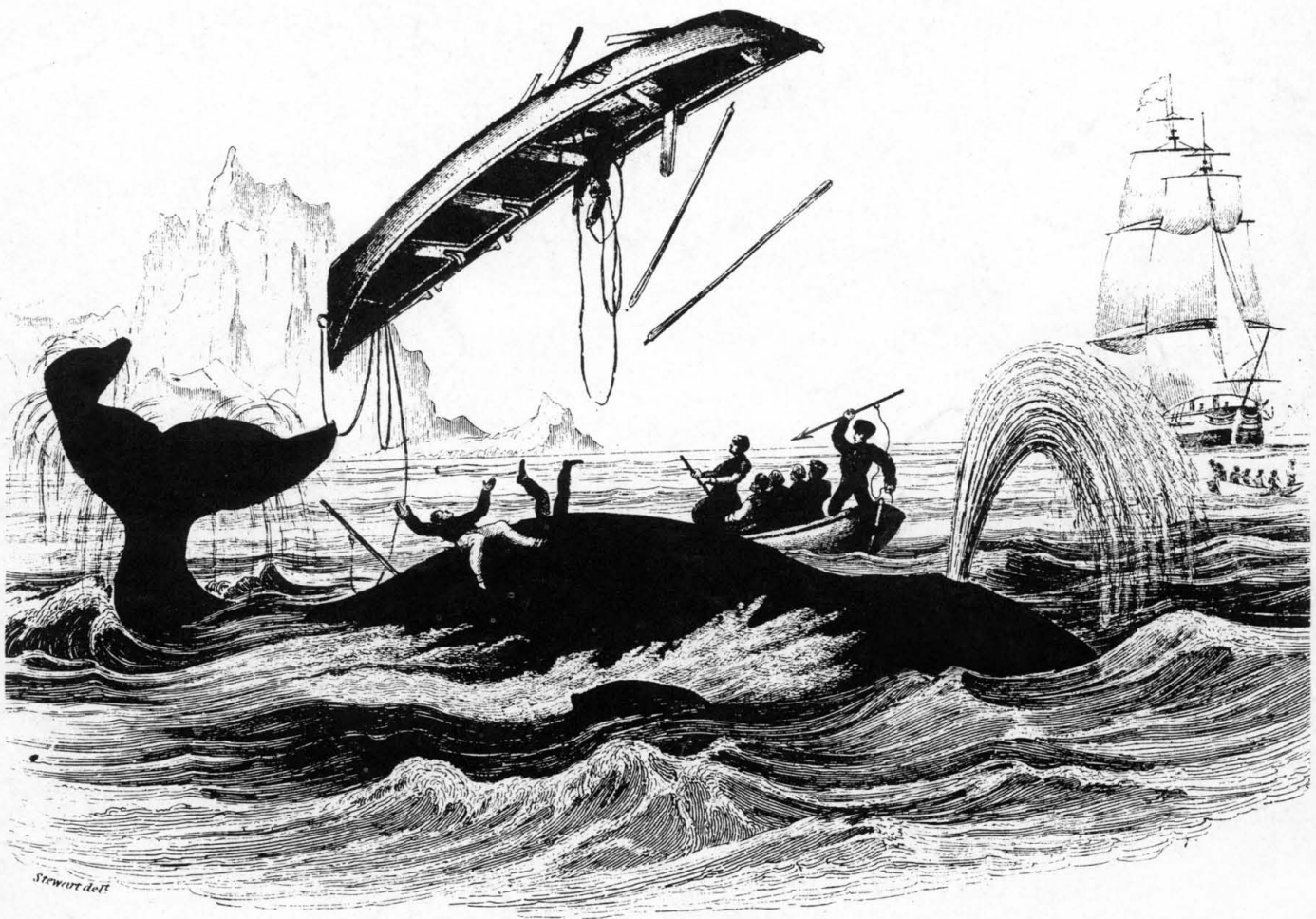


SCIENCE

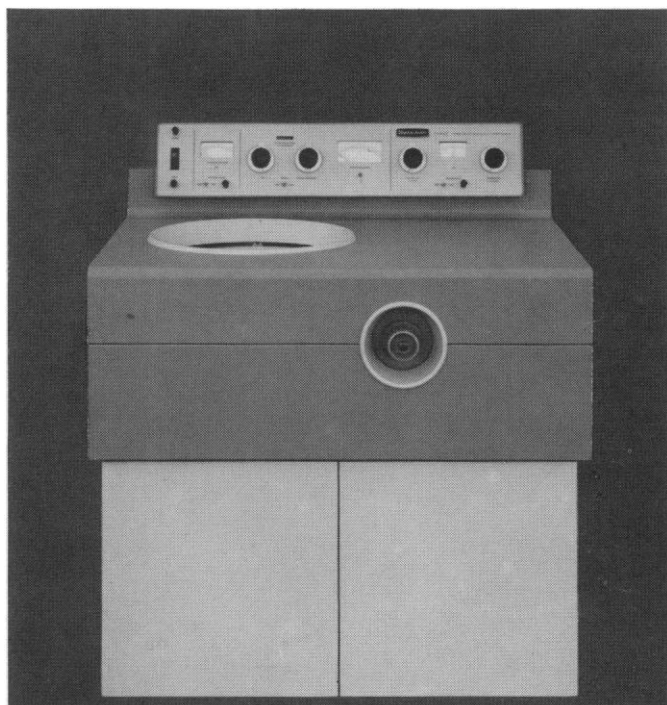
27 August 1965
Vol. 149, No. 3687

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

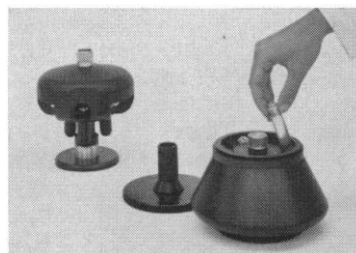


OF WHALES AND WHALING

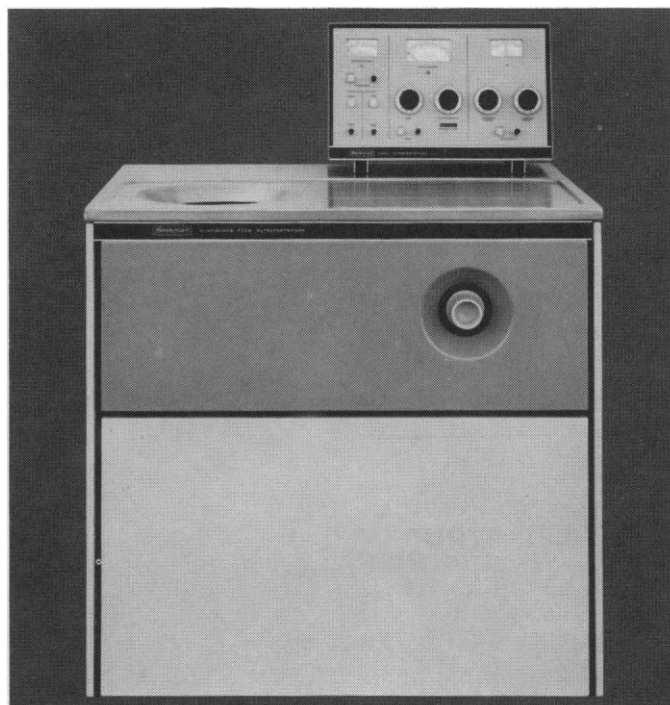
Two New Beckman Ultracentrifuges



The Model L2-65—a powerful new preparative ultracentrifuge that will reduce separation times and improve resolution, and may bring some unexpected particles within the realm of routine investigation. The power of the L2-65 lies in its 65,000 rpm drive; two rotors are already available to take advantage of that speed, to



generate forces in excess of 400,000 *g*. More rotors are on their way. In addition, the L2-65 will accept all Beckman Model L and L2-50 rotors for an unprecedented variety of speeds, forces, and capacities to suit an unpredictable range of applications. Standard features of the L2-65 include exacting temperature and speed controls, automatic temperature readout from the rotor itself, a diffusion pump to increase rotor chamber vacuum to 1 micron or below.



The Model L4—a new concept in ultracentrifuges that permits introduction of sample solution and recovery of fractions during rotation, providing separations at 90,000 *g* in greater quantity than ever before. The L4 is actually three instruments in one. Its extra-deep rotor chamber accommodates a large-scale density gradient Zonal Rotor that holds 1725 ml, and a Continuous Flow Rotor that accepts sample solution at a rate of approximately two liters per hour. The large-scale Zonal and Continuous



Flow capabilities will be particularly valuable in studies of the distribution of particulates and in the production of vaccines, proteins, ribosomes, etc. And with its 65,000 rpm drive, the L4 can also utilize most Beckman Model L, L2-50, and L2-65 rotors. Other features—a removable control panel for remote use and solid-state speed control circuitry. For complete details on both these exciting new instruments—from the Company that knows ultracentrifugation best—write for Data File L24-5.

Beckman

INSTRUMENTS, INC.

SPINCO DIVISION

PALO ALTO, CALIFORNIA • 94304

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

A NEW SERIES FROM W. B. SAUNDERS COMPANY

STUDIES in PHYSICS and CHEMISTRY

Physicists, theoretical chemists, and industrial scientists can all draw valuable aid from this practical new series. These authoritative 150-200 page monographs highlight underlying principles needed to be understood before research can be attempted in each of the various areas such as high energy physics, nuclear chemistry, crystallography, fluids and plasma, etc. In addition to the first two volumes described below, others are now scheduled on Chemistry and Physics of DNA and RNA—Alternant Molecular Orbital Method—Vectorial Methods of Theoretical Physics. The series is under the Consulting Editorship of R. Stevenson and M. A. Whitehead, both at McGill University.

— These are the first two volumes in the series —

Stevenson—

MULTIPLIET STRUCTURE of ATOMS and MOLECULES

Clearly describes simplified techniques for calculation of energy levels in incomplete electron shells

By RICHARD STEVENSON, McGill University

This new book gives concrete aid to the experimental physicist, theoretical chemist, and electron engineer in understanding calculation of various properties of atoms and molecules. Theoretical techniques are expressed in their most concise forms—concentrating on calculations allowing quick understanding of the subject, especially group theory. The author outlines the use of symmetry considerations to obtain maximum information about the system. He then describes calculation of parameters, generally in terms of the radial part of the wave function. Projection operator techniques are heavily drawn upon with considerable attention to use of tensor operator methods. Information and tables not previously published on Ligand field theory are included. Worked out examples are strategically placed in the text to aid understanding.

Vital information is included in discussions on Schrodinger's Equation—The Virial Theorem—The Exclusion Principle—Calculation of Multiplet Energies—Symmetry Operations and Point Groups—Coupling of Angular Momentum.

About 200 pp. * illus. * about \$5.50 * New!—Ready Sept.!

Smart—

EFFECTIVE FIELD THEORIES of MAGNETISM

Provides new insight into the phenomena associated with spontaneously magnetized systems

By J. S. SMART, IBM Watson Research Center

Here is a closer and deeper look into magnetically ordered phenomena than is afforded in the usual text on solid state physics. The discussions are readily comprehensible to the reader who has had a course in elementary quantum theory. The author builds his discussions around insulating magnetic materials instead of metals and alloys. He uses the Heisenberg model of magnetic interactions in solids to develop the descriptions of the "Effective Field Theories" referred to in the title. These theories have simple physical interpretations and can be used successfully to calculate the properties of real magnetic materials. Here are a few of the general headings in this new book: Quantum Mechanics of Simple Paramagnets—Spontaneous Magnetized Systems—The Molecular Field Theory of Ferromagnetism—Comparison and Evaluation of Effective Field Theories—Physicists, metallurgists, electrical engineers, and graduate students in the physical sciences will all gain a new appreciation of the complex and fascinating phenomena associated with spontaneously magnetized systems.

About 200 pp. * illus. * about \$5.50 * New!—Ready November!

W. B. SAUNDERS COMPANY West Washington Square, Philadelphia, Pennsylvania 19105

SC 8/27/65

Please send and bill me:

- ☐ Stevenson/MULTIPLIET STRUCTURES of ATOMS and MOLECULESAbout \$5.50
☐ Smart/EFFECTIVE FIELD THEORIES of MAGNETISMAbout \$5.50

Name _____ Address _____ Zip Code _____

27 August 1965

Vol. 149, No. 3687

SCIENCE

LETTERS	Parapsychology Not Guilty: <i>J. B. Rhine; C. G. Morris, W. S. Taylor;</i> What Professors Are For: <i>N. Guttman; R. Roy;</i> Project Orion: <i>H. P. Green; D. I. Bolef; R. W. Deutsch;</i> Endorsement of H.R. 5191: <i>M. B. Visscher; Homo habilis: A. Montagu; P. V. Tobias;</i> Teaching by Research Fellows: <i>D. T. Denhardt;</i> Sap Pressure in Plants: <i>W. R. Gardner and S. L. Rawlins; P. F. Scholander et al.;</i> Mass Extinctions at the End of the Cretaceous Period: <i>N. D. Newell;</i> Severe-Weather Forecasting: <i>W. S. Barney;</i> "Wasted" Water: <i>R. J. Baldauf;</i> Malaria Control and Economics: <i>D. J. Pletsch</i>	910
EDITORIAL	Translation of Scientific Literature	929
ARTICLES	The Physical Basis of Life and Learning: <i>F. O. Schmitt</i>	931
	Electrophoretic Variation in Enzymes: <i>C. R. Shaw</i>	936
	Of Whales and Whaling: <i>N. Simon</i>	943
	A New Science City in Siberia: <i>H. Koprowski et al.</i>	947
NEWS AND COMMENT	Soviet-American Exchange: Viet Strife Casts Chill on Expansion Possibilities— Drug Abuse: New Controls—COSUP: Brooks Succeeds Kistiakowsky— Smithsonian Bicentennial	950
	<i>Report from India:</i> Effects of the Indian Ocean Expedition: <i>V. K. McElheny</i>	957
BOOK REVIEWS	<i>Samples from English Cultures</i> , reviewed by <i>D. M. Schneider;</i> other reviews by <i>F. W. McLafferty, D. A. Karnofsky, P. H. Klopfer, P. B. Sears,</i> <i>R. B. MacLeod, W. Goad;</i> New Books	959
REPORTS	Ultraviolet Reflectivity of Mars: <i>D. C. Evans</i>	969
	Merrihueite, a New Alkali-Ferromagnesian Silicate from the Mezö-Madaras Chondrite: <i>R. T. Dodd, Jr., W. R. Van Schmus, U. B. Marvin</i>	972
	Saturn's Ring and the Satellites of Jupiter: Interpretations of Infrared Spectra: <i>T. Owen</i>	974

BOARD OF DIRECTORS	LAURENCE M. GOULD Retiring President, Chairman	HENRY EYRING President	ALFRED S. ROMER President Elect	JOHN W. GARDNER H. BENTLEY GLASS	DAVID R. GODDARD MINA S. REES	
	MATHEMATICS (A) Bernard Friedman Wallace Givens	PHYSICS (B) Emilio G. Segrè Stanley S. Ballard	CHEMISTRY (C) A. H. Batchelder Milton Orchin	ASTRONOMY (D) John W. Evans Frank Bradshaw Wood		
VICE PRESIDENTS AND SECTION SECRETARIES	ANTHROPOLOGY (H) Albert C. Spaulding Eleanor Leacock	PSYCHOLOGY (I) Benton J. Underwood Frank W. Finger	SOCIAL AND ECONOMIC SCIENCES (K) Thorsten Sellin Ithiel de Sola Pool	HISTORY AND PHILOSOPHY OF SCIENCE C. West Churchman Norwood Russell Hanson		
	PHARMACEUTICAL SCIENCES (Np) John E. Christian Joseph P. Buckley	AGRICULTURE (O) R. H. Shaw Howard B. Sprague	INDUSTRIAL SCIENCE (P) Allen T. Bonnell Burton V. Dean	EDUCATION (Q) James Rutledge Frederic B. Dutton		
	DIVISIONS					
	ALASKA DIVISION Richard M. Hurd President	George Dahlgren Executive Secretary	PACIFIC DIVISION James Bonner President	Robert C. Miller Secretary	SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION Aden B. Meinel President	Marlowe G. Anderson Executive Secretary

SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington, D.C. 20005. Now combined with *The Scientific Monthly*. Second-class postage paid at Washington, D.C. Copyright © 1965 by the American Association for the Advancement of Science. Annual subscriptions \$8.50; foreign postage, \$1.50; Canadian postage, 75¢; single copies, 35¢. School year subscriptions: 9 months, \$7.10; 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 *Readers' Guide to Periodical Literature*.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Antarcticite: A New Mineral, Calcium Chloride Hexahydrate, Discovered in Antarctica: <i>T. Torii</i> and <i>J. Ossaka</i>	975
Simple Microcentrifuge for Use in the Field: <i>B. Holmstedt</i>	977
Lidar Observation of Cloud: <i>R. T. H. Collis</i>	978
Major Urinary Protein Complex of Normal Mice: Origin: <i>J. S. Finlayson et al.</i>	981
Double Mating: Its Use to Study Heritable Factors in Dental Caries: <i>R. H. Larson</i> and <i>M. E. Simms</i>	982
Hemadsorption-Negative Plaque Test: New Assay for Rubella Virus Revealing a Unique Interference: <i>P. I. Marcus</i> and <i>D. H. Carver</i>	983
Serum Prealbumin: Polymorphism in Man: <i>M. K. Fagerhol</i> and <i>M. Brænd</i>	986
Hurler's Syndrome: Demonstration of an Inherited Disorder of Connective Tissue in Cell Culture: <i>B. S. Danes</i> and <i>A. G. Bearn</i>	987
Response of the Pupil to Steady-State Retinal Illumination: Contribution by Cones: <i>J. ten Doesschate</i> and <i>M. Alpern</i>	989
Primary Immune Reactions in Organ Cultures: <i>A. Globerson</i> and <i>R. Auerbach</i>	991
Brucite in Carbonate Secreted by the Red Alga <i>Goniolithon</i> sp.: <i>R. F. Schmalz</i>	993
Brucite in the Calcareous Alga <i>Goniolithon</i> : <i>J. N. Weber</i> and <i>J. W. Kaufman</i>	996
Inhibition of L1210 Tumor Growth by Thymus DNA: <i>J. L. Glick</i> and <i>A. R. Goldberg</i>	997
Focal Antibody Production by Transferred Spleen Cells in Irradiated Mice: <i>J. H. L. Playfair</i> , <i>B. W. Papermaster</i> , <i>L. J. Cole</i>	998
Interocular Transfer in Goldfish: Color Easier than Pattern: <i>D. J. Ingle</i>	1000
Vocalization Evoked from the Optic Lobe of a Songbird: <i>J. L. Brown</i>	1002
MEETINGS Electromagnetic Relays: <i>D. D. Lingelbach</i> ; System Theory: <i>L. Shaw</i> ; Forthcoming Events	1004

ALTER ORR ROBERTS THELSTAN F. SPILHAUS	H. BURR STEINBACH JOHN A. WHEELER	PAUL E. KLOPSTEG Treasurer	DAEL WOLFLE Executive Officer
ECOLOGICAL AND GEOGRAPHY (E) Harry Ladd Richard H. Mahard	ZOOLOGICAL SCIENCES (F) C. Ladd Prosser David W. Bishop	BOTANICAL SCIENCES (G) Ira L. Wiggins Warren H. Wagner	
ENGINEERING (M) Charles F. Savage Lawman A. Hall	MEDICAL SCIENCES (N) A. Baird Hastings Robert E. Olson	DENTISTRY (Nd) Lloyd F. Richards S. J. Kreshover	
INFORMATION AND COMMUNICATION (T) Robert C. Miller Phyllis V. Parkins		STATISTICS (U) Thornton Fry Morris B. Ullman	

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

COVER

Print from an old book, depicting one of the many dangers encountered in whale fishery during the 19th century. The whale is a Greenland whale (*Balaena mysticetus*). Its home was mainly in Arctic waters and off the shores of Greenland. However, the species is now almost extinct because of the whaling industry. See page 943. [*The Naturalist's Library* (Bohn, London, 1861), vol. 26, p. 114; courtesy of Raymond H. de Lucia, Museum of Natural History, New York]

WORTH WAITING FOR!

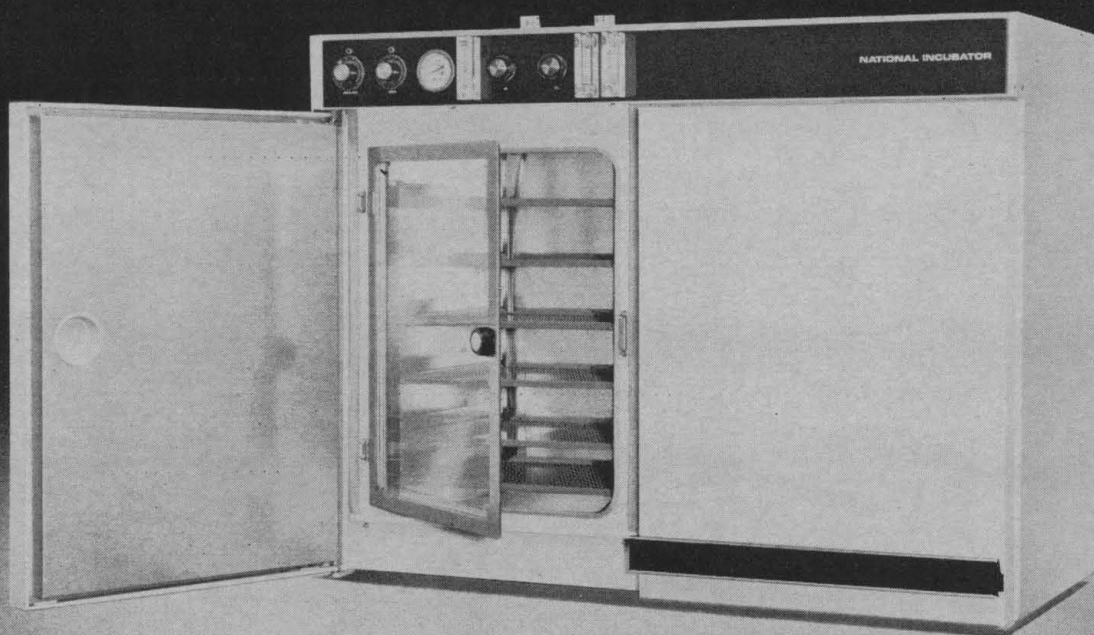
Many buyers waited for NATIONAL's water-jacketed CO₂ Incubator because they wouldn't settle for second best.

Now that production backlogs have been cleared up, your chances of getting one of these truly great Incubators are excellent. Want one now? Just order from your nearest franchised NATIONAL dealer. Rather have more information on why NATIONAL's CO₂ Incubator is tops in its class? Just write or phone for a fully illustrated brochure. No obligation, of course!

And to whet your interest in case you haven't

decided, here are some of the many advantages of NATIONAL's CO₂ Incubator:

- Fully water-jacketed for accurate temperature control
- Built-in CO₂ air-mixing device at no extra cost
- Pre-heater for gas mixture to protect your work
- Corrosion-proof construction inside and out
- High humidity without condensation on inner walls
- Exclusive non-magnetic door mechanism . . . won't stick or click!



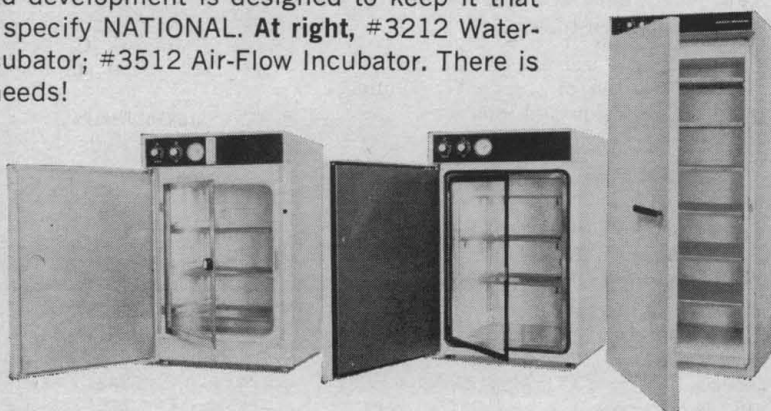
NATIONAL #3321 WATER JACKETED CO₂ INCUBATOR

NATIONAL INCUBATORS and other laboratory apparatus have led the field for more than forty years. Continuing research and development is designed to keep it that way. If **you** won't settle for second best, specify NATIONAL. **At right**, #3212 Water-Jacketed Incubator; #3211 Anhydro Incubator; #3512 Air-Flow Incubator. There is a NATIONAL Incubator tailored to **your** needs!



NATIONAL APPLIANCE COMPANY

Home Office and Factory: Box 23008, Portland, Oregon 97223
General Sales Office: Box 3102, Stamford, Connecticut 06905



Your Comparative Reference Guide to CEC Mass Spectrometry Instrumentation

This basic guide is designed to be helpful to those concerned with the use of Mass Spectrometers, Leak Detectors and Residual Gas Analyzers. Here you will find all of the CEC instruments

immediately available for every application, as well as the primary advantages of each.

For more than a quarter-century, CEC has been the pioneer and leader in

mass spectrometry. As a result, approximately 90% of all existing data has been secured with CEC instrumentation.

The following chart will indicate how CEC can best serve you.

INSTRUMENT	DESCRIPTION AND KEY SPECIFICATIONS	PRINCIPAL FIELDS OF APPLICATION						
21-110B MASS SPECTROMETER	Mattauch-Herzog type: high resolution model. Resolution — 1/30,000. Mass range — m/e 2-2500. Mass accuracy — 1 part in 200,000 or better. Flexibility — 2 basic models, gas source and spark source + 2 additional sources — Knudsen cell and surface ionization ion source; combination photo-plate/electrical detector.	Organic chemistry, biological chemistry, solid state physics, natural products research.						
21-104 ANALYTICAL MASS SPECTROMETER NEW	Dempster type: precise analytical model. Mass range — m/e 2-2000. Resolution — Adjustable to 1 part in 1500. Sample from average accuracy table — <table> <tr> <td>% of Component</td><td>Max. Deviation</td><td>Max. % Deviation</td></tr> <tr> <td>10.0</td><td>±0.10</td><td>1</td></tr> </table> Scan speeds — To 3 octaves per second.	% of Component	Max. Deviation	Max. % Deviation	10.0	±0.10	1	Most precise and accurate mass spectrometer in existence. A general analytical tool for university laboratories, research service groups and for routine analyses in organic chemistry.
% of Component	Max. Deviation	Max. % Deviation						
10.0	±0.10	1						
21-703 MASS SPECTROMETER	12-inch Sector type. Two available — surface ionization model and Knudsen cell model. Sensitivity — 1. Surface ionization model, sufficient to measure the normal U²³⁴ abundance (55 ppm) with an accuracy of ±5%. 2. Knudsen cell model, with silver in cell at 900°K, signal due to Ag will be ten times noise level of ion detector system. Ratio accuracy — 1 to 100, ±1.0%.	Atomic power research and analysis, isotope production.						
21-620A MASS SPECTROMETER	Cycloidal type: low-cost analytical model. Flexible, versatile. Mass range — m/e 2-4 and m/e 12-150. Sensitivity — Threshold detection of 50 ppm easily attainable.	Routine lab analysis, respiratory analysis, computer-governed process control analysis.						
21-130 MASS SPECTROMETER	Cycloidal type: premium medium-priced model. Performs all routine mass spectrometer analyses. Precise, accurate. Scan speed — 5 standard speeds (fast scan modification available, 3 oct./sec. Mass range — m/e 2-230 (500 with modification). Unit resolution — m/e 200 (300 with modification). Sensitivity — Threshold detection of 50 ppm easily attainable. Accuracy — Within 1% of actual concentration.	Chromatograph effluent analysis, petroleum, chemical and pharmaceutical research and control laboratories, commercial product analysis.						
21-612 RESIDUAL GAS ANALYZER	Dempster type: low cost, simple to operate. Mass range — m/e 2-10 and m/e 10-80. Sensitivity — Detects partial pressures of 5×10^{-10} Torr or better, for most gases in its mass range. Unit resolution — m/e 20.	Electronic tube research, cryogenics, metallurgy, space simulation, thin-film studies, outgassing studies.						
21-614 RESIDUAL GAS ANALYZER	Cycloidal type: advanced instrument — widest mass range, highest unit resolution and accuracy available. Mass range — m/e 2-11 and m/e 12-200. Sensitivity — As high as 5×10^{-12} Torr for N ₂ . Unit resolution — m/e 150.	Electronic tube research, cryogenics, metallurgy, space simulation, thin-film studies, outgassing studies.						
24-120B LEAK DETECTOR	Efficient, convenient, reliable mass spectrometer type leak detector, largest selection of accessories ever offered. Sensitivity — Detects at least 5×10^{-11} atm cc/sec of helium. Flexibility — 4 testing methods, remote control, bench top or mobile testing, may be used with helium, neon, argon, and hydrogen.	Aerospace systems and components, industrial hermetic sealing, production line component testing, space chambers.						

Additional services and advantages CEC is prepared to offer:

■ CEC offers instrumentation with the best combination of standard resolution, analytical precision and reliability.

■ CEC will create new instrumentation to meet the need. In those cases where standard instrumentation is not available to meet specific requirements, CEC has the capability to create custom-made equipment for almost any conceivable application.

■ CEC will update or modify its existing instrumentation. This valuable service assures that no CEC Mass Spectrometer need become obsolete.

■ CEC will sell individual components. In cases where users prefer to build their own instruments, CEC is prepared to supply any or all standard components.

■ CEC has a liberal trade-in program for its Mass Spectrometers.

■ CEC conducts training courses throughout the nation. These comprehensive courses include the operation of all mass spectrometry equipment as well as on-the-job instruction of operators at time of installation.

■ CEC's Analytical & Control Division maintains the largest and best trained sales and service organization in the field today.

Offices are located in Pasadena, Palo Alto, Denver, Chicago, Dallas, Houston, Columbus, Boston, Philadelphia, New York, Washington, D.C., and Atlanta.

For complete information on all CEC Mass Spectrometer instrumentation, call or write for CEC Bulletin Kit 7042-X4.

CEC

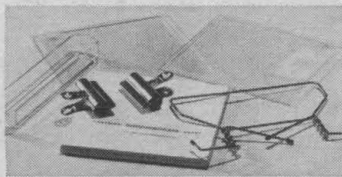
Analytical & Control Division

CONSOLIDATED ELECTRODYNAMICS

A SUBSIDIARY OF BELL & HOWELL/PASADENA, CALIF. 91109
INTERNATIONAL SUBSIDIARIES: WOKING, SURREY, ENGLAND
AND FRIEDBERG (HESSEN), W. GERMANY

The EASTMAN CHROMAGRAM System for thin-layer chromatography consists of EASTMAN CHROMAGRAM Sheet and EASTMAN CHROMAGRAM

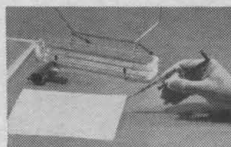
Developing Apparatus.



It makes TLC — once messy

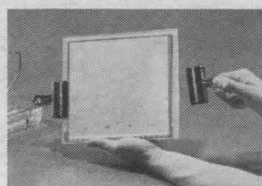
and cumbersome — fast, neat, and uncomplicated. Gone are the bulk and expense of coating equipment and the problems of breakage and siliceous dust. You take EASTMAN CHROMAGRAM Sheet out of a box,

spot it,

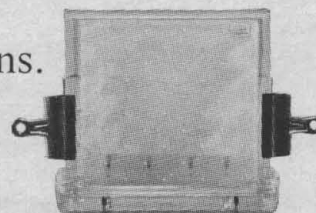


place it in the EASTMAN CHROMAGRAM Developing

Apparatus,



and separation begins.



EASTMAN CHROMAGRAM Sheet comes in two types: Type K301R with fluorescent indicator and Type K301R2 without fluorescent indicator. Both types are inert poly(ethylene terephthalate) with an adsorbent layer of polyvinyl-alcohol-bound silica gel 100 microns thick; over-all thickness is 0.3mm. The 20cm x 20cm sheets are packed 20 to the box. They are easily cut to desired sizes and shapes—you need stock only the one size.

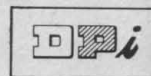
EASTMAN CHROMAGRAM Developing Apparatus comprises two identical 23cm-square plates made with bosses,

ridges, and flats that work together; a solvent trough, an easel, and a pair of spring clips. The apparatus involves no presaturation or lining with solvent-soaked filter paper. It takes little bench space, and that only when in actual use.

You can obtain EASTMAN CHROMAGRAM Sheet and Apparatus from your regular supplier of EASTMAN Organic Chemicals. Also available directly from *Distillation Products Industries*, Rochester, N.Y. 14603, at \$35.50 for the apparatus and \$23.20 per box of sheet (prices are subject to change without notice and do not include transportation).

"CHROMAGRAM" is a trademark.
Patents applied for.

Distillation Products Industries is a division of Eastman Kodak Company



VICTOREEN FEMTOMETER®

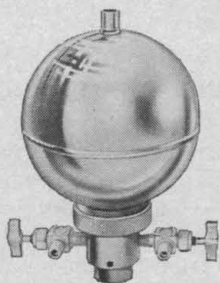
Total versatility in a research quality
Vibrating Reed Electrometer



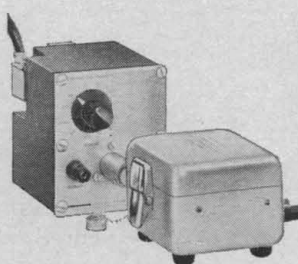
The Victoreen Femtometer Dynamic Capacitor Electrometer offers sensitivity and stability equal to the most demanding research applications. At about 1/3 full-scale it measures currents as small as 1 femtoamp (10^{-15} amp), charges of less than 10 femtocoulombs (10^{-15} C), and voltages from ultrahigh-impedance sources. Solid-state circuitry, unitized modular con-

struction and many built-in extras, all furnished at an attractive base price, have led to the popular acceptance of the Victoreen Femtometer. Choose the one instrument which offers the most for your research application. Request full details, performance and specification data on your professional letterhead. Or arrange for a demonstration without obligation.

Ion Current Measurement



Test Measurements

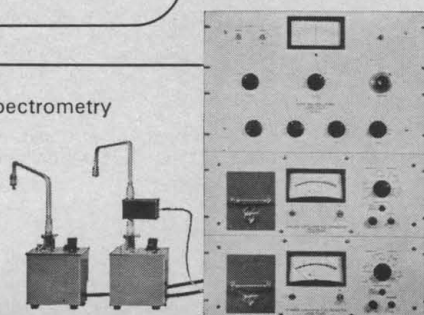


Remote Input Applications



AC or Portable Battery Operation

Mass Spectrometry



WORLD'S FIRST NUCLEAR COMPANY
VICTOREEN
THE VICTOREEN INSTRUMENT COMPANY
10101 Woodland Avenue • Cleveland, Ohio 44104



August, 1965

FISHER PRODUCT REPORT

News about instruments, apparatus and reagent chemicals that make your work quicker, surer, safer and easier.

New Fisher-Bean Flask Holders End the Nuisance of Round Flasks.

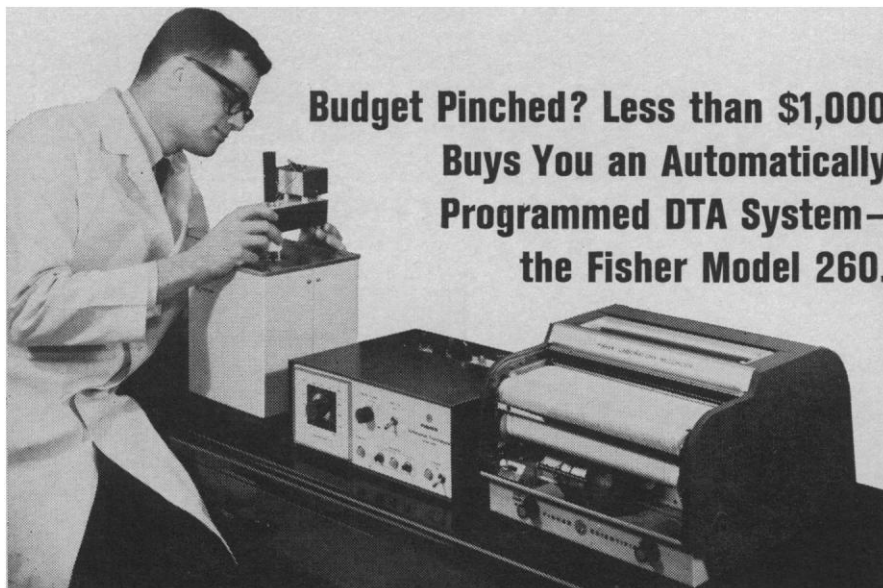
Every laboratory uses round-bottom flasks for distillations, Kjeldahls, etc. . . . and every lab has to cope with the problem of how to set 'em down. Cork and rubber rings are a nuisance to use and handle; so are clamps. Now Fisher-Bean Flask Holders (patent pending) have eliminated the problem completely. These stainless steel triangles have strong, springy fingers that grip any round-bodied flask and hold it safely and securely. It can't tip and you can set it anywhere.

The holders also make efficient draining and storage racks. Fisher-Bean Flask Holders come in five sizes, to hold 50-100 ml, 200-300 ml and 500, 1000 or 2000 ml flasks. Six of the 200-300 ml size are only \$7.50. If you'd like to know more, read our illustrated bulletin. (b) ☐

Ten Timesaving Fisher Metal Reference Solutions for Atomic Absorption Spectrometry.



To analytical chemists absorbed in the fast new technique of atomic absorption spectrometry, these dilute-and-use Fisher solutions save a world



Budget Pinched? Less than \$1,000 Buys You an Automatically Programmed DTA System—the Fisher Model 260.

If you have champagne tastes in DTA equipment but a beer budget, then Fisher's new Model 260 Differential Thermalalyzer™ is made to order for you. At \$950 for the 115-volt 60-cycle AC unit, it's priced far below the elaborate micro-DTA systems and only a bit more than "set-and-read" apparatus. The Model 260—programmer unit, furnace and sample holder—plots exothermic or endothermic changes of as little as 0.25°C. The programmer automatically feeds

power to the furnace at a rate which increases sample and reference temperatures linearly to a preset maximum—500°C or 1200°C. You have a choice of heating rates: 5°, 10° or 25°C per minute. The Thermalizer can handle two samples simultaneously, each weighing 50 to 200 mg. Most any 1-mv recorder will chart the results. Say the word, and our Miss Gallagher will send you our fact-filled Model 260 brochure posthaste. (a) ☐

Metal	Concentration	
	1000 ppm	10,000 ppm
Calcium	So-C-191	So-C-182
Copper	So-C-194	So-C-183
Chromium	So-C-192	So-C-184
Cobalt	So-C-193	So-C-185
Iron	So-I-124	So-I-123
Lead	So-L-21	So-L-15
Magnesium	So-M-51	So-M-45
Manganese	So-M-81	So-M-72
Nickel	So-N-70	So-N-69
Sodium	So-S-139	So-S-140

of mixing and standardizing time. Most importantly, they are certified by Fisher, guaranteeing the required purity and reliability. \$5.00 per qt., \$4.50 per qt. in the six-pack. Our free data sheet spells out details. (c) ☐

What would you like in the way of product literature? Make the appropriate checkmarks and send this page, with your name and address, to Fisher Scientific Company, 139 Fisher Building, Pittsburgh, Pennsylvania 15219. F-458

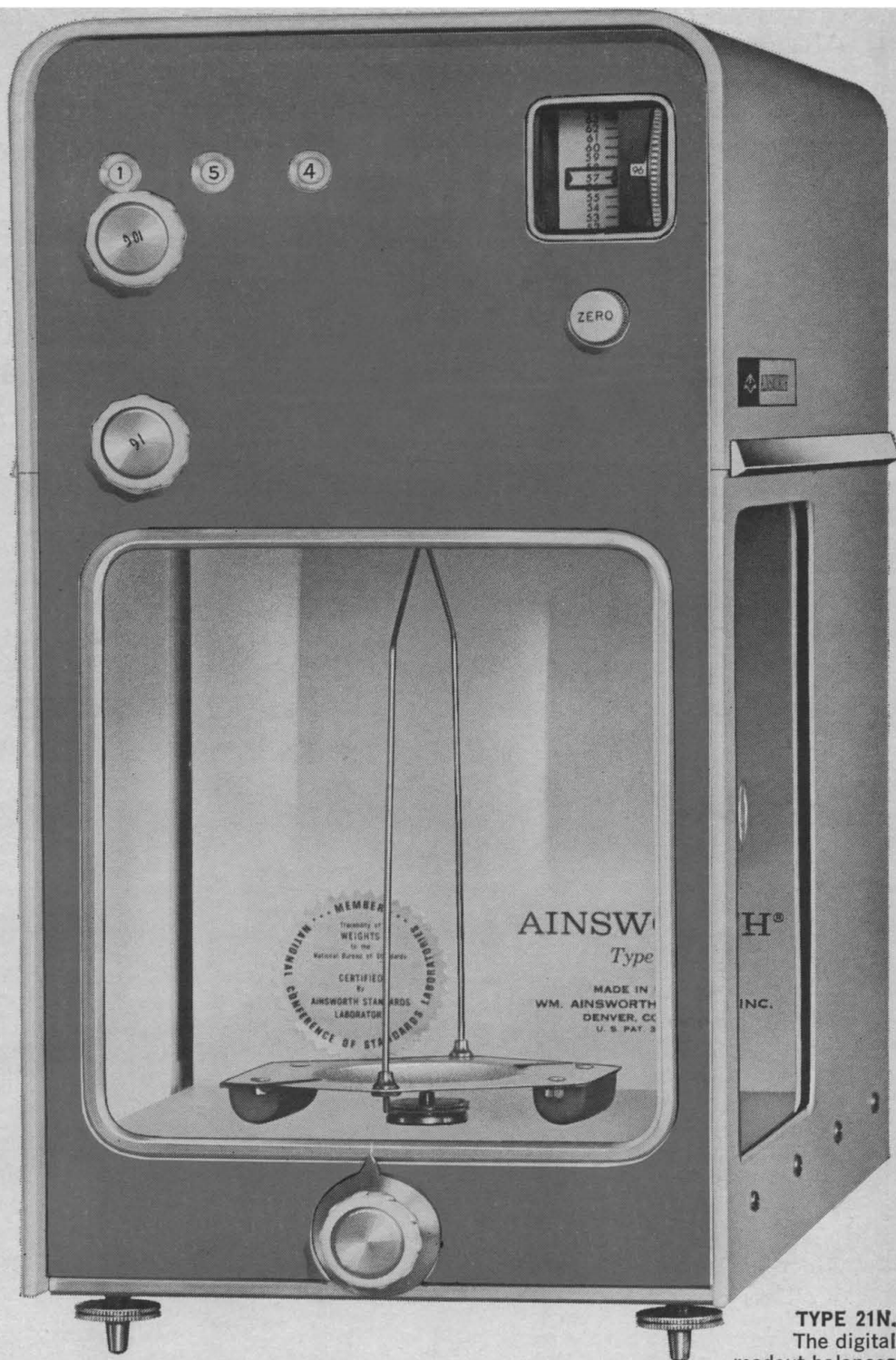


FISHER SCIENTIFIC

World's Largest Manufacturer-Distributor of Laboratory Appliances & Reagent Chemicals

Complete stocks in all these locations: Atlanta • Boston • Chicago • Cleveland • Houston • New York
Philadelphia • Pittsburgh • St. Louis • Union, N. J. • Washington • Edmonton • Montreal • Toronto

complete
line
of
all new
all digital,
in-line readout
substitution
type
balances



the name Ainsworth is your guarantee

TYPE 21N.
The digital
readout balances
are completely new in appearance,
including color.

A type and price for every need write for bulletin 665

Type	SCN	24N	10N	21N	23N
Total Capacity	200 g	120 g	220 g	160 g	160 g
Sensitivity	0.1 mg	0.01 mg	0.1 mg	0.1 mg	1.0 mg
1 digit in last place	0.1 mg	0.01 mg	0.1 mg	0.1 mg	1.0 mg
Color	Brown Hammerstone	Brown Wood Grain	Blue	Green	Red
Price	\$895	\$875	\$670	\$550	\$530



A BALANCE FOR EVERY NEED



WM. AINSWORTH & SONS, INC.

2151 Lawrence Street/Denver, Colorado 80205/Telephone Area Code 303 255-1723



Analgetics

VOLUME 5 OF MEDICINAL CHEMISTRY: A SERIES OF MONOGRAPHS

edited by George deStevens

Explores the interdisciplinary aspects of the chemistry and pharmacology of analgetics. Beginning with a general introduction to the field of analgetics, the succeeding chapters are concerned with the physiology and pharmacology of pain and the clinical measurement of pain. The next three chapters are a chronological development of analgetics from morphine through pyrazole derivatives. The chapter, "General Synthetics," is especially notable for hitherto unpublished data on compounds independently developed by the editor, Dr. deStevens. The conclusion of each chapter contains a large number of references.

(D352) June 1965, 475 pp., \$17.00

Handbook of Preparative Inorganic Chemistry

SECOND EDITION

edited by Georg Brauer

Translated from the Second German Edition by Scripta Technica

Special experimental methods, techniques, and apparatus are presented together with detailed methods for preparation of inorganic compounds. For all substances described, controllable and reproducible preparative conditions are given . . . all have been verified by laboratory experience. Important individual methods found throughout the book are linked to the main techniques given in the first section. The new translation includes insertion of U.S. trade names and suppliers, conversion of German glass and ground-glass joint sizes to the U.S. equivalents, substitution throughout the text of "liquid nitrogen" for "liquid air," and improved nomenclature and general up-dating of the practice and equipment described.

(B714) Volume 1, 1963, 1002 pp., \$36.00

(B716) Volume 2, August 1965, 860 pp., \$32.00

Mammalian Radiation Lethality

A DISTURBANCE IN CELLULAR KINETICS

by V. P. Bond, T. M. Fliedner, and J. O. Archambeau

A volume in the A. E. C. Monograph Series on Radiation Biology and Industrial Hygiene. Prepared under the direction of the American Institute of Biological Sciences.

The study of the responses of the mammal, particularly man, to whole-body irradiation, and of tumors to therapeutic irradiation.

(B464) 1965, August 1965, 340 pp., \$9.50

Methods and Goals in Human Behavior Genetics

edited by Steven G. Vandenberg

Presents the recent research trends in human behavior genetics, and undertakes a careful consideration of the methodological problems encountered in the study of the joint effects of heredity and environment in human abilities and personality traits.

(V070) August 1965, 351 pp., \$8.95

Photographic Atlas of the Moon

by Zdenek Kopal, Josef Klepsta, and Thomas W. Rackham

Provides a comprehensive collection of photographs of the moon, including an up-to-date account of the physical and dynamic properties of the moon and an outline of the many problems that still remain unsolved. Of special interest are closeup shots of the moon transmitted from the American spaceship, VII.

(K830) 1964, 277 pp., \$16.00

PRICE UNTIL OCTOBER 31, \$12.00

Selected Problems in Quantum Mechanics

collected and edited by D. ter Haar

Revised and augmented Second Edition of Gol'dman, Krivchenkov, Kogan, and Galitskii, "Problems in Quantum Mechanics." Published jointly with Infosearch, Ltd.

CONTENTS: PROBLEMS. One-Dimensional Motion; Energy Spectrum and Wave Functions. Tunnel Effect. Commutation Relations; Heisenberg Relations; Spreading of Wave Packets; Operators; de Broglie Waves. Angular Momentum; Spin. Central Field of Force. Motion of Particles in a Magnetic Field. Atoms. Molecules. Scattering. ANSWERS AND SOLUTIONS. Index.

(G521) May 1965, 402 pp., \$8.50

Plasma Diagnostic Techniques

edited by H. Huddleston and Stanley L. Leonard

A comprehensive single source of information about methods of measuring parameters of gaseous plasmas. Gathers into a single volume information about all plasma measurement techniques which have more than very specialized applicability. The main emphasis is on techniques of use in the study of laboratory plasmas.

(H924) October 1965, 627 pp., \$19.50

Applied Geochronology

by E. I. Hamilton

Including a chapter on Comparative Geochemistry by L. H. Ahrens

The dating of rocks and related isotope studies have become increasingly important branches of the Earth Sciences. The technical aspects of this work and the interpretation of results are rather specialized. A large gap now exists between those who obtain and interpret results, and the field geologist who wishes to apply those results to conventional geological problems. This book will prove invaluable to that end. The results are interpreted in terms of the various problems encountered by the geologist in routine field studies, and apart from dating the age of rocks and minerals, the work shows how related isotope studies can be applied to fundamental problems of petrology and geophysics.

(H116) 1965, 595 pp., \$10.00

Advances in Astronomy and Astrophysics

edited by Zdenek Kopal

Volumes 1-3 available. Send for details.

SEND THIS ORDER TO:

**YOUR TECHNICAL
BOOKSELLER**

or

Academic Press

PLEASE SEND THE FOLLOWING:

☐ B464 ☐ B714 ☐ B716 ☐ D352 ☐ H116 ☐ H924 ☐ K830 ☐ V070 ☐ G521

NAME

ADDRESS

CITY STATE ZIP #

Affiliation

☐ Remittance enclosed ☐ Bill me

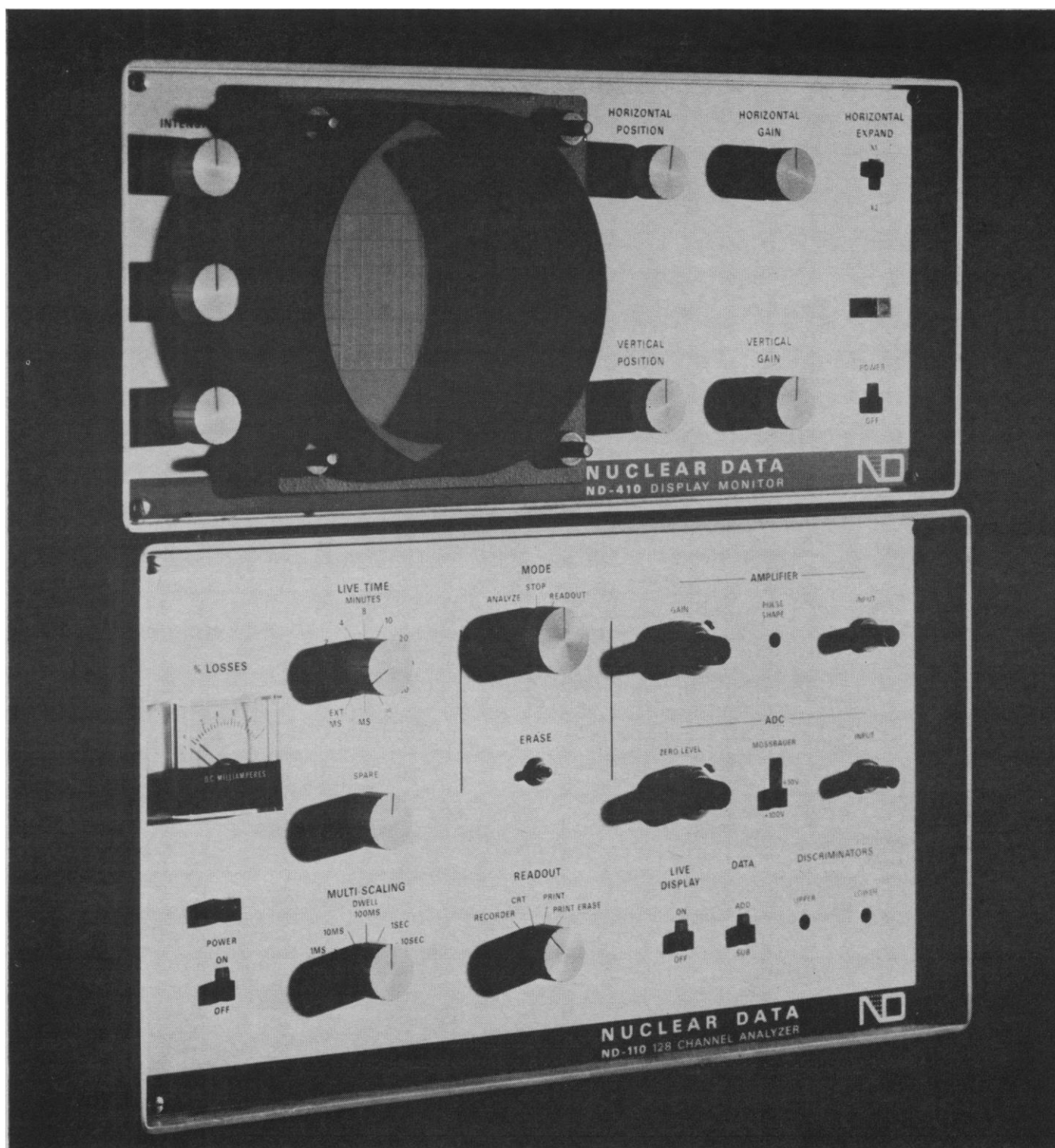
☐ Send more information on the following (use code numbers):

No charge for postage and handling on orders accompanied by payment. New York City deliveries please add 5% sales tax; other N.Y. State deliveries add 2%.

46-65

Academic Press

MATHEMATICS • PHYSICS • CHEMISTRY • BIOLOGICAL SCIENCES • MEDICAL RESEARCH • SPACE SCIENCES • ENGINEERING • PSYCHOLOGY



This 128-channel pulse height analyzer—yours, at the price of a single-channel unit!

\$3650*, that's all it takes to own the ND-110. And just think how much more you accomplish with a 128-channel instrument:

- 128 channels eliminate the need to position a peak in a "window" and try to hold it there. Readings are fast, clear, accurate.
- In the multi-scaling mode you use the ND-110 as 128 scalers and record events as a function of time. Ideal for studying isotope flow in plants, organs or animals—because you get numbers instead of an analog curve.

• In illustrating energy and half life characteristics of radiation emitted by different elements, the ND-110 shortens experiments. Students can plot the whole energy spectrum and radiation decay in two simple counting operations.

All this and much more with the 128 channel ND-110—just \$3650. Also available with display monitor (shown above), digital printer, shield assembly and scintillation detector (a complete radiation analysis system). *Write for ND-110 literature today.*

*Price for U.S.A. and Canada: Export Price add 10%

ND NUCLEAR DATA INC
120 West Golf Road, Palatine, Illinois 60067

27 AUGUST 1965

907

MORE FOR LESS?

Yes.

You can get more versatility... more features...in a super-speed centrifuge ...and pay less.

With the new
LOURDES BETA-FUGE

You get Larger Capacity

A 3300ml volume rotor is a Lourdes exclusive.
You can centrifuge 3300ml at 14,000 x G.
Also — 1600ml at 27,500 x G... and 400ml at 41,300 x G.
Or, 1000ml at 5500 x G in a swinging bucket rotor.

Wider choice of Rotors

14 different rotors — swinging bucket, solid angle, continuous flow and the new blood bag rotor give you more capacity — more versatility.

Programming capacity

Speed and time factors can be preset and reproduced to within 1%. Temperature can be preset and held to within $\pm 1^\circ \text{C}$. Fail-safe controls prevent motor damage during programmed run.

Faster, fully controlled cycling

Accelerates to 18,000 rpm (400ml volume) in only 1 min. 45 sec. Decelerates from 18,000 rpm to full stop in just 4 min. 25 sec. — with electro-dynamic braking and special coasting action — without disturbing interfaces or pellet structure.

More efficient Continuous Flow facility

It's simpler to install and operate gives faster separation — has greater sediment capacity.

Discard temperature conversion charts

A single control maintains true temperature of material to within $\pm 1^\circ \text{C}$ in all operational phases, throughout temperature range of -20 to $+40^\circ \text{C}$.

No motor damage due to brush failure

Exclusive Fail-Safe control signals when 5 hours of brush life remains. Unit cannot be started when brushes are due for replacement.

Complete safety in operation

Rotor CANNOT fly off due to the independent support shaft — even if the drive spindle breaks. Exclusive feature stops the centrifuge in event of excess vibration. Heavy steel armor plate provides chamber protection. Solid state circuitry eliminates short circuits. Heavy duty motors are never overtaxed.

You pay less too

Check for yourself with the "competitive" centrifuges — which do not have all these features. Lourdes' 20 years of engineering and production skills assure you get more — And, you'll be pleasantly surprised, to hear how much less the BETA-FUGE costs.

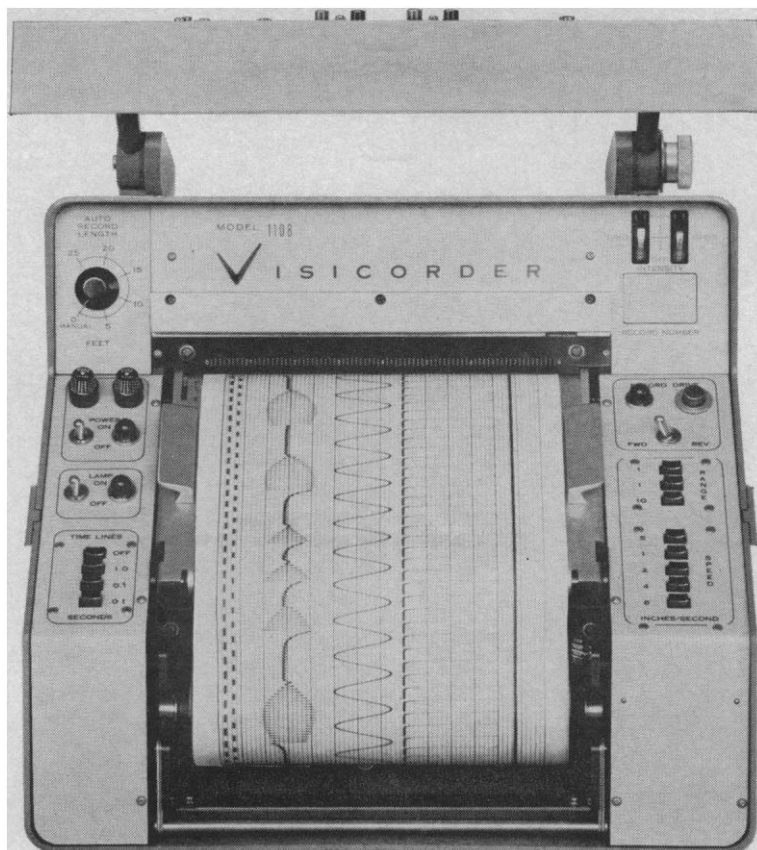
Interested?

Check with any Lourdes franchised dealer — or write for Catalog 70.

LOURDES

656 Montauk Avenue
Brooklyn, N.Y. 11208 • (212) NI 9-2860

SPECIFYING A RECORDING OSCILLOGRAPH?



**Only Honeywell
gives you 12" features
at an 8" price!!!!**

Compare the Honeywell Model 1108 Visicorder Oscillograph with other intermediate-size recorders. You'll find that no other 8-inch instrument offers all these features for under \$5000:

- Simultaneous recording of up to 24 channels of dynamic data from DC to 13,000 cps.
- Clear, immediately visible recordings on 8" wide paper.
- Choice of 15 forward recording speeds from .05 to 80 inches/second.
- Built-in record takeup unit.
- Reverse record travel for easy review; also permits latensification of traces run at high paper speeds.
- Latensification while recording with an optional built-in latensifier lamp.
- Photographically printed time lines at any of three different intervals.
- Manual control of galvanometer trace and gridline intensity.
- Provision for use as a developing-out recorder by simply snapping an accessory filter in place.

Sound like a lot of oscillograph for under \$5000? It is! For a demonstration of the Model 1108 Visicorder Oscillograph, call your nearest Honeywell office, or write: Honeywell, Denver Division, 4800 East Dry Creek Rd., Denver, Colo. 80217.

DATA HANDLING SYSTEMS

Honeywell

HONEYWELL IS WORLDWIDE • Sales and service offices in all principal cities of the world. Manufacturing in Brazil, Canada, France, Germany, Japan, Mexico, Netherlands, United Kingdom, United States.

Meet the new queen of the numbers game:



COSTUME BY PAULINE TRIGERE. HAT BY ADOLFO. CALCULATOR BY MONROE. PHOTOGRAPHED AT KITT PEAK NATIONAL OBSERVATORY, ARIZONA, BY HIRO. © 1964

It does things no competitive calculator can.

Like pointing off and printing 14 decimal places automatically. Providing 21 digits for totaling. And giving printed answers as fast as any electronic calculator except Monroe's own EPIC 2000.

MONROE
A DIVISION OF LITTON INDUSTRIES



Five failures we are proud to show

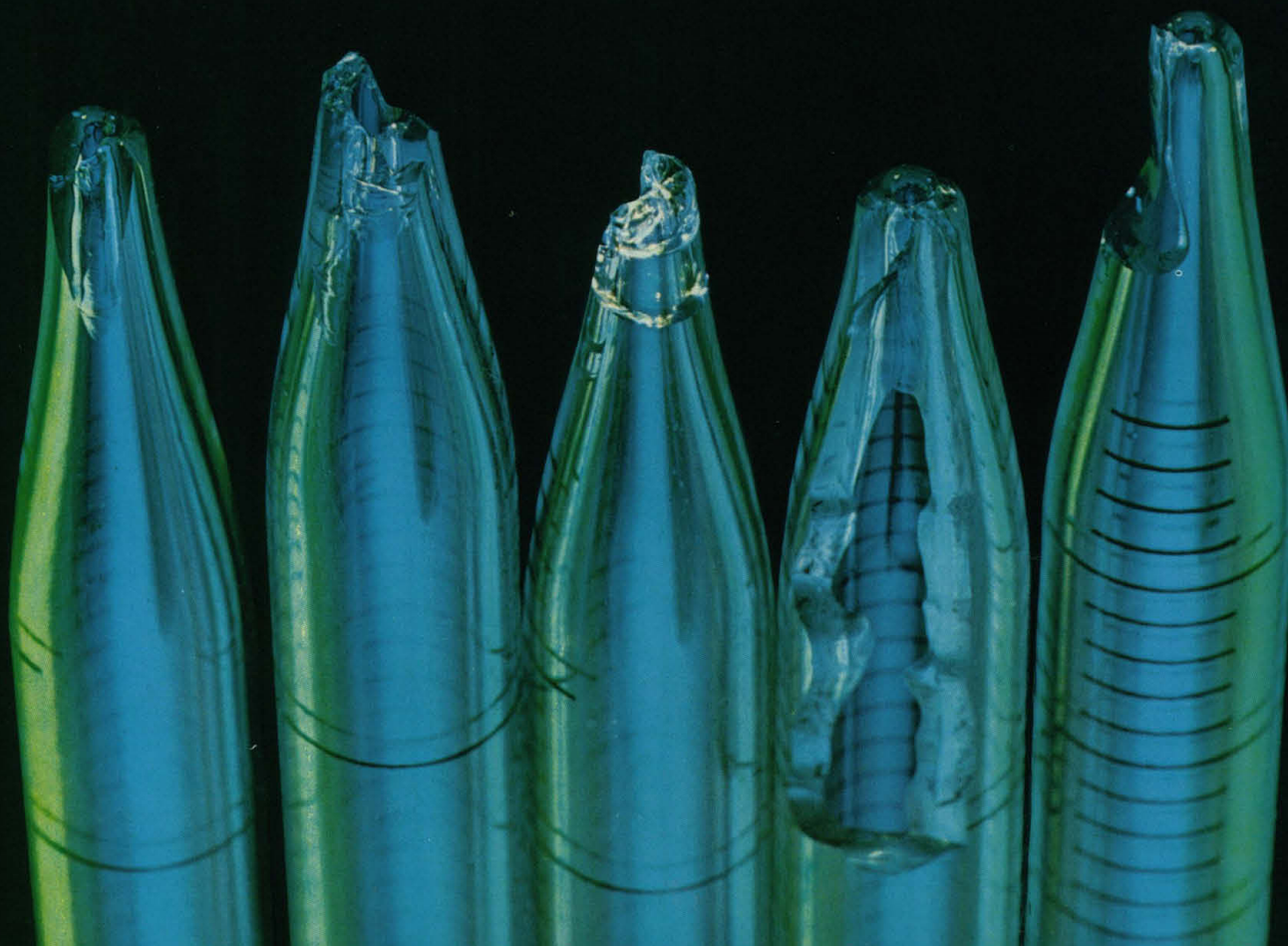
They are the only Kimble SAFE-GARD® pipet tips to chip out of ten thousand used for a year by a major eastern pharmaceutical manufacturer.

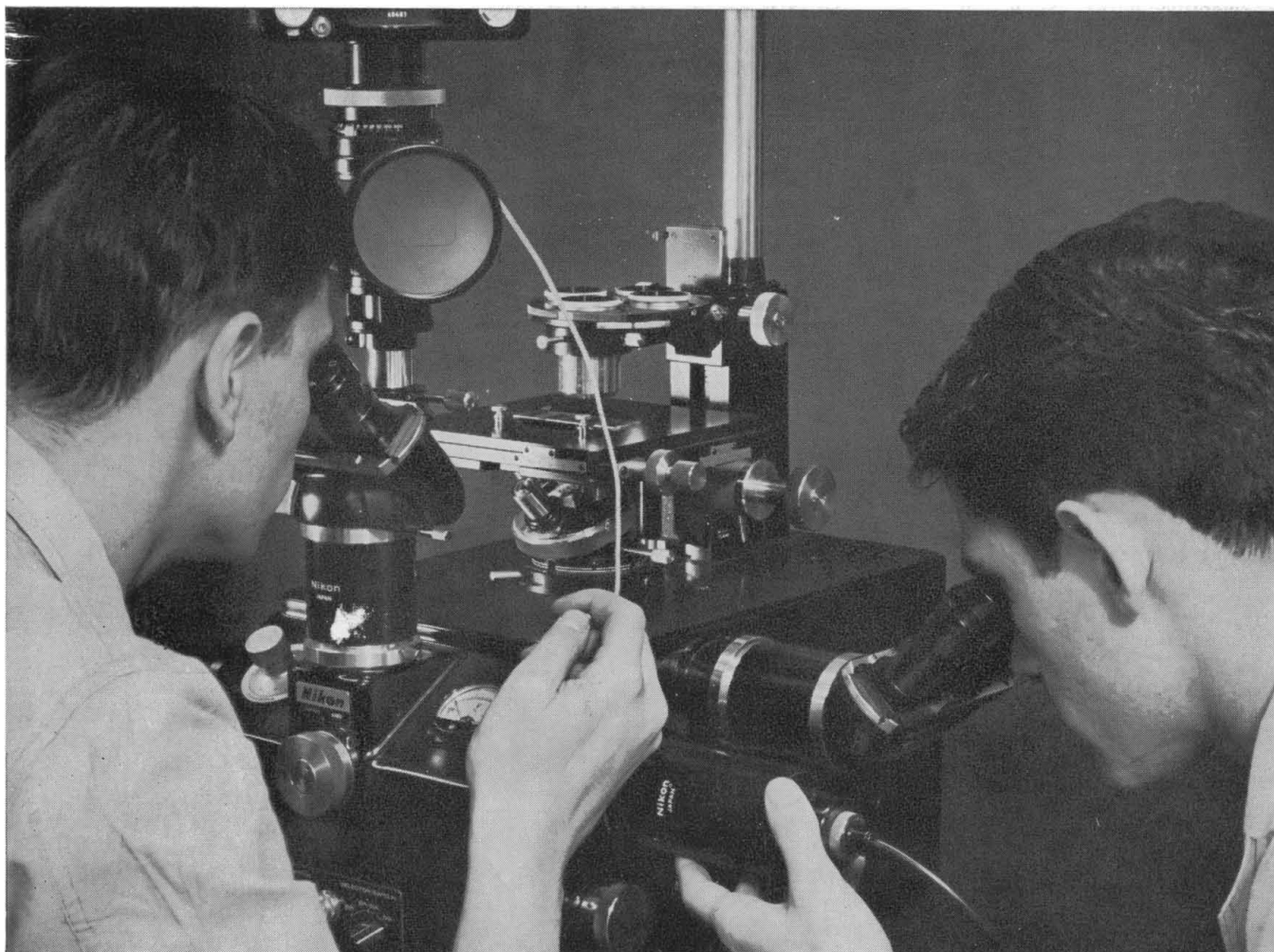
The other 9,995 SAFE-GARD pipets please this major manufacturer because they (1) didn't break, (2) have excellent resistance to etching and clouding, (3) are color coded and (4) cost $\frac{2}{3}$ less than premium priced pipets.

Could smart purchasing be one reason why this major pharmaceutical manufacturer is so major?

OWENS-ILLINOIS

maker of Kimble Products
Toledo, Ohio





approaching the ultimate in versatility

The new Nikon M can be relied upon to deal with the most exacting demands arising in industrial, biological and medical research. Its capabilities are almost limitless, embracing every aspect of reflected- and transmitted-light microscopy, bright-field, dark-field, phase-contrast, interference-phase, fluorescence, and photomicrographic techniques.

Of significant interest to the researcher is the unique suitability of the Nikon M for time-lapse cinemicrography in tissue-culture studies. Of equal significance are its facilities for using petri dishes and incubators, for projecting superimposed data onto the field of view, and for meeting consultation requirements by permitting two people to observe the same field simultaneously.

All of this is still further implemented by a wide variety of interchangeable accessories and attachments. But perhaps

even more important is the quality of performance the Nikon M brings to these applications — the ruggedness and stability of its design, the precise responsiveness of its controls, and the noticeable superiority of its optics. Inquiries regarding special applications are invited; Demonstrations arranged. For complete details, write to NIKON Instrument Division, 623 Stewart Ave., Garden City, N.Y., 11533 Subsidiary of Ehrenreich Photo-Optical Industries, Inc. In Canada: Anglophoto Ltd., Instrument Div., Rexdale, Ont.



Nikon M Inverted Microscope

Introducing



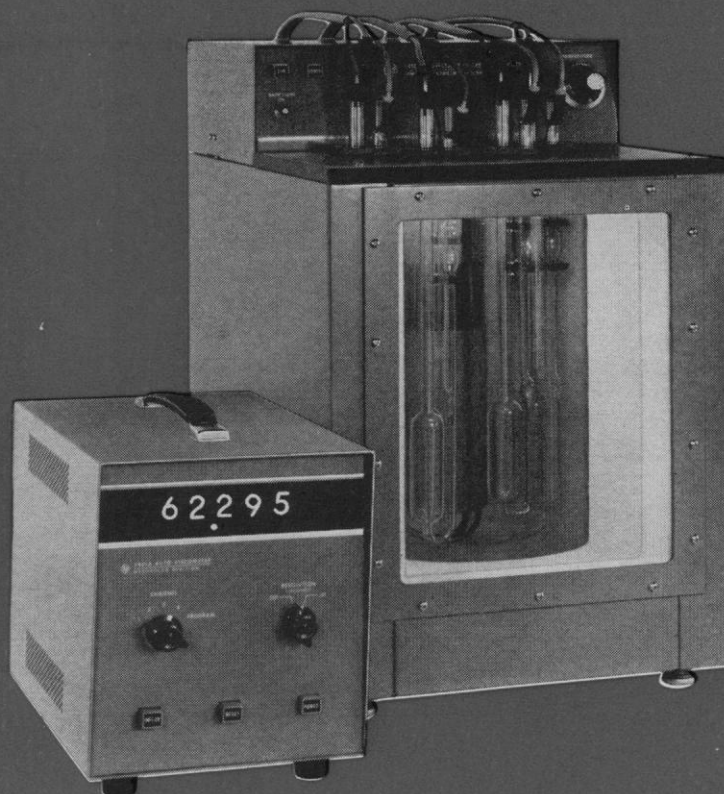
PUSHBUTTON



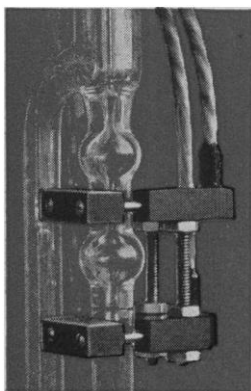
VISCOSITY



MEASUREMENTS



MECHROLAB MODEL 5901A AUTO-VISCOMETER. Electronic counter automatically measures efflux time through use of photocell detectors mounted at upper and lower reference points on glass viscometer. Model 5910A Constant Temperature Bath provides precise temperature control, eliminating errors due to temperature fluctuations.



Just push a button, and Mechrolab's new Auto-Viscometer automatically measures efflux time in glass capillary viscometers. Not only are viscosity measurements more efficient, they're at least 10 times more accurate than stopwatch techniques. Here's why:

- 1. Automatic influxing** eliminates possible errors due to differences in technique.
- 2. Efflux time** is automatically measured with an electronic counter which has a resolution of ± 0.001 second up to 100 seconds, ± 0.01 second to 1,000 seconds.
- 3. Constant Temperature Bath** provides tem-

perature control and stability of better than $\pm 0.005^\circ\text{C}$ from ambient to 75°C , $\pm 0.01^\circ\text{C}$ between 75 and 150°C .

- 4. Efflux times** are digitally displayed on the counter readout and **remain** there until intentionally erased by the operator. There's also provision for a remote programmer and digital printer.

Applications? Intrinsic viscosities; molecular weights; molecular shapes of natural and synthetic polymers. To learn more about automated viscometer measurements, contact your Hewlett-Packard office or write to us at 1062 Linda Vista, Mountain View, 6, Calif.

**HEWLETT
PACKARD**  **MECHROLAB
DIVISION**



new syringe! the ultimate in GC reproducibility

You will find that the new Hamilton 7101 is the ideal device for delivering reproducible gas chromatograph samples. It's a 1 μ l capacity syringe, with a Teflon seal that can be tightened to compensate for wear and prevent leakage. Several innovations improve reproducibility and promote longer septum life.

Write for the 7101 literature.

HAMILTON 

HAMILTON COMPANY
P. O. Box 307-K, Whittier, Calif.

modified to provide an inducement for the recipient to teach.) In order to enhance the prestige of these fellowships, and to compete with the regular post-doctoral fellowships, their monetary rewards must be greater than those of the research fellowships (which permit the holders to devote up to 10 percent of their time to teaching). The awards should be flexible enough to permit the recipient either to do research entirely on his own (he may need funds to buy equipment) or to do research with a more established investigator. The teaching requirements would be subject to negotiation between the individual and the institution to which he is going and should not require him to spend more than 10 percent of his time teaching. The kind of teaching I have in mind is giving lectures on agreed-upon subjects, helping to prepare and grade examinations, helping to organize and oversee laboratory exercises, and acting as an adviser to students. With a little foresight and initiative on the part of the universities and colleges, the teaching load of the staff and graduate students (who are sometimes unfairly overburdened) could be reduced. It might be argued that the threat of government control over education makes this suggestion unworkable; however, it is my opinion that the present control government is exerting over education (by supporting research exclusive of teaching) is a much more real threat.

DAVID T. DENHARDT

*Biological Laboratories,
Harvard University,
Cambridge 38, Massachusetts*

Sap Pressure in Plants

In their article "Sap pressure in vascular plants" (16 Apr., p. 339), Scholander, Hammel, Bradstreet, and Hemmingsen present some interesting data on the water relations of plants. The experimental procedure that they employed does not, however, demonstrate the existence of negative sap pressures as they stated. This is not to disclaim the existence of negative pressures, but rather to point out that their procedure measures only the difference in free energy per unit volume between water in the plant and the same water outside the plant. Their pressure chamber operates on the same principle as the pressure-membrane apparatus devel-

oped by Richards [*Agr. Eng.* **28**, 451 (1947)] for measurement of the potential energy of water in soils. When air pressure is applied to the sample chamber, the free energy of the water is raised. If this pressure increase is carried out isothermally, the free energy of the water would be raised by approximately $V\Delta P$, where V is the volume of water in the sample and ΔP is the pressure increase necessary to establish equilibrium between water in the system and that outside. It is common practice to express this energy difference in terms of energy per unit volume (the water potential), which, of course, is dimensionally the same as pressure. In the experiment of Scholander *et al.*, the plant itself provides the membrane which is permeable to water but not to air.

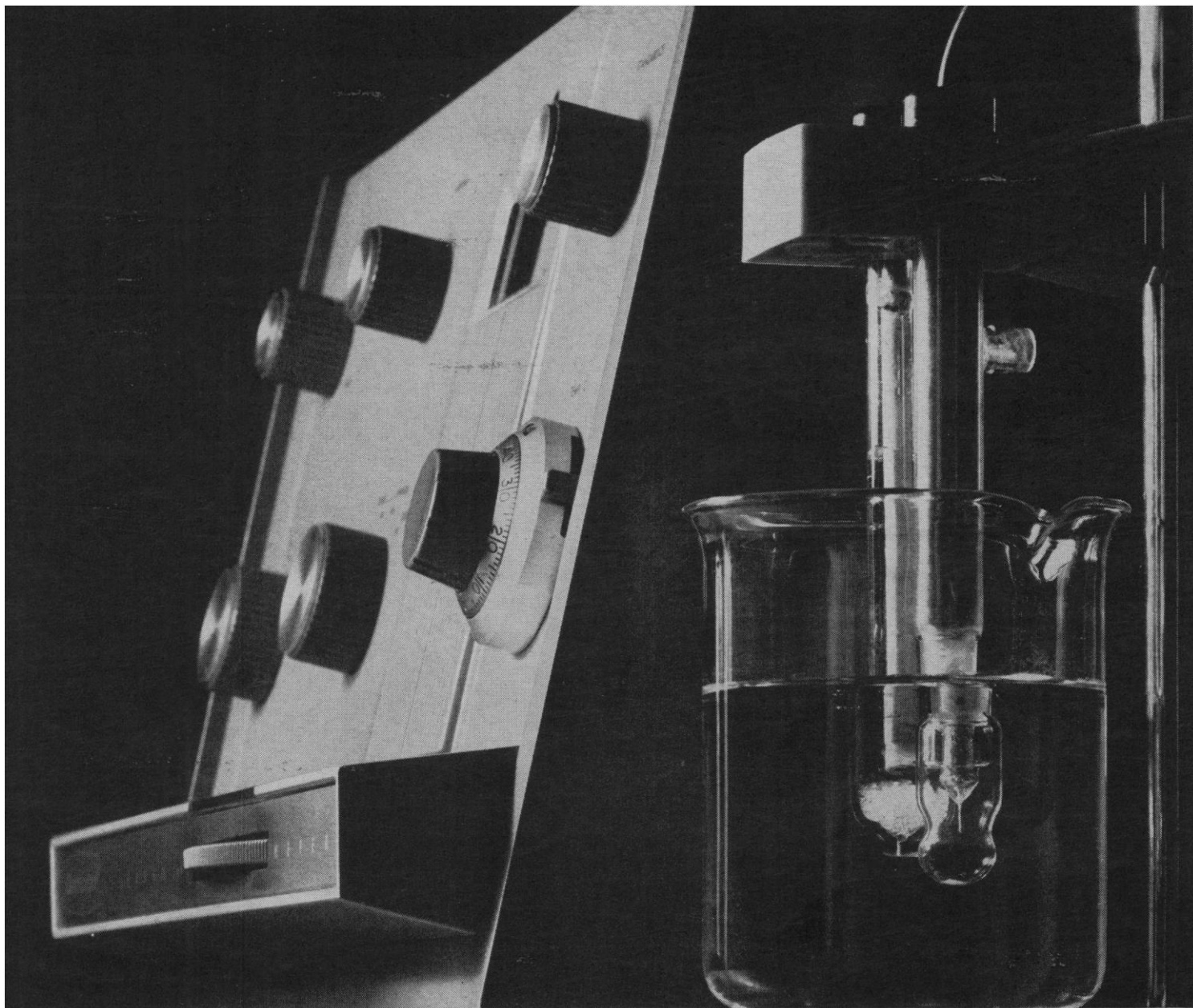
Richards emphasized that the pressure-membrane apparatus measures an "equivalent" or "apparent" negative pressure within the soil. Nevertheless, many soil scientists have assumed that the pressure necessary to force water out of the soil gave a measure of the actual pressure of the water in the soil. It now seems apparent that the adsorptive force field around soil particles acts throughout a sufficiently long range to account for a significant proportion of the potential-energy lowering in soils. Thus, the pressure membrane measures the free-energy difference but not necessarily the pressure difference. If sufficiently long-range adsorption forces do exist in plants, as seems entirely reasonable, particularly within the cell wall, the same would hold true for the experiments of Scholander *et al.* One could argue that the data presented prove the existence of adsorption forces just as readily as the existence of negative pressures. This is a challenging problem, and it is to be hoped that a means can be found to distinguish between the various components of the potential energy in plants in a conclusive way.

W. R. GARDNER

S. L. RAWLINS

*U.S. Salinity Laboratory,
P.O. Box 672, Riverside, California*

Gardner and Rawlins argue that our measurements do not demonstrate negative sap pressure in plants, let alone measure it. This criticism appears to stem from a misplaced analogue between their soil and our plant experiments. It is true that the balancing bomb pressure does not differentiate between hydrostatic and osmotic forces



It reads 673.2 mv. You know it's correct!

No combination is more accurate for sodium ion or monovalent cation measurements than Beckman Specific Ion Electrodes and the unsurpassed Beckman Research pH Meter.

Ask your local Beckman Sales Engineer,
or write for Data File LpH-465.

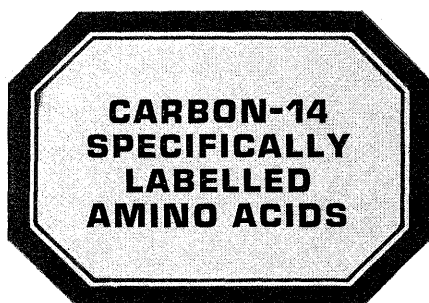
Beckman

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

NUCLEAR-CHICAGO RESEARCH QUALITY RADIOCHEMICALS



COMPOUND	SPECIFIC ACTIVITY (mc/mM)
DL-Alanine-1-C14	5-25
2-Amino-isobutyric-1-C14 acid	5-20
L-Arginine-(guanido-C14) monohydrochloride	5-15
L-Citrulline-(carbaryl-C14)	5-25
Creatine-1-C14	2-8
Creatinine-1-C14 hydrochloride	2-8
(DL + meso)-Cystine-3-C14 hydrochloride	5-20
DL-3 (3, 4-Dihydroxyphenyl) alanine-2-C14 ["DOPA"-C14]	5-35
DL-Glutamic-1-C14 acid	5-20
Glycine-1-C14	2-15
Glycine-2-C14	5-35
L-Histidine-(2-ring-C14)	10-40
DL-Hydroxyproline-2-C14	2-10
DL-5-Hydroxytryptophan- (methylene-C14) [3'-(5-Hydroxy- 3-indolyl)-alanine-3'-C14]	2-25
DL-Leucine-1-C14	5-40
L-Leucine-1-C14	5-10
DL-Lysine-1-C14 monohydrochloride	5-20
L-Methionine-(methyl-C14)	5-30
DL-Phenylalanine-1-C14	2-25
DL-Phenylalanine-2-C14	4-20
Sarcosine-1-C14	2-10
DL-Serine-3-C14	5-20
L-Serine-3-C14	2-10
D-Tryptophan-(methylene-C14) [D-Indolylalanine-3-C14]	5-20
DL-Tryptophan-(benzene ring- C14-U)	1-5
DL-Tryptophan-(methylene-C14) [DL-Indolylalanine-3-C14]	5-35
L-Tryptophan-(methylene-C14) [L-Indolylalanine-3-C14]	5-20
DL-Tyrosine-2-C14	2-20
DL-Valine-1-C14	4-35
DL-Valine-4-C14	1-10

Data sheets available on request for every compound. Please write for current schedules containing complete radiochemical listings and information. Or call 312 827-4456 collect.

NUC-G-4-269



NUCLEAR-CHICAGO
A DIVISION OF NUCLEAR-CHICAGO CORPORATION
349 Howard Avenue, Des Plaines, Illinois 60018

in the soil; neither does it do so *inside* the cells. On the *outside* of the membrane (extracellular), however, it measures the negative hydrostatic pressure in the xylem ducts as a straightforward null measurement. It does not matter what causes the negative pressure balance in the xylem sap, nor what adsorptive forces may reside in the vessel walls; nor does it matter whether the ducts run plain water or sap solution. In plants, nevertheless, a close approximation to the turgor pressure (intracellular) can be derived from the pressure-volume curve.

P. F. SCHOLANDER

*Scripps Institution of Oceanography,
University of California, San Diego*

H. T. HAMMEL

*John B. Pierce Foundation,
Yale University, New Haven,
Connecticut*

EDDA D. BRADSTREET

E. A. HEMMINGSEN

Scripps Institution of Oceanography

Mass Extinctions at the End of the Cretaceous Period

The environmental factors that influence communities of living organisms are so complex that they are rarely well understood. Consequently, the problems that confront the paleoecologist may seem insuperable. Yet, recurring regularities in the fossil record of past life tempt paleontologists to venture explanations of real events, now millions of years past, in the history of life. Such an explanation is M. N. Bramlette's stimulating new hypothesis (25 June, p. 1696) to account for revolutionary changes in marine life at the close of the Mesozoic era. His conclusions are based on an exceptionally well-documented case history, and once and for all remove any doubt that marine life has undergone catastrophic changes over wide expanses of the oceans. This is a matter that has long been suspected and much debated. Now that the facts seem well established, the problem is to explain them.

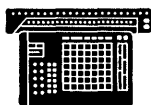
I have cited evidence [(*Sci. Amer.* 208, 76 (Feb. 1963)] that extinctions of the past display a spectrum of patterns ranging from apparently catastrophic revolutions in the faunas of the world to very slow selective and evolutionary replacement. For the former, I have sought general, rather than specific, causes because some of

these mass extinctions have involved both terrestrial and marine animals and have recurring rhythms that would seem to eliminate unique causes. Bramlette considers the apparent synchronicity of extinction of land and sea organisms as unproven and possibly a result of circularity in the method of stratigraphic paleontology, in which rocks are dated by fossils and fossils are dated by the rocks that contain them. However, there cannot now be any reasonable doubt that these and comparable changes in world faunas were compressed into time intervals that were very short as measured on the scale of geologic time. It seems to me reasonable to conclude that worldwide vicissitudes among organisms were the result of recurring general ecological disturbances that destroyed the most fragile populations of both land and marine animals. Extinctions on a massive scale clearly were highly selective among animals, affecting some groups while sparing others, but it is one of the unsolved problems of paleontology that plants were not simultaneously and equally affected by crises in the animal kingdom.

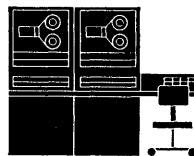
Bramlette's interesting hypothesis explains mass extinctions in marine fauna at the close of the Mesozoic era by gradual failure of supply of nutrient salts and sudden collapse of the worldwide ecosystem at a threshold point in a gradual diminution of supply of land-derived sediments carried to the sea by streams. This hypothesis is intriguing and highly promising, but in the present form it seems vulnerable on two counts. In the first place, terrestrial animals did indeed undergo important mass extinctions at approximately the same time as marine animals near or at the close of the Permian, Triassic, and Cretaceous periods. It is incredible that the supply of nutrient salts to the sea would directly affect land animals.

It is also probable that fluctuations of the rate of supply of land-derived nutrients are not nearly as important as variations in oceanic circulation, particularly upwelling, in determining the concentration of nutrients in the euphotic zone. Marine ecologists believe that by far the greatest part of immediately available nutrient salts are contained in the deep basins of the oceans. These salts are continuously recycled by oceanic circulation. Compared with this reservoir, the annual increment from the lands must be infinitesimal. In areas of rapid sedimentation, of course, much nutrient matter is

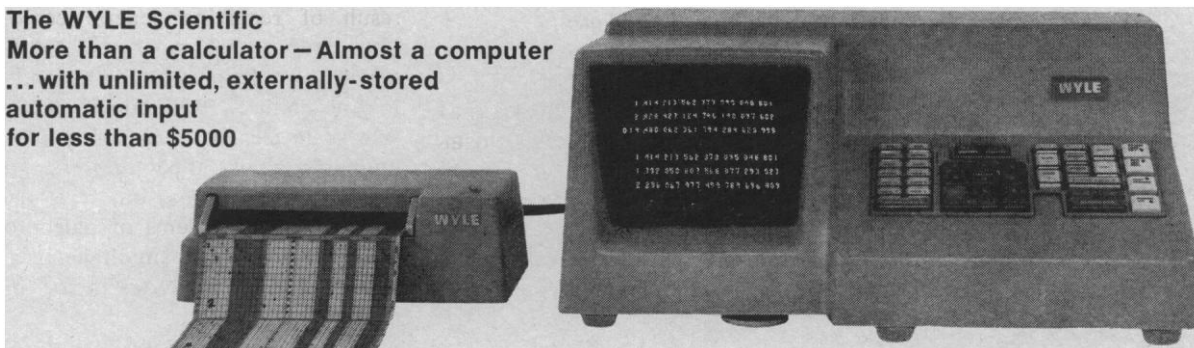
When the job is too big for this...



and this is too big for the job:



The WYLE Scientific
More than a calculator — Almost a computer
... with unlimited, externally-stored
automatic input
for less than \$5000



**WORLD'S MOST ADVANCED
DESK-TOP COMPUTATIONAL CENTER,**
the WYLE *Scientific* offers almost unlimited application in the solution of complex scientific, engineering, and statistical problems. Yet it is easier to operate than a calculator; takes up about the same desk space as an electric typewriter; solves problems with speed approaching that of a computer; operates with the quiet, and reliability of all-solid-state electronics. And its cost amortizes over a three-year period at less than \$1 per working hour.

**THE ONLY DESK-TOP MACHINE
WITH UNLIMITED STORED-PROGRAM AUTOMATIC INPUT,**
it eliminates all the wasted time of multi-step repetitive problem solving. It can be programmed with a ballpoint pen to perform all your recurrent computations automatically, regardless of length, through its card reader. Typical calculations you can program include the development of any trigonometric functions; any exponential functions; statistical analysis; $\log_e x$ and $\log_{10} x$; antilog x ;

radix conversion; cube root; polynomial evaluation. For *any* program, you simply punch in your instructions by hand on a Wyle stored program card, which has the *Scientific* keyboard reproduced on it, and enter the variables through the manual keyboard. No computer training, "language," or special equipment is needed to develop a complete library covering your repetitive formulas. Any number of cards can be taped together to feed continuously into the reader the lengthiest computations. And *preprogrammed* Wyle cards are available covering a wide area of problem solutions.

AS A COMPLEMENT TO DIGITAL COMPUTERS,
the *Scientific* is effectively used for computer program formulation and checkout. It is particularly valuable when determining the requirement for double precision programming. Program checkout on conventional calculators is very time consuming, and failure to properly check out programs can waste expensive computer time. The features of the Wyle *Scientific* make it indispensable for increasing the productivity of computer oriented staffs.

NEVER BEFORE CAPABILITIES LIKE THESE
The contents of all registers are displayed, on an eight-inch cathode ray tube, as indicated below.

0 000 000 000 000 000 495 582 441	Multiplier-Quotient Register
000 000 004 512 000 000 000 000	Entry Register
000 000 000 000 000 495 582 441	Accumulator Register
000 000 000 001 414 213 562 373	Storage Register 1
000 000 000 001 732 050 807 568	Storage Register 2
000 000 000 002 236 067 977 499	Storage Register 3

All parts of a problem are visible. The contents not only of the three active arithmetic registers, but also

of the three storage registers are displayed at all times. Numbers entered from the keyboard are seen as they are entered and can be verified before use.

Transcription errors are eliminated through complete versatility of transfer from any register to any other without loss of desired data.

All registers handle 24-digit numbers to provide extreme numerical precision.

Decimal points are entered as they occur in the numbers, using an eleventh key, and all input and answers are correctly aligned with decimal point on the output display.

Automatic square root is provided, as is single entry squaring.

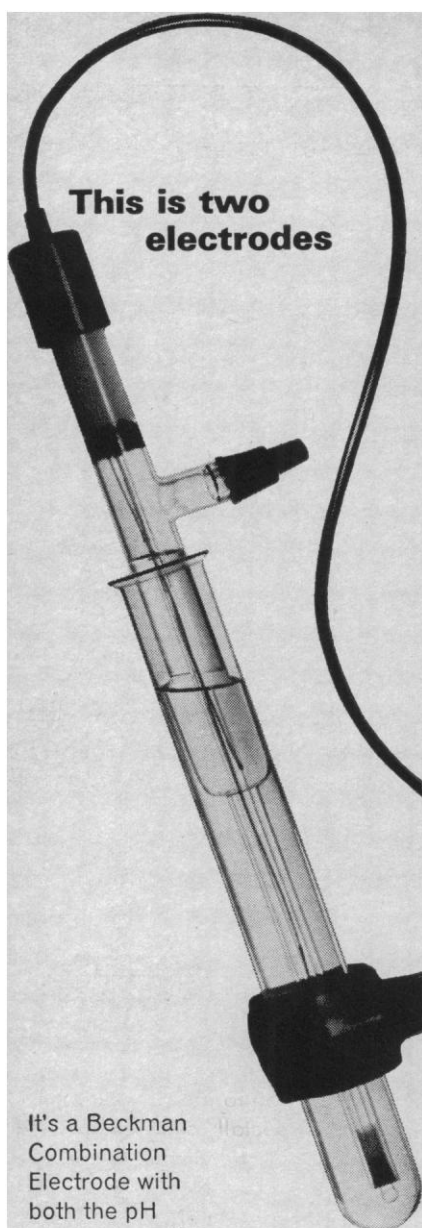
These capabilities, combined with stored program

automatic entry, for the first time fill the technical and economic gap between calculators and computers.

Cost of the *Scientific*, complete with automatic input reader, is less than \$5000. This cost amortizes over a three-year period at less than \$1 per working hour.

For further information, write Dept S, Wyle Scientific Sales, 339 South Isis Avenue, Inglewood, California. Or phone OR 8-5671.

THE WYLE Scientific
a product of **WYLE LABORATORIES**



**This is two
electrodes**

It's a Beckman
Combination
Electrode with
both the pH
electrode and its
reference junction
in a single shaft.

**In the
space of
one**

It simplifies pH
determinations in
test tubes and narrow-necked
flasks. You can work with samples
as small as 0.1 ml. Beckman
stocks eight different Combination
Electrodes. Others can be
designed for unusual needs.

Now you can get Combination
Electrodes in the Twin Pack. Ask
your Beckman Sales Engineer
about this new, convenient way
to buy electrodes. Call him, or
write for the Electrode Catalog.

Beckman INSTRUMENTS, INC.

**SCIENTIFIC AND PROCESS
INSTRUMENTS DIVISION**
FULLERTON, CALIFORNIA • 92634

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

buried in marine sediments before it can be recycled by organisms. Intermittent stagnation of one or more of the ocean basins by whatever means would, of course, produce an immediate deficit in the available budget of marine nutrients. Such stagnation might conceivably have occurred as a result of rapid diastrophic or climatic episodes [see, for example, A. G. Fischer, in *Problems in Palaeoclimatology*, A. E. M. Nairn, Ed., Interscience (Wiley), New York, 1965], but the climatic oscillations of the Pleistocene did not bring about noteworthy mass extinctions of major terrestrial or marine communities (mass extinctions of large herbivorous mammals occurred mainly after the last major retreat of the Pleistocene glaciers). Perhaps the environmental changes of the Pleistocene were too slow, not sufficiently protracted, and of too limited range.

NORMAN D. NEWELL
*American Museum of Natural History
and Columbia University, New York*

Severe-Weather Forecasting

John Walsh's article "Tornadoes: Weather Bureau office in Kansas City is nerve center for severe weather warning network" (News and Comment, 4 June, p. 1306) presents an excellent, concise summary of the U.S. Weather Bureau's activities in forecasting severe local storms. The article is concerned with the contributions of a specific agency in this area and does not purport to include a survey of the work of other units. However, mention is made in general terms of improvement in knowledge of thunderstorms during World War II and the demand for better severe-storm forecasting, which is attributed to the rise in commercial air traffic.

Therefore I believe that a few comments concerning the implementation of techniques and units for severe-weather forecasts are appropriate. Before World War II meteorologists generally agreed that forecasts of time and place of tornado occurrences were beyond the state of the art. During 1948, Ernest J. Fawbush and Robert C. Miller of the Air Weather Service detachment at Tinker Air Force Base, Oklahoma, developed available techniques into a reliable system for forecasting severe local storms. In 1949 the Air Weather Service invited U.S. Weather Bureau regional directors at Oklahoma

City, Kansas City, and Fort Worth to visit Tinker AFB. As a result of their meeting with Fawbush and Miller, arrangements were made for the direct transmission of the Air Weather Service's severe-weather forecasts affecting Arkansas, Kansas, Missouri, Oklahoma, and northern Texas to the U.S. Weather Bureau offices at Oklahoma City and Kansas City. These forecasts were monitored by the U.S. Weather Bureau for use in warning the civilian population when the situation warranted such action.

In 1950 the Gulf Coast states were added to the area of responsibility, and in 1951 the Air Force Severe Weather Warning Center (SWWC) was established with responsibility to provide forecast coverage for the entire continental United States between the Appalachians and the Rockies. The awareness by certain civilians and the newspapers of the existence of these forecasts prompted a demand for similar forecast services to the general public. Accordingly, in March 1952 the U.S. Weather Bureau established a specialized forecast unit, known as the Severe Local Storms Unit, in Washington, D.C. This unit moved to Kansas City in 1954. The U.S. Weather Bureau Severe Local Storms Unit and the Air Force Severe Weather Warning Center were collocated in 1956 at Kansas City.

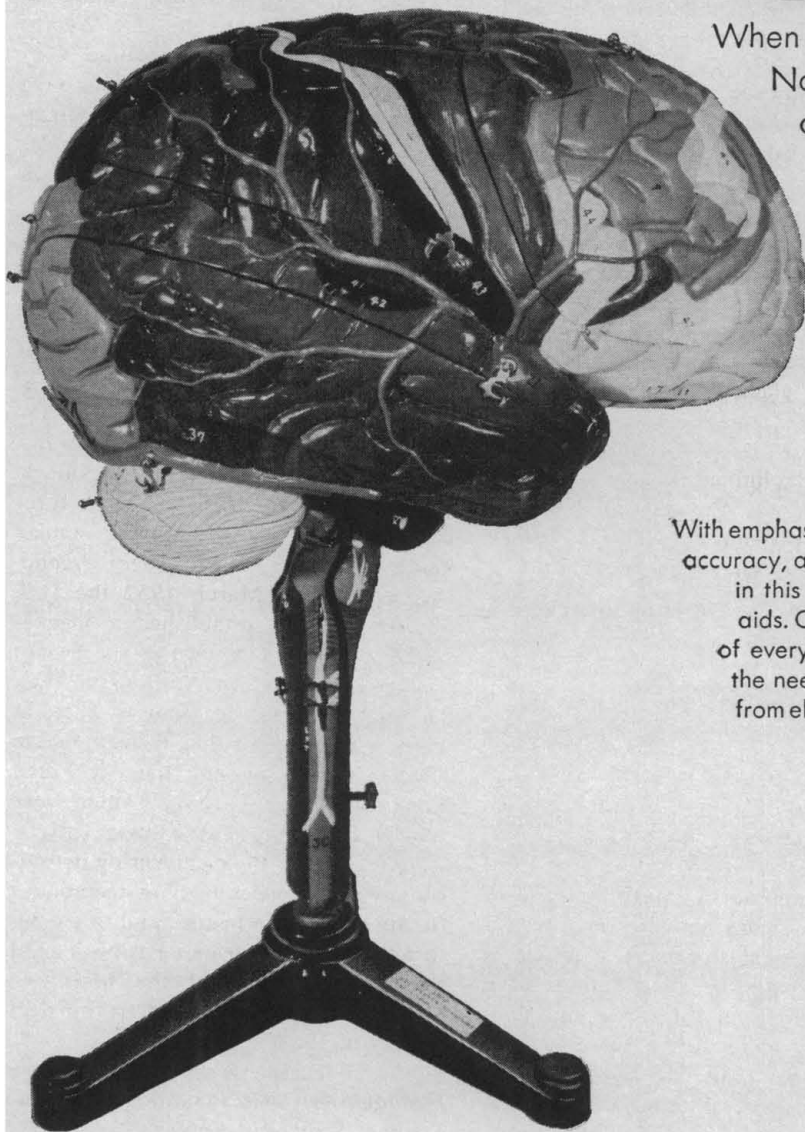
As a result of their pioneering investigations and development of techniques for forecasting tornadoes and other destructive local storms, Fawbush and Miller were presented the Meisinger Award of the American Meteorological Society in 1956.

WILLIAM S. BARNEY
*Headquarters, Air Weather
Service, Scott Air Force
Base, Illinois*

"Wasted" Water

I am impressed with the sober thoughts of D. B. Luten (Letters, 9 July, p. 133) on some of the burgeoning plans to conserve our natural resources. At all levels of government and among the public in the United States there appears to be a hard-core belief in BIG projects to provide water in greater quantities to specific places for specific purposes. The NAWAPA proposal referred to by Luten is one such project, but there are others of equal importance because of their implications. It seems that everyone is

think Clay-Adams



When quality is required in aids for teaching the Natural Sciences, you can place your confidence in Clay-Adams. Continual research and precision craftsmanship have helped maintain the highest possible standards for almost half a century.

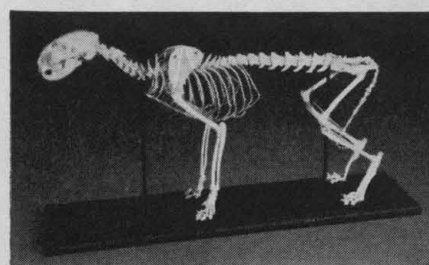
ANATOMICAL MODELS

With emphasis on structural detail, anatomical accuracy, and durable materials, the models in this group are outstanding teaching aids. Clay-Adams offers several models of every major body structure to satisfy the needs of varying educational levels from elementary through medical school.



ANIMAL SKELETONS

A new addition to the Clay-Adams line, these specially selected specimens are carefully mounted under the supervision of osteologists experienced in the preparation of museum displays to assure anatomical correctness.



OSTEOLOGICAL MODELS

Clay-Adams skeletons, skulls and bone preparations are available in both human bone or realistic plastic reproduction. Painstaking craftsmanship under the supervision of expert osteologists assures perfect articulation.



BOTANY AND ZOOLOGY MODELS

Invaluable as teaching aids, these greatly enlarged and colorful models are also excellent as laboratory guides for dissection work.

Clay-Adams
New York 10, N. Y.

Clay-Adams, Inc., Dept. S8275, 141 E. 25th St., New York 10, N.Y.

Please send me illustrated descriptive information on:

☐ Anatomical Models ☐ Osteological Models
☐ Animal Skeletons ☐ Botany and Zoology Models

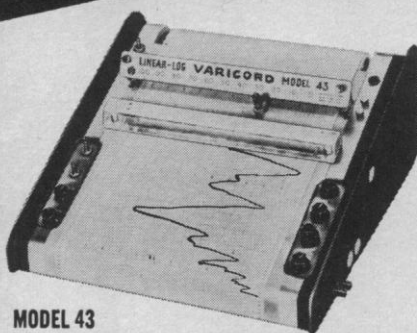
Name

Institution

Address

City State Zip

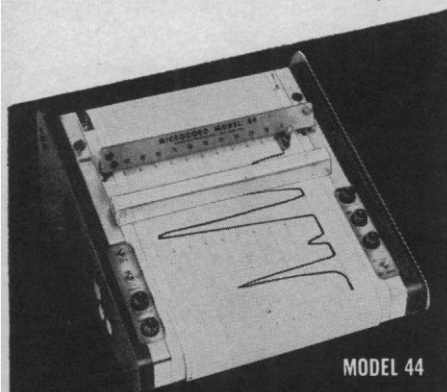
**FOR
CONVENIENCE
AND ACCURACY
USE ONE OF THESE
10" MULTI-PURPOSE
RECORDERS**



MODEL 43

**VARICORD LINEAR/LOG
LABORATORY RECORDER**

24 calibrated ranges from 10 MV or 10 μ A full scale. Potentiometric recording, both linear and logarithmic. Absorbance scale zero to infinity.



MODEL 44

**MICROCORD SUPER SENSITIVE
LABORATORY RECORDER**

$\frac{1}{2}$ MV full scale maximum sensitivity, or 50 microvolts per inch. Fast pen speed; excellent noise rejection. Dual chart speed.

Write for bulletins
Stocked by
Laboratory Supply Houses

PHOTOVOLT
CORPORATION
1115 BROADWAY • NEW YORK 10, N.Y.

on the bandwagon for BIG canals and BIG dams, and the wagon is going at a rapid rate, greased by the idea that water flowing downstream is unused water—that it's water wasted because it dumps into an ocean. Nothing could be further from the truth.

In this light there is a need to comment on the Texas Basins Project—a proposed canal to divert waters from the large rivers which normally flow into the bays along the Upper Texas Coast. Such waters would flow through the canal to meet irrigation and other needs in the Lower Rio Grande Valley.

It is well documented that most of the Texas bays serve either as nursery grounds, spawning areas, or permanent habitats for most of the commercially important marine organisms and for most of the fish of importance to sport fishermen along the Texas coast. Most of these bays serve in this capacity because they are estuaries, and they are estuaries because of the inflow of fresh water at various times during each year. This close balance between fresh and marine waters and marine organisms is essential, but it is on the brink of being destroyed in Texas and perhaps elsewhere.

The ecology of the Texas bays has already been changed by the effects of large inland dams, by channelization within and between bay systems, by increased upstream water usage, and by pollution, to name a few. And it is a matter of record that the fresh-water flow into bay systems extending from Galveston to Corpus Christi is already deficient for maintaining the status quo. Coupled with this reality the Texas Basins Project can only spell disaster in its present state of planning.

Water that flows downstream is not unused. The bays of Texas are what they are *because* of water inflow, not in spite of it.

It is time for a new bandwagon.

RICHARD J. BALDAUF

*Department of Wildlife Management,
Texas A&M University,
College Station*

Malaria Control and Economics

I am very late in commenting on Brain's article "Science and antiscience" (9 April, p. 192) because I am one of the field workers in remote areas who is trying to help the people of Ethiopia eliminate malaria through the

use of insecticides and antimalaria drugs.

It is difficult to understand what prompted Brain's statement that anti-malaria workers "... do not think about the effects of their actions on population growth in relation to food supplies." No worker on the Manhattan Project could have done more soul-searching than many of us engaged in this endeavor.

In late 1958 the people in the potentially rich agricultural highlands of Ethiopia suffered from a malaria epidemic which, by conservative estimates, caused 3 million cases and 150,000 deaths in 2 months. A less disastrous recurrence in 1964 resulted in 2000 to 3000 deaths. Efforts now under way are aimed at eliminating this threat to the rural population of Ethiopia. Considerable extensions of arable land now uninhabitable because of malaria will increase the country's agricultural productivity. Importantly, a number of high government officials and international specialists cooperating with them are not unaware of the demographic factors involved in complexities of national planning.

Fifteen years ago George MacDonald, director of the Ross Institute of the London School of Tropical Medicine and Hygiene, wrote concerning the economic importance of malaria in Africa:

The policy of all countries which are governed in the interest of the inhabitants is the elimination of all avoidable infectious diseases, and there is no example known to the writer where it has been considered necessary to appraise the economic effects as a preliminary. The bare fact that illness and death are harmful to the social organism is universally accepted both by the humanitarian and the economist. Efforts are made to control disease even though the actual statistical loss is small, as is for instance—that due to pulmonary tuberculosis in England and Wales where it causes an annual mortality of 0.432 per 1000 but is considered to be a material blemish on the community. . . .

As a practical and practicing biologist I expect to continue my exploitation of scientific findings toward elimination of malaria as an individual and collective catastrophe hindering an enlightened social and economic evolution. May my fellow biologists and social and political scientists similarly dedicate themselves to the development and exploitation of tools in their respective fields!

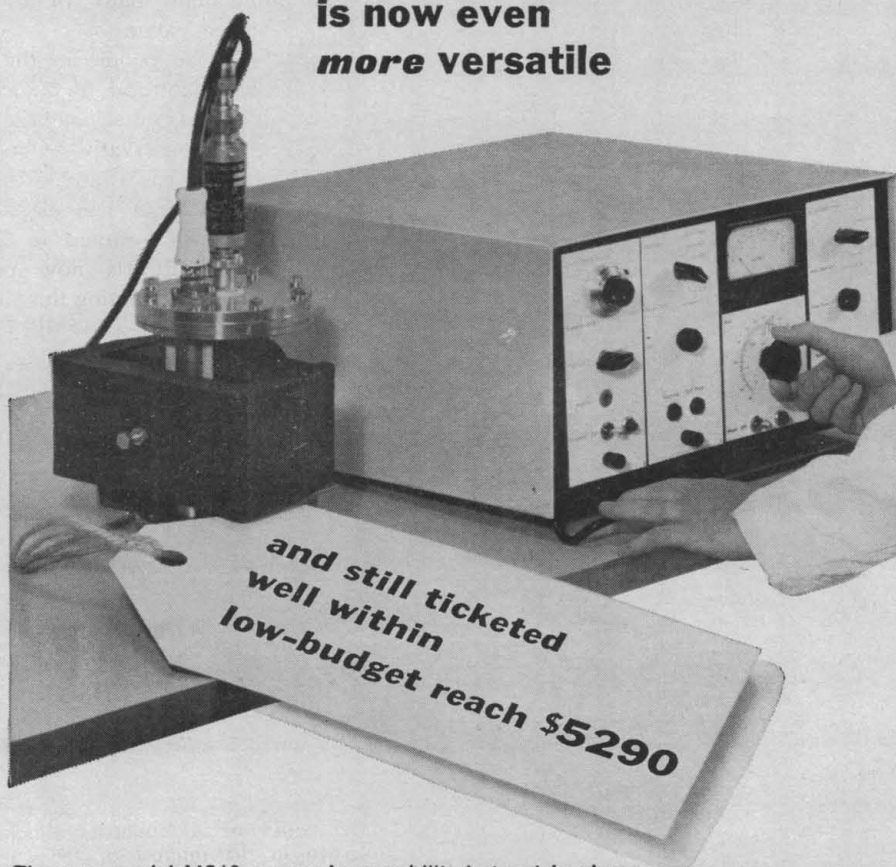
DONALD J. PLETSCH

*U.S. Agency for International
Development, Addis Ababa, Ethiopia*

the new **AEI MS10**

MASS SPECTROMETER

is now even
more versatile



and still ticketed
well within
low-budget reach \$5290

The new model MS10, grown in *capability* but not in size or cost, is even more versatile than its predecessor. Technical improvements (listed opposite) endow it with the ability to handle an even wider range of spectrometric chores, often to the extent of freeing its larger, more elaborate counterparts for the more sophisticated assignments.

So much so, in fact, that many laboratories already possessing a large mass spectrometer will want to acquire one in the "second car" philosophy. Pair an ion pump with it, mount on a cart and you've got a mobile mass spectrometer you can wheel into action anywhere.

Which is not to say that the new MS10 doesn't qualify as a first line mass spectrometer in *any* man's laboratory, as a glance at these improved specifications will attest:

Mass Range	2 to 200
Resolution	100 (10% valley definition)
Sensitivity	5×10^{-12} torr
Detection Limit	10 parts per million
Scan Speeds	3.5 or 13 minutes per spectrum

A complete complement of accessories designed exclusively for the MS10 is available, including vacuum systems, sampling systems and ion gauges)

Our booklet "Questions and Answers on the MS10" will tell you all about this remarkable instrument. Gladly sent on request.

The MS10 is a 180° magnetic deflection type instrument for high sensitivity dial-indicated analyses of gases or vapors. It is compact and portable. It will monitor a single peak or scan spectra manually or automatically scan m/e 12-45 or 36-200 repeatable without attention ad inf. It will run off any existing vacuum system. It has an output for recording spectra on any 10 MV recorder. It is so easy to operate that a student can quickly learn how: and so rugged that it thrives on inexpert handling.

the **AEI MS10 MASS SPECTROMETER**
a product of Associated Electrical Industries in England.
is marketed and serviced in the U.S.A. by

PICKER
nuclear
PICKER X-RAY CORPORATION
White Plains, N.Y.

people like these
will welcome its
elevated capability . . .

ANALYTICAL CHEMISTS making high-accuracy gas analyses with small samples

BIOLOGISTS, BOTANISTS, BIOCHEMISTS using stable isotopes (D^2 , N^{15} , O^{18}) as tracers

CHEMICAL ENGINEERS needing purity determinations, process monitoring

COMBUSTION ENGINEERS investigating flame structure, combustion products, precipitation

ELECTRICAL ENGINEERS concerned with device encapsulation, vacuum tube and lamp studies, insulation

GEOLOGISTS AND MINERALOGISTS, for potassium-argon age determination and petrology

LECTURERS AND TEACHERS of electronics, electron physics, measurements, and all subjects in which mass spectrometry is a current or future technique

METALLURGISTS wanting p.p.m. level gas-in-metal analysis

PHYSICAL CHEMISTS AND PHYSICISTS studying reaction rates, irradiation products, bond energies

VACUUM ENGINEERS AND TECHNOLOGISTS for monitoring, leak detection, partial pressure analysis

ZEISS



What's in a Name?

Objectives of unsurpassed quality, if the name is ZEISS.

ZEISS offers the widest range of precision objectives. 132 of them. From 1/.04 to 100/1.32. Many available exclusively from ZEISS.

For instance, only ZEISS offers 4x, 10x and 25x dry Planapochromats which provide unequalled sharpness across the entire field. Only ZEISS offers a 100x Planapochromat for phase-contrast work. Only ZEISS offers Ultrafluars which are corrected across the entire visible spectrum—and beyond, for exploring the invisible worlds of the ultraviolet microcosm.

All ZEISS objectives are parfocalized (except the 1x Planapochromat). And there is no such thing as a "selected" ZEISS objective, since each must meet the precision standards which have made the name ZEISS a synonym for quality for more than a hundred years.

For complete information about objectives for your needs, write Carl Zeiss, Inc., Dept. 1 SC, 444 Fifth Avenue, New York, N.Y. 10018. In Canada: 14 Overlea Blvd., Toronto. Other offices in Atlanta, Chicago, Denver, Los Angeles, San Francisco, Seattle, Washington D. C., Boston, Montreal, Winnipeg and Vancouver.

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

ROBERT L. BOWMAN	WILLARD F. LIBBY
MELVIN CALVIN	GORDON J. F. MACDONALD
JOSEPH W. CHAMBERLAIN	EVERETT I. MENDELSON
FARRINGTON DANIELS	NEAL E. MILLER
JOHN T. EDSALL	JOHN R. PIERCE
DAVID R. GODDARD	COLIN S. PITTENDRIGH
EMIL HAURY	KENNETH S. PITZER
ALEXANDER HOLLAENDER	ALEXANDER RICH
ROBERT JASTROW	DEWITT STETTIN, JR.
EDWIN M. LERNER, II	EDWARD L. TATUM
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, JANE AYRES

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

Book Reviews: SARAH S. DEES

Editorial Assistants: JAMES BLESSING, ISABELLA BOULDIN, ELEANORE BUTZ, BEN CARLIN, SYLVIA EBERHART, GRAYCE FINGER, NANCY HAMILTON, OLIVER HEATWOLE, ANNE HOLDSWORTH, MARCIA JODLBAUER, RUTH KINGERLEE, KATHERINE LIVINGSTON, ELLEN SALTZ

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 BURKLUND

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.

Translation of Scientific Literature

The use of English as the world's scientific language has been fostered in several ways. The number of high-quality scientific contributions of the English-speaking peoples makes it expedient for scientists generally to know the language. Scientists in other countries, wishing maximum attention for their research publications, also have written in English.

The importance of English is further enhanced by the availability of translations of scientific material appearing originally in other languages. The situation and the needs can be estimated from the broad sample of the world's scientific literature provided by *Chemical Abstracts*. In 1964 this service found percentages for the original language of articles abstracted by it were English, 44; Russian, 20; German, 9; Japanese, 8; French, 5; and Italian, 2. Analysis of *Physics Abstracts* provides another measure and a different distribution. In 1961 the percentages for the original language of articles abstracted by that service were English, 68; Russian, 15; French, 7; German, 6.

Since Russian is now the second language of science, it is important that contributions in that language be made available in English. Opinion among U.S. scientists is divided concerning the value of the Russian literature. Our physicists are among those who regard it most highly.

The translation program of the American Institute of Physics is thus of particular significance. Started on a modest scale in 1955, it was subsidized by the National Science Foundation. The program is now self-sustaining, and ten principal Russian physics journals are translated cover-to-cover. The publication delay is quite short—from 3 to 6 months. The most popular of the Russian translations is the *Journal of Experimental and Theoretical Physics*, with about 1300 subscribers, half of them abroad. An analysis of papers abstracted by *Physical Abstracts* indicates that 84 percent of the important Russian physics literature is being translated.

The largest effort in Russian translation of journals is being made not by a scientific society but by a profit-making organization—Consultants Bureau Enterprises Inc. This company translates 48 scientific journals on a cover-to-cover basis. Distribution of these translations to subscribers abroad constitutes 45 percent of the business. In addition to the English-speaking nations, Japan, France, and Germany are important customers.

In some areas of science, translations of Russian journals are not in great demand. As few as 250 subscribers receive translations of some geophysical material. Accordingly, a subsidy amounting to a few tens of thousands of dollars a year for each journal is required.

The Federation of American Societies for Experimental Biology is conducting an experiment in selective translation that makes sense. Some 5000 articles are scanned each year. About 600 are translated, and about 300 are printed in a translation supplement which is sent to about 13,000 subscribers.

One of the greatest single factors in the trend toward the use of English as a universal scientific language is *Chemical Abstracts*. This service abstracts much scientific literature, written in essentially all languages, and does so with unusual efficiency.

This coverage of all the literature of many fields provides an example and challenge to other aspects of the translation program. We should not be satisfied until all the important scientific literature of the world is readily available in English.—PHILIP H. ABELSON

STEREOSCOPIC MICROSCOPE MSF \$145

KOEHLER RESEARCH ILLUMINATOR LKR \$99

POLARIZING MICROSCOPE MPS \$269

Trans-Illumination Base for MSF \$27

Photomicrography set ACA \$39.95

BINOCULAR PHASE CAMERA MICROSCOPE BU-13 \$1580

BINOCULAR PHASE AUTO-ILLUMINATION BPH \$527

STUDENT AUTO-ILLUMINATION MSA \$90.25

LABORATORY MICROSCOPE MLK \$191

WIDEFIELD FILAR MICROMETER EYEPIECE \$105

BINOCULAR BRIGHTFIELD RESEARCH BR-BMIC \$775

TISSUE CULTURE INCUBATOR \$399

BINOCULAR AUTO-ILLUMINATION BMLU \$414

MORE MICROSCOPE FOR THE MONEY UNITRON

WHY UNITRON MICROSCOPES ARE SEEN IN THE BEST OF CIRCLES

Most brands of microscopes **promise** quality . . . But UNITRON really **delivers** it.

Some other brands **imply** economy . . . UNITRON **proves** it . . . check our prices!

And a few others **claim** both quality and economy . . . But UNITRON is the brand that **guarantees** both.

What's more, this guaranteed UNITRON quality and economy are offered in a complete line of microscopes, to meet the routine and research needs of modern labs. Choose from brightfield, dark-field, and phase contrast models . . . monocular or binocular . . . familiar upright or unique inverted stands . . . with attachable or built-in cameras and illumination systems.

The extraordinary features of many other brands are the **ordinary** in UNITRON Microscopes. Complete optical and mechanical accessories are standard equipment, rather than hidden extras "at slight additional cost". Coated optics are second to none. Original designs provide easy operation, versatility, lab-proven ruggedness and guaranteed performance. All of these are just routine, normal advantages that customers have learned to expect when they specify UNITRON Microscopes — **plus** attractive prices which are so easy on your budget.

UNITRON MEANS MORE MICROSCOPE for the MONEY. Leading labs throughout the world know this. It's the reason, really, why "UNITRON Microscopes are seen in the best of circles". But why take our word? It's easy to prove for yourself, the advantages and value that UNITRON can offer you. Borrow any model (or models) for a **free 10 day trial** in your own lab. No cost . . . no obligation to buy . . . not even any shipping charges. Why not use the coupon to ask for a free trial, the chance to try before you decide whether or not to purchase. Or, ask us to send a catalog that will give you full details.

- ☐ Please send UNITRON'S Microscope Catalog. **4-M**
- ☐ I accept (without cost or obligation) your invitation to try UNITRON Model _____ for 10 days.

NAME _____

COMPANY _____

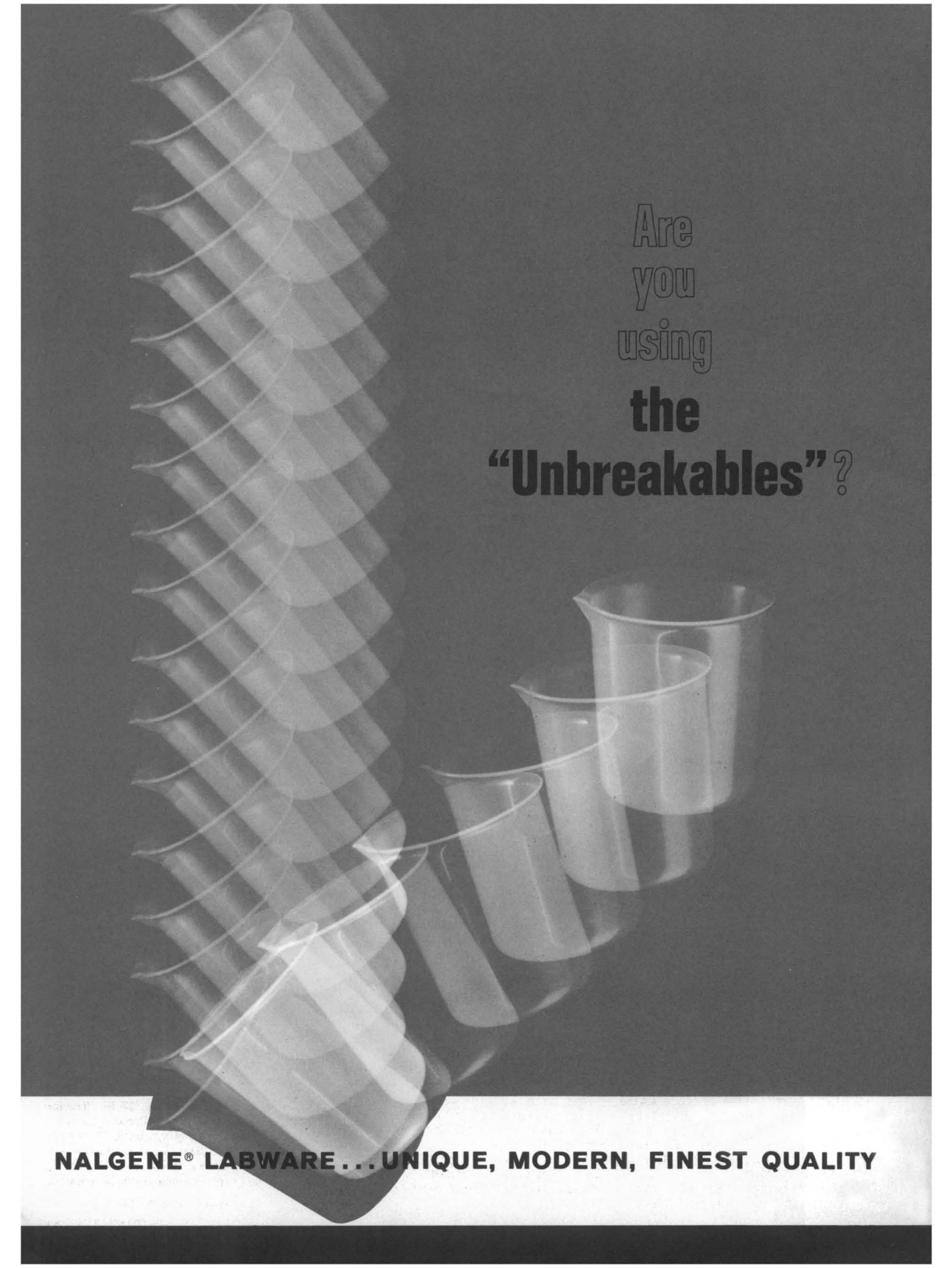
ADDRESS _____

CITY _____

STATE _____

UNITRON

INSTRUMENT COMPANY • MICROSCOPE SALES DIV.
66 NEEDHAM ST., NEWTON HIGHLANDS 61, MASS.



Are
you
using
the
“Unbreakables”?

NALGENE® LABWARE... UNIQUE, MODERN, FINEST QUALITY



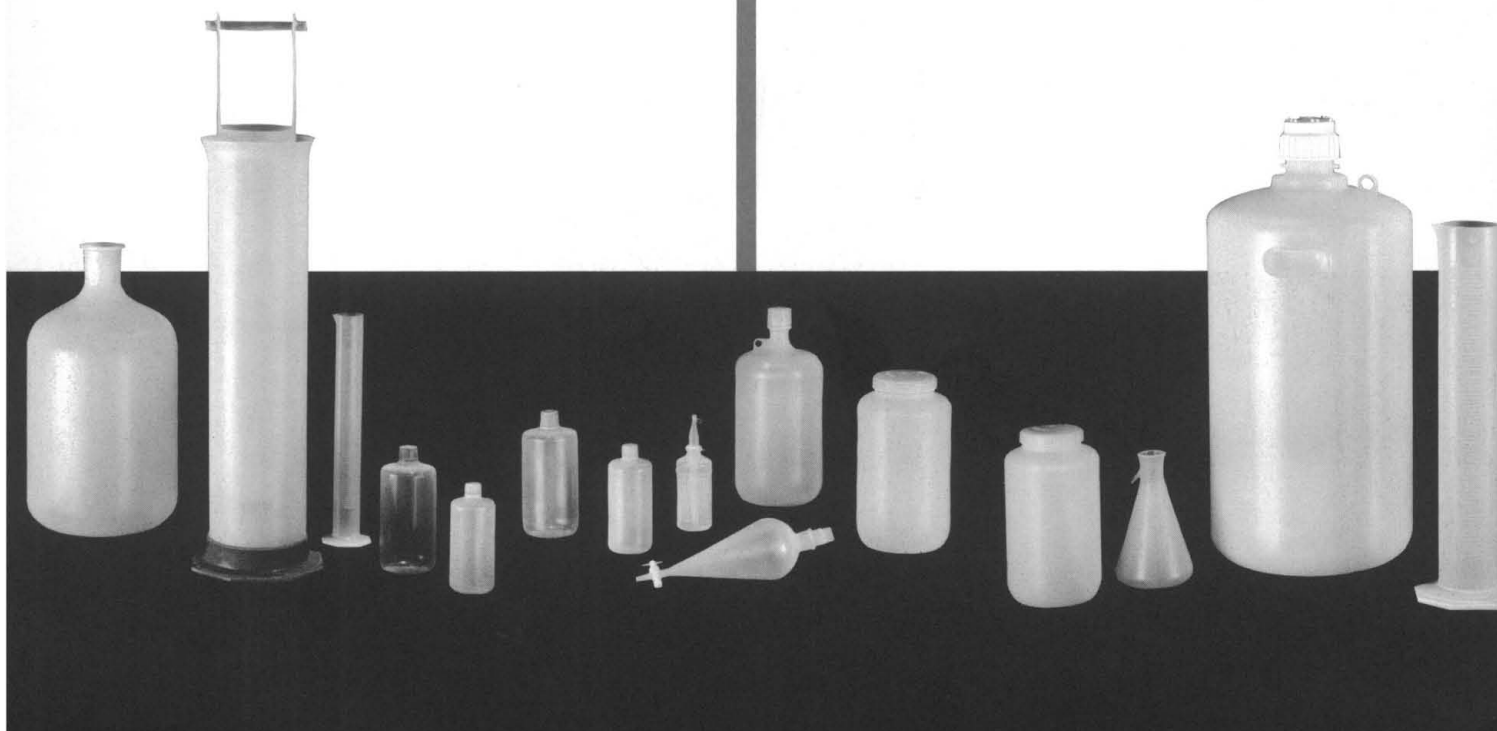
NALGENE "Unbreakables"... EASY ON YOU, EASY ON YOUR BUDGET

Safety is the number one reason Nalgene Labware is so popular in today's laboratories. With the hazard of breakage removed, school, industrial and research people obtain maximum protection. Drop a beaker or bottle, flask or graduate . . . if it's Nalgene Labware, just pick it up again! It doesn't break or shatter, crack or chip. It's as good as ever.

And because lifetime Nalgene Labware doesn't break, your budget doesn't suffer. Replacement costs go down and stay down. The money you save lets you buy other equipment you thought you couldn't afford. That's the second important reason for using the "unbreakables."

NALGENE "Unbreakables"... UNIQUE IN CONCEPT

Just duplicating existing labware but utilizing non-breakable materials would have been a giant step forward. But that's only part of the story. The many advantages of the rugged, new materials developed in recent years have permitted a redesign of classic labware. Nalge has created a line of distinctively designed equipment that can be handled easier, withstands harsher treatment and operates more efficiently. Special features, available only in Nalgene Labware, offer greater convenience and utility. The combination of modern materials, functional design and revolutionary molding techniques has resulted in labware of greater strength and chemical resistance.



NALGENE "Unbreakables"... **THE MODERN LABWARE**

Nalgene Labware is a modern product . . . for a modern age. Nalge uses selected resins especially suited to the functions of the finished labware. Because the choice of modern materials is broad, Nalge engineers can design labware with optimum characteristics.

Conventional polyethylene is resilient and translucent. Just right for certain bottles, jugs, carboys, jars, funnels and pipet washing equipment.

Opaque, strong and rigid linear polyethylene is specified for bottles, jars, jerricans, funnels, pumps and buckets.

Polypropylene—extremely rigid, strong and autoclavable, with excellent chemical resistance—is used for bottles, beakers, cylinders, flasks, funnels, filter pumps, pipets, centrifuge ware, connectors, stopcocks and closures.

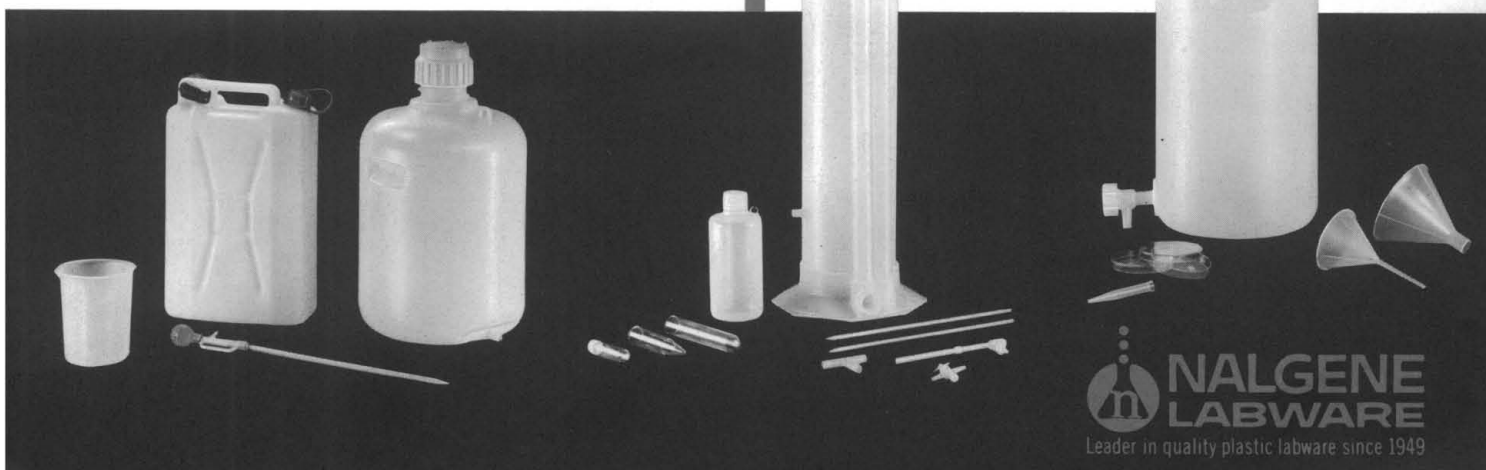
Teflon* FEP-fluorocarbon resin is virtually indestructible, resists practically all chemicals. Withstanding temperature variations from extreme heat to extreme cold, Nalgene beakers and bottles of Teflon can be used for cryogenic work as well as extended high-temperature applications.

For the "window-clear" look combined with great toughness and rigidity as well as high impact and tensile strength, polycarbonate is the preferred material for petri dishes, centrifuge bottles and tubes.

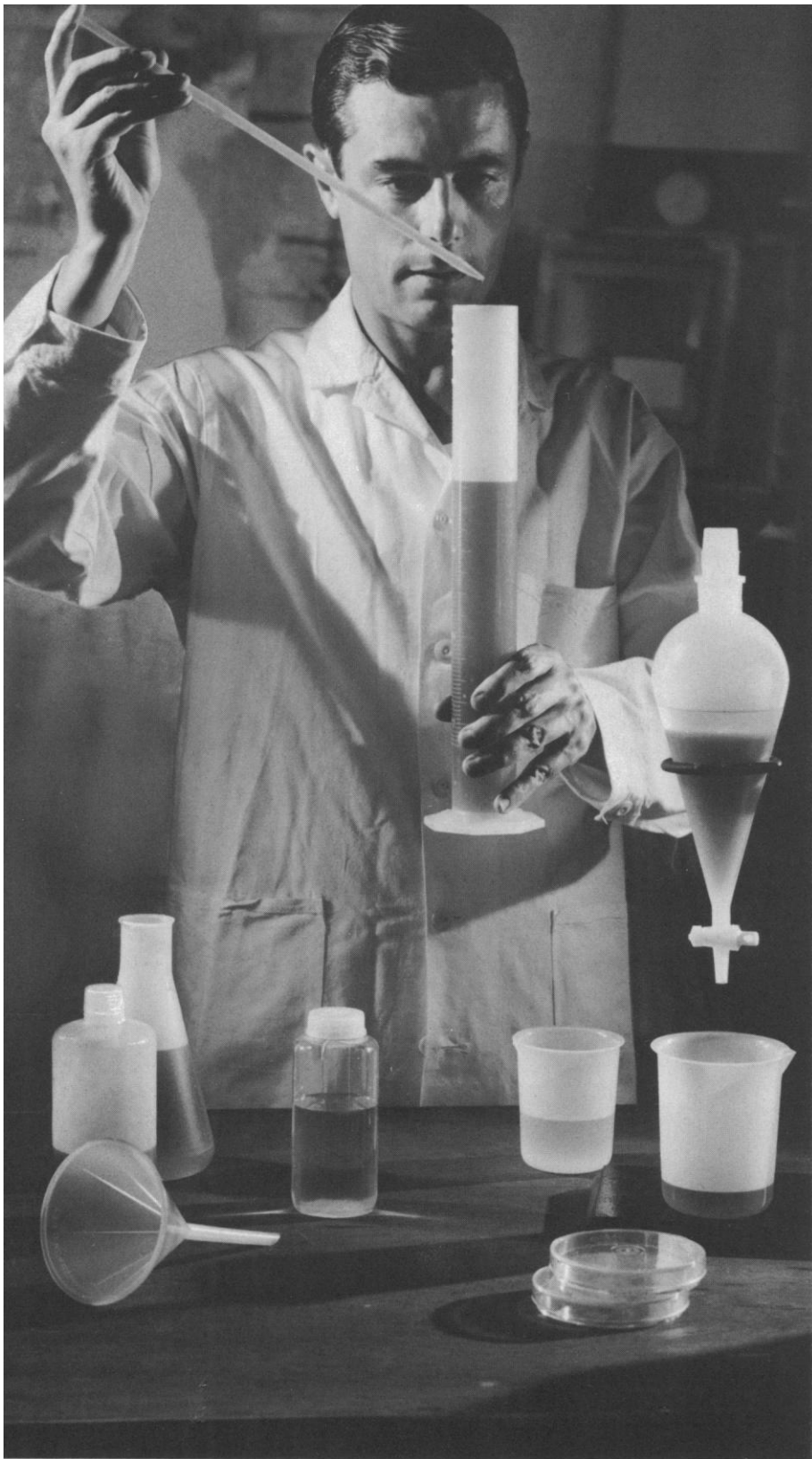
*DuPont registered trademark

NALGENE "Unbreakables"... **THE TOP-QUALITY LINE**

Every piece of Nalgene Labware is made to the highest standards. Carefully chosen materials, creative engineering, advanced production techniques, accuracy maintained to exact tolerances . . . all add up to products you can use with confidence and satisfaction. If you're not already using Nalgene unbreakables, isn't it time you were?



**NALGENE
LABWARE**
Leader in quality plastic labware since 1949



**PUT NALGENE
"Unbreakables"..
IN YOUR LAB—
THEY BELONG!**

Unbreakable Nalgene Labware is tomorrow's equipment—available today! Precision molded of materials unknown a few years ago, it has characteristics vitally important to busy laboratories—whether engaged in routine or specialized work.

Unbreakability offers safety and economy. Non-adherent surfaces are easy to clean and never slippery—even when wet. Nalgene "unbreakables" are corrosion-resistant, non-contaminating, unaffected by most chemicals and light in weight.

 **NALGENE
LABWARE**
Leader in quality plastic labware since 1949

Get the labware of the future for your laboratory—today! For more information about Nalgene "unbreakables," see your lab supply dealer, or use the coupon below.

The Nalge Co., Inc., Dept. 77835
75 Panorama Creek Drive, Rochester, N. Y. 14625

Please send:

- ☐ New 36-page Catalog O-165
- ☐ Sample "unbreakable" centrifuge tube
- ☐ Sample "unbreakable" connectors

Name

Position

Company or Institution

Street Address

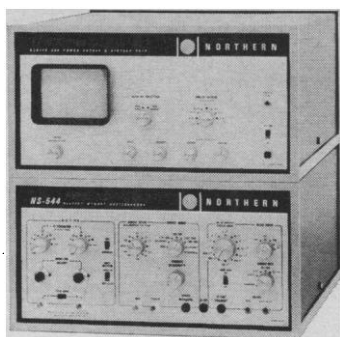
City State Zip

SG
81
AH81

La

interval and
latency
histograms are
now standard
capabilities . . .

SO ARE OTHER FEATURES
USUALLY AVAILABLE
ONLY AT EXTRA COST IN
OTHER INSTRUMENTS



NS-544 **\$9400***
COMPLETE

DIGITAL MEMORY OSCILLOSCOPE

The NS-544 offers many features either not available in competitive instruments, or available only at extra cost—and surprisingly the NS-544 costs hundreds of dollars less!

Design standards and functions include: Drives IBM Model B output writer • Automatic data normalization in digital and analog readout • Interval and latency histograms • 1% accuracy within 2 sweeps • Five-inch CRT views input or output • 1024 ordinate points • Adjustable baseline • Non-rising baseline • 0-2 volt to 0-100 volts input signal ranges • One megohm signal input impedance • Precision attenuator for each input • 115 volts RMS signal overload tolerance for 0-2 volt input • Sweep counts are memory recorded • Pre-set sweep counter • Exclusive, temperature-tolerant silicon semiconductor circuitry.

COMPARE BEFORE YOU BUY. Write for the technical bulletin on the NS-544. Learn how this new, improved version of the classical averager gives faster, more efficient measurement of noisy signals.

*Domestic price, F.O.B., Madison, Wisconsin



**NORTHERN
SCIENTIFIC/INC.**

P. O. Box 4247 • Madison, Wisconsin 53711

Wiesbaden, Germany. (H. L. Biegeleisen, Phlebology Soc. of America, 155 E. 72 St., New York 10021)

9-12. Canadian Agricultural Chemicals Assoc., 13th annual, Banff, Alberta, Canada. (CACA, 3405 Code des Neiges Rd., Montreal 25, Que.)

9-12. Mass Spectrometry, Euechem conf., Sarlat, France. (Gesellschaft Deutscher Chemiker, Postfach 9075, 6 Frankfurt am Main, Germany)

9-13. Association of European Anesthetists, congr., Athens, Greece. (P. Mastracci, Centre de Transfusion Sanguine, Rue Delille, Nice, France)

9-13. International Soc. for Clinical Electroretinography, 4th symp., Tokyo, Japan. (A. Nakajama, Dept. of Ophthalmology, Juntendo Univ., Tokyo)

9-14. Econometric Soc., world congr., Rome, Italy. (L. R. Klein, Univ. of Pennsylvania, Philadelphia 19104)

10. Manned Space Stations, intern. symp., Munich, Germany. (German Soc. for Rocket Technology and Travel, Neuensteiner str. 19, Stuttgart-Zuffenhausen, Germany)

10-12. Comparative Neurophysiology, symp., Tokyo, Japan. (Yasuji Katsuki, Tokyo Medical and Dental Univ., 3-Chome, Yushima, Bunkyo-ku, Tokyo)

10-12. Structure and Function of the Limbic System, symp., Hakone, Japan. (T. Tokizane, Inst. of Brain Research, Univ. of Tokyo, Hongo, Tokyo, Japan)

11-12. Brain Edema, symp., Vienna, Austria. (F. Seitelberger, World Federation of Neurology, Schwarzspanierstr. 17, Vienna)

11-18. International Cardiovascular Soc., 7th congr., Philadelphia, Pa. (R. A. Deterling, Jr., 171 Harrison Ave., Boston, Mass. 02111)

11-18. Plant Environment in Glass-houses, symp., Bedfordshire, England. (Secretariat, P.O. Box 38, Wageningen, Netherlands)

11-18. International Soc. of Surgery, 21st congr., Philadelphia, Pa. (P. Martin, 43, rue des Champs-Elysees, Brussels 5, Belgium)

11-26. Chemistry in Industry and Agriculture, intern. conf., Moscow, U.S.S.R. (Central Office of Information, Reference Div., London, England)

12-15. International Assoc. of Milk, Food, and Environmental Sanitarians, Hartford, Conn. (H. L. Thomasson, P.O. Box 437, Shelbyville, Ind.)

12-17. International Aeronautic Federation, 58th annual general conf., Munich, Germany. (Natl. Aeronautic Federation, 1025 Connecticut Ave., NW., Washington, D.C. 20036)

12-17. American Chemical Soc., 150th annual, Atlantic City, N.J. (B. S. Baker, Inst. of Gas Technology, 3424 S. State St., Chicago, Ill. 60616)

12-17. Fracture, intern. conf., Sendai, Japan. (T. Yokobori, Dept. of Mechanical Engineering, Tohoku Univ., Sendai)

12-17. Highspeed Photography, 7th intern. conf., Zurich, Switzerland. (K. Pfister, Secretariat, Postfach 189, 8033 Zurich)

12-18. Astronautics, 16th intern. congr., Athens, Greece. (A. L. Jaumotte, Inst. de Mécanique Appliquée, Université Libre de Bruxelles, 50, avenue F. D. Roosevelt, Brussels, Belgium)



**YOU WON'T FIND
A MICROSCOPE
BETTER THAN THE
JEM-30
FOR DOUBLE THE PRICE.**

The JEM-30 is the electron microscope industrial quality-control and research labs have wanted for years. They find it ideal for examining replicated metal surfaces, ceramics and crystal structure in all kinds of materials at direct magnifications of up to 4000X. With the built-in camera, they get enlarged photos at 30,000X or more. And the JEM-30 needs no special installation or equipment, plugs into any 115-volt, 50/60-cycle AC line. Price: \$6950. **Make an appointment to see the JEM-30 at one of these demonstration centers.** T-461

Electron Optics Division



**FISHER
SCIENTIFIC**

ATLANTA 690 Miami Circle, NE,
Atlanta, Ga. 30324; 231-4120 (404)

BOSTON 461 Riverside Avenue,
Medford, Mass. 02155; 395-7800 (617)

CHICAGO 1458 N. Lamon Avenue,
Chicago, Ill. 60651; 261-1221 (312)

HOUSTON 4102 Greenbriar Drive,
Houston, Texas 77006; 523-6605 (713)

SAN FRANCISCO 832 Mahler Road,
Burlingame, Calif. 94010; 697-7322 (415)

MONTREAL 8505 Devonshire Road,
Montreal 9, Quebec; 735-2621 (514)

12-18. **Radiology**, 10th Brazilian congr., first Portuguese-Brazilian congr., Rio de Janeiro, Brazil. (A. Arantes Pereira, Av. Churchill 97, S/508, Rio de Janeiro)

12-19. **Mechanisms of Viral Carcinogenesis**, symp., Rehovoth, Israel. (Weizman Inst., Rehovoth)

12-25. **Speleology**, 4th intern. congr., Ljubljana and other cities, Yugoslavia. (W. Bohinec, Titova 17a, Ljubljana)

13-15. **Drugs Affecting Lipid Metabolism**, 2nd intern. symp., Milan, Italy. (R. Paoletti, Inst. of Pharmacology, Univ. of Milan, Via Andrea del Sarto 21, Milan)

13-15. **Mechanism and Control of Gastric Secretion**, Univ. of Alberta, Edmonton, Alta., Canada. (Gastric Secretion Symp. Committee, Rm. C148, University Hospital, Edmonton)

13-15. **Association of French-Speaking Pediatricians**, 20th congr., Nancy, France. (Prof. Pierson, Hôpital General, Nancy)

13-16. **Cancer**, Latin American congr., Bogota, Colombia. (A. Buendia-Ferro, Avenida 1^a no. 9-85, Bogota)

13-16. **Optical Properties and Electronic Structure of Metals and Alloys**, intern., Paris, France. (F. Abelès, Institut d'Optique, 3 Boulevard Pasteur, Paris)

13-16. **Natural Mammalian Hibernation**, 3rd intern. symp., Univ. of Toronto, Ontario, Canada. (E. South, Jr., Dept. of Physiology, Colorado State Univ., Fort Collins)

13-17. **Environmental Physiology**, symp., Tokyo, Japan. (A. Nixon, Fed. of American Societies for Experimental Biology, 9650 Wisconsin Ave., Bethesda, Md.)

13-17. **Microwave Behavior of Ferromagnetics and Plasmas**, intern. conf., London, England. (P. J. B. Clarricoats, IEE, Savoy Pl., London W.C.2)

13-17. **Mother-Infant Interaction**, symp., CIBA Foundation, London, England. (CIBA, 41 Portland Pl., London W.1)

13-18. **Society of German Chemists**, general assembly, Bonn, Germany. (The Society, Postfach 9075, 6 Frankfurt am Main, Germany)

13-18. **International Gravimetric Commission**, mtg., Paris, France. (P. Tardi, Intern. Assoc. of Geodesy, 19 rue Auber, Paris 93)

13-18. **Electroanalysis of Organic and Inorganic Substances**, German Chemical Soc., Bonn, Germany. (W. Pfab, Homburg str. 10, 67 Ludwigshafen, Germany)

13-18. **French Speaking Psychiatrists and Neurologists**, 63rd congr., Lausanne, Switzerland. (P. Warot, 10 rue d'Esquermes, Lille, France)

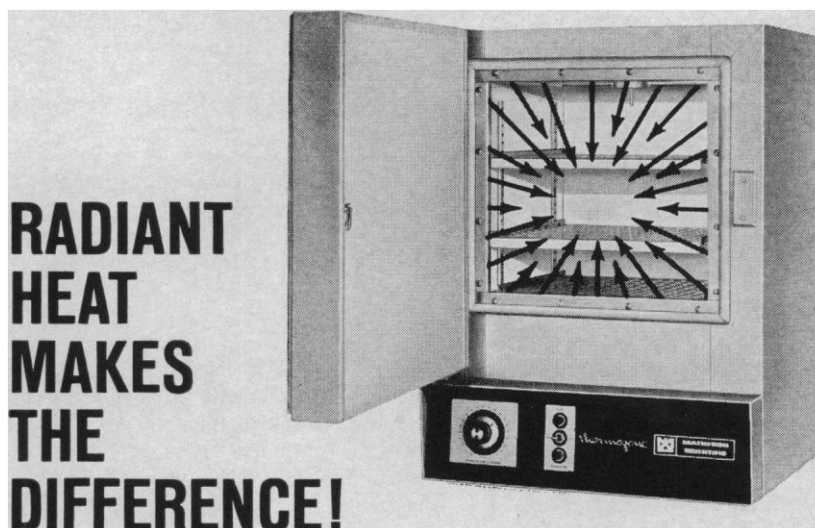
14-16. **Faraday Soc.**, mtg., Bristol, England. (The Society, 6 Gray's Inn Sq., London W.C.1)

14-17. **Theory of Self-adaptive Control Systems**, intern. symp., Teddington, England. (R. W. Wilde, Dept. of Electrical Engineering, Imperial College of Science and Technology, Exhibition Rd., London S.W.7)

14-20. **Hydrogeologists**, intern. congr., Hanover, Germany. (G. Castany, Intern. Assoc. of Hydrogeologists, 74, rue de la Federation, Paris 15^e, France)

14-20. **International Statistical Inst.**, 35th session, Belgrade, Yugoslavia. (The Institute, 2 Oostdijunlann, The Hague, Netherlands)

15-17. **Nuclear and Particle Physics**, conf., Univ. of Liverpool, England. (Inst.



New THERMOZONE ovens and incubator provide more uniform heat, in a hurry

The entire inner chamber is a radiator, reducing the stratified heat effect common in many ovens and incubators. Temperature is unusually stable and spatially uniform. There's plenty of capacity for quick warm-ups and rapid recovery (ovens reach 200° C in half the time of some competitive models). Check these and other features of our new Thermozone ovens and you'll see they represent the best solid value in their class. Insulation—3" fiberglass on all sides of chamber; Cabinet—double walled, space saving door, easily banked; Temperature Range—ambient to 230° C (Incubator model, ambient to 60° C); Hydraulic Thermoregulator—with auxiliary guardian contacts for added safety; Turbo Blower—on forced draft models; Underwriters' Laboratories approval.

GRAVITY CONVECTION OVENS			
	Inside Dimensions	Watts	Price
52750-10	12" h. x 13" w. x 12" d.	800	\$230.00
52750-20	18" h. x 19" w. x 15½" d.	1200	345.00
FORCED DRAFT OVENS			
	Inside Dimensions	Watts	Price
52755-10	11" h. x 12" w. x 12" d.	850	335.00
52755-20	17" h. x 18" w. x 15½" d.	1250	440.00
INCUBATOR—Temperature Range, Ambient to 60° C.			
	Inside Dimensions		Price
31900-10	18" h. x 19" w. x 15½" d.		350.00

Check THERMOZONE before you buy your next Oven or Incubator
Call or write for Bulletin or demonstration

Available only from

MATHESON SCIENTIFIC

CHICAGO 60622
1735 N. Ashland Ave.
Phone (312) 278-4630

BELTSVILLE, MD. 20705
10727 Tucker Ave.
Phone (301) 345-9550

DETROIT 48228
9240 Hubbell Ave.
Phone (313) 836-3301

LOS ANGELES 90022
5922 Triumph Street
Phone (213) 685-8060

CINCINNATI 45237
6265 Wiehe Road
Phone (513) 731-9100

HOUSTON 77011
6622 Supply Row
Phone (713) 823-1627

OAKLAND 94601
5321 East 8th Street
Phone (415) 533-9169

CLEVELAND 44125
4540 Willow Parkway
Phone (216) 883-2424

KANSAS CITY, MO. 64111
3160 Terrace Street
Phone (816) 561-8780

PHILADELPHIA 19148
Jackson & Swanson Sts.
Phone (215) 462-4700

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.

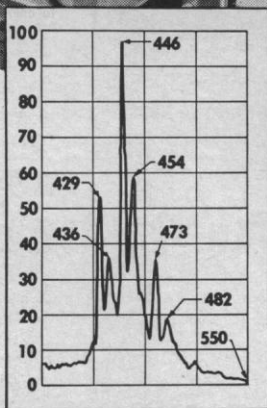
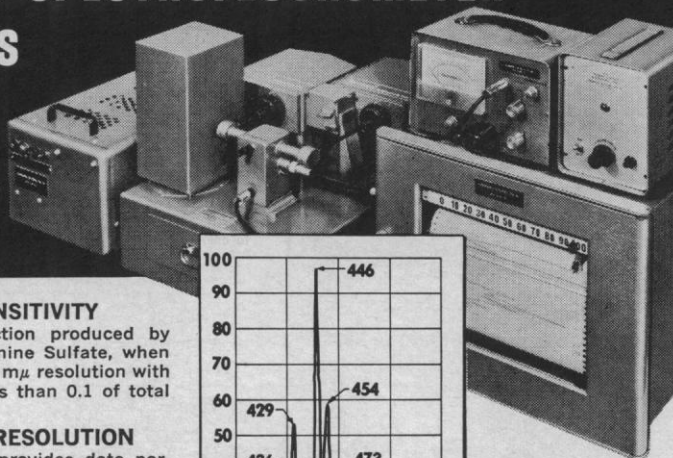
See your laboratory or hospital supplier for service.

PROFESSIONAL TAPE COMPANY, INC.
365E Burlington Ave. • Riverside, Ill. • 60546

FOCUS ON THESE FARRAND SPECTROFLUOROMETER FEATURES

...for greater analytical accuracy

- **SUPERIOR SENSITIVITY**
Full scale deflection produced by .0001 mg/ml Quinine Sulfate, when operating with 20 mμ resolution with noise level of less than 0.1 of total signal
- **SIGNIFICANT RESOLUTION**
1 mμ capability provides data normally obscured
- **MODULAR DESIGN**
Complete accessibility and component interchangeability
- **OPTICAL PRECISION**
Farrand Master Grating replicas... F/3.5 optical beam throughout



SPECTRO-FLUOROMETER GRAPH
Fluorescence Spectra, 1 mμ resolution. Coronene in Benzene 10⁻⁷ molar (0.03 micrograms/ml).

Compare before you buy. Send your sample for free comparative analysis.

Farrand OPTICAL CO., INC.

4405 Bronx Blvd. at E 238th St.
Bronx, N. Y. 10470 • 212 FA 4-2200

Think of Farrand first... for the finest scientific instruments

of Physics and the Physical Soc., 47 Belgrave Sq., London S.W.1)

15-17. **Regional Science Assoc.**, 2nd Far East congr., Tokyo, Japan. (G. Konno, Faculty of Economics, Univ. of Tokyo)

15-17. **Urban Planning Information Systems and Programs**, Chicago, Ill. (American Soc. of Planning Officials, 1313 E. 60 St., Chicago 60637)

15-18. **Bacteriophagy**, 2nd intern. symp., Bucharest, Rumania. (Secretariat, Str. Progresului 10, Bucharest)

16-17. **Astrodynamics Specialist conf.**, Monterey, Calif. (V. Szebehely, Celestial Mechanics Research Center, Box 2034 Yale Station, New Haven, Conn. 06520)

16-17. **Production of Automation Elements**, conf., Esztergom, Hungary. (L. Prockl, Scientific Soc. of Mechanical Engineers, Szabadsag ter 17, Budapest 5)

16-18. **Marine Microbiology**, symp., Soc. for General Microbiology, Aberdeen, Scotland. (J. Shewan, Torry Research Station, Dept. of Scientific and Industrial Research, 135 Abbey Rd., Aberdeen)

16-19. **General Practice**, 7th intern. congr., Salzburg, Austria. (K. Englemeier, Intern. College of General Practice, Lange Str. 21a, 4740 Oelde, Westphalia, Germany)

16-19. **American Medical Writers Assoc.**, Detroit, Mich. (J. E. Bryan, 2000 P St., NW, Washington, D.C. 20036)

17. **Southern California Acad. of Science**, Los Angeles County Museum, Los Angeles. (C. Rozaire, Los Angeles County Museum, 900 Exposition Blvd., Los Angeles 90007)

17-18. **Dialysis and Transplant**, 2nd intern. conf., Newcastle, England. (W. Drukker, Dept. of Medicine, Queen Wilhelmina Hospital, Amsterdam W., Netherlands)

17-18. **British Tissue Culture Assoc.**, Manchester, England. (L. M. Franks, Imperial Cancer Research Fund, Lincoln's Inn Fields, London W.C.2)

18-19. **Minnesota Acad. of Science**, Grand Rapids. (V. E. Anderson, 6 Zoology, Univ. of Minnesota, Minneapolis 55455)

18-21. **International Soc. of Radiographers and Radiological Technicians**, 3rd world congr., Rome, Italy. (E. R. Hutchinson, 159 Gabalfa Ave., Cardiff, Wales)

19-22. **Odontology**, 5th Latin American congr., Buenos Aires, Argentina. (A. F. Alvarez, Argentine Odontological Assoc., Junin 959, Buenos Aires)

19-22. **Power**, natl. conf., Albany, N.Y. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 10021)

19-23. **Cerebral Palsy**, Mediterranean symp., Rome, Italy. (Intern. Soc. for Rehabilitation of the Disabled, 701 First Ave., New York 10017)

19-25. **Greek Chemists Assoc.**, 3rd intern. meeting, Athens. (Dr. Parissakis, Technical Univ. of Athens, 42 Patission St., Athens)

19-25. **Elementary Particles**, 3rd intern. conf., Oxford, England. (R. C. Pepperell, Rutherford High Energy Laboratory, Chilton, Didcot, England)

19-25. **Immediate Separation and Chromatography**, intern., Athens, Greece.



**NEW
COMPACT
INFUSION
PUMP**

Model 975 is a new, low-cost pump designed for infusion only, using glass or disposable plastic syringes of 100, 50, 20, and 5 ml. size. Syringes are held in simple, snap-on syringe plates. The 30-position gearbox permits instantaneous selection of any synchronous speed over a 17,000 to 1 range. In all, 330 precise rates are possible from 0.00046 ml./minute to 154.8 ml./minute. Dimensions are 14" x 6¾" x 3½"; weight is 12 pounds.

Model 975, complete with 4 syringe plates\$275.00
f.o.b. Dover, Mass.

Write for Bulletin 975 and Catalog

HARVARD APPARATUS CO., INC.
DOVER · MASSACHUSETTS · U.S.A. · 02030
(a non-profit organization)

DIFCO

REAGENTS and MEDIA
for
TISSUE CULTURE
and
VIRUS PROPAGATION

These reagents are prepared and standardized to preserve unaltered the properties of the original material and include those commonly employed for the slide, roller tube and flask culture techniques for propagation and study of tissue cells and viruses *in vitro*.

REAGENTS OF ANIMAL ORIGIN
—Desiccated and Liquid

Plasma, Sera and Serous Fluids
Embryos and Embryo Extracts
Ultrafiltrates

REAGENTS, CHEMICALLY DEFINED
—Dilute and Concentrate

Synthetic Media—Eagle-HeLa, Eagle L, Scherer, 199, 703 and all formulas
Balanced Salt Solutions—Earle, Gey, Hanks, Osgood, Simms, Tyrode and all formulas

**ENZYMES INDICATORS AMINO
ACIDS HYDROLYSATES MEDIA
ENRICHMENTS BIOCHEMICALS
CARBOHYDRATES**

Descriptive Literature sent upon request

DIFCO LABORATORIES
DETROIT 1 MICHIGAN USA

Unmatched:
■ Versatility
■ Reliability
■ Simplicity of operation

**THE
PHYSIOGRAPH**
the complete physiological
recording system

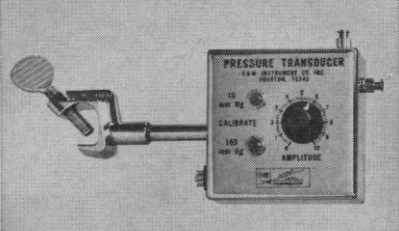


Recorders
Choice of one to six recording channels, 12 fixed-speed or continuously variable speed chart drive, rectilinear or curvilinear ink writing. Operational simplicity of all E & M precision equipment permits immediate use by personnel untrained in electronics.

Transducers
E & M provides Transducers for respiration—rate, depth; air flow; impedance pneumography; plethysmography, rheography; muscle pull—smooth, skeletal, cardiac; gut motility; pressure; blood pressure—direct and indirect; blood flow; circulation times; oxygen tension; pulse—rate, contour, velocity; electrocardiography; heart rates; heart sounds; electroencephalography; rheoencephalography; glandular secretions; galvanic skin response; temperature; electromyography; and others.

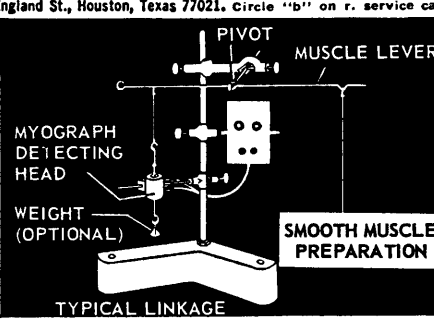
E & M INSTRUMENT CO., INC.
Box 14013 • 6030 England Street • Houston, Texas 77021
Instrumentation for Research and Education
Send for 32 page, fully-illustrated catalog, #105.

Circle "a" on readers' service card



**E & M's Newest Pressure Transducer
The Linear-Core™ Model P-1000**

The first in a wholly new series of force and pressure transducers is now available, featuring wide range, low volume displacement and a high overload factor. It reduces the per channel cost of pressure recording, since no pre-amplifier is required. Designed to operate into the PHYSIOGRAPH, the Linear-Core™ Model P-1000 provides maximum sensitivity of 4 mm. Hg/cm pen deflection. The overall range is from —100 to over 1000 mm.Hg. Volume displacement: 0.7 mm³ per 100 mm.Hg. Maximum overload: 4000 mm.Hg. Internal calibration: 10 and 100 mm.Hg. Linearity and hysteresis: ±0.5% of selected range. E & M Instrument Co., Inc., 6030 England St., Houston, Texas 77021. Circle "b" on r. service card



E & M's New Isotonic Myograph

Linear displacement transducer for smooth muscle and other constant tension studies: no internal hysteresis or friction; minimal system inertia; internal calibration. E & M Instrument Co., Inc., 6030 England St., Houston, Texas 77021
Circle "c" on readers' service card

EFFECTIVE AUGUST 9, 1965

New Organics

available in J. T. Baker's growing line

C₅-C₁₀ Alkanols

G164	5-Decanol, 'Baker' CH ₃ (CH ₂) ₄ CHOH(CH ₂) ₃ CH ₃ FW 158.29 B.P. 118-120°C./30mm.	25 g. 7.25 100 g. 21.75
J791	2,2-Dimethyl-3-heptanol, 'Baker' CH ₃ (CH ₂) ₃ CHOHC(CH ₃) ₂ FW 144.26 B.P. 78-80°C./18mm.	25 g. 10.00 100 g. 30.00
J805	3,4-Dimethyl-2-hexanol, 'Baker' CH ₃ CH ₂ CH(CH ₃)CH(CH ₃)CHOHCH ₃ FW 130.23 B.P. 170-171°C.	25 g. 15.00 100 g. 44.00
J944	2,2-Dimethyl-3-octanol, 'Baker' CH ₃ (CH ₂) ₄ CHOHC(CH ₃) ₂ FW 158.29 B.P. 88-91°C./20mm.	25 g. 11.50 100 g. 33.00
L823	4-Ethyl-3-hexanol, 'Baker' CH ₃ CH ₂ CH(C ₂ H ₅)CHOHCH ₂ CH ₃ FW 130.23 B.P. 82-84°C./30mm.	25 g. 6.00 100 g. 17.50
M085	3-Ethyl-3-pentanol, 'Baker' (C ₂ H ₅) ₃ COH FW 116.20 B.P. 143-144°C.	25 g. 5.00 100 g. 15.75
Q581*	2-Methyl-3-heptanol, 'Baker' CH ₃ (CH ₂) ₃ CHOHCH(CH ₃) ₂ FW 130.23 B.P. 73-75°C./19mm.	25 g. 7.75 100 g. 23.20
Q589*	3-Methyl-3-heptanol, 'Baker' CH ₃ (CH ₂) ₃ C(CH ₃)OHCH ₂ CH ₃ FW 130.23 B.P. 163-164°C.	25 g. 7.25 100 g. 23.20
Q590	4-Methyl-3-heptanol, 'Baker' CH ₃ (CH ₂) ₂ CH(CH ₃)CHOHCH ₂ CH ₃ FW 130.23 B.P. 75-77°C./20mm.	25 g. 9.00 100 g. 26.00
Q592	2-Methyl-2-hexanol, 'Baker' CH ₃ (CH ₂) ₃ C(CH ₃) ₂ OH FW 116.20 B.P. 142-143°C	25 g. 10.00 100 g. 30.00
Q593	3-Methyl-2-hexanol, Practical CH ₃ (CH ₂) ₂ CH(CH ₃)CHOHCH ₃ FW 116.20 B.P. 79-83°C./52mm.	25 g. 8.50 100 g. 25.60
Q594	3-Methyl-3-hexanol, 'Baker' CH ₃ (CH ₂) ₂ C(CH ₃)OHCH ₂ CH ₃ FW 116.20 B.P. 142-143°C.	25 g. 8.50 100 g. 25.60
Q855	2-Methyl-3-octanol, 'Baker' CH ₃ (CH ₂) ₄ CHOHCH(CH ₃) ₂ FW 144.26 B.P. 188-189°C.	25 g. 9.25 100 g. 28.00
Q874*	2-Methyl-3-pentanol, 'Baker' CH ₃ CH ₂ CHOHCH(CH ₃) ₂ FW 102.18 B.P. 127-128°C.	25 g. 8.50 100 g. 26.00

*Non mailable

The group of alkanols listed above have just been added to J. T. Baker's line of organic laboratory chemicals and are available for immediate delivery. They represent newest additions not yet listed in our catalogs. Check the chemicals you require and pass this list to your purchasing department. Orders can be sent to your nearest distributor of Baker organics or directly to J. T. Baker. And you'll get fast service.

Many other alkanols are described in our Catalog 641 and in the recently issued Supplement No. 1. Both are available on request. Write J. T. Baker Chemical Co., Phillipsburg, New Jersey.

J. T. Baker Chemical Co.



(G. Parissakis, Technical Univ. of Athens, Odos 28 Octovriou 42, Athens)

19-25. World Medical Assoc., 19th general assembly, London, England. (H. S. Gear, 10 Columbus Circle, New York 10019)

20. Organic Solid State, 3rd annual symp., Franklin Inst., Philadelphia, Pa. (M. M. Labes, Franklin Inst. Research Laboratories, Philadelphia 19103)

20. Photo-Electronic Image Devices as Aids to Scientific Observation, symp., London, England. (G. V. McGee, Dept. of Physics, Imperial College of Science and Technology, South Kensington, London S.W.7)

20-22. Glacier Mapping, symp., Ottawa, Ont., Canada. (Intern. Assoc. of Scientific Hydrology, 61 rue des Ronces, Gentbrugge, Belgium)

20-24. Biochemistry, 8th Latin meeting, Lisbon, Portugal. (S. F. Gomes da Costa, Laboratorio de Quimica Fisiologica, Faculdade de Medicina, Hospital de Santa Maria, Lisbon)

20-24. Burn Research, intern. congr., Edinburgh, Scotland. (A. Sutherland, Royal Hospital for Sick Children, Sciennes Rd., Edinburgh 9)

20-24. Fundamental Research, 3rd intern. symp., Cambridge, England. (H. W. Emerton, Reed Paper Group Ltd., Research and Development Centre, Aylesford, Maidstone, Kent, England)

20-24. International Council of Societies of Industrial Design, 4th general assembly and congr., Vienna, Austria. (Mrs. D. des Cressonieres, 70 Coudenberg, Brussels, Belgium)

20-24. Thermionic Electrical Power Generation, intern. conf., London, England. (Inst. of Electrical Engineers, Savoy Pl., London W.C.2)

20-27. Comparative and Cellular Pathology of Epilepsy, symp., Liblice, Czechoslovakia. (F. Hrabal, Foreign Relations Dept., Czechoslovak Academy of Sciences, Narodni tr. 3, Prague 1)

21-23. Chemurgic conf., Columbus, Ohio. (J. Ticknor, Chemurgic Council, 350 Fifth Ave., New York, N.Y.)

21-23. Fiber Soc., 25th mtg., Boston, Mass. (Box 625, Princeton, N.J.)

21-23. Magnetism, European conf., Vienna, Austria. (Verein Deutscher Eisenhüttenleute, Breit Str. 27, Düsseldorf, Germany)

21-23. Plasma Electromagnetics of Hypersonic Flight, 3rd symp., Boston and Bedford, Mass. (A. Cahill, Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Bedford, Mass. 01731)

21-23. Touch, Heat, and Pain, CIBA symp., London, England. (CIBA, 41 Portland Pl., London W.1)

21-25. Propagation Factors in Space Communication, symp., Rome, Italy. (Lt. Col. E. F. Dukes, Advisory Group for Aeronautical Research and Development, 64 rue de Varenne, Paris 7, France)

22-24. Practice of Gas Chromatography, 4th annual mtg., St. Louis, Mo. (N. Brenner, Perkin-Elmer Corp., Main Ave., Norwalk, Conn.)

22-24. Canadian High Polymer Forum, 13th, Ottawa, Ont. (D. M. Wiles, Div. of Applied Chemistry, National Research Council, Ottawa)

22-24. Military Electronics, conf. (MIL-E-CON 9), Washington, D.C. (L. H. King,

Atlantic Research Corp., Shirley Hwy. at Edsall Rd., Alexandria, Va.)

22-24. American Soc. of **Photogrammetry**, 30th semiannual conv., Wright-Patterson AFB, Ohio. (A. J. Cannon, Research and Technology Div., Wright-Patterson AFB)

22-25. Committee of European **Acarologists**, symp., Milan, Italy. (G. Mathys, Stations Federales d'Essais Agricoles, Lausanne, Switzerland)

22-25. **Amblyopia Exanopsia**, intern. symp., Liège, Belgium. (R. Weekers, Clinique Ophthalmologique, Université de Liège, 66 blvd. de la Constitution, Liège)

22-25. British Assoc. for **Cancer Research**, annual, Dublin, Ireland. (J. G. Bennerre, Courtauld Inst., Middlesex Hospital, London W.1, England)

22-26. **Paläontologische Gesellschaft**, mtg., Zurich, Switzerland. (E. Kuhn-Schnyder, Paläontologisches Institut d. Univ. Zurich, Künstlergasse 16, 8006, Zurich)

22-28. **Radiology**, 11th intern. congr., Rome, Italy. (Secretariat, Via Reno 21, Rome)

23-25. French **Medical Congr.**, Paris, France. (M. Bricaire, 40 rue Scheffer, Paris 16)

23-25. Society of the **Plastics Industry**, New England sect., 21st annual, Groton, Conn. (The Society, 250 Park Ave., New York 10017)

23-26. **Mycology**, tripartite conf., Germany, Austria, Switzerland; Klagenfurt, Austria. (Austrian Mycology Soc., Postfach 200, Vienna 1)

23-28. **Electronics and Vacuum Physics**, 3rd Czechoslovak conf., Prague, Czechoslovakia. (Organizing Committee, Ke Karlovu 5, Dept. of Electronics and Vacuum Physics, Prague 2)

24-25. **Communications**, 13th conf., Cedar Rapids, Iowa. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 21)

25-30. International Soc. of **Nephrology**, 3rd intern. congr., Washington, D.C. (Secretariat, 9650 Wisconsin Ave., Washington, D.C. 20014)

26-29. American Inst. of **Chemical Engineers**, 57th natl., Minneapolis, Minn. (AIChE, 345 E. 47 St., New York 10017)

27. Society for **Pediatric Radiology**, Washington, D.C. (J. L. Gwinn, Children's Hospital, 4614 Sunset Blvd., Los Angeles, Calif.)

27-29. Chemistry of the **Solvent Extraction of Metals**, intern. conf., Atomic Energy Research Establishment, Harwell, England. (F. K. Pyne, B. 329, Harwell)

27-1. **Community Oral Health**, hemispheric conf., San Juan, P.R. (N. O. Harris, School of Dentistry, Univ. of Puerto Rico, San Juan 00905)

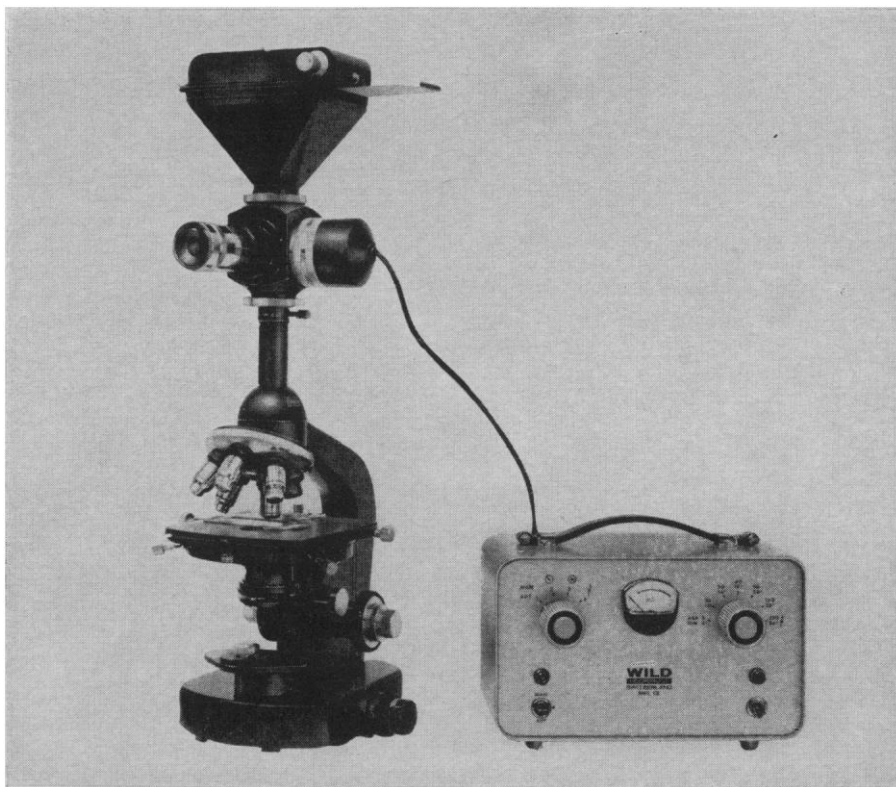
27-1. **Urology**, French congr., Paris, France. (J. Michon, French Assoc. of Urology, 47, boul. des Invalides, Paris 7)

28. Society of Austrian **Chemists**, general assembly, Graz, Austria. (The Society, Eschenbachgasse 9, Vienna 1)

28-29. **Electric Heating**, 7th biennial conf., Cleveland, Ohio. (A. F. Leatherman, Battelle Memorial Inst., 505 King Ave., Columbus, Ohio 43201)

28-30. German Soc. for **Documentation**, 17th annual, Constance, Germany. (The Society, Schubertstr. 1, Frankfurt am Main, Germany)

Researchers, Scientists, Technicians have long wanted speed, versatility, high quality and simplicity in Photomicrography.



Now they have it.

The Wild* Photo Automat attaches to any straight monocular tube microscope or the Wild Trinocular M-20 Research Microscope. It shoots color or B/W with equal ease on 35mm, #120 roll, or 6x9 cm cut film. Automatic film transport is available for 35mm film. The operator (experience unnecessary) focuses microscope and dials eyepiece power. He dials illumination (Brightfield, Darkfield, Widefield) and the film speed. He snaps the picture. Exposure time is automatic, so there's no waste of time or film.

The operator will find it quite difficult to get a bad photomicrograph.

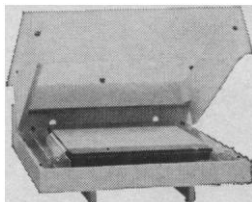
WRITE FOR BOOKLET MI-608 OR DEMONSTRATION.

WILD* HEERBRUGG	WILD HEERBRUGG INSTRUMENTS, INC. PORT WASHINGTON, NEW YORK Full Factory Services	In Canada: Wild of Canada Ltd., 881 Lady Ellen Place, Ottawa 3, Ontario
----------------------------------	---	--

Savant Analytical Systems for HIGH VOLTAGE ELECTROPHORESIS



ELECTROPHORESIS TANK has "see-through" Lucite walls that permit observation of entire run. Lightweight rack is adjustable for paper lengths up to 46". Ideal for separation of a wide variety of compounds, fingerprinting of peptides, amino acid mapping, preparative separations.



FLAT PLATE is light in weight, has stainless steel channels for trouble-free operation. Accommodates sheets up to 19" wide (24" long), as well as one or many strips of filter paper. Removable vessels make it easy to change buffer solutions. Use this system for separation of nucleotides, conjugated steroids, organic and inorganic acids.



POWER SUPPLIES in four performance-proven models cover range from 1,000 to 10,000 volts. All feature solid state circuitry throughout — instant starting — current overload relays and complete internal interlock protection — separate voltage and current meters. Available with preset timer for runs of up to five hours.

See us at Booth 515
ACS EXPOSITION
September 14-16
Atlantic City



**Savant
Instruments, Inc.**

221 PARK AVE. / HICKSVILLE, N. Y. / (516) WE 5-8774

28-30. Physics and Nondestructive Testing, symp., Dayton, Ohio. (D. W. J. McGonnagle, IIT Research Inst., 10 W. 35 St., Chicago, Ill. 60616)

28-30. Industrial and Commercial Power Systems, conf., Buffalo, N.Y. (J. A. Hart, Allison Div., General Motors Corp., Box 894, Indianapolis 6, Ind.)

28-1. Experimental Mechanics, 2nd intern. congr., Washington, D.C. (J. L. Jones, Soc. for Experimental Stress Analysis, 21 Bridge Sq., Westport, Conn. 06880)

28-1. Society for Experimental Stress Analysis, Washington, D.C. (B. E. Rossi, 21 Bridge Sq., Westport, Conn.)

28-1. Inhaled Particles and Vapors, Cambridge, England. (J. S. McLintock, Medical Service, Natl. Coal Board, Hobart House, Grosvenor Pl., London S.W.1)

28-1. Medical Electronics, European symp., Brighton, England. (J. Pearce, 4 Mill St., London W.1)

28-2. Hyperpure Materials in Science and Technology, Inst. for Applied Physics of Hyperpure Materials, Dresden, Germany. (The Institute, Dresden A 20, Winterbergstr. 28, East Germany)

29-1. Analytical Chemistry, symp., Graz, Austria. (Prof. Gutmann, Austrian Assoc. for Microchemistry and Analytical Chemistry, Eschenbachgasse 9, Vienna 1)

29-1. European Atomic Forum, 2nd congr., Frankfurt am Main, Germany. (European Atomic Energy Forum, 26, rue de Clichy, Paris 9)

29-1. German Soc. for Aviation and Space Medicine, intern. congr., Munich, Germany. (H. von Diringshofen, German Soc. for Aviation and Space Medicine, Silcherstr. 6, Munich 13)

29-1. American Vacuum Soc., 12th annual symp., New York, N.Y. (R. L. Jepsen, Varian Associates, 611 Hansen Way, Palo Alto, Calif.)

October

1-3. French-Language Assoc. of Scientific Psychology, 10th study sessions, Marseilles, France. (P. Fraisse, The Association, Inst. de Psychologie, 28, rue Serpente, Paris 6)

1-11. International Scientific Film Assoc., 19th annual congr., Bucharest, Rumania. (ISFA, 38, avenue des Termes, Paris 17, France)

2. Association of Clinical Biochemists, annual, London, England. (D. W. Moss, Postgraduate Medical School, Ducane Rd., London, W.12)

3-5. Refractory Metals, 4th symp., French Lick, Ind. (J. Maltz, Materials Research Div., NASA, 600 Independence Ave., SW, Washington, D.C. 20546)

3-7. American Phytopathological Soc., Miami Beach, Fla. (J. R. Shay, Dept. of Botany and Plant Pathology, Purdue Univ., Lafayette, Ind.)

3-8. Clinical Pathology, 6th intern. congr., Rome, Italy. (B. L. Della Vida, Via de'Penitenzieri 13, Rome)

3-9. Water Desalination, 1st intern. symp., Washington, D.C. (Atomic Industrial Forum, 850 Third Ave., New York 10022)

4-5. Enzyme Regulation, 4th intern. symp., Indiana Univ., Indianapolis. (G. Weber, Indiana Univ. School of Medicine, Indianapolis 46207)

4-5. Physical Metallurgy of Refractory Metals, conf., American Inst. of Mining, Metallurgical, and Petroleum Engineers, French Lick, Ind. (AIME, 345 E. 47 St., New York 10017)

4-6. Electronics, Canadian conf., Toronto, Ont. (W. M. Lower, 1819 Yonge St., Toronto)

4-6. Industrial Organic Analysis, Analytical Chemistry Div., Chemical Inst. of Canada, Sarnia, Ont. (R. M. Small, Research Dept., Polymer Corp, Sarnia)

4-6. International Scientific Radio Union/Inst. of Electrical and Electronics Engineers, fall meeting, Dartmouth College, Hanover, N.H. (IEEE, Box A, Lenox Hill Station, New York, N.Y.)

4-7. Instrument-Automation Conf., Los Angeles, Calif. (E. M. Grabbe, Instrument Soc. of America, 530 William Penn Pl., Pittsburgh, Pa. 15219)

4-7. Otorhinolaryngology, 62nd French congr., Paris, France. (H. Guillon, 6, avenue Mac-Mahon, Paris 16)

4-7. Research Equipment, exhibit and instrument symp., 15th annual, Bethesda, Md. (J. B. Davis, Natl. Institutes of Health, Bethesda, Md. 20014)

4-7. International Committee for Social Sciences Documentation, annual plenary assembly, Budapest, Hungary. (J. Meyriat, 27, rue St. Guillaume, Paris 7)

4-8. Aeronautic and Space Engineering, Soc. of Automotive Engineers, Los Angeles, Calif. (C. C. King, SAE Western Branch, 999 North Sepulveda Blvd., El Segundo, Calif. 90245)

4-8. Ciba Foundation Clinical Research Guest Conf., London, England. (Ciba, 41 Portland Pl., London W.1)

4-10. Physicists, conf., Frankfurt am Main, Germany. (G. Schubert, Inst. für Theoretische Physik, Universität, Mainz, Germany)

4-13. International Council for the Exploration of the Sea, 53rd annual meeting, Rome, Italy. (The Council, Charlottenlund Slot, Charlottenlund, Denmark)

4-13. Commonwealth Medical Conf., Edinburgh, Scotland. (Mrs. J. Hotchkiss, Ministry of Overseas Development, Eland House, Stag Place, London, S.W.1, England)

5-7. Industrial and Commercial Power Systems, conf., Buffalo, N.Y. (T. O. Zittel, Bethlehem Steel Co., 3555 Lake Shore Rd., Buffalo 14219)

5-8. International Committee of Weights and Measures, session, Sèvres, France. (Intern. Bureau of Weights and Measures, Pavillon de Breteuil, Sèvres, Sein-et-Oise, France)

5-9. Infectious Pathology, 4th intern. congr., Freiburg im Breisgau, Germany. (G. Mossner, Hugertstr. 55, Freiburg im Breisgau)

5-9. Tuberculosis, 18th intern. conf., Munich, Germany. (Intern. Union Against Tuberculosis, 15, rue Pomereu, Paris 16, France)

6-8. Dynamics of Fluids and Plasmas, symp., Univ. of Maryland, College Park. (S. I. Pai, Inst. for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park 20742)

6-8. Optical Soc. of America, annual meeting, Philadelphia, Pa. (M. E. Wurga, OSA, 1155 16th St., NW, Washington, D.C. 20036)

Three New Lists Available! Materials and Supplies for BSCS

Blue Version
Green Version
Yellow Version

Based on the
April, 1964
BSCS Newsletter

Wide selection of
products ready
to ship



Now you can make a complete selection of exactly the items you need—apparatus, chemicals, live or preserved specimens, charts, glassware—in accordance with the official BSCS lists of supplies. Simplify the procurement of all the biology teaching equipment you need at once—from the foremost manufacturer of scientific apparatus for schools.

Write for your copies today!

WELCH
SCIENTIFIC

THE WELCH SCIENTIFIC COMPANY
General Offices: 7352 N. Linder Avenue, Skokie, Illinois 60078
Eastern Office: 331 E. 38th Street, New York, New York 10016
Western Divisions: 840 Cherry Street, San Carlos, California 94070
13428 Wyandotte, North Hollywood, California 91605

New 12-Page Bulletin on Mettler Balances with **UNIDIGIT™** READOUT

You can now read the results of your weighings to 0.1 milligram with the new Mettler Digital Balances. The Unidigit readout presents only one number in each counter window at a time. Write for your copy of the bulletin about these new 160 gram capacity balances to Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey.

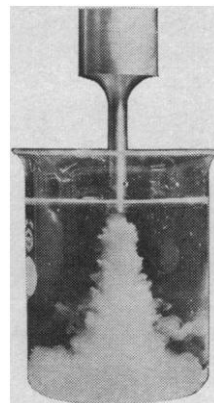
METTLER



HIGH INTENSITY **SONIFIER®**

TM of Branson

The Versatile Research And Processing Tool



- Biochemistry • Virology • Hematology
- Microbiology • Pharmacology • Pathology

Ultrasonically disintegrates cells and tissues with excellent enzyme activity and protein release. Perfect as Homogenizer and Emulsifier.

- Extreme Intensity With Power Selection
- Micro Tip, Continuous Flow
- Sealed Chamber Attachments
- Material Temp. Can Be Kept Below 10°C
- Ideal For Yeast, Staph, Strep, Skin, Heart Muscle, Micrococci, Mycobacteria, All Spores — Candida, Albicans, Bacillus Subtilis, Etc.

Model S-75—\$820; Model S-125—\$920



For Further Information Contact:

HEAT SYSTEMS CO.

60 Broad Hollow Rd.

Melville, L.I., New York 11749

Proof in use!

To our knowledge, no laboratory
has ever returned to glass
after trying —



FALCON^{T.M.} RIGID PLASTIC STERILE DISPOSABLE PIPETS (average cost — 7¢)

Accurate

- ☐ Individually tested
- ☐ Quality-controlled
- ☐ Crystal clear
- ☐ Sharp markings
- ☐ Chemically clean
- ☐ Biologically inert

Economical

- ☐ No breakage
- ☐ No washing
- ☐ No drying
- ☐ No sterilizing
- ☐ No wrapping
- ☐ No cotton plugging
- ☐ No sorting

**Free samples...
prove it yourself**



FALCON PLASTICS

Division of
B-D LABORATORIES, INC., Rutherford, New Jersey
20165

FALCON PLASTICS, DEPT. 8-27:

I would like to try FALCON plastic pi-
pets in my laboratory — please send
free samples.

Name _____ Position _____

Company or Laboratory _____

Address _____

City _____ State _____ Zip Code _____

6-8. Royal Inst. of **Public Health and Hygiene**, annual conf., Weymouth, Eng-land. (Secretary, RIPHH, 28 Portland Place, London, W.1, England)

6-10. **Wood and Organisms**, intern. symp., Berlin, Germany. (German Soc. for Wood Research, Danneckerstr. 37, Stuttgart S, Germany)

7-9. **Seismological** Soc. of America, eastern sec. 37th annual, Lamont Geological Observatory, Palisades, N.Y. (J. Dorman, Lamont Geological Observatory, Palisades 10964)

8-9. **Atlantic Coastal Plain Geological** Assoc., field trip, South Carolina. (D. J. Colquhoun, Dept. of Geology, Univ. of South Carolina, Columbia)

8-9. Association of **Midwestern College Biology Teachers**, 9th annual conf., Northern Illinois Univ., DeKalb)

8-9. **Indiana** Acad. of Science, fall meeting, Notre Dame. (C. F. Dineen, St. Mary's College, Notre Dame)

9. **Paleontological Research** Inst., Ithaca, N.Y. (K. V. W. Palmer, Paleontological Research Inst., 109 Dearborn Pl., Ithaca)

9-10. **Gastroenterology**, French conf., Paris, France. (R. Biguic, 79, Boulevard Malesherbes, Paris 8°)

9-13. American Soc. of **Clinical Hypnosis**, Chicago, Ill. (F. D. Nowlin, ASCH, 800 Washington Ave., SE, Minneapolis, Minn. 55414)

9-17. Electrical, Electronics, and Mech-
anical **Engineering**, first Pan American
congr., Mexico, D.F. (Inst. of Electrical
and Electronics Engineers, Box A, Lenox
Hill Station, New York 10021)

10-14. **Water Pollution Control** Fed.,
38th annual, Atlantic City, N.J. (R. E.
Fuhrman, 4435 Wisconsin Ave., NW,
Washington, D.C. 20016)

10-15. International Federation for
Documentation, congr., Washington, D.C.
(Secretariat, FID, 9650 Wisconsin Ave.,
Washington 20014)

10-15. **Electrochemical** Soc., meeting,
Buffalo, N.Y. (Executive Secretary, ES, 30
E. 42 St., New York 10017)

10-15. **Endocrinology**, 6th Pan Amer-
ican conf., Mexico, D.F. (G. Gual, Inst.
Nacional de la Nutrición, Dr. Jimenez
No. 261, Mexico 7)

10-16. American **Documentation** Inst.,
Washington, D.C. (J. E. Bryan, 2000 P
St., NW, Washington, D.C. 20036)

10-17. **Bronchoesophagology**, 1st Latin
American congr., Rio de Janeiro, Brazil.
(F. Aprigliano, Rua Alcindo Guanabara,
24, Sob-Loja 206, Rio de Janeiro)

10-17. **Otorhinolaryngology**, 14th Bra-
zilian congr., Rio de Janeiro, Brazil. (W.
Benevides, Rua Alcindo Guanabara, 24,
Sob-Loja 206, Rio de Janeiro)

10-17. **Plastic Surgery**, 10th Latin
American congr., Buenos Aires, Argen-
tina. (J. Norberto Spera, Riglos 624,
Buenos Aires)

11-13. **Color Centers in Alkali Halides**,
symp., Univ. of Illinois, Urbana. (D. W.
Compton, Dept. of Physics, Univ. of
Illinois, Urbana)

11-13. **Communications**, 11th natl.
symp., Utica, N.Y. (G. E. Brunette, Com-
munications Div. (EMCT) Rome Air De-
velopment Center, Griffiss AFB, New
York 13442)

11-13. Metabolic Roles of **Lipids**,
symp., Cincinnati, Ohio. (C. H. Hauber,

American Oil Chemists' Soc., 35 East
Wacker Dr., Chicago 1, Ill.)

11-13. **Manned Spaceflight**, 4th meet-
ing, St. Louis, Mo. (J. F. Yardley, McDon-
nell Aircraft Corp., P.O. Box 516, St.
Louis)

11-13. **National Acad. of Sciences**, fall
meeting, Univ. of Washington, Seattle.
(H. Neurath, Dept. of Biochemistry, Univ.
of Washington, Seattle 98105)

11-13. American **Record Management**
Assoc., 10th annual conf., Minneapolis,
Minn. (L. Loveless, Office Services, Honey-
well, Inc., 2701 Fourth Ave., S, Minneapo-
lis 55408)

11-14. Association of **Official Agri-
cultural Chemists**, 79th annual, Washing-
ton, D.C. (L. G. Ensminger, AOAC, Box
540, Benjamin Franklin Station, Wash-
ington 20044)

11-14. American **Oil Chemists' Soc.**, fall
meeting, Cincinnati, Ohio. (AOCS, 35 E.
Wacker Dr., Chicago, Ill. 60600)

11-15. Fall **Metallurgy** Days, Paris,
France. (Soc. Française de Metallurgie,
25 rue de Clichy, Paris 9°)

11-16. **Stomatology**, 19th French congr.,
Paris. (R. Cayron, 99, rue de Courcelles,
Paris 17°)

11-23. International Organization for
Standardization, Milan, Italy. (Soc. of Mo-
tion Picture and Television Engineers, 9
E. 41 St., New York 10017)

12-13. **Cardio-Renal Consequences of
Sustained Hypertension**, seminar, Phila-
delphia, Pa. (Miss S. Rosen, Symposium
Office, Hahnemann Medical College and
Hospital, 230 N. Broad St., Philadelphia
19102)

12-14. **Analytical Chemistry in Nuclear
Technology**, 9th conf., Gatlinburg, Tenn.
(C. D. Susano, Oak Ridge Natl. Labora-
tory, P.O. Box X, Oak Ridge, Tenn.
37831)

12-16. **Communications**, 13th intern.
congr., Genoa, Italy. (Inst. for Intern.
Communications, Viale Brigate Partigiane,
18, Genoa)

13. **Medical Physics**, seminar, New
York, N.Y. (American Inst. of Physics,
335 E. 45 St., New York 10017)

13. **Animal Nutrition Research** Council,
26th annual, Washington, D.C. (J. C.
Fritz, 12314 Madeley Lane, Bowie, Md.
20715)

13-15. **Detonation**, 4th symp., White
Oak, Silver Spring, Md. (S. J. Jacobs,
U.S. Naval Ordnance Laboratory, White
Oak, Silver Spring 20910)

13-15. American Assoc. of **Petroleum
Geologists**, mid-continent regional meet-
ing, Tulsa, Okla. (E. W. Ellsworth, AAPG,
Box 979, Tulsa 74101)

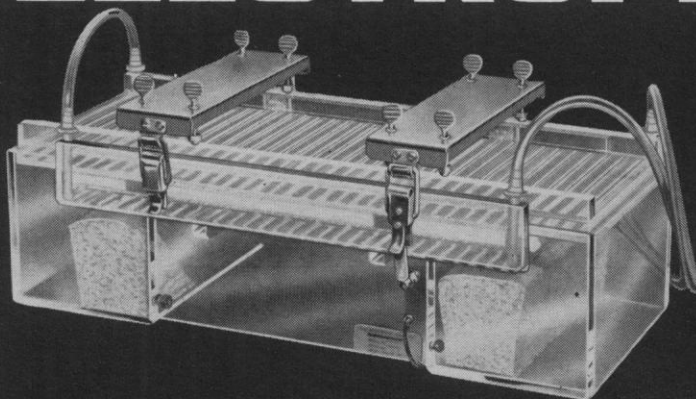
13-16. **Tau Beta Pi** Assoc., Inc., Univ.
of Maryland, College Park. (R. H. Nagel,
508 Dougherty Engineering Bldg., Univ.
of Tennessee, Knoxville)

13-17. **Soil Biology**, first Latin Ameri-
can colloquium, Bahia Blanca, Argentina.
(Organizing Committee, Inst. de Edafologia
e Hidrologia, Alem 925, Bahia Blanca,
Argentina)

13-19. **Instrumentation and Automa-
tion**, 3rd intern. congr., Düsseldorf, Ger-
many. (Nordwestdeutsche Ausstellungs-
und-Messe-Gesellschaft, Ehrenhof 4, 4000
Düsseldorf 10)

14. Association of **Vitamin Chemists**,
Chicago, Ill. (D. Olson, Dawe's Labora-
tories, 4800 S. Richmond St., Chicago)

ELECTROPHORESIS



EC 451 PRESSURE PLATE
ELECTROPHORESIS CELL
FOR PAPER ELECTROPHORESIS

Circle Reader Service Card for bibliography
and data sheets.

EC451 electrophoresis apparatus makes paper electrophoresis possible under uniform conditions of paper wetness. Six—2½" or sixteen—1" paper strips are placed between nonwettable plastic surfaces, thus preventing evaporation and allowing sample to travel through uniformly wet paper from beginning to end.

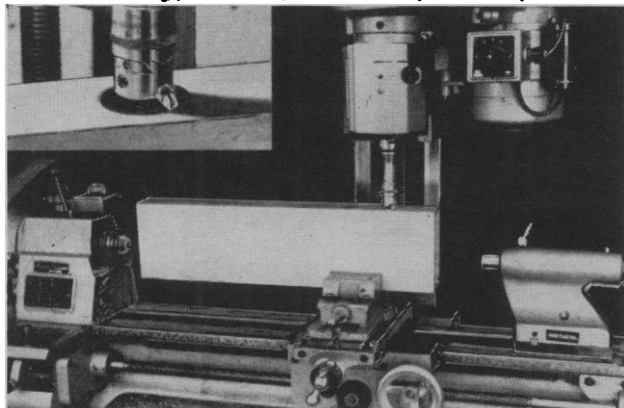
The paper strips with sample applied are then clamped between water-cooled plates. When ice water is circulated through these plates, as much as 2000 V at 200 MA can be passed through the cell, permitting rapid separation.

AMONG MANY RECENT APPLICATIONS FOR THE EC451

- Mobility studies of iodinated human serum albumin.
- Two-dimensional paper agar electrophoresis of hemoglobin.
- High-voltage electrophoresis BAIB.
- Super-cooled electrophoresis of P-esters in non-aqueous buffers.

E-C APPARATUS CORPORATION
ELECTROPHORESIS/COUNTERCURRENT
220 So. 40th St., Philadelphia, Pa. 19104
PHONE: Area Code 215—383-2204

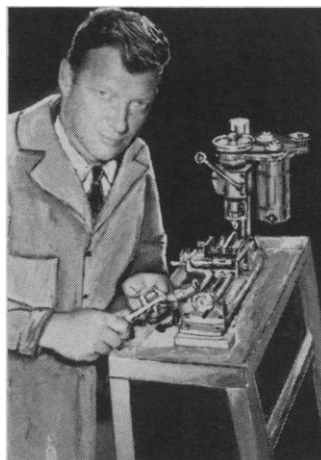
ACTION PHOTO OF A VERY UNUSUAL LATHE



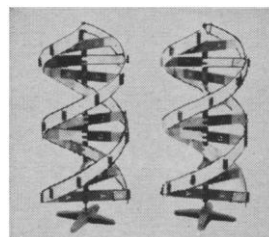
Boring a 2-inch hole in a casting is an unusual task for a lathe. In this example, the job might strain an ordinary drill press, and it might pose a problem with some of the lighter styles of milling machines. But here the bore is cut accurately and quickly on a new Maximat, the most modern lathe in the world. This machine actually has two beds . . . one horizontal, and the other arranged perfectly vertical. On the Vertabed travels a second headstock complete with quill feed . . . thus the precision built into this tool room lathe bed is used to locate and feed work under the Vertabed. The combination of two machines in one gives you the advantage of a lot of performance in limited space, plus some very real time and cost saving economies. Write today for free literature:

AMERICAN EDELSTAAL INC.
Dept. B-H5, 350 Broadway
New York 10013

(or) **CANADIAN EDELSTAAL**
47 Granger Ave.
Scarborough,
Ontario, Canada



MAKE MOLECULES ON A UNIMAT?



Even though Unimat can turn, drill, mill and saw parts so small you need tweezers to handle them, making a molecule, actual size, is quite impossible. But molecule models are made in prototype by Science Teaching Aids Co., of Pell Lake, Wisconsin, who are famous for their DNA "working molecule model".

Paul Dziulak, biologist (in photo) says, "Our work is very unusual. Our biological cell models are made of metals, hard plastics, epoxies. Nature seldom makes anything in true round, square or flat shapes. That's why we use Unimat in our design shop . . . because of its ability to tackle so many unusual jobs in machining, cutting, polishing impossible shapes."

Isn't it time to put Unimat to work for you too?

A special bulletin describing the Science Teaching Aids Co. shop, unusual Unimat applications and latest tech literature will be sent free on request.

Write today to

AMERICAN EDELSTAAL INC.
Dept. BB-H5, 350 Broadway
New York 10013

(or) **CANADIAN EDELSTAAL**
47 Granger Ave.
Scarborough,
Ontario, Canada

WARRANTY

If you are about to buy a system or an instrument with a high speed printer, read this:

Our confidence in Monroe DATA/LOG[®] Printers is backed by a full year's Warranty with on-site maintenance

So here's what we do, and this applies to every DATA/LOG printer, just as it has to the thousands we have made in the years past:

Every Monroe DATA/LOG printer carries a year's warranty with on-site maintenance by factory-trained service engineers. This warranty covers 2,200 hours, or

130,000,000 lines of printing on the MC 10-40 and MC 13-80, and 750,000,000 lines of printing on the ultra high speed MC 4000.

Following the first year's warranty the Monroe DATA/LOG printers can be placed on yearly maintenance contracts.

That, we think, is a forthright expression of confidence.

No other printers carry such a warranty—not for 130,000,000 lines of printing, and certainly not for 750,000,000 lines of printing, not with on-site service, not with maintenance contracts for years to follow.

We place such a warranty on our Monroe DATA/LOG printers. They're that good—that well designed—that reliable.

There are many Monroe products in daily use that are over forty years old, serviced and maintained on the same arrangements. Users won't trade them in on the new shiny models.

That's reliability. That's confidence in your product, and that's backing it up with deeds. That's putting your money where your product is. Think about it.

For specifications and warranty, write or call Monroe DATA/LOG Division of Litton Industries, 343 Sansome, San Francisco. (415) 397-2813.

MONROE DATA/LOG
DIVISION OF LITTON INDUSTRIES



14-15. International Federation of **Surgical Colleges**, 8th annual, Philadelphia, Pa.; 17, Atlantic City, N.J. (K. Cassels, Royal College of Surgeons, Lincoln's Inn Fields, London W.C.2, England)

14-16. British **Orthopaedic Assoc.**, fall meeting, London, England. (Joint Secretariat, 47 Lincoln's Inn Fields, London, W.C.2)

15. **Southern California Acad. of Science**, Los Angeles. (C. Rozaire, Los Angeles County Museum, 900 Exposition Blvd., Los Angeles 90007)

15-16. Contributions of Cytogenetics to the **Determination of Phylogenies**, 12th symp., Missouri Botanical Garden, St. Louis. (H. C. Cutler, Missouri Botanical Garden, St. Louis 63110)

15-16. National Soc. of **Professional Engineers**, 3rd annual conf., Oklahoma City, Okla. (NSPE, 2029 K St., NW, Washington 20006)

15-17. American **Heart Assoc.**, Scientific sessions, Bal Harbour, Fla. (AHA, 44 E. 23 St., New York 10010)

16-17. **Infectious Diseases Soc. of America**, Washington, D.C. (E. H. Kass, IDS, Boston City Hospital, Boston, Mass. 02118)

17-21. **Antimicrobial Agents and Chemotherapy**, 5th interscience conf./4th intern. congr. of chemotherapy, Washington, D.C. (R. W. Sarber, American Soc. for Microbiology, 115 Huron View Blvd., Ann Arbor, Mich.)

17-21. **Metallurgical Soc. of American Inst. of Mining, Metallurgical, and Petroleum Engineers**, Detroit, Mich. (AIME, 345 E. 47 St., New York 10017)

18. **Industrial Pharmacy** sect., American Pharmaceutical Assoc., 4th annual mid-west regional meeting, Chicago, Ill. (C. Schroeter, Abbott Laboratories, North Chicago, Ill.)

18-19. American Inst. of **Aeronautics and Astronautics/Canadian Aeronautics and Space Inst.**, Toronto, Ont., Canada. (D. L. Raymond, 1290 Sixth Ave., New York 10019)

18-19. **Systems Science**, conf., Case Inst. of Technology, Cleveland, Ohio. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 10021)

18-20. **Dynamic Stability of Structures**, intern. conf., Evanston, Ill. (G. Herrmann, Technological Inst., Northwestern Univ., Evanston 60201)

18-20. **Electromagnetic Radiation in Agriculture**, intern. conf., Roanoke, Va. (D. P. Brown, Niagara Mohawk Power Corp., 300 Erie Blvd. W., Syracuse, N.Y. 13202)

18-20. American Soc. of **Lubrication Engineers**, San Francisco, Calif. (D. B. Sanberg, 5 N. Wabash Ave., Chicago, Ill.)

18-20. Canadian Inst. of **Mining and Metallurgy**, annual western meeting, Winnipeg, Canada. (CIMM, 906 Drummond Bldg., 1117 St. Catherine St. W., Montreal 2, P.Q., Canada)

18-20. **Nuclear Science**, 12th symp., San Francisco, Calif. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 10021)

18-20. Applied **Spectroscopy**, 12th symp., Ottawa, Ont., Canada. (R. V. Baker, Aluminum Co. of Canada, Arvida, P.Q., Canada)

18-21. **Advances in Gas Chromatog-**

raphy, 3rd intern. symp., Houston, Tex. (A. Zlatkis, Dept. of Chemistry, Univ. of Houston, Houston)

18-21. **Management Information and Data Transfer Systems**, American Univ., Washington, D.C. (R. I. Cole, Center for Technology and Administration, American Univ., 2000 G St., NW, Washington, D.C. 20006)

18-22. American Soc. of **Civil Engineers**, Kansas City, Mo. (W. H. Wisely, ASCE, 345 E. 47 St., New York 10017)

18-22. Society for **Nondestructive Testing**, 25th natl. conv., Detroit, Mich. (N. H. Cale, Anaconda American Brass Co., Research and Technical Center, P.O. Box 747, Waterbury, Conn.)

18-22. American **Public Health Assoc.**, 93rd annual, Chicago, Ill. (APHA, 1790 Broadway, New York, N.Y.)

18-22. **Radioisotope Instruments in Industry and Geophysics**, Warsaw, Poland. (J. H. Kane, Div. of Special Projects, U.S. Atomic Energy Commission, Washington, D.C.)

18-22. American Soc. for **Metals**, natl. congr., Detroit, Mich. (A. R. Putnam, ASM, Metals Park, Ohio)

18-22. Application of **Radioisotopes in Gastroenterology**, symp., Lausanne, Switzerland. (A. Vannotti, Clinique Médicale Universitaire, Hôpital Cantonal, Lausanne)

18-22. American College of **Surgeons**, annual clinical congr., Atlantic City, N.J. (American College of Surgeons, 55 East Erie St., Chicago, Ill. 60611)

19-20. International **Rhinologic Soc.**, 1st congr., Kyoto, Japan. (H. A. E. van Dishoeck, Academisch Ziekenhuis, Leiden, Netherlands)

19-21. Association of **Analytical Chemists**, 13th conf., Detroit, Mich. (G. Schenk, Dept. of Chemistry, Wayne State Univ., Detroit 48202)

19-21. **Cloud Physics and Severe Storms**, conf., American Meteorological Soc., Reno, Nev. (K. C. Spengler, 45 Beacon St., Boston 8, Mass.)

19-21. Radio Astronomical and Satellite **Studies of the Atmosphere**, 2nd symp., Boston, Mass. (G. A. Cushman, Wentworth Inst., 550 Huntington Ave., Boston)

19-22. Economics of **Automatic Data Processing**, symp., Rome, Italy. (Intern. Computation Center, Viale della Civiltà del Lavoro, 23, P.O.B. 10053, Rome)

20-21. **Airborne Infection**, 2nd intern. symp., Johns Hopkins School of Medicine, Baltimore, Md. (E. K. Wolfe, Fort Detrick, Frederick, Md. 21701)

20-21. International Soc. of **Audiology**, 2nd congr., Kyoto, Japan. (M. Goto, Dept. of Otolaryngology, Kyoto Univ., Shogoin, Sakyo-ku, Kyoto)

20-22. **Circuit and System Theory**, Allerton Conf., Univ. of Illinois, Monticello. (M. E. Van Valkenburg, Dept. of Electrical Engineering, Univ. of Illinois, Urbana 61803)

20-22. **Design of Experiments**, 11th conf., Hoboken, N.J. (F. G. Dressel, Army Research Office-Durham, Box CM, Duke Station, Durham, N.C. 27706)

20-22. **Parenteral Drug Assoc.**, annual conv., New York, N.Y. (PDA, Western Saving Fund Bldg., Broad and Chestnut St., Philadelphia, Pa. 19107)

21. **New Mexico Acad. of Science**, Albuquerque. (K. S. Bergstresser, 739 42nd St., Los Alamos, N.M.)

21-22. **Copolymer** conf., Ludwigshafen, Germany. (Deutsche Bunsen-Gesellschaft für Physikalische Chemie, Varrentrappstr. 40-42, 6 Frankfurt am Main, Germany)

21-22. **Electrochemical Current Sources**, symp., Frankfurt am Main, Germany. (Gesellschaft Deutscher Chemiker, Postfach 9075, 6 Frankfurt am Main)

21-23. **Microminiaturization in Automatic Control**, symp., Munich, Germany. (G. Müller, Siemens & Halske AG, Wernerwerk für Messtechnik, Postfach 834, Karlsruhe, Germany)

21-23. Society of **Photographic Scientists and Engineers**, symp., Washington, D.C. (W. S. Dempsey, Houston Fearless Corp., 1413 K St., NW, Washington 20005)

22-23. **Data Processing** in Public Libraries, conf., Drexel Inst. of Technology, Philadelphia, Pa. (M. D. Warrington, Graduate School of Library Science, Drexel Inst. of Technology, Philadelphia 19104)

23-28. American Acad. of **Pediatrics**, annual, Chicago, Ill. (R. G. Frazier, AAP, 1801 Hinman Ave., Evanston, Ill. 60204)

24-27. Society of American **Foresters**, annual, Detroit, Mich. (Society of American Foresters, 1010 16th St., NW, Washington 20036)

24-29. **Stable Isotopes**, 4th symp., Leipzig, East Germany. (Inst. für Stabile Isotope, Deutsche Akademie der Wissenschaften, Permoserstr. 15, 705 Leipzig)

24-30. American College of **Gastroenterology**, Bal Harbour, Fla. (D. Weiss, 33 W. 60 St., New York 10023)

25-27. **Chemical Engineering**, 15th conf., Quebec, Que., Canada. (Chemical Inst. of Canada, 48 Rideau St., Ottawa 2, Ont.)

25-27. Functional Organization of the **Compound Eye**, symp., Karolinska Inst., Stockholm, Sweden. (W. E. Savely, Air Force Office of Scientific Research, Washington, D.C. 20333)

25-27. **Electrical Insulation**, Natl. Acad. of Sciences-Nat. Research Council conf., Buck Hill Falls, Pa. (D. W. Thornhill, NAS, 2101 Constitution Ave., NW, Washington, D.C.)

25-27. **Electronics**, natl. conf., Chicago, Ill. (R. G. Brown, Dept. of Electrical Engineering, Iowa State Univ., Ames 50010)

25-27. **Nuclear and Engineering Ceramics**, conf., Harwell, England. (G. H. Stewart, British Ceramic Soc., Shelton House, Shelton, Stoke-on-Trent, England)

25-27. Society of **Rheology**, Case Inst. of Technology, Cleveland, Ohio. (J. C. Miller, Union Carbide Plastics Co., Bound Brook, N.J.)

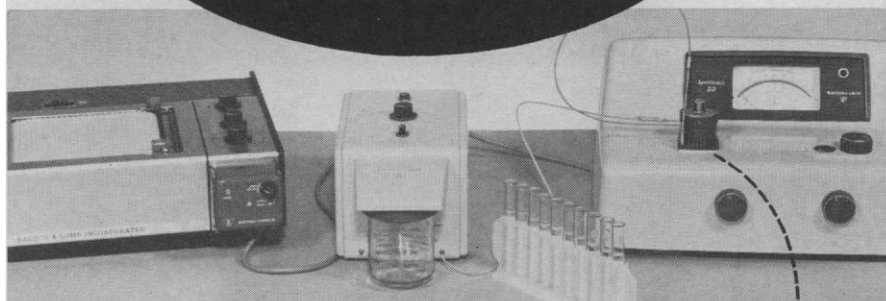
25-29. **Hypotensive Polypeptides**, intern. symp., Florence, Italy. (E. G. Erdös, Dept. of Pharmacology, Univ. of Oklahoma Medical Center, Oklahoma City 73104)

26. American Soc. of **Safety Engineers**, annual, Chicago, Ill. (A. C. Blackman, ASSE, 5 N. Wabash, Chicago, Ill.)

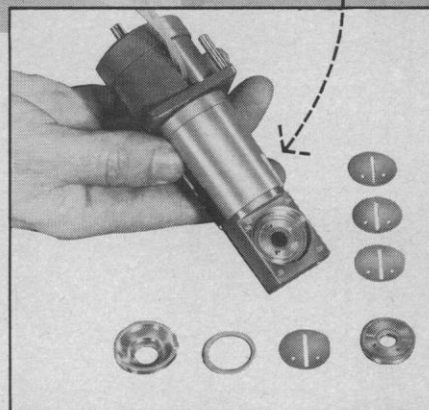
26-28. **Fluid Amplification**, symp., Washington, D.C. (J. M. Kirschner, Fluid Systems Branch, Harry Diamond Laboratories, Washington 20438)

26-28. **Shock and Vibration**, 25th symp., New Orleans, La. (Shock and Vibration Information Center, Code 4021, U.S. Naval Research Laboratory, Washington, D.C. 20390)

READ OPTICALLY DENSE SOLUTIONS... RELIABLY... WITHOUT DILUTION



with the New B&L SHORT-PATH DATA ACQUISITION SYSTEM



Samples that are too dark or too dense for conventional spectrophotometric readings can now be handled reliably, rapidly, and routinely. Gone is the necessity for time-consuming, error-prone dilutions. The newly developed short-path Flow-Thru Cuvette saves time and trouble. It has a short-path length capability between 0.1mm and 1.0mm . . . provided by an easily interchangeable stainless steel shim. Available shims provide path lengths of 0.1mm, 0.2mm, 0.5mm and 1.0mm.

The unique B&L Flow-Thru Cuvette can save up to 70% of your time. Samples can be introduced and removed, without special test tubes, as fast as 4 per minute!

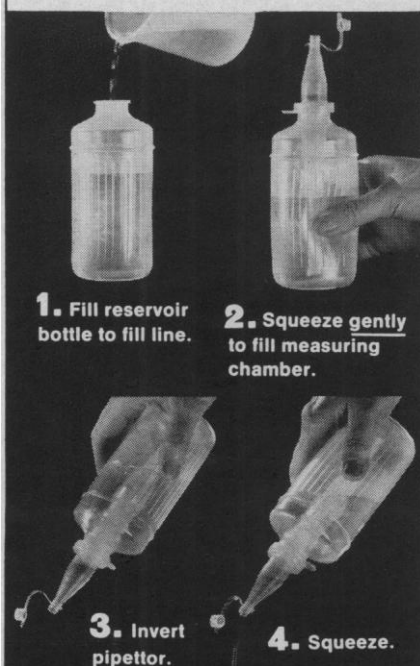
It's part of our modular Data Acquisition System. Buy the whole system . . . or any modular component . . . readily adaptable to your current Spectronic 20. For further information, or a demonstration in your laboratory, write Bausch & Lomb, 75920 Bausch Street, Rochester, New York 14602.

BAUSCH & LOMB

FOR RAPID, REPETITIVE,
RELIABLE DISPENSING...

THE NALGENE® AUTOMATIC CONSTANT VOLUME PIPETTOR

Precision engineered—delivers an exact, fixed quantity every time... automatically... accurately... using only one hand. Here's all you do:



Use several for procedures requiring repeated dispensing of different reagents. Unbreakable... resists most chemicals. Disassembles in seconds for cleaning and refilling. All units have 8-oz. polyethylene reservoir bottle with choice of 1, 2, 3, or 5 ml polypropylene measuring chamber. Price, \$4.50 each. May be assorted with other Nalgene Labware for maximum discount. Ask your lab supply dealer, or write Dept. 21201, The Nalge Co., Inc., 75 Panorama Creek Drive, Rochester, New York 14625.



NEW BOOKS

(Continued from page 964)

Growth and Development (8 papers); and Special Topics (3 papers).

Atlas of Neuropathology. W. Blackwood, T. C. Dodds, and J. C. Sommerville. Williams and Wilkins, Baltimore, ed. 2, 1964. 246 pp. Illus. \$12.

Atlas of Steroid Spectra. Walter Neudert and Horst Röpke. Translated from the German by John B. Leane. Springer-Verlag, New York, 1965. Unpaged. Illus. \$36. In English and German.

Automat und Mensch: Kybernetische Tatsachen und Hypothesen. Karl Steinbunch. Springer, Berlin, 1965. 466 pp. Illus. DM. 36.

The Baboon in Medical Research. Proceedings of a symposium (San Antonio, Tex.), November 1963. Harold Vagtborg, Ed. Published for the Southwest Foundation for Research and Education, San Antonio, Univ. of Texas Press, Austin, 1965. 655 pp. Illus. \$12.50. Forty-six papers; the sections are Taxonomy, Habitat, Social Order, and Ecology (4 papers); Social Order, Ecology, and Maintenance in Captivity (7 papers); Morphology and Function (7 papers); Physiology and Biochemistry (9 papers); Pathology (8 papers); Experimental Physiology (8 papers); and Experimental Medicine (3 papers).

Balsam Fir: A Monographic Review. E. V. Bakuzis and H. L. Hansen. Univ. of Minnesota Press, Minneapolis, 1965. 467 pp. Illus. \$9.50. Contributions by F. H. Kaufert, D. B. Lawrence, D. P. Duncan, S. S. Pauley, R. M. Brown, R. E. Schoenike, and L. W. Krefting.

Biochemie der Nebennierenrinden-Hormone. H. J. Hübener and W. H. Staib. Thieme, Stuttgart, 1965. 269 pp. Illus. Paper, DM. 58.

Biological Statistics: An Introduction. S. C. Pearce. McGraw-Hill, New York, 1965. 226 pp. \$9.50. McGraw-Hill Series in Probability and Statistics.

Biologie der Antibiotica. Hans Zahner. Springer, Berlin, 1965. 121 pp. Illus. Paper, DM. 8.80.

Biology. Karl von Frisch. Translated from the German edition (1964) by Jané M. Oppenheimer. Harper and Row, New York, 1965. 534 pp. Illus. \$9.50.

The Biology of Cells. Herbert Stern and David L. Nanney. Wiley, New York, 1965. 560 pp. Illus. \$7.95.

The Biology of Organisms. William H. Telfer and Donald Kennedy. Wiley, New York, 1965. 388 pp. Illus. \$6.95.

Biophysical Principles of Structure and Function. Fred M. Snell, Sidney Shulman, Richard P. Spencer, and Carl Moos. Addison-Wesley, Reading, Mass., 1965. 400 pp. Illus. \$12.75.

Cell Biology. E. D. P. DeRobertis, Wiktor W. Nowinski, and Francisco A. Saez. Saunders, Philadelphia (ed. 4 of *General Cytology*), 1965. 464 pp. Illus. \$10.50.

The Clinical Psychiatry of Late Life. Felix Post. Pergamon, New York, 1965. 183 pp. Illus. Paper, 21s. The Commonwealth and International Library, Mental Health and Social Medicine Division.

Comparative Anatomy of the Vertebrates. George C. Kent, Jr. Mosby, St. Louis, Mo., 1965. 471 pp. Illus. \$9.25.

Comparative Atherosclerosis. The morphology of spontaneous and induced atherosclerotic lesions in animals and its relation to human disease. James C. Roberts and Reuben Straus, Eds. Harper and Row, New York, 1965. 559 pp. Illus. Plates. \$20. The volume contains papers contributed by 56 authors.

Comparative Hematology. Warren Andrew. Grune and Stratton, New York, 1965. 196 pp. Illus. \$22.75.

The Control of Fertility. Gregory PinCUS. Academic Press, New York, 1965. 380 pp. Illus. \$9.

Cultiver l'Océan. Maurice Aubert. Presses Universitaires de France, Paris, 1965. 212 pp. Illus. Paper, F. 16.

Current Concepts in Surgery: A Clinical Interpretation of Basic Knowledge. John H. Davis, Ed. McGraw-Hill, New York, 1965. 400 pp. Illus. \$15. Ten papers: "Physical instrumentation in medical science" by George G. Armstrong, Jr.; "Staphylococcal disease" by John H. Davis; "A physiologic approach to the surgical treatment of peptic ulcer" by M. Michael Eisenberg and E. R. Woodward; "Respiratory physiology and its chemistry" by Watts R. Webb; "Surgical physiology of the exocrine pancreas" by Alan P. Thal; "Understanding thermal burns and principles of management" by Curtis Price Artz; "Current concepts of therapy for derangements of extracellular fluid" by Hastings K. Wright, Donald S. Gann, and William R. Drucker; "Biology of metastases" by Bernard Fisher and Edwin R. Fisher; "Adenomas of the colon and rectum" by Jack W. Cole; and "The passive transfer of transplantation immunity with cellular extracts" by William D. Holden.

Current Research in Leukaemia. F. G. J. Hayhoe, Ed. Cambridge Univ. Press, New York, 1965. 318 pp. Illus. \$22.50. Twenty-two papers presented at a post-graduate symposium (Cambridge, England), August 1964; The sections are: Cytology and Electron Microscopy (4 papers); Cytogenetic Studies (3 papers); Studies of Cell Growth and Division (8 papers); The Burkitt Tumour (1 paper); Biochemistry (2 papers); Therapy (1 paper); and Epidemiology (3 papers).

Cyclophosphamide (Cytosan). Proceedings of a symposium (London), October 1963. G. Hamilton Fairley and J. M. Simister, Eds. Williams and Wilkins, Baltimore, 1965. 212 pp. Illus. \$9.75. Thirty-two papers.

Diabetes Mellitus. Lehrbuch für Ärzte und Studierende. Konrad Seige. Thieme, Leipzig, 1965. 251 pp. Illus.

Drill's Pharmacology in Medicine. Joseph R. DiPalma, Ed. McGraw-Hill, New York, ed. 3, 1965. 1502 pp. Illus. \$22.50. Ninety papers.

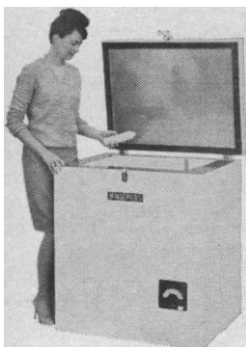
The Evoked Vocal Response of the Bullfrog: A Study of Communication by Sound. Robert R. Capranica. M.I.T. Press, Cambridge, Mass., 1965. 120 pp. Illus. \$5. Research Monograph, No. 33.

Evolving Genes and Proteins. A symposium (New Brunswick, N.J.), September 1964. Vernon Bryson and Henry J. Vogel, Eds. Academic Press, New York, 1965. 653 pp. Illus. \$19.50. Twenty-eight papers.

Experimental Microbial Physiology. Herman C. Lichstein and Evelyn L. Ogino

ultra-low

Temperature STORAGE FREEZERS



4.5 cu. ft. capacity

for storage of specimens,
medical supplies, pharmaceu-
ticals and chemically-
reactive materials.

- Compact and convenient to use.
- Simple plug-in 115VAC operation.
- No liquid CO₂ or dry ice required.
- Indicating controller.
- Dependable mechanical refrigeration.

To —46C \$595 Model L4.5-50
To —74C \$990 Model L4.5-100

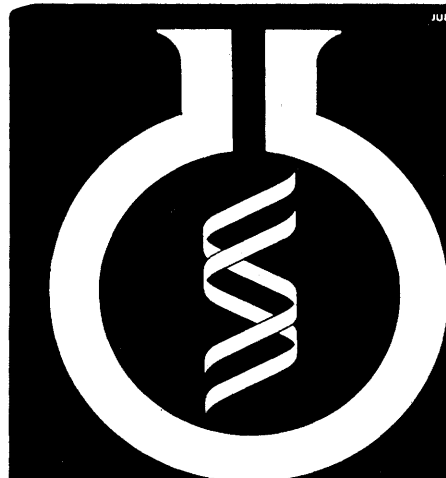
Optional accessories: casters,
alarm system, temperature recorders.

PURCHASE • RENT • LEASE



MISSIMERS
INCORPORATED

3739 San Fernando Rd., Glendale, Calif. 91204
(213) 245-8471 TWX 213-240-2187



P-L Biochemicals Inc. | specifications and price list

yours for the asking!

P-L Biochemicals, Inc. (formerly Pabst Laboratories) has a new catalog ready for you now. Complete specifications and prices for all of our products are contained in this handsome new book. Won't you write today?

P-L Biochemicals, Inc., 1037 W. McKinley, Milwaukee, Wis. 53205



lightweight!

Plastic is not only light—it's featherweight compared to metal. Lightweight plastic cages allow more work performance per man hour with less effort. But take the other advantages—ease of cleaning, smooth warm surfaces, clarity, imperviousness to animal acids and most detergents.

Plastic cages are available in many different materials, one is certain to suit your particular needs. Also available is a complete line of accessories.

Have you tried AB-SORB-DR!®—the remarkable new bedding designed for animals and used now throughout the U.S. and Canada. Ask your distributor or contact us for free samples.

Write for our free catalog of all our quality products

lab products, inc.

P.O. BOX 176
Kennett Square, Pa. 19348
Area Code 215 444-5441

Measure solution conductivity continuously with L&N's improved Monitor

Now, equipped with a new meter and other improvements, L&N's completely transistorized line-operated Conductivity Monitor offers even greater reliability for direct-reading measurements in the laboratory or on the process line.

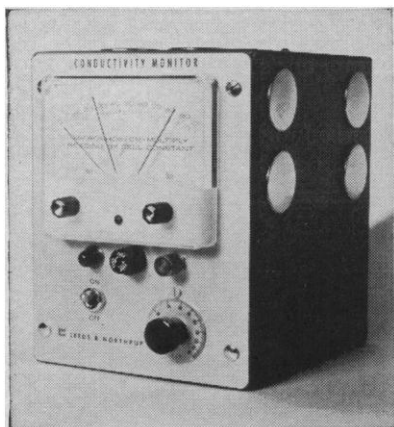
Outstanding features include:

- * continuous indication, even above set point(s) when one- or two-point alarm signalling is provided
- * a wide choice of ranges for versatility of application (even a 0 to 1-micromho/cm range, for high-purity water measurements)
- * an output d-c signal for transmission to a recorder, controller or other data-logging equipment
- * a model to meet your needs: either the panel- or wall-mounted industrial model (as illustrated) or a light-weight portable unit.

Prices start at \$235 for the Industrial Model; the Portable Model is \$265. Ask for Data Sheet B2.2121 (or B2.2122, describing the High-Purity Water Monitor) from Leeds & Northrup Company, 4926 Stenton Avenue, Philadelphia 44, Pa. or your nearby L&N office.



LEEDS & NORTHRUP
Pioneers in Precision



sky. Freeman, San Francisco, 1965. 153 pp. Illus. Paper, \$3.75.

The Fifth International Thyroid Conference (Rome), May 1965. M. Andreoli *et al.*, Eds. Fifth International Thyroid Conference, Rome (Secretary: Mario Andreoli, Patologia Medica Policlinico, Umberto 1, Rome, Italy), 1965. 406 pp. Paper. Abstracts of 128 papers presented at the conference are given in English, Italian, French, and German. Abstracts of the Van Meter Prize Essay and the Dunhill Memorial Lecture are included.

Genetics. Robert C. King. Oxford Univ. Press, New York, ed., 2, 1965. 464 pp. Illus. \$8.50.

Genetics and the Interaction of Blood Clotting Factors. Transactions of a conference (Amsterdam), August 1964. F. Koller and F. Streuli, Eds. Schattauer, Stuttgart, Germany, 1965. 365 pp. Illus. DM. 72. Thirty-one papers; the sections are: Interaction of Clotting Factors (5 papers); Lipids and Blood Coagulation (4 papers); Metabolic Aspects of Imbalance in Haemostasis: Consumption of Factors in Disease (2 papers); Genetics of Haemorrhagic Diathesis (6 papers); Short Communications (11 papers); and Reports of Subcommittees (3 papers).

Group Therapy in Childhood Psychosis. Rex. W. Speers and Cornelius Lansing. Univ. of North Carolina Press, Chapel Hill, 1965. 206 pp. \$6.

Human Body Composition: Approaches and Applications. Conference proceedings (London), August 1963. Josef Brozek, Ed. Pergamon, New York, 1965. 323 pp. Illus. \$12. Eighteen papers.

Handbuch der Histochemie. vol. 5, pts. 1 and 2. pt. 1, *Biochemie der Fette und Lipide: Methoden der Lipidhistochemie* (406 pp. 1965. DM. 112), H. Debusch and Max Clara; pt. 2, *Histochemistry of Lipids in Pathology* (762 pp., 1964. DM. 176), M. Wolman. Fischer, Stuttgart, Germany. Illus.

Identification d'une nouvelle maladie à virus de la Vigne, "la flavescence dorée". Etude des phénomènes de localisation des symptômes et de rétablissement. A. Caudwell. Institut National de la Recherche Agronomique, Paris, 1965. 193 pp. Illus. Paper, F. 25.

An Index of Responses to the Group Rorschach Test. pt. 2, *Studies on the Psychological Characteristics of Medical Students.* Caroline Bedell Thomas, Donald C. Ross, and Ellen S. Freed. Johns Hopkins Press, Baltimore, 1965. 548 pp. \$15.

The Inflammatory Process. Benjamin W. Zweifach, Lester Grant, and Robert T. McCluskey, Eds. Academic Press, New York, 1965. 949 pp. Illus. \$36.

An Introduction to Embryology. B. I. Balinsky. Saunders, Philadelphia, ed. 2, 1965. 689 pp. Illus. \$8.50.

A Laboratory Guide to Clinical Diagnosis. R. D. Eastham and B. R. Pollard. Williams and Wilkins, Baltimore, 1964. 258 pp. Paper, \$4.75.

Lucrările Institutului de Cercetări Veterinare și Biopreparate "Pasteur". vol. 1. Editura Agro-Silvica, Bucharest, Rumania, 1962. 804 pp. Illus.

Lung Function: Assessment and Application in Medicine. J. E. Cotes. Davis, Philadelphia, 1965. 551 pp. Illus. \$12.50.

Les Maladies des Plantes Maraîchères. vol. 2. C. M. Messiaen and R. Lafon. Institut National de la Recherche Agronomique, Paris, 1965. 179 pp. Illus. Paper, F. 26.

The Mast Cells. Hans Selye. Butterworth, Washington, D.C., 1965. 528 pp. Illus. \$19.75.

Methods of Soil Analysis. pts. 1 and 2. pt. 1, *Physical and Mineralogical Properties, Including Statistics of Measurement and sampling* (894 pp.); pt. 2, *Chemical and Microbiological Properties* (926 pp.). C. A. Black, D. D. Evans, L. E. Ensminger, J. L. White, and F. E. Clark, Eds. American Soc. of Agronomy, Madison, Wis., 1965. Illus. \$30 per set; \$17.50 each. Agronomy Series, No. 9.

Modern Physiology: The Chemical and Structural Basis of Function. Fleur L. Strand. Macmillan, New York, 1965. 714 pp. Illus. \$8.50.

Molecular and Cellular Aspects of Development. Eugene Bell, Ed. Harper and Row, New York, 1965. 541 pp. Illus. \$10.75. Forty-four papers.

Muir's Textbook of Pathology. D. F. Cappell. Williams and Wilkins, Baltimore, ed. 8, 1965. 887 pp. Illus. \$16.

Mycotoxins in Foodstuffs. Proceedings of a symposium (Cambridge, Mass.), March 1964. Gerald N. Wogan, Ed. M.I.T. Press, Cambridge, Mass., 1965. 303 pp. Illus. \$10. Twenty-three papers.

Neue Ergebnisse der biophysikalischen Forschung. In commemoration of the 25th anniversary of the Max Planck-Institut für Biophysik (December 1962). Published for the Max Planck-Institut für Biophysik Institute, Stuttgart, 1965. 178 pp. Illus. Paper, DM. 26.

Normality and Pathology in Childhood: Assessments of Development. Anna Freud. International Universities Press, New York, 1965. 285 pp. \$5.

The Oligosaccharides. Jaroslav Staněk, Miloslav Černý, and Josef Pacák. Translated from the Czechoslovakian (Prague, 1965) by Karel Mayer. P. M. Williams, Translation Ed. Academic Press, New York; Czechoslovak Acad. of Sciences, Prague, 1965. 567 pp. Illus. \$21.

Pharmacogenetics: A Fresh Approach to the Problem of Allergy (*Ann N.Y. Acad. Sci.* 118, No. 8). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1964. 14 pp. Illus. Paper, \$1.

Pharmacology of Conditioning, Learning, and Retention. Second international pharmacological meeting (Prague), August 1963. M. Ya. Mikhelson, V. G. Longo, and Z. Votava, Eds. Pergamon, London; Macmillan, New York, 1965. 377 pp. Illus. \$13. Twenty-eight papers presented at the symposium; the sections are General Problems (20 papers) and Electrophysiological Phenomena of Conditioning (8 papers).

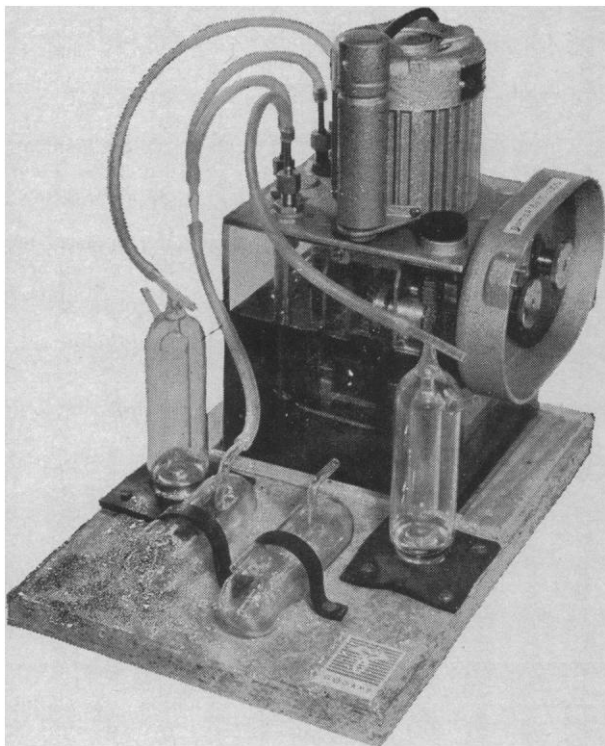
The Photochemical Origin of Life. A. Dauvillier. Translated from the French edition (Paris, 1958) by Scripta Technica. Academic Press, New York, 1965. 205 pp. Illus. \$7.50.

Physiologische Bedeutung und pharmakologische Wirkungen des Heparins. Helmut Gastpar. Schattauer, Stuttgart, 1965. 142 pp. Illus. Paper, DM. 24.

Physiology and Pathophysiology of Plasma Protein Metabolism. Proceedings

GAS MIXING PUMP

Prepares Calibration Gases



Gas analysis accuracy depends on the accuracy and availability of high quality gas standards in sufficient variety for full range calibration of your analyzers. Such high quality and stable gas standards are difficult to obtain, expensive, and create storage problems.

With i/a gas mixing pumps and 1 tank of 100% CO_2 or other gas you can obtain the exact calibration ranges, accurate to $\pm 0.05\%$, your instruments require.

These precision pumps consist of durable bronze gears, and double single-acting piston systems in an oil bath housed in plexiglass. Mixing ratios are obtained by interchanging paired gears outside this housing.

Prices from \$755



Write for technical details.

**INSTRUMENTATION
ASSOCIATES, INC.**

17 West 60th Street • New York 23, N. Y. • Circle 5-0840 •

Wh-o-o-o-o-sh

(List of radiochemicals shipped from Tracerlab, rotated 45 degrees for readability)
 ...re-carboxyl-C¹⁴ Acid Tryptophan-7a-C¹⁴ Allyl-1-C¹⁴ Alcohol Maleic-1-C¹⁴ Hydrazide
 ...carboxyl-C¹⁴ Acid Lithocholic-carboxyl-C¹⁴ Acid p-Chloromercuribenzoic-carboxyl-C¹⁴ Acid Citric-1,5-C¹⁴ Acid
 ...Aminolevulinic-4-C¹⁴ Acid S-Methyl-C¹⁴-L-Methionine Cholic-carboxyl-C¹⁴ Acid p-Chloromercuribenzoic-carboxyl-C¹⁴ Acid
 S-Adenosyl-L-methionine-methyl-C¹⁴ Itaconic-carboxyl-C¹⁴ Acid Tryptophan-7a-C¹⁴ Allyl-1-C¹⁴ Alcohol Maleic-1-C¹⁴ Hydrazide
 ...olic-carboxyl-C¹⁴ Acid Cholic-carboxyl-C¹⁴ Acid Lithocholic-carboxyl-C¹⁴ Acid Citric-1,5-C¹⁴ Acid
 ...yl-C¹⁴ S-Methyl-C¹⁴-L-Methionine

There it goes... another radiochemical shipment from Tracerlab

Our records show that our current speed record from receipt of order in Waltham, Mass. to delivery in Berkeley, Calif. now stands at 19 hours. The way we're going, it isn't going to stand very long. Speed is just naturally part of the Tracerlab radiochemicals service — along with superlative purity, widest range (more than 900 stock compounds at last count), and friendly, personal attention to your every need.

Prove it to yourself. Call Dr. John Leak at TW 4-6600, area code 617 . . . and help us break a new record in speed and service.



TRACERLAB

A Division of Laboratory For Electronics, Inc.
WALTHAM, MASSACHUSETTS 02154

Film Badge Service • Health Physics • Bioassays • Sources • Nuclear Instrumentation • Radiochemicals
Radioactive Waste Disposal • Radiation Monitoring Instrumentation • Isotope Applications

ADD A NEW DIMENSION TO YOUR MICROSCOPE

Time Lapse and Normal
Speed Motion Pictures
for Only \$1495.00

Now—a complete cinephotomicrography system that takes only 21"x21" of table-top space. The Sage Model 500 is simpler to operate than a laboratory microscope—lets you get excellent results from the start. It can be used with any upright microscope. Engineered to isolate both external and internal vibrations. Provides sharp, clear pictures at high magnifications.

Send for technical data, or let us arrange a demonstration in your laboratory.

SAGE INSTRUMENTS, INC.

2 Spring Street, White Plains, N. Y. 10601 • 914 WH 9-4121



Reviewers are Praising Functional Human Anatomy

By **JAMES E. CROUCH, Ph.D.**, Chairman, Division of Life Sciences;
Professor of Zoology, San Diego State College, California.
662 Pages, 7" x 10". 394 Illustrations, 39 in Color. \$9.50

"This is, by a wide margin, the finest synthesis of instructive materials for beginning students of human anatomy that has yet been accomplished."—R.G.S.

"A thorough and complete text of anatomy filling a great gap in this field between the anatomy and physiology combined texts and the large volumes used in medical school. I especially appreciate the histological, comparative anatomy and embryological approaches."—E.R.V.

"A relief to have an integrated gross and microscopic anatomy text for introductory college courses."—C.W.A.

"An outstanding text for an introductory human anatomy course. Interesting factual items and vivid illustrations add to basic anatomical coverage. The best anatomy book I have reviewed to date."—J.P.C.

"Certainly the best thing of its kind I have seen in over forty years of looking. The illustrations are superbly conceived and reproduced."—F.R.G.

"I am impressed with the numerous colored plates and marvel you can include them in a volume of relatively modest price. The integration of embryology, histology and endocrinology merits recommendation to our pre-medical seniors."—G.N.

From the publishers of GRAY'S ANATOMY

Washington
Square

LEA & FEBIGER

Philadelphia
Pa. 19106

of the third symposium (Grindelwald, Switzerland), September 1964. Hans Koblet, Paul Vesin, Heidi Diggelmann, and Silvio Barandun, Eds. Grune and Stratton, New York, 1965. 240 pp. Illus. Paper. \$7.75. Twenty-three papers on methods (6 papers); physiology (9 papers); and pathophysiology (8 papers).

Protozoan Nutrition. R. P. Hall. Blaisdell (Ginn), New York, 1965. 98 pp. Illus. \$3.50.

Radiation Preservation of Foods. Proceedings of an international conference (Boston, Mass.), September 1964. Natl. Acad. of Sciences—Natl. Research Council, Washington, D.C., 1965. 436 pp. Illus. \$9. Thirty-seven papers presented at a conference sponsored by the U.S. Atomic Energy Commission, the U.S. Army Natick Laboratories, and the National Academy of Sciences—National Research Council.

Radioactivity in Man. A symposium sponsored by Northwestern University Medical School and the American Medical Association. George R. Meneely and Shirley Motter Linde, Eds. Thomas, Springfield, Ill., 1965. 672 pp. Illus. \$24.50. Forty-three papers; the sections are Instrumentation, Technique, and Calibration (13 papers); Potassium and Body Composition (7 papers); Cobalt Metabolism (5 papers); Iron Metabolism (4 papers); Miscellaneous Topics (3 papers); Metabolism of Fission Products (9 papers); and Social and Industrial Aspects of Internal Radioisotope Burdens (2 papers).

Radioisotopes and Circulation. Gunnar Sevelius, Ed. Little, Brown, Boston, 1965. 331 pp. Illus. \$13. Fifteen papers.

Radioisotopes in Animal Nutrition and Physiology. Proceedings of a symposium (Prague), November 1964. International Atomic Energy Agency, Vienna, 1965 (order from National Agency for International Publications, New York). 884 pp. Illus. Paper, \$9. An introductory lecture and 48 papers; the sections are Biochemistry and Physiology of Milk Secretion (12 papers); Trace Elements, Including Magnesium (29 papers); The Influence of Environmental Factors on Animal Production and Reproduction (4 papers); and Closing Lectures (3 papers). Most of the papers are in English.

Research in Behavior Modification: New Developments and Implications. Leonard Krasner and Leonard P. Ullmann, Eds. Holt, Rinehart, and Winston, New York, 1965. 413 pp. Illus. Fifteen papers.

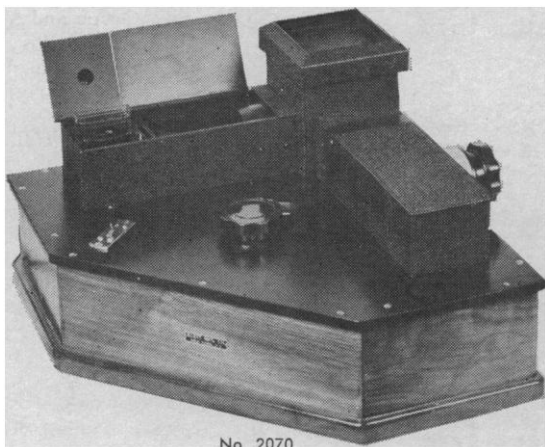
Role of Aldosterone in Myocardial Infarction (*Ann. N.Y. Acad. Sci.* 118 No. 11. Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1965. 17 pp. Illus. Paper, \$1.50.

Sex Offenders: An Analysis of Types. Paul H. Gebhard, John H. Gagnon, Wardell B. Pomeroy, and Cornelia V. Christenson. Harper and Row, New York, 1965. 957 pp. Illus. \$12.50.

Sex Research: New Developments. A symposium (Boston), November 1963. John Money, Ed. Holt, Rinehart, and Winston, New York, 1965. 272 pp. Illus. Paper, \$3.50. Eleven papers.

Spores—Ferns: Microscopic Illusions Analyzed. vol. 1, *Varied Plant Groups Intro-*

50TH ANNIVERSARY 1915-1965
THE KLETT FLUORIMETER

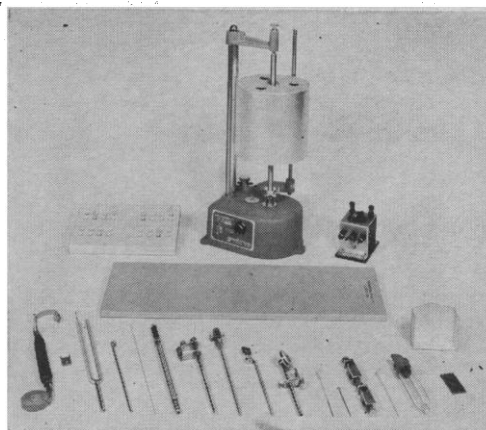


Designed for the rapid and accurate determination of thiamin, riboflavin, and other substances which fluoresce in solution. The sensitivity and stability are such that it has been found particularly useful in determining very small amounts of these substances.

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.



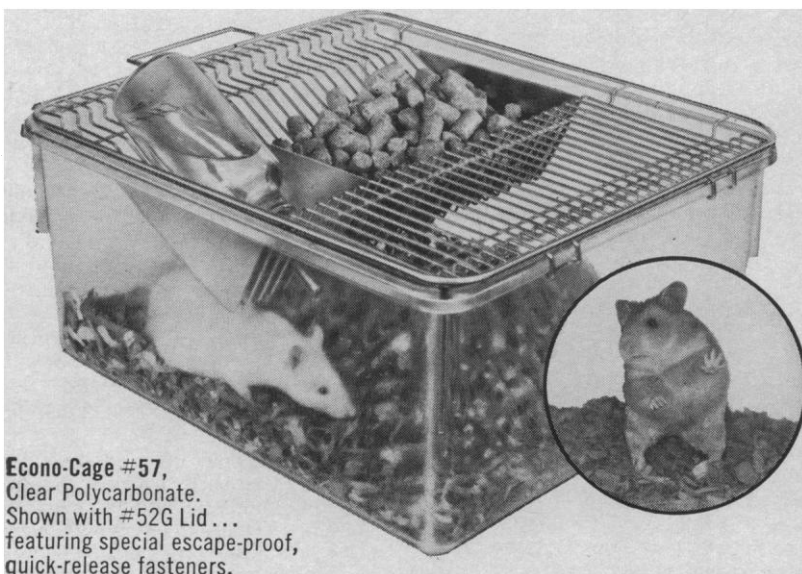
Phipps & Bird

Physiology Equipment Kits

A kit of physiology equipment has been assembled as a teaching aid for the rapidly expanding field of biological science. This kit, housed in a durable metal valise type case, allows the student to perform a variety of the basic physiology experiments. There are three models: the PK#1 for smoke writing; the PK#2 is identical to the PK#1 except a Smoking Stand and Burner is included; and the PK#3 for ink writing.

PHIPPS & BIRD, INC.
Manufacturers & Distributors of Scientific Equipment
6th & Byrd Streets — Richmond, Virginia

NOW! One Cage for rats or hamsters



Econo-Cage #57,
Clear Polycarbonate.
Shown with #52G Lid...
featuring special escape-proof,
quick-release fasteners.

**ECONO-CAGE
#50 Series**

Here's real versatility—an ideal cage for housing either rats or hamsters. Dimensions: 12 $\frac{1}{8}$ " x 14 $\frac{1}{8}$ " x 6 $\frac{1}{8}$ " deep. Floor area: 168 square inches. Meets standards established by Institute for Laboratory Animal Resources.

Available in 3 materials:

Econo-Cage #57 Polycarbonate (as shown) clear, autoclavable, very high impact strength, stain resistant. The *only* transparent plastic that can withstand temperatures up to 290°F.

Econo-Cage #55 Polypropylene, economical, autoclavable (temperatures to 230°F), excellent resistance to chemicals and solvents. A translucent material with good impact strength.

Econo-Cage #53 Acrylonitrile-Styrene—For researchers who need a clear material at budget prices. Withstands temperatures to 180°F.

Contact your Econo-Cage Distributor or send for our new catalog.



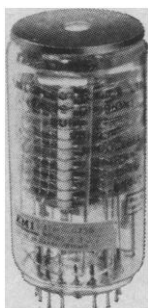
**ECONO-LAB division
MARYLAND PLASTICS, INC.**

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



Measuring low light levels

...requires extremely low dark currents coupled with maximum useful sensitivity. The EMI 6256, a 13-stage venetian blind 2" photomultiplier tube has the essential characteristics that are necessary for low light level applications. The unique 10mm cathode-DI geometry, together with the ultra-stable EMI venetian blind design, has resulted in its widely successful use in astronomy, biology and spectrophotometry. The EMI 6256B has a quartz window and the S-11 cathode (S-13) which has a peak quantum efficiency of 17% at 4,200 Å. The EMI type 6256S has 5 to 10 times lower dark current than the 6256B, and should be used when system performance is dark current limited. This type is also available for visible light applications as 9502B/9502S, or with 11 dynodes as 6094B/6094S. Many other EMI photomultiplier tubes are available for special applications from stock in sizes from 1" to 12". EMI photomultiplier tubes are available through qualified engineering representatives located in major marketing areas throughout the United States. A request on your company letterhead will bring you the name of your nearest representative as well as a copy of our latest catalog.



Whittaker
CORPORATION

GENCOM DIVISION

80 Express St., Plainview, L.I., N.Y.
516-433-5900 TWX 516-433-8790
*EMI ELECTRONICS, LTD.

duce True Ferns Through Spore Tetrad Structure. Clara S. Hines. Mistaire Laboratories, Millburn, N.J., 1965. 572 pp. Illus. \$22.50.

Statistical Studies in the Aetiology of Malignant Neoplasms. vols. 1 and 2. vol. 1, *Review and Results* (559 pp.); vol. 2, *Basic Tables: Denmark, 1943-57* (325 pp.). Johannes Clemmeson. Munksgaard, Copenhagen, 1965. Kr. 160.

Studies in Comparative Biochemistry. K. A. Munday, Ed. Pergamon, New York, 1965. 215 pp. Illus. \$9.50. Seven papers: "Euryhalinity and the concept of physiological radiation" by M. Florkin and E. Schoffeniels; "Amino acids and related substances in fish" by C. B. Cowey; "Electron-microscope studies on high molecular weight erythrocytins (invertebrate haemoglobins) and chlorocytins of annelids" by Jean Roche; "The comparative physiology of the transfer of substances between the blood and central nervous system" by J. E. Treherne; "Comparative metabolism and toxicology of organic insecticides" by F. P. W. Winteringham; "Distribution of phosphagens in errant and sedentary polychaeta" by N. V. Thoai and Y. Robin; and "Evolutionary implications of enzyme structure and function" by D. C. Watts. International Series of Monographs on Pure and Applied Biology, vol. 23.

Symposium on the Nerve Growth Factor (New York), February 1963 (*Ann. N.Y. Acad. Sci.* 118, No. 3). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1964. 86 pp. Illus. Paper. \$5.50. Four papers: "The nerve growth factor" by Rita Levi-Montalcini; "The nerve growth factor as two essential components" by Isaac Schenkein and Elmer D. Bueker; "Effects of daily subcutaneous injections of nerve growth stimulating protein fractions on mice during postnatal to adult stage" by Elmer D. Bueker and Isaac Schenkein; and "Some cytologic effects of salivary nerve growth factor on tissue cultures of peripheral ganglia" by Stanley M. Crain, Helena Benitez, and Albert E. Vatter.

A Synopsis of Biology. W. B. Crow. Williams and Wilkins, Baltimore, ed. 2. 1964. 1076 pp. Illus. \$11.

A Textbook of Entomology. Herbert H. Ross. Wiley, New York, ed. 3. 1965. 549 pp. Illus. \$8.95.

A Textbook of Surgical Physiology. R. Ainslie Jamieson and Andrew W. Kay. Williams and Wilkins, Baltimore, ed. 2. 1965. 768 pp. Illus. \$16.50.

Theoretical and Mathematical Biology. Talbot H. Waterman and Harold J. Morowitz, Eds. Blaisdell (Ginn), New York, 1965. 444 pp. Illus. Chapters were contributed by Talbot H. Waterman; Harold J. Morowitz; N. Rashevsky; Henry Eyring and Dan W. Urry; J. D. Bernal; Kenneth S. Cole; Georg von Békésy; M. S. Bartlett; Robert E. Blackith; Robert S. Ledley; David Garfinkel; H. Quastler; Britton Chance; Werner Reichardt; Richard Levins; and Robert H. MacArthur.

The Use of Radioactive Isotopes in Tuberculosis Research. Proceedings of the International Symposium (Prague), May 1963. J. F. Pasquier, L. Trnka, and R. Urbancik, Eds. Pergamon, New York, 1965. 190 pp. Illus. \$10. Thirteen papers.

Visual Principles of Elementary Human Anatomy. Charles E. Tobin and Peter Ng. Davis, Philadelphia, 1965. 110 pp. Illus. Paper, \$2.50.

Zoology. E. Lendell Cockrum and William J. McCauley. Saunders, Philadelphia, 1965. 729 pp. Illus. \$9.

Economics and the Social Sciences

Imprinting and Early Learning. W. Sluckin. Aldine, Chicago, 1965. 157 pp. Illus. \$5.

An Introduction to Psychological Statistics. Philip H. DuBois. Harper and Row, New York, 1965. 544 pp. Illus. \$7.95.

A Laboratory Manual for the Control and Analysis of Behavior. Harland Lane and Daryl Bem. Wadsworth, Belmont, Calif., 1965. 299 pp. Illus. Paper. \$6.60. Basic Concepts in Psychology Series, edited by Edward L. Walker.

Language in Culture and Society: A Reader in Linguistics and Anthropology. Dell Hymes. Harper and Row, New York, 1964. 800 pp. \$12.50. Sixty-six of the 69 selections are reprints or extracts from various sources.

New Directions in Psychology. vol. 2. Frank Barron and others. Holt, Rinehart, and Winston, New York, 1965. 432 pp. Illus. Paper, \$2.95. Four papers: "The psychology of creativity" by Frank Barron; "An essay on dreams: The role of physiology in understanding their nature" by William C. Dement; "Emerging technologies for making decisions" by Ward Edwards, Harold Lindman, and Lawrence D. Phillips; and "Drives, rewards, and the brain" by James Olds and Marianne Olds.

Peoples of Africa. James L. Gibbs, Jr., Ed. Holt, Rinehart, and Winston, New York, 1965. 608 pp. Illus. \$10.50. Fifteen papers by Phoebe Ottenberg; Walter H. Sargree; Martin Southwold; M. G. Smith; P. H. Gulliver; James L. Gibbs, Jr.; Lorna Marshall; Colin M. Turnbull; I. M. Lewis; Derrick J. Stenning; Marcel D'Hertefelt; Igor Kopytoff; Hilda Kuper; Paul Bohannan, and P. C. Lloyd.

Prehistoric and Early Wales. I. Ll. Foster and Glyn Daniel, Eds. Humanities Press, New York; Routledge and Kegan Paul, London, 1965. 256 pp. Illus. \$10. The contributors are Glyn Daniel, C. B. M. McBurney, W. F. Grimes, H. N. Savory, A. H. A. Hogg, I. A. Richmond, L. Alcock, and I. Ll. Forster.

A Primer of Experimental Psychology. Joseph Lyons. Harper and Row, New York, 1965. 334 pp. Illus. Paper, \$3.50. Harper's Experimental Psychology Series, edited by H. Philip Zeigler.

The Primitive City of Timbuctoo. Horace Miner. Doubleday, Garden City, N.Y., ed. 2. 1965. 358 pp. Illus. Paper, \$1.75.

Quantitative Planning of Economic Policy. A conference of the Social Science Research Council Committee on Economic Stability (Washington, D.C.), August 1963. Bert G. Hickman, Ed. Brookings Institution, Washington, D.C., 1965. 293 pp. Illus. \$7.95. Ten papers: "Linear decision rules for macrodynamic policy problems" by Henri Theil; "Specification of structures and data require-

ELECTRON TRANSFER



Worthington Biochemical Corporation



now offers

FERREDOXIN

From *Cl. pasteurianum*

Ferredoxin is an electron-transferring protein which is unique in that it is the most electronegative electron carrier found to date in bacteria. It is currently available from inventory.

Write for free Technical Bulletin 65-9A

WORTHINGTON

Biochemical Corporation

FREEHOLD, NEW JERSEY

QUANTITATIVE ULTRAVIOLET MONITORING

FOR
\$845⁰⁰



- ▶ Built-in recorder monitors true linear absorbance in two ranges; 0 to 0.5 and 0 to 2.5.
- ▶ Unique design eliminates need for base line compensation.
- ▶ Automatically controls a fraction collector to deposit each UV-absorbing fraction into a separate collecting tube.

The ISCO Model UA is the only UV monitor with a bandwidth so narrow that it conforms rigorously to Beer's absorption law, and does it without changing wave lengths!

Bandwidth is so narrow* that precise quantitative results will be obtained if the flow stream absorbs *any* light at 254 m μ , regardless of the wavelength of maximum absorption. Other ultraviolet analyzers operating at a fixed wavelength have so wide a bandwidth (even though more than 95% of their light may be at 254 m μ) that they shift their maximum response to other wavelengths at higher absorbances. They can only detect the presence, not the quantity, of UV absorbing fractions.

*0.6 m μ at one thousandth peak intensity.

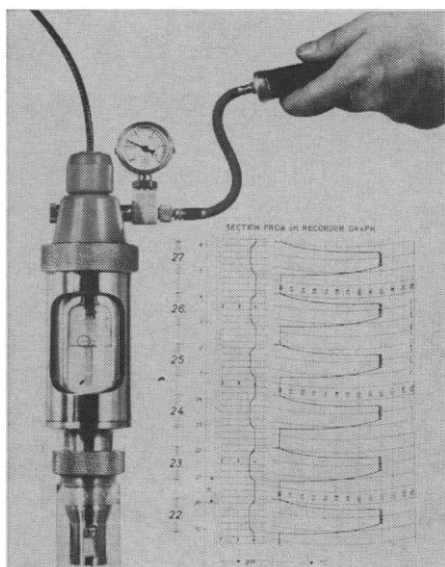
ISCO

For more information,
send for brochure UA-2
or complete catalog.

**INSTRUMENTATION
SPECIALTIES COMPANY, INC.**

5624 SEWARD AVE. • LINCOLN, NEBRASKA 68507, U.S.A.
PHONE (402) 434-8265 • CABLE ADDRESS: ISCOLAB LINCOLN

pH Glass Electrodes Withstand Repeated Sterilization To 130°C



Pressures To 28 psig

A unique group of pH electrodes (In-gold Design) will withstand repeated sterilization autoclaving up to 28 psig in the standard design, and up to 375 psig in special designs where required. Available in lab sizes and up to units for very large reactors. Ideal for applications in biological and R & D laboratories; for fermentation application as well as general chemical and the food industry. Redox and self-cleaning electrodes are also available.



Call or write today
for complete
technical data.

CHEMAPEC, INC.

1 Newark St. • Hoboken, New Jersey 07030
(201) 659-5417

ments in economic policy models" by Karl A. Fox and Erik Thorbecke; "Specification and estimation of structural relations in policy models" by Jati K. Sen-gupta; "The objectives and instruments of economic policy" by Etienne S. Kir-schen and Lucien Morissens; "Short-term planning experience in the Netherlands" by C. A. Van Den Beld; "Quantitative planning of economic policy in the Netherlands" by Willem Hessel; "French planning" by Bernard Cazes; "Japanese experience with long-term economic plan-ning" by Shuntaro Shishido; "National planning and economic growth in Japan" by Tsunehiko Watanabe; and "Quantita-tive decision analysis and national policy: How can we bridge the gap?" by Charles C. Holt.

Psychology: The Science of Behavior. Robert L. Isaacson, Max L. Hutt, and Milton L. Blum. Harper and Row, New York, 1965. 384 pp. Illus. \$6.95.

Readings in Mathematical Psychology. vol. 2. R. Duncan Luce, Robert R. Bush, and Eugene Galanter. Eds. Wiley, New York, 1965. 578 pp. Illus. \$8.95. Thirty-three papers in the following sections: Computers (4 papers); Language (7 pa-pers); Social Interaction (5 papers); Sen-sory Processes (11 papers); Preference and Utility (5 papers); Bayesian Statistics (1 paper).

The Revolution in Anthropology. I. C. Jarvie. Humanities Press, New York, 1964. 270 pp. \$6.75. International Library of Sociology and Social Reconstruction Series, edited by W. J. H. Spott.

Samples from English Culture. vols. 1 and 2. vol. 1, *Three Preliminary Studies: Aspects of Adult Life in England* (447 pp., \$8.50); vol. 2, *Child-Rearing Practices* (250 pp., \$6). Josephine Klein. Routledge and Kegan Paul, London; Humanities Press, New York, 1965. Illus. The Inter-national Library of Sociology and Social Reconstruction Series, edited by W. J. H. Spott.

Sensory Psychology. Conrad G. Muel-ler. Prentice-Hall, Englewood Cliffs, N.J., 1965. 128 pp. Illus. Paper, \$1.50; cloth, \$3.95. Prentice-Hall Foundations of Mod-ern Psychology Series, edited by Richard S. Lazarus.

Society and the Adolescent Self-Image. Morris Rosenberg. Princeton Univ. Press. Princeton, N.J., 1965. 338 pp. \$6.50.

Mathematics, Physical Science, and Engineering

Hydrogenation in Solutions. D. V. Sokol'skii. Translated from the Russian edition (Alma-Ata, 1962) by N. Kaner. J. A. Epstein, Translation Ed. Israel Pro-gram for Scientific Translations, Jerusalem, 1964; Davey, New York, 1965. 542 pp. Illus. \$19.

Introduction to Abstract Algebra. Roby Dubisch. Wiley, New York, 1965. 203 pp. Illus. \$5.95.

Introduction to Digital Computer Ap-plications. Andrew G. Favret. Reinhold, New York, 1965. 256 pp. Illus. \$10.

Introduction to Quantitative Chemistry. Joseph J. Klingenberg and Kenneth P. Reed. Reinhold, New York; Chapman and Hall, London, 1965. 347 pp. Illus. \$6.50.

CONCEPTS OF PROFESSIONALS

Is A Cage Really
Just A Cage



In Animal Housing Systems

We:

- Translate new ideas to new concepts
- Design with knowledge and ex-perience
- Engineer to tolerances of re-quirements
- Manufacture with craftsman-ship

CONSULT US FOR SERVICES OR TESTED
QUALITY CAGES FROM OUR CATALOGUE

HARFORD METAL PRODUCTS, INC.
BOX 5, ABERDEEN, MARYLAND

THE HUMAN INTEGUMENT NORMAL AND ABNORMAL

Editor: Stephen Rothman 1959
AAAS Symposium Volume No. 54

"As a whole, the papers are presented in a simple form easily understand-able to readers who do not neces-sarily have the background knowledge of recent biological research often as-sumed in articles written by specialists for their own colleagues. . . . Such sym-posita are of value in that they give physicians in clinical practice an ac-count of fundamental research in areas of particular interest to them." *The Quarterly Review of Biology*, December 1960

270 pp., 59 illus., index, cloth. \$6.75
AAAS members' cash orders \$5.75

Chapters

- 1) The Integument as an Organ of Protection
- 2) Circulation and Vascular Reaction
- 3) Sebaceous Gland Secretion
- 4) Pathogenetic Factors in Pre-malignant Conditions and Malignancies of the Skin

British Agents: Bailey Bros. & Swinfen, Ltd., Warner House, 48 Upper Thames Street, London, E.C.4

AAAS

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