963, 287

*Computer Simulation of Personality*, S. S. Tomkins and S. Messick, Eds. (Wiley), 8 Nov. 1963, 656

*Creativity and Psychological Health: Origins of Personal Vitality and Creative Freedom*, F. Barron (Van Nostrand), 8 Nov. 1963, 656

*Culture Against Man*, J. Henry (Random House), 17 Jan. 1964, 231

*Digging Up Bones*, D. R. Brothwell [British Museum (Natural History)], 9 Aug. 1963, 513

*Ekade Ektab, Die Felsbilder Fezzans*, L. Frobenius (Akademische Druck, Graz, Austria), 27 Dec. 1963, 1642

*Ethnic Origins of the Peoples of North-eastern Asia*, M. G. Levin; H. N. Michael, Ed. (Univ. of Toronto Press), 28 June 1963, 1389

*Focus on Behavior* (film), Audio-Visual Center (Indiana Univ.), 21 Feb. 1964, 792

*Geography in World Society*, A. H. Meyer and J. H. Strietelmeier (Lippincott), 10 May 1963, 641

*Handbook of Mathematical Psychology*, vol. 1, R. D. Luce, R. R. Bush, and E. Galanter, Eds. (Wiley), 20 Mar. 1964, 1319

*Human Nature and the Study of Society*, M. P. Redfield, Ed. (Univ. of Chicago Press), 2 Aug. 1963, 419

*The Human Species*, F. S. Hulse (Random House), 13 Dec. 1963, 1450

*Inhibition and Choice*, S. Diamond, R. S. Balvin, and F. R. Diamond (Harper and Row), 19 July 1963, 260

*Introduction to Econometrics*, O. Lange (Pergamon; Macmillan), 29 Nov. 1963, 1157

*The Japanese People: Origins of the People and the Language*, I. Komatsu (Soc. for International Cultural Relations, Tokyo), 13 Mar. 1964, 1157

*Madsimu Dsangara, Südafrikanische Felsbilderchronik*, L. Frobenius (Akademische Druck, Graz, Austria), 27 Dec. 1963, 1642

*Maternal Behavior in Mammals*, H. Rheingold, Ed. (Wiley), 28 Feb. 1964, 944

*Monozygotic Twins*, J. Shields (Oxford Univ. Press), 10 May 1963, 642

*Nomades et Nomadisme au Sahara*, vol. 19 (UNESCO), 27 Sept. 1963, 1266

*Palestine Before the Hebrews*, E. Anati (Knopf), 5 Apr. 1963, 41

*The Paliau Movement in the Admiralty Islands, 1946-54*, T. Schwartz (American Museum of Natural History), 23 Aug. 1963, 708

*Peoples of Central Asia*, L. Krader (Indiana Univ. Press; Mouton), 31 Jan. 1964, 459

*The Political Role of Labor in Develop-*

ing Countries, B. H. Millen (Brookings Institution), 26 July 1963, 346

*Prehistoric Rock Art of the Federation of Rhodesia and Nyasaland*, R. Summers, Ed. (National Publications Trust, Rhodesia and Nyasaland; Humanities Press), 27 Dec. 1963, 1642

*The Prehistory of East Africa*, S. Cole (Macmillan), 20 Sept. 1963, 1169

*The Professional Scientist*, A. L. Strauss and L. Rainwater (Aldine), 17 May 1963, 797

*The Religions of the Oppressed*, V. Lanternari (Knopf), 23 Aug. 1963, 708

*The Reluctant Job Changer*, G. L. Palmer, H. S. Parnes, R. C. Wilcock, M. W. Herman, and C. P. Brainerd (Univ. of Pennsylvania Press), 16 Aug. 1963, 624

*Rengsanggri*, R. Burling (Univ. of Pennsylvania Press), 28 June 1963, 1387

*Resources for the Teaching of Anthropology*, D. G. Mandelbaum, G. W. Lasker, and E. M. Albert, Eds. (Univ. of California Press), 12 July 1963, 144

*Science in Archaeology*, D. Brothwell and E. Higgs, Eds. (Thames and Hudson; Basic Books), 10 Jan. 1964, 120

*The Science of Animal Behaviour*, P. L. Broadhurst (Penguin Books), 7 Feb. 1964, 560

*Sects and Society*, B. R. Wilson (Univ. of California Press), 23 Aug. 1963, 708

*Six Cultures: Studies of Child Rearing*, B. B. Whiting, Ed. (Wiley), 25 Oct. 1963, 476

*The Sonjo of Tanganyika*, R. F. Gray (Oxford Univ. Press), 26 July 1963, 347

*The Structure of Chin Society*, F. K. Lehman (Univ. of Illinois Press), 3 Jan. 1964, 36

*A Study in Behaviour: Principles of Ethology and Behavioural Physiology, Displayed Mainly in the Rat*, S. A. Barnett (Methuen), 26 July 1963, 344

*The Sumerians*, S. N. Kramer (Univ. of Chicago Press), 16 Aug. 1963, 623

*The Swazi*, H. Kuper (Holt, Rinehart, and Winston), 7 Feb. 1964, 558

*The Teaching of Anthropology*, D. G. Mandelbaum, G. W. Lasker, and E. M. Albert, Eds. (Univ. of California Press), 12 July 1963, 144

*They Shall Take Up Serpents*, W. La Barre (Univ. of Minnesota Press), 23 Aug. 1963, 708

*Uncertainty and Structure as Psychological Concepts*, W. R. Garner (Wiley), 17 May 1963, 799

*Understanding Culture*, J. J. Honigmann (Harper and Row), 21 June 1963, 1300

*Vanished Civilizations of the Ancient World*, E. Bacon, Ed. (McGraw-Hill), 4 Oct. 1963, 39

## General

*Access to Higher Education*, F. Bowles (UNESCO; Columbia Univ. Press), 29 Nov. 1963, 1154

*AMA: The Voice of American Medicine*, J. G. Burrow (Johns Hopkins Press), 30 Aug. 1963, 794

*America's New Policy Makers: The Scientists' Rise to Power*, D. W. Cox (Chilton), 13 Mar. 1964, 1156

*Anatomie et Biologie des Rhinogrades*,

8 MAY 1964

# HELPFUL LEA & FEBIGER BOOKS

## diFiore—An Atlas of Human Histology

By MARIANO S. H. diFIORE, Faculty of Medical Sciences, University of Buenos Aires. 224 pages 7" x 10½". 103 original color plates. 160 figures. New 2nd \$8.00.

## Faust and Russell—Craig and Faust's Clinical Parasitology

By ERNEST C. FAUST, Ph.D., LL.D., Emeritus, Tulane University School of Medicine, New Orleans; and PAUL F. RUSSELL, M.D., Harvard School of Public Health. 1099 pages. 352 illustrations and 8 plates in color. 23 tables. New 7th edition \$16.50

## Galigher and Kozloff—The Essentials of Practical Microtechnique

By the late ALBERT E. GALIGHER, Berkeley, California; and EUGENE N. KOZLOFF, Lewis and Clark College, Portland. About 350 pages. 60 illustrations. New. Ready soon.

## Lloyd—Human Reproduction and Sexual Behavior

By CHARLES W. LLOYD, M.D., Worcester Foundation for Experimental Biology, Shrewsbury. 560 pages. 203 illustrations. New. \$12.50.

## Lumb—Small Animal Anesthesia

By WILLIAM V. LUMB, D.V.M., Colorado State University, Fort Collins. 420 pages. 125 illustrations, 1 in color. 60 tables. New \$11.50.

## Noble and Noble—Parasitology: The Biology of Animal Parasites

By ELMER R. NOBLE, Ph.D., University of California, Santa Barbara; and GLENN A. NOBLE, Ph.D., California State Polytechnic College, San Luis Obispo. 724 pages. 1490 illustrations on 381 figures and 3 plates in color. New 2nd edition. \$11.00.

## Porter and Bonneville—An Introduction to the Fine Structure of Cells and Tissues

By KEITH R. PORTER, Ph.D., Harvard University, Cambridge; and MARY A. BONNEVILLE, Ph.D., College of Physicians and Surgeons, Columbia University, New York. 60 loose-leaf sheets, 8½" x 11", punched to fit standard size notebook. 26 full page illustrations and 30 accompanying legends. Available in loose-leaf student and clothbound editions. New 2nd edition. Ready in August. Clothbound \$6.00.

## Radeleff—Veterinary Toxicology

By R. D. RADELEFF, D.V.M., Toxicology Investigations Laboratory, Animal Disease and Parasite Research Division, Agricultural Research Service, U.S. Department of Agriculture, Kerrville. About 400 pages. 105 illustrations. New. Ready soon.

## Thienes and Haley—Clinical Toxicology

By CLINTON H. THIENES, M.D., Emeritus, University of Southern California, Los Angeles, and THOMAS J. HALEY, Ph.D., University of California, Los Angeles. About 650 pages. Illustrated. New 4th edition ready soon.

## Williams, Bonde and Younggren—Laboratory Exercises for Biological Science

By OLWEN WILLIAMS, Ph.D., University of Colorado, Boulder; ERIK K. BONDE, Ph.D., University of Colorado; and NEWELL A. YOUNGGREN, Ph.D., University of Arizona, Tucson. 189 pages. Wirebound. New. \$3.50.

## Wohl and Goodhart—Modern Nutrition in Health and Disease

Edited by MICHAEL G. WOHL, M.D., Emeritus, Temple University School of Medicine, Philadelphia; and ROBERT S. GOODHART, M.D., The National Vitamin Foundation, Inc. Many contributors. About 1180 pages. Illustrated. 155 tables. New 3rd edition. Ready soon.

Write for Descriptive Literature on Books in Your Special Fields of Interest

MAIL TODAY 

## LEA & FEBIGER

Washington Square  
Philadelphia, Pa. 19106

Please send me the books circled above or listed in margin below.  
I will return books or pay for those I keep within 60 days of their receipt.

NAME (print) .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

TEACHING AFFILIATION .....  
SC. 5-8-64

What's your preference?

## LABCO has the enclosure line

Labco stainless-steel small animal enclosures meet every requirement for laboratory animal care. Durable, stain resistant, easily autoclaved. Sloping side, mouse, rat and hamster units are easily stacked; have three types of interchangeable tops for pellet or grain feeding. Accommodate round or square water bottles. Square, wire enclosures fit colony racks for space saving economy. Labco has the line or will design to your specification. Write today for catalog information.

**LABCO DIVISION**  
PARTSCO, INC.  
2977 LAMB AVENUE  
COLUMBUS 19, OHIO



## FLUORESCENCE LAMP UNIT

### REICHERT FLUOREX is more versatile

has built-in low voltage lamp for instantaneous transitions to white light

#### For:

- FLUORESCENT ANTIBODY TECHNIQUES
- GENERAL FLUORESCENCE MICROSCOPY
- CONTRAST FLUORESCENCE MICROSCOPY
- ROUTINE MICROSCOPY

FLUOREX with HBO-200 super pressure mercury lamp and high intensity low voltage lamp for instantaneous transitions. Shown with REICHERT Microscope "Biozet" and Bino-Photo Tube with 35mm camera.



For Particulars or demonstration contact  
**WILLIAM J. HACKER & CO., INC.**  
BOX 646 / W. CALDWELL, N. J. / CA 6-8450

H. Stümpke (Masson), 10 May 1963, 625  
*Antarctic Research*, H. Wexler, M. J. Rubin, and J. E. Caskey, Jr., Eds. (American Geophysical Union), 3 May 1963, 474

*The Atomic Age*, M. Grodzins and E. Rabinowitch, Eds. (Basic Books), 24 Jan. 1964, 341

*Francis Bacon and the Modern Dilemma*, L. Eiseley (Univ. of Nebraska Press), 5 July 1963, 35

*Birds of Hampshire and the Isle of Wight*, E. Cohen (Oliver and Boyd), 3 Jan. 1964, 37

*Birds of Wisconsin*, O. J. Gromme (Univ. of Wisconsin Press), 25 Oct. 1963, 477

*Careers in the Biological Sciences*, W. W. Fox (Walck), 1 Nov. 1963, 570

*The Century of Science*, W. Davis (Duell, Sloan, and Pearce), 22 Nov. 1963, 1050

*Ceramics: Stone Age to Space Age*, L. Mitchell (National Science Teachers Assoc.), 13 Dec. 1963, 1451

*Change, Hope, and the Bomb*, D. Lienthal (Princeton Univ. Press), 18 Oct. 1963, 374

*The Congressman, His Work as He Sees it*, C. L. Clapp (Brookings Institution), 31 Jan. 1964, 457

*Conjectures and Refutations*, K. R. Popper (Basic Books), 10 May 1963, 643

*The Dawn of a New Age*, E. Rabinowitch (Univ. of Chicago Press), 18 Oct. 1963, 374

*Education in an Industrial Society*, G. H. Bantock (Faber and Faber), 1 Feb. 1964, 556

*The Education of American Teachers*, J. Conant (McGraw-Hill), 20 Sept. 1963, 1166

*Empire of the Inca*, B. C. Brundage (Univ. of Oklahoma Press), 3 Jan. 1964, 36

*Federal Conservation Policy, 1921-1933*, D. C. Swain (Univ. of California Press), 30 Aug. 1963, 795

*The First New Nation*, S. M. Lipset (Basic Books), 6 Mar. 1964, 1022

*The Fishes*, F. D. Ommanney and the editors of *Life* (Time), 10 May 1963, 626

*A Guide to Science Reading*, H. J. Deason, Ed. (New American Library), 5 Apr. 1963, 42

*How to Know a Fly*, V. G. Dethier (Holden-Day), 21 June 1963, 1302

*George Hoyt Whipple and His Friends*, G. W. Corner (Lippincott), 24 Jan. 1964, 346

*The Human Body*, I. Asimov (Houghton Mifflin), 10 May 1963, 627

*Incidents of Travel in Yucatan*, vols. 1 and 2, J. L. Stephens; V. W. von Hagen, Ed. (Univ. of Oklahoma Press), 10 May 1963, 644

*Knowledge and Wonder*, V. F. Weisskopf (Doubleday), 10 May 1963, 626

*Kremers and Urdang's History of Pharmacy*, revised by G. Sonnedeker (Lippincott), 31 Jan. 1964, 461

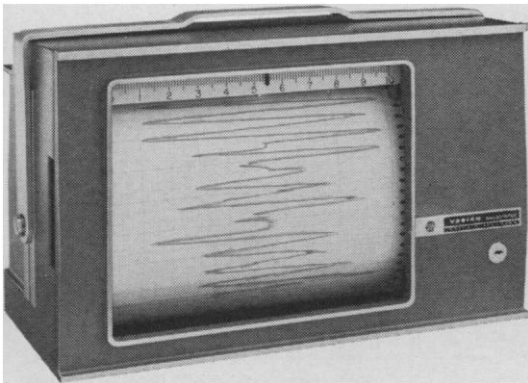
*Land and Life*, J. Leighly, Ed. (Univ. of California), 28 Feb. 1964, 945

*Land and Water Use*, W. Thorne, Ed. (AAAS), 2 Aug. 1963, 422

*The Language of Mathematics*, F. Land (Doubleday), 21 June 1963, 1298

*Literature and Science*, A. Huxley (Harper and Row), 3 Jan. 1964, 33





## NEW 10" RECORDERS

Varian's new G-40 series ten-inch potentiometer recorders are—if you'll pardon the expression—five ways better:

■ **They're compact.** Die-cast aluminum construction and solid-state design keep weight down to 30 lbs., yet make them rugged and easy to service.

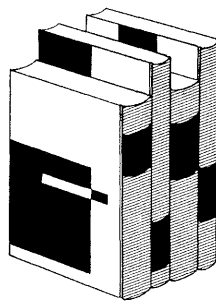
■ **True differential input circuit** means you get both high input impedance and high common mode rejection. You can even operate them with unbalanced circuits.

■ **Choose from single or multiple range models.** Eight push-button ranges—1 mv to 100 volts—or single range. Attenuator adjustment on all.

■ **Fast pen speed.** Less than  $\frac{1}{2}$  second full scale.

■ **And they are accurate.**  $0.25\% + 5 \mu v$  on 1 mv range;  $0.25\%$  on all other ranges. Need more information? Well, then: 9 optional chart speeds; controls are in front for easy operation; they're portable or rack-mountable; and prices start at \$985, with healthy discounts for quantity or OEM orders. Three distinct models are available now for laboratory, industrial or OEM applications. Other inputs available as specials. Get all the facts from RECORDER DIVISION.

**VARIAN ASSOCIATES**  
PALO ALTO 18, CAL.  
*In Europe contact Varian A. G., Zug, Switzerland*



## NEW FROM YEAR BOOK MEDICAL PUBLISHERS

### THE BIOCHEMISTRY OF CLINICAL MEDICINE

**New 3rd Edition**—In his usual thorough fashion, the author has given this distinguished work a fine-comb revision. Scores of new subjects have been added. Outdated information has been replaced by later theory and fact. The book has been enlarged by some 65 pages and no effort or expense spared to enhance its completeness. By **WILLIAM S. HOFFMAN, Ph.D., M.D.**, *Professorial Lecturer in Medicine, University of Illinois College of Medicine*. 802 pages; illustrated. \$12.50.

### RADIATION EFFECTS IN PHYSICS, CHEMISTRY AND BIOLOGY

**New**—Proceedings of the Second International Congress of Radiation Research. Using the rapporteur method of presentation, this volume contains reports on some 300 papers and summaries of the discussions to which the reports gave rise. In a unique way, access is gained to the thoughts and opinions of several hundred leading scientists, drawn from over forty countries, on twenty-five topics broadly representative of the advancing frontiers of radiation research. Edited by **MICHAEL EBERT**, *Christie Hospital and Holt Radium Institute, Withington, Manchester*; and **ALMA HOWARD**, *Mount Vernon Hospital and The Radium Institute, Northwood, Middlesex*. 510 pages; illustrated. \$15.00.

### ANIMAL & CLINICAL PHARMACOLOGIC TECHNIQUES IN DRUG EVALUATION

**New**—Many leading authorities have authored this new book. The book is divided into two major sections. The first discusses the basic principles of clinical pharmacology, including variability of drug response, medical statistics, etc., as well as general principles of drug metabolism and drug evaluation in man. Part Two consists of a series of paired chapters covering individual types of pharmacologic agents, with the first chapter describing animal techniques followed by a second chapter outlining clinical techniques. Edited by **JOHN H. NODINE, M.D.**, and **PETER E. SIEGLER, M.D.**, *Hahnemann Medical College and Hospital, Philadelphia*. Approx. 400 pages; illustrated.

### METHODS IN MEDICAL RESEARCH— New Vol. 10

**In preparation**—In the same vein as its predecessors, Volume 10 is an outstanding discussion of the principles, techniques, results, trends, and equipment as applied to important areas of medical research. Contents: Methods for the Study of Histocompatibility Genes and Isoantigens. Some Methods Applicable to the Study of Experimental Hypersensitivity. Resistance to Chemotherapeutic Agents. Methods with Cultures of Dispersed Animal Cells. **HERMAN N. EISEN, M.D.**, *Washington University, St. Louis*, Editor-in-Chief. Approx. 370 pages; illustrated.

*Order from your Medical Book Store  
or from the Publishers*

**Year Book Medical Publishers, Inc.**

35 East Wacker Drive,

Chicago, Ill. 60601



**ALL NEW!**

**C.R.C. LABWASHER®**

**AUTOMATED GLASSWARE  
WASHING AND DRYING  
BRINGS YOU THE LATEST IN  
CONVENIENCE AND EFFICIENCY**



◀ C.R.C. LABWASHER® VERSATILITY PERMITS UNDER-COUNTER OR FREE STANDING INSTALLATION!

▲ FRONT LOADING MEANS FULL CAPACITY LOADING . . . EASIER ACCESS TO INDIVIDUAL PIECES.

Only C.R.C. Labwasher® provides automatic programming and a choice of distilled or tap water on each of three rinses!

- New Model with many added features.
- Stand-by racks for pre-loading.
- Accommodates over 90% of all labware.
- Saves up to 50% of glassware breakage.
- Effective even on oil-soluble materials.
- Accessory racks available for volume washing of glassware used in large quantities.
- Low initial cost . . . pays for itself in weeks.
- Low operating and maintenance costs.
- Authorized service men in your area.

The new C.R.C. Labwasher® brings a completely automated source of clean lab glassware. Load it before lunch or at the close of the day. Have a complete supply of clean glassware ready and waiting when needed.

Check your glassware washing problems against actual, in-the-field "Usage Reports". Request Bulletin No. 121.

**C.R.C. THE CHEMICAL RUBBER co.**  
2310 Superior Ave. Cleveland 14, Ohio

A-4519

*Little Science, Big Science*, D. Price (Columbia Univ. Press), 10 May 1963, 639

*The Mammals*, R. Carrington and the editors of *Life* (Time), 20 Sept. 1963, 1168

*A Manager's Guide to Operations Research*, R. L. Ackoff and P. Rivett (Wiley), 17 Jan. 1964, 232

*Mathematics*, S. Rapport and H. Wright, Eds. (New York Univ. Press), 21 June 1963, 1298

*The Measure of the Moon*, R. B. Baldwin (Univ. of Chicago Press), 26 Apr. 1963, 374

*The Mind of Robots*, J. T. Culbertson (Univ. of Illinois Press), 6 Sept. 1963, 895

*Models for Production and Operations Management*, E. S. Buffa (Wiley), 13 Dec. 1963, 1452

*Moon Atlas*, V. A. Firsoff (Viking), 3 May 1963, 475

*Moon Maps*, H. P. Wilkins (Faber and Faber; Macmillan), 3 May 1963, 475

*Mount Everest*, T. Hagen, G. O. Dyhenfurth, Ch. Von Fürer-Haimendorf, and E. Schneider (Oxford Univ. Press), 26 Apr. 1963, 375

*Natural History*, R. A. Pimentel (Reinhold; Chapman and Hall), 24 Jan. 1964, 347

*Operations Research in Research and Development*, B. V. Dean, Ed. (Wiley), 17 Jan. 1964, 232

*The Petroleum Industry*, G. Sell (Oxford Univ. Press), 20 Mar. 1964, 1319

*Pictorial Astronomy*, D. Alter, C. H. Clemminshaw, and J. G. Phillips (Crowell), 23 Aug. 1963, 709

*Politics and Conservation: The Decline of the Alaska Salmon*, R. A. Cooley (Harper and Row), 6 Dec. 1963, 1285

*Politics and Geographic Relationships*, W. A. Douglas Jackson (Prentice-Hall), 6 Mar. 1964, 1025

*Problem-Solving Discussions and Conferences*, N. R. F. Maier (McGraw-Hill), 27 Mar. 1964, 1428

*The Production and Distribution of Knowledge in the United States*, F. Machlup (Princeton Univ. Press), 3 May 1963, 473

*The Quiet Crisis*, S. L. Udall (Holt, Rinehart, and Winston), 31 Jan. 1964, 458

*Quiet Crisis in India*, J. P. Lewis (Brookings Institution), 10 May 1963, 641

*Recent Advances in Conservation*, G. Thomson, Ed. (Butterworth), 20 Dec. 1963, 1565

*Resources in America's Future*, H. H. Landsberg, L. L. Fischman, and J. L. Fisher (Johns Hopkins Press), 31 May 1963, 971

*The Road to H: Narcotics, Delinquency, and Social Policy*, I. Chein, D. L. Gerard, R. S. Lee, and E. Rosenfeld (Basic Books), 13 Mar. 1964, 1157

*The Role of Science in Civilization*, R. B. Lindsay (Harper and Row), 11 Oct. 1963, 220

*Science and Politics*, Lord Hailsham (Faber and Faber, London), 10 May 1963, 622

*Science in Progress*, W. R. Brode, Ed. (Yale Univ. Press), vol. 12, 10 May 1963, 627; vol. 13, 19 July 1963, 258

*The Science of Life*, G. R. Taylor (McGraw-Hill), 13 Sept. 1963, 1026

*Science, Technology and Development*,



**NEW!**  
**MILLIVOLTMETER**  
**\$195.**

Model VM 77B is a versatile, general purpose instrument for laboratory and production work. It has twelve ranges between 0.001 volt and 300 volts AC full scale and a frequency range of 10 cps to 4.5 MC with measurements to 100 microvolts possible on the most sensitive range.  
Input Impedance: 10M $\Omega$  20 pF.  
Amplifier output: Maximum output 1V r.m.s.  
Voltmeter frequency range:  
50c/s to 100kc/s: accuracy  $\pm 3\%$  F.S.D.  
15c/s to 2Mc/s: accuracy  $\pm (3\% + 3\% \text{ F.S.D.})$   
2Mc/s to 4.5Mc/s: accuracy  $\pm 2 \text{ dB}$ .



**houston instrument corporation**  
4950 Terminal Avenue / Bellaire, Texas 77401 / MOhawk 7-7403

## New books from Wisconsin

### THE NEURAL CONTROL OF SWEATING

By G. H. Wang

A detailed account of the central mechanisms of the neural control of sweating based on laboratory work with cats, by one of the foremost authorities in this field of neurophysiological research. 144 pages, 29 illus., \$5.00

### STOCHASTIC MODELS IN MEDICINE AND BIOLOGY

Edited by John Gurland

Prominent authorities discuss such topics as Cancer Research, Sclerosis in Aorta and in Coronary Arteries, Oscillations of Nonlinear Systems, and Stochastic Models in Genetics. 416 pages, \$6.00

### NONLINEAR INTEGRAL EQUATIONS

Edited by P. M. Anselone

Proceedings of an advanced seminar held April 22-24, 1963, at which such topics as Application of the Fixed Point Theorem, Newton's Method and Variations, and Equations in Partially Ordered Space were discussed. 404 pages, \$6.50



THE UNIVERSITY OF WISCONSIN PRESS  
Box 1379 • Madison, Wisconsin 53701

## A NEW AMCI SLOTTED LINE

TO COVER 600 MC TO 11,000 MC  
WITH INTERCHANGEABLE PRECISION REDUCERS



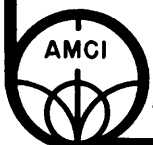
0.6 to 11.0 gc  
\$575.00

#### OTHER AMCI SLOTTED LINES

Frequency Range (mc)	Type	Price	Frequency Range (mc)	Type	Price
300-4500	2181A-2	725.00	150-3000	1026C-4	1,485.00
200-4500	2181A-3	825.00	100-3000	1026C-6	1,635.00
150-4500	2181A-4	925.00	75-3000	1026C-8	1,885.00
100-4500	2181A-6	1,125.00	50-3000	1026C-13	3,585.00
300-3000	1026C-2	1,385.00	37.5-3000	1026C-16	4,085.00

- Type 2288A-1
- Rated Residual SWR of the line itself;  
under 1.004 to 3 gc, 1.006 to 6 gc,  
1.010 to 11 gc.
- Rated error in detected signal under 1.005.
- Only an AMCI precision connector and a single precision reducer are used between the unknown and the slotted line.

Precision reducers to a wide variety of connectors such as Types N, TNC, BNC, C, SC, HN, MICON 1002, Sealectro 3000, TPS, OSM, TM — can be quickly interchanged. This permits measurements in many transmission line sizes without intermediate adapters. When measurements are made through reducers, the connectors involved usually limit the residual SWR of the measuring system. For example, the reducers to Type N Plug or Jack introduce an SWR under 1.04 up to 10 gc.



**ALFORD**

Manufacturing Company, 299 Atlantic Ave., Boston, Mass.  
INSTRUMENTS — COMPONENTS — ANTENNA SYSTEMS

617-426-2150 TWX 617-451-3883

*The Indiana University Press is privileged to announce its appointment as publishers in the Western Hemisphere to the World Academy of Art and Science and to announce the first two volumes sponsored by the Academy:*

### THE POPULATION CRISIS AND THE USE OF WORLD RESOURCES

Edited by Stuart Mudd, with the assistance of Hugo Boyko, Robert C. Cook, Larry Ng, and W. Taylor Thom, Jr.

The overwhelming consensus of the articles presented in this volume is that stringent birth control is the only long-term solution to the population crisis. Thus the eminent contributors examine the birth control efforts of India, Red China, and other nations, the religious objections to control methods, and the use, abuse, and possible conservation of world resources in the light of overpopulation. Included are articles by Sir Julian Huxley, President Sarvepalli Radhakrishnan, Ronald Hilton, Alan Guttmacher, Carl-Göran Hedén, Eugene R. Black, and Hermann J. Muller.

560 pages index \$7.95

### SCIENCE AND THE FUTURE OF MANKIND

Edited by Hugo Boyko  
Foreword by Lord John Boyd Orr

Twenty-one of the world's leading scientists and humanists explore the vital problems of mankind in the light of increasing technological and scientific advancement, while fully acknowledging the tremendous responsibility they must bear, together with statesmen and political leaders, for the destiny of modern man. Included are articles by Robert Oppenheimer, Albert Einstein, Hermann J. Muller, Theodore André Monod, Harold D. Lasswell, Lord John Boyd Orr, and Bertrand Russell.

380 pages \$6.95

INDIANA UNIVERSITY PRESS  
Bloomington

vols. 1-12 (Superintendent of Documents, GPO), 11 Oct. 1963, 216

*The Scientific Intellectual: The Psychological and Sociological Origins of Modern Science*, L. Feuer (Basic Books), 19 July 1963, 257

*A Selected List of U.S. Readings on Development*, S. M. Katz and F. McGowan (Agency for International Development, Washington, D.C.), 11 Oct. 1963, 216

*Soviet Men of Science*, J. Turkevich (Van Nostrand), 14 Feb. 1964, 673

*Subantarctic Campbell Island*, A. M. Bailey and J. H. Sorensen (Denver Museum of Natural History), 14 June 1963, 1204

*Twentieth Century China*, O. E. Clubb (Columbia Univ. Press), 13 Mar. 1964, 1158

*The United Nations Reconsidered*, R. A. Moore, Ed. (Univ. of South Carolina Press), 9 Aug. 1963, 512

*The View from a Distant Star*, H. Shapley (Basic Books), 13 Mar. 1964, 1160

*View from a Height*, I. Asimov (Doubleday), 11 Oct. 1963, 220

*Wanted: Amateur Scientists*, R. Froman (McKay), 7 Feb. 1964, 558

*Yearbook of Astronomy, 1963*, J. G. Porter and P. Moore, Eds. (Eyre and Spottiswoode; Norton), 19 Apr. 1963, 288

### History of Science and Technology

*An Account of the Astronomical Discoveries of Kepler*, R. Small (Univ. of Wisconsin Press), 8 Nov. 1963, 659

*The Ancient Engineers*, L. S. de Camp (Doubleday), 28 June 1963, 1387

*John Clayton: Pioneer of American Botany*, E. Berkeley and D. S. Berkeley (Univ. of North Carolina Press), 13 Sept. 1963, 1027

*The Collected Papers of Lord Rutherford of Nelson*, vol. 2, Manchester [Interscience (Wiley)], 14 Feb. 1964, 672

*Correspondence Between Spencer Fullerton Baird and Louis Agassiz, Two Pioneer American Naturalists*, E. C. Herber, Ed. (Smithsonian Institution), 29 Nov. 1963, 1157

*Erasmus Darwin*, D. King-Hele (Scribner's), 6 Mar. 1964, 1024

*The Epic of Steel*, D. Fisher (Harper and Row), 10 May 1963, 659

*The Growth of Medical Thought*, L. S. King (Univ. of Chicago Press), 19 Apr. 1963, 287

*A History of Chemistry*, C. A. Reichen (Hawthorn), 6 Mar. 1964, 1026

*The History of Sciences in India*, P. Maheshwari, Ed. (National Inst. of Sciences of India), 21 Feb. 1964, 795

*A Hundred Years of Geography*, T. W. Freeman (Aldine), 17 May 1963, 800

*Japanese Studies in the History of Science*, S. Yajima, Ed. (History of Science Society of Japan), 16 Aug. 1963, 624

*A Journal of Captain Cook's Last Voyage*, J. Ledyard (Quadrangle Books), 14 June 1963, 1204

*The Lying Stones of Dr. Johann Bartholomew Adam Beringer, Being His Lithographiae Wirceburgensis*, M. E. Jahn and D. J. Wolff (Univ. of California Press), 7 June 1963, 1083

Matthew Fontaine Maury, *Scientist of*

**IF YOU WOULD  
NORMALLY  
PAY  
\$2,000  
FOR A  
STOPPERING  
UNDER  
ORIGINAL VACUUM  
SYSTEM...**

**BUY  
THERMOVAC  
(AND DONATE  
\$1,700  
TO CHARITY)**

Yes it's that good and that inexpensive. Although it was invented especially for all Thermovac freeze dryers it can be adapted to almost any make of freeze dryer on the market today. It's easy to operate and trouble free. At completion of drying just press to seal. That's all.

\*Pat. Pend.

**WHEN IS  
-125°  
HOT?**

**NOW!**

Because we've got FREEZE DRYERS, BATHS & CHAMBERS and VACUUM TRAPS that are mechanically refrigerated to go all the way down to -125°F.

Dept. S-5



Write for complete information.  
**THERMOVAC  
INDUSTRIES CORP.**  
41 DECKER ST., COPIAGUE, L.I., N.Y.





*Naturally, WE CHOSE*

## A MICRO-TEK DSS GAS CHROMATOGRAPH...

You buy for today's needs... while planning for tomorrow's. Even the most basic model can be converted into the most deluxe by adding readily available modules. All the latest developments in gas chromatography are here: ■ Complete choice of 5 interchangeable detectors... Thermal Conductivity, Dual Flame Ionization, Electron Capture, Argon Triode and Micro Cross-Section (a single instrument can accommodate any two detectors at one time) ■ Dual column system for maximum baseline stability where substrate bleeding is a problem (or, for greater versatility, it can be used as two different column systems) ■ Choice of manual or automatic temperature programming... up to 450°C ■ All solid-state, zener-regulated circuitry ■ And whatever your sampling problem, there's an accessory to do it... easily.

## AND *Naturally*, WE BOUGHT IT FROM WILL...

Because Will's "AAA" program... APPLICATIONS—AVAILABILITY—ASSISTANCE... is always working for you. ■ Every Will salesman is schooled by Micro-Tek to help you select the right equipment. Will offers instant availability of modules, accessories and service. ■ Will service personnel are factory trained at Baton Rouge for expert installation and dependable service. And Will's exclusive double guarantee of satisfaction... the manufacturer's warranty and Will's... protects you. Get the full story

...WRITE today.



**Scientific, Inc.**  
and subsidiaries

Rochester 3, N.Y. • New York 52, N.Y. • So. Charleston 9, W. Va.  
Atlanta 25, Ga. • Baltimore 24, Md. • Buffalo 5, N.Y. • Cambridge 39, Mass.



*the Sea*, F. L. Williams (Rutgers Univ. Press), 27 Dec. 1963, 1647

*Maya Archaeologist*, J. E. S. Thompson (Univ. of Oklahoma Press), 5 July 1963, 34

*Isaac Newton, Historian*, F. E. Manuel (Harvard Univ. Press), 10 May 1963, 642

*Nickel*, F. B. Howard-White (Van Nostrand), 11 Oct. 1963, 218

*Nobel Prize Winners in Chemistry*, E. Farber (Abelard-Schuman), 10 May 1963, 623

*The Picture History of Inventions*, U. Eco and G. B. Zorzoli (Macmillan), 8 Nov. 1963, 657

*A Professor's Story of Hybrid Corn*, H. K. Hayes (Burgess), 24 Jan. 1964, 347

*Rutherford at Manchester*, J. B. Birks, Ed. (Heywood; Benjamin), 15 Nov. 1963, 943

*Sertum Anglicum*, C.-L. L'Héritier de Brutelle; G. H. M. Lawrence, Ed. (Hunt Botanical Library), 4 Oct. 1963, 43

*A Short History of Medicine*, C. Singer and E. A. Underwood (Oxford Univ. Press), 28 June 1963, 1389

*Alexander von Humboldt*, L. Kellner (Oxford Univ. Press), 31 May 1963, 973

*The World of Leonardo da Vinci*, I. B. Hart (Viking Press), 17 May 1963, 798

*Yankee Scientist: William David Coolidge*, J. A. Miller (Mohawk Development Service, Schenectady, N.Y.), 13 Mar. 1964, 1159

### Mathematics and Physical Science

*Abstract Harmonic Analysis*, vol. 1, E. Hewitt and K. A. Ross (Springer; Academic Press), 14 Feb. 1964, 673

*Advance in Mass Spectrometry*, R. M. Elliott, Ed. (Pergamon; Macmillan), 21 Feb. 1964, 795

*Basic Concepts of Physics*, A. Beiser (Addison-Wesley), 26 Apr. 1963, 376

*Basic Physics of the Solar System*, V. M. Blanco and S. W. McCuskey (Addison-Wesley), 10 May 1963, 655

*Basic Problems in Geotectonics*, V. V. Belousov; J. G. Maxwell, Ed. (McGraw-Hill), 10 May 1963, 656

*Calculus: Problems and Solutions*, A. Ginzburg (Holden-Day), 8 Nov. 1963, 657

*Clays and Clay Minerals*, A. Swineford and P. C. Franks, Eds. (Pergamon; Macmillan), 3 Jan. 1964, 35

*Combinatorial Mathematics*, H. J. Ryser (Wiley), 8 Nov. 1963, 658

*Contemporary Models of the Atomic Nucleus*, P. E. Nemirowskii (Pergamon; Macmillan), 20 Dec. 1963, 1561

*A Course in Higher Geodesy*, P. S. Zakatov (Israel Program for Scientific Translations), 21 June 1963, 1301

*Cryogenics*, M. Sittig (Van Nostrand), 20 Dec. 1963, 1561

*Direct Analysis of Diffraction by Matter*, R. Hosemann and S. N. Bagchi (North-Holland; Interscience), 1 Nov. 1963, 568

*Direct Interactions and Nuclear Reaction Mechanisms*, E. Clementel and C. Villi, Eds. (Gordon and Breach), 3 Jan. 1964, 34

*The Distribution and Motion of Interstellar Matter in Galaxies*, L. Woltjer, Ed. (Benjamin), 10 May 1963, 657

# LABEL SLIDES

Quickly • easily • permanently with...



## TIME SCOPE LABELS

Identify glass slides in an instant with Time Scope Labels. Permanent self-sticking adhesive labels meet all legal requirements... eliminate unsanitary licking. Available in Standard or Tissue high thickness, Time Scope Labels measure  $\frac{7}{8}$ " x  $\frac{7}{8}$ ". In plain white or imprinted with laboratory name, Time Scope Labels can be pre-numbered if desired. Plain white end labels  $\frac{3}{8}$ " x  $\frac{7}{8}$ " also in Standard or Tissue high thickness. Pencil, pen, grease marker—all write perfectly on Time Scope Labels. In easy-to-use dispenser or sheet form.

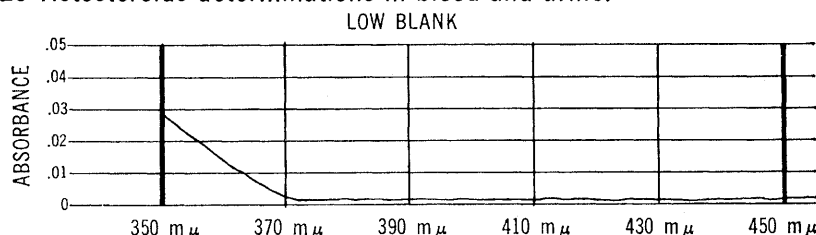
See your laboratory or hospital supplier for service.

PROFESSIONAL TAPE COMPANY, INC.  
365K Burlington Ave. • Riverside, Ill. • 60546

# Dichloromethane

## Spectroquality

Certified as a solvent for use in PORTER-SILBER 17, 21-Dihydroxy-20-Ketosteroids determinations in blood and urine.



The above tracing is typical of those run on Dichloromethane, Spectroquality after it has been in contact with the appropriate quantities of sulfuric acid (62%), phenylhydrazine HCl and pure absolute ethanol. The lack of chromogens generated demonstrates, of course, that this solvent is suitable for PORTER-SILBER 17, 21-Dihydroxy-20-Ketosteroids determinations without further purification. This requirement is a recent addition to the already stringent specifications imposed on Dichloromethane, Spectroquality by MC&B which include:

U.V. Cut-off	232 mμ
Residue after evaporation	.0002% max.
Water	.01% max.
Fluorescent contaminants	0.3 parts per billion max.

(Typically all of these, except the cut-off are much lower.)

Dichloromethane is one of 40 Spectroquality Solvents now available from your MC&B distributor. For reagents with rigid quality requirements, specify MC&B. Catalog on request.

**MC&B** Division of The Matheson Co., Inc. Norwood (Cincinnati) O., East Rutherford, N. Y.

*Earth Science and Meteoritics*, compiled by J. Geiss and E. D. Goldberg [North-Holland; Interscience (Wiley)], 8 Nov. 1963, 658

*The Earth Sciences*, A. N. Strahler (Harper and Row), 6 Dec. 1963, 1287

*Electron Scattering and Nuclear and Nucleon Structure*, R. Hofstadter (Benjamin), 24 Jan. 1964, 344

*Elementary Theory of Numbers*, W. J. LeVeque (Addison-Wesley), 4 Oct. 1963, 41

*Elements of Geology*, J. H. Zumberge (Wiley), 6 Dec. 1963, 1287

*Elements of Structural Geology*, E. S. Hills (Wiley), 28 Feb. 1964, 945

*Evolution of Stars and Galaxies*, W. Baade; C. Payne-Gaposchkin, Ed. (Harvard Univ. Press), 10 May 1963, 658

*Exploring the Atmosphere*, G. M. B. Dobson (Oxford Univ. Press), 10 May 1963, 653

*Formation Evaluation*, E. J. Lynch (Harper and Row), 10 May 1963, 655

*Foundations of Differential Geometry*, vol. 1, S. Kobayashi and K. Nomizu [Interscience (Wiley)], 17 Jan. 1964, 235

*Foundations of Linear Algebra*, A. I. Mal'cev; J. B. Roberts, Ed. (Freeman), 7 Feb. 1964, 560

*Fracture of Solids*, D. C. Drucker and J. J. Gilman, Eds. [Interscience (Wiley)], 15 Nov. 1963, 944

*Fundamental Problems in Turbulence and Their Relation to Geophysics*, F. N. Frenkiel, Ed. (American Geophysical Union), 5 Apr. 1963, 44

*Geodesy*, G. Bomford (Oxford Univ. Press), 12 Apr. 1963, 167

*Geologic Map of New York, 1961*, New York State Geological Survey (New York State Museum and Science Service), 10 May 1963, 660

*Geologie von Paraguay*, vol. 2, H. Putzer; A. Bentz, Ed. (Borntraeger), 2 Aug. 1963, 421

*The Geology of Egypt*, R. Said (Elsevier), 5 Apr. 1963, 41

*A Geometric Introduction to Linear Algebra*, D. Pedoe (Wiley), 20 Mar. 1964, 1320

*Gravitation: An Introduction to Current Research*, L. Witten, Ed. (Wiley), 10 May 1963, 654

*High Pressure Physics and Chemistry*, vols. 1 and 2, R. S. Bradley, Ed. (Academic Press), 31 Jan. 1964, 460

*Hungarian Problem Book I and Hungarian Problem Book II*, J. Kürschák, (Random House; Singer), 8 Nov. 1963, 657

*An Introduction to Atmospheric Physics*, R. G. Fleagle and J. A. Businger (Academic Press), 27 Mar. 1964, 1427

*Introduction to the Theory of Integration*, T. H. Hildebrandt (Academic Press), 17 Jan. 1964, 235

*An Introduction to the Theory of Seismology*, K. E. Bullen (Cambridge Univ. Press), 6 Mar. 1964, 1025

*Introductory Atomic Physics*, M. R. Wehr and J. A. Richards, Jr. (Addison-Wesley), 24 May 1963, 886

*Introductory Nuclear Reactor Theory*, J. S. Isbin (Reinhold; Chapman and Hall), 22 Nov. 1963, 1049

*Introductory Statistical Mechanics for Physicists*, D. K. C. MacDonald (Wiley), 1 Nov. 1963, 568

# NEW and RECENT PUBLICATIONS

from  
**VAN  
NOSTRAND**

## BIOCHEMICAL ENGINEERING

F. C. WEBB, *University College, London*

This book attempts for the first time to draw together the existing disciplines of chemical engineering, biochemistry and microbiology from the viewpoint of those industries—including food processing, beverage manufacture, and pharmaceuticals—which use biological processes or materials. Written for engineers, technicians, and biochemists in the biological industries, as well as students preparing to enter these or related industries, the book emphasizes practical and large-scale industrial applications and provides a broad basis for the design and operation of industrial equipment.

1964 600 pages Prob. \$15.00

## PRINCIPLES OF ANGIOSPERM TAXONOMY

P. H. DAVIS, *Lecturer in Taxonomic Botany, University of Edinburgh*; and V. H. HEYWOOD, *Reader in Botany, University of Liverpool, England*.

As well as considering the nature of taxonomic characters derived from the disciplines of anatomy, cytology, embryology and palynology, and the theory and principles underlying their selection and use, the book surveys the rapidly expanding fields of comparative phytochemistry and numerical taxonomy. Also reviewed is recent work on variation in natural populations, breeding systems and genealogy. Consideration is given to the evolution and differentiation of species, and to hybridization, from the point of view of practical classification. A critical evaluation is made of the present-day role of biosystematics and its bearing on species concepts and definitions.

1963 576 pages \$15.00

## BIOCHEMISTRY AND BEHAVIOR

SAMUEL EIDUSON, *Neuropsychiatric Institute, Edward Geller, Veterans Administration Center, Arthur Yuwiler, Veterans Administration Center, all of the University of California, Los Angeles*; and BERNICE T. EIDUSON, *Reiss-Davis Clinic for Child Guidance, Los Angeles*.

An extensive and impressive review of the scientific literature on the interrelation between biochemistry and behavior, this volume will be greatly valued by investigators and students in biochemistry and the behavioral sciences. It aims "primarily to describe the principal biochemical systems and processes that seem pertinent to behavioral function, and to discuss the basic biochemical concepts that underlie our knowledge of these systems." Both human and animal studies have been included and references to 2380 papers are given throughout the text.

June, 1964 600 pages Prob. \$15.00

## TECHNIQUES IN THE USE OF RADIO- ISOTOPES IN ANALYSIS: A Laboratory Manual

D. A. LAMBIE  
Spring, 1964 135 pages \$5.50

## VAN NOSTRAND'S INTERNATIONAL ENCYCLOPEDIA OF CHEMICAL SCIENCE

1964 1344 pages \$32.50

## PRACTICAL CHROMATOGRAPHIC TECHNIQUES

A. H. GORDON and J. E. EASTOE  
April, 1964 192 pages Prob. \$6.75

## GROWTH PROCESS IN ANIMALS

A. E. NEEDHAM  
May 540 pages Prob. \$12.50

120 ALEXANDER ST. • PRINCETON, N.J.

8 MAY 1964

*The Ionosphere*, A. C. Strickland, Ed. (Inst. of Physics and the Physical Soc.), 21 June 1963, 1301

*Lasers*, B. A. Lengyel (Wiley), 10 May 1963, 647

*Lectures in Theoretical Physics*, vol. 5, W. E. Brittin, Ed. [Interscience (Wiley)], 31 Jan. 1964, 460

*Lectures on Modern Mathematics*, vol. 1, T. L. Saaty, Ed. (Wiley), 22 Nov. 1963, 1049

*Linear Differential Equations in the Real Domain*, K. S. Miller (Norton), 10 Jan. 1964, 124

*Linear Partial Differential Operators*, L. Hörmander (Springer; Academic Press), 17 Jan. 1964, 234

*Luminescence in Crystals*, D. Curie (Methuen; Wiley), 31 Jan. 1964, 464

*Mass Spectrometry*, C. A. McDowell, Ed. (McGraw-Hill), 31 Jan. 1964, 462

*Mathematical Discovery on Understanding, Learning, and Teaching Problem Solving*, vol. 1, G. Polya (Wiley), 24 May 1963, 886

*Mathematical Models in Physical Sciences*, S. Drobot and P. A. Viebrock, Eds. (Prentice-Hall), 21 Feb. 1964, 794

*The Mathematical Works of J. H. C. Whitehead*, vol. 4, (Pergamon; Macmillan), 21 Feb. 1964, 796

*Mathematics*, D. Bergamini and the editors of *Life (Time)*, 6 Dec. 1963, 1287

*Mathematics: The Man-made Universe*, S. K. Stein (Freeman), 21 June 1963, 1298

*Methods of Quantum Field Theory in Statistical Physics*, A. A. Abrikosov, L. P. Gorkov, and I. E. Dzyaloshinski (Prentice-Hall), 7 Feb. 1964, 559

*New Directions in Mathematics*, R. W. Ritchie, Ed. (Prentice-Hall), 6 Dec. 1963, 1284

*Nuclear Reactions*, vol. 2, P. M. Endt and P. B. Smith, Eds. [North-Holland; Interscience (Wiley)], 10 May 1963, 646

*Organic Functional Group Analysis*, F. E. Critchfield (Pergamon; Macmillan), 10 Jan. 1964, 123

*Petrologic Studies: A Volume in Honor of A. F. Buddington*, A. E. J. Engel, H. L. James, B. F. Leonard, Eds. (Geological Soc. of America), 10 May 1963, 658

*Physics and Astronomy of the Moon*, Z. Kopal, Ed. (Academic Press), 26 Apr. 1963, 374

*The Physics of Rainclouds*, N. H. Fletcher (Cambridge Univ. Press), 17 Jan. 1964, 236

*Physique Solaire et Géophysique*, A. Dauvillier (Masson), 10 May 1963, 645

*Principles of Modern Mathematics*, vol. 1, W. E. Harnett (Harper and Row), 23 Aug. 1963, 710

*Principles of Physics*, E. S. Greene (Prentice-Hall), 10 May 1963, 656

*Proceedings of the International Conference on Crystal Lattice Defects* (Physical Soc. of Japan), 19 July 1963, 258

*Progress in the Astronautical Sciences*, vol. 1, S. F. Singer, Ed. [North-Holland; Interscience (Wiley)], 31 Jan. 1964, 463

*Projective and Euclidean Geometry*, W. T. Fishback (Wiley), 23 Aug. 1963, 711

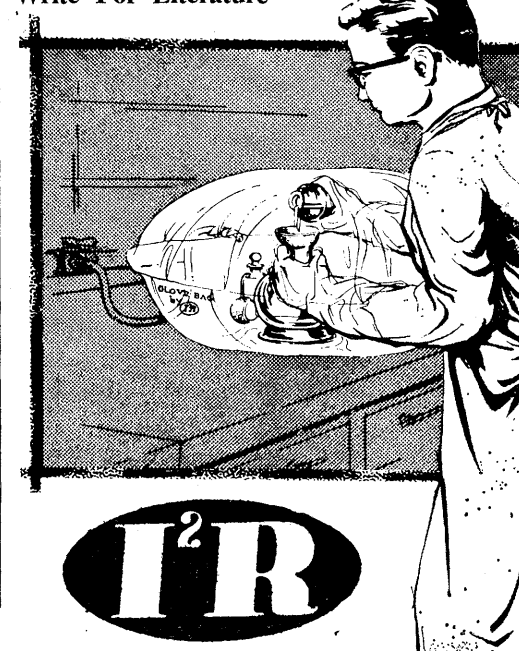
*Quantum Mechanics*, vol. 1, Sin-Itiro Tomonaga [North-Holland; Interscience (Wiley)], 24 May 1963, 886

*The Quantum Theory of Fields*, report on the 1961 Solvay Congress [Stoops; Interscience (Wiley)], 31 Jan. 1964, 462

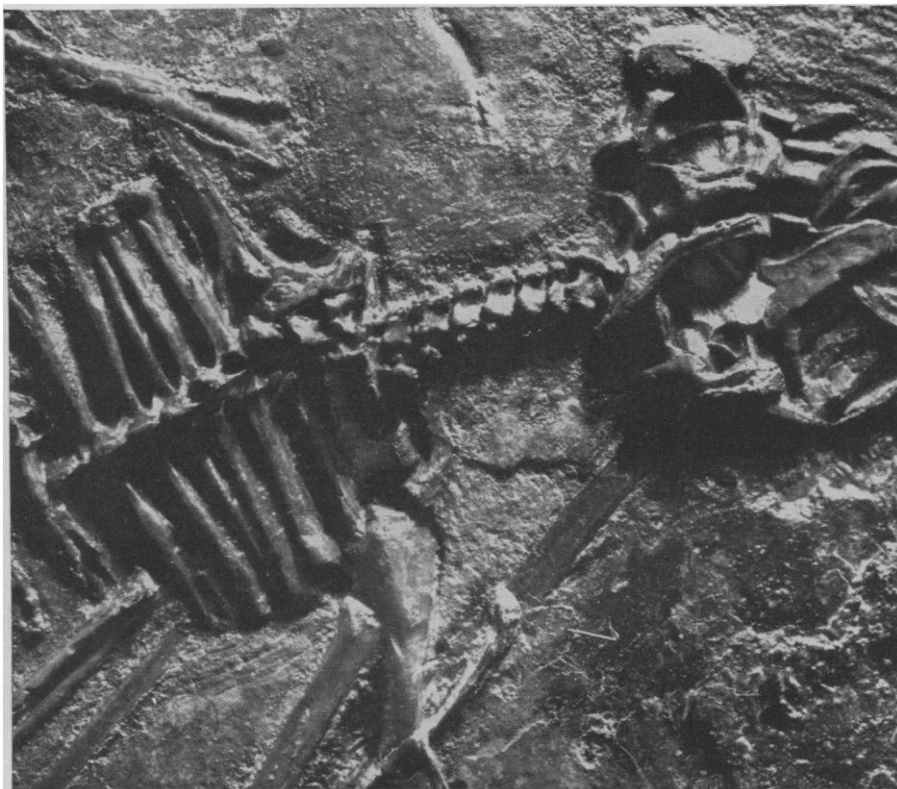


Both Glove Bag and dry box are made to do an equal job: provide dry, inert or clean atmospheres. I<sup>2</sup>R's Glove Bag is faster to purge because it starts out flat . . . saving time and gas. The polyethylene Glove Bag is transparent, light and portable. Folded it slips easily into your coat pocket . . . expanded you have up to 18 cu. ft. of clear workspace. And most important, you may discard it after a single experiment or use it over and over again!

Write For Literature



Instruments For Research And Industry  
108 Franklin Ave. Cheltenham, Pa.



## them dry bones...

Here's a use we hadn't thought of when we designed our industrial Airbrasive Unit. The American Museum of Natural History tells us that they have drastically reduced the recovery time of fragile fossils from hard stone matrix.

What used to take months by hand methods now takes only a few weeks. Extraction is more precise too, yielding more information. With proper technique, the most delicate bone structure is retained while the matrix is removed by Airbrasive cleaning... even from previously "inaccessible" places. In the small specimen above, the first known vertebrate to fly, even the inner ear was delineated.

This is only one of the many "impossible" jobs accomplished by the Airbrasive. In laboratories and production lines its precise, gas-propelled stream of abrasive particles is used to cut all sorts of hard, brittle materials.

Cost is low, too... under \$1000.

Let us make a free trial for you.

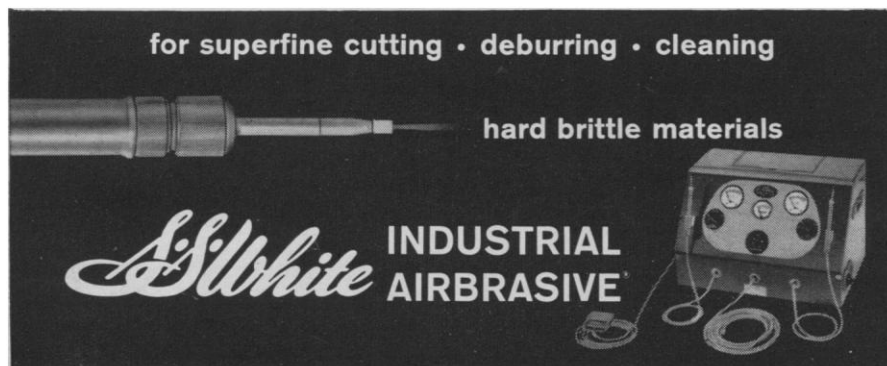
Send samples for test or telephone collect for a demonstration.

SEND FOR  
BULLETIN 6006  
... complete information



S. S. WHITE INDUSTRIAL DIVISION

DEPT. 49A, 10 East 40th St., N.Y. 16, N.Y. • Telephone MU 3-3015 collect



*Quantum Theory of Solids*, C. Kittel (Wiley), 14 Feb. 1964, 672

*Retracing Elementary Mathematics*, L. Henkin, W. N. Smith, V. J. Varineau, and M. J. Walsh (Macmillan), 23 Aug. 1963, 710

*The Royal Society International Geophysical Year Antarctic Expedition*, D. Brunt, Ed. (Royal Soc.), 3 May 1963, 474

*The Sea*, M. N. Hill, Ed. (Wiley), vol. 1, 10 May 1963, 644; vol. 3, 11 Oct. 1963, 215

*A Second Course in Number Theory*, H. Cohn (Wiley), 4 Oct. 1963, 41

*Solar Flares*, H. J. Smith and E. v. P. Smith (Macmillan; Collier-Macmillan), 11 Oct. 1963, 217

*The Solar System*, vol. 4, B. M. Middlehurst and G. P. Kuiper, Eds. (Univ. of Chicago Press), 28 Feb. 1964, 946

*Solids Under Pressure*, W. Paul and D. M. Warschauer, Eds. (McGraw-Hill), 23 Aug. 1963, 711

*Solved and Unsolved Problems in Number Theory*, D. Shanks (Spartan), 2 Aug. 1963, 420

*Soviet Science of Interstellar Space*, S. Pikelner (Philosophical Library), 10 May 1963, 659

*Space Age Astronomy*, A. J. Deutsch and W. B. Klemperer, Eds. (Academic Press), 11 Oct. 1963, 223

*Standard Wolfcampian Series (Permian)*, *Glass Mountains, Texas*, C. A. Ross (Geological Soc. of America), 26 July 1963, 345

*Stars and Galaxies*, T. Page, Ed. (Prentice-Hall), 12 July 1963, 146

*Statistical Analysis in the Geological Sciences*, R. L. Miller and J. S. Kahn (Wiley), 5 Apr. 1963, 42

*Statistical Mechanics*, K. Huang (Wiley), 1 Nov. 1963, 568

*Statistical Treatment of Experimental Data*, H. D. Young (McGraw-Hill), 11 Oct. 1963, 219

*Strange Particles*, R. K. Adair and E. C. Fowler [Interscience (Wiley)], 22 Nov. 1963, 1051

*Stratigraphy and Sedimentation*, W. C. Krumbein and L. L. Sloss (Freeman), 10 Jan. 1964, 124

*Studies in Mathematical Analysis and Related Topics*, essays in honor of George Pólya, G. Szegő et al. Eds. (Stanford Univ. Press), 19 Apr. 1963, 286

*Studies in Modern Algebra*, A. A. Albert, Ed. (Prentice-Hall), 5 July 1963, 37

*Submarine Geology*, F. P. Shepard (Harper and Row), 3 Jan. 1964, 34

*Supai Formation (Permian) of Eastern Arizona*, S. S. Winters (Geological Soc. of America), 13 Dec. 1963, 1452

*A Survey of the Moon*, P. Moore (Norton), 27 Sept. 1963, 1268

*The Teaching of Mathematics*, R. Dubisch and V. E. Howes (Wiley), 10 Jan. 1964, 123

*The Tectonics of the Canadian Shield*, J. S. Stevenson, Ed. (Univ. of Toronto Press), 28 Feb. 1964, 945

*Tektites*, J. A. O'Keefe, Ed. (Univ. of Chicago Press), 6 Dec. 1963, 1286

*Thermodynamics of Clouds*, L. Dufour and R. Defay (Academic Press), 13 Mar. 1964, 1160

*Understanding the Physical Sciences*, O. P. Anfinson (Allyn and Bacon), 26 Apr. 1963, 376



University Mathematics, R. C. James (Wadsworth), 29 Nov. 1963, 1156  
*The World of Elementary Particles*, K. W. Ford (Blaisdell), 6 Mar. 1964, 1023

#### Techniques and Instrumentation

*Adsorption Spectra in the Ultraviolet and Visible Region*, vol. 3, L. Lang, Ed. (Akademiai Kiado, Budapest; Academic Press), 11 Oct. 1963, 223

*Alternating Current Polarography and Tensammetry*, B. Breyer and H. H. Bauer [Interscience (Wiley)], 13 Dec. 1963, 1450

*Analysis Instrumentation*, 1963, L. Fowler, R. D. Eanes, and T. J. Kehoe, Eds. (Plenum Press), 11 Oct. 1963, 221

*The Art and Science of Growing Crystals*, J. J. Gilman, Ed. (Wiley), 14 Feb. 1964, 672

*Chemical Analysis: The Working Tools*, vols. 1-3, C. R. N. Strouts, H. N. Wilson, and R. T. Parry-Jones, Eds. (Oxford Univ. Press), 10 May 1963, 647

*Electronic Instrumentation*, S. D. Prensky (Prentice-Hall), 3 Jan. 1964, 35

*Gas Phase Chromatography*, R. Kaiser (Butterworth), 6 Mar. 1964, 1026

*Identification of Organic Compounds*, N. D. Cheronis and J. B. Entrikin [Interscience (Wiley)], 20 Dec. 1963, 1563

*Infrared Absorption Spectroscopy, Practical*, K. Nakanishi (Nankodo; Holden-Day), 10 May 1963, 648

*Infra-Red Spectroscopy and Molecular Structure*, M. Davies, Ed. (Elsevier), 14 Feb. 1964, 671

*Inorganic Thermogravimetric Analysis*, C. Duval (Elsevier), 20 Sept. 1963, 1169

*Ion Exchange Separations in Analytical Chemistry*, O. Samuelson (Almqvist and Wiksell; Wiley), 5 July 1963, 36

*Modern Polarographic Methods*, H. Schmidt and M. von Stackelberg (Academic Press), 13 Dec. 1963, 1450

*Organic Electronic Spectral Data*, vol. 4, J. B. Phillips and F. C. Nachod [Interscience (Wiley)], 13 Dec. 1963, 1453

*Physical Methods in Heterocyclic Chemistry*, A. R. Katritzky, Ed. (Academic Press), 5 July 1963, 34

*Progress in Microscopy*, M. Françon (Pergamon; Harper and Row), 10 May 1963, 655

*Radioactive Tracers in Physical Metallurgy*, C. Leymonie (Wiley), 15 Nov. 1963, 944

*Rare Metal Extration by Chemical Engineering Techniques*, W. D. Jamrack (Pergamon; Macmillan), 22 Nov. 1963, 1050

*Spectroscopy*, S. Walker and H. Straw (Macmillan), 16 Aug. 1963, 625

*Standard Methods of Chemical Analysis*, vol. 2, pts. A and B, F. J. Welchner, Ed. (Van Nostrand), 23 Aug. 1963, 710

*Technique of Organic Chemistry*, vol. 11, pts. 1 and 2, K. W. Bentley, Ed. [Interscience (Wiley)], 29 Nov. 1963, 1155

*Vacuum Technology*, A. Guthrie (Wiley), 14 Feb. 1964, 671

*X-Ray Diffraction in Crystals, Imperfect Crystals, and Amorphous Bodies*, A. Guinier (Freeman), 20 Dec. 1963, 1564

*X-Ray Studies of Materials*, A. Guinier and D. L. Dexter [Interscience (Wiley)], 21 Feb. 1964, 793

The New Bausch & Lomb

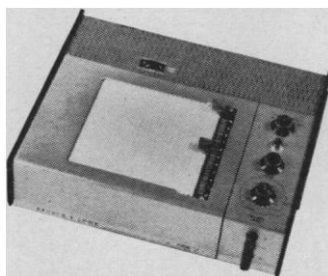
V. O. M.-7

# RECORDS 500 MICRO- VOLT SIGNALS FULL SCALE

Now, the one truly versatile recorder that records volts, milliamperes and ohms, without extra attachments or extra cost, is available in a high sensitivity model. 500 microvolt signals can be recorded full scale with a 2.5 microvolt accuracy. For every conceivable application in gas chromatography; monitoring of pH, temperature, pressure and humidity with appropriate transducers; time-rate studies; extending the useful absorbance range of colorimeters—the new V.O.M.-7 is the ideal recorder. And it's priced very reasonably, too.

#### FEATURES:

- 6 D.C. voltage ranges—0.5 mv, 1 mv, 10 mv, 100 mv, 1 v, 10 v—full scale
- 5 D.C. current ranges—1 microamp, 10 microamps, 100 microamps, 1 milliamp, 10 milliamps
- 6 linear resistance ranges—1 ohm, 10 ohm, 100 ohm, 1 K ohm, 10 K ohm, 100 K ohm—full scale, zener diode D.C. supply (accuracy 3%)
- Fast response
- Built-in full-scale offset control
- Operates in flat, tilt, or wall-mounted position
- Compact and portable
- Built-in event marker
- 5 chart speeds between .05 inch/min. to 20 inches/min.



PRICE ONLY **\$885** COMPLETE  
(Suggested Retail)

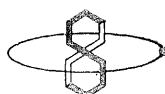
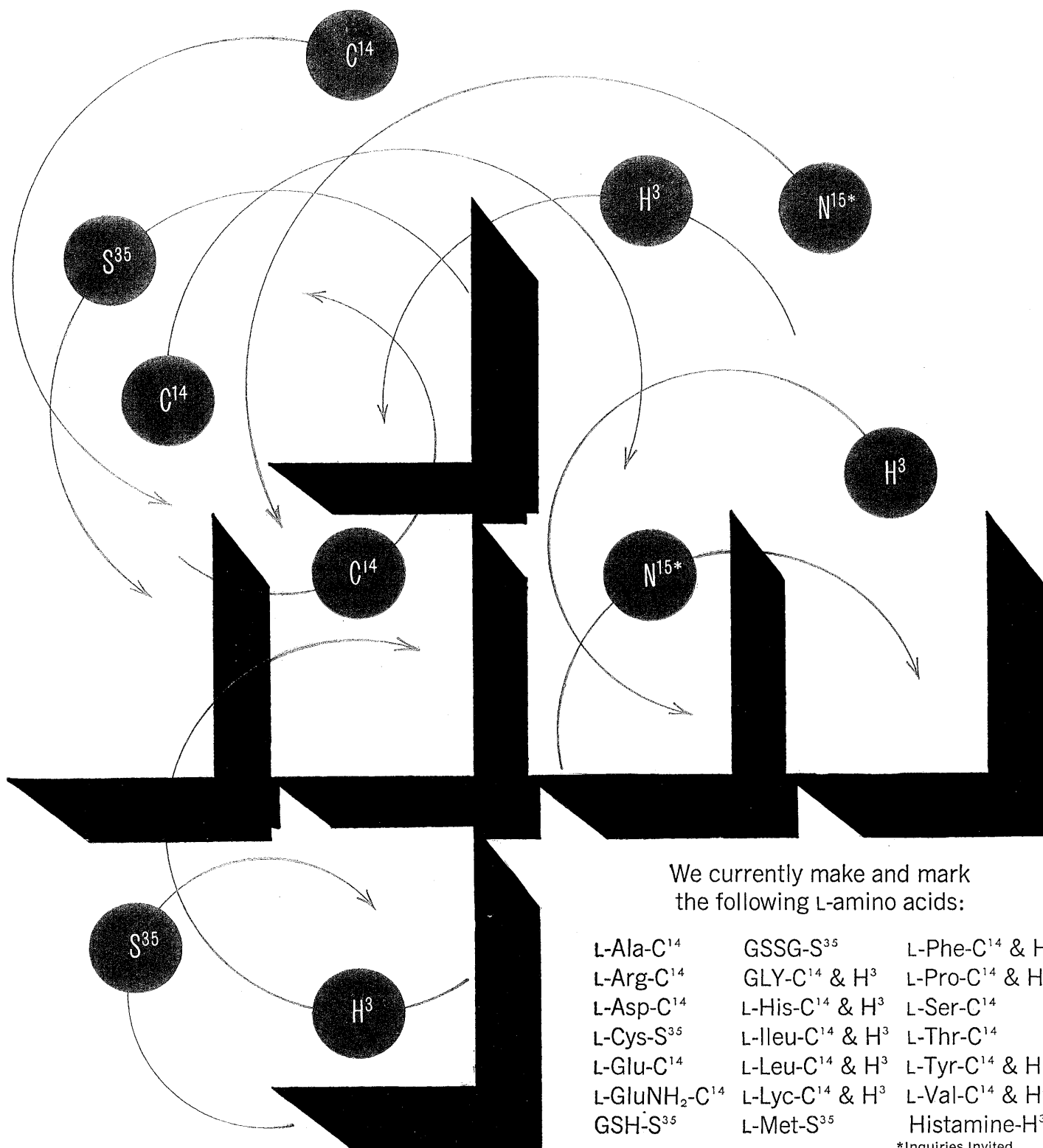
For further information just circle our ad number below on the magazine's reply card and mail it or write to Bausch & Lomb Incorporated, 64205 Bausch Street, Rochester, New York 14602.

BAUSCH & LOMB



In Canada, write Bausch & Lomb Optical Co., Ltd., Dept. 642, Scientific Instrument Division, 16 Grosvenor St., Toronto 5, Ont.

## Labeled L-amino acids



**SCHWARZ BIORESEARCH, INC.** Orangeburg, New York  
BIOCHEMICALS • RADIOCHEMICALS • PHARMACEUTICALS for research, for medicine, for industry

## New Products

**Microscope laser** focuses a high-energy pulse of red or infrared light through the microscope optics onto an object under observation. The laser radiation can be concentrated into an area of the order of  $1 \mu$  in diameter and thus attains very high power density at the point of focus. The equipment consists of a power supply package and the laser head which is fitted to replace the ocular. A right angle viewing ocular is provided to facilitate the positioning of the focal point onto the target area, and a shutter interlock switch protects the observer from accidental discharge while viewing. Controlled output permits the level to be adjusted from stimulation or photo-reactivation levels to explosive destruction at either of the operating wavelengths of  $694.3 \mu$  and  $1.060 \mu$ . At highest output the concentrated energy is sufficient to explosively volatilize the surface of metals. The visible radiation is obtained from a ruby crystal and the infrared from Neodymium-doped glass, and interchange of crystals is required to obtain the wavelength desired. The pulse duration of  $200 \mu$ sec provides more than adequate power density and is probably much less destructive to microscope optics than the giant pulse systems used to blast out local regions of metals into a spectrographic arc. At full power, repetition rate is limited to 12 pulses per minute with forced air cooling of the laser head. In operation approxi-

mately 625 joules are delivered to xenon flash lamps to excite the laser crystal to deliver about 0.5 joule from the crystal at the output wavelength. When concentrated to a  $1 \mu^2$  area the energy density reaches  $300 \text{ joule/mm}^2$ . The unit is line operated, the laser head is 17 inches (43 cm) long, 3 inches (7.6 cm) in diameter, and the power supply is 10 by 20 by 14 inches (25.4 by 50.8 by 35.6 cm)—R.L.B. (Ranney Co., 155 Montgomery St., San Francisco, Calif.)

Circle 1 on Readers' Service card

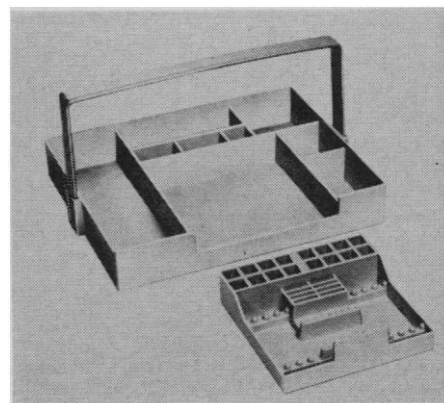
**Differential temperature probe** is designed specifically for measuring temperatures within living brain tissue. The device employs two matched copper-constantan thermocouples with hot junctions 0.038 mm in diameter. Each thermocouple is housed in a double bore quartz tube 0.076 mm in diameter which serves to insulate the two leads and strengthen the assembly. Both assemblies are sealed into a fused quartz sheath, 0.254 mm outside diameter. Fused quartz is used, as it has a thermal conductivity approximating that of brain tissue. One junction is at the tip of the probe, while the other is located 2 mm up the tube. This arrangement of matched, reference-grade junctions allows precise measurements to be made exactly in the area of interest, while introducing a minimum of foreign mass. In addition to brain work, the probe is suitable for monitoring the rate of tumor growth, measuring blood flow, or for other biomedical applications where differential temperature measurement is thought to be a meaningful tool. The probe, which is autoclavable and adaptable for threading into stereotactic equipment, is available with quartz sheath lengths of 25, 50, or 75 mm and is supplied with 5 ft (1.5 m) of flexible leads.—D.J.P. (High Temperature Instruments Corp., 225 W. Lehigh Ave., Philadelphia, Pa.)

Circle 2 on Readers' Service card

**Dynamic controlled magnetic environment field system** provides a constant, precise, and uniform field of any desired magnitude within a range of  $\pm 600$  gauss and will maintain a zero magnetic field at any location. By automatically nulling ambient magnetic disturbances, it is said to eliminate the need for magnetic shielded rooms and remote installation locations. The system consists of the three-axis Helmholtz coil available in 4- or 8-ft (1.2- or 2.4-m) diameter; a three-axis fluxgate magnetometer probe assembly; and a console that contains all necessary power supplies, magnetometer amplifiers, field adjustment controls, field indication meters, and gradient adjustments. The manufacturer furnishes the following performance specifications: The field in the working volume will not deviate from the set point by more than 2.0 gauss for variation in the ambient magnetic field up to  $\pm 600$  gauss. Frequency response is down 3 db at 10 cy/sec. Field uniformity is within 0.6 gauss in a sphere 0.5 ft (0.15 m) in diameter and within 6.0 gauss in a sphere 2 ft (0.6 m) in diameter. Field indication meter indicates over the range  $\pm 1.0$  gauss with accuracy  $\pm 3$  percent on each axis.—J.S. (Vickers Div. of Sperry Rand Corp., 1815 Locust St., St. Louis 3, Mo.)

Circle 3 on Readers' Service card

**Specimen collection tray**, a convenient means of collecting and transporting specimens from bedside to laboratory, holds instruments, equipment, and supplies needed to collect blood samples for complete hematology determinations and blood chemistries, as well as specimens for serology, bacteriology, urinalysis, and other routine tests. The Yankee Tech Tray consists of a base tray and a removable specimen rack. The base tray is designed to store the materials required for taking, treating and marking specimens. It includes



The material in this section is prepared by the following contributing writers:

Robert L. Bowman (R.L.B.), with the assistance of Denis J. Prager (D.J.P.), Laboratory of Technical Development, National Heart Institute, Bethesda 14, Md. (medical electronics and biomedical laboratory equipment).

Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washington 25, D.C. (physics, computing, electronics, and nuclear equipment).

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Neither *Science* nor the writers assume responsibility for the accuracy of the information. A Readers' Service card for use in mailing inquiries concerning the items listed is included on page 679. Circle the department number of the items in which you are interested on this card.

**NOW . . . .  
INSTANT  
FLUORS!**

**LIQUIFLUOR\***  
(PPO-POPOP CONCENTRATE)

**WILL SAVE  
YOU HOURS  
OF MIXING  
TIME!**

New LIQUIFLUOR\* is an exclusive development of Pilot Chemicals—a pre-mixed liquid concentrate of PPO and POPOP in specially purified toluene which will save you hours of mixing time in the laboratory . . . and greatly reduce the chance for error.

No more time-consuming laboratory weighing and stirring. No more waiting for ingredients to dissolve. All you do is pour LIQUIFLUOR\* into the solvent.

Independent laboratory tests show counting efficiencies identical with old 'weigh and stir' method.

**ADVANTAGES:**

- Saves time — just mix — no waiting.
- Less chance for error in compounding.
- Flexible — can be used with any liquid scintillator system containing toluene.
- Contents: a 25x concentrate, 1 liter contains 100 grams PPO and 1.25 grams POPOP in specially purified toluene.
- Available in 1 liter and 500 milliliter bottles.

**FOR COMPLETE INFORMATION,  
WRITE TODAY.**  
(A request on your letter-head will bring you a free sample.)

S-622

\*TM

**P I L O T**  
**CHEMICALS, INC.**  
36 PLEASANT ST., WATERTOWN 72, MASS.

compartments for syringes, needles, blood lancets, diluting fluids, alcohol sponges, tourniquets, and pencils. The removable specimen rack holds the specimen containers themselves. It has holes of varying sizes and shapes to hold test tubes and micro slides, as well as racks for blood diluting pipettes and hematocrit capillary tubes. The removable specimen rack can also be used independently for "stat" collections or glassware storage. These lightweight trays are made of a light green plastic, and are available in both 8-patient and 16-patient capacities.—D.J.P. (Cortez F. Enloe, Inc., 551 Fifth Ave., New York 17)

Circle 4 on Readers' Service card

**Plasma-arc generator** is said to produce well-defined, uncontaminated, predictable plasma flow for materials, physics, and chemical research and plasma magnetohydrodynamic studies. Flexible design allows a wide range of duct configuration; the injection of gases, liquids, and powders into the plasma; and insertion of various types of probes. Typical performance information furnished by the manufacturer for a generator using atmospheric-pressure helium in a duct 1 cm in diameter and 6.35 cm long include: voltage drop approximately 175 volts d-c at 30 amp or 100 volts d-c at 300 amp; helium flow approximately 0 to 1 g/sec; gas temperatures to 20,000°K at flow centerline. The basic generator exhausts to the atmosphere but an optional after-cooler allows operation under vacuum and positive pressures, recirculation of plasma, and improved stability of operation.—J.S. (Creare Inc., Box 226, Hanover, N.H.)

Circle 5 on Readers' Service card

**Laboratory cooler** is a thermoelectric cooler designed for applications including chilling liquids in baths and pumping circuits and for cooling instruments such as refractometers, polarimeters, viscometers, and spectrophotometers. This unit, which has a maximum heat removal capacity of 400 Btu/hr is only a cooling unit and has no provision for temperature regulation. If desired, however, cooling can be controlled by connecting the power cord to an intermediate relay which is operated by a thermoregulator. An external circulator is required to circulate the water through the cooling unit and to the bath or instrument to be cooled. Although recommended for use in the +10°C to ambient range with

## Ruby Laser Megapulse Q-Switch

*a complete system  
by TRG*

*Model 104 Laser System with integral Q-Switch, providing power outputs up to 15 megawatts in a single 30 nanosecond pulse, is a reliable tool for research and production, ready for delivery now.*



**SPECIFICATIONS**

**LASER HEAD AND MEGAPULSE Q-SWITCH**

Output . . . . 1 joule Q-switched, 2 joules normal  
Wavelength . . . . .6943 Å  
Beam Divergence (nominal) . . . . 10 milliradians  
Pulse Length . . . . 30 nanoseconds Q-switched,  
800 microseconds normal  
Duty Cycle . . . . .10 ppm

**POWER SUPPLY**

Input: Power . . . . .1000 watts, max.; Voltage,  
115/220 volts ±10%, 50-60 cps, 1 phase  
Output . . . . .0 to 1000 joules (950V), optional  
remote triggering.  
Recycle Time . . . . .5 seconds

**PRICE:** Complete system **\$7,100.00** — Laser Head, Model 104-002 \$1,950.00. Megapulse Q-Switch, Model 104-003 \$2200.00. Laser Power Supply, Model 104-001 \$2950.00. Accessory: Daly-Sims Prism, doubles power output. Price \$1500.00.

For complete information write to TRG INCORPORATED, Electro-Optical Products Section C, Route 110, Melville, L. I., N. Y.

**ELECTRO-OPTICAL PRODUCTS**

**TRG**  
INCORPORATED



average-size baths and circulating systems, more ideal conditions will allow cooling to lower temperatures. If higher temperature operation is desired with heating provided by an external circulator, the Brinkmann Thermo-Cool power supply is turned off and warm water up to 100°C may be circulated through the unit. The thermoelectric junctions and the d-c power supply are packaged in an aluminum housing measuring 12 by 6 by 8½ inches (30 by 15 by 22 cm). One set of nozzles on the top of this housing accepts the circulating fluid which is to be cooled, while a second set circulates tap water for cooling the hot junctions of the thermoelectric couples. Only 2 to 3 lit./hr are required for this purpose. A safety switch turns the power supply off when the heat sink temperature reaches 77°C, protecting the unit against overheating if the tap water supply is interrupted. The Thermo-Cool is a convenient, quiet, self-contained source of considerable cooling capacity and should prove useful in many general laboratory procedures requiring cooling.—D.J.P. (Brinkmann Instruments, Cantiague Rd., Westbury, N.Y. 11590)

Circle 6 on Readers' Service card

Compact **equal-path interferometer**, designed for optical testing, measures the deviation of optical path length in lens systems caused by surface irregularities or variation in glass index of refraction. The instrument finds application in testing of spherical lenses and lens systems, flat or spherical mirrors, and prisms. It may also be used to test raw optical glass. The instrument measures 2 by 2 by 6 inches (5 by 5 by 15 cm) and is supplied as a self-contained unit incorporating all equipment necessary for operation: basic interferometer, mercury-arc light source and power supply, positioning adjustments, and mounting stand. The unit is designed to operate in autocollimation at the focus of the optical system formed by the test setup. Size of the optical elements under test is limited only by the diameter of the test flat or other necessary auxiliary optics. The complete instrument weighs 14 lb (6.4 kg) and measures 12 by 17 inches (30 by 43 cm) in maximum dimensions. Accessory equipment is available, including flat mirrors, aspheric collimating lenses, and viewing plates.—J.S. (Perkin-Elmer Corp., Main Avenue, Norwalk, Conn.)

Circle 7 on Readers' Service card

8 MAY 1964



**DON'T ORDER  
CUSTOM  
CHROMATOGRAPHIC  
COLUMNS  
UNTIL YOU CHECK  
FISHER'S  
LOW PRICES**

**\$17.50**  
per column ... plus  
**\$1.00**  
per foot for aluminum  
or copper tubing;  
**\$2.00**  
per foot for  
stainless steel tubing

Columns tailored for any standard or "homemade" chromatographic instrument. Cost includes packing: one solid absorbent or any combination of inert support and substrate. Your choice of outside diameters: ⅛ in., ⅜ in., ¼ in. Prompt delivery. At these low prices, can you even afford to make your own? And look into Fisher's economical custom packings. **Get full details** in free Custom Chromatographic Columns bulletin. Write Fisher Scientific Company, 139 Fisher Building, Pittsburgh, Pennsylvania 15219.

J-374

**F FISHER SCIENTIFIC**

World's Largest Manufacturer-Distributor of Laboratory Appliances & Reagent Chemicals

Atlanta • Boston • Chicago • Fort Worth • Houston • New York • Philadelphia  
Pittsburgh • St. Louis • Union, N. J. • Washington • Edmonton • Montreal • Toronto

## TIME YOUR TESTS IN SPLIT-SECONDS!



### **GRA LAB** ALL PURPOSE LABORATORY TIMERS

MODELS AT  
\$25.00 to \$31.00

You can set the large 8" dial for any desired time period within an unusually wide range of 3600 possible settings, (ie., 1 sec. to 60 min., 1 min. to 60 hrs., etc.). At end of preset interval, alarm sounds and external load is automatically switched on or off.

**GRA-LAB MICRO TIMERS**, Electric Stop Clocks, are available in 1/10 sec. or 1/1000 min. graduations for split-second measurements of elapsed time in laboratory or production operations. Price \$39.50

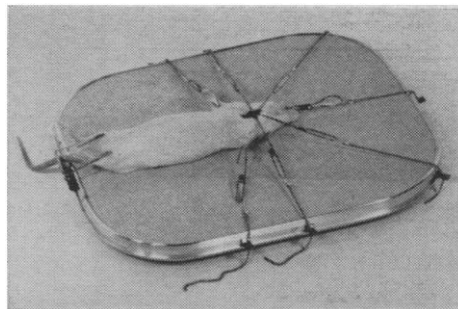
**WRITE FOR COMPLETE CATALOG!**

**DIMCO-GRAY COMPANY**

203 E. Sixth St.  
DAYTON 2, OHIO

#### SIZES DESIGNED FOR:

MOUSE  
RAT  
HAMSTER  
GUINEA PIG  
RABBIT  
CAT  
DOG  
MONKEY



U. S. Pat. No.: 2,832,313

### *THE ANIMAL SURGICAL APPARATUS*

Specifically designed for surgery and dissection. Has a formica surface surrounded by a grooved track. Rounded corners make it possible to attach the holders and retractors from every angle of the table to any position on the body of the animal. All attachments are made of stainless steel. Each table has a built-in storage compartment.

*For illustrated literature please write to:*

*Brookline Surgical Specialties*

50 HARRIS STREET, BROOKLINE 46, MASSACHUSETTS, U.S.A.

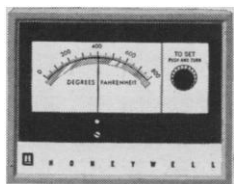
## GO FIRST CLASS AT ECONOMY PRICES!

Got a process variable you want to measure or control? Like temperature, humidity, pressure, liquid level or flow? You name it, we'll tame it. Choose from more than a thousand Honeywell controls . . . you'll find at least one that suits your needs. And for the ultimate convenience in mounting your precision instruments, ask about our new Modu-Mount Enclosures. Call the Industrial Sales Manager

at your nearest Honeywell office, or write: Honeywell, Apparatus Controls Division, Minneapolis, Minn. 55408, Dept. SE-5-26.

## Honeywell

**HONEYWELL INTERNATIONAL:** Sales and service offices in all principal cities of the world.



**\$235.00**  
LIST

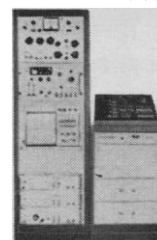
**R7161B VERSATRONIK\***—Precise temperature regulation plus indication. True potentiometer control with on-off or time-proportioning action. Thirty-two ranges available, from  $-200^{\circ}\text{F}$ . to  $3000^{\circ}\text{F}$ . Thermocouple actuated. \$235.00.

\*trademark



**\$282.40**  
LIST

**W611 HUMIDITY INSTRUMENT**—Portable Relative Humidity Read-Out Instrument. Spot-checks humidity anywhere. Accurate to  $\pm 3\%$  RH. Price includes leather carrying case, seven sensors with ranges of 2% to 100% RH. \$282.40.



**MODU-MOUNT**  
Series 20

**MODU-MOUNT\* 20 SERIES**—Modular constructed cabinetry lets you customize enclosures to specific requirements. Ideal for mounting test instruments to lab standards. Portable, can easily be altered as needs change. Complete line of accessories.

(Continued from page 662)

tics, or computer simulation. The papers judged best will be included in the third volume of the ONR monograph series, *Mathematical Methods in Logistics*; the author of the best paper will be offered an opportunity to spend a year on full-time research in logistics or related fields, at an \$11,000 salary. Deadline for receipt of manuscripts: 30 June. (Logistics and Mathematical Statistics Branch, ONR, Washington 25, D.C.)

### Grants, Fellowships, and Awards

The Helen Hay Whitney Foundation offers research fellowships to persons who are considering a career in **biological or medical research**, preferably relating to diseases of connective tissue. Applicant must hold the M.D., Ph.D. or equivalent degree, and be no more than 35 years of age. The fellowships carry a \$6500 stipend, and \$500 per dependent; they are renewable for 3 years and have a \$500 annual increment. Deadline for receipt of applications: 15 August. (Helen Hay Whitney Foundation, 22 E. 65 St., New York, N.Y. 10021)

The Australian Academy of Science is offering the Selby fellowship for postdoctoral research in the **physical or biological sciences**. The fellowship carries a stipend of £A2000 (equivalent to approximately \$4465 in U.S. funds) for a year's work at an Australian university or research institution of the recipient's choice. Applicants must submit a statement of the general scope and nature of their proposed research, their choice of university or research institution, copies of published papers, and the names of three references. Deadline for applications: 30 July. (Assistant Secretary, Australian Academy of Science, Gordon St., Canberra City, A.C.T., Australia)

The Damon Runyon memorial fund for **cancer research** is offering research fellowships, to begin 1 January. Applicants must have received their doctorate, or have completed all requirements for it; persons who have already had 3 years of postdoctoral fellowships are not eligible. The recipients may study at the institutions of their choice, and may be permitted limited teaching or clinical work if it

## NEW BOOKS IN SCIENCE AND TECHNOLOGY

### SELECTED WORKS IN ORGANIC CHEMISTRY by A. N. Nesmeyanov.

Monumental one-volume compendium of this distinguished scientist's contributions to: synthesis of organometallic compounds; ferrocene research; stereochemistry; and quasi-complex compounds.

1,172 pages \$30.00  
A Pergamon Press Book

### THE HIGH TEMPERATURE ASPECTS OF HYPERSONIC FLOW, AGARDograph #68

Edited by W. Nelson. Theoretical analysis and experimental data on topics including radiation effects, heat transfer, and chemical kinetics. Discusses test facilities and research materials.

786 pages \$42.00  
A Pergamon Press Book

**THIRST** *Proceedings of the First International Symposium on Thirst in the Regulation of Body Water, held at Florida State University. Edited by Matthew J. Wayner.* A unique source of information on physiological, biological and other aspects of the regulation of body fluids. Describes research at the molecular, cellular and anatomical levels.

570 pages \$20.00  
A Pergamon Press Book

### FREE RADICAL REACTIONS IN PREPARATIVE ORGANIC CHEMISTRY by G. Sosnovsky.

Only current reference manual written for experimental chemists from a preparative point of view. Gives a complete account of reactions in solution, providing approaches that are not accessible by classical methods.

approx. 464 pages \$17.00

### ELECTRODYNAMICS AND CLASSICAL THEORY OF FIELDS AND PARTICLES by A. O. Barut.

Systematic, covariant treatment of classical theory of particle motion, fields, radiation and radiation reaction, and the interaction of charged particles with electromagnetic fields. The relativistic point of view is used throughout.

224 pages \$9.00

### THE THEORY OF ELECTROMAGNETISM by D. S. Jones

*International Series of Monographs on Pure and Applied Mathematics, Volume 47.* Takes up developments from Maxwell's equations to present. Contents include: Special Theory of Relativity, Cavity resonators, Waveguide Theory, Aperiodic Phenomena. Written at an advanced level.

807 pages \$15.00  
A Pergamon Press Book

Two recent volumes in the *International Series of Monographs on Analytical Chemistry*:

### VOLUME 2: TRACE ANALYSIS OF SEMICONDUCTOR MATERIALS Edited by J. P. Cali.

Up-to-date instrumental techniques for analysis and control of trace impurities and constituents of semiconductors. Radioactivation techniques. Emission spectroscopy. Mass spectroscopy. Fluorimetry. Polarography.

281 pages \$10.00

A Pergamon Press Book

### VOLUME 13: CONTROLLED-POTENTIAL ANALYSIS by G. A. Rechnitz.

First book devoted exclusively to controlled potential coulometry. Theoretical background. Apparatus. Experimental techniques. Applications in inorganic chemistry.

85 pages \$5.00

A Pergamon Press Book

### THE THEORY OF RINGS by N. H. McCoy.

Compact and clear introduction to properties of rings, ideals and homomorphisms, subdirect sums, prime ideals, endomorphisms, Jacobson, radical, and other topics.

173 pages \$3.50

Macmillan Mathematics Paperbacks

### LIMITS AND CONTINUITY by W. K. Smith.

A rigorous, self-contained exposition of the concept of limit of a function and of continuity of a function, developed in thoroughly modern terms.

140 pages \$2.95

Macmillan Mathematics Paperbacks

### SLOW VISCOUS FLOW by W. E. Langlois.

Develops the equation of viscous hydrodynamics from basic principles, giving much more detail than the usual treatments. Covers Cartesian tensors, equations and exact solutions for viscous flow, pipe flow, and flow past a sphere.

240 pages \$8.95

### TENTH NATIONAL VACUUM SYMPOSIUM TRANSACTIONS Edited by G. H. Bancroft.

Up-to-the-minute account of advances in both general and specialized areas of vacuum theory. Covers vacuum gauges, sputtering, getter and ion pumps, freeze drying, lubrication and space friction, semiconductor films, and cryopumping.

550 pages \$23.00

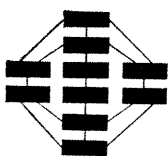
### INSTRUMENTAL METHODS OF EXPERIMENTAL BIOLOGY Edited by D. W. Newman.

Combined study of fundamental techniques and theory of instrumental measurements in the biological sciences. Gives examples for each type of instrument. 182 photos, drawings.

352 pages \$15.00

THE MACMILLAN COMPANY 60 FIFTH AVENUE NEW YORK 10011

*A Fresh  
and  
Imaginative  
Look at  
Life Science . . .*



## Modern Biology Series

Ten beautiful, beautifully written paperbacks. Singly, each of them gives a complete, easy-to-understand treatment of its particular subject. Together, they create an up-to-the-minute text on basic biology.

### CELL STRUCTURE AND FUNCTION

Ariel G. Loewy, *Haverford College*  
Phillip Siekevitz, *Rockefeller Institute*  
1963 236 pp. \$2.65

### ECOLOGY

Eugene P. Odum, *University of Georgia*  
1963 160 pp. \$1.75

### GENETICS

Robert Paul Levine, *Harvard University*  
1962 192 pp. \$1.95

### EVOLUTION

Jay M. Savage, *University of Southern California, Los Angeles*  
1963 136 pp. \$1.75

### ANIMAL STRUCTURE AND FUNCTION

Donald R. Griffin, *Harvard University*  
1962 128 pp. \$1.75

### THE LIVING PLANT

Peter Martin Ray, *University of Michigan*  
1963 144 pp. \$1.75

### MICROBIAL LIFE

William R. Sistrom, *University of Oregon*  
1962 128 pp. \$1.75

*Latest in the Series . . .*

### ANIMAL ADAPTATION

Allison L. Burnett, *Western Reserve University*  
Thomas Eisner, *Cornell University*  
January, 1964 144 pp. \$1.75 paper

*In Preparation . . .*

### DEVELOPMENT

J. D. Ebert, *Carnegie Institution of Washington*

### PLANT DIVERSIFICATION

Theodore Delevoryas, *Yale University*



**HOLT, RINEHART  
and WINSTON, inc.**

383 Madison Avenue, New York, N.Y. 10017

In Canada: 833 Oxford Street, Toronto 18, Ontario

is consistent with their training during the term of the fellowship. The stipends are \$5000, plus \$500 each for a maximum of three dependents. The fellowships are for 1 year, renewable for an additional year. Deadline for receipt of applications: *1 July*. (J. H. Teeter, Damon Runyon Memorial Fund for Cancer Research, Inc., 730 Fifth Ave., New York 19)

Grants are available for participants in a mathematics institute in **analysis**, scheduled 15 June to 7 August at Lehigh University. Applicants must have completed at least a year's graduate work in analysis, and be planning to write a Ph.D. thesis on the subject. Stipends for U.S. students are \$600, plus \$120 per dependent, and travel allowances. Foreign applications also will be considered, but recipients will receive only the stipend. The institute is supported by a \$49,500 NFS grant. (A. E. Pitcher, Department of Mathematics, Lehigh University, Bethlehem, Pa.)

Predocutorial fellowships are available from the University of Miami for an interdisciplinary program leading to a Ph.D. in biochemistry, zoology, or physiology with a major in **cellular and molecular biology**. Stipends are \$2200 to \$2600. (E. L. Chambers, Graduate Program in Cellular and Molecular Biology, University of Miami, Coral Gables, Fla. 33134)

The Life Insurance Medical Research Fund is accepting applications for grants to institutions for research on **cardiovascular problems**. The awards, to support basic research, will be available in July 1965. Deadline for receipt of applications: *15 September*. (W. A. Jeffers, Scientific Director, Life Insurance Medical Research Fund, 1030 East Lancaster Ave., Rosemont, Pa.)

### Meeting Notes

The Instrument Society of America will sponsor a research conference on **instrumentation**, 3-7 August, in Geneva, N.Y. Among the topics to be included are geodetic instrumentation in the space sciences, systems for manipulation of physical data, problems and solutions in process instrumentation, applications of lasers and coherent light, elements and principles for instrumentation design, and current problems in instrumentation science. Morn-



VICKERS

*Phase Contrast*  
**MICROSCOPES**



Superb phase contrast performance . . . with Vickers microscopes (conventional or inverted) . . . built-in annuli centering system and Magnification Changer available . . . choice of a variety of phase systems . . . normal or long (up to 18mm W.D. with high-dry lens) working distance . . . TRILUX system for rapid interchange between bright field, dark field and phase contrast . . . low power phase of tissue cultures in test tubes.



**COOKE,  
TROUTON  
& SIMMS, Inc.**

91 WAITE STREET, MALDEN 48, MASSACHUSETTS



ing and evening sessions only are planned, leaving the afternoons free for informal discussions. Attendance, by application only, will be limited to about 100 participants. (H. S. Kindler, 530 William Penn Place, Pittsburgh, Pa.)

The fourth inter-American conference on **toxicology and occupational medicine** will be held in Miami Beach, Florida, 24-27 August, sponsored by the medical schools of the University of Miami and the University of Puerto Rico. The meeting will focus on recent developments in toxicology, radiology, and occupational and space medicine; approximately 250 scientists plan to attend, representing North and South America and several European nations. (W. Machle, University of Miami School of Medicine, Coral Gables, Florida)

Oak Ridge National Laboratory will sponsor its eighth conference on **analytical chemistry in nuclear technology**, 6-8 October, in Gatlinburg, Tenn. The meeting will center on "determination of interstitials and trace constituents in reactor materials and products"; sessions will be held on various methods of analysis; determination of carbon, hydrogen, oxygen, and nitrogen in metals; and determination of trace constituents. Papers are invited for the meeting; they should be primarily discussions of novel methods of analysis and of instrumental devices. Abstracts of 500 words are required, and the presentation time for papers should be no more than 25 minutes. Deadline for receipt of abstracts: *10 July*. (C. D. Susano, ORNL, P.O. Box X, Oak Ridge, Tenn.)

The ninth international conference on **low temperature physics** will be held 31 August to 4 September, in Columbus, Ohio. The meeting, sponsored by the International Union of Pure and Applied Physics, will include papers on superconductivity; liquid and solid helium-3 and helium-4 and their mixtures; and properties of gases, liquids, and solids at low temperatures. About 800 delegates are expected to attend. (The Conference, P.O. Box 3073, University Station, Columbus, Ohio 43210)

The American Society for Microbiology invites papers for presentation at the fourth interscience conference on **antimicrobial agents and chemotherapy**, 26-28 October in New York. Topics to



## WHAT COULD BE NEW ABOUT A BOTTLE?

No one thing, but a combination of advantages makes **NALGENE® LABORATORY BOTTLES** the greatest idea since glass. For many labs, the mere fact that they're unbreakable is reason enough to standardize on Nalgene bottles. Others choose them for their resistance to acids, caustics, bacterial growth. And their light weight makes a big difference... safer handling and storing. Now you can select from Teflon® FEP, polyethylene, polycarbonate, or polypropylene; sizes from one ounce to thirteen gallons—natural or amber, narrow or wide mouth. Ask your lab supply dealer. Or write for our Catalog N-164. The Nalge Co., Inc., Dept. 2705, Rochester 2, New York.

\*Du Pont registered trademark

 **NALGENE  
LABWARE**  
Leader in quality plastic labware since 1949

## NEW PAPERBACKS FOR SCIENCE STUDENTS

R. M. Hochstrasser

### BEHAVIOR OF ELECTRONS IN ATOMS

An elementary but precise introduction to the theory of electrons in atoms. Presented through a qualitative, nonmathematical description of quantum mechanics and experimental spectroscopy.

160 Pages \$1.95 paper

Fred Basolo  
R. C. Johnson

### COORDINATION COMPOUNDS

Modern theoretical concepts are emphasized in this introduction to coordination chemistry. Discussions include the coordinate bond, crystal field theory, molecular orbital theory, stereochemistry, and reaction mechanisms.

160 Pages \$1.95 paper

G. R. Choppin

### NUCLEI AND RADIOACTIVITY

A more detailed explanation than is usually given freshmen of the basic properties of the nucleus (size, charge, mass), of radioactivity, radiation detection, and nuclear fission.

160 Pages \$1.95 paper

I. M. Klotz

### INTRODUCTION TO CHEMICAL THERMODYNAMICS

A paperback version of the first part of the author's newly revised text, *Basic Chemical Thermodynamics*. It is a clear and logical development of the three laws of thermodynamics, with applications limited to systems of constant composition.

256 Pages \$3.95 paper

E. L. King

### HOW CHEMICAL REACTIONS OCCUR

156 Pages \$1.95 paper

B. H. Mahan

### CHEMICAL THERMODYNAMICS

156 Pages \$1.95 paper

G. M. Barrow

### THE STRUCTURE OF MOLECULES

156 Pages \$1.95 paper

Werner Herz

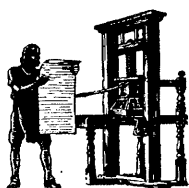
### THE SHAPE OF CARBON COMPOUNDS

156 Pages \$1.95 paper

R. D. Hill

### TRACKING DOWN PARTICLES

208 Pages \$2.95 paper



W. A.  
BENJAMIN

One Park Ave.,  
New York

be covered include the discovery, production, and use of new compounds; taxonomy of producing organisms; identification and isolation procedures; structural chemistry and synthesis; in vitro studies; experimental chemotherapy; pharmacology; and clinical studies, including development of resistance and allergy. Papers must contain data not previously published or presented at national meetings. Deadline for submission of titles and abstract: 15 July. (American Society for Microbiology, 115 Huron View Blvd., Ann Arbor, Mich.)

The University of Denver Research Institute will present its 11th annual symposium on **computers and data processing**, 24-25 June, in Estes Park, Colorado. Twelve papers will be presented on the various aspects of research and development. (W. H. Eichelberger, Denver Research Institute, University of Denver, Denver, Colo., 80210)

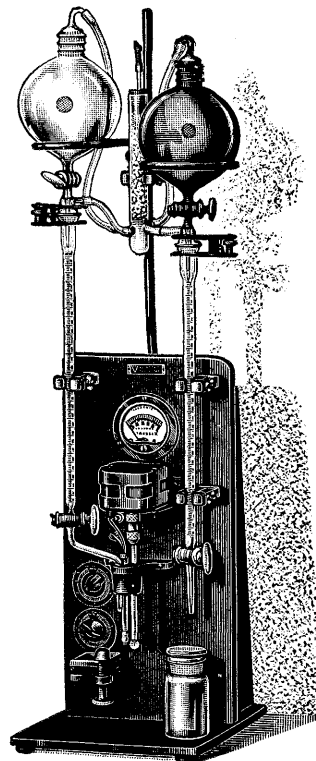
A symposium on **thalamic regulation of sensorimotor activities** will be held at Columbia University, New York, 30 November to 2 December. The conference is to be the first of a series scheduled by the Parkinson's Disease Research and Information Center; it is cosponsored by the National Institutes of Health and the Parkinson's Disease Foundation. (M. D. Yahr, New York Neurological Institute, 710 W. 168 St., New York 32)

Denver Research Institute plans to present its 13th annual conference on the applications of **x-ray analysis**, 12-13 August, in Denver, Colorado. Sessions will be held on emission spectrography, microprobe, absorption and microscopy, and instrumentation. Approximately 250 representatives from industry, universities, and manufacturers of x-ray equipment will attend. (M. D. Robbins, Denver Research Inst., University of Denver, Colorado)

The call for papers has been issued for the 11th **nuclear science** symposium, 28-30 October, in Philadelphia, Pa. It is sponsored by the professional technical group on nuclear science of the Institute of Electrical and Electronics Engineers; co-sponsors are the AEC and NASA. The meeting will center on nuclear instrumentation in space and in the laboratory; topics include laboratory instrumentation, nanosecond circuitry, radiation detectors, space nuclear propulsion, space instru-

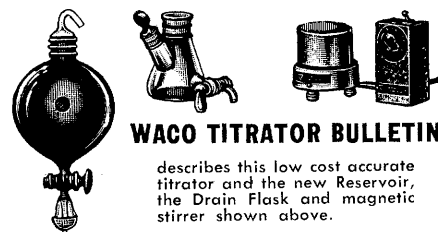
## WACO TITRATOR

...for Karl Fischer Moistures



*You get the best for less*

At \$290.00 complete, the new WACO for Karl Fischer moisture determinations now features NO-DIP, BALL JOINT Pyrex glassware . . . plus Drain Flask, WACO magnetic stirrer . . . for every application! Hundreds of users of the original WACO may also modernize as parts are INTER-CHANGEABLE!



### WACO TITRATOR BULLETIN

describes this low cost accurate titrator and the new Reservoir, the Drain Flask and magnetic stirrer shown above.

WRITE FOR WACO TITRATOR BULLETIN

LABORATORY SUPPLIES AND EQUIPMENT  
**WILKENS-ANDERSON CO.**  
4525 W. DIVISION ST. CHICAGO 51, ILL.

mentation and space phenomena, reactor control instrumentation, and radiation effects. Abstracts of 100 to 300 words are required. Deadline: 1 July. (W. A. Higinbotham, Brookhaven National Laboratory, Upton, L.I., New York 11973)

Lehigh University's chemistry department has scheduled its third annual symposium on **instrumental analytical chemistry**, 13-18 July. Emphasis will be on recent applications and modifications of instruments readily available to analytical chemists. The topics to be discussed include atomic adsorption spectrometry, color evaluation, isotope dilution analysis, near infrared and infrared spectrophotometry, neutron activation, and x-ray diffraction and fluorescence. The meeting is open to persons with a bachelor's degree in chemistry or an allied field, or equivalent industrial experience. (A. J. Diefenderfer, Department of Chemistry, Lehigh University, Bethlehem, Pa.)

Fisk University will present its 15th annual **infrared spectroscopy** and **gas chromatography** institute 11-21 August. The first infrared session, 11-15 August, will review elementary theory and present laboratory work on modern commercial infrared spectrophotometers. Participation is limited to 60 persons, and tuition is \$125.

The gas chromatography session, also 11-15 August, will present theory, applications, and techniques; laboratory work will be in the use of gas chromatographic instruments, preparation of samples, packing of columns, and reading and interpretation of gas chromatograms. Tuition is \$125; 60 persons may attend.

The second infrared session, 17-21 August, will feature interpretation of recent developments in infrared techniques. Participation is limited to 80 persons; tuition is \$150.

In addition to the tuition, a \$10 registration fee is required; on-campus housing and meals are available for \$50 for each session. (N. Fuson, Fisk Infrared Institute, Fisk University, Nashville, Tenn.)

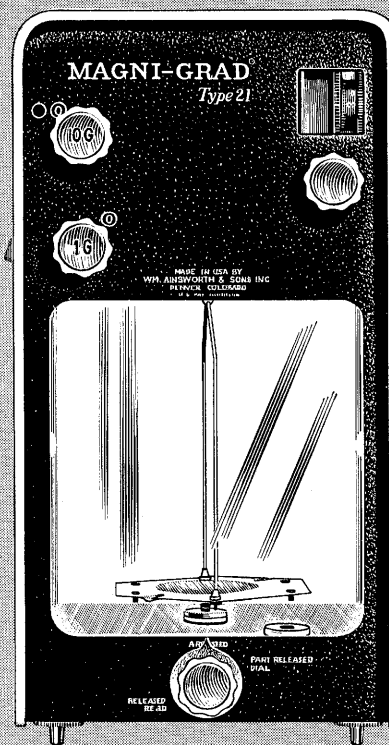
#### Courses

A workshop on the use of **gas chromatography** in clinical chemistry will be held 20-24 July at the Baylor University college of medicine, sponsored by the Texas section of the

8 MAY 1964

get  
**AINSWORTH**  
quality  
in one-pan  
balances

a type and  
price to meet  
your needs



New Analytical  
Magni-Grad Type 21, with simplified  
design for lower cost.

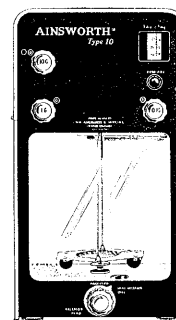
*speed/accuracy/convenience*

Patented compensated beam

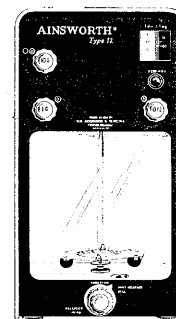
"Add weight" and "remove weight" signals

All metal case

Eye-level, unobstructed readout

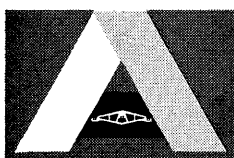


Type 10 Analytical



Type 12 Semi-Micro

	TYPE 21	TYPE 10	TYPE 12
Capacity	160 gr.	160 gr.	80 gr.
Total load	—	220 gr.	120 gr.
Sensitivity	0.1 mg.	0.1 mg.	0.01 mg.
Readability, by estimation	0.05 mg.	0.05 mg.	0.005 mg.
Reproducibility	±0.05 mg.	±0.03 mg.	±0.01 mg.
Price	\$550.	\$670.	\$875.



A BALANCE FOR EVERY NEED

The name Ainsworth is your guarantee

**WM. AINSWORTH & SONS, INC.**

2151 LAWRENCE STREET • DENVER, COLORADO 80205  
Telephone Area Code 303 255-1723

## Viscosity directly in centipoises

### HOEPPLER Viscosimeter

#### PRECISION MODEL

The Hoeppler Viscosimeter provides a fast, accurate method of determining the viscosity of gases, liquids, oils, plastics, syrups, viscous tars and dark liquids. Operates on the falling ball principle. Shows absolute viscosity in centipoises.

From 0°C to 100°C. Direct readings in centipoises (or centistokes). From 0.01 to 1,000,000 centipoises. Accuracy 0.1% to 0.5%. Small sample (30cc) required. Results consistent and reproducible. Price \$350. Interchangeable spare parts available.

Write for Bulletin HV-303

### UBBELOHDE Viscosimeter

#### on the principle of the suspended level

A capillary-type viscosimeter for determining the kinematic viscosity of any true viscous liquid, such as petroleum products or lubricants. See American Society for Testing Materials, A.S.T.M. designation D 445-53T.

Measures viscosity with an error not greater than  $\pm 0.1\%$ , when used at efflux times of 90-1000 seconds. In all capillary sizes as called for by the A.S.T.M.—calibrated or uncalibrated.

Uncalibrated capillary, \$20. Calibrated, \$38.

Metal frame to fit capillary, \$6.50.

Write for Bulletin UV374

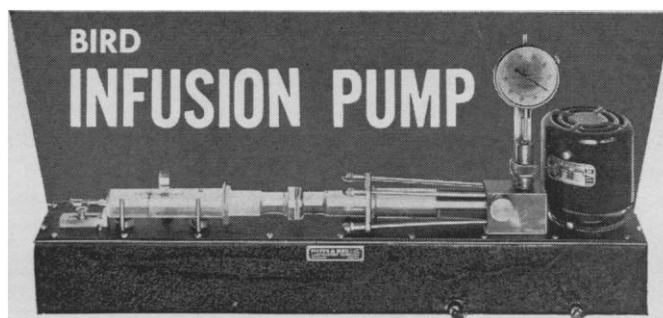
### Absorption Type Colored Optical Filter Glass

Processed in our New Rochelle Optical Shop in about 100 types for the ultra-violet (from about 250  $m\mu$ ), visible, and infrared (to about 3,000  $m\mu$ ) spectral regions. Available in flat or as solid bars for the manufacture of tubing for liquid laser excitation.

Also Anti-Laser Eye-Protection Filter Glass BG-18

Fish-Schurman Corp., 74 Portman Road, New Rochelle, N.Y.

# Fish-Schurman



For accurately and continuously metering small quantities of liquid which do not react with glass. The three main units are: a motor-driven, hydraulic, adjustable metering pump; a hydraulic operated driving plunger, and delivery syringe. Liquid delivery rate is easily adjusted. A reference dial indicating gauge shows the setting of the pre-determined rate of delivery. Its readings may be translated, by the graph furnished, into volume delivered per minute. The rate can be accurately read to a hundredth of a cc. per minute. In addition, the rate of flow may be adjusted continuously from .01 cc. to 2.5 cc. per minute without stopping pump. Complete with 50 cc. standard glass syringe for operation on 115 V. 60 C., A.C. only.

CAT. NO. ....71-049

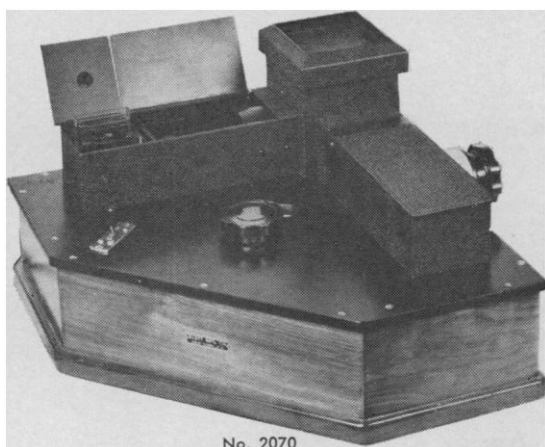
## PHIPPS & BIRD, INC.



Manufacturers & Distributors of Scientific Equipment

6th & Byrd Streets — Richmond, Virginia

### THE KLETT FLUORIMETER



No. 2070

Designed for the rapid and accurate determination of thiamin, riboflavin, and other substances which fluoresce in solution. The sensitivity and stability are such that it has been found particularly useful in determining very small amounts of these substances.

#### KLETT SCIENTIFIC PRODUCTS

PHOTOELECTRIC COLORIMETERS • BIO-COLORIMETERS  
GLASS ABSORPTION CELLS • COLORIMETER NEPHELOMETERS • KLETT REAGENTS • COLONY MARKER AND TALLY

**Klett** Manufacturing Co., Inc.  
179 EAST 87TH STREET, NEW YORK, N. Y.

## ROYSON

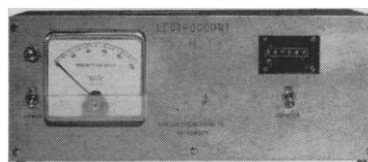
### Electronic

## Integrator

This highly accurate ROYSON Integrator offers long life and high stability. It is used for:

- Integrating the signal from a flow meter to get actual pounds, gallons, etc.
- Batching control
- Computing KW hours, ampere hours, volt seconds
- Computing the area under the peaks on chromatographs and densitometers

*It is also used as an analog to digital converter*



**TYPICAL INPUTS:** Volts, Millivolts, Current, Pot Position  
**OUTPUTS:** Counter, Predetermined Counter, Dry Contacts

offers unusual  
**VERSATILITY**  
and  
**RELIABILITY**

In Addition, With Available Transducers You Can Integrate:

- AC KW HOURS • AC AMPERE HOURS OR MINUTES • PNEUMATIC PRESSURE SIGNALS • MECHANICAL POSITION • TEMPERATURE •

*Write, wire or call. Let us review your requirements.*

**ROYSON ENGINEERING COMPANY**

Hatboro, Pa. Phone: (215) OS 5-2800



American Association of Clinical Chemists. It will include both lecture and laboratory sessions. (F. B. Moreland, Department of Biochemistry, Baylor University College of Medicine, Houston 25, Tex.)

Massachusetts Institute of Technology plans a course in **thermodynamics** 29 June to 3 July, for engineers and scientists interested in teaching, research, and development. The course will stress gravity, electrostatic and electromagnetic force fields, equilibrium in nuclear processes, fluctuations, information theory, quantum mechanics, relativity, and thermodynamics of irreversible processes. (Summer Session Office, M.I.T., Cambridge, Mass. 02139)

The Mellon Institute, Pittsburgh, Pa., will present a course on the mechanics of **non-Newtonian fluids**, 8-13 June. It is designed for persons interested in both experimental and theoretical aspects of the topic. (C. B. Willingham, Mellon Institute, Pittsburgh, Pa.)

An institute in "probabilistic techniques in **systems reliability** and maintainability" is scheduled 13-24 July at New York University. Participants must have a knowledge of probability and stochastic processes. (R. N. Wilburn, Bureau of Conferences and Institutes, New York University, 6 Washington Square N., New York 10003)

A course on the combined use of **analog and digital computer techniques** is scheduled 8-19 June at the University of Southern California. Engineering applications of hybrid techniques will be stressed in lecture and laboratory sessions, and material on mechanization of combined systems also will be presented. (G. A. Bekey, Electrical Engineering Department, U.S.C., Los Angeles, Calif. 90007)

A course in **electron microscopy of biological materials** will be given at the University of California, Berkeley, 6-24 July. It is designed for academic, professional, and industrial personnel. Participants will conduct research of their own choosing, with assistance from the faculty and from the staff of the school's Electron Microscope Laboratory. Applicants must have at least a bachelor's degree in biological sciences, and have had some research experience in the field; applications

## C. P. SNOW The Two Cultures and A Second Look

A re-issue of the original Rede Lecture delivered by Sir Charles in 1959, with a new section of equal length in which he extends his thinking and deals with world-wide reactions to his concept of the 'Two Cultures'  
\$1.95

# CAMBRIDGE



### Fluidised Particles

J. F. DAVIDSON & D. HARRISON

An account of the behaviour of fluidised beds, for practising chemical engineers and students of the subject. The book starts from first principles and shows how the underlying theory can be applied to the design and engineering problems of a full-sized plant. \$6.50

### An Introduction to Crystal Chemistry

R. C. EVANS

A new edition of a standard textbook, completely rewritten and enlarged to take account of new material. The book sets out the general principles of crystal architecture and the relation of physical and chemical properties to crystal structure. *Second edition*

### An Introduction to the Theory of Seismology

K. E. BULLEN

A standard work for undergraduate and graduate students of geophysics. The new material includes chapters on long-period oscillations, seismology and nuclear explosions and extra-terrestrial seismology. \$9.50

### Dynamic Aspects of Biochemistry

ERNEST BALDWIN

This textbook retains, in its new edition, emphasis on basic principles with only illustrative details. New material has been added on coenzymes, l-carbon metabolism, oxidative decarboxylation, and the citric acid and related cycles. The chapter on nucleic acids and nucleoproteins has also been greatly expanded and now includes a section on biochemical genetics.

*Fourth Edition* \$7.50

Write for our complete list

CAMBRIDGE UNIVERSITY PRESS

32 EAST 57th STREET, NEW YORK, N.Y. 10022

## The Norse Atlantic Saga

*Being the Norse Voyages of Discovery and Settlement to Iceland, Greenland, America*

By GWYN JONES. A spirited retelling of the remarkable expansion of the Norsemen to the north and west, backed by significant new archeological discoveries and important advances in interpretation. Sources are newly translated. "Combines passion and scholarship with rare skill."—*The Times Literary Supplement*. "A rich piece of historical exposition."—*Punch*. Illustrated with half-tones, line drawings and maps. \$8.00

## Desert Animals

*Physiological Problems of Heat and Water*

By KNUD SCHMIDT-NIELSEN. Professor Schmidt-Nielsen provides an intensive study of the mammal, bird, and reptile life which thrives in desert areas. Physiological adaptations and peculiar solutions to problems of excessive heat and lack of water are discussed in detail. A summary follows each chapter.

8 plates; 51 figures. \$7.20

## Equilibrium, Stability and Growth

*A Multi-Sectoral Analysis*

By MICHIO MORISHIMA. Essays developing and reformulating the Walrasian theory of general equilibrium according to recent analytical methods. Models are examined, and related topics discussed. An appendix and footnotes explain higher mathematical theorems. 23 text figures. \$9.60

## The Friction and Lubrication of Solids, Part II

By F. P. BOWDEN and D. TABOR. Explores frictional behavior of the adhesion mechanism for metals and, with modification, for non-metals. Covers experimental studies of surface structure and topography, adhesion in high vacuum, surface films, lamellar solids. *International Series of Monographs on Physics*.

40 half-tones. \$13.45

**Oxford University Press**

**New York**

should include a brief outline of the proposed project. The enrollment fee is \$400. (Engineering Sciences Extension, University of California, Berkeley 94720)

### New Journals

*Alabama Journal of Medical Sciences*, vol. 1, No. 1, January 1964. Emmett B. Carmichael, editor. (University of Alabama Medical Center, 1919 Seventh Ave. South, Birmingham. Quarterly, \$6 per year)

*Birth Defects*. Abstracts of selected articles, vol. 1, No. 1, January 1964. (The National Foundation, Supply Division, Rm. 555, 800 Second Ave., New York 10017. Monthly, \$5 per year)

*Surface Science*, vol. 1, No. 1, January 1964, Harry C. Gatos, editor. (North-Holland Publishing Co., P.O. Box 103, Amsterdam, Netherlands. Quarterly, \$16 per year)

### Films

The following films are available from the Bureau of Audio-Visual Instruction, State University of Iowa, Iowa City. Rental: \$10 each; purchase: \$275 each, or \$750 for all three.

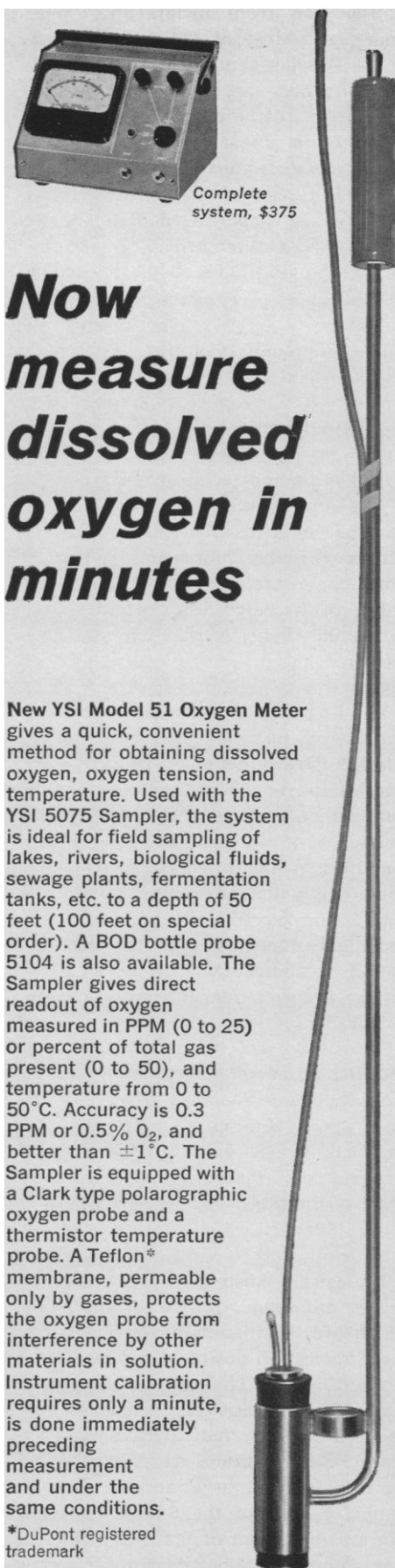
*Atomic Models, Valence, and the Periodic Table* (U-5113). Shows covalent radius, valence electronic structure, and electronegativity; new periodic chart and its applications in teaching.

*New Models of Molecules, Ions, and Crystals: Their Construction and General Use in Teaching Chemistry* (U-5114). Construction of molecular or crystal models of about 60 elements and compounds; their use in conjunction with atomic models in explaining the physical nature of the elements and the composition and properties of compounds.

*A Special Set of Models for Introducing Chemistry* (U-5115). Describes a set of 25 specially selected chemical models and their uses in teaching many fundamental principles of elementary chemistry.

### Publications

The Department of Commerce has made available a bibliography of **Soviet research in field emission** from 1960 to 1963. It includes approximately 80 references on both experimental and theoretical aspects of field electron and



**Now measure dissolved oxygen in minutes**

**New YSI Model 51 Oxygen Meter** gives a quick, convenient method for obtaining dissolved oxygen, oxygen tension, and temperature. Used with the YSI 5075 Sampler, the system is ideal for field sampling of lakes, rivers, biological fluids, sewage plants, fermentation tanks, etc. to a depth of 50 feet (100 feet on special order). A BOD bottle probe 5104 is also available. The Sampler gives direct readout of oxygen measured in PPM (0 to 25) or percent of total gas present (0 to 50), and temperature from 0 to 50°C. Accuracy is 0.3 PPM or 0.5% O<sub>2</sub>, and better than ±1°C. The Sampler is equipped with a Clark type polarographic oxygen probe and a thermistor temperature probe. A Teflon\* membrane, permeable only by gases, protects the oxygen probe from interference by other materials in solution. Instrument calibration requires only a minute, is done immediately preceding measurement and under the same conditions.

\*DuPont registered trademark

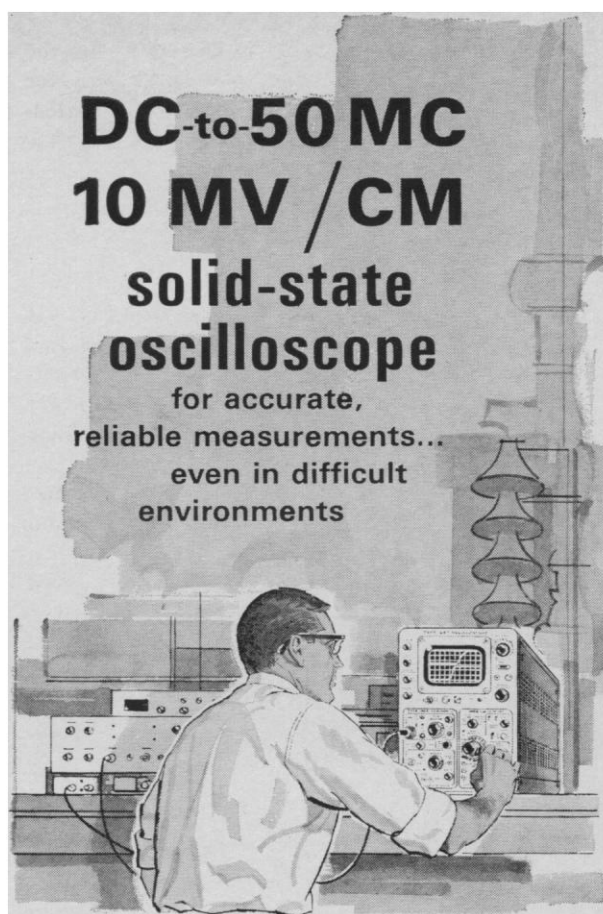
**YELLOW SPRINGS INSTRUMENT CO., INC.**  
Yellow Springs, Ohio

ion emission from metals and semiconductors. Most of the papers listed are in Russian, and, where available, full references are given to English translations of the entries. (*Soviet Research in Field Emission, 1960-1963; An Annotated Bibliography*. National Bureau of Standards Technical Note 234; Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402. 39 pages. 30 cents)

The **National Institutes of Health** has published the 1964 edition of its *Directory-Bibliography*. The book presents broad outlines of NIH structure, names the professional staff, and lists the scientific and technical publications of staff members during 1963. It is intended as a reference for research workers in the biomedical sciences. Single copies are available at no charge. (Office of Research Information, Bldg. 31, Room 4B-11, NIH, Bethesda, Md. 20014)

M.I.T. Libraries announce the publication of the **Correlation Index to Current Department of Defense Research Reports**, prepared in cooperation with the libraries at U.C.L.A. and the University of Washington. The volume contains a listing, by Defense Document Center accession number, of microfilm reports on deposit in the Regional Technical Report Centers of the Office of Technical Service. It also includes a correlation index by issuing agency report number, which indexes *U.S. Government Research Reports*, and the unclassified section of *Technical Abstracts Bulletin*, June 1962 to June 1963. Semimonthly supplements are planned. (R. L. Snyder, Associate Director of Libraries, Rm. 14-E210, MIT, Cambridge 39, Mass. \$10 per copy)

**Biological Abstracts** is offering a new "microfilm program," through which life scientists may obtain microcard copies of abstracts in the areas covered by BA. The cards, available on a subscription basis, can be easily read under a low-powered dissecting microscope. Subscriptions are available to individuals only, at a cost of \$6 per year, for each of the 84 subject divisions; a maximum of ten different divisions may be subscribed to by any single person. The microcards will be published semimonthly. (Microform Unit, Biological Abstracts, Inc., 3815 Walnut St., Philadelphia, Pa. 19104)



### Type 647 Features with 10A2 and 11B2 Plug-In Units

■ Dual-trace operation. 10 mv/cm sensitivity. Dc-to->50 Mc passband. Less than 7-nsec risetime.

■ 6-cm by 10-cm display area. Internal, no-parallax graticule. Controllable graticule illumination. 14-kv accelerating potential.

■ 2 time bases, independent triggering. Sweep rates to 0.1  $\mu$ sec/cm. 10X sweep magnifier.

■ Sweep delay 50 sec to 1  $\mu$ sec. Single-sweep operation. Wideband (>50 Mc) triggering. External horizontal input.

■ Bright line automatic triggering.  $\div 10$  external trigger attenuator, (on main time-base triggering). 'Ground' input positions on each vertical channel.

■ 1-kc voltage calibrator, (crystal controlled). Push-button trace finder. Dc-coupled Z-axis amplifier. Current-probe calibrator.

■ 100 v—130 v line voltage. No calibration changes with line fluctuations. 50-to-400 cps line frequency. Low power—185 watts, approximately. Convection cooled—no fan needed.

Type 647 Oscilloscope (without plug-ins) . . .	\$1225
Type 10A2 Dual-Trace Unit . . . . .	\$675
Type 11B2 Time-Base Unit . . . . .	\$825
2 P6008 Probes . . . . .	\$ 70

U.S. Sales Prices f.o.b. Beaverton, Ore.

FOR MORE INFORMATION—OR TO ARRANGE A DEMONSTRATION—PLEASE CALL YOUR TEKTRONIX FIELD ENGINEER.

## Tektronix, Inc.

P.O. BOX 500 • BEAVERTON, OREGON 97005 • Phone: (Area Code 503) Mitchell 4-0161 • Telex: 036-691 TWX: 503-291-6805 • Cable: TEKTRONIX • OVERSEAS DISTRIBUTORS IN 25 COUNTRIES  
TEKTRONIX FIELD OFFICES in principal cities in United States. Consult Telephone Directory.  
Tektronix Australia Pty., Ltd., Melbourne; Sydney • Tektronix Canada Ltd., Montreal; Toronto  
Tektronix International A.G., Zug, Switzerland • Tektronix Ltd., Guernsey, C. I.  
Tektronix U. K. Ltd., Harpenden, Herts



The Type 647 Oscilloscope and plug-in units add new convenience to display and measurement of high sensitivity, wide band, dual trace applications. Adaptable and versatile, the oscilloscope retains accuracy, within stated specifications, under extensive temperature variations . . . fluctuating line voltages . . . other difficult conditions.

### TEMPERATURE

Non-Operating —55°C to +75°C. Operating —30°C to +65°C.

### SHOCK

Non-Operating 20 G's max, 2 shocks, each direction, along each of 3 major axes.

### HUMIDITY

Non-Operating meets Mil-Std-202B, Method 106A, except freezing, vibration, through 5 cycles (120 hours).

### VIBRATION

Non-Operating or Operating 0.025" pk-pk, 10-55-10 cycles, (4 G's max), 1 min cycles, 15 min each major axis.

### ALTITUDE

Non-Operating 50,000 ft. Operating 15,000 ft. 50-to-400 cps line freq.



## A \$50,000 POLICY FOR \$105?

Using **PLAN Your Life Insurance**, this professor estimated that to meet the needs of his family he should have \$50,000 of additional life insurance. And he found he could get it in a TIAA 20-Year Home Protection policy for a net premium of only \$105.

At his age of 30, this \$50,000 decreasing Term policy calls for a level annual premium of \$193. The cash dividend of \$88, payable at the end of the first policy year on TIAA's current dividend scale, reduces his first-year net cost to \$105. Dividends cannot, of course, be guaranteed.

This level premium Term plan provides its largest amount of protection initially and reduces by schedule each year to recognize decreasing insurance needs. Insurance periods of 15, 20, 25 or 30 years are available.

Teachers Insurance and Annuity Association (TIAA) is a unique, nonprofit life insurance company established by educational and philanthropic organizations in 1918 to serve higher education.

Staff members of colleges, universities, nonprofit private schools and certain other nonprofit educational or scientific institutions are eligible to apply for TIAA individual life insurance—regardless of whether the institution has a TIAA retirement plan. Do you qualify? If so, send for your copy of the booklet *Plan Your Life Insurance* and your personal illustration of low-cost TIAA insurance.

*TIAA employs no agents—no one will call on you.*

<b>TIAA</b>	
TIAA • 730 Third Avenue, New York N. Y. 10017	
Please send me:	
<ul style="list-style-type: none"> <li>• The booklet, <b>PLAN Your Life Insurance</b>.</li> <li>• Information describing TIAA life insurance.</li> </ul>	
Name _____	Date of Birth _____
Address _____	
Nonprofit Employer _____	
<small>college, university, or other educational or scientific institution</small>	

## Scientists in the News

The Royal Netherlands Academy of Sciences has awarded the first H. P. Heineken prize to **Erwin Chargaff**, Columbia University professor of biochemistry, for "noticeable achievements in the field of biochemistry." The award, established last year by the Heineken Foundation, carries an honorarium of 35,000 Dutch guilders, equal to about \$10,000 in U.S. currency.

**William J. Harrington**, associate professor of medicine and director of the hematology division at Washington University school of medicine, St. Louis, Mo., has been appointed professor and chairman of the department of medicine in the University of Miami's medical school, as of 1 June.

University of Oregon biology professor **Edward Novitski**, has been appointed head of the school's biology department, effective 16 September. He will succeed **Bradley Scheer**, who plans to spend the 1964-65 school term on sabbatical leave in Italy.

**Richard V. Kadison**, mathematics professor at Columbia University, has been appointed Gustave C. Kuemmerle professor of mathematics at the University of Pennsylvania, as of 1 July.

**James E. Birren** has been appointed director of the Aging Program in the National Institute of Child Health and Human Development. He has been chief of the section on aging in the National Institute of Mental Health's laboratory of psychology.

**Jan Langman**, anatomy professor at McGill University, Montreal, has been appointed chairman of the anatomy department in the University of Virginia medical school, effective 1 September.

**James L. Elliott**, formerly assistant chief of the PHS Bureau of Medical Services, Bethesda, Md., has become medical director at the University of Pennsylvania hospital. He succeeds **John N. Bowden**, who is now the hospital's executive director.

**Ray Hooker**, chief of the research models and facilities division, Langley Research Center, Hampton, Va., has been named NASA's senior scientific representative in Australia. He is scheduled to leave in June for Melbourne.



Prentice-Hall announces two new series in Biological Science



## THE FOUNDATIONS OF MODERN BIOLOGY Series 2nd Edition

Edited by William D. McElroy and Carl P. Swanson

A series of short, inexpensive, well-written, and well-illustrated books so planned as to encompass those areas of study central to an understanding of the content, state, and direction of modern biology. Each volume, complete within itself, and at the same time is an integral part of the series as a whole. *All volumes in the series: 1964 publication, approx. 128 pages each, Clothbound \$3.95. Paperbound also available.*

A new volume has been added: • **CHEMICAL BACKGROUND FOR THE BIOLOGICAL SCIENCES** Emil H. White, The Johns Hopkins University. **New Second Editions:** • **THE CELL** Carl P. Swanson, The Johns Hopkins University • **CELL PHYSIOLOGY AND BIO-CHEMISTRY** William D. McElroy, The Johns Hopkins University • **HEREDITY** David M. Bonner and Stanley E. Mills, both of the University of California, San Diego • **ADAPTATION** Bruce Wallace and Adrian M. Srb, both of Cornell University • **GROWTH AND DEVELOPMENT** Maurice M. Sussman, Brandeis University • **ANIMAL PHYSIOLOGY** Knut Schmidt-Nielsen, Duke University • **ANIMAL DIVERSITY**, Earl D. Hanson, Wesleyan University • **ANIMAL BEHAVIOR: ITS EVOLUTIONARY AND NEUROLOGICAL BASIS** V. G. Dethier and Eliot Stellar, both of the University of Pennsylvania • **THE LIFE OF THE GREEN PLANT** Arthur W. Galston, Yale University • **THE PLANT KINGDOM** Harold C. Bold, University of Texas • **MAN IN NATURE** Marston Bates, University of Michigan.



## THE FOUNDATIONS OF MODERN GENETICS Series

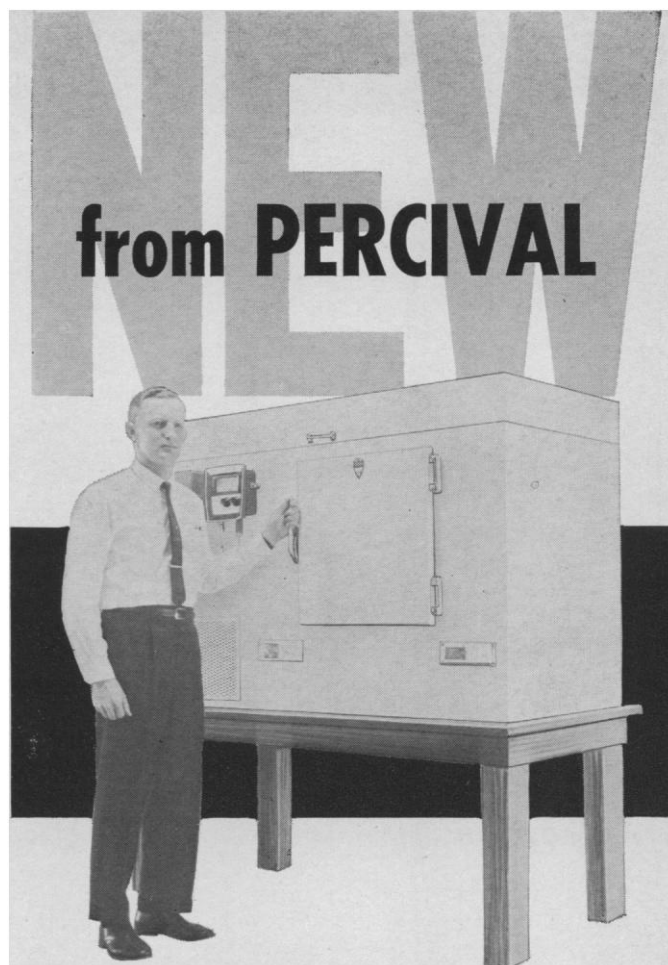
Edited by Sigmund R. Suskind and Philip E. Hartman

This series of books is a coordinated presentation of evidence comprising the foundations upon which genetical thought is based *at the current time*. The short volumes allow authoritative and specialized treatment of the various aspects of genetics at the intermediate level. *1964 publication of all volumes, approx. 128 pages each, Clothbound \$3.95. Paperbound edition also available.*

• **MECHANICS OF INHERITANCE** Frank W. Stahl, University of Oregon • **EXTRACHROMOSOMAL INHERITANCE** John L. Jinks, University of Birmingham, England • **AGRICULTURAL GENETICS** James L. Brewbaker, University of Hawaii • **HUMAN GENETICS** Victor A. McKusick, M.D., The Johns Hopkins Hospital • **GENE ACTION** Philip E. Hartman and Sigmund R. Suskind, both of the Johns Hopkins University • **CYTOGENETICS** Carl P. Swanson, Timothy Merz, and William Young, all of the Johns Hopkins University • **POPULATION GENETICS** Lawrence E. Mettler, North Carolina State College • **DEVELOPMENTAL GENETICS** Clement Markert, The Johns Hopkins University.

For approval copies, write: Box 903

PRENTICE-HALL, INC.  
Englewood Cliffs, N.J.



## A BENCH MODEL PLANT GROWTH LAB

## E-57 ENVIRONATOR

The new PERCIVAL Environator is the perfect answer to demands for a small yet versatile environmental test lab. It is compact and portable—only 57 x 32" at the base—yet, it has a full 12 cu. ft. testing chamber. It's ideal for teaching as well as research.

Even though compact, the E-57 Environator has everything the larger PERCIVAL growth labs have. It features a removable thermal barrier, consistent air flow, controlled temperature from 45 to 90°F, and regulated light intensity from 200 to 2000 ft. candles. A complete programming mechanism provides 24-hour indicating thermostat control and a 24-hour clock for controlling day and night temperature and photo period.

Small, versatile and dependable. The E-57 Environator answers all these demands—and, at a low initial cost. For complete information mail this coupon today.

Please send bulletin on the PERCIVAL Environator to:

Name.....

Address.....

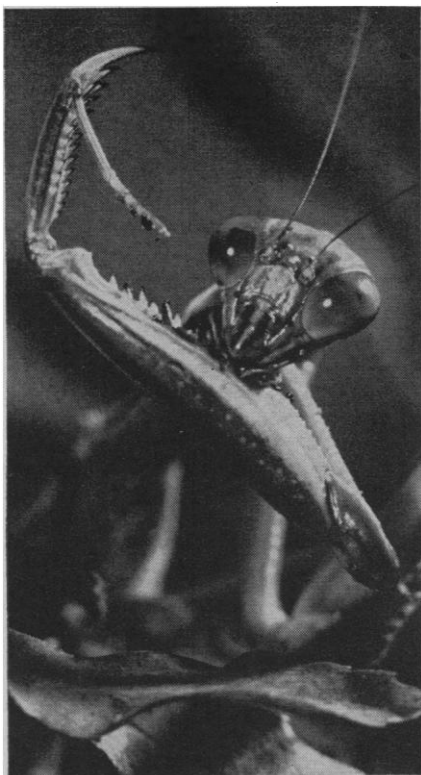
City.....Zone.....State.....



**PERCIVAL REFRIGERATION AND MANUFACTURING CO.**

Box 589-S

Boone, Iowa



## DO YOUR BUGWATCHING WITH A HONEYWELL PENTAX!

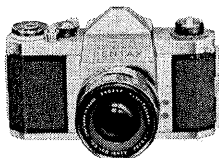
Watching a praying mantis through the razor-sharp lens of a Honeywell Pentax camera may be so absorbing that you'll forget to release the shutter! For with a Honeywell Pentax, you see exactly what the film will see—in sharp focus, with exact composition and completely controlled depth of field.

Mantes, praying or otherwise, and most other insects, like to pose for Honeywell Pentax pictures. (Birds, animals, and flowers do, too.) For any type of photography, you will find a world of pleasure in the dependability of the Honeywell Pentax.

The H1a (f/2 lens, speeds to 1/500th) is \$169.50; the H3v (f/1.8 lens, speeds to 1/1000th) is \$229.50, and the H3v with f/2 lens is \$199.50. See them at your dealer's soon!



For full-color brochure, write to Ron Hubbard (209), Honeywell, Denver, Colorado 80217.



# Honeywell

PHOTOGRAPHIC PRODUCTS

**John P. Eberhard**, consultant to J. Herbert Hollomon, assistant secretary for science and technology at the Department of Commerce, has been appointed deputy director of the National Bureau of Standards' Institute for Applied Technology.

**Carl W. Hall**, professor of agricultural engineering at the Michigan State University, has been named chairman of the department, effective 30 June. He succeeds **A. W. Farrall**, who will retire as department chairman.

**Joseph T. Velardo**, director of the Institute for the Study of Human Reproduction, St. Ann Hospital, Cleveland, Ohio, and biology professor at John Carroll University, has been appointed editor of the *Journal of Continuing Medical Education*.

**Thomas H. Hunter**, on leave as dean of medicine at the University of Virginia, has been named the school's first chancellor for medical affairs. The new dean of medicine is **Kenneth R. Crispell**, acting dean; and **John R. Stacey**, director of the University Hospital, is the new director of the medical center.

**Fred W. McLafferty**, director of Dow Chemical Company's fundamental research laboratory, Framingham, Mass., has been appointed professor of analytical chemistry at Purdue University.

**Victor C. Vaughan III**, chairman of the pediatrics department at the Medical College of Georgia, has been named professor and chairman of the pediatrics department at Temple University medical school and St. Christopher's Hospital for Children.

**Leo Szilard**, professor of biophysics at the University of Chicago, has been appointed a resident fellow at the Salk Institute for Biological Studies, San Diego, Calif.

The American Chemical Society has presented its highest award, the Priestley Medal, to **John C. Bailar, Jr.**, professor of inorganic chemistry at the University of Illinois.

**Ivan A. Wolff**, chief of the industrial crops laboratory, U.S. Department of Agriculture's Northern Utilization Research and Development Division, Peoria, Ill., has been elected president of the Society for Economic Botany.

## RUSSIAN TECHNICAL AND SCIENTIFIC LITERATURE

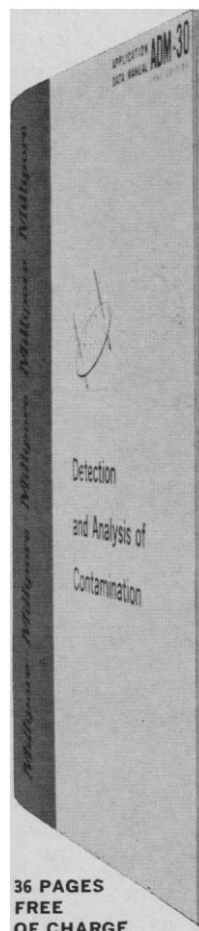
... imported from U.S.S.R.

- |                          |                  |
|--------------------------|------------------|
| • BIOLOGY                | • GEODESY        |
| • CARTOGRAPHY            | • GEOGRAPHY      |
| • CHEMICAL TECHNOLOGY    | • MEDICINE       |
| • CHEMISTRY              | • METALLURGY     |
| • COMMUNICATION          | • PHYSICS        |
| • CONSTRUCTION           | • PSYCHOLOGY     |
| • CYBERNETICS            | • PUBLIC HEALTH  |
| • ELECTRICAL ENGINEERING | • THERMODYNAMICS |
| • ENERGETICS             | • TRANSPORTATION |

1964 subscriptions to Scientific Journals and Magazines still available—Write for complete catalog S-310.

Write for catalog on Scientific and Technical Literature

**FOUR CONTINENT BOOK CORP.**  
Dept. 310, 156 FIFTH AVENUE  
NEW YORK 10, N. Y.



## Worth writing for

**ADM-30**, "Detection and Analysis of Contamination" outlines the measurement of particulate contamination with Millipore filters as applied to hydraulic fluids, air, fuels, lubricants, solvents, garments, surfaces and other aerospace and industrial fluids. To get a copy of this manual, write to

**Millipore®**  
FILTER CORPORATION  
145 Ashby Rd., Bedford, Mass.

Millipore® filters are cellulose plastic porous membranes made in twelve pore-size grades from 8 microns down to 10 millimicrons. In microfiltration or analysis, all matter larger than the filter pore size is screened from fluids and retained on the filter surface.

36 PAGES  
FREE  
OF CHARGE