

SCIENCE

13 March 1959

Volume 129, Number 3350

Editorial	Science and Art	687
Articles	Organization of Science in the United Kingdom: <i>E. S. Hiscocks</i>	689
	There are significant differences as well as similarities between national science patterns in the United Kingdom and the United States.	
	Organization of Scientific Activities in Norway: <i>R. Major</i>	694
	Government, industry, and research have joined forces to develop the country's research capacity.	
	Spectroscopic Evidence of Metabolic Control: <i>B. Chance</i> and <i>B. Hess</i>	700
	Rapid measurements of intracellular events afford new evidence on mechanisms for metabolic control.	
News of Science	Science Advisory Committee's Recommendation for Science Council Being Implemented by Executive Order; recent events	708
Book Reviews	L. W. Martin's <i>Peace without Victory</i> , reviewed by <i>H. Stout</i> ; other reviews	713
Reports	Incidence of Familial Hyperlipemia: <i>K. Hirschhorn</i> et al.	716
	Predaceous Feeding in Two Common Gooseneck Barnacles: <i>G. K. Howard</i> and <i>H. C. Stout</i>	717
	Structural Correlation between Esterase and Protease Activities of Trypsin: <i>L. Augenstine</i>	718
	Lack of Abnormal Hemoglobins in Alaskan Eskimos, Indians, and Aleuts: <i>E. M. Scott</i> et al.	719
	New Method for the Rapid Determination of Lathrogenic Agents: <i>B. M. Levy</i>	720
	Effect of Ultraviolet Light on Pectolytic Enzyme Production and Pathogenicity of <i>Pseudomonas</i> : <i>B. A. Friedman</i> and <i>M. J. Ceponis</i>	720
	Intracellular Impulse Conduction in Muscle Cells: <i>L. D. Peachey</i> and <i>K. R. Porter</i>	721
Departments	Letters	684
	Biological Exhibits at Geneva; Meeting Notes; Forthcoming Events; Equipment ...	724

*Your scientists and
engineers now benefit from
electronic computation without
becoming computer specialists!*



How to get increased research and engineering productivity without increased manpower

Electronic computation in the right hands. The lowest-priced complete computer you can buy, the Royal Precision LGP-30 enables both present and new computer users to bring electronic computation *to a level where it does the most good*. No longer do you need a group of highly-specialized computer men. The compact, mobile LGP-30 plugs into any convenient wall outlet without expensive installation or air-conditioning... puts electronic computation *in the hands of your own research and engineering specialists*... greatly increases their available creative time and productive output.

Short break-in time; fast answers. Although the LGP-30 gives you memory (4096 words) and capacity comparable to that of computers many times its size and cost, it is by far the easiest computer to learn and program. Answers are printed out directly—require no deciphering. Result: because the people qualified in your specific field are given access to the computer, you get an almost immediate increase in productivity. At one LGP-30 installation, for instance, an output of 34 engineers has been attributed to a staff of only four.

Elimination of tedium; increased quality. A survey of your research and engineering work would undoubtedly show much of it to be of a routine nature

—the repetitive calculations known to be deadly to the morale of highly-trained personnel. In fact, one research organization estimates that creative thinking and routine calculation are usually found in the ratio of 1 to 9. Using the LGP-30, your engineers can eliminate the tedious 9 parts out of 10... can not only increase output per man but, equally important, improve the quality of the work produced.

Maximum results; minimum cost. Successfully employed in well over 200 installations, the LGP-30 is available on either a sale or rental basis... gives you the opportunity to investigate electronic computation without the attendant burdens of high cost and complexity. Backed by 20 years of electronics experience, LGP-30 sales and service are available through Royal McBee offices coast-to-coast. Training is free—as well as membership in an active users organization. A complete library of programs and sub-routines is available.

Write today for complimentary brochure. To discover more fully how the LGP-30 can serve your engineers and your organization, call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, N. Y. for illustrated brochure. In Canada: 179 Bartley Drive, Toronto 16.

ROYAL M^cBEE • data processing division



VECTOR SPACE

and its application in crystal-structure investigation

By Martin J. Buerger, *Massachusetts Institute of Technology*. Buerger reports fully on the increased importance of using vector space as a relatively easy solution of the phase problem normally encountered in the study of the arrangement of atoms in crystals. Whereas the subject is described only briefly in general works, this book is unique in that it deals exclusively with the theory of vector space and its application in crystallography. 1959. Approx. 350 pages. Prob. \$17.50.

BIOPHYSICAL SCIENCE: A Study Program

Planned and edited by J. L. Oncley, *Harvard Medical School*; F. O. Schmitt, *Massachusetts Institute of Technology*; R. C. Williams, *University of California*; M. D. Rosenberg and R. H. Bolt, *both of the National Institutes of Health*. With 49 contributors.

Based on the study Program in Biophysical Science, recently conducted by the National Institutes of Health, this book contains compact summaries of certain key problems in the field, relating the concepts and methods of physical science with those of life science in the investigation of biological problems. 1959. In Press.

IMMUNITY AND VIRUS INFECTION

Edited by Victor Najjar, M.D., *Vanderbilt University School of Medicine*. Contains latest research contributions in immunology and virology as presented at a symposium, held at Vanderbilt University School of Medicine and sponsored by the National Foundation for Infantile Paralysis, Inc. This research report stresses the problem of the immunology and epidemiology of poliomyelitis as influenced by killed and live virus vaccine. 1959. 262 pages. \$10.50.

COMPARATIVE ANATOMY

By William Montagna, *Brown University*. Written simply and clearly, the book stresses major principles of comparative anatomy, organogenesis, and embryology. 1959. 397 pages. Prob. \$6.00.

ENVIRONMENTAL CONSERVATION

By Raymond F. Dasmann, *Humboldt State College*. An ecological approach to conservation of complete environments rather than conservation of isolated resources. 1959. 307 pages. \$6.50.

ASTRONOMY

By Theodore G. Mehlin, *Williams College*. This book makes the great sweep of Astronomy evident from the beginning. Chapters deal with instruments and light, the life story of a typical star, binary stars, and intrinsic variables. The author also presents a comprehensive picture of the metagalaxy and the solar system. 1959. Approx. 400 pages. Prob. \$7.75.

LABORATORY MANUAL FOR GENERAL BACTERIOLOGY Fifth Edition

Compiled by George L. Peltier, Carl E. Georgi, and the late Lawrence F. Lindgren, *all of the University of Nebraska*. The 3rd and 4th editions of this book have been used in over 225 universities and colleges. The fifth edition features new questions at the end of each exercise; introduces new laboratory procedures in the exercises on flagella and the wet mount of bacteria; and includes a completely revised section on the microscope. 1959. In Press.

THE STRUCTURE OF ELECTROLYTIC SOLUTIONS

Edited by Walter J. Hamer, *National Bureau of Standards*. Discusses the early history, background and recent contributions to the structure of electrolytic solutions. The material is based upon an international symposium conducted by the Electrochemical Society and co-sponsored by the National Science Foundation. 1959. Approx. 468 pages. Prob. \$18.50.

PLANTS AND ENVIRONMENT: A Textbook of Plant Autecology Second Edition

By R. F. Daubenmire, *State College of Washington*. Revised and expanded to include atmospheric pollution by smog and hydrogen fluoride, evaluation of stoniness of the soil, significance of dew for plants, new concepts of evapotranspiration, shielding of precipitation gages, urban microclimate, and frost-churning of soil. The last three chapters (The Fire Factor, The Environmental Complex, and Ecologic Adaptation and Evolution) have no counterpart in other ecology texts. 1959. Approx. 425 pages. Prob. \$7.00.

OUR MINERAL RESOURCES

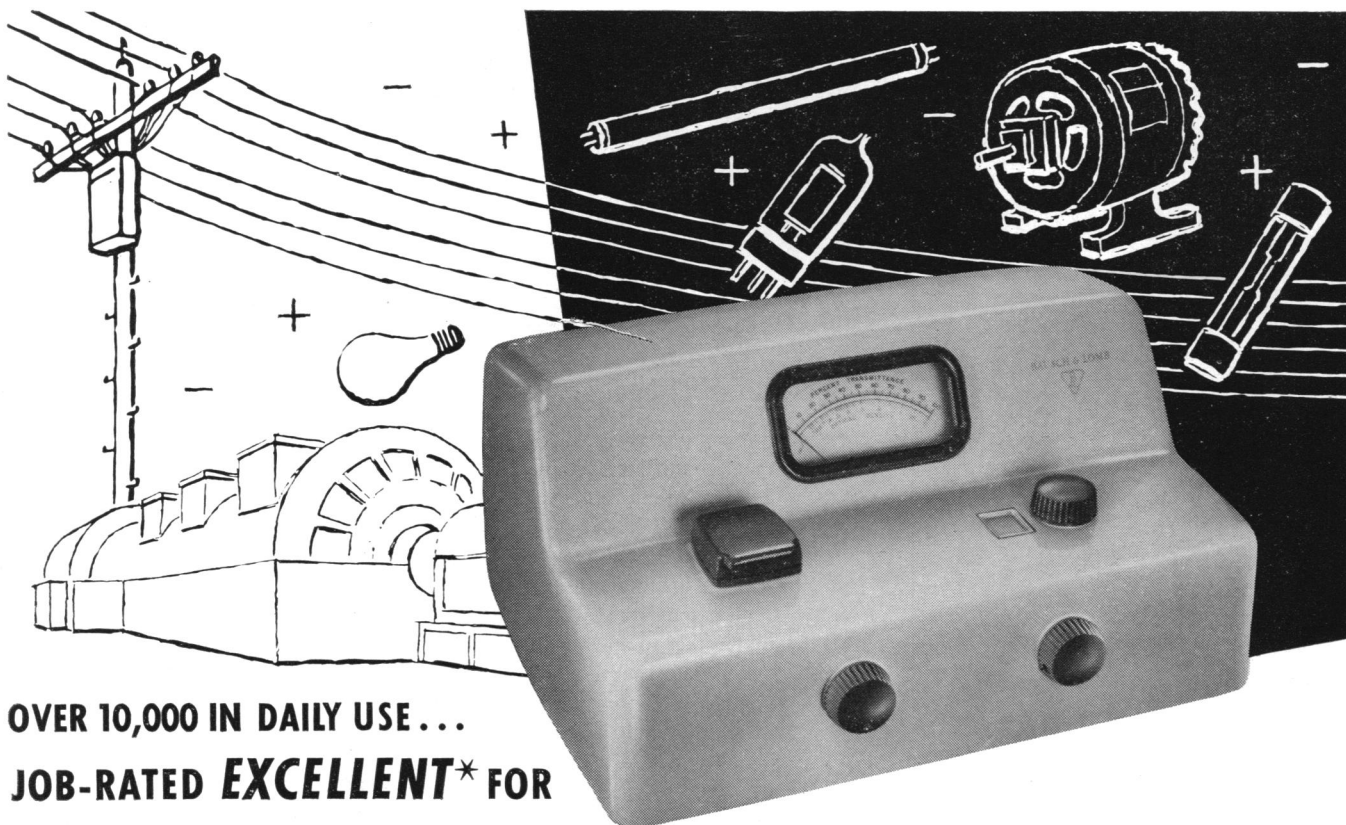
By Charles M. Riley, *Humble Oil and Refining Co., formerly of the University of Nebraska*. Using a minimum amount of scientific terminology, the book surveys important theories and useful facts. 1959. Approx. 352 pages. Prob. \$6.95.

Send for examination copies.

JOHN WILEY & SONS, Inc.

440 Fourth Avenue, New York 16, N.Y.

SCIENCE is published weekly by the AAAS, 1515 Massachusetts Ave., N.W., Washington 5, D.C. Entered at the Lancaster, Pa., Post Office as second class matter under the act of 3 March 1879. Annual subscriptions: \$8.50; foreign postage, \$1.50; Canadian postage, 75¢.



OVER 10,000 IN DAILY USE...
JOB-RATED **EXCELLENT*** FOR

W-I-D-E TEST RANGE

*"Excellent for analyzing fuel oil, slags, boiler water, metals, flue gas, etc. We're recommending its use in the labs of our power plants."
*Leading Power & Light Co.
—name on request.*

BAUSCH & LOMB
Spectronic 20
COLORIMETER

This low-cost "production tool" gives you quick, dependable photometric readings . . . easy as tuning your radio! In many industries it's basic equipment for quality control testing, inspection . . . even research! Here's why:

- **DEPENDABLE ACCURACY!** Narrow band pass (only $20m\mu$!) assures highest spectral purity.
- **EASIEST TO USE!** Dial instantly sets Certified-Precision diffraction grating to desired wavelength; no color filters to fuss with.
- **FASTEST READING!** Instant-acting meter gives exact percent transmission, or optical density.
- **LOW PRICE, DOUBLE VALUE!** Colorimeter *plus* spectrophotometer, $375m\mu$ - $950m\mu$ range in one long-life, trouble-free instrument. (Extended range, $340m\mu$ - $950m\mu$ at slight extra cost.)

Used in these and many other industries
to maintain quality and boost output:

METALS RUBBER PETROLEUM FOODS PLASTICS
PAINTS PLATING LEATHER DYES PAPER BEVERAGES
TEXTILES PHARMACEUTICALS SYNTHETIC FIBERS

MAIL COUPON FOR IMPORTANT DATA

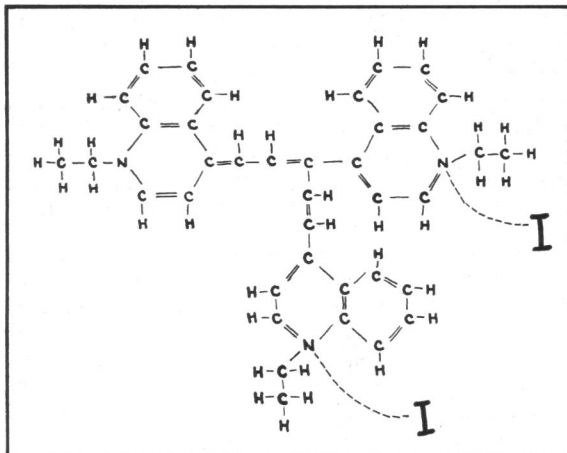
BAUSCH & LOMB OPTICAL CO.
64239 St. Paul St., Rochester 2, N. Y.

- ☐ Send me B&L Spectronic 20 Catalog D-266.
☐ I would like an obligation-free demonstration of the B&L Spectronic 20 Colorimeter at my convenience.

Name Title
Company
Address
City Zone State

Kodak reports on:

trapping photons and transferring their energy . . . a film that separates the lemons from the oranges . . . what's good for the missileers is good for the chromatographers



Old model resonator

Look—with the eye of a quantum mechanic—at this marvelous little molecular resonating machine. For the trifling sum of \$16.65 we can supply 400 quintillion of these machines. They will weigh $\frac{1}{2}$ gram, all told, and will come in a small bottle labeled *Neocyanine* (Eastman 2067).

The two iodines come separately packed in the crystal lattice as ions. The points where

they were detached, at the quaternary nitrogens, are positively charged, of course. Either of these two positive charges can be sent skittering back and forth through the branched chain of conjugated carbon atoms to bounce off the third nitrogen atom. All it takes to set the machine resonating thus is a photon of light or infrared that carries the difference in energy between quiescence of the positive charges and resonance thereof.

This little resonator has proved useful for trapping photons and transferring their energy to silver halide crystals. The silver halide thereupon responds photographically to wavelengths it would otherwise miss.

This is a 1925 model. We have since devised thousands of more advanced models of this basic type of resonator, but stock only the above and five other simple ones for off-the-shelf delivery: *Cryptocyanine* (Eastman 1334), *Dicyanine A* (Eastman 1532), *Pinacyanole* (Eastman 622), *Pinaflavole* (Eastman 1842), and *Orthochrome T* (Eastman 623). As dyes they are exceedingly powerful.

For a discussion of the working parts from which such ultra-subminiaturized electronic machines can be built by the skillful worker, see a paper entitled "A Century of Progress in the Synthesis of Dyes for Photography." As long as our supply of reprints lasts, we can send you a copy free.

Write to Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y. (Division of Eastman Kodak Company). The latest catalog, No. 41, also lists some 3700 other compounds for research.

Process E-3

Distinguished by the designation "(Process E-3)" from earlier versions, a new *Kodak Ektachrome Film* is aimed to please the worker who is pretty all-fired sure that for any trifling deficiency in his color transparencies the fault has lain not in himself, not in his technique, not in his equipment, but in his film.

Beyond the shadow of an illusion, this film is *sharper* than its predecessors. *Sharpness* differs from contrast and from resolving power. It represents ability to render a boundary—within how few microns the color on the transparency can change from (let us say) a certain yellow to a certain orange. This ability does not readily lend itself to quantitative statement.

We mention yellow and orange ad-

visedly. A classic challenge to any color photographic process has been to distinguish between the hue of lemons and oranges in one bowl of fruit. The new film meets it handily. Greens are better, too.

More valuable to some users will be the fidelity of the new film to the visual appearance of such photographically elusive biological stains as eosin and fuchsin. The photomicrographer now gets not only an enhancement of the fine color discrimination for which *Ektachrome* was notable even before but a new advantage in speed. Exposure Index is 32 for the *Type B* (which requires only heat-absorbing and possibly U-V filters in the usual photomicrographic setups) and 50 for the *Daylight Type* (used with electronic flash). Statistics show that in 1/25

second you get only 20% of the vibration contained in 1/5 second.

Kodak dealers now stock the new Kodak Ektachrome Film (Process E-3) in the usual sheet-film sizes. For 120 and 620 roll-film cameras it's called Kodak Ektachrome Professional Film, Daylight Type (Process E-3). They also carry various-sized kits of the new processing chemicals that Process E-3 requires. The processing cycle takes about an hour.

If a) you want paper prints and duplicate transparencies, and if b) you want to be able to manipulate your color balance toward a conception of reality transcending what can be built into inanimate film, and if c) you are willing to process both a negative and a positive before you judge your results, don't even bother with this new stuff. Stick to Kodak Ektacolor Film and Paper.

See the steroid?

When we brought out *Kodak Linagraph Direct Print Paper* we never dreamed of steroids. We were dreaming of the long, long miles of galvanometer data traces that the missileers would be happy to make on a photographic paper requiring no wet processing.

These dreams having come true, correspondence on the product is handled by gentlemen who don't even know what a steroid is. Of the inconvenience in locating on a paper chromatogram a substance readily discernible only by its ultraviolet absorption, they know even less. They have never read pp. 255-305 in Volume 7 of "Recent Progress in Hormone Research" (Academic Press, New York, 1952).

Fortunately, biochemical laboratory technique need not be discussed with them. A short paper in *Analytical Chemistry* (12, 2068) describes how a piece of Kodak Linagraph Direct Print Paper, briefly exposed to an ultraviolet lamp while kept in good contact under a dried chromatogram, will upon subsequent exposure to a 30-watt fluorescent lamp show light gray areas against a dark background at the sites of U-V absorbers in the chromatogram. The method is reported successful in routine use where 5γ or more is present of the absorber per square centimeter of paper.

To find out where to order Kodak Linagraph Direct Print Paper, write Eastman Kodak Company, Photorecording Methods Division, Rochester 4, N. Y. That much they know.

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

Kodak
TRADE MARK

Meetings

Biological Exhibits at Geneva

The second International Conference on the Peaceful Uses of Atomic Energy, held in Geneva, Switzerland, 1-13 September, was participated in by many countries as guests of the United Nations. The basic objective of the United States was to provide, wherever possible, operating laboratories and exhibits staffed with scientists skilled in various areas of research. An integrated picture

of nuclear research was presented, which included power, physics, chemistry, and the life sciences. Many people availed themselves of the opportunity provided for discussion, and the American exhibit became a meeting ground for scientists from around the world.

Short-lived radioisotopes were prepared in a Triga reactor and utilized in an activated isotope laboratory operated by personnel from the National Naval Medical Center. Drugs and biochemically important compounds were labeled with C^{14} , S^{35} , and H^3 and assayed in a chemistry laboratory oper-

ated by the Chemistry Division of the Argonne National Laboratory and the University of Chicago's department of pharmacology. Biosynthetic labeling was demonstrated in a greenhouse transported from the Argonne National Laboratory and operated by personnel from the biology division of the laboratory. A large display on photosynthesis was prepared by the University of California, as were exhibits on erythropoietin and a gamma-ray camera used in medical practice. The Roswell Park Memorial Institute sent a photoscanner for tumor localization.

The Public Health Service provided exhibits on the diagnosis of cardiac anomalies by means of radioactive noble gas and on the metabolism of labeled carcinogens. The Los Alamos Scientific Laboratory operated a "Human Counter," which was a very popular attraction. The Army Quartermaster Corps developed an exhibit on food preservation, and the Department of Agriculture exhibit on parasite eradication was especially attractive. The universities of Maryland, Illinois, and California co-operated to develop an exhibit on milk synthesis. The measurement of C^{14} -labeled lysergic acid diethylamide in brain was displayed by the University of Rochester. The biodynamics of $C^{14}O_2$ was demonstrated in patients by a group from the University of Chicago, who also demonstrated the technique of hypophysis ablation, using yttrium-90 implants. New developments in the field of autoradiography were displayed in exhibits from Columbia University and the universities of Arkansas and Chicago.

LLOYD J. ROTH

*University of Chicago,
Chicago, Illinois*

JOHN H. RUST

*Massachusetts Institute of Technology,
Cambridge, Mass.*

Differential Equations

A Symposium on Boundary Problems in Differential Equations, with special reference to recent developments in this field, will be held by the Mathematics Research Center, U.S. Army, at the University of Wisconsin, 20-22 April. Invited speakers, about 20 in number, will each present a 30-minute paper. Both ordinary and partial differential equations will be considered, the emphasis to be upon methods that are potentially adapted to computation. The proceedings of the symposium will be published.

Among the speakers, European and American, will be L. Collatz, G. Fichera, L. Fox, W. T. Koiter, J. Schröder, I. N. Sneddon, R. Bellman, G. Birkhof, H. Bueckner, R. Courant, J. B. Diaz, J. Douglas, K. Friedrichs, P. Garabedian, B. A. Troesch, R. Varga, C. Wilcox, and

A TIME LABEL

for every laboratory requirement!

It's safe...

SURE and ACCURATE!

TIME self-sticking LABELS are used without wetting. They are fast, safe and provide positive identification with complete safety from hepatitis and other laboratory infections.

They are excellent for use on microscopic slides, bottles (glass and plastic), radioactive containers, animal cages and hundreds of other laboratory uses. They are moistureproof and resist autoclave temperatures to $+250^{\circ}F.$ or deepfreeze temperatures to $-70^{\circ}F.$

BE SAFE... BE SURE... use TIME LABELS!
Custom labels and color coding are available for specific requirements.

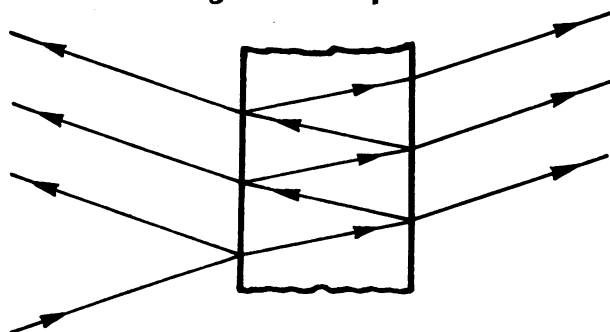



Write today for complete detailed literature on the outstanding advantages of TIME LABELS.

PROFESSIONAL TAPE CO., INC.
355 BURLINGTON ROAD • Dept. 41-C • RIVERSIDE, ILL.

INTERFERENCE FILTERS

for isolating narrow spectral bands



Spectral Range: 340-900 millimicrons

Peak Transmission: 40%

Half Peak Width: 8-12 m μ

Size: 2" x 2"

For

Colorimetry

Fluorimetry

Flame Photometry

also microscopy, photomicrography, microcolorimetry, refractometry, polarimetry, light scattering measurements, and for many other applications requiring monochromatic light in the visible, near-ultraviolet, and near-infrared range.

Write for Bulletin #180 to

PHOTOVOLT CORP.

95 Madison Avenue

New York 16, N.Y.

AAAS SYMPOSIUM VOLUMES

6" x 9", illustrated, clothbound

Zoogeography, 510 pp., 1958	\$12.00
The Species Problem, 404 pp., 1957	8.75
Atomic Energy and Agriculture, 460 pp., 1957 ..	9.50
The Beginnings of Embryonic Development, 408 pp., 1957	8.75
Alcoholism, 220 pp., 1957	5.75
Tranquilizing Drugs, 205 pp., 1957	5.00
Venoms, 480 pp., 1956	9.50
The Future of Arid Lands, 464 pp., 1956	6.75
Water for Industry, 140 pp., 1956	3.75
Psychopharmacology, 175 pp., 1956	3.50
Luminescence of Biological Systems, 466 pp., 1955	7.00
Advances in Experimental Caries Research, 246 pp., 1955	6.75
Antimetabolites and Cancer, 318 pp., 1955	5.75
Monomolecular Layers, 215 pp., 1954	4.25
Fluoridation as a Public Health Measure, 240 pp., 1954	4.50

7 1/2" x 10 1/2", double column, illustrated, clothbound

Centennial, 319 pp., 1950	5.00
Mammary Tumors in Mice, 231 pp., 1945	3.50

AAAS,

1515 Mass. Ave., NW, Washington 5, D.C.

DIFCO LABORATORY PRODUCTS

BIOLOGICS CULTURE MEDIA REAGENTS

Media for Standard Methods
Culture Media *Dehydrated and Prepared*
Microbiological Assay Media
Tissue Culture and Virus Media
Bacterial Antisera and Antigens
Diagnostic and Serological Reagents
Sensitivity Disks Unidisks
Peptones Hydrolysates Amino Acids
Enzymes Enrichments Dyes Indicators
Carbohydrates Biochemicals

DIFCO

over 60 years' experience

in the preparation of Difco products assures

UNIFORMITY STABILITY ECONOMY

Complete Stocks Fast Service

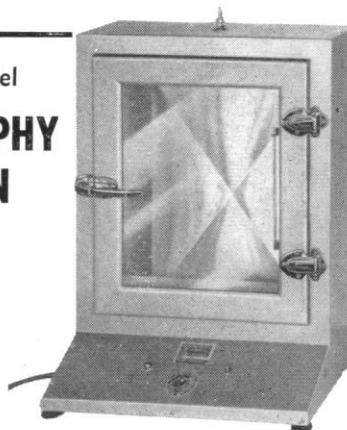
Descriptive literature available on request

DIFCO LABORATORIES DETROIT 1 MICHIGAN USA

Full View, Table Model CHROMATOGRAPHY DRYING OVEN

Fast, Uniform
Drying of
Paper Chromatograms

Accurate development
of four 18 1/4" x 22 1/2"
sheets simultaneously



Model CD-4 is a thermostatically controlled, insulated oven which quickly reaches temperatures up to 110° C. Achieves evacuation of solvent vapors with water or motor aspirator. Heating elements concealed in base are protected from combustible, solvent droplets. Heavy metal-reinforced safety glass door readily permits temperature readings and observation without repeated opening of door. Stainless steel oven chamber is corrosion-resistant.

Overall Dimensions: 27" wide; 35 3/4" high; 14 1/2" deep
UNCONDITIONAL 1 YEAR GUARANTEE

Write for Bulletin CD-313



NEW BRUNSWICK SCIENTIFIC CO.

PRECISION LABORATORY APPARATUS

P. O. BOX 606 • NEW BRUNSWICK, N. J.

D. Young. Persons interested in attending the symposium may obtain the program and other details from R. E. Langer, Director, Mathematics Research Center, U.S. Army, 1118 West Johnson St., Madison 6, Wis.

Molecular Structure

A Symposium on Molecular Structure and Spectroscopy will be held at the department of physics and astronomy, Ohio State University, 15-19 June. There will be discussions of the interpretation of molecular spectroscopy data as well as of methods for obtaining such data. In addition, there will be special sessions on phases of spectroscopy that are of current interest. A dormitory will be available for those who wish to reside on the campus during the meeting. For further information, or for a copy of the program when it becomes available, write to Professor R. A. Oetjen, Department of Physics and Astronomy, Ohio State University, Columbus 10, Ohio.

Data Processing

The Denver Research Institute of the University of Denver will hold its 6th annual Symposium on Computers and Data Processing at the Stanley Hotel in Estes Park, Colo., 30-31 July. The conference will be restricted to papers and panel discussions on basic problems in

the fields of data processing, particularly in the area of formalized analysis techniques, logical design, systems organization, and components or devices.

Although it is anticipated that the program will be comprised largely of invited papers, a limited number will be selected from those submitted to the papers committee. Authors wishing to present papers are urged to send abstracts of approximately 150 words, *no later than 1 April*, to: W. H. Eichelberger, Papers Committee, Denver Research Institute, University of Denver, Denver 10, Colo.

Forthcoming Events

April

11. Extending the Parabola, Alfred Korzybski Memorial Symp., New York, N.Y. (E. L. Gates, Inst. of General Semantics, Lakeville, Conn.)

12-14. Atomic Mechanisms of Fracture, conf., Cambridge, Mass. (D. K. Felbeck, Natl. Acad. of Sciences-Natl. Research Council, 2101 Constitution Ave., NW, Washington 25.)

12-15. Neurosurgery, 8th Latin American cong., Santiago, Chile. (A. Asenjo G., Casilla 70-D, Santiago, Chile.)

12-16. American Physiological Soc., Atlantic City, N.J. (R. C. Daggs, 9650 Wisconsin Ave., Washington, D.C.)

12-16. Fracture, intern. conf., Cambridge and Dedham, Mass. (Headquarters, Air Force Office of Scientific Research, Washington 25.)

13. Biochemical Cytology of Liver (Histochemical Soc.), symp., Atlantic City, N.J. (A. B. Novikoff, Dept. of Pathology, Albert Einstein College of Medicine, Yeshiva Univ., Eastchester Rd. and Morris Ave., New York 61.)

13-15. Hydraulics Conf. (American Soc. of Mechanical Engineers), Ann Arbor, Mich. (O. B. Schier, ASME, 29 W. 39 St., New York 18.)

13-17. American Assoc. of Immunologists, Atlantic City, N.J. (C. Howe, 630 W. 168 St., New York 32.)

13-17. American Inst. of Nutrition, Atlantic City, N.J. (G. M. Briggs, NIAMD, Room 9D20, Bldg. 10, National Institutes of Health, Bethesda, Md.)

13-17. American Soc. for Pharmacology and Experimental Therapeutics, Atlantic City, N.J. (H. Hodge, Univ. of Rochester, Rochester 20, N.Y.)

13-18. American Acad. of Neurology, Los Angeles, Calif. (J. M. Foley, Boston City Hospital, Boston, Mass.)

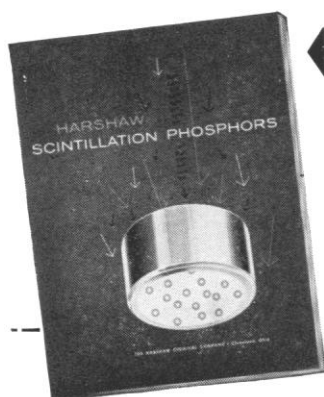
13-18. American Soc. of Biological Chemists, Atlantic City, N.J. (F. W. Putnam, Univ. of Florida Medical School, Gainesville.)

13-18. American Soc. for Experimental Pathology, Atlantic City, N.J. (J. F. A. McManus, Univ. of Alabama Medical Center, Birmingham 3.)

14-15. Electrical Heating Conf. (American Institute of Electrical Engineers), Philadelphia, Pa. (N. S. Hibshman, AIEE, 33 W. 39 St., New York 18.)

14-16. Faraday Soc. (Energy Transfer), Nottingham, England. (Faraday Soc., 6 Gray's Inn Square, London, W.C.1, England.)

14-16. Life Span of Animals, 5th colloquium on aging, London, England.



Write for this free 40-page book

HARSHAW SCINTILLATION PHOSPHORS

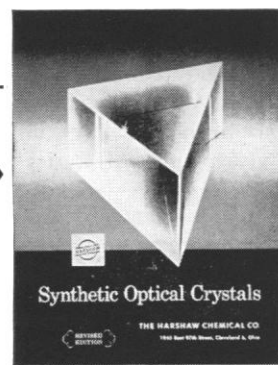
Presents definitive article on characteristics and properties of scintillation phosphors with special emphasis on NaI(Tl). A general discussion of scintillation counting is augmented with many appropriate tables, efficiency curves, and typical gamma ray spectra. Gives specifications and drawings of Harshaw mounted phosphors, and lists miscellaneous other phosphors available from Harshaw. We will be pleased to send you a copy.

Also available . . .

Free 36-page book

HARSHAW SYNTHETIC OPTICAL CRYSTALS

Discusses in detail various Harshaw crystals used for infra-red and ultra-violet optics. Includes many pertinent graphs. Ask for your copy today.



THE HARSHAW CHEMICAL COMPANY

1945 EAST 97th STREET • CLEVELAND 6, OHIO

CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES • PHILADELPHIA
HASTINGS-ON-HUDSON, N. Y. • PITTSBURGH

3 ways to satisfy a scientific curiosity

CAN MAN BE MODIFIED?

By Jean Rostand

A breath-taking presentation of science's advances towards the control of heredity, mutations, breeding, and the chemistry of organisms, by the distinguished French biologist. **\$3.00**



THE LIFE AND LETTERS OF CHARLES DARWIN

Introduction by
Geo. Gaylord Simpson

Back in print after 16 years—the intimate biography and voluminous correspondence of the great naturalist, edited by his son, Francis. Two volumes, boxed.

The set **\$10.00**

INSIDE THE LIVING CELL

Some Secrets of Life

By J. A. V. Butler

A clear, non-technical account—by the noted biochemist—of the makeup of cells and the marvelous mechanisms by which they function.

44 illustrations, **\$3.50**

BASIC BOOKS

Publishers

59 Fourth Avenue
New York 3, N.Y.

(Ciba Foundation, 41 Portland Pl., London, W.1.)

14-16. Rheology of the Glassy State (British Soc. of Rheology), Sheffield, England. (D. W. Saunders, British Rayon Research Assoc., Heald Green Laboratories, Wythenshawe, Manchester 22, England.)

15-17. American Assoc. of Genito-Urinary Surgeons, Absecon, N.J. (W. J. Engel, 2020 E. 93 St., Cleveland 6, Ohio.)

15-17. American Surgical Assoc., San Francisco, Calif. (W. A. Altemeier, Cincinnati General Hospital, Cincinnati 29.)

15-17. Midwest Benthological Soc., annual, Hickory Corners, Mich. (C. M. Fetterol, Jr., Water Resources Commission, Sta. B. Lansing 13, Mich.)

16-18. American Assoc. of Railway Surgeons, Chicago, Ill. (C. C. Guy, 5800 Stony Island Ave., Chicago 37.)

16-18. Association of Southeastern Biologists, Knoxville, Tenn. (H. J. Humm, Dept. of Botany, Duke Univ., Durham, N.C.)

16-18. Ohio Acad. of Sciences, Columbus. (G. W. Burns, Ohio Wesleyan Univ., Delaware.)

16-18. Southern Sociological Soc., 22nd annual, Gatlinburg, Tenn. (S. C. Mayo, North Carolina State College, Raleigh.)

16-30. Engineering, Marine, Welding and Nuclear Energy Exhibition, 22nd, Olympia, London. (F. W. Bridges & Sons, Ltd., Grand Buildings, Trafalgar Square, London, W.C.2, England.)

17. Current Developments in the Production of High Vacua, symp., London. England. (Institute of Physics, 47 Belgrave Square, London, S.W.1.)

17-18. American Mathematical Soc., Monterey, Calif. (E. G. Begle, Leet Oliver Hall, Yale Univ., New Haven, Conn.)

17-18. American Mathematical Soc., Chicago, Ill. (E. G. Begle, Leet Oliver Hall, Yale Univ., New Haven, Conn.)

17-18. Nebraska Acad. of Sciences, 69th annual, Lincoln. (M. Beckman, Teachers College, Univ. of Nebraska, Lincoln.)

18-19. Myasthenia Gravis, 2nd intern. symp., Los Angeles, Calif. (K. E. Osserman, Myasthenia Gravis Foundation, Inc., 155 E. 23 St., New York 10.)

18-22. American Soc. of Tool Engineers, 27th annual, Milwaukee, Wis. (ASTE, 10700 Puritan, Detroit 38, Mich.)

19-23. Oil and Gas Power Conf. (American Soc. of Mechanical Engineers), Houston, Tex. (O. B. Schier, ASME, 29 W. 39 St., New York 18.)

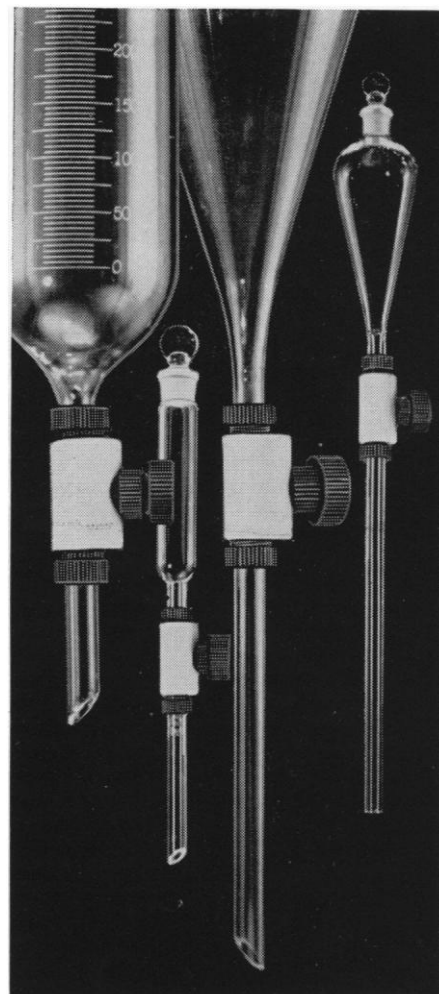
19-24. American Pharmaceutical Assoc., annual conv., Cincinnati, Ohio. (R. P. Fischelis, APA, 2215 Constitution Ave., Washington 7.)

20-21. Analog and Digital Instrumentation, 3rd natl. conf. (American Inst. of Electrical Engineers), Philadelphia, Pa. (N. S. Hibshman, AIEE, 33 West 39 St., New York 18.)

20-22. American Oil Chemists' Soc., spring, 50th anniversary, New Orleans, La. (Mrs. L. R. Hawkins, 35 E. Wacker Dr., Chicago 1, Ill.)

20-22. Boundary Problems in Differential Equations, symp., Madison, Wis. (R. E. Langer, Mathematics Research Center, U.S. Army, 1118 W. Johnson St., Madison 6.)

(See issue of 20 February for comprehensive list)



Easier to use because they're harder to break!

PYREX® Needle Valve Ware with double-thick stems



Stem walls are *twice as heavy* as conventional walls—twice as durable!

Two valve sizes are available: small (with 2mm bore) and large (with 4.7mm bore).

You get ultra-precise control of fluid flow with PYREX Needle Valves. And their fine-ground flanges assure a better seal, particularly under pressure.

The famous chemical stability of PYREX brand glass No. 7740 helps prevent contamination. Valve body and retainer rings are pure

TEFLON*.

Needle valves and connecting tubes can be purchased separately; or in PYREX burettes, distilling heads, funnels, chromatographic tubes and stopcocks; or in special ware fabricated to your needs.

For sizes and prices, see your PYREX Laboratory Glassware Catalog, LG-1.

*T.M. for Du Pont Tetrafluoroethylene Resin.



CORNING GLASS WORKS

34 Crystal Street, Corning, New York
CORNING MEANS RESEARCH IN GLASS

Webster Says... QUALITY means

"The degree of
excellence and
superiority"



...at Nutritional Biochemicals Corporation
QUALITY is one of our proudest assets.

- Over 300 amino acids
- Over 90 peptides
- More than 200 nucleoproteins, purines, pyrimidines
- Miscellaneous biochemicals
- Vitamins
- Enzymes • crystalline • purified
- Growth factors
- Steroid hormones
- Biological salt mixtures
- Biological test materials
- Peptides
- Carbohydrates
- Purified proteins
- Fatty acids
- Antibiotics
- Alkaloids
- Glandular substances



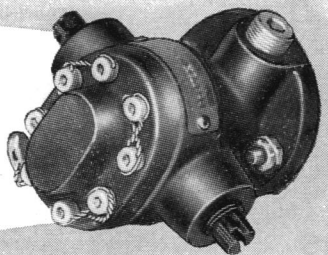
**NUTRITIONAL
BIOCHEMICALS
CORPORATION**

21010 MILES AVE. • CLEVELAND 28, OHIO



Write for New Catalog—March, 1959—More than 2500 Items—Write Dept. 102

**smallest, lightest
aircraft pumps
aloft...**



... are Eastern Industries high speed gear pumps. Check these characteristics—proved reliable in the most advanced missile power systems:

- Flow from .015 to 1.5 GPH
- Pressures from 15 to 2000 psig
- Speeds to 24,000 rpm
- Weights with motor 1.5 to 8.5 lbs.

Beyond these ranges many of the existing units can be adapted to specific needs... and creatively-engineered custom pumps can meet still other requirements.

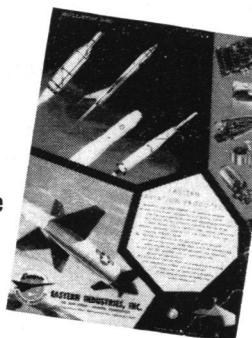
NEW!

CATALOG 360
covers the entire line of Eastern
aircraft pumps—features hydraulic
power units, avionic cooling packs,
refrigeration cooling and servo-valve
systems. Send for it now!



EASTERN

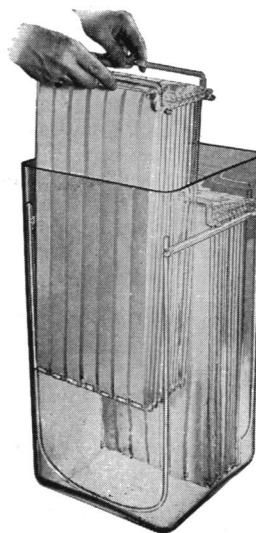
INDUSTRIES, INC.
100 Skiff St., Hamden 14, Conn.



West Coast Branch Office: 1608 Centinela Ave., Inglewood, Calif.

FOR PAPER CHROMATOGRAPHY— A NEW & SIMPLE METHOD OF CHROMATOGRAPHING PAPER STRIPS

The New Kurtz-Miramon Technique



...permits chromatographing
large numbers of paper strips
at one time in a small space.

...eliminates fumbling with
dangling, wet paper strips.

...prevents papers from
touching or rubbing together
while being developed,
washed, sprayed, and dried.

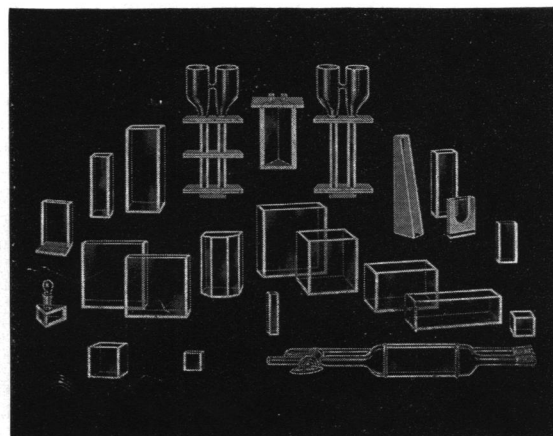
...eliminates use of anchor
and anti-siphon rods.

...utilizes all-glass apparatus.

Write for Brochure SK

CALIFORNIA LABORATORY EQUIPMENT CO.
98 Rincon Road • Berkeley 4, California

GLASS ABSORPTION CELLS made by **KLETT**



SCIENTIFIC APPARATUS

Klett-Summerson Photoelectric Colorimeters—
Colorimeters — Nephelometers — Fluorimeters—
Bio-Colorimeters — Comparators — Glass Stand-
ards—Klett Reagents.

Klett Manufacturing Co.

179 East 87 Street, New York, New York

Equipment

The information reported here is obtained from manufacturers and from other sources considered to be reliable, and it reflects the claims of the manufacturer or other source. Neither Science nor the writer assumes responsibility for the accuracy of the information. A coupon for use in making inquiries concerning the items listed appears on page 734.

■ **VOLTAGE-CURRENT CALIBRATOR** delivers continuously variable positive or negative voltages from 1 mv to 100 v in four ranges. The output is available either as a direct voltage or as a 5-msec pulse repeated from 5 to 50 times per second. Currents are calibrated by voltage drop produced across an internal 1-ohm resistor. Accuracy is ± 0.3 percent. (Rese Engineering, Inc., Dept. 682)

■ **X-RAY IMAGE INTENSIFIER** offers binocular viewing of the image of a 5-in. field intensified 1000 times. The device is compact enough to permit normal access to the fluoroscopic mechanism and can be connected or disconnected by means of a quick-release clamp. (Keleket X-Ray Corp., Dept. 680)

■ **SOLID-STATE ELECTRONIC COMMUTATOR** will sample up to a maximum of 1000 channels of information at rates up to 100,000 samples per second. Accuracy of the switches is a function of the full scale of the signals being commutated. For example, a full scale of ± 1 v would have a total error of 0.07 percent, ± 8 v full scale would have a total error of 0.02 percent. (Packard-Bell Computer Corp., Dept. 685)

■ **MERCURY BATTERY PACKS** are designed for use as secondary voltage standards. Desired voltages can be made up by combination of basic cells of nominal open-circuit voltage 1.357 ± 0.5 percent. Voltage declines 1 percent in 2 years' storage at 70°F. Short-period stability of 1 part in 10,000 is obtainable. Voltage remains stable within ± 1 percent over a temperature range -40° to 160°F. (Malory Battery Co., Dept. 686)

■ **DELAYED-PULSE GENERATOR** is adjustable in 1- μ sec steps from 1 to 10,000 μ sec with provision for interpolation between steps. Over-all accuracy is within ± 0.1 μ sec, and jitter is less than 0.02 μ sec. Time intervals may be initiated internally at rates from 10 cy to 10 kcy/sec or by external signals from 0 to 10 kcy/sec. (Hewlett-Packard Co., Dept. 689)

■ **ZONE REFINER** applies the zone melting principle to the purification of organic compounds or other materials that melt between 50° and 300°C. The material to be purified is contained in a glass tube. A Nichrome ribbon loop encircles the tube and generates heat to melt the

material. As a carriage moves the heater along the tube, the molten zone moves with it. An air-blast ring carried behind the heater cools the tube to solidify the molten material. A second heater and air-blast ring may be used to double the effect of each pass. Zone widths from about 1/4 to 2 in. can be obtained by adjustment of the relative position of the heaters and air blast. Carriage motion is adjustable between 0.1 and 2.4 in./hr. (Fisher Scientific Co., Dept. 692)

■ **SERVO MILLIVOLTMETER** is available as either a ratio meter or an absolute voltage measuring device for full-scale inputs as low as ± 5 mv. Accuracy of a standard model is ± 0.5 percent, but accuracies as high as ± 0.03 percent can be provided. Visual display and a variety of electrical outputs, analog or digital, are available. (North Atlantic Industries, Inc., Dept. 695)

■ **VIBRATION GENERATOR** produces double amplitudes up to 1-in. at frequencies from 2 to 20 cy/sec. Table motion is linear in a vertical plane. Specimens weighing 25 lb can be accelerated up to 20 g. Frequency may be adjusted while the machine is running. (L. A. B. Corporation, Dept. 687)

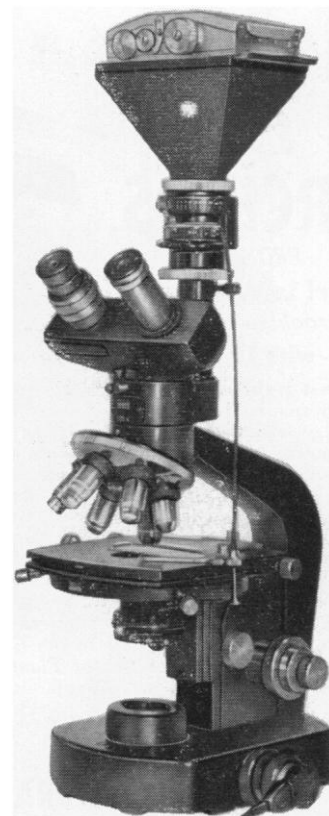
■ **OXYGEN ANALYZER** is available in single or multiple ranges from 0 to 10 parts per million to 0 to 1 percent oxygen. Accuracy is ± 2 percent of full scale. A built-in calibrator adds a known amount of oxygen to the sample by electrolysis of water. The analyzer uses an electrochemical cell in which oxygen is catalytically converted at the cathode to hydroxyl ions. The current required is measured by a potentiometer recorder. The instrument responds 90 percent in less than 1 min. (Analytic Systems Co., Dept. 694)

■ **SQUIB-ACTUATED MOTOR** measures 0.3 in. in diameter by 0.5 in. long and is capable of providing 8 lb of thrust over a 0.1-in. minimum stroke within an elapsed time of 1 msec. The motor is actuated by as little as 7500 erg and will withstand accelerations of 20,000 g. Operating temperature range is -65° to +165°F. (Atlas Powder Co., Dept. 691)

■ **PLUG-IN VOLTMETER CIRCUITRY** contains complete vacuum-tube voltmeter circuitry but does not include meter, calibration control, zero adjust, or input voltage divider. With this unit meters being utilized for other purposes may also be used for voltage measurement in the range 1 to 1000 v. Input resistance is 10 megohm. The circuit requires a meter of sensitivity 50 to 250 μ a. (Metronix, Inc., Dept. 688)

JOSHUA STERN

National Bureau of Standards,
Washington, D.C.



For every requirement— MICROSCOPY at its finest

Here is the WILD[®] M-20, internationally renowned for its superb optics, traditionally fine Swiss craftsmanship and almost unbelievable versatility.

The M-20 microscope is unexcelled for research and scientific exploration in any field of microscopy. It is available with sextuple revolving nosepiece if desired, 20-Watt built-in illumination, beam-splitting phototube for binocular focusing for photomicrography, and a full range of attachments for all observation methods.

Attachments include Camera II (shown in illustration), Cinetube, Universal Lamp, Episcopic Equipment, Phase Contrast and Incident Light.

Camera II permits continuous binocular observation. The phototube deflects 25% of light to the binocular tube. A special format indicating eyepiece permits rapid, perfect focusing.

Your consideration of the WILD M-20 will prove most rewarding. Write for Booklet M-20 today.

[®]The FIRST name in Surveying Instruments, Photogrammetric Equipment and Microscopes

WILD
HEERBRUGG

Full Factory
Services

INSTRUMENTS, INC.

Main at Covert Street • Port Washington, New York
Port Washington 7-4843

In Canada

Wild of Canada Ltd., 157 MacLaren St., Ottawa, Ontario

The first complete
scientific survey of . . .

THE ORCHIDS

Edited by
Carl L. Withner,
Brooklyn College

— with 15 Contributing Authors



Just published. A complete synthesis, international in scope, of present knowledge about the Orchidaceae, by well-known authorities. Book covers orchid structure and classification, physiology, hybridization and genetics, pests and diseases. Includes an extensive list of chromosome numbers, a key to tribes and subtribes, a listing of intergeneric hybrids with dates, a compilation of important seedling culture media, and lineographs of orchid flowers and growth habits. A volume in the *Chronica Botanica New Series of Plant Science Books*. 144 ills.; 625 pp. \$14.

A definitive, lifetime study . . .

BLAKESLEE: THE GENUS DATURA

Amos G. Avery, Sophie Satina,
and Jacob Rietsema

— all formerly of the Smith College
Genetics Experiment Station

Just published. A full account of the investigations conducted by Albert F. Blakeslee and his associates on the genus *Datura*. Topics include breeding, cytology, morphology, physiology, embryology, etc. *Chronica Botanica: An International Biological and Agricultural Series*. 318 ills., tables; 329 pp. \$8.75

Applying the case method
to the . . .

NOMENCLATURE OF PLANTS

Harold St. John,
University of Hawaii

A new method for becoming familiar with the International Code of Botanical Nomenclature. Book develops cases on nearly 900 plants with a valuable summary of their nomenclature and references. *Chronica Botanica New Series of Plant Science Books*. 157 pp. Paper cover. \$2.50

USE THIS COUPON TO ORDER

Send books checked below:

- ☐ THE ORCHIDS, Withner . . . \$14.00
- ☐ BLAKESLEE: THE GENUS DATURA, Avery et al . . . 8.75
- ☐ NOMENCLATURE OF PLANTS, St. John . . . 2.50

Send complete list of books in:

- ☐ *Chronica Botanica: An International Biological and Agricultural Series*
- ☐ *Chronica Botanica New Series of Plant Science Books*

☐ Check enclosed ☐ Send COD ☐ Bill me

Name S-2

Address

City Zone . . . State

THE RONALD PRESS COMPANY
15 East 26th Street, New York 10, N. Y.

Letters

(Continued from page 684)

wide range of concentrations may be used, and some popular modifications of the Gram stain employ crystal violet near this concentration—for example, Nicolle's (0.33 percent) (2). At relatively higher concentrations (1 to 2 percent), the bacteria clump and the dye polymerizes, causing uncertainties in the interpretation of work of this and similar types.

The work of Fischer (3) and of Fischer and Zaleschuk (4) deals with a method of measurement of crystal violet taken up by various biological materials. This is applicable to the Gram reaction only if one accepts Fischer's statement that "gram positiveness is related to the amount of primary dye absorbed" (3). This is not necessarily "conclusively demonstrated," since other studies have shown that crystal violet uptake by bacterial cells is not correlated with their Gram character (5). As a matter of fact, the precise and extensive data presented by Wensinck and Boevé (6), as cited above by Fischer, indicate that at a dye concentration of about 0.1 percent, a "differential in crystal violet uptake between a Gram-positive and a Gram-negative organism ceases to exist." Since I have shown that Gram differentiation readily occurs when dye of this concentration is used, it appears that measurement of dye uptake does not suffice as a measure of Gram positiveness. The Gram differentiation seems to depend more upon the integrity of the cell membrane or membranes and the relative permeabilities of these membranes to the decolorizing solvent (6, 7).

TOD MITTWER

Bacteriology Department, University
of Southern California, Los Angeles

References

1. H. Finkelstein and J. W. Bartholomew, *Stain Technol.* 28, 177 (1952).
2. Society of American Bacteriologists, *Manual of Microbiological Methods* (McGraw-Hill, New York, 1957), p. 14.
3. R. Fischer, *Naturwissenschaften* 45, 287 (1958).
4. R. Fischer and J. Zaleschuk, *J. Histochem. and Cytochem.* 6, 237 (1958).
5. J. W. Bartholomew and H. Finkelstein, *J. Bacteriol.* 67, 689 (1954); H. Finkelstein and J. W. Bartholomew, *ibid.* 72, 340 (1956).
6. F. Wensinck and J. J. Boevé, *J. Gen. Microbiol.* 17, 401 (1957).
7. V. Burke and M. W. Barnes, *J. Bacteriol.* 18, 69 (1929).

Echo Ranging in the Porpoise

W. N. Kellogg's paper "Echo ranging in the porpoise," which appeared in a recent issue of *Science* [128, 982 (1958)], causes me to wonder about the efficacy of the journal's referee system (or that part of the editorial procedure used instead).

To my knowledge, echolocation in a marine animal was experimentally "demonstrated for the first time" by W. E. Schevill and B. Lawrence of Harvard University and the Woods Hole Oceanographic Institution. Their paper, "Food-finding by a captive porpoise (*Tursiops truncatus*)," appeared as No. 53 of *Breviora* in April 1956 and is discussed at some length in one piece of literature Kellogg cites (Donald R. Griffin's *Listening in the Dark*).

RICHARD H. BACKUS

Woods Hole Oceanographic Institution,
Woods Hole, Massachusetts

I am sorry about the omission of a reference to the Schevill and Lawrence paper (1) from my recent article in *Science*. The omission was entirely my responsibility and not that of the editors of *Science*. It would have been better to have included it. However, whether the *Breviora* article actually "demonstrates" anything is a matter of opinion. In a way it is regrettable that Backus has raised the issue, for this leaves me no alternative but to point out why the *Breviora* paper fails to prove echolocation, and consequently why the omission was not really a serious one.

It is a basic rule of good research that the variables involved must be properly controlled. This becomes particularly important in a difficult field involving a unique perceptual avenue like echolocation. Under these circumstances we are quite unable to see how leaning over the side of a small boat and feeding fishes to a porpoise by hand can be construed as "demonstrating echolocation." Of course Schevill's porpoise found the fish which he offered, as the title of his article indicates, but from the descriptions given it is impossible to tell what method the porpoise employed to locate the bait. Almost any animal—marine or otherwise—will seek and find food which is near it.

To determine whether a porpoise reacts to the echoes of its own noises, one should certainly not introduce extraneous auditory signals which might help guide the animal to its goal. Slapping the water upon the insertion of the fish—a practice followed in a good deal of the work reported in the *Breviora* article—is the very thing not to do. It simply confuses the issue by telling the animal where (or where not) to go.

Even more serious is the failure to eliminate crucial visual stimuli. Not only can porpoises see through the water and in the air, but they also view objects in the air from a swimming position beneath the surface of the water. Since no visual screening was employed in the *Breviora* study, there would seem to be no reason why the animal could not have observed the movements and postures of