

SCIENCE

28 July 1967

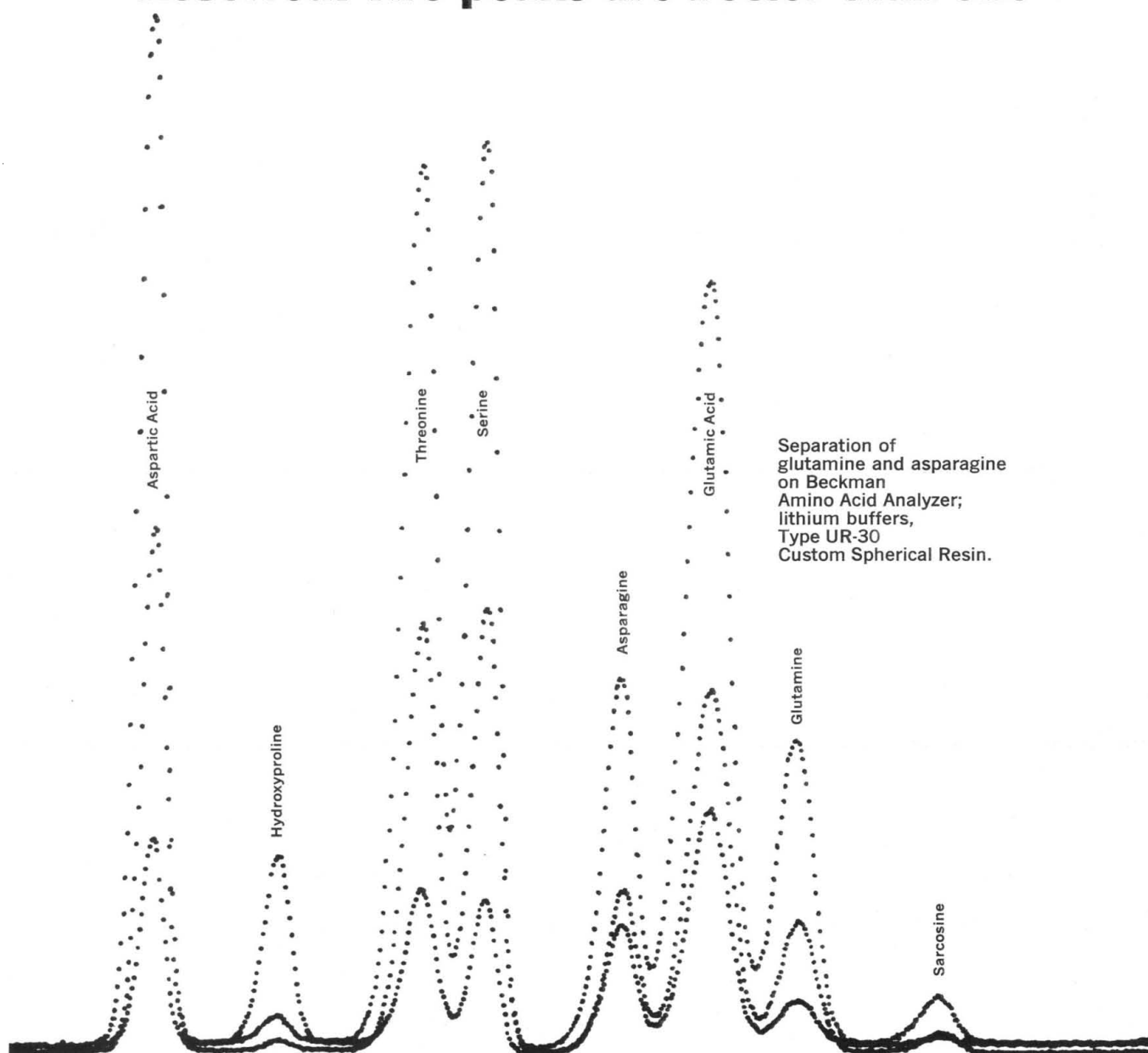
Vol. 157, No. 3787

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



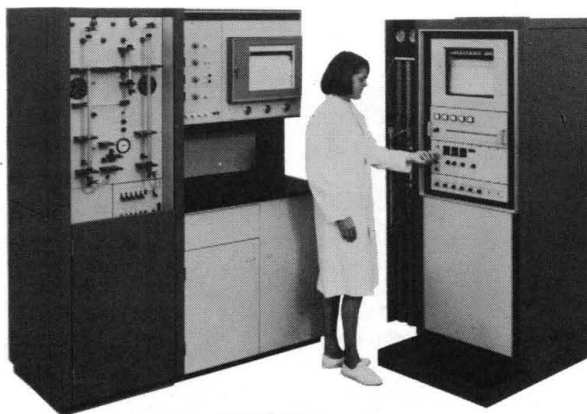
NOCTILUCENT CLOUD

Resolved: Two peaks are better than one



It took three things to split the glutamine/asparagine peak in analyzing physiological fluids: new methodology, Custom Spherical Resin, and a superb amino acid analyzer. All three of these are developments from Beckman.

And now Beckman gives you a choice of two analyzers. The classic Model 120C is the premier instrument in the field—the logical choice for volume



of analyses and for built-in capabilities. The new Model 116 Analyzer is a modular unit so you can order only the capabilities you need at present and can add additional capabilities later. The resolution shown above is typical of both instruments.

To get more information, and representative chromatograms, write for Data File 2016-5.

Beckman

INSTRUMENTS, INC.

SPINCO DIVISION

PALO ALTO, CALIFORNIA • 94304

INTERNATIONAL SUBSIDIARIES: GENEVA; MUNICH; GLENROTHES, SCOTLAND; TOKYO; PARIS; CAPE TOWN; LONDON; MEXICO CITY

BASIC TEXTS WITH "TEACHABILITY"

Gardner & Osburn:

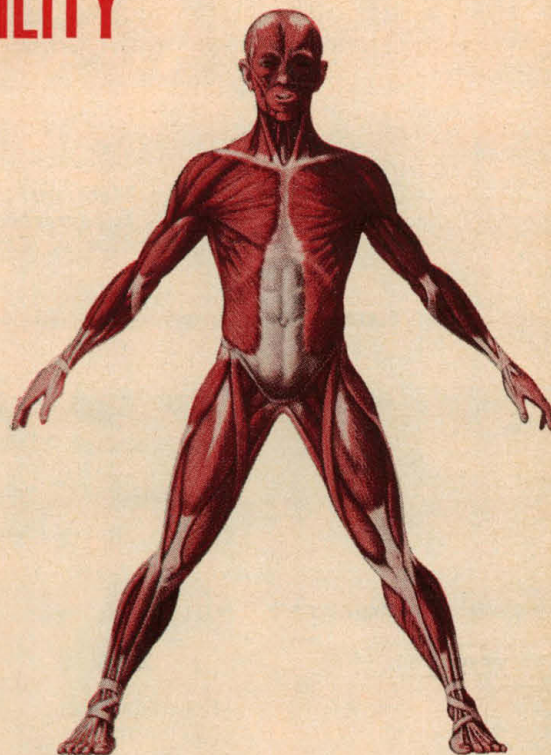
Just Ready!

STRUCTURE OF THE HUMAN BODY

by WESTON D. GARDNER, M.D., *Marquette University*, and WILLIAM A. OSBURN, M.M.A., *W. B. Saunders Company*.

This basic anatomy text pioneers a new scheme of verbal-visual presentation designed to reinforce the learning process. Each illustration depicts a single concept or a few related facts and is placed where it can be "read" with the text. To fit this plan, more than 625 drawings were made especially for this book. Eight pages of plates are shown in full color. The muscles, nerves, and blood vessels are presented in newly-designed tables with integral illustrations. The emphasis throughout is on living, normal anatomy, and the relationship of structure to function is stressed. Developmental and microscopic anatomy are included where they aid the understanding of basic structure. The selection of material, its organization, and the unique presentation make this an unrivalled textbook for any college-level course in anatomy.

417 pages, 934 illustrations. \$8.75. Published June, 1967.



Villee: BIOLOGY

New (5th) Edition!

by CLAUDE A. VILLEE, Ph.D., *Harvard University*

With nearly half a million copies in print, Villee's *Biology* is well established as a leading introductory college text. In the *New (5th) Edition*, the chapters on genetics, evolution, and cell metabolism are entirely new, as are the discussions of biosynthetic processes and the utilization and conservation of energy. The rest of the text has been thoroughly updated and many new illustrations have been added. Dr. Villee maintains just the right balance between the organismic, molecular, and ecological levels; between plants and animals; between generalization and detail. As in previous editions, he emphasizes the comparative, evolutionary, and biochemical aspects of biology.

730 pages, 804 illustrations. \$8.25. Published March, 1967.

Stevenson & Moore:

A New Book!

THEORY OF PHYSICS

by RICHARD STEVENSON and R. B. MOORE, *McGill University*.

Written primarily for science and liberal arts majors, this exciting and original non-calculus physics text covers the standard curriculum but is thoroughly "modern" in point of view. The authors have integrated modern physics throughout the book instead of presenting it separately at the end. The book is organized into five sections: Motion, Energy, Oscillations and Waves, and Applications. A wealth of pedagogic aids make this an outstanding text from which to teach as well as to learn. Some 1200 problems give the instructor a wide choice at any level (an answer book is available).

795 pages, 577 illustrations. \$9.75. Published March, 1967.

Schonberger:

New (2nd) Edition!

LAB MANUAL OF GENERAL BIOLOGY

by CLINTON F. SCHONBERGER, *Moorpark College, California*.

This widely-used manual contains 32 experiments and 13 optional projects designed to teach biological principles with a maximum of discovery by the student and a minimum of direction by the instructor. Although it parallels the Villee text (left) it can be used with any general biology text.

375 pages, illustrated. \$4.50. Published April, 1967.

Masterton & Slowinski:

A New Book!

CHEMICAL PRINCIPLES

by WILLIAM L. MASTERTON, *University of Connecticut*, and EMIL SLOWINSKI, *Macalaster College*.

This major new text for the full-year introductory college course in general chemistry maintains a careful balance between the theoretical and the descriptive. It is organized around types of reactions (oxidation-reduction, acid-base, precipitation, etc.) rather than families of elements. It does not rely on higher mathematics, but emphasizes experimental proof of principles and concepts, and quantitative calculations that promote a logical approach to problem solving and laboratory practice. Imaginative problems help to develop the student's reasoning ability. An instructor's manual is available.

668 pages, 150 figures. \$8.75. Published April, 1966.

Textbooks Gladly Sent to Teachers on Approval

W. B. SAUNDERS COMPANY,

West Washington Square, Philadelphia, Pa. 19105

28 July 1967
Vol. 15, No. 3787

SCIENCE

| | | |
|-------------------------|---|-----|
| LETTERS | College Math for 11-Year-Olds: <i>E. H. Lehman, Jr.</i> ; Congressional Testimony: <i>W. T. Lippincott</i> ; <i>E. L. Yochelson</i> ; Why's of Weightlessness: <i>M. M. Mueller</i> ; Measure of Education: <i>A. W. VanderMeer</i> | 367 |
| EDITORIAL | Mainland China: An Emerging Power | 373 |
| ARTICLES | Intermolecular Forces and the Nature of the Liquid State: <i>B. Widom</i> | 375 |
| | Prostaglandins: Members of a New Hormonal System: <i>S. Bergström</i> | 382 |
| | Research and Development in Communist China: <i>L. A. Orleans</i> | 392 |
| | Quasars: Rapid Light Fluctuations: <i>W. H. McCrea</i> | 400 |
| NEWS AND COMMENT | NIH: President Endorses Basic Research | 403 |
| | Cigarette Advertising: FCC Demands an Antidote | 406 |
| | Molecular Biology: Drug Firm To Establish New Research Center | 408 |
| | Redwood Park: Squabbling on Details Delays Final Agreement | 410 |
| | Neutrinos: Current Experiments at CERN | 411 |
| BOOK REVIEWS | The Use of Social Research in Federal Domestic Programs, reviewed by <i>N. W. Polsby</i> ; other reviews by <i>H. W. Leverenz</i> , <i>J. V. Cathcart</i> , <i>H. T. Odum</i> , <i>O. Gingerich</i> , <i>A. Thackray</i> , <i>K. Meyer</i> , <i>R. L. Carovillano</i> , <i>D. Stetten, Jr.</i> , <i>D. J. Struik</i> ; Books Received | 413 |
| REPORTS | Temperature Measurements in Noctilucent Clouds: <i>J. S. Theon</i> , <i>W. Nordberg</i> , <i>W. S. Smith</i> | 419 |
| | Wake Collapse in a Stratified Fluid: <i>A. H. Schooley</i> | 421 |
| | Resonance Rotation of Venus: <i>I. I. Shapiro</i> | 423 |
| | Europium-155 in Debris from Nuclear Weapons: <i>A. Aarkrog</i> and <i>J. Lippert</i> | 425 |
| | Photography of the Earth's Cloud Satellites from an Aircraft: <i>C. Wolfe</i> , <i>L. Dunkelman</i> , <i>L. C. Haughney</i> | 427 |
| | Problematical Pleistocene Artifact Assemblage from Northwestern Spain: <i>E. de Aguirre</i> and <i>K. W. Butzer</i> | 430 |

BOARD OF DIRECTORS

ALFRED S. RÖMER
Retiring President, Chairman

DON K. PRICE
President

WALTER ORR ROBERTS
President-Elect

BARRY COMMONER
DAVID R. GODDARD

HUDSON HOAGLAND
GERALD HOLTON

VICE PRESIDENTS AND SECTION SECRETARIES

MATHEMATICS (A)
A. M. Gleason
Wallace Givens

PHYSICS (B)
W. W. Havens, Jr.
Stanley S. Ballard

CHEMISTRY (C)
Herman F. Mark
Milton Orchin

ASTRONOMY (D)
John S. Hall
Frank Bradshaw Wood

ANTHROPOLOGY (H)
Cora Du Bois
Anthony Leeds

PSYCHOLOGY (I)
Leo J. Postman
Frank W. Finger

SOCIAL AND ECONOMIC SCIENCES (K)
David Truman
Eugene B. Skolnikoff

HISTORY AND PHILOSOPHY OF SCIENCE (L)
Peter J. Caws

PHARMACEUTICAL SCIENCES (Np)
Curtis Waldon
Joseph P. Buckley

AGRICULTURE (O)
Richard Geyer
Ned D. Bayley

INDUSTRIAL SCIENCE (P)
Allen V. Astin
Burton V. Dean

EDUCATION (Q)
Herbert A. Smith
Frederic B. Dutton

DIVISIONS

ALASKA DIVISION

Peter Morrison
President

Eleanor Viereck
Executive Secretary

PACIFIC DIVISION

Adolph Hecht
President

Robert C. Miller
Secretary

SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

Harold E. Dregne
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., NW, Washington, D.C. 20005. Now combined with *The Scientific Monthly*. Second-class postage paid at Washington, D.C. Copyright © 1967 by the American Association for the Advancement of Science. Annual subscriptions \$8.50; foreign postage, \$1.50; Canadian postage, 75¢; single copies, 50¢ (back issues, \$1), except *Guide to Scientific Instruments*, which is \$2. School year subscriptions: 9 months, \$7, 10 months, \$7.50. Provide 4 weeks' notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the *Reader's Guide to Periodical Literature*.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

| | |
|--|-----|
| Autosomal Phosphogluconic Dehydrogenase Polymorphism in the Cat (<i>Felis catus</i> L.): <i>H. C. Thuline et al.</i> | 431 |
| Aminoaciduria Resulting from Cycloleucine Administration in Man: <i>R. R. Brown</i> .. | 432 |
| Sodium-Potassium Adenosine Triphosphatase: Acyl Phosphate "Intermediate" Shown to be L-Glutamyl- γ -Phosphate: <i>A. Kahlenberg, P. R. Galsworthy, L. E. Hokin</i> .. | 434 |
| Tritiated Thymidine: Effect of Decomposition by Self-Radiolysis on Specificity as a Tracer for DNA Synthesis: <i>M. Wand, E. Zeuthen, E. A. Evans</i> | 436 |
| Morphological Changes in Human Scalp Hair Roots during Deprivation of Protein: <i>R. B. Bradfield, M. A. Bailey, S. Margen</i> | 438 |
| Langerhans Cells: Uptake of Tritiated Thymidine: <i>L. Giacometti and W. Montagna</i> .. | 439 |
| Heterologous Antilymphocyte Globulin: Studies in vitro: <i>L. J. Humphrey, M. H. Kauffman, Jr., E. Dunn</i> | 441 |
| Complement: Substitution of the Terminal Component in Immune Hemolysis by 1,10-Phenanthroline: <i>U. Hadding and H. J. Müller-Eberhard</i> | 442 |
| <i>Tribolium castaneum</i> : Morphology of "Aureate" Revealed by the Scanning Electron Microscope: <i>A. Sokoloff et al.</i> | 443 |
| Chromosome Studies on Marshall Islanders Exposed to Fallout Radiation: <i>H. Lisco and R. A. Conard</i> | 445 |
| <i>Chlamydomonas reinhardi</i> : Heterozygous Diploid Strains: <i>W. T. Ebersold</i> | 447 |
| Improved in vitro Survival of Normal, Functional Spleen Cells: <i>B. Mohit and G. H. Sato</i> | 449 |
| Function of the Dorsal Motor Nucleus of the Vagus: <i>F. W. L. Kerr</i> | 451 |
| Steptonigrin: Effect on the First Meiotic Metaphase of the Mouse Egg: <i>G. Jagiello</i> .. | 453 |
| Deficient Complement Fixation by Aggregated Gamma Globulin from Hypogammaglobulinemic Patients: <i>R. J. Pickering, R. Hong, R. A. Good</i> | 454 |
| Reward and Learning in the Goldfish: <i>G. Lowes and M. E. Bitterman</i> | 455 |
| Evoked Potentials: Three-Dimensional Display: <i>S. K. Burns, A. A. Borbély, R. D. Hall</i> | 457 |
| LSD: Injection Early in Pregnancy Produces Abnormalities in Offspring of Rats: <i>G. J. Alexander et al.</i> | 459 |
| Diets for Rearing the Ambrosia Beetle <i>Xyleborus ferrugineus</i> (Fabricius) in vitro: <i>J. L. Saunders and J. K. Knoke</i> | 460 |
| MEETINGS Insect Pests: Microbial Control: <i>G. R. Stairs</i> ; Calendar of Events | 464 |

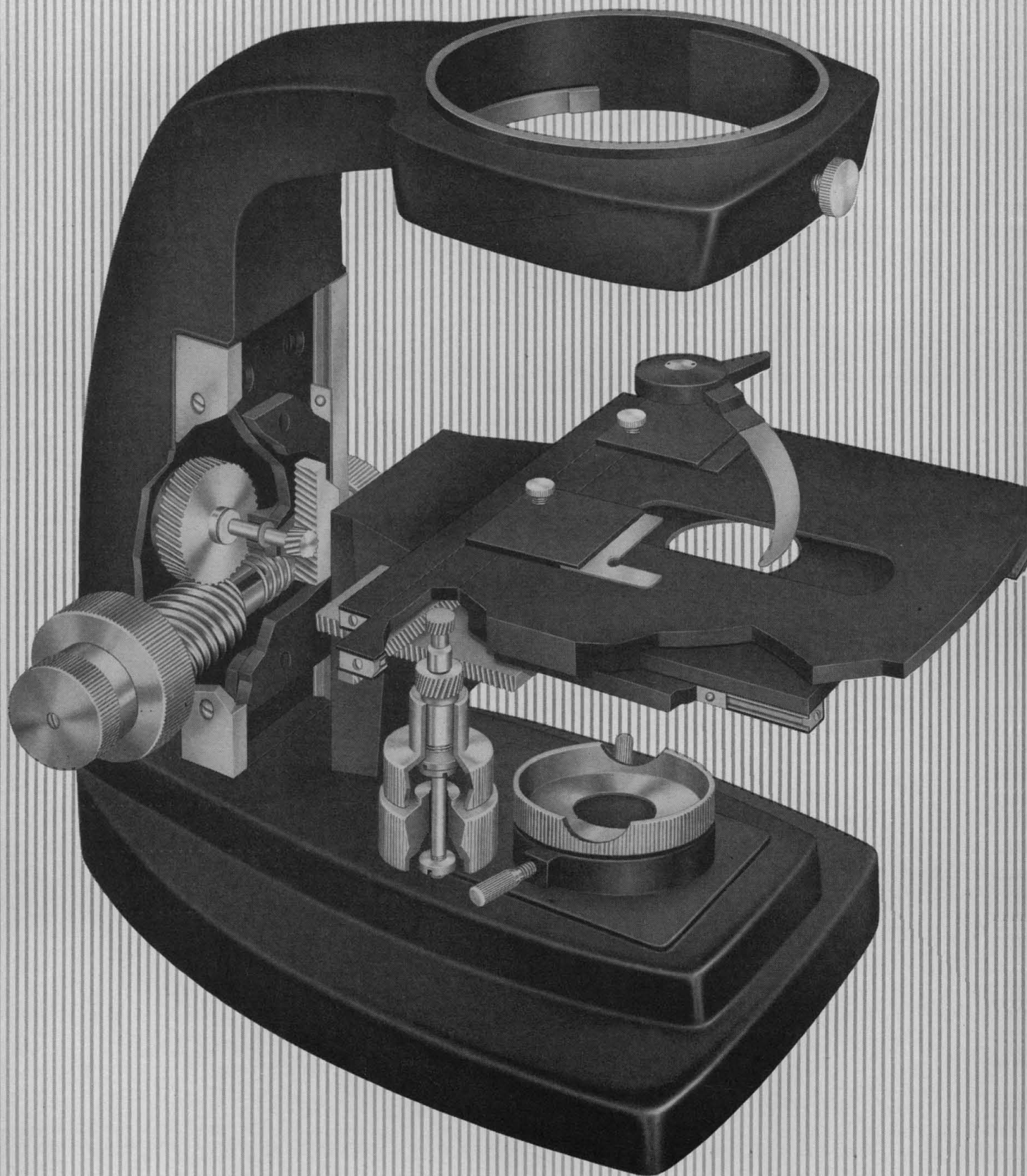
| | | | |
|---|---|---|----------------------------------|
| MINA S. REES ATHELSTAN F. SPILHAUS | H. BURR STEINBACH JOHN A. WHEELER | PAUL E. KLOPSTEG Treasurer | DAEL WOLFLE Executive Officer |
| GEOLOGY AND GEOGRAPHY (E) Louis Quam Richard H. Mahard | ZOOLOGICAL SCIENCES (F) Colin S. Pittendrigh David E. Davis | BOTANICAL SCIENCES (G) William C. Steere Warren H. Wagner | |
| ENGINEERING (M) Paul Rosenberg Newman A. Hall | MEDICAL SCIENCES (N) Julius H. Comroe Robert E. Olson | DENTISTRY (Nd) Lester R. Cahn Richard S. Manly | |
| INFORMATION AND COMMUNICATION (T) Phyllis V. Parkins Ileen H. Stewart | | STATISTICS (U) George E. P. Box Roseedith Sitgreaves | |

COVER

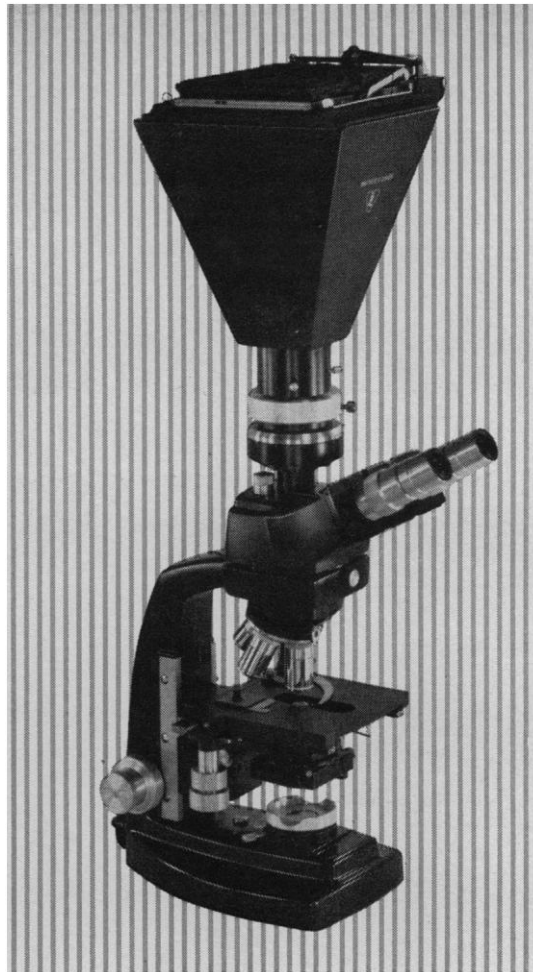
(Top) Panoramic view of noctilucent cloud over Stockholm, Sweden, night of 21 August 1966. Panorama spans an azimuth from approximately 330 degrees through north to 70 degrees. (Bottom) Noctilucent cloud over Torsta, Sweden, 10-11 August 1958. See page 419. [George Witt, Institute of Meteorology, University of Stockholm, Sweden]

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.

BAUSCH & LOMB 



See inimitable quality in microvision



precision coordinated response

You're always in full command . . . with a Dynazoom® Microscope. Dynamics and optics are perfectly synchronized in this unique focusing and stage control system. You get instant response, total response, with lowest possible wear and maintenance. No backlash, looseness, friction or roughness. All parts roll smoothly with precision-meshed gears and ball bearings. Such microscope performance cannot be matched for anywhere near the Dynazoom price. But—let your own eyes decide. We can arrange for you to try a Dynazoom/Flat Field in your own laboratory. **Meanwhile we will send you the deluxe Laboratory Microscope brochure, 31-185, and an indexed reproduction of the focusing system rendering. You'll want to display it in your office or use it in your classroom. Just write Bausch & Lomb, 85643 Bausch Street, Rochester, New York 14602.**

In Canada, Bausch & Lomb Optical Co., Ltd., 16 Grosvenor St., Toronto.

See a demonstration of Dynazoom/Flat Field

COOL IT!

With a compact
refrigerated circulator.



Any little 12½" x 19" area in your lab is large enough for the new Lauda K-2/R all-stainless steel refrigerated constant temperature circulator to do its job.

And what a job it does.

It's ideal for tempering accurately many types of jacketed laboratory appliances at temperatures down to -10°C . Don't let the word "refrigerated" fool you though—the Lauda K-2/R also heats to 150°C . Here are some of its outstanding features: Tecumseh compressor eliminates the need for auxiliary cooling systems such as tap water or dry ice. Reservoir tank, pump, heater, cooling coil and circulating lines (everything that comes in contact with the liquid) are stainless steel. Solid-state electronic control with an exclusive new type of extra-sensitive thermoregulator. Flow control and drain valves facilitate operating and emptying. Top opens for easy filling and immersion of samples. Control accuracy is ± 0.01 to $\pm 0.02^{\circ}\text{C}$. Yet this compact instrument costs only \$595.

Hard to believe?

Why not write for a copy of our new 32-page catalog. It provides information on all of our constant temperature baths and circulators for control from -120 to $+330^{\circ}\text{C}$.

LAUDA Circulators

Division of Brinkmann Instruments
Cantiague Rd., Westbury, New York 11590

CONCENTRATE

proteins 100x in 30 minutes?

DESALT

them in 10 minutes more?

WASH

cellular suspensions?

FILTER

goopy messes without clogging?

SEPARATE

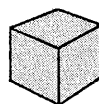
differently-charged ionic components?

all on one apparatus?
and for less than \$1000?

Canalco's Electrophoretic Filter/Concentrator does all these and more!

It's a very unique device, nothing before like it . . . uses a combination of electrophoresis, hydrostatic pressure, dialysis, and some black magic involved in the complex capabilities of a special electrolyte. It does so many things that we're hard put for a single name that describes all of its functions. For instance you can:

- *concentrate ten 20 ml aliquots to 10x in only 15 minutes! Or up to ten of 200 ml each in 150 minutes! Or larger volumes at 3 liters per hour!*
- *continue to concentrate to 100x in 15 minutes more!*
- *recover 80 to 100 percent of starting protein!*
- *desalt ten 20 ml samples from 12 percent salt to near zero in 40 minutes, and larger volumes at one liter per hour!*
- *filter and sterilize continuously and without clogging—producing up to 50 ml clear filtrate per minute (3 liters per hour) of the most hard-to-filter isotonic biological mixes.*
- *filter low-salt mixes and non-biologicals (like pollutant colloids in water) up to 75 liters per hour!*
- *fractionate isoelectric or weakly-charged from highly-charged isotonic components (like serum fractions) at 25 ml per minute (1.5 liters per hour)!*
- *and wash less-charged from more-charged components (like extra-cellular enzymes from bacteria, or glycerol from red cells) at comparable rates!*

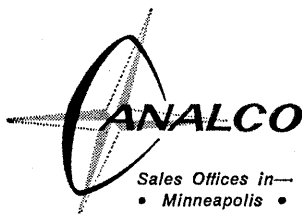


all this from a little bench device, which measures only 10" cubed . . . great for the space-pressed researcher

AND IF YOU'RE THINKING BIG . . .

we have pilot plant units, about the size of your secretary's desk, which can do any of the above at rates up to *1000 liters a day* for biologicals or 4000 gallons a day for fresh water treatments. Typical applications of the EFC, already performed successfully, are separations of gamma globulin and albumin from whole serum, tuberculin protein from carbohydrate, gamma globulin from whole blood *in vivo*, glycerol from thawed red cells, phage from *E. coli*, enzymes from fermentation broths, tetanus toxin from bacteria, enzymes from zeolite clay, oil from water emulsions, amylose from amylopectin, and a whole host of materials—phenolics, extractives, humic acid, B.O.D. sewage substances, algae, bacteria, molds, silt, calcium, magnesium, iron, phosphates and other inorganic salts—from water.

An illustrated brochure describes the capabilities of the EFC in detail. Write for your copy!



Canal Industrial Corporation

5635 Fisher Lane Dept. S-7C
Rockville, Maryland 20852 Telephone (301) 427-1515

Sales Offices in— • Boston • Chicago • Cincinnati • Cleveland • Denver • Houston • Los Angeles
• Minneapolis • New York • Ottawa • Philadelphia • Pittsburgh • San Francisco • Washington, D.C.

WOW! I'm within 1 milligram in only 10 seconds!

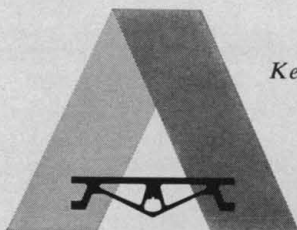


NEW Ainsworth Type 23V VERN MATIC Balance

The price is right, too!
Only \$475.

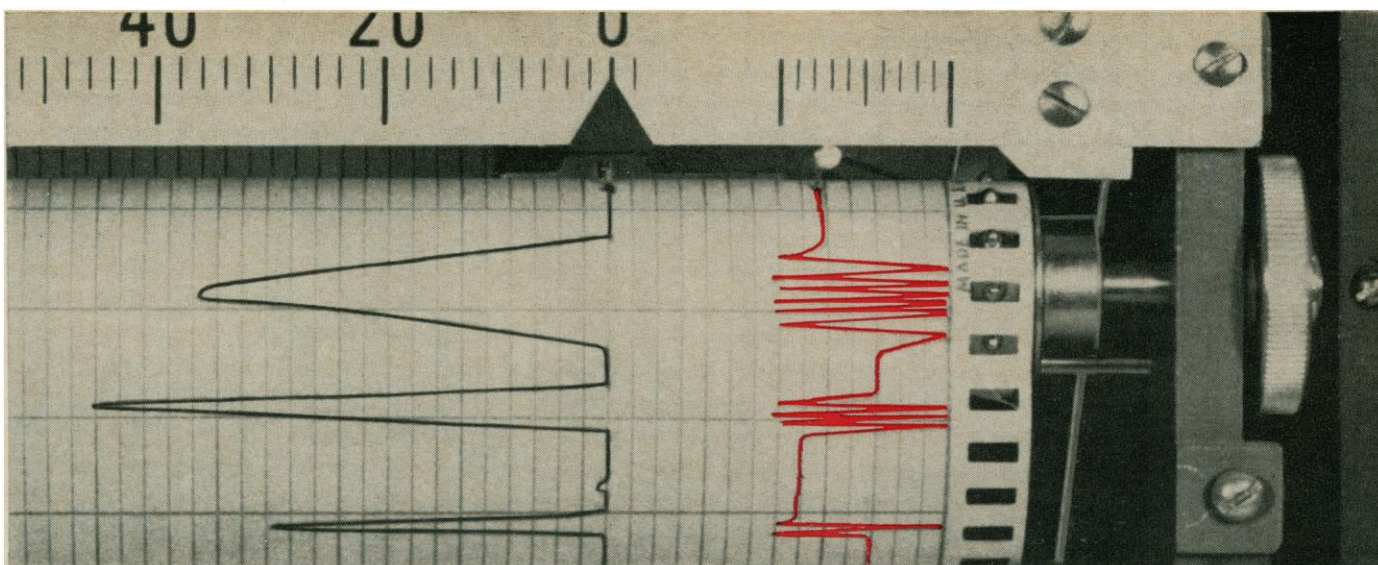


Latest addition to the Ainsworth Balance line gives the speed of a top loading balance . . . yet with analytical accuracy. Weighs your material within 1 milligram as fast as 10 seconds. Ideal for schools, hospitals, industry, *and* it's priced to fit your budget—*only* \$475. The new Type 23V Balance has rugged, enlarged readout; 15-month factory warranty. For additional information, write to Ainsworth, 2151 Lawrence Street, Denver, Colorado 80205 or call your Ainsworth Distributor for a demonstration.



Keeping America in balance since 1880!

INSWORTH



**As each
peak
is recorded**

**the Disc[®] Integrator
automatically
computes
the peak area
and gives you
the answer on
the same chart.**

- **Eliminates time-consuming hand calculations.**
- **Automatic and continuous—no adjustments or controls.**
- **Permanent record of peak areas.**
- **Accuracy within $\pm 0.1\%$.**
- **\$585.00**

Available as a standard accessory from recorder or chromatograph manufacturers—can be ordered with new recorders or installed on those already in service. Contact your equipment supplier or Disc Instruments, Inc. 2701 S. Halladay Street Santa Ana, California 92705 Phone (714) 549-0345



Developing a CD measuring capability for a spectropolarimeter isn't something you rush. At least if you want to do it right. First we had to make certain that circular dichroism was recorded with a performance comparable to our present ORD capabilities — that the CD accessory performed as well as the basic Optical Rotatory Dispersion instrument, with the same minimum detectable optical activity in either mode. And that it was done over a range of 1850 to 6000Å.

Then we considered the chemist himself. Would it be simple for him to use. Problems associated with molecular conformation and stereochemical studies are difficult enough, so we tried to help him get his data as easily as possible. Only two new controls were added, and the CD unit was designed for quick installation. Change-over time, from one mode of operation to the other, is only a matter of minutes. Now all the convenience and versatility of our ORD controls, which allow quick adaptation of instrument

parameters to sample requirements, are also available for CD.

Both CD and ORD utilize the same adjustable slit program, for constant energy or resolution; the same strip chart recorder, for maximum flexibility of presentation; the same constant temperature system, for stability; and, the same double monochromator, for providing low stray light and high resolution.

All the controls are grouped together to keep the versatility of the instrument convenient and easy.

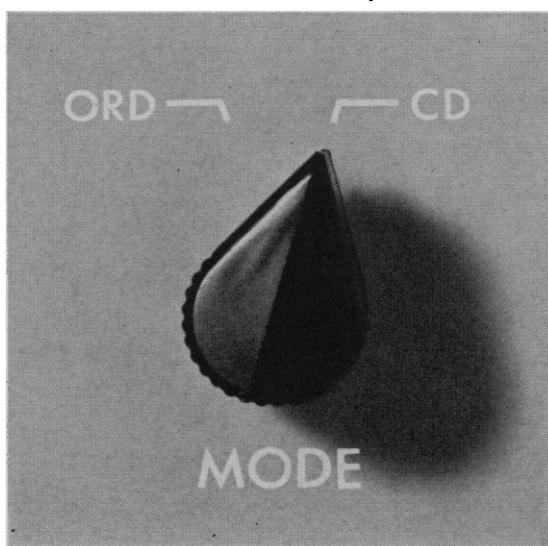
Finally, we wanted the CD equipment to adapt easily to CARY 60 Spectropolarimeters in the field.

That way a laboratory would have one instrument which was unsurpassed in either its ORD or CD capabilities.

It was worth the wait.

For details, write Cary Instruments, a Varian Subsidiary, 2724 S. Peck Road, Monrovia, California 91016. Ask for Data File E702-77.

CARY 60
SPECTROPOLARIMETER



**Now Cary's
Model 60 has CD.
Better late.**

Instanalysis

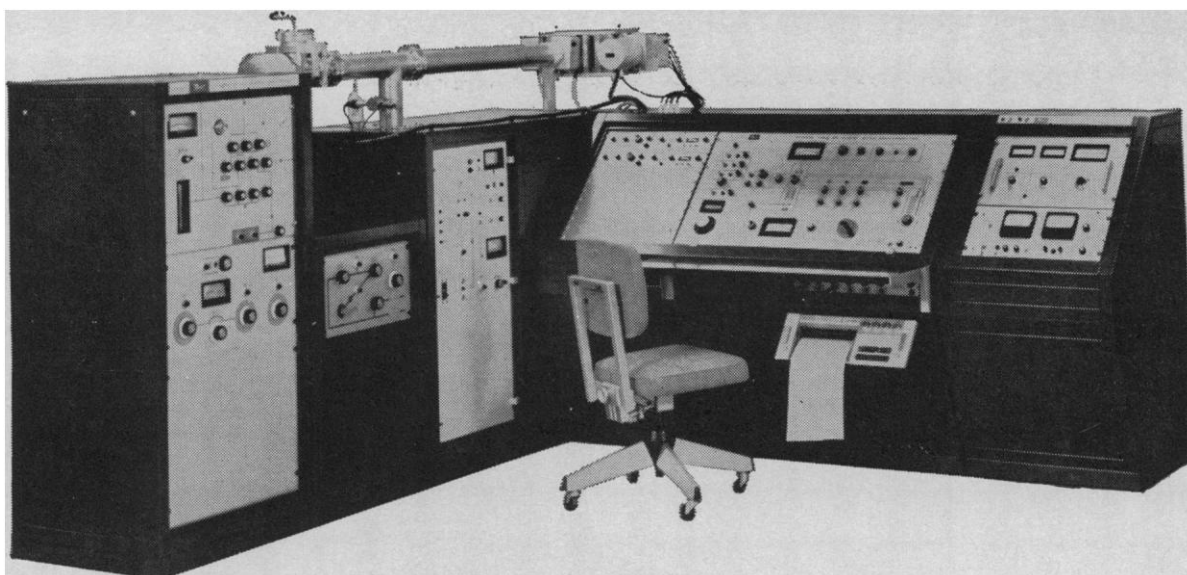


This is a birds-eye view of one of the world's fastest frozen sectioning systems. IEC's Model CTI Microtome-Cryostat. From specimen to slide in less than 3 minutes enables you to perform almost instant analysis of tissue. You'll find this speed invaluable particularly in surgical procedures. On the other hand, the CTI is perfectly suited for both research and the rapidly increasing volume of routine frozen sectioning. It has $\pm 1^{\circ}\text{C}$ temperature control, quick defrost system, a vacuum port for freeze drying equipment, anti-fog control, and internal quick-freeze block. As in our smaller, economy Model CTD, the CTI comes complete with the famous 100% rustproof IEC Custom Microtome. If you are in the market for a Microtome-Cryostat, consider IEC . . . the company that revolutionized frozen sectioning techniques. Your dealer has IEC Cryostats in stock. Ask for Bulletin CT.



**INTERNATIONAL
EQUIPMENT CO.**

300 SECOND AVENUE • NEEDHAM HEIGHTS, MASSACHUSETTS 02194.



Just because this is the world's fastest Mass Spectrometer doesn't mean you can't use it in general analytical labs.

The Bendix® Time-of-Flight Mass Spectrometer is a versatile analytical instrument that can be used in over 25 different research and analysis areas. *Now with unit mass resolution of 700 ($M/\Delta M$)*, it's accurate enough to use in general applications for both organic and inorganic work. Use it, for example, in monitoring chromatograph output. Laser vaporization. Organic structure analysis and identification. Thermodynamic studies. Shock tube research, combustion analysis and fast reaction studies, too.

Through it all, you'll see unequalled speed—10,000 to 100,000 measurements per second. Mass range up to 5,000 amu. Detectability of 1 to 5 ppm. and sensitivity to 10^{-13} torr or better. And thanks to the exclusive magnetic electron mul-

tiplier, you can have oscilloscope and analog/recorder readout simultaneously.

In addition to measuring positive or negative ions, you can have up to six analog/recorder channels. With each one scanning a separate peak or group of peaks with the oscilloscope viewing the full spectrum—all at the same time. You can also add the total output integrator to integrate the spectrum or any part of it.

Ease of operation? The Bendix TOF Mass Spectrometer wins hands down here, too. No difficult alignment or stringent geometric conditions are required. Ion source, flight tube and high-gain magnetic electron multiplier detector are all in a single, straight tube. Almost any kind of inlet system is easily adapted. Laser microprobe, molecular leak, direct inlet, ion molecule

source, fast reaction, hot filament, Knudsen cell and gas chromatograph manifold included.

It's all been proven in hundreds of installations in major universities and private industry throughout the world. Isn't now the time to let a Bendix TOF Mass Spectrometer prove itself to you?

Bendix scientific instruments—including mass spectrometers, atomic absorption and flame spectrophotometers, polarimeters, polarographic systems and electron multipliers—are used in over 100 areas of research and analysis. For more information on any of our instruments, write: **The Bendix Corporation, Scientific Instruments Division, 3625 Hauck Road, Cincinnati, Ohio 45241.** Or phone (513) 772-1600.

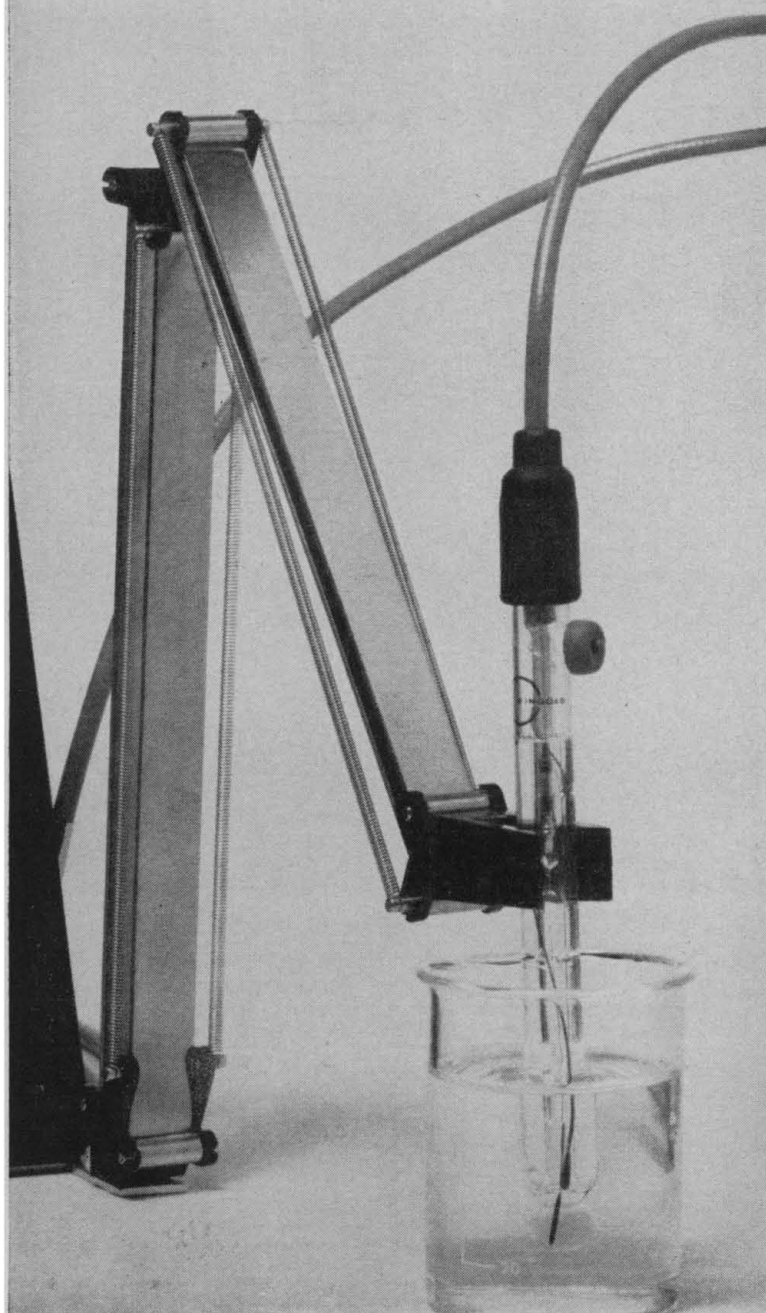


the IL MULTI-flex[®] pH electrode arm

The NEW . . . IL MULTI-flex Electrode Arm . . . a better way for fast, smooth electrode handling. A touch of your fingertips positions the electrode precisely where you want it . . . in the beaker . . . up in the air for cleaning . . . or at any level in the sample. This sturdy flexible holder stops exactly where you want it to . . . anywhere within a 270° radius and as far as 15" from the meter . . . a convenience that serves to protect against electrode breakage and enables you to work more quickly. Constructed entirely of durable plastic and stainless steel, it can be connected to the electrode support bar of any pH meter with the simple thumb-screw adaptor. The IL MULTI-flex Electrode Arm can be used with combination pH electrodes, glass/reference pairs, or metallic electrodes. The price of the 83020 MULTI-flex Electrode Arm complete with adaptor, is \$29.95. Add this new dimension of convenience to your laboratory . . . and look to IL for "innovations in pH" and other scientific instrumentation.

special offer

To acquaint you with the convenience of using an IL MULTI-flex Electrode Arm — and to introduce you to IL precision pH Electrodes — for a limited time the electrode holder will be offered at a reduced price **when purchased with any one of three popular IL Combination Electrodes**. You have your choice . . . the 14023, a rugged polyethylene-protected combination electrode for general laboratory or school use wherever a great deal of abuse can be expected; the 14063, a widely used, high alkaline, general purpose 0-14 pH combination electrode; or the 14043, a slim combination electrode for measuring samples as small as 10 microliters, or for pH measurements on flat, wet surfaces. For further information about this offer fill in and mail the coupon below today or contact your nearest authorized IL dealer representative — Aloe Scientific, Division of Brunswick, or Scientific Products, Division of American Hospital Supply.



INSTRUMENTATION LABORATORY INC
9 GALEN ST. WATERTOWN, MASS. 02172

Yes, please send me additional information about your SPECIAL OFFER.

NAME _____

ADDRESS _____

CITY & STATE _____

ZIP CODE _____

SPACE-AGE INCUBATOR

You say floor space is at a premium and you have high-volume culturing to do? Install a NATIONAL Air-Flow Incubator and your problem is solved!

The #3512 Air-Flow Incubator offers many advantages besides space-saving, to which a new hinge design contributes by permitting the unit to be placed adjacent to other apparatus, or walls, without interfering with the opening of the door:

- Low-velocity mechanical air circulation minimizes temperature gradient with minimum drying action.
- Top-mounted control panel eliminates accidental temperature control re-settings.
- Adjustable perforated aluminum shelves are rigid to eliminate work-load sag.
- Available in refrigerated model to 5°C...also with full CO₂ facilities and/or modifications for electrical outlets, gas inlets, etc.
- New positive cam lock prevents shock damage to work when closing door...no stick, no click!



NATIONAL #3512 AIR-FLOW INCUBATOR

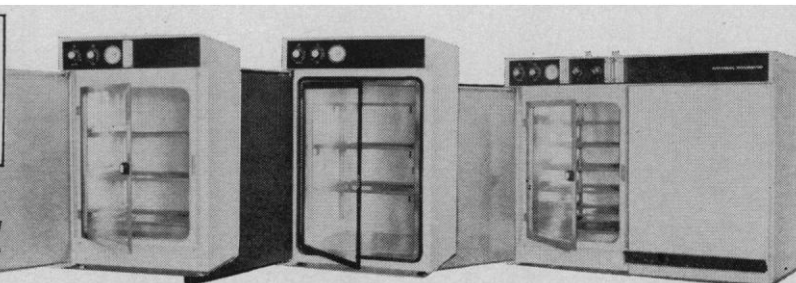


NOW
UNDERWRITERS'
LABORATORIES,
INC. LISTED!

THREE MODELS of Air-Flow Incubators are available: two floor models and one bench model. Contact your nearest NATIONAL franchised dealer for further information. Shown here are selected models from NATIONAL's extensive line: #3212 Water-Jacketed Incubator, #3211 Anhydro Incubator, #3321 Water-Jacketed CO₂ Incubator. There's a NATIONAL Incubator tailored to your needs!




NATIONAL APPLIANCE COMPANY
 Box 23008, Portland, Oregon 97223 • Box 103, Cherry Hill, New Jersey 08034 • 2602 E. Devon, Des Plaines, Illinois 60018 • 14921 Ventura Blvd., Sherman Oaks, California 91403



**A laboratory that
needs a computer
always needs more
than a computer...
unless it's a LINC-8**

A laboratory needs ways to get data into the computer, for example. Ways to look at the results. Ways to store masses of data. Ways to get at that data, easily. Ways to communicate with the machine easily, so that it could do things that need doing. If you add up the basic computer and all the needed attachments, you have exceeded the price of the LINC-8 — and you still haven't got what the LINC-8 uniquely offers.

For LINC-8 is more than a general purpose digital computer. It is, in fact, two digital computers (the PDP-8 and the LINC) with built-in A to D converter, oscilloscope display, automatic tape loader, dual magnetic tape unit for mass storage, relay buffer, buffered input-output lines, teletype-writer and two complete software packages, one with FORTRAN compiler. \$38,500.

And this is what you can't buy when you do it by separate attachments.

To put a LINC-8 into full operation, you put your tape on the tape rolls, hit the "Load" switch, the "Do" switch, the "Start" switch and you're on the air. 5 seconds. The display scope is reading "Which Program?". You go to the typewriter and tell it.

And this, too. LINC-8 is not only the easiest computer system to operate — it is also the easiest computer in the world to communicate with. Some scopes and some scientists have spoken to each other so often, you could almost call them friends.

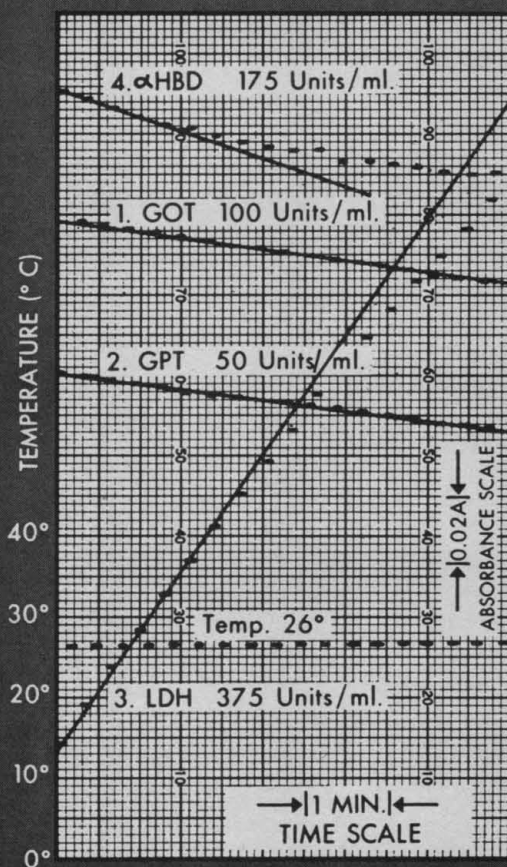
Write for a free copy of the "Small Computer Handbook". LINC-8 is described therein.



digital
COMPUTERS • MODULES

DIGITAL EQUIPMENT CORPORATION, Maynard, Massachusetts 01754.
Telephone: (617) 897-8821 • Cambridge, Mass. • New Haven • Washington,
D. C. • Parsippany, N. J. • Rochester, N. Y. • Philadelphia • Huntsville •
Pittsburgh • Chicago • Denver • Ann Arbor • Houston • Los Angeles •
Palo Alto • Seattle • Carleton Place and Toronto, Ont. • Reading, England
• Paris, France • Munich and Cologne, Germany • Sydney and West Perth,
Australia • Modules distributed also through Allied Radio

Four Enzyme Assays with Temperature Measurements made Simultaneously



Enzyme Assays from Standardized Human Test Serum. Chart is from the Gilford Applications Laboratory, Oberlin, Ohio.

Scientists in hundreds of research laboratories throughout the world have come to depend on Gilford Automatic Spectrophotometers as the standard for a wide range of solution kinetics, including the enzyme reaction rates shown here.

Gilford Instruments have won acceptance because their accuracy is of a high order, and in addition they are extremely versatile. Gilford Spectrophotometers measure Absorbance directly — not percentage transmission converted to Absorbance. Thus, their accuracy is not limited to the small central portion of the scale, but has a fully usable range of 0 to 3 A with high accuracy anywhere in this range.

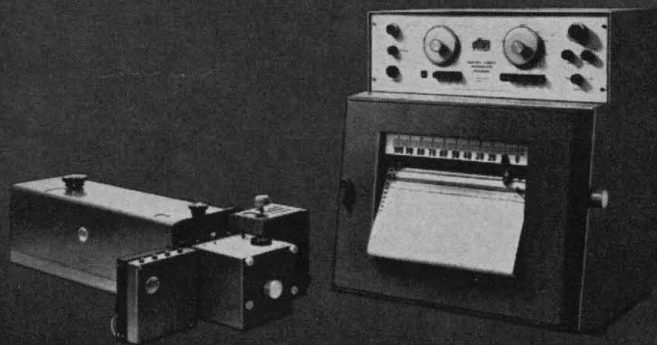
Gilford Spectrophotometers provide a digital display, reflecting their high sensitivity and resolution — direct readings to 0.001 A. Full scale recording is easily established anywhere in the 0 to 3 A range. The Gilford Photometric System is extremely stable; drift is less than 0.005 A per hour. Fewer "returns to reference" are needed.

The typical group of serum assays shown at left includes Glutamic Oxalacetic Transaminase (SGOT), Glutamic Pyruvic Transaminase (SGPT), Lactic Dehydrogenase (LDH) and α -Hydroxybutyric Dehydrogenase (α -HBD) — with a fifth trace for temperature. With the Gilford Offset Control, it is possible readily to separate the four recording traces, thus assuring clear, error-free recordings. True linear slopes can be determined from one-minute intervals, avoiding the need for averaging rates over long fixed time intervals.

In selecting a Gilford Automatic Spectrophotometer, you will find a wide range of "building blocks" available. These include a number of sample handling systems, including flow-through cells, temperature control and sensing units, dual wavelength mechanisms and others. With Gilford equipment, you get what you need to do today's jobs, and it will have the inherent adaptability so important in meeting your spectrophotometric assay problems of tomorrow.

Write for full information on Gilford Spectrophotometers.
Gilford Instrument Laboratories, Inc. • Oberlin, Ohio 44074

gilford®





**This is a new
automatic pipette.**

**Among other things,
it doesn't touch the
liquid it pipettes.**

(How's that again?)

When using the BIOPETTE automatic pipette, all of the measured aliquot is held in the disposable plastic tip. The liquid never has to enter the housing of the BIOPETTE itself. Hence, the BIOPETTE stays clean, can't contaminate anything else, and doesn't need washing. And to switch from one liquid to another: just put in a new disposable tip. Period.

Fast? It takes approximately 2 seconds for *both* filling and discharging. Without sacrificing accuracy.

Safe? Safety is inherent in the design. Liquid does not come in contact with operator.

Reproducible delivery volume? Using the same instrument: $\pm 1\%$.

Easy to use? Yes. With virtually no training. Requires no special "touch" or technique. (Goodbye meniscus.) Weighs less than 2 oz. with tip.

Economical? If time *is* money, yes. Two ways: greatly reduces time for pipetting; totally eliminates time required for the washing ritual. (Special bonuses: no broken or contaminated glass pipettes.)

Useful? Without doubt. Interesting current animal care

applications include, for example, forced feeding, artificial insemination, blood dilutions, and so forth.

Guarantee? A real one, lasting ten years. If a problem develops (unlikely), we will immediately send you a replacement BIOPETTE automatic pipette while we fix yours for you. Or we'll throw yours away and let you keep the replacement.

For further information and prices, please write: Lab Cages Inc., 126 John St., Hackensack, New Jersey 07602. (And why not ask for our new, interesting catalog also?)

lab cages inc.

A SUBSIDIARY OF BECTON, DICKINSON AND COMPANY

BIOPETTE is a trademark of Becton, Dickinson and Company.

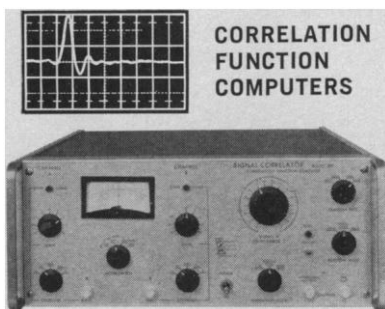
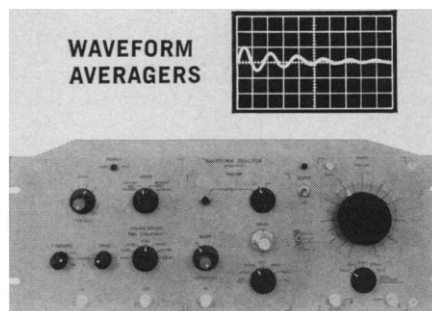
When information buried in noise is periodic, transient, or random, there is a **PAR^{T.M.}** instrument to recover it

PAR manufactures a complete line of signal processing equipment to measure signals of various types buried in noise. The choice of the most appropriate instrument depends upon the characteristics of the signals. The equipment falls into three general classes:



Lock-In Amplifiers have application where the signal of interest is or can be made to appear at a single frequency and where a reference voltage related in frequency and phase to the signal can be obtained. These instruments employ phase-sensitive detection and narrow-band filtering techniques to provide a DC output signal proportional to the amplitude of the fundamental component of the signal being measured. The Lock-In Amplifier can be described as a tuned voltmeter, the response of which is "locked" to that particular frequency and phase at which the signal information has been made to appear. They operate typically in the frequency range of 1.5 Hz to 150 kHz with full scale sensitivities down to 10^{-9} volts.

Waveform Averagers are useful when, after processing, the actual waveform of the signal of interest must be maintained and the signals are repetitive waveforms or transients whose onset can be related to a trigger pulse. The application of a synchronized, repetitive waveform will result in an output that corresponds to the average value at each of the segments of the waveform being studied, whereas any non-repetitive (or un-synchronized) signals such as noise will be suppressed since their average after many occurrences will approach zero. PAR makes two instruments that perform this function; the Boxcar Integrator and the Waveform Eductor^{T.M.} The Boxcar Integrator is a single point averager in which a single slice, as narrow as 1 microsecond, of the input waveform is averaged while the position of the slice is slowly scanned through the waveform. The Waveform Eductor simultaneously averages one hundred points of the waveform which can be distributed over periods varying from 100 microseconds to 10 seconds.



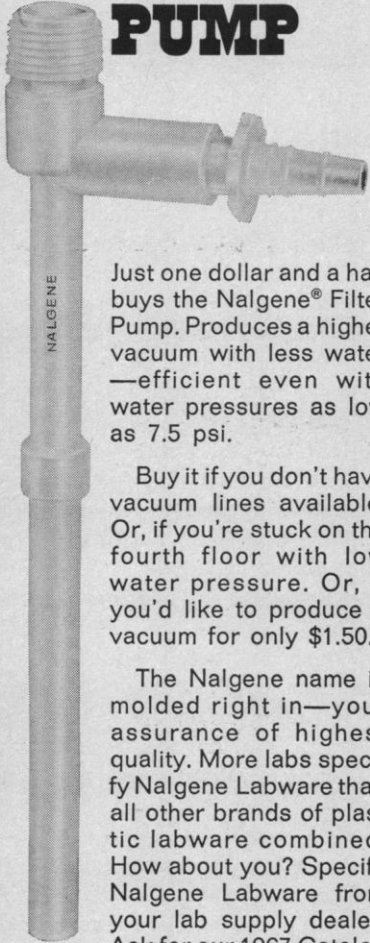
Correlation Function Computers are the most general form of signal processing equipment that can be constructed (Lock-In Amplifiers and Waveform Averagers are actually special cases of correlation equipment). Whereas a reference or synchronization signal is required in the other equipment discussed, autocorrelation analysis allows periodic and random signals to be defined without this restriction. An even more powerful technique is crosscorrelation which has the ability to describe the degree of conformity between two different signals as a function of their mutual delay. The PAR Signal Correlator simultaneously computes in real time 100 points of either the auto- or crosscorrelation function over total delay spans of 100 microseconds to 10 seconds.

A variety of instruments and associated peripheral equipment is available from PAR in each general class. Instrument prices range from \$765 to \$9500. Since PAR has wide experience in applying these systems to many situations in all fields of science and engineering (e.g.: aero- and hydrodynamics, spectroscopy, medical physics, geophysics, etc.), we welcome the opportunity to discuss your specific application. For additional information, or to arrange for a demonstration at your facility, contact Princeton Applied Research Corporation, Dept. G, P.O. Box 565, Princeton, New Jersey 08540. Telephone: (609) 924-6835.



PRINCETON APPLIED RESEARCH CORP.

WORLD'S ONLY
\$1.50
VACUUM PUMP



Just one dollar and a half buys the Nalgene® Filter Pump. Produces a higher vacuum with less water—efficient even with water pressures as low as 7.5 psi.

Buy it if you don't have vacuum lines available. Or, if you're stuck on the fourth floor with low water pressure. Or, if you'd like to produce a vacuum for only \$1.50.

The Nalgene name is molded right in—your assurance of highest quality. More labs specify Nalgene Labware than all other brands of plastic labware combined. How about you? Specify Nalgene Labware from your lab supply dealer. Ask for our 1967 Catalog or write Dept. 21071, Nalgene Labware Division, Rochester, N.Y. 14602.

**SPECIFY
NALGENE
LABWARE**

NALGE
RITTER PFAUDLER CORPORATION

Congressional Testimony

I, too, was much distressed by the partisan article, "The great research boondoggle," referred to in Abelson's editorial ("A partisan attack on research," 9 June, p. 1315). In his criticism of the magazine article, Abelson said, "The article is also very damaging when it quotes a professor of chemistry at a large university as saying that government support of research is 'potentially the most powerful destructive force the higher educational system has ever faced.'" That statement was made by me before a congressional subcommittee, but the following paragraph is the *complete* expression which I presented on my views of government support of university research and demonstrates clearly that the quotation as it appeared in the article was taken out of context (1).

The present program for Government support of university research including the methods and policies for granting and administering funds, is at the same time the greatest benefit and also potentially the most powerful destructive force the higher education system in America has ever faced. Federal support has created opportunities for the evolution and advancement of human knowledge and for the stimulation of creativity far beyond the most prodigious expectations of our current senior scholars. University scientists, particularly the young men, with and without tenure, are working unbelievably long hours and with a passion that suggests a compulsion to prove their worth to society. At the same time an imbalance between the effect at the graduate and undergraduate levels has arisen with the results that the talents of the undergraduate students are not being developed. Hence the supply of dedicated teachers, competent scientists, engineers, scholars, and well-informed citizens is being constrained dangerously due, in part, to a loss of the stimulation, guidance and experience-inspired knowledge which traditionally has been passed on to the students by the research scholars.

W. T. LIPPINCOTT
*Department of Chemistry,
Ohio State University, Columbus 43210*

Reference

1. Hearings before a Subcommittee of the Committee on Government Operations, H.R., 89th Congress, 1st session (Government Printing Office, Washington, D.C., 1965), p. 5.

Such attacks by quoting titles of valid research projects are unfair but not new.

In 1892, Congressman Hilary A. Herbert of Alabama nearly destroyed the U.S. Geological Survey by ridiculing the paleontological work of O. C. Marsh. He displayed a special author's

edition of Marsh's work on toothed birds, a sumptuous volume with morocco binding, gilt edges, wide margins, specially tinted paper, and a wealth of illustration, "... pointing to it as an excellent example of the way in which large amounts of Government money were being wasted" (1). The next day Herbert admitted that Marsh had written to him 6 years earlier, pointing out that the work in question was not published by the Geological Survey, that the cost of illustrations (and special printing) had been borne by the author, and that a supposed duplication of printing was only of a 40-page abstract.

In spite of this admission, "birds with teeth" continued to appear in speeches against the Survey as a symbol of government waste. The House voted to end all federal work in paleontology. Senator Wolcott of Colorado indicated that the birds themselves were not important, "... but here is a chance to cut Survey appropriations." The Geological Survey was eventually saved only by the resignation of Director John Wesley Powell in 1894.

Today it would be just as tempting for a congressman to launch such an attack on radiation studies as a way of cutting the AEC appropriation or an assault on biochemistry to "get" NIH. Scientists should do their best to inform the press that a book, or a research project, should not be judged by its title.

ELLIS L. YOCHELSON
*12505 Killian Lane,
Bowie, Maryland 20715*

Reference

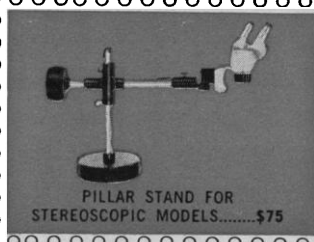
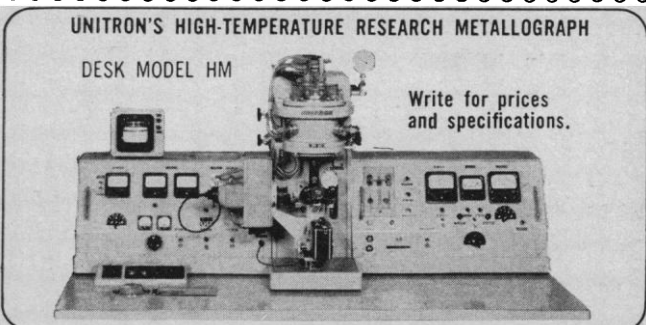
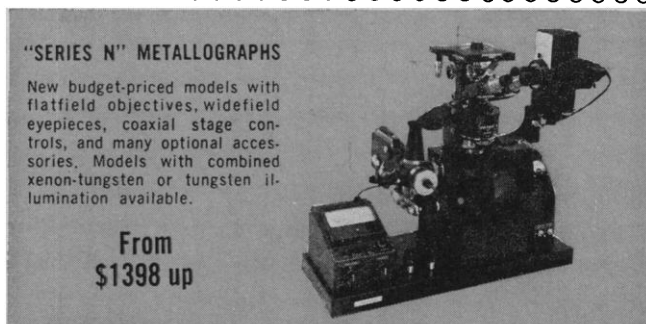
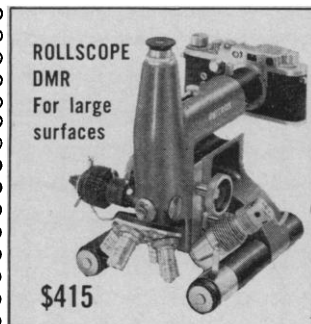
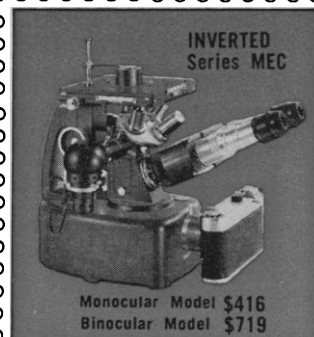
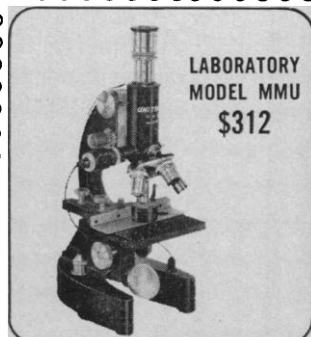
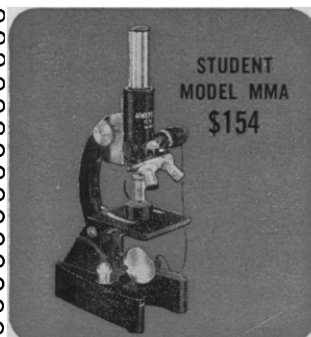
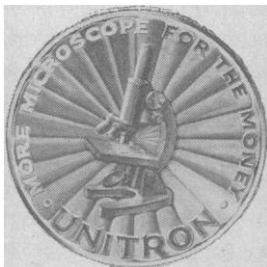
1. C. Schuchert and C. M. LeVine, *O. C. Marsh, Pioneer in Paleontology* (Yale Univ. Press, New Haven, Conn., 1940), p. 317.

Why's of Weightlessness

Lilley's letter (9 June) on weightlessness in space corrected one popular misconception but propagated another with the statement, "The gravitational forces on an Apollo crewman will be very weak for much of his journey, and his weightless condition will indeed be due to his remoteness from the earth and moon."

The reason for weightlessness during an earth-moon trajectory (which, even at the gravitational minimum point, is still subject to appreciable solar gravitation) has nothing to do with decreas-

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



10 DAY FREE TRIAL

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

WRITE FOR OUR FREE CATALOG

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

- ☐ Please send UNITRON's Microscope Catalog No. 4-J
☐ I want a FREE, no-obligation, trial of Model...

NAME _____ DEPT. _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

MICROSCOPE SALES DIVISION
UNITRON
INSTRUMENT COMPANY

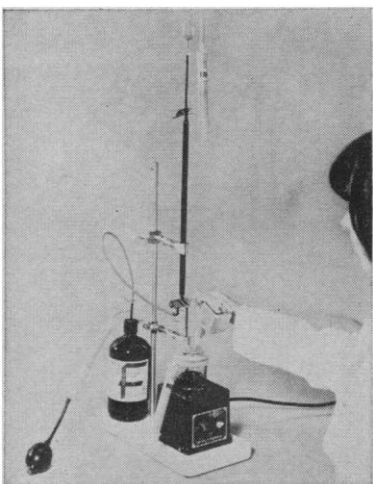
66 NEEDHAM STREET
NEWTON HIGHLANDS
MASS 02161



PERFORM CHEMICAL TESTS FASTER, MORE ACCURATELY

Just drop L/I Automatic REPI-PETS* and Automatic Dilutors into your reagent bottles and leave them there. These two instruments sample, dispense, dilute, transfer and mix with a guaranteed accuracy of 1%, reproducibility 0.1%. You'll save between 50-95% of your analysis time!

L/I instruments give you complete freedom from contamination, can handle **any** reagent, require no change in your methods, and never need cleaning. Volumes? From microliters to deciliters. Available in 1, 10, 20 and 50 ml sizes. Prices: REPIPETS \$47.50, Dilutors \$89.50. Write for details.



WATER DETERMINATIONS IN 4 MINUTES!

Use L/I Aquametry Apparatus to measure water content in foods, drugs, organics—all materials. Range 1 ppm. to 100% water without adjustment. 1% accuracy over entire range. Price \$235.

* trademark-(REpetitive PIPETS)

LABINDUSTRIES

1802H Second Street
Berkeley, California 94710

ing gravitation—weightlessness would obtain in a gravitational field of any strength whatsoever. The explanation is exactly the same as for weightlessness during a near-earth orbit: whenever the rocket motor is not firing, both the spaceship and the astronaut are in the free-fall condition, and thus both move on the same trajectory with the same acceleration and consequently with no relative motion between them.

Weight can only be caused by a gravitational field when, as on the surface of a planet, a body is restrained from accelerating. For example, a spring scale measures the force which the earth exerts to keep a body from accelerating downward; this is its weight.

MARVIN M. MUELLER
307 Manhattan Loop,
Los Alamos, New Mexico 87544

Measure of Education

In commenting on Carter's article on the National Assessment of Educational Progress ("Educational testing: national program enters critical phase," 5 May, p. 622), I should like to make two points: (i) the twin problems of measurement—criterion and sampling—do not appear to have been met by those responsible for NAEP; and (ii) since there is likely to be no way of maintaining the security of the tests and other instruments, it is inevitable that in a significant number of instances the tests will, as the American Association of School Administrators has predicted, dominate if not determine the curriculum.

What shall be the criteria by which citizenship shall be assessed? Are comparisons of educational progress in this domain to be made across social class lines or will the white, Anglo-Saxon, Protestant ethic be the standard? Will the same measures serve central city and suburb, North and South; and, if not, how will comparisons be made?

Two things might be said concerning the sampling problem. At the American Educational Research Association session on NAEP in Chicago in 1966 one of Tyler's assistants explained how random sampling would be achieved; then, presumably sensing some enthusiasm from his audience, invited any administrators present to volunteer their schools as subjects! A sample made up of volunteers first, and second, of subjects from schools whose administra-

tors are *not* among those who object to NAEP, may not be particularly representative.

The influence of NAEP instruments on the curriculum is more serious. Already examples of some test items are public knowledge. Can anyone suppose that when the program is completed the mass media and the popular press will not insist on using many more items as examples in reporting the level of educational progress discovered by the investigators? School boards and citizens groups all over will demand that the full battery be administered in their schools to determine whether the taxpayers are getting their money's worth. Under such circumstances it is hard to believe that most teachers and principals will not begin to slant the curriculum in the direction of the tests.

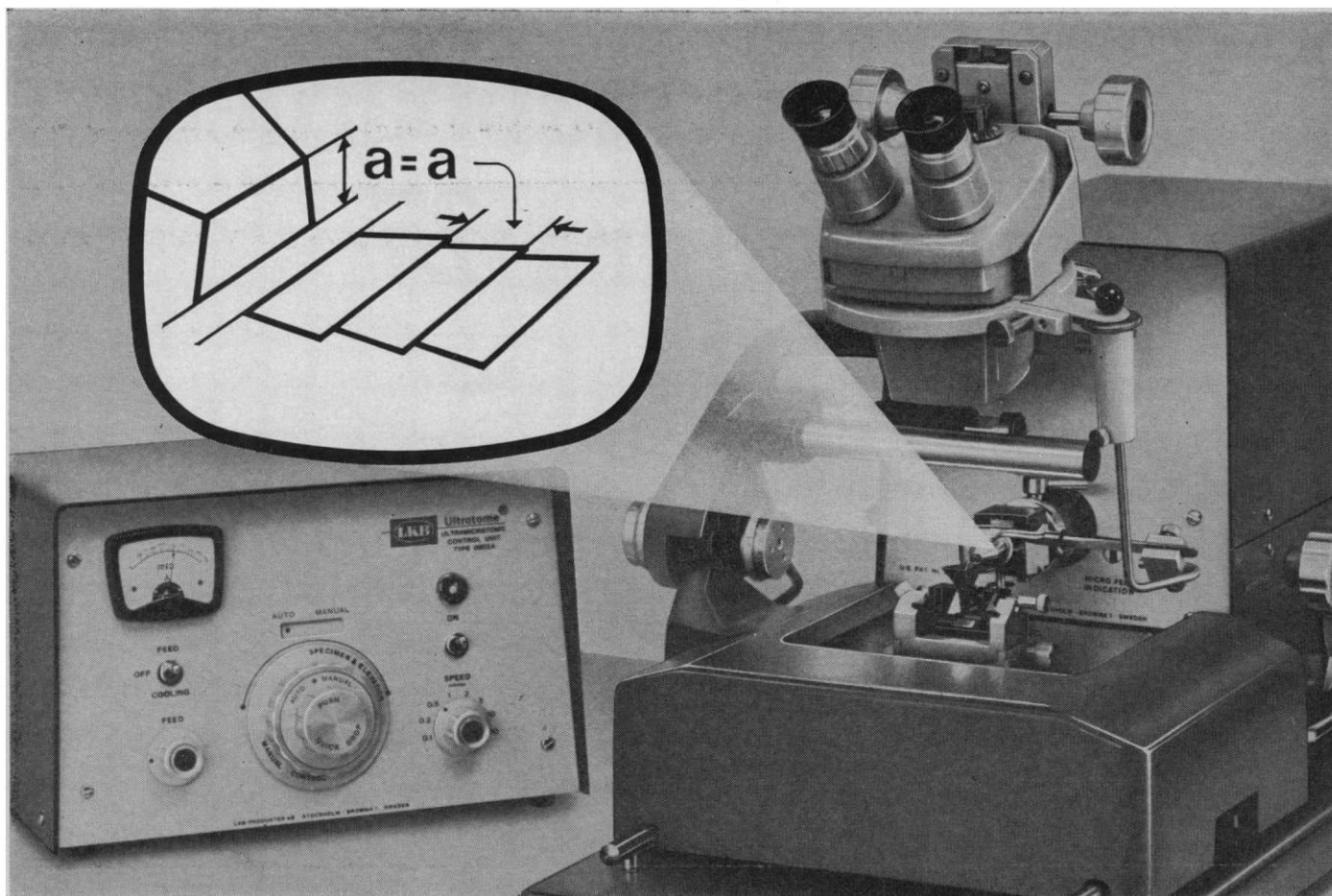
It is perhaps unfortunate that AASA took quite such a strong stand—unfortunate but understandable. After all, school people have been criticized for everything from Sputnik to their inability to solve the problems of delinquency, poverty, crime, and what-have-you. (It might be observed that the condemnation of the schools over Sputnik has not turned to equally loud applause now that we seem to have drawn even in the space race.) What is more disturbing is the emotional and uninformed reaction of so many people who attack the critics of NAEP. In "stating their oppositions to AASA's stand," for example, the dean of Harvard's Graduate School of Education and his associates say, "We believe that the risks of knowing nothing are greater than the risks of knowing something, and that the national assessment program should be allowed to go forward in a *modest and exploratory* way without *harassment*." (1) (Italics mine.)

It seems inappropriate to employ such emotion-laden words in deliberating the merits of what should be a scientific investigation. There is a third possibility that could be added to "knowing nothing" and "knowing something." The something "known" can be either true and useful or false and harmful. The odds that the unhappy third result may obtain are too great to ignore.

A. W. VANDERMEER
College of Education,
Pennsylvania State University,
University Park 16802

Reference

1. *Harvard Grad. Sch. Educ. Alumni Bull.* 12, No. 1, 31 (1967).



Focus on Ultramicrotomy

We at LKB want to focus your attention on the solution, not on the problem—get your problems in focus and solve them the LKB-way.

LKB ULTROTOME III SOLVES PROBLEM OF "COMPRESSION"

"Compression" (not to be confused with "chatter"), is a deformation of the section caused during cutting whereby the section length becomes shorter than the pyramid height. Compression deforms the specimen ultrastructure, makes direct measurement of micrographs inaccurate (without corrections), and morphology misleading.

Design of LKB optical system (viewing at 45° incident angle), checks compression and estimates correction factor where it has occurred. Low speeds eliminate or minimize compression; the LKB ultramicrotome can produce usable sections at 0.5 and 0.2 mm/sec. because there are NO VIBRATIONS.

The first of an LKB-series dealing with problems in ultramicrotomy.

Answer to many more problems provided by unique design features:

Cutting speeds: Widest range available, 20–0.1 mm/sec.

Optical system: Most flexible—pyramid tip/knife edge always central.

Specimen/Knife Holders: Complete freedom of structure orientation.

Feed: Linear thermal. Two independent manual mechanical systems.

Focused Lamps: Provides evaluation of knife edge quality and angle.

Section Collector: Simplifies picking up sections and manipulation of grids.

Diamond Knife sectioning: Gravity powered specimen arm prevents damage.

Machine Trimming: Fast procedure and superior pyramids.

For the complete story write today for our fully illustrated two-colour brochure describing in detail the LKB Ultramicrotome—ULTROTOME III.



LKB INSTRUMENTS INC. • 12221 PARKLAWN DRIVE • ROCKVILLE Md. 20852

OTHER
HEADQUARTERS
FOR SALES
AND SERVICE

SWEDEN
LKB-Produkter AB
Box 76,
Stockholm—Bromma 1

UK
LKB Instruments Ltd.
232 Addington Rd.
S. Croydon, Surrey CR2 8YD

NETHERLANDS
LKB-Produkten N.V.
Zeekant 35,
The Hague.

DENMARK
LKB Instrument A/S
Amagerbrogade 34,
Copenhagen S

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 | EVERETT I. MENDELSON |
| JOSEPH W. CHAMBERLAIN | NEAL E. MILLER |
| JOHN T. EDSALL | JOHN R. PIERCE |
| EMIL HAURY | KENNETH S. PITZER |
| ALEXANDER HOLLAENDER | ALEXANDER RICH |
| WILLARD F. LIBBY | DEWITT STETTIN, JR. |
| GORDON J. F. MACDONALD | CLARENCE M. ZENER |

Editorial Staff

Editor

PHILIP H. ABELSON

Publisher

DAEL WOLFE

Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

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

Assistant to the Editor: NANCY TEIMOURIAN

News Editor: DANIEL S. GREENBERG

News and Comment: JOHN WALSH,* ELINOR LANGER, LUTHER J. CARTER, BRYCE NELSON, NIGEL CALDER (contributing correspondent), ROBERT J. SAMUELSON, GILLIAN PARRILLO, JOAN ANDERSON

Book Reviews: SYLVIA EBERHART

Editorial Assistants: JOANNE BELK, ISABELLA BOULDIN, ELEANORE BUTZ, BEN CARLIN, CAROLYN CLARK, GRAYCE FINGER, NANCY HAMILTON, OLIVER HEATWOLE, ANNE HOLDSWORTH, KONSLYN-NIETTA HUTCHINSON, ELEANOR JOHNSON, PAULA LECKY, KATHERINE LIVINGSTON, HELEN OLNEY, LEAH RYAN, BARBARA SHEFFER

*European Office: Lime Tree Farm, East Hagbourne, Berkshire, England. Telephone Didcot 3317

Advertising Staff

Director

EARL J. SCHERAGO

Production Manager

ROSE MARIE ROMAGNOLO

Advertising Sales Manager: RICHARD L. CHARLES

Sales: New York, N.Y., 11 W. 42 St. (212-PE-6-1858): ROBERT S. BUGBEE

Scotch Plains, N.J., 12 Unami Lane (201-889-4873): C. RICHARD CALLIS

Medfield, Mass. 02052, 4 Rolling Lane (617-359-2370): RICHARD M. EZEQUELLE

Chicago, Ill. 60611, 919 N. Michigan Ave., Room 426 (312-DE-7-4973): HERBERT L. 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.

Mainland China: An Emerging Power

Mainland China has substantial natural resources and a tremendous human potential. Although only modest progress has been made in the development of material resources, great steps have been taken in achieving the intellectual status necessary to sustain an advanced technology.

What is the intellectual potential of the Chinese? It seems great. The 1960 U.S. census figures show that there were 135,000 Chinese men in this country. Yet from this small number have come many university faculty members as well as members of other professions. The U.S. census figures for different racial groups show the following comparison, on the basis of professional manpower per thousand of the group's male population: engineers, white, 10.8, Chinese, 26; natural scientists, white, 1.7, Chinese, 5.0. Behind these figures are positive and negative factors of many kinds; nevertheless, the performance of the Chinese in our environment is impressive. What will be their performance in the environment of the Chinese mainland? The present regime has both helped and hindered the development of China. Some of the ideological handicaps are alluded to in an article appearing in this issue of *Science* (page 392). However, there has also been great progress.

In 1949 there were only about 50,000 scientists and engineers in mainland China. In the period 1949–63, some 671,000 Chinese students graduated from colleges and universities, with majors in natural sciences, agriculture, medical sciences, or engineering. A recent congressional report indicates that a broad educational base has been established in China. The report* states:

The number of children and young adults in full-time educational institutions today is five to seven times the school enrollment in 1949. The number in primary schools has jumped to over 100 million, including almost all urban children and a great majority of rural children. . . . If the word "school" is extended to include part-time education . . . China may be said to be just one great big school.

Fruits of this educational effort are appearing. The committee document states, "A Canadian doctor who has recently visited China's medical colleges, hospitals and research institutions reported that he had found good equipment, high medical standards, excellent medical care . . . 'almost all comparable to Canadian standards.'" A British physicist, K. Mendelssohn, writing in the 1 July issue of *Nature*, reports seeing in China many locally manufactured products, such as diesel-driven trains, electric generators, gas turbines, machine tools, and electronic gear. He also noted electron microscopes, precision balances, and computers. At the Institute for Solid State Physics he was shown superconducting solenoids of niobium-zirconium and of niobium-tin. He also saw equipment for producing artificial diamonds of a size and quality similar to those made in the West.

Today 80 percent of the population in China is engaged in agriculture. Although energy sources such as coal are abundant, electric output now is only about 4 percent that of the United States. Soon all this will change and China will become a great power. Will mainland China then be a menace to all mankind, or will she return to a long tradition of noninterference in the affairs of others?—PHILIP H. ABELSON

* "Mainland China in the World Economy," *Report of the Joint Economic Committee, Congress of the United States* (Government Printing Office, Washington, D.C., 1967); see also, "An Economic Profile of Mainland China," *Studies Prepared for the Joint Economic Committee, Congress of the United States* (Government Printing Office, Washington, D.C., 1967).

The tissue culturist has many problems with which Nikon cannot even hope to deal. But, when he turns to his microscope, the situation changes.

Nikon inverted microscopes were designed specifically for the tissue culturist. Even more than in their ability to accommodate flasks, chambers, petri dishes, incubators and other containers, these instruments provide the operating versatility and convenience, the handling ease and responsiveness so essential to tissue culture microscopy.

There are two Nikon inverted microscopes: the Model M and Model MS. Both share the same uncommon quality of optics, and the same well-thought-out positioning of controls and components.

THE MODEL M is the more sophisticated of the two. Its optical system permits simultaneous observation, cinemicrography and still photomicrography. The use of two eyepiece tubes also permits simultaneous observation by two people or, by equipping it with a projection screen, by several. The heavy, rigid construction of the unit assures vibration-free photographic results.

The M also has facilities for projecting data onto the field of view. Episcopic or diascope illumination may be employed. And the two may be used together for Rheinberg differential color effect.

THE NIKON MS is an inverted microscope of somewhat simpler design, yet retaining the same quality of optics and

much of the versatility of the Model M.

It is also provided with a bypass optical system which serves for either photomicrography or cinemicrography.

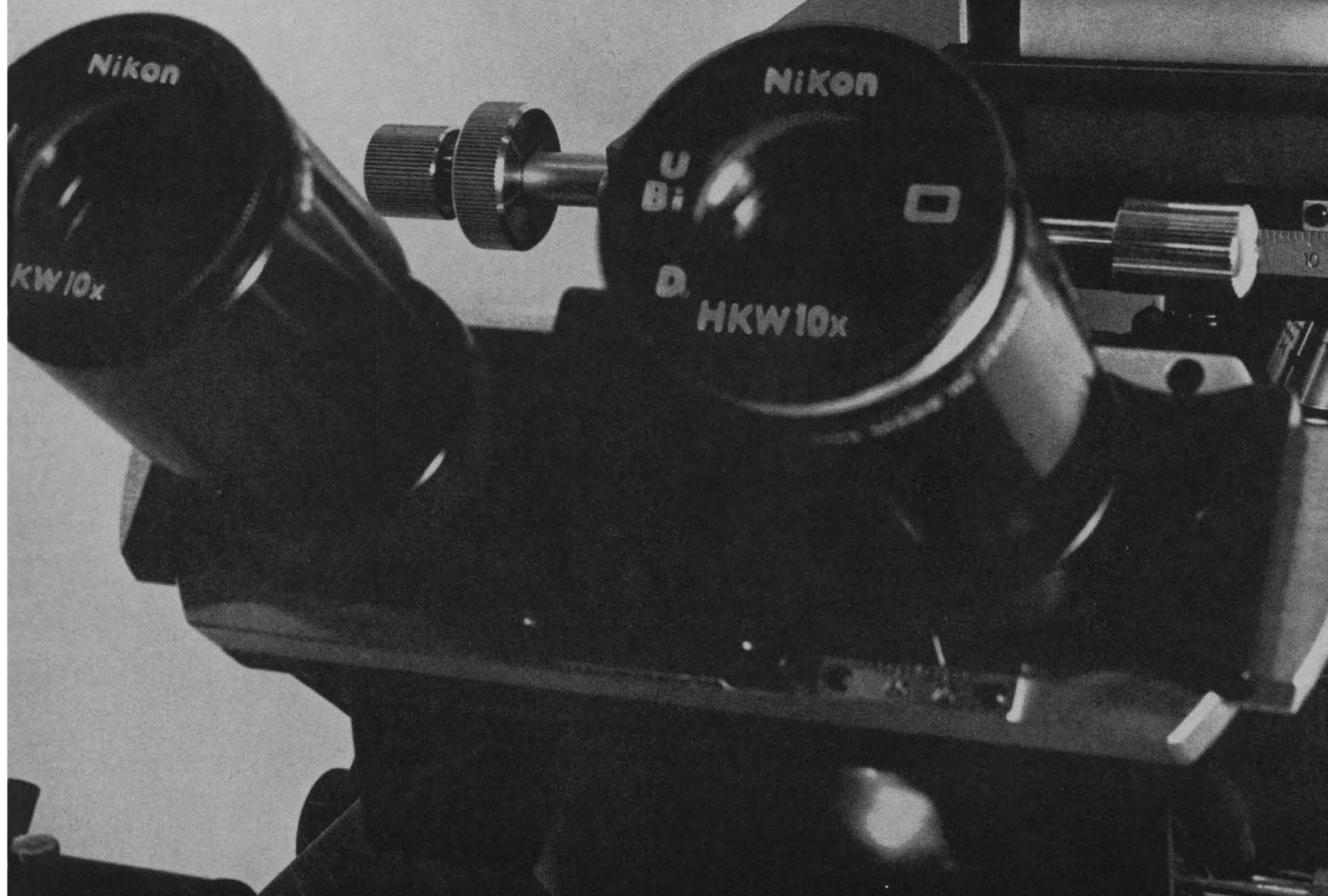
Eyepiece tubes, objectives, oculars and other accessories and attachments for the M and MS are, for the most part, the same as those used with all Nikon microscopes, and are readily interchangeable.

Two long working distance phase condensers (20 and 40mm) are available, as well as a special long working distance 40x phase objective.

For complete Nikon M and MS details, write:

Nikon Inc. Instrument Div., Garden City, N.Y. 11533. Subsidiary of Ehrenreich Photo-Optical Industries, Inc. (In Canada: Anglophoto Ltd., Ontario)

**Nikon makes life
easier for the living cell
microscopist**



IT'S TIME TO COMPARE
VICTOREEN
GAS CHROMATOGRAPHS
WITH ALL OTHER LEADING INSTRUMENTS

**before you buy,
check these important features**

1

Four-column oven?

2

Four universal injection ports?

3

Vibrating reed electrometer?

4

Digital log electrometer?

5

Dual power supply (thermistor or hot wire)?

6

Electron capture power supply (pulse or DC mode)?

7

Up to four individually controlled
detector ovens?

**only Victoreen offers
all 7 important features
as standard**

What about performance? Leading gas chromatographers have been impressed at the outstanding results of Victoreen Gas Chromatographs. If you're interested in these results, give us a call. **When Victoreen offers so much, you have no other choice.**

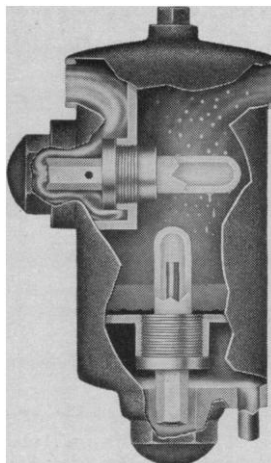
VICTOREEN INSTRUMENT DIVISION
MILITARY ELECTRONICS DIVISION
GENERAL ELECTRIC COMPANY
Schenectady, New York 12301



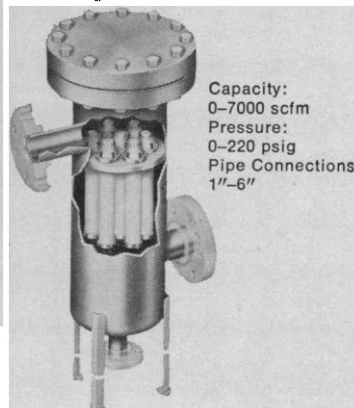
POINT-OF-USE

Continuous/automatic liquid-gas separation

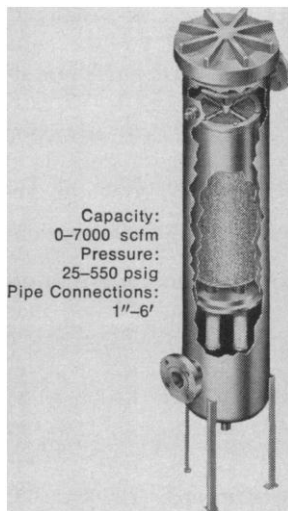
The Selas Liqui-Jector® continuously removes entrained water, water-oil emulsions and dirt from compressed air and gases. Installed in-line at point-of-use by industrial plants, laboratories and highly demanding processors for air-gas systems. Use the Vape-Sorber (described below) for oil-vapor removal. Ask for Bulletin LJ-1.



Capacity:
0-9 scfm
Pressure:
0-125 psig
Pipe Connections:
1/4"-3/4"-1"



Capacity:
0-7000 scfm
Pressure:
0-220 psig
Pipe Connections:
1"-6"



Capacity:
0-7000 scfm
Pressure:
25-550 psig
Pipe Connections:
1"-6"



Capacity:
0-40 scfm
Pressure:
0-250 psig
Pipe Connections:
3/8"-1/2"-3/4"

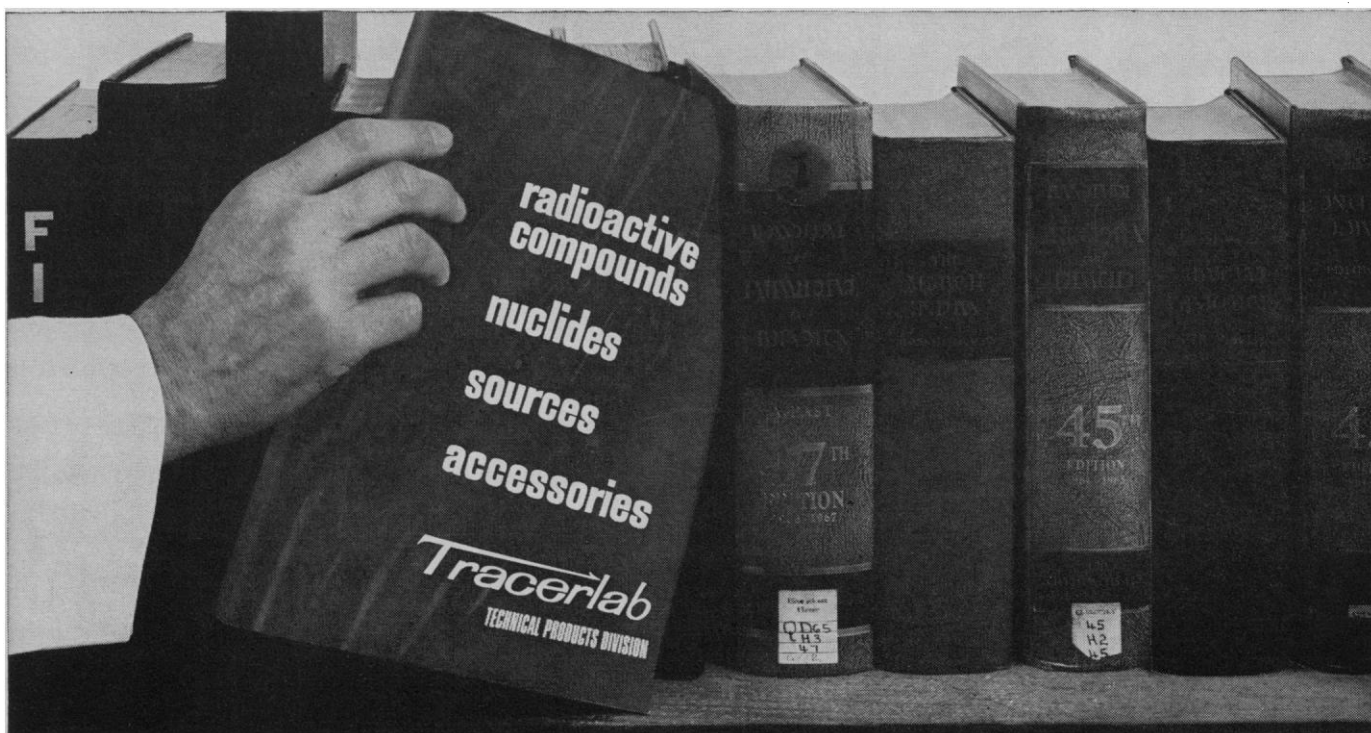
Positively removes air and gas contaminants

The Selas Vape-Sorber® coalesces water, water-oil emulsions and entrained dirt in compressed air and gas systems—then adsorbs oil vapor and liquid to an oil-free level of approximately 1 ppm. Particle size is held to 10 microns. Research laboratories, pharmaceutical and electronic components manufacturers and demand-

ing industrial users install them in air and gas lines, at the point-of-use to insure purity. Economical to install—simple, disposable cartridge for easy maintenance. For Bulletin VS-1, write Selas Corporation of America, Box 200, Dresher, Pennsylvania 19025. Call (215) 646-6600.

Flotronics DIVISION **SELAS** 
CORPORATION OF AMERICA

67-16



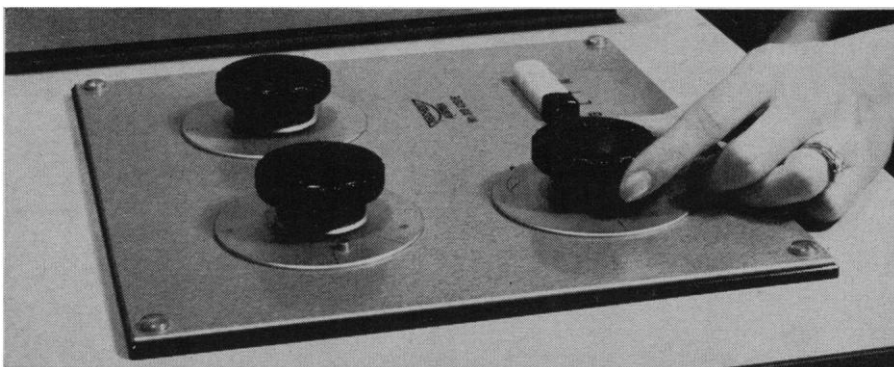
Catalog 68: the complete source

Write for it now



TRACERLAB

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

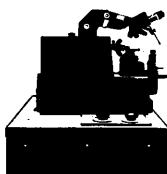


"DIAL" ULTRA-THIN SECTIONS?

Precisely . . . since the new Reichert "Om U2" ultramicrotome is automated. Now you just dial for single or continuous ultra-thin sections for electron microscopy. With all controls dial or push-button operated, you merely "select" speed, sequence and thickness of sections. The completely inertia-free thermal advance of the "Om U2" represents a major breakthrough in ultramicrotomy.

The "Om U2" gives you the accuracy of the thermal advance and the advantages of a precision, mechanical advance in one instrument. The tedious task of producing useful ultra-thin sections is now a thing of the past.

Hacker



Request literature and
a free demonstration.
William J. Hacker & Co., Inc.
Box 646
W. Caldwell, N.J. 07006
(201) 226-8450



. . . or anything else. The Neslab PBC-4 portable cooler will chill a quart of Martinis from 75°F to 40°F in 10 minutes . . . without dilution from melting ice.

It will also fit into Dewar flasks to hold methanol at -30°C . . . and into a variety of laboratory vessels to chill reagents.

In fact, the specially designed 1 inch diameter cooling probe gets into more places and does more cooling than any other.

Of course it is at its best in a well insulated Tamson Circulating Thermostatic Bath where the 1600 BTU/hr capacity of the PCB-4 extends the bath control range to -15°C.



For complete specifications and prices on
Coolers, Thermostatic Baths & Circulators, contact:

NESLAB
Instruments, Inc.

P.O. Box Y-1 Durham, N.H. 03824

Calendar of Events

National Meetings

August

6-9. **Heat Transfer**, 10th conf., Seattle, Wash. (ASME, 345 E. 47 St., New York 10017)

7-9. **Cryobiology**, 4th annual mtg., Washington, D.C. (V. P. Perry, Tissue Bank, NMRI-NNMC, Bethesda, Md. 20014)

7-11. **Engineering of Unconventional Protein Production**, conf., Santa Barbara, Calif. (Engineering Foundation, 345 E. 47 St., New York 10017)

7-11. **Topological Dynamics**, symp., Fort Collins, Colo. (J. Auslander, Dept. of Mathematics, Univ. of Maryland, College Park 20740)

9-11. **Applications of X-Ray Analysis**, 16th annual conf., Denver, Colo. (J. B. Newkirk, Metallurgy Div., Univ. of Denver, Colo. 80210)

10-12. **Lessons from Revolution**, symp., San Francisco, Calif. (W. J. Monihan, Univ. of San Francisco, San Francisco 94117)

13-16. **Soil Conservation Soc. of America**, 22nd annual meeting, Des Moines, Iowa. (7515 NE Ankeny Rd., Ankeny, Iowa 50021)

13-17. **Energy Conversion Engineering**, 2nd conf., Miami Beach, Fla. (ASME, 345 E. 47 St., New York 10017)

14-16. **Astroynamics**, Guidance and Control, conf., Huntsville, Ala. (American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

14-17. **National Medical Assoc.**, St. Louis, Mo. (S. C. Smith, 520 W St., NW, Washington, D.C. 20001)

15-18. **American Dietetic Assoc.**, Chicago, Ill. (R. M. Yakel, ADA, 620 N. Michigan Ave., Chicago)

20-23. **American Phytopathological Soc.**, Washington, D.C. (J. P. Fulton, Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville 72701)

20-25. **American Crystallographic Assoc.**, Minneapolis, Minn. (T. Zoltai, Dept. of Geology and Geophysics, Univ. of Minnesota, Minneapolis 55455)

20-25. **American Soc. of Parasitologists**, 42nd annual mtg., Tucson, Ariz. (D. V. Moore, Univ. of Texas, Southwest Medical School, Dallas 75235)

21-23. **Cryogenic Engineering**, conf., Palo Alto, Calif. (K. D. Timmerhaus, c/o Engineering Center, AD 1-25, Univ. of Colorado, Boulder)

21-25. **American Assoc. of Clinical Chemists**, 18th annual mtg., Philadelphia, Pa. (M. E. Rylan, 318 Rodman Ave., Jenkintown, Pa. 19046)

21-25. **Complex Problem Solving**, conf., Andover, N.H. (S. S. Cole, Engineering Foundation, 345 E. 47 St., New York 10017)

21-25. **Poultry Science Assoc.**, 56th annual mtg., Durham, N.H. (C. B. Ryan, c/o Texas A&M Univ., College Station 77843)

23-25. **Estuarine Pollution**, natl. symp., Stanford, Calif. (R. M. Kennedy, Kennedy Engineers, 604 Mission St., San Francisco, Calif. 94105)

23-25. **Gas Dynamics Symp.**, Evanston,

Ill. (The Symposium, Northwestern Univ., Evanston)

23-25. Wave Propagation and Dynamic Properties of **Earth Materials**, symp., Albuquerque, N.M. (G. E. Triandafilidis, Univ. of New Mexico, P.O. Box 188, University Station, Albuquerque 87106)

23-26. **American Physiological Soc.**, fall mtg., Washington, D.C. (Executive Secretary, 9650 Wisconsin Ave., Bethesda, Md.)

24-26. **Phytochemical Soc.** of America, annual mtg., Madison, Wis. (T. J. Mabry, Univ. of Texas, Austin 78712)

25-1. **American Soc. for Pharmacology and Experimental Therapeutics**, fall mtg., Washington, D.C. (Executive Officer, 9650 Wisconsin Ave., Bethesda, Md.)

27. **American Assoc. of Electromyography and Electrodiagnosis**, annual mtg., Miami Beach, Florida. (M. K. Newman, 16861 Wyoming Ave., Detroit, Mich. 48221)

27-1. **American Congr. of Physical Medicine and Rehabilitation**, 45th annual session, Miami Beach, Fla. (Executive Director, 30 N. Michigan Ave., Chicago, Ill.)

27-1. **American Inst. of Biological Sciences**, 18th annual mtg., College Station, Tex. (AIBS, 3900 Wisconsin Ave., NW, Washington, D.C.)

The following societies will meet in conjunction with the AIBS. Additional information is available from AIBS or from the program chairmen listed below.

American Bryological Soc. (Secretary Treasurer, Box 36, S.W. Missouri State College, Springfield)

American Soc. for Horticultural Science. (Executive Director, 615 Elm St., St. Joseph, Mich. 49085)

American Soc. of Human Genetics. (c/o Division of Medical Genetics, Dept. of Medicine, Johns Hopkins Hospital, Baltimore 5, Md.)

American Soc. of Naturalists. (Executive Director, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

American Soc. of Plant Physiologists. (Secretary, c/o Dept. of Biology, Yale Univ., New Haven, Conn.)

American Soc. of Plant Taxonomists. (Secretary, c/o Botany Dept., Univ. of California, Berkeley)

Botanical Soc. of America. (Secretary, c/o Botany Dept., Indiana Univ., Bloomington)

Ecological Soc. of America. (Secretary, c/o Ecology Section, Health Physics Div., Oak Ridge National Lab., Oak Ridge, Tenn.)

Genetics Soc. of America. (Executive Director, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

Mycological Soc. of America. (Secretary-Treasurer, c/o Pioneering Res. Div., Natick Labs., Natick, Mass.)

28-30. Gatlinburg Conf. on Special Topics in **Nuclear Education and Research**, Gatlinburg, Tenn. (J. E. Mott, Oak Ridge Associated Universities, Box 117, Oak Ridge, Tenn. 37830)

28-30. Preparation and Properties of **Electronic Materials**, 9th annual conf., New York, N.Y. (L. R. Weisberg, RCA Labs., David Sarnoff Research Center, Princeton, N.J. 08540)

28-30. **Space Program Issues** of the



SARGENT
pH
combination
electrodes

include both glass and reference in a single probe for the entire range 0 to 14 pH, from 0 to 80°C. All-glass construction has no rubber or plastic to contaminate the sample, and no crevices or pockets to trap solution for carry-over from one sample to the next. In both standard and miniature sizes for as little as 1 ml and ½ ml of sample.

Range, 0 to 14 pH with linear response even in highly acid solutions. Alkali ion response is insignificant below pH 12.5; it is low and — more important — stable in higher pH solutions.

Shock-resistant construction derived from inherent strength of the glass and careful fabrication.

Fast response, both in sensitivity of the glass and in symmetrical internal and external references—for rapid temperature equilibrium.

High efficiency, with a millivolt/pH response close to the Nernst coefficient.

Shown Actual Size

S-30070-10 COMBINATION ELECTRODE — 0 to 14 pH, Miniature, Sargent/Jena. pH range, 0-14; temperature, 0-80°C; total length, 6 inches; stem diameter, 5mm; immersion depth, 10 to 78 mm; cap length, ⅞ inch; cap diameter, 8 mm.

Complete with 20-inch connecting cable and plugs directly fitting Sargent, Corning, Coleman and Beckman pH meters40.00

S-30072-15 COMBINATION ELECTRODE — 0 to 14 pH, Sargent/Jena. pH range, 0-14; temperature, 0-80°C; internal buffer, pH 7; total length, 8 inches; body diameter, 12 mm; cap diameter, 41/64 inch; cap length, 1 inch.

Complete with 30-inch connecting lead and plugs directly fitting Sargent, Corning, Coleman and Beckman pH meters38.00

SARGENT® SCIENTIFIC LABORATORY INSTRUMENTS • APPARATUS • CHEMICALS

E. H. SARGENT & CO.
4647 West Foster Avenue
Chicago, Illinois 60630

Chicago • Anaheim, Calif. • Birmingham • Cincinnati • Cleveland
Dallas • Denver • Detroit • Springfield, N.J. • Toronto, Canada

The Big One



Is New Again and Bigger

New Gases

Including ozone, arsine, germane, hexafluoroacetone . . . over 100 gases.

New Equipment

More regulators, valves, flowmeters and other gas handling equipment: mass flowmeter, cryogenic liquefier, 3 pages of gas detectors.

Gas Mixtures

Special 12 page section lists calibration mixtures, doping gases, nuclear counter mixtures, sterilizing mixtures, special accuracy mixtures, etc.

GET YOUR COPY NOW!

Write Matheson, P.O. Box 85, East Rutherford, N. J. 07073

MATHESON

East Rutherford, N. J.; Cucamonga, Calif.; Joliet, Ill.; LaPorte, Texas; Morrow, Ga.; Newark, Calif.; Matheson of Canada, Whitby, Ont.

70's, conf., Seattle, Wash. (AIAA, Meetings Manager, 1290 Sixth Ave., New York 10019)

28-31. **Clay Minerals Soc.**, 16th natl. conf., Golden, Colo. (L. G. Schults, U.S. Geological Survey, Bldg. 25, Federal Center, Denver, Colo. 80225)

28-1. **Electron Microscope Soc. of America**, 25th annual mtg., Chicago, Ill. (Executive Director, c/o School of Chemical Engineering, Olin Hall, Cornell Univ., Ithaca, N.Y. 14850)

28-2. **Alaska Science Conf.**, 18th, College. (P. Morrison, Inst. of Arctic Biology, Univ. of Alaska, College 99735)

29-31. **Association for Computing Machinery**, 22nd natl. conf., Washington, D.C. (T. Willette, Box 6, Annandale, Va. 22003)

29-1. **Electron Microscopy Soc. of America**, annual mtg., Chicago, Ill. (A. V. Loud, Pathology Dept. College of Physicians and Surgeons, Columbia Univ., 630 W. 168 St., New York 10032)

31-2. **American Physical Soc.**, Seattle, Wash. (Executive Secretary, 538 W. 120 St., New York 10027)

31-6. **American Psychological Assoc.**, annual mtg., Washington, D.C. (APA, 1200 17th St., NW, Washington 20036)

International and Foreign Meetings

August

6-9. **International Union Against the Venereal Diseases and the Treponematoses**, 25th general assembly and technical conf., Munich, Germany. (G. A. Canaperia, Via Salaria 237, Rome, Italy)

7-12. **Computers and Human Development**, Kuala Lumpur, Malaysia. (C. C. Yoon, Dept. of Mathematics, Univ. of Malaya, Kuala Lumpur)

7-12. **Hungarian Soc. of Mechanical Engineers**, Intern. Spectroscopy Colloq., Debrecen, Hungary. (L. Prockl, The Society, Szabadság tér 17, Budapest V, Hungary)

7-19. **Sedimentology**, 7th intern. congr., Reading, England, and Edinburgh, Scotland. (Sedimentology Research Lab., Dept. of Geology, Univ. of Reading, Whiteknights Park, Reading, Berks., England)

8-12. **Acta Endocrinologia**, 6th congr., Helsinki, Finland. (B. A. Lamber, University Central Hospital, Haartmaninkatu 4, Helsinki 29)

9-11. **Association of American Feed Control Officials**, 57th annual, Toronto, Canada. (B. Poundstone, Agricultural Experiment Sta. Bldg., Univ. of Kentucky, Lexington 40506)

10-17. **World Congr. of the Deaf**, 5th, Warsaw, Poland. (Polish Assoc. of the Deaf, The Principal Board, 1-3, Jezuicka Str., Warsaw 40)

11-17. **Apiculture**, 21st intern. congr., College Park, Md. (J. I. Hambleton, Univ. of Maryland, College Park 20742)

13-17. **Canadian Pharmaceutical Assoc.**, annual mtg., Toronto, Ont., Canada. (175 College St., Toronto 2B)

13-19. **Social Psychiatry**, 2nd intern. congr., Amsterdam, Netherlands. (M. S. Jones, Intern. Assoc. of Social Psychiatry, Dingleton Hospital, Melrose, Scotland)

14-17. **Controlled Fusion and Plasma Physics**, 2nd European conf., Stockholm,

Sweden. (Mrs. B. Törnelli, Div. of Plasma Physics, The Royal Inst. of Technology, Stockholm 70)

14-18. **Australian Spectroscopy**, 6th conf., Brisbane. (D. James, Univ. of Queensland, St. Lucia, Brisbane, Queensland)

14-18. **Operations Research Around the World Mtgs.**, Kyoto and Tokyo, Japan. (J. E. Walsh, Systems Development Corp., Santa Monica, Calif.)

14-19. **International Federation for Medical and Biological Engineering**, 7th conf., Stockholm, Sweden. (Secretary-General, The Conference, Stockholm 60)

14-22. **Rehovoth Conf. on Health Problems in Developing States**, Jerusalem and Rehovoth, Israel. (A. Manor, P.O.B. 150, Rehovoth)

16-18. **Colloquium on the Gravitational N-Body Problem**, Paris, France. (G. M. Clemence, Yale Univ. Observatory, Box 2023, Yale Station, New Haven, Conn. 06520)

16-23. **International Assoc. of Scientific Hydrology**, symp. on computation of maximum floods, Leningrad, U.S.S.R. (World Meteorological Organization, 41, Avenue Giuseppe Motta, Geneva, Switzerland)

19-25. **International Union of Biochemistry**, 7th intern. congr., Tokyo, Japan. (Secretariat, c/o Dept. of Chemical Pathology, Guys Hospital Medical School, London S.E.1, England)

19-26. **International Geological Congr.**, 23rd, Prague, Czechoslovakia. (M. A. Dudek, Ustredni Ustav geologicky, Malostranske nam. 19, Prague 1, Czechoslovakia)

20-23. **American Soc. of Agricultural Engineering**, Quebec City, Canada. (M. Y. Chartier, Faculté d'Agriculture, Univ. Laval, Cité Universitaire, Québec 10^e)

20-24. **Society for Industrial Microbiology**, annual mtg., London, Ont., Canada. (S. Rich, Dept. of Plant Pathology and Botany, Connecticut Agricultural Experiment Station, P.O. Box 1106, New Haven 06504)

20-24. **Biological Photographic Assoc.**, 37th annual mtg., Toronto, Ont., Canada. (S. Klosevych, Terminal A, P.O. Box 33, Ottawa 2, Ont.)

20-25. **Biometrics**, 6th intern. conf., Sydney, Australia. (H. L. Leroy, Laboratory for Biometrik and Populationsgenetik, EIDG. Tech. Hochschule, Zurich, Switzerland)

21-24. **Entomological Soc. of Canada**, Ste. Anne de Bellevue, P.Q., Canada. (R. Blais, Forest Entomology and Pathology Laboratory, P.O. Box 35, Sillery, P.Q.)

21-24. **World Meeting on Medical Law**, Ghent, Belgium. (R. Dierkens, Apotheekstraat 5, Ghent)

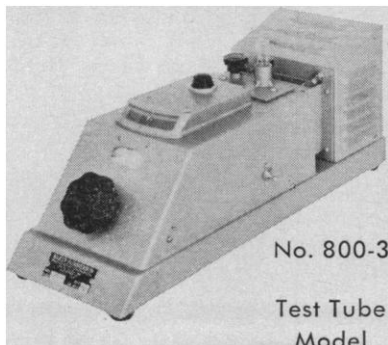
21-25. **Microscopy**, 14th intern. symp., Cambridge, England. (Mrs. S. Graft, MICRO-67, McCrone Research Inst., 451 E. 31 St., Chicago, Ill. 60616)

21-26. **Psychotherapy**, 7th intern. congr., Wiesbaden, Germany. (Secretary-General, Westfälisches Landfrankenhaus, 483 Gutersloh, Germany)

21-2. **New Theories in Medical Practice**, intern. congr., Merano, Italy. (W. Grune, Kongressbüro der Bundesärztekammer Haedenkampstr. 1, 5000 Köln-Lindenthal, Germany)

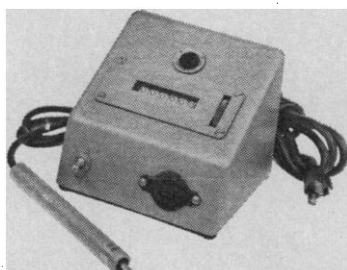
22-25. **Institute of Management Sciences**, 14th annual intern. mtg., Mexico City, Mexico. (C. Gibson, Ford Founda-

Klett Summerson Photoelectric Colorimeter



KLETT COLONY MARKER and TALLY

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



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

AAAS Symposium Volume

MAN, CULTURE, AND ANIMALS: THE ROLE OF ANIMALS IN HUMAN ECOLOGICAL ADJUSTMENTS

Editors: Anthony Leeds and Andrew P. Vayda
304 pp., illus., bibliog., indexes, August 1965. Price:
\$8.00. AAAS members' cash orders: \$7.00.

The volume is based on a symposium held at the AAAS meeting in Denver, December 1961. It presents case studies of the relationships among human populations, the animals they use for food or food-getting, the plants significant for maintaining both animals and men, and the socio-cultural usages by which plants, animals, and men are linked in ecosystems.

Anthropologists and geographers discuss animal characteristics, populations dynamics, diets, and other ecosystem variables, including culture. The case material is used for a unique effort to rethink the logic of functional analysis in anthropology in terms of general systems approaches.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

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

Honeywell takes the hidden error-factors out of your environmental studies

Too often, environmental chambers have suffered from the limitations of relatively crude, slow-acting, inaccurate methods of control. As a result, the validity of environmental studies often has been compromised.

The reason? Until now, the only available method of precision control has been priced out of reach of many who actually wanted and needed it.

Now Honeywell ends this dilemma with the development of a new system of low-cost precision electronic controls. Precise, accurate control systems costing one-third to one-fifth of comparable systems!

Honeywell has controls for humidity, temperature, light, sound and other variables. They can be programmed to chronological, sequential, or other modes. All have been designed with flexibility in mind. You can buy exactly the amount of control sophistication you want, without purchasing unwanted control capacity. As your requirements grow, you can add additional equipment economically. Whatever your control problem, Honeywell can help you solve it.

FREE BROCHURE!

For complete facts on Honeywell's new family of precision environmental controls send in the coupon below.

Honeywell

Dr. Eli Amdur
Honeywell
Apparatus Controls Division
Minneapolis, Minn. 55408

Please send me your free brochure on environmental controls.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____



Make no mistake! The ORION Model 801 Digital pH Meter eliminates reading, ranging, and interpolation errors. A unique all-electronic display system gives complete data presentation including decimal point and polarity sign. Illuminated inch high numerals are visible regardless of lighting conditions at distances up to thirty feet, with readings to 0.001 pH or 0.1 mv. Both strip chart recorder and binary coded decimal outputs available at the rear panel. Without question, the Model 801 is the most technically advanced pH Meter available today. May we arrange a demonstration in your laboratory?

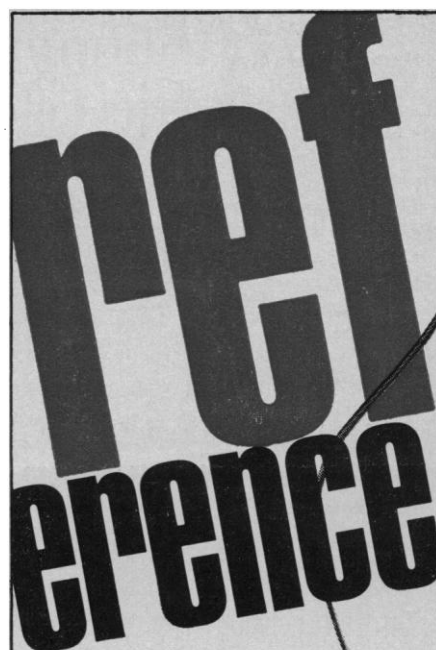
ORION

Orion Research Incorporated
11 Blackstone Street, Dept. D
Cambridge, Mass. 02139/(617) 864-5400

- ☐ Please send a copy of the 801 bulletin.
☐ Please arrange a demonstration.

Name _____
Organization _____
Street _____
City _____
State _____ Zip Code _____

- tion, Reforma 243-7 Piso, Mexico 5, D.F.)
- 22-25. **Nematology**, 9th intern. symp., Warsaw, Poland. (H. Sandner, c/o Inst. of Ecology, Dept. of Applied Biology, Nowy Swiat 72, Warsaw)
- 22-31. **International Astronomical Union**, 13th general assembly, Prague, Czechoslovakia. (Asst. Secretary-General, Astronomical Institute, Czechoslovak Acad. of Sciences, Budecska 6, Prague)
- 23-25. **Canadian Assoc. of Physical Medicine and Rehabilitation**, 15th annual mtg., Winnipeg, Man., Canada. (Secretary-Treasurer, 153 Lyndhurst Ave., Toronto 4, Ontario)
- 23-25. **Computational Linguistics**, intern. conf., St. Martin-Dheres, France. (A. H. Roberts, Center for Applied Linguistics, 1717 Massachusetts Ave., NW, Washington, D.C. 20036)
- 24-28. **Anaesthesia**, 3rd intern. symp., Poznan, Poland. (W. Jurczyk, Ul. Długa 1/2, Poznan)
- 24-28. **Marine Biology**, 2nd European symp., Bergen, Norway. (H. O. Brattstrom, Biological Station, Univ. of Bergen, Bergen)
- 25-30. **Hyperfine Interactions Detected by Nuclear Radiation**, intern. conf., Pacific Grove, Calif. (K. E. Sebrell, Lawrence Radiation Lab., Univ. of California, Berkeley 94720)
- 25-31. **Physical Medicine**, 5th intern. congr., Montreal, P.Q., Canada. (B. Talbot, 6300 Darlington Ave., Montreal 26)
- 25-1. **First Intern. Health Conf.**, Copenhagen, Denmark. (P. A. Wells, 90 Buckingham Palace Rd., London. S.W.1, England)
- 25-2. **Logic, Methodology and Philosophy of Science**, 3rd intern. congr., Amsterdam, Netherlands. (Congress Secretariat, c/o Holland Organizing Centre, 16, Lange Voorhout, The Hague, Netherlands)
- 25-3. **Epidemiological Assoc.**, 5th intern. mtg., Krakow, Poland. (R. M. Acheson, Dept. of Epidemiology and Public Health, Yale Univ. Medical School, 60 College St., New Haven, Conn. 06510)
- 27-1. **Laurentian Hormone Conf.**, Mont Tremblant, P.Q., Canada. (The Conference, 222 Maple Ave., Shrewsbury, Mass.)
- 27-2. **Ionization Phenomena in Gases**, 8th intern. conf., Vienna, Austria. (F. Viehbock, Österreichische Studiengesellschaft für Atomenergie, Lenaugasse 10, A-1082 Vienna VIII)
- 28-29. **Oxidation**, intern. symp., San Francisco, Calif. (T. Mill, Stanford Research Inst., Menlo Park, Calif. 94025)
- 28-29. **International Theoretical Physics Conf. on Particles and Fields**, Rochester, N.Y. (R. E. Marshak, Dept. of Physics and Astronautics, Univ. of Rochester, Rochester 14627)
- 28-30. **American Mathematical Soc., Mathematical Assoc. of America**, 72nd joint summer mtg., Toronto, Ont., Canada. (Executive Director, SUNY at Buffalo, Univ. of Buffalo, Buffalo, N.Y.)
- 28-30. **Canadian Inst. of Mining and Metallurgy**, 6th conf. of Metallurgists, Kingston, Ont., Canada. (The Institute, 906-1117 St. Catherine St., W. Montreal 2)
- 28-1. **Atomic Masses and Related Constants**, 3rd intern. conf., Winnipeg, Man., Canada. (H. E. Duckworth, Univ. of Manitoba, Winnipeg 19)



At last! A totally new concept in reference electrode design. Made especially for specific ion electrode measurements and precision pH determinations, the IONALYZER® series reference electrode is constructed of specially developed unbreakable acid-resistant (including HF) plastic. Unique low thermal mass design gives more precise measurements with changing ambient temperature. Quickly disassembled for easy cleaning and long trouble-free life. Choice of internal filling solutions allows matching of conventional AgCl or calomel reference electrode characteristics. Part of the new technology for chemical measurement by ORION.

ORION
IONALYZER

Orion Research Incorporated
11 Blackstone Street, Dept. D
Cambridge, Massachusetts 02139
Phone: (617) 864-5400

Name _____
Organization _____
Street _____
City _____
State _____ Zip Code _____

Send detailed specifications on
Reference Electrode

BOOKS RECEIVED

(Continued from page 418)

Human Parasitology. Practical exercises in medical natural history. Daniel M. Jarry. Translated from the French edition (Paris, 1961) by R. Crawford. Pergamon, New York, 1967. 247 pp. Illus. \$7.

Imagination and the Growth of Science. A. M. Taylor. Schocken, New York, 1967. 118 pp. \$3.95.

Immunological Properties of Protein Hormones. Proceedings of a meeting organized under the auspices of Accademia Nazionale dei Lincei and of Consiglio Nazionale delle Ricerche (Rome), June 1964. Filippo Polvani and Piergiorgio Crosignani, Eds. Academic Press, New York, 1966. 273 pp. Illus. \$12. Twenty-three papers.

International Tectonic Dictionary—English Terminology. John G. Dennis, Ed. American Assoc. of Petroleum Geologists, Tulsa, Okla., 1967. 208 pp. Illus. \$5; members, \$3.50. Memoir No. 7.

Introducing Culture. Ernest L. Schusky and T. Patrick Culbert. Prentice-Hall, Englewood Cliffs, N.J., 1967. 160 pp. Illus. Paper, \$2.95. Prentice-Hall Anthropology Series.

Introduction to Nuclear Chemistry. D. J. Carswell. Elsevier, New York, 1967. 289 pp. Illus. \$11.

An Introduction to Polymer Chemistry. D. Margerison and G. C. East. Pergamon, New York, 1967. 308 pp. Illus. \$5.95. Commonwealth and International Library.

Introduction to Quantum Theory. Hendrik F. Hameka. Harper and Row, New York, 1967. 288 pp. Illus. \$12.

Introduction to Radar and Radar Techniques. Denis Taylor. Philosophical Library, New York, 1967. 135 pp. Illus. \$4.75.

Lubrication and Lubricants. Eric R. Braithwaite, Ed. Elsevier, New York, 1967. 582 pp. Illus. \$30. Ten papers.

Lunar Geology. Gilbert Fielder. Dufour, Chester Springs, Pa., 1967. 184 pp. Illus. \$8.95.

Major Problems in Developmental Biology. The 25th symposium of The Society for Developmental Biology (Haverford, Pa.), June 1966. Michael Locke, Ed. Academic Press, New York, 1966. 420 pp. Illus. \$16. Eleven papers.

Man Incorporate: The Individual and His Work in an Organized Society. Carl B. Kaufmann. Doubleday, Garden City, N.Y., 1967. 287 pp. \$5.95.

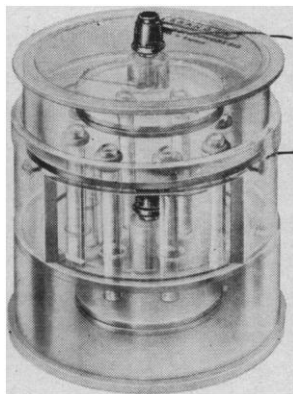
A Manual of Closed Reduction of Closed Fractures and Dislocations. Robert Mazet, Jr. Thomas, Springfield, Ill., 1967. 141 pp. Illus. \$10.50.

Manual on Industrial Water and Industrial Waste Water. Sponsored by ASTM Committee D-19 on Industrial Water. American Soc. for Testing and Materials, Philadelphia, ed. 2, 1967. 1006 pp. Illus. \$17.25.

Microbiology. Philip L. Carpenter. Saunders, Philadelphia, 1967. 488 pp. Illus. \$7.50.

Middle-Class Juvenile Delinquency. Edmund W. Vaz, Ed. Harper and Row, New York, 1967. 297 pp. Paper, \$3.95. Readers in Social Problems Series. Nineteen papers.

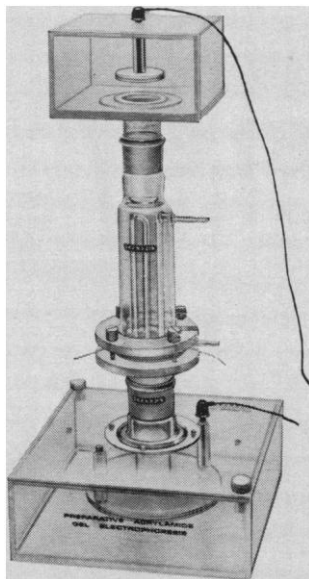
unmatched set for impressive results from DISC ACRYLAMIDE ELECTROPHORESIS



Coming soon . . .
a Shandon Rapid
Disc Destainer

DISC ELECTROPHORESIS

High resolution zone technique for separating a wide range of complex proteins, tissue extracts and plant tissue using polyacrylamide gel. The Shandon Disc Electrophoresis is convenient, rapid, versatile and 100 times more sensitive than starch gel techniques. You can process eight tubes at once. Use of acrylic plastic wherever possible reduces danger of breakage to a minimum. The complete unit, except power supply, but including extra tube closures, etc., is priced at \$225. Send for descriptive bulletin.

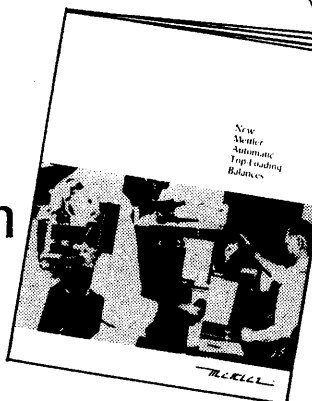


PREPARATIVE ACRYLAMIDE APPARATUS

An extension of the disc electrophoresis unit, this apparatus removes the sample components as they separate out and carries them through a tube into an ultraviolet analyzer head for further testing. The Shandon Preparative Apparatus is easy to use, highly efficient and essentially trouble-free. Acrylic plastic is used wherever possible to eliminate breakage. Price, excluding power supply: \$485. For literature, write Shandon Scientific Company, Inc., 515 Broad Street, Sewickley, Pennsylvania 15143 (Pittsburgh District).

SHANDON

Four new top-loading balances described in Mettler bulletin



P160, P2000, P5, and P6 are Mettler's new top-loading balances. All provide improved precision/capacity relationships, and all feature analog or digital reading.

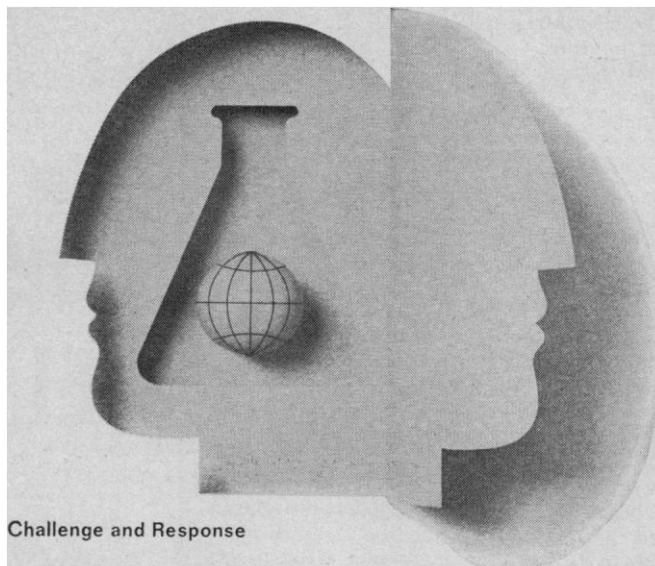
The P160 features a reversible scale which eliminates computations in weight-loss studies and permits easy gravimetric titrations.

Level-matic, a Mettler feature which automatically compensates for slight shifts in balance level, is supplied in the P5 and is an option in the P160 and P2000.

The P5 and P6 offer special advantages for weighings in the range of 5 to 6 kilograms; the P2000 is unusually compact.

Request Bulletin P. Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey 08540.

METTLER®



Challenge and Response

Research, dynamic adventure of the mind into the world of elements. In our industry, research chemicals, the probe is intense, volatile, massive. And the six billion dollars spent annually for discovery creates a never-ending need for quality products and services.

To meet masterfully, the daily demands of research, ICN's corporate structure has diversified

into six separate divisions participating in 17 specialized areas. Like basic biomedical research. Radioactive sources. Organic chemicals and radioisotopes. And environmental services.

You might say we are growing as the industry grows. Or better yet, say our growth in the past six years proves we are the leading manufacturer of chemicals for research.

International Chemical & Nuclear Corporation

1333? East Amar Road, City of Industry, California 91743 Tel: 213-962-3475



WE BUILT A BETTER MOUSE CAGE— so you could throw it away!

DISPOSABLE MOUSE CAGE

The most economical, most convenient laboratory mouse cage!

Nest these self-standing, escape-proof disposable cages. After completing your test, just lift off and discard the used cage and continue testing with the clean cage nested below. Used cage is easily incinerated. You *never* have to clean a mouse cage again!

Priced as low as 22¢ each in contract quantities.

STARTER SET, Cat. No. 9000

Try this Introductory Kit for proof of economy: 10-Disposable cage bottoms; 5-Disposable supports; 5-each: metal tops and food hoppers, water bottles with stoppers and tubes.

All for only
\$24⁵⁰
Order Today!

- SELF-STANDING • SAVES TIME
- SAVES WORK • SAVES SPACE
- SAVES TRIPS TO THE STOREROOM
- SAVES INVENTORY AND INVESTMENT IN CAGE EQUIPMENT

Cages are shown nested and self-standing, but disposable, or permanent metal cage supports are available, also.

Patented



Developed by the Design and Microbiology Departments of Southern Illinois University, Carbondale, Illinois

ORIGINATORS of the WORLD'S FIRST AND ONLY DISPOSABLE MOUSE CAGES

LAB-LINE LABORATORY CAGES, Inc.

BioScience Division/Lab-Line Instruments, Inc.

LAB-LINE PLAZA • MELROSE PARK, ILL.



Cage bottom and contents burn completely