

SCIENCE

13 September 1957

Volume 126, Number 3272

Editorial	When Scientists Disagree	483
Articles	Strontium-Calcium Movement from Soil to Man: <i>C. L. Comar, R. S. Russell, R. H. Wasserman</i>	485
	Stockholm Natural Radiocarbon Measurements I: <i>H. G. Ostlund</i>	493
	H. R. Morgan, Astronomer: <i>F. P. Scott</i>	497
	R. M. Yerkes, Psychobiologist: <i>L. Carmichael</i>	498
News of Science	News Articles and Briefs; Scientists in the News; Recent Deaths	499
Reports	Occurrence of <i>l</i> -Quinic Acid in Tobacco Leaves: <i>J. K. Palmer</i>	504
	Physiological Response to Air Exposure in Codfish: <i>H. Leivestad, H. Andersen, P. F. Scholander</i>	505
	Irregular Maintenance Schedules and Drive: <i>J. M. Mandler</i>	505
	Release of 5-Hydroxytryptamine by Benzoquinolizine Derivatives with Sedative Action: <i>A. Pletscher</i>	507
	Nature of the Glucuronide in Direct-Reacting Bilirubin: <i>D. Schachter</i>	507
	Absence of Chitin in Epicuticle of Some Indian Scorpions: <i>M. B. Lal and S. C. Shrivastava</i>	508
	Withdrawal of Positive Reinforcement as Punishment: <i>C. B. Ferster</i>	509
	Gamma Globulin Factors Protective against Infections from <i>Pseudomonas</i> and Other Organisms: <i>R. C. Millican, J. Rust, S. M. Rosenthal</i>	509
	Interrelationship between Certain Bacteria and the Rumen Ciliate <i>Dasytricha ruminantium</i> : <i>J. Gutierrez and R. E. Hungate</i>	511
	Rapid Chemical Changes in Reconstituted Dry Milk: <i>M. Keeney and R. Bassette</i>	511
Book Reviews	<i>Organic Synthesis; Battle for the Mind; Glossary of Geology and Related Sciences; Quantum Chemistry, an Introduction; Biochemical Problems of Lipids; Experimental Research on Ageing; A Revision of the Australian Chafers (Coleoptera: Scarabaeidae: Melolonthinae); New Books; Miscellane- ous Publications</i>	513
Meetings and Societies	High-Energy Physics; Royal Society of Canada; AAAS Finances: Report for 1956; Meeting Notes; Forthcoming Events	518
	Equipment News	528



HIGH ENERGY
RESOLUTION
DISPERSION
SPECTRAL PURITY

Farrand Master Diffraction Gratings are the most precise ever available. They are produced on a Ruling Engine recently constructed according to the designs of Dr. John Strong.

DATA

Type: Master, Plane Reflection.

Size: Blank 6" diameter.

Ruling 5" wide x 2.8" long.

Lines per inch: 14,400.

Efficiency: 65-85% of Incident Energy in Blazed Region.

Ghost Intensity: Less than 0.1% in First Order of 5500 Å.

Resolution: 100% of Theoretical in Third Order or Better.

IMMEDIATE DELIVERY

The Farrand Optical Co., Inc. is also in a position to supply the FARRAND-STRONG Ruling Engine on special order

Engineering

Research • Development

Design • Manufacture

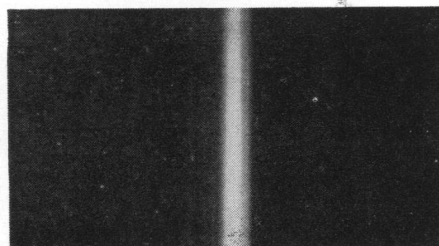
PRECISION OPTICS, ELECTRONICS AND
SCIENTIFIC INSTRUMENTS

FARRAND OPTICAL CO., INC.

Bronx Boulevard and East 238th Street, New York 70, N. Y.

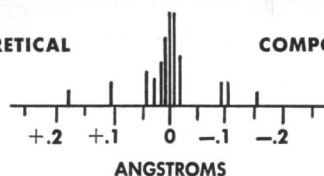
HYPERFINE STRUCTURE OF MERCURY SPECTRUM

Unretouched photograph taken with a
Farrand Diffraction Grating



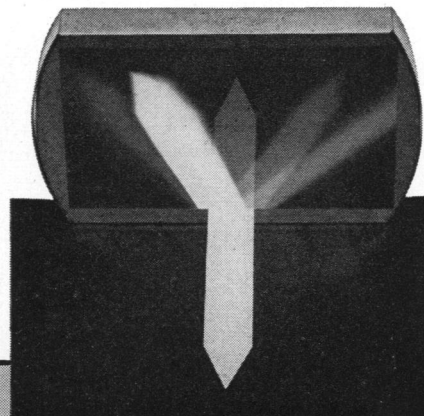
THEORETICAL

COMPONENTS



$\lambda = 4538 \text{ Å}$ 6th ORDER (DOUBLE PASS)
RESOLVING POWER = 750,000

Below, an unretouched photograph of a grating, blazed for First Order at 5500 Å, illustrates the control achieved over the groove form.

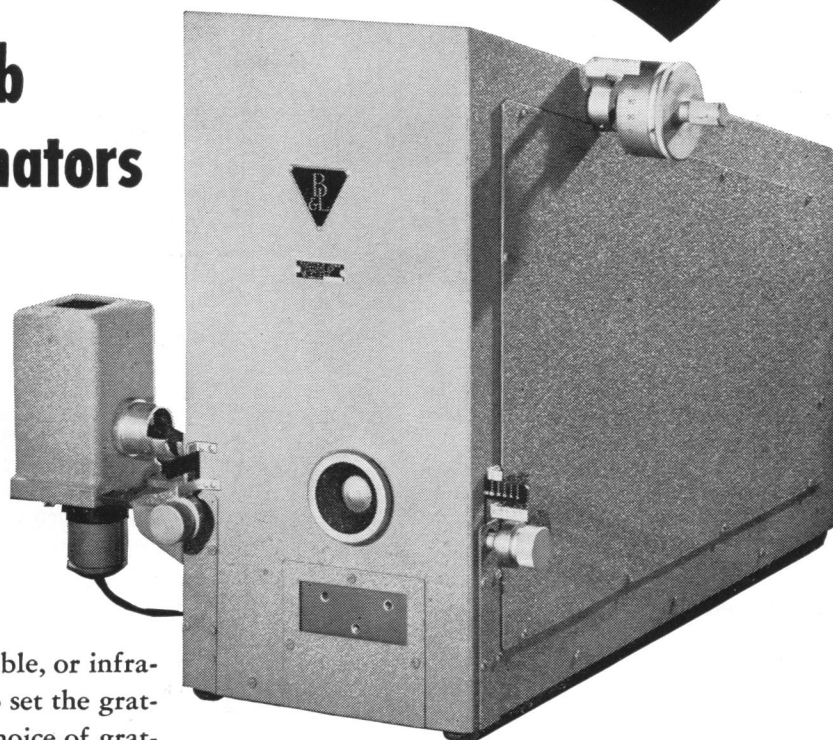


Get light of needed wavelength at the turn of a dial

Bausch & Lomb Grating Monochromators

with

CERTIFIED PRECISION GRATINGS



Pure, intense light . . . ultra-violet, visible, or infra-red—just turn the micrometer drum to set the grating to the desired wavelength. Wide choice of gratings for full range coverage (2000Å-14,000Å), or for more intensive U-V or infra-red study. Nine monochromator models, with linear dispersion from 66Å/mm to 16.5Å/mm, first order.



B & L OPTICS FOR ULTRA-VIOLET WORK

Complete accessories for critical study under high intensity U-V illumination. Twice the resolving power attainable with visible light.

- Direct irradiation
- U-V microscopy
- Photo-chemistry
- Physical chemistry
- Spectro-photometry

WRITE FOR INFORMATIVE DATA!

For your copy of Catalog D-259, for an obligation-free demonstration, for expert advice on specific applications, write to Bausch & Lomb Optical Co., 85622 St. Paul St., Rochester 2, N. Y.

BAUSCH & LOMB



America's only complete optical source . . . from glass to finished product

SCIENCE, VOL. 126

New Books

Histology. Arthur W. Ham. Lippincott, Philadelphia, Pa., ed. 3, 1957. 909 pp. \$11.

Industry and Technical Progress. Factors governing the speed of application of science. C. F. Carter and B. R. Williams. Oxford University Press, London, 1957. 252 pp. \$4.

Mathematical Analysis. A modern approach to advanced calculus. Tom M. Apostol. Addison-Wesley, Reading, Mass., 1957. 565 pp. \$8.50.

The Measurement of Meaning. Charles E. Osgood, George J. Suci, Percy H. Tannenbaum. University of Illinois, Urbana, 1957. \$7.50.

Mosses of Indiana. Winona H. Welch. Bookwalter, Indianapolis, Ind., 1957. 478 pp.

No Frontier to Learning. The Mexican student in the United States. Ralph L. Beals and Norman D. Humphrey. University of Minnesota Press, Minneapolis, 1957. 159 pp. \$3.25.

Prehistoric Man. A. Leroi-Gourhan. Philosophical Library, New York, 1957. 129 pp. \$4.75.

Recent Progress in Hormone Research, vol. XIII. Proceedings of the Laurentian Hormone Conference 1956. Gregory Pinus, Ed. Academic Press, New York, 1957. 654 pp. \$12.80.

Survey of Biological Progress, vol. III. Bentley Glass, Ed. Academic Press, New York, 1957. 345 pp. \$7.50.

Synthetic Methods of Organic Chemistry, vol. 11. W. Theilheimer, Ed. Karger, Basel; Interscience, New York, 1957. 510 pp. \$20.

Tables of Angular Distribution Coefficients for Light-Scattering by Spheres. Chiao-Min Chu, George C. Clark, Stuart W. Churchill. Engineering Research Institute, University of Michigan, Ann Arbor, 1957. 58 pp. \$3.

Biology of the Treponematoses. Based on studies carried out at the International Treponematoses Laboratory Center of Johns Hopkins University under the auspices of the World Health Organization. WHO Monogr. Ser. No. 35. Thomas B. Turner and David H. Hollander. World Health Organization, Geneva, 1957. 278 pp. \$6.

The Development and Meaning of Eddington's 'Fundamental Theory.' Including a compilation from Eddington's unpublished manuscripts. Noel B. Slater. Cambridge University Press, Cambridge, Mass., 1957. 311 pp. \$7.50.

Fall Out. Radiation hazards from nuclear explosions. A. Pirie. MacGibbon & Kee, London, 1957. 160 pp. 12s. 6d.

Fenestella from the Permian of West Texas. Geological Society of America Memoir 70. M. K. Elias and G. E. Condra. Geological Society of America, New York, 1957. 167 pp.

General Zoology. Tracy I. Storer and Robert L. Usinger. McGraw-Hill, New York, ed. 3, 1957. 670 pp. \$7.50.

Handbuch der Physik, vol. XXVIII, *Spectroscopy II.* S. Flügge, Ed. Springer, Berlin, 1957. 454 pp. DM. 98.

The A-B-C of Electrons, Atoms, and Molecules. Their mechanical actions and functions and their simple ratios in mathematical terms. Frank X. Graser. Greenwich, New York, 1957. 104 pp. \$3.

Advances in Pest Control Research, vol. I. R. L. Metcalf, Ed. Interscience, New York, 1957. 521 pp. \$11.

L. P. Alford and the Evolution of Modern Industrial Management. William J. Jaffe. New York University Press, New York, 1957. 387 pp. \$5.

Quantitative Organic Analysis. James S. Fritz and George S. Hammond. Wiley, New York; Chapman & Hall, London, 1957. 316 pp. \$6.

The Relativistic Gas. J. L. Synge. North-Holland, Amsterdam: Interscience, New York, 1957. 119 pp. \$4.50.

Rheumatoid Arthritis. A definition of the disease and a clinical description based on a numerical study of 293 patients and controls. Charles L. Short, Walter Bauer, William E. Reynolds. Published for The Commonwealth Fund by Harvard University Press, Cambridge, Mass., 1957. 490 pp. \$7.

Semiconductors. Their theory and practice. G. Goudet and C. Meuleau. Translation by G. King of *Theorie et Pratique des Semiconducteurs.* MacDonald & Evans, London, 1957 (order from Essential Books, Fair Lawn, N.J.). 334 pp. \$18.90.

Set Theory. Felix Hausdorff. Translated from the German, ed. 3, by John R. Aumann et al. Chelsea, New York, 1957. 352 pp. \$6.

Soil-Plant Relationships. C. A. Black. Wiley, New York; Chapman & Hall, London, 1957. 339 pp. \$7.

A Student's Histology. H. S. D. Garven. Livingston, Edinburgh, 1957. 662 pp.

Miscellaneous Publications

(Inquiries concerning these publications should be addressed, not to Science, but to the publisher or agency sponsoring the publication.)

Analysis and Operational Research. Two series of papers reprinted from *Research*, vol. 9, 1956. Butterworths, London, 1957 (order from Interscience, New York). 69 pp. \$2.50; 40 pp. \$2.

An Archaeological Survey of West Central New Mexico and East Central Arizona. Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University, vol. 44, No. 1, Edward Bridge Danson. 133 pp. \$4.50. *A Chancay-Style Grave at Zapallan, Peru.* An analysis of its textiles, pottery, and other furnishings. Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University, vol. 50, No. 1. S. K. Lothrop and Joy Mahler. 38 pp. \$2.50. *Peabody Museum of Archaeology and Ethnology, Harvard University, Ninetieth Report.* 55 pp. Peabody Museum, Cambridge, Mass., 1957.

Atomic Energy Commission, Twenty-second Semiannual Report. U.S. Atomic Energy Commission, Washington, D.C., 1957. 257 pp.

The Birds of Isla Coiba Panama. Smithsonian Misc. Coll., vol. 134, No. 9. Alexander Wetmore. 105 pp. *Music of Acoma,*

Isleta, Cochiti and Zuni Pueblos. Bureau of American Ethnology Bull. 165. Frances Densmore. 117 pp. \$0.70. Smithsonian Institution, Washington, D.C., 1957 (order from Supt. of Documents, GPO, Washington, D.C.).

Colloque de Topologie Algébrique. Held at Louvain 11-13 June 1956. Centre Belge de Recherches Mathématiques. Thone, Liège; Masson, Paris, 1957. 190 pp. Paper, F. 3000.

Current Expenditures per Pupil in Public School Systems: Large Cities, 1955-56. Circ. No. 500. Lester B. Herlihy and Joel Williams. Office of Education, Washington 25, D.C., 1957 (order from Supt. of Documents, GPO, Washington 25). 25 pp. \$0.15.

European Organization for Nuclear Research, Second Annual Report. European Organization for Nuclear Research, Geneva, 1957. 71 pp.

Expert Committee on Biological Standardization, Tenth Report. WHO Tech. Rept. Ser. No. 127. World Health Organization, Geneva, 1957 (order from Columbia University Press, New York 27). 35 pp. \$0.30.

Human Protein Requirements and Their Fulfillment in Practice. Proceedings of a conference in Princeton, N.J. (1955). Sponsored jointly by the Food and Agriculture Organization of the United States (F.A.O.), World Health Organization (WHO), and Josiah Macy, Jr., Foundation, New York. J. C. Waterlow and Joan M. L. Stephen, Eds. John Wright, Bristol, England, 1957. 193 pp. \$2.

An Introduction to Electromyography. Fritz Buchthal. Gyldendals Forlagstrykkeri, København, 1957. 43 pp.

New Tables of Mie Scattering Functions for Spherical Particles, pt. 3, *Values of Amplitude Functions am and bm for Refractive index $n=1.44$ and for size Parameters $\alpha=0(0.1)30$.* Geophysical Research Papers, No. 45. ASTIA Document No. AD-98769. Rudolf Penndorf and Bernice Goldberg. Geophysics Research Directorate, Bedford, Mass., 1957 (order from U.S. Dept. of Commerce, Office of Technical Services, Washington, D.C.). 251 pp.

Bibliography of Research Reports Issued by the Biophysics Branch. ASTIA Document No. AD 126361. Margaret Siegfried. Wright Air Development Center, Wright-Patterson Air Force Base, Ohio, 1957 (order from ASTIA Document Service Center, Knott Building, Dayton 2, Ohio). 14 pp.

South African Council for Scientific and Industrial Research, Eleventh Annual Report 1955-1956. The Council, Pretoria, Union of South Africa, 1957. 214 pp.

Statistical Tables for Use with Binomial Samples—Contingency Tests, Confidence Limits, and Sample Size Estimates. Donald Mainland, Lee Herrera, Marion I. Sutcliffe. Department of Medical Statistics, New York University College of Medicine, New York 1957. 83 pp. \$2.

The Western Apache Clan System: Its Origins and Development. University of New Mexico Publ. in Anthropology, No. 9. Charles R. Kaut. University of New Mexico, Albuquerque, 1957. 99 pp. \$2.



STUDENT MICROSCOPES

Most reasonably priced **GUARANTEED**
Microscope on the market.

Made in West Germany

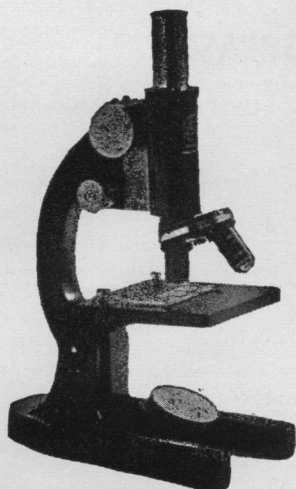
NEW DESIGN
EXCLUSIVE
SAFETY FEATURES
HIGH QUALITY OPTICS
10X OCULAR
OBJECTIVES
16mm (10X) N.A. 0.27
4mm (44X) N.A. 0.66

STILL \$118.00
TEN YEAR GUARANTEE

Write for catalogue
listing safety features

10% Discount on 5 or more.
Models may be assorted to obtain this discount

TRANSPORTATION
INCLUDED

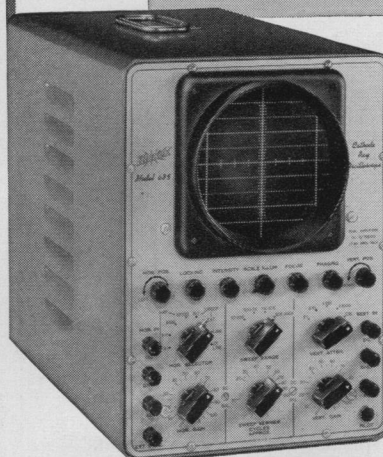


THE GRAF-APSCO CO.

5868 BROADWAY

CHICAGO 40, ILL.

HICKOK



5-INCH
Cathode Ray
Oscilloscope
Model 685

Identical Horizontal and
Vertical Amplifiers.

Sensitivity: 20 MV RMS
per inch.

Frequency: 0-750 KC.

Pulse: 0.5 microseconds.
(Also available with Sensitivity of 10 MV RMS per inch with frequency coverage of 0-500 KC.)

Frequency compensated
attenuators in 4 ranges of 1 to 1 thru 1000 to 1.

Sweep: Recurrent or triggered. 1 cps to 100 KC in 5 calibrated decade ranges with vernier control. Provision for external capacitors for very slow sweep rates. On special order, capacitors are built-in to obtain sweep speed as slow as 10 seconds. For slower rates, size of capacitors requires external mounting. Internal or external locking.

Illuminated Calibrated Screen: Backed with a green filter to reduce reflections. Astigmatic focus control.

Write today for complete technical details. **\$345. Net**

THE HICKOK ELECTRICAL INSTRUMENT COMPANY
10534 DUPONT AVENUE • CLEVELAND 8, OHIO

*Enthusiastically accepted by clinical
laboratories all over the world—*

Sigma's New Colorimetric Procedure for SERUM GO- and GP- TRANSAMINASE operates at 480 to 530 mμ

ENTIRE PROCEDURE REQUIRES ONLY 4 SIMPLE STEPS!

1. Add 0.2 ml serum to 1 ml Prepared Substrate at 37° or 40°C.
2. After 60 minutes, add 1 ml Color Reagent (wait only 30 minutes after determining SGP-T).
3. After 20 minutes at room temperature, add 10 ml 0.4N NaOH.
4. After 30 minutes more, read vs water at approximately 505 mμ.

MINIMUM KIT (100 Determinations) Stock No. 505—\$13.50
For SGP-T add substrate, Stock No. 505-51—\$6.00

DOES NOT REQUIRE an ultraviolet spectrophotometer
or deproteinization with T.C.A., or centrifuging, or
extraction with Toluene as in other published methods.

**DO NOT CONFUSE THIS PROCEDURE
WITH OTHER COLORIMETRIC METHODS
THAT ARE OF QUESTIONABLE ACCURACY**

**SATISFACTION WITH THE SIGMA PROCEDURE
IS ABSOLUTELY GUARANTEED.**

Write for our Bulletin #505

Call Sigma for
reagents for any
Transaminase
Procedure

Certainly the procedure of choice for SERUM PHOSPHATASE

SIGMA 104 PHOSPHATASE SUBSTRATE
(p-Nitrophenyl Phosphate, Sigma Grade)

100 DETERMINATIONS, Complete Kit, #104 —\$ 9.30
200 DETERMINATIONS, Complete Kit, #104A—\$13.00

Complete trial kit #104S available gratis
(40 acid or alkaline determinations)

Ask for Bulletin #104

NEW! TECHNICAL BULLETIN #500

The Original Berger-Broida
COLORIMETRIC PROCEDURE FOR
SERUM LACTIC DEHYDROGENASE
at approximately 500 mμ.

Catalog available on request offering the world's most
complete list of high purity nucleotides

PHONE COLLECT: DAN BROIDA



SIGMA CHEMICAL COMPANY

3500 DeKalb STREET, ST. LOUIS 18, MO., U.S.A.
MANUFACTURERS OF THE FINEST BIOCHEMICALS AVAILABLE

St. Louis,
Missouri
Office: PR 1-5750
Home: WY 3-6418



direct-reading
syringe **MICROBURET**
over 99% accurate



**INTERCHANGEABLE SYRINGES SPEED
MULTIPLE SAMPLE ANALYSIS**

One SB-2 Buret stand gives you the service of an infinite number of Microburets simply by changing syringes for desired volume delivery or reagent. Mechanical control through calibrated gauge. No mercury!

Syringes available with volume deliveries of 0.2 to 5.0 μ l per division.

Request Bulletin SB-2

micro-metric instrument co.
P. O. Box 884 Cleveland 22, Ohio

ἀπιεζον

... from the Greek
meaning "without pressure"

**APIEZON ...
OILS
WAXES
GREASES**

These Apiezon products have the recognition of leading scientists who accord them top preference for high vacuum work. Because of the exceedingly low vapor pressure of all these oil distillates, at usual room temperatures, they are in great demand for all sorts of high vacuum work. Their vapor pressures are as low as 10^{-6} mm. Hg., and even unmeasurable at room temperature.

As the exclusive distributor in the United States, we offer immediate delivery from stock on the complete range of these oils and compounds.

JAMES G. BIDDLE CO.

Electrical and Scientific Instruments
1316 Arch Street—Philadelphia 7, Penna.

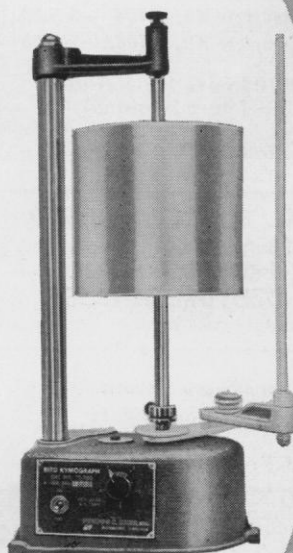
For applications, working
characteristics and
list prices, write for
Bulletin 43-S.



B627

BIRD

KYMOGRAPH



A motor driven recording drum that is very suitable for students' use and also for general experimental work.

The driving mechanism consisting of an induction motor and a gear box, is housed in the aluminum base. Five speeds are provided—they are 0.44, 2.2, 11, 54 and 270 centimeters per minute. Care has been exercised to provide speeds that will be suitable for all student experiments. Any one of the five speeds may be selected at will, by rotating the speed control knob to the desired position while the motor is running. The chart drum (aluminum) is 15 cm. high and 50 cm. in circumference.

A special feature of this kymograph is the convenient provision for attaching the long paper extension (No. 70-128) to the base. The base is drilled and tapped for attaching the extension. This may be accomplished by removing the two acorn nuts and attaching the drilled end plate to the base. Paper records 225 cm. in length may be made.

Another special feature is an accessory which provides for the mounting of instruments on a swinging bracket which may be rotated concentrically with the recording drum shaft. The bracket, clamp nut and support rod are illustrated under No. 70-112.

No. 70-060 Kymograph-
Bird, complete as
illustrated

PHIPPS & BIRD, INC.

Manufacturers & Distributors of Scientific Equipment
6th & Byrd Streets - Richmond, Va.

