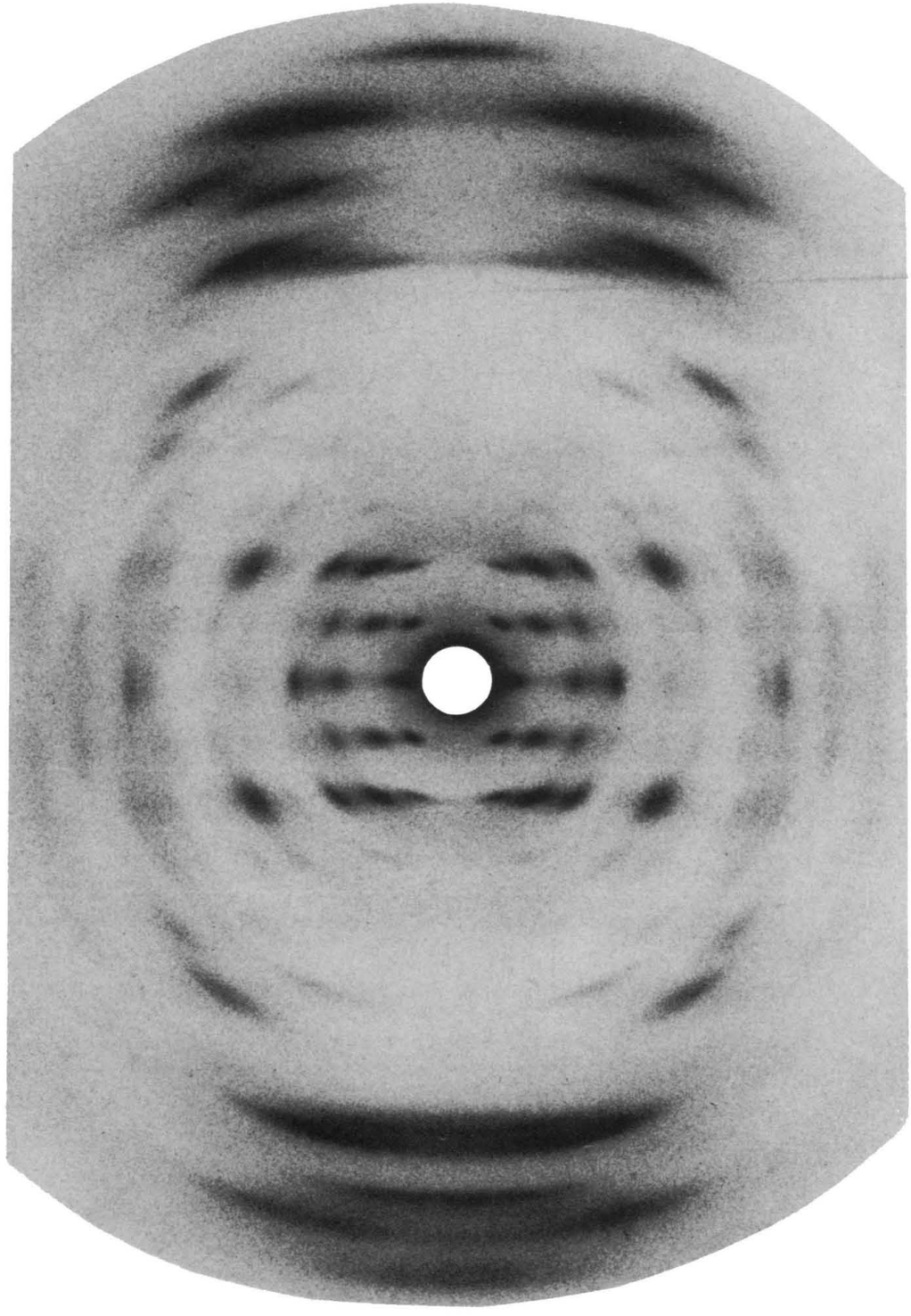
SCIENCE

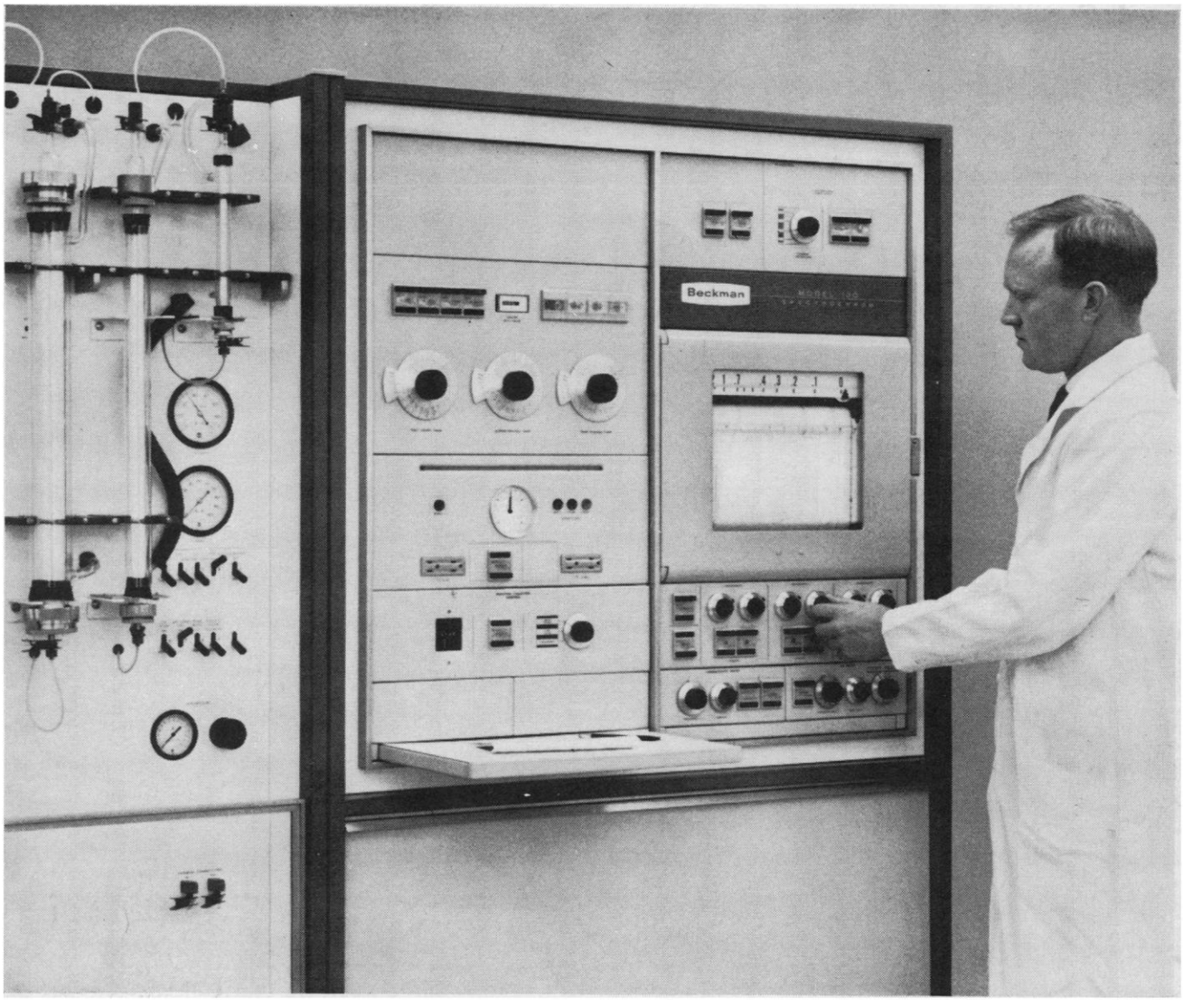
23 August 1963

Vol. 141, No. 3582

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



RNA FROM REOVIRUS



The New Beckman Model 130 Spectrochrom™ Analyzer

Automated Column Chromatography–in One Console

Snap-in columns
Gradient pump
Continuous flow spectrophotometer
Recorder
Fraction collector
pH and conductivity monitors

For the busy investigator–here is a complete column chromatography console–the Spectrochrom Analyzer. It is at once an experimental laboratory which allows you to select the conditions you wish for chromatography of proteins, nucleoproteins, nucleic acids–*and* when you have found the best conditions–it becomes a routine instrument you program for automatic reproducible runs.

The Spectrochrom Analyzer contains all the systems you need for column chromatography: a gradient system to program the desired gradient curve and flow rates; interchangeable fractionating columns which snap in place in seconds; a spectrophotometer to monitor continuously at any three wavelengths from 215 mμ through the visible region; pH and conductivity monitors; a multi-channel recorder to show the results and conditions of the run; a refrigerated 250-tube fraction collector, and all the other components for automatic programmed operation.

Best of all, the Spectrochrom Analyzer is backed by Beckman service. Our field engineers install the Spectrochrom Analyzer, train your operator, provide a year's service without additional cost. For more information on this new way to take full advantage of column chromatography in your research program, write for Data File 130-5

Beckman INSTRUMENTS, INC.

SPINCO DIVISION
Palo Alto, California

INTERNATIONAL SUBSIDIARIES: GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND.

New Programed Texts to Ease Learning in Problem Areas of Chemistry

New! Carnell and Reusch— MOLECULAR EQUILIBRIUM

This is one of the first programed courses in Chemistry for freshmen. It is the initial unit of *General Chemistry*, by Carnell and Reusch, which will consist of 12 to 14 separate units. *Molecular Equilibrium* presents at a rigorous yet workable level one of the subjects freshmen students have found most difficult to grasp. With this program the student can spend more time at self-study. At his own pace, progressively and successfully building his knowledge of the subject, he substantiates each bit of additional information as he goes along. He constructs his responses to a question stimulus, is reinforced in his correct responses, and thus proceeds step-by-step. The authors completely cover the subject in such sections as: *Reversible and Irreversible Reactions; Static vs. Dynamic Equilibrium; Heterogeneous Reactions; Stress; The Role of the Catalyst; Le Chatelier's Principle—etc.* A complete problem section at the end of the book tests comprehension. This course was widely tested in over a dozen schools and with more than 200 students.

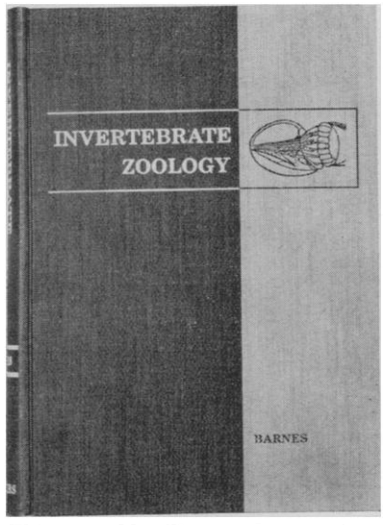
By PAUL H. CARNELL, Ph.D., Albion College, Albion, Michigan; and ROSETTA N. REUSCH, Ph.D. About 208 pages, 7¼" x 10", illustrated. About $2.50. *New—Just Ready!*

New! Christensen— pH and DISSOCIATION

Here is a unique programed instruction for students of the biological sciences. It is designed to help the reader acquire a firm understanding of the association and dissociation of the hydrogen ion in aqueous solutions. It sets forth information in small sequential steps, and requires correct written responses to questions before proceeding to the next frame. The student secures an immediate feedback as to the quality of his comprehension, and thus builds his knowledge step-by-step. After about 7 hours of study the reader can expect to reach a level where he can calculate the pH of buffer systems, select indicators and buffers for various applications, interpret the titration curves of multifunctional compounds, predict the electrophoretic behavior and interactions of protein molecules, and understand the buffering by biological systems and the sensitivity of biological events to the pH. The author presumes only a minimal acquaintance with pH, logarithms, indicators, titration, stoichiometry and structural chemistry.

By HALVOR N. CHRISTENSEN, Ph.D., Professor of Biological Chemistry, and Chairman of the Department, the University of Michigan. 60 pages, 7¼" x 10¼", illustrated. About $1.75. *New—Just Ready!*

Two Recent Texts on Modern Concepts of Zoology

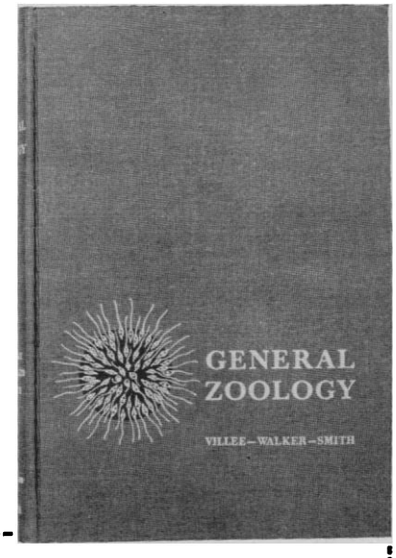


Barnes—INVERTEBRATE ZOOLOGY

Designed for upper division college courses, this text requires at least one year's background in biology or zoology. Both East and West Coast fauna are covered. The author discusses anatomy, physiology, ecology, and taxonomy of each individual phylum. Groups are considered systematically, correlated to the others through their phylogenetic relationships. Dr. Barnes examines each group from a general standpoint, avoiding distorted and narrow concepts often produced in students through overemphasis upon one "representative" species. However, those invertebrates commonly used as laboratory specimens are referred to throughout the text, familiarizing the student with the particular characteristics of those forms. Chapters include: *Protozoans, Coelenterates, Nemerteans, Mollusks, Lophophorate Coelomates, the Lesser Deuterostomes, etc.* Systematic resumes of various phyla, classes, orders, and sub-classes are scattered throughout. The book is lavishly illuminated with 490 illustrations.

By ROBERT D. BARNES, Ph.D., Professor of Biology, Gettysburg College, Pa. 632 pages, 7¼" x 10¼", 490 illustrations. $10.00. *Published February, 1963!*

Villee, Walker, Smith— GENERAL ZOOLOGY



This superbly illustrated text gives the student a sound understanding of modern zoology. Recent teaching trends are reflected and the latest knowledge of cell structure and function is incorporated into the chapters on cell metabolism, nervous coordination, and biomechanical genetics. The authors offer a skillful blend of broad biologic principles and thorough examination of representative species. Progressive studies are devoted to the physiologic mechanisms common to all animals: respiration, locomotion, digestion, reproduction, etc. Separate chapters deal with each of the major invertebrate phyla, and the vertebrates are introduced by a detailed study of the frog as representative. Both vertebrate and invertebrate sections point out habitat, mode of life, and role in the biologic community of the groups studied. Whether you open your course with a study of a vertebrate such as the frog, or a consideration of the amoeba, this flexible text will suit your needs. It is designed for a one year or one semester course at the freshman or sophomore level.

By CLAUDE A. VILLEE, Harvard University; WARREN F. WALKER, JR., Oberlin College; and FREDERICK E. SMITH, University of Michigan, 848 pages, 6½" x 9¾", with 468 illustrations. $8.50. *Second Edition—Published February, 1963!*

Gladly Sent to College Teachers on Approval

W. B. SAUNDERS COMPANY West Washington Square, Phila. 5, Pa.

Saunders Books

Please send and bill me:

☐ Carnell & Reusch—*Molecular Equilibrium*....About $2.50 ☐ Barnes—*Invertebrate Zoology*...$10.00

☐ *Christensen—pH & Dissociation*..About $1.75 ☐ Villee, Walker, Smith—*General Zoology*....$ 8.50

Teaching Position.....

Name..... Address.....Sc 8-23-63

23 August 1963
Vol. 141, No. 3582

SCIENCE

EDITORIAL BOARD
DAVID M. BONNER, MELVIN CALVIN, ERNEST COURANT, FARRINGTON DANIELS, JOHN T. EDSALL, DAVID R. GODDARD, ALEXANDER HOLLAENDER, ROBERT JASTROW, KONRAD B. KRAUSKOPF, EDWIN M. LERNER II, WILLARD F. LIBBY, NEAL E. MILLER

EDITORIAL STAFF
Editor PHILIP H. ABELSON
Publisher DAEL WOLFLE
Business Manager HANS NUSSBAUM
Managing Editor: ROBERT V. ORMES. Assistant Editor: ELLEN E. MURPHY. Assistant to the Editor: NANCY TEIMOURIAN.
News and Comment: DANIEL S. GREENBERG, JOHN R. WALSH, ELINOR LANGER, MARION Y. KLINE. Book Reviews: SARAH S. DEES.

ADVERTISING STAFF
Director: EARL J. SCHERAGO
Production Manager: RAYMONDE SALAMA
Sales: New York, N.Y., 11 W. 42 St.: RICHARD L. CHARLES, ROBERT S. BUGBEE (212-PE-6-1858)
Old Bridge, N. J., 3 Woodcrest Dr.: C. RICHARD CALLIS (201-257-3448)

SCIENCE is published weekly by the American Association for the Advancement of Science, 1515 Massachusetts Ave., N.W., Washington 5, D.C. Now combined with **The Scientific Monthly** ®. Second-class postage paid at Washington, D.C. Copyright © 1963 by the American Association for the Advancement of Science. Annual subscriptions $8.50; foreign postage, $1.50; Canadian postage, 75¢; single copies, 35¢. School year subscriptions: 9 months, $7; 10 months, $7.50. Provide 4 weeks' notice for change of address, giving new and old address and zone numbers. Send a recent address label. Opinions expressed by authors are their own and do not necessarily reflect the opinions of the AAAS or the institutions with which the authors are affiliated. Indexed in the **Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PHILIP M. MORSE
COLIN S. PITTENDRIGH
KENNETH S. PITZER
DeWITT STETTEN, JR.
WILLIAM L. STRAUS, JR.
EDWARD L. TATUM
JOHN R. WINCKLER
CLARENCE M. ZENER

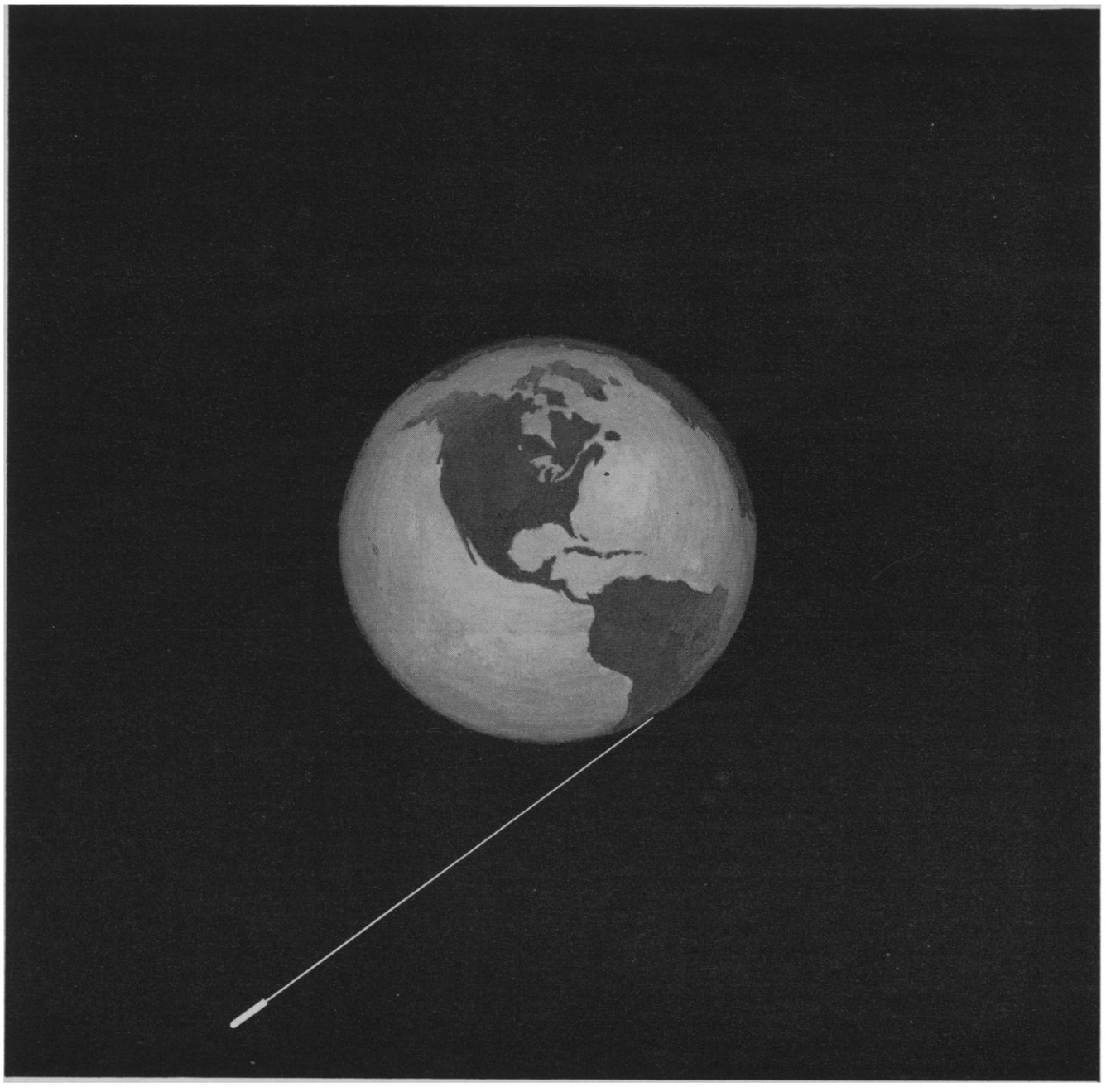
Editorial Assistants: ELEANORE J. BUTZ, GRAYCE A. FINGER, NANCY S. HAMILTON, VIRGINIA HAMILTON, OLIVER W. HEATWOLE, ANNE D. HOLDSWORTH, SHELLEY MANN, EDGAR C. RICH, JOHN E. RINGLE, HARRIET WILLIAMS, EVA WOO.
Staff Assistants: VIRLINDA M. GIBSON, LILLIAN HSU, BARBARA J. SHEFFER.

Chicago, Ill., 6 W. Ontario St.: HERBERT BURKLUND (312-DE7-4973)
Los Angeles 45, Calif., 8255 Beverly Blvd.: WINN NANCE (213-653-9817)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., N.W., Washington 5, D.C. Phone: 202-DU 7-7171. Cable: Advancesci, Washington. Manuscripts should be submitted in triplicate, double-spaced throughout. The AAAS assumes no responsibility for the safety of manuscripts. Copies of "Instructions for Contributors" can be obtained from the editorial office.
ADVERTISING CORRESPONDENCE: Room 1740, 11 West 42 St., New York 36, N.Y. Phone 212-PE 6-1858.

COVER

X-ray diffraction pattern of a fiber drawn from the sodium salt of RNA extracted from reovirus. The RNA molecule thus appears to be a double-stranded helix differing in configuration from DNA. Although all other RNA diffraction patterns are similar, they show far less orientation and crystallinity. Hence, the definition of the structure of reovirus RNA should apply to double helical RNA from all sources. See page 694.



Some of our work is "out of this world!"

More and more of our sterilization work for NASA will be "out of this world." Space probes, equipment, satellites, interplanetary vehicles . . . all will be sterilized to prevent earth-type contamination from being transferred into space or to other planets. Castle also does an excellent job setting up sterilization programs for various industries right here on earth. Our know-how and equipment have provided positive sterilization for thousands of items, from adhesive bandages to photographic film. Remember, sterilization ideas *start* with Castle. For more information on our Contract Sterilization, and Process Development plans, write to the Wilmot Castle Company, 1732 E. Henrietta Road, Rochester 18, New York.

Castle *Subsidiary of Ritter Company Inc.*

THIS ANALYZER CAN DO YOUR JOB

WE WOULD LIKE TO PROVE IT

CONTACT US

FOR A DEMONSTRATION

Radiation Instrument Development Laboratory
4501 West North Avenue • Dept. 783
Melrose Park, Illinois
Please contact me to arrange a demonstration:

Name_____

Organization_____

Title_____ Phone_____

Address_____

_____

RIDL

Radiation Instrument Development Laboratory

4501 WEST NORTH AVENUE • MELROSE PARK, ILLINOIS • 681-2323 • CABLE: RADILAB • TWX: 312-681-3448

DIVISION OF NUCLEAR-CHICAGO CORPORATION

TITRIGRAPH

For recording Titration Curves
For Use as a Recording pH Stat

SBR2
RECORDER

TTT-1
AUTOMATIC TITRATOR

SBU1
SYRINGE BURETTE
UNIT

The new Radiometer Titrigraph has a wide field of application in pH and buffering studies, and in enzymatic and protein investigations or any other studies requiring maintenance of constant pH in reaction solutions.

The TTT-1 Automatic Titrator is noted for its stability and flexibility in the performance of automatic titrations, and as a precise pH meter. Combined with the new SBR2 Recorder and the SBU1 Syringe Burette units, it can automatically draw and record titration curves, or act as a pH stat to record titrant consumption as a function of time under conditions of constant pH.

As a Titrigraph, the Recorder is unique in adapting itself to the slope of the titration curve and closely controlling titrant flow where the curve becomes steep. As a pH stat, remarkable stability permits studies of up to several days' duration with a wide choice of chart speeds and burette delivery rates.

A precise and versatile instrument designed and produced in the Radiometer tradition.

Write for descriptive literature and complete specifications — you will find prices most attractive.

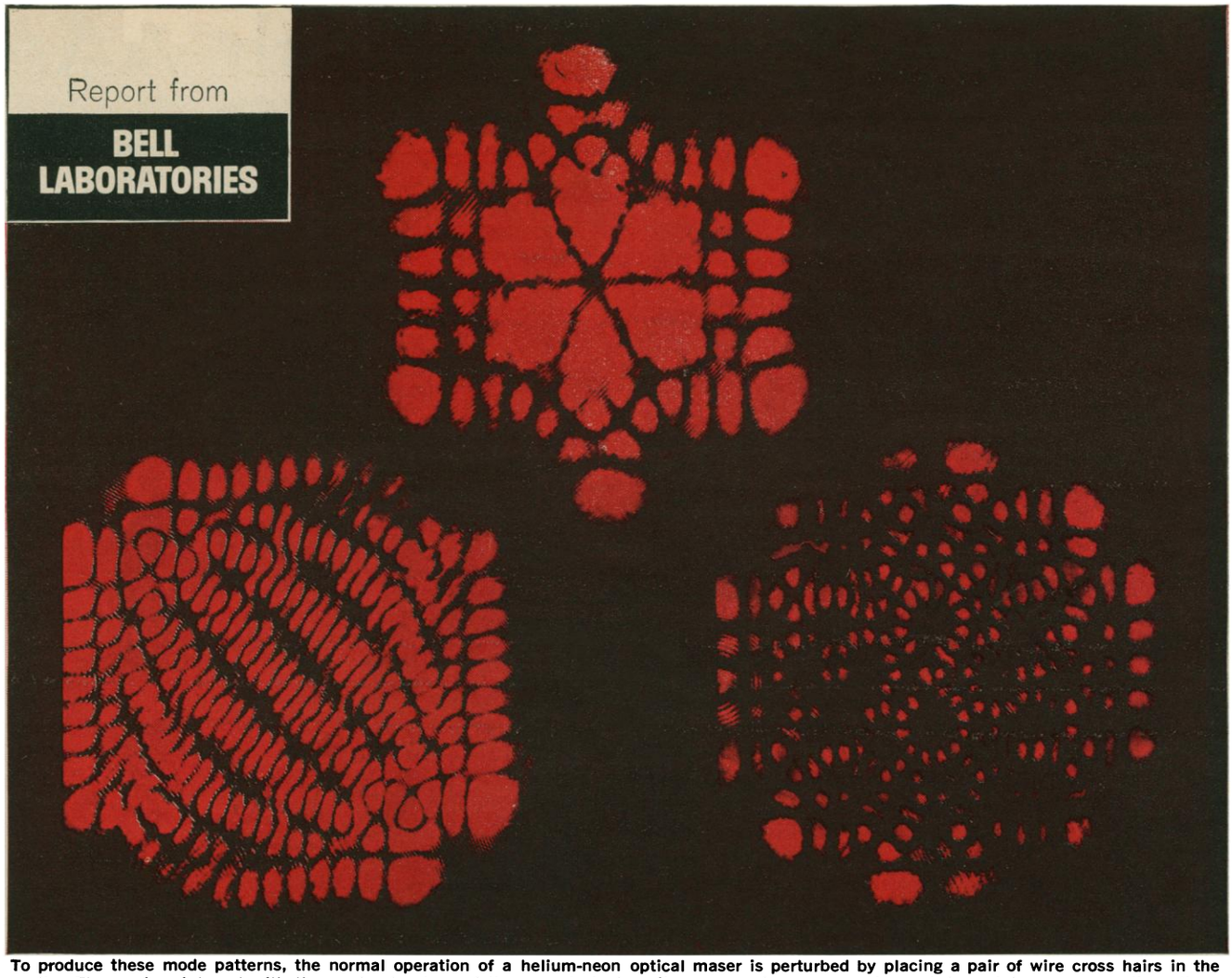
SOLD AND SERVICED IN U.S.A. BY
THE LONDON COMPANY
3355 Edgecliff Terrace CLEVELAND 11, OHIO

RADIOMETER
72 Emdrupvej COPENHAGEN, DENMARK

In Canada: Factory representatives Bach-Simpson Limited; sold and serviced by Canadian Laboratory Supplies Limited

Report from

BELL LABORATORIES



To produce these mode patterns, the normal operation of a helium-neon optical maser is perturbed by placing a pair of wire cross hairs in the cavity. These wires interact with the mode structure of the unperturbed cavity, suppressing some modes and, in certain cases, coupling others together. By changing the angle between the cross hairs, this interaction can be altered and different mode patterns, as shown, can be produced.

A STEADILY GROWING FAMILY OF OPTICAL MASERS

Scientists at Bell Telephone Laboratories are continuing extensive research programs to gain increased knowledge about optical maser (laser) action. The immediate goal of these investigations is more complete understanding of the phenomenon itself. In the long run, however, this knowledge will help us to evaluate better the communications applications.

One aspect of optical maser research is the study of the mode structures in laser cavities. The modes excited in a particular experiment can be identified by mode patterns, shown above, produced by directing the emergent beam onto a photographic plate.

Optical maser research at Bell Laboratories has resulted in a broad new field of radiation science. For instance, discovery of gas lasers also provided the first continuously operating laser. The active medium in this device is a mixture of helium and neon; its operation depends on the excitation of neon atoms by collision with excited helium atoms. Originally, this system emitted infrared light, but recently it has been made to produce visible red and yellow light.

More recently, in another significant advance, our scientists have discovered two other new mechanisms for creating maser action in gases. One depends on the dissociation of oxygen molecules in mixtures of oxygen and neon or argon. The other takes place in pure noble gases—helium, neon, argon, krypton and xenon—and depends on a direct transfer of energy from accelerated free electrons to the gas atoms.

With these mechanisms and various gases or gas mixtures, we have achieved maser action at approximately 150 different wavelengths extending from 0.594 microns in the yellow region of the spectrum to 34.5 microns in the far infrared—and more are in prospect.

BELL TELEPHONE LABORATORIES

World center of communications research and development

Terminal Tower

CLEVELAND • 130th AAAS

Order Your General Program

It provides complete, detailed information about all the sessions and symposia scheduled, the Annual Exposition of Science and Industry, and the Science Theatre.

Program Highlights

Moving Frontiers of Science A. M. Gleason on nature and direction of current mathematical research; Gordon J. F. MacDonald on deep structure of continents and ocean basins; A. L. Schawlow on infrared optical masers; V. G. Dethier on biology of behavior.

Interdisciplinary Symposia AAAS day: Uses of lasers and masers; philosophical aspects of present-day cosmogony and cosmology; developmental aspects of immunity; biological and sociological research on the effects of human reproduction control; the federal government, science, and the universities.

Special Sessions AAAS Presidential Address by Paul Gross; the AAAS Distinguished Lecture by J. K. Galbraith; the Joint Address of Sigma Xi and Phi Beta Kappa by Paul Sears; the George Sarton Memorial Lecture by Hudson Hoagland; and the National Geographic Society Illustrated Lecture.

Other General Events Three-session symposium on Japanese science sponsored jointly by the Science Council of Japan and the AAAS. Two symposia sponsored by the Office of Economic and Statistical Studies of the National Science Foundation: Planning and administration of scientific research programs, and nontechnical aspects of instrumentation and equipment in research and development.

AAAS Committees Sessions of the Cooperative Committee on the Teaching of Science and Mathematics, the Committee on Science in the Promotion of Human Welfare, and perhaps others.

Sections and Societies The 20 AAAS Sections and some 70 participating societies are scheduling specialized symposia, and many have sessions for contributed papers.

Science Theatre The latest foreign and domestic films.

Exposition The Annual Exposition of Science and Industry is conveniently located adjacent to the Ballroom on the mezzanine of the Sheraton-Cleveland.

Advance Registration By registering in advance, you avoid delay at the Registration Center on arrival, you receive the *General Program* in time to plan your days at the meeting, and your name is posted in the Visible Directory of Registrants when the meeting opens.

Use the coupon below for advance registration or to order your advance copy of the *General Program*.

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

(Check 1a or 1b)

1a. ☐ Enclosed is $5.00 Advance Registration Fee. This brings me the **General Program** and Convention Badge.

1b. ☐ Enclosed is $3.00 for the **General Program.** (If I attend the meeting, the badge, which I need to obtain the privileges of the meeting, will cost me $2.00 more.)

2. FULL NAME (Dr., Miss, etc.) .....
(Please print or typewrite) (Last) (First) (Initial)

3. OFFICE ☐ OR HOME ☐ ADDRESS .....
(For receipt of General Program)

4. ACADEMIC, PROFESSIONAL, OR BUSINESS CONNECTION .....

CITY ..... STATE ..... ZIP CODE .....

5. FIELD OF INTEREST .....

6. CONVENTION ADDRESS .....
(May be added later, after arrival)

Please mail this coupon and your check or money order for the total amount to the AAAS.

MEETING • 26-30 DECEMBER

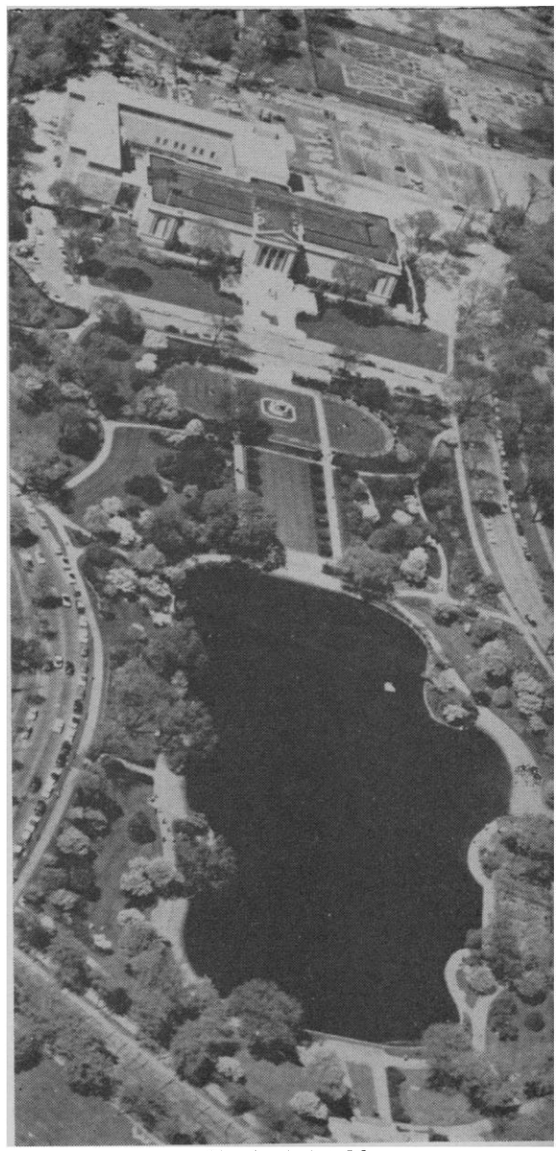
Reserve Your Hotel Room

Make sure you have the accommodations you prefer. A list of headquarters hotels of participating societies appears on page 280, 19 July, SCIENCE. The AAAS headquarters is the Sheraton-Cleveland.

The hotels for the AAAS Cleveland meeting have established special, low flat rates and have reserved large blocks of rooms for the meeting.

Use the coupon below to make your hotel reservation in Cleveland. Send your application to the AAAS Housing Bureau in Cleveland, not to any hotel. Give a definite date and estimated hour of arrival, and also probable date of departure. The Housing Bureau will make the assignment and send you a confirmation in two weeks or less.

A rollaway bed can be added to any room at $3.00 per night. Mail your application now to secure your first choice of accommodations.



Cleveland Art Museum

HOTEL RATES*
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

For a list of the headquarters of each participating society and section, see page 280, *Science*, 19 July.

Hotel	Single Bed	Double Bed	Twin Beds	Suites
Sheraton-Cleveland	$8.50	$14.00	$15.50	$33.00—$60.00
Statler-Hilton	8.50	14.00	15.50	28.00— 59.00
Manger	7.50	13.00	14.50	25.00— 35.00
Pick-Carter	7.50	13.00	14.50	32.50— 60.00
Auditorium	5.50—10.50	8.50—12.50	12.50—13.50	

* All rooms are subject to a 3% Ohio state sales tax.

AAAS Housing Bureau
511 Terminal Tower
Cleveland, Ohio, 44113

Date of Application .....

Please reserve the following accommodations for the 130th Meeting of the AAAS in Cleveland, 26–30 December 1963

First Choice Hotel ..... **Second Choice Hotel** ..... **Third Choice Hotel** .....

Type of room: Single ☐ Double ☐ Double, twin beds ☐ Suite ☐ Rates: Desired ..... Maximum .....

Number in party..... Sharing this room will be: .....

(List name and address of each person, including yourself. Attach list if space is insufficient.)

.....

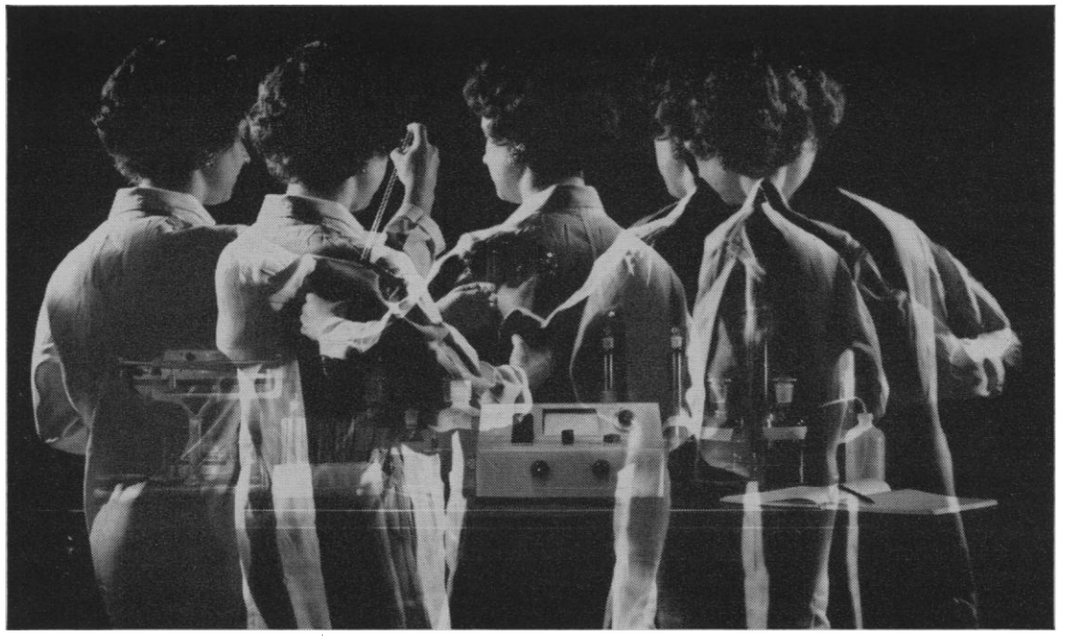
.....

DATES: ARRIVAL ..... A.M. .....P.M.....**DEPARTURE** .....
(These must be indicated—add approximate hour, A.M. or P.M.)

NAME .....
(Individual requesting reservation) (Please print or type)

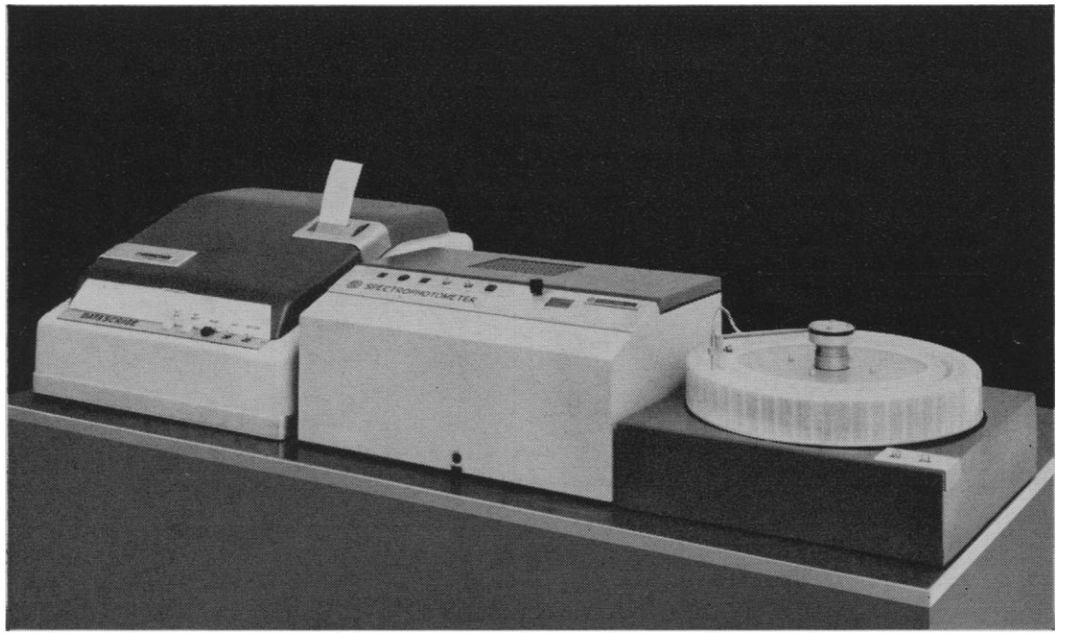
ADDRESS .....
(Street) (City) (State) (ZIP Code)

Mail this coupon now to the Housing Bureau. Rooms will be assigned and confirmed in order of receipt of reservation.



In spectrophotometry, would you prefer six chances for error...

or none?



☐ **RSCo's NEW AUTOMATED SPECTROPHOTOMETRY SYSTEM** eliminates the chance of human error. Simply load the turntable. Push the button labeled START. RSCo automation does the rest. ☐ Our fully automated spectrophotometry system presents each sample (up to 52 of them), measures light absorbance, converts this measurement to constituent concentration, and prints the result opposite an identifying sample number. Automatically. Unattended. Without operator variability. ☐ Three separate units make up the system: The Automatic Turntable, Programmed Operation Spectrophotometer, and DATA-SCRIBE™ Printing Converter. Components of the system may also be purchased for semi-automatic operation or for use with other instruments. ☐ Want to improve your lab's productivity, reduce expenses, and get more reliable results? Please write. We'd like to send you detailed information.

RESEARCH SPECIALTIES CO.

200 SOUTH GARRARD BLVD. • RICHMOND, CALIFORNIA

What's so different about the Vanguard Model 1000 volumatic fraction collector?

A Only the Vanguard Model 1000 Volumatic Fraction Collector is completely transistorized, completely self-contained. Thanks to transistorization, you're assured of absolute reliability in performance. This reliability even extends to cold-room environments where temperature often causes erratic operation or complete instrument failure.

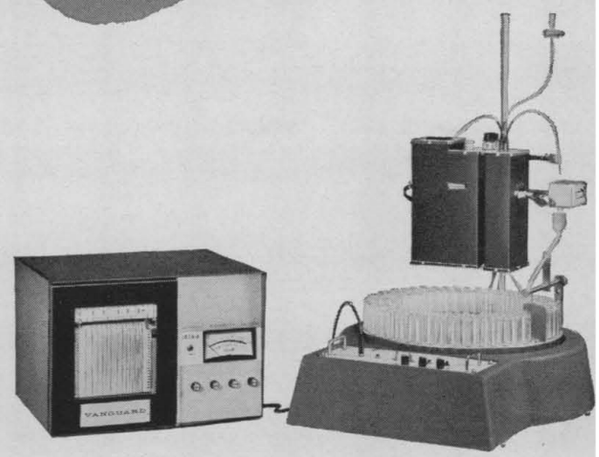
Q. How does the Vanguard Volumatic Fraction Collector affect hold-up and mixing?
A. In volumetrically controlled separations, hold-up and mixing are virtually eliminated between fractions.

Q. How is this reduction possible?
A. The Model 1000 uses a unique system of repetitive cuts for a single sample, in conjunction with a photo-electric sensing device. It actually collects from one to ten times the siphon volume in each test tube. You simply dial the number of times you want the siphon filled and discharged into each test tube.

Q. Is the Model 1000 compact and portable?
A. Vanguard's Model 1000 is highly compact. Specifically: 25″ wide, 30″ long and 6″ high. So, you make maximum use of laboratory and cold-room space. The Volumatic weighs less than 50 lbs. Yet, because the instrument cabinet is cast aluminum, you get the strength and rigidity needed for large columns and ancillary equipment.

Q. Any other facts?
A. Interchangeable turntables for 13mm, 15mm and 18mm test tubes are standard accessories. There's a complete selection of siphons. For increased versatility, a time and drop counting plug-in unit is available.

Q. Where can I get more information?
A. For complete information about the Model 1000, write: Vanguard Instrument Company, Box 244, LaGrange, Illinois.



Shown above are Vanguard's all new Model 1056-A Automatic UV Analyzer and Model 1000 Volumatic Fraction Collector.

VANGUARD

VANGUARD INSTRUMENT COMPANY
Designers and Manufacturers of Precision Instrumentation for Research
P. O. Box 244, LaGrange, Illinois, FLeetwood 2-1600 • Regional Offices: New York, N. Y., 520 Fifth Avenue, TN 7-1998
San Francisco, Calif., 115 Montgomery Street, EXbrook 2-0511 • Baltimore 2, Maryland, 217 North Calvert Street, 301-727-3666

GME

MODEL M5P MINI-POLYGRAPH

- *Fully modular*
- *2 to 5 channels*
- *Rectilinear recording*
- *Simultaneous 8″ servo and other records on one graph*
- *Compact versatility—up to 4 chopper, ECG, or EEG channels in any assortment —up to 2 servos...for a total of 5 channels*

- Each channel a complete, self-contained interchangeable unit
- One or two servos may be used, writing the full width of 8″ chart. Sensitivity up to 6 millivolts full scale, traverse time approximately 1 second
- Chopper amplifiers, for pressure or force with a Statham transducer, or for temperature with a thermistor bridge. Include Zener diode regulated power supply for bridge. May also be used as stable high gain DC amplifiers
- Time and event markers included
- Rectilinear recording — simple and reliable linkage with only two moving parts
- Transducers plug in directly — no extra power supply or pre-amplifiers needed
- Ease of record analysis — the servo record is on the same chart as other records (EEG, ECG, pressure, etc.) — all on 8″-wide fan-folded paper with millimeter square marking
- Anti-clogging inking system
- Instantaneous speed change without gear shifting — 6 speeds
- Rugged and sturdy construction

MODEL M8PM FULLY MODULAR 8-CHANNEL MACRO-POLYGRAPH AVAILABLE

GILSON MEDICAL ELECTRONICS

MIDDLETON, WISCONSIN

On Madison's West Beltline Highway

23 August 1963, Volume 141, Number 3582

SCIENCE

American Association for the Advancement of Science

BOARD OF DIRECTORS

Paul M. Gross, *Retiring President, Chairman*
Alan T. Waterman, *President*
Laurence M. Gould, *President Elect*

Henry Eyring — Mina Rees
John W. Gardner — Walter Orr Roberts
H. Bentley Glass — Alfred S. Romer
Don K. Price — H. Burr Steinbach

Paul E. Klopsteg, *Treasurer* — Dael Wolfle, *Executive Officer*

VICE PRESIDENTS AND SECRETARIES OF SECTIONS

MATHEMATICS (A)
Magnus R. Hestenes — Wallace Givens
PHYSICS (B)
Elmer Hutchisson — Stanley S. Ballard
CHEMISTRY (C)
Milton Orchin — S. L. Meisel
ASTRONOMY (D)
Paul Herget — Frank Bradshaw Wood
GEOLOGY AND GEOGRAPHY (E)
John C. Reed — Richard H. Mahard
ZOOLOGICAL SCIENCES (F)
Dietrich Bodenstein — David W. Bishop
BOTANICAL SCIENCES (G)
Aaron J. Sharp — Harriet B. Creighton
ANTHROPOLOGY (H)
David A. Baerreis — Eleanor Leacock
PSYCHOLOGY (I)
Lloyd G. Humphreys — Frank W. Finger
SOCIAL AND ECONOMIC SCIENCES (K)
Kingsley Davis — Ithiel de Sola Pool
HISTORY AND PHILOSOPHY OF SCIENCE (L)
Adolph Grünbaum — N. Russell Hanson
ENGINEERING (M)
Clarence E. Davies — Leroy K. Wheelock
MEDICAL SCIENCES (N)
Francis D. Moore — Oscar Touster
DENTISTRY (Nd)
Paul E. Boyle — S. J. Kreshover
PHARMACEUTICAL SCIENCES (Np)
Don E. Francke — Joseph P. Buckley
AGRICULTURE (O)
A. H. Moseman — Howard B. Sprague
INDUSTRIAL SCIENCE (P)
Alfred T. Waidelich — Allen T. Bonnell
EDUCATION (Q)
H. E. Wise — Herbert A. Smith
INFORMATION AND COMMUNICATION (T)
Foster E. Mohrhardt — Phyllis V. Parkins
STATISTICS (U)
Harold Hotelling — Morris B. Ullman

PACIFIC DIVISION

Phil E. Church, *President* — Robert C. Miller, *Secretary*

SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

Edwin R. Helwig, *President* — Marlowe G. Anderson, *Executive Secretary*

ALASKA DIVISION

Allan H. Mick, *President* — George Dahlgren, *Executive Secretary*

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.

The Same Old Gang?

The complaint is sometimes heard that the advisory boards and committees responsible for major scientific activities of the federal government consist of the same old gang of insiders and that the members are too far removed from their days of active participation in the fields they represent.

In the sense of knowing a good deal about what is going on, the members are insiders, and desirably so; plans and policies for the most effective use of the large amounts of money involved should be in the hands of knowledgeable people. Yet there is also a planned and substantial turnover in the membership of these bodies. Of the 17 members of the President's Science Advisory Committee when that body was given its present status in 1957, only 2 have continued to serve to the present time; 2 others were rotated off and later reappointed. Of the 24 members of the National Science Board of 6 years ago, only 7 are still serving. The Defense Science Board, which advises the Director of Defense Research and Engineering, has 27 members, of whom only 5 were serving 6 years ago, and 2 of the 5 are ex officio representatives of other federal agencies. Membership on the advisory councils to the National Institutes of Health is routinely for a 4-year term, without immediate reappointment.

There is also an unofficial apprenticeship system. Some members of the National Science Board earlier served as members of a divisional advisory committee. A record as an effective adviser to one of the military services usually precedes appointment to the Defense Science Board. Experience on an NIH study committee can provide good training for membership on one of the NIH councils.

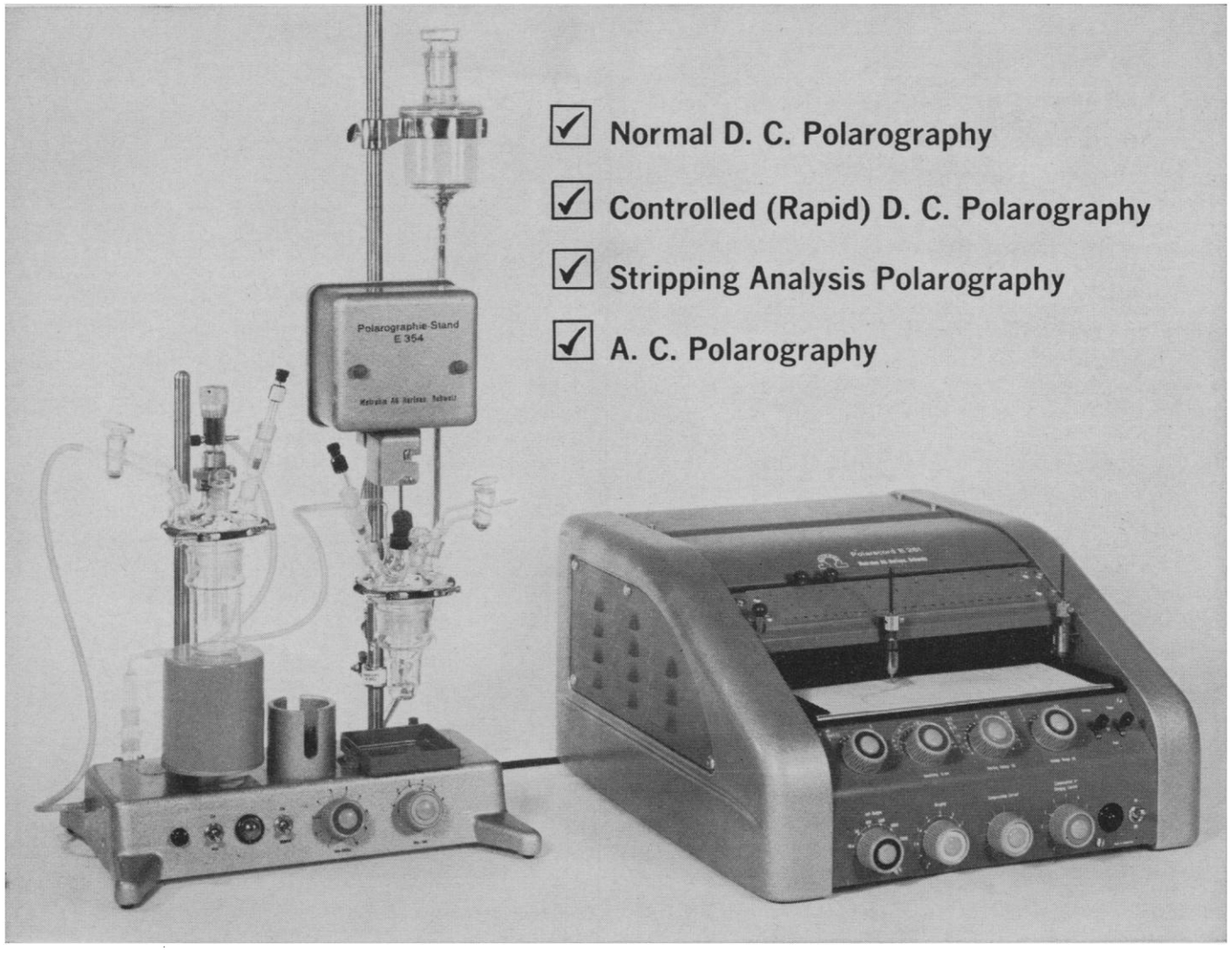
Through such apprenticeships, experienced men are brought into the highest councils. Through systematic rotation, the membership constantly changes. But there is still the charge that the average age is too high. It often is. Members of the National Science Board average about 59, and members of the Defense Science Board, 57. The President's Science Advisory Committee has the better average of 49.

The present group of members of major scientific advisory boards is partly a heritage of World War II. That period brought into government service a large number of scientists whose experience and interest quite naturally led to their continued use as government advisers. Now a new generation is ready to replace them, and there is thus an opportunity for deliberate selection of members to cover a wider age range.

Deliberate action will be necessary, for most methods of election and appointment favor men who are widely known and older. One technique that has occasionally been used is to ask each "senior" member of an important, policy-making committee to name a "junior" deputy. The junior need not and usually would not be so widely known as his senior, but usually he would be closer to the laboratory. This technique might improve the work of the committees. Clearly it would provide a larger group of experienced and still comparatively young prospects for appointment to the major boards and councils.

Whatever the means, such boards need both members who have attained considerable experience in handling large responsibilities and members who are close enough to the laboratory to know what is appearing over the research horizons. The gradual retirement of veterans of World War II research activities provides an opportunity to move deliberately toward better balance.—D.W.

RECORDING POLAROGRAPHIC ANALYZER



The Polarecord E 261-R is the only instrument currently available which can be applied to the various polarographic methods now developed because it provides the chart-speeds, voltage scan speeds, mechanical systems, and compensation facilities necessary for effective use of these procedures. The equipment illustrated is all that is required for Normal, Rapid or Stripping Analysis Polarography—and permits the determination of concentrations to 10^{-9} Molar. For A. C. Polarography, an auxiliary power supply is offered.

Recently, new analytical procedures based on the use of our exclusive controlled (rapid) forced dropping mercury electrode have been developed by major U.S. chemical laboratories using the Polarecord. For complete current technical information and descriptive literature, please contact:

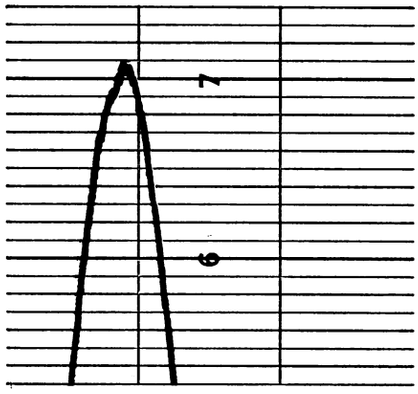
METROHM

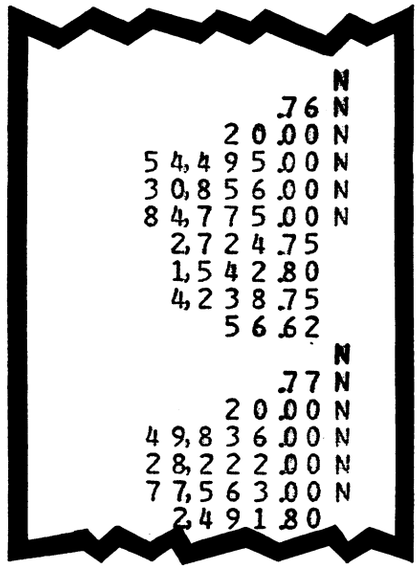
BRINKMANN INSTRUMENTS, INC.
115 Cutter Mill Road, Great Neck, N. Y.

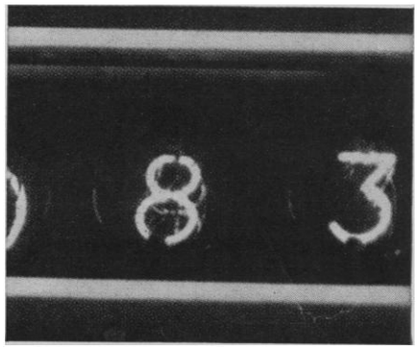
PHILADELPHIA · CLEVELAND · HOUSTON · MIAMI · MENLO PARK, CAL. · ST. LOUIS

Collect accurate data in less time with these reliable Nuclear-Chicago instruments

The instruments shown here can satisfy many of your needs in radioactivity counting equipment. Whether you want a simple gas-flow detector or an automatic spectrometry system, Nuclear-Chicago offers an instrument to do the job reliably, conveniently, accurately, and efficiently. Consult your Nuclear-Chicago sales engineer for information.

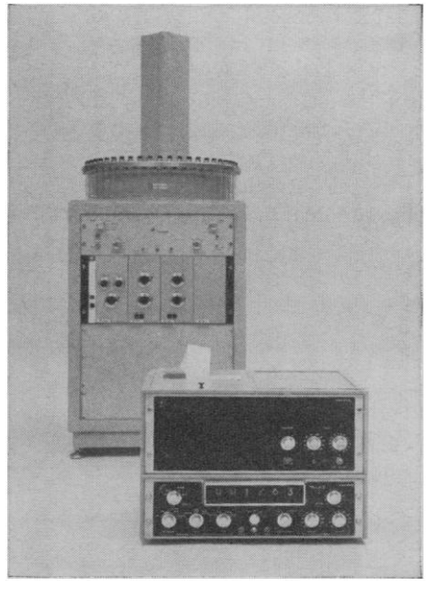




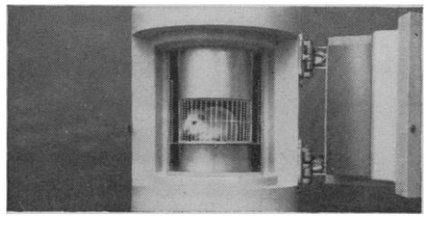


Gamma counting

Gamma emitting isotopes can be analyzed faster and with better precision using Nuclear-Chicago manual or fully automatic gamma counting systems. These advanced systems are designed around high-efficiency scintillation detectors. They are available with a wide variety of pulse-height spectrometers engineered specifically for gamma discrimination. The lead shielding supplied is more than adequate to maintain a low background level.



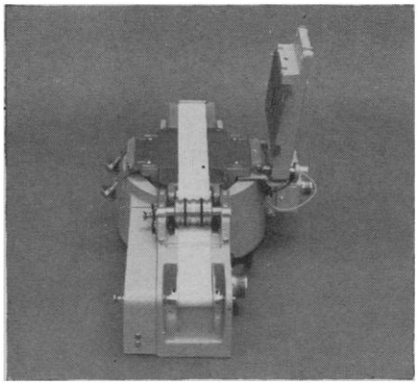
Model 1070 Sample Changer featured with Nuclear-Chicago automatic gamma counting systems is designed for small-volume solid or liquid samples. It handles up to 50 samples in bottles or test tubes and is available in systems with 2-inch or 3-inch crystal well scintillation detectors. Also offered in this reliable line of gamma counting systems is a wide variety of solid-state analyzer and monitoring instrumentation, including single or dual channel analyzers and single or dual scaler/timer combinations.



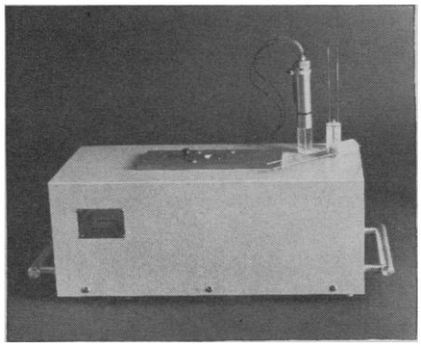
Tobor is the practical solution to many of your gamma-counting problems especially if your samples vary in volume or if they are as large as laboratory animals and human forearms. Measurements with Tobor are highly reproducible because counting efficiency is uniform over a wide range of sample volumes. Sodium iodide crystals or plastic scintillators up to seven inches in diameter can be furnished.

Radiochromatography

The data producing capabilities of analytical radiochromatography now can be expanded through the use of Nuclear-Chicago's new systems for qualitative and quantitative determinations. These versatile systems detect and record radioactivity in paper, thin-layer, liquid-column, or gas chromatography procedures.



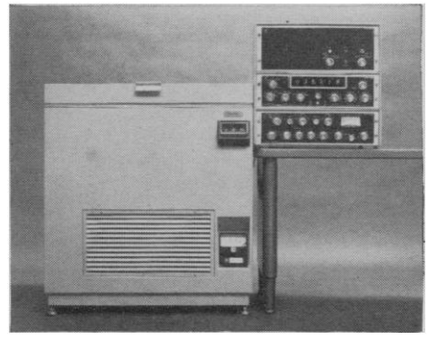
Model 1032 Actigraph is the only strip chromatogram scanner that offers 4-pi detecting geometry with a choice of window or windowless operation. By scanning both sides of the strip, the Actigraph virtually doubles the sensitivity of the 2-pi method and delivers correspondingly higher resolution. Efficiencies of 10% for carbon-14 and 2% for tritium can be obtained with a background of 15 counts per minute or less. For thin-layer chromatography techniques an adapter kit, Model 1039, is available for use with Actigraph systems. This low-cost assembly permits automatic scanning of the 2-inch-wide glass plates used in thin-layer studies.



Chroma/Cell bench top detector systems automatically and continuously monitor the radioactive effluent of a liquid chromatography column. Efficiencies are as high as 28% to 40% for carbon-14 and 1% to 2.5% for tritium; background rates are low. Data presentation options include fast digital print-out and analog recording with choice of linear or logarithmic ratemeters and single-channel, dual-channel, or integrating graphic recorders. Chroma/Cell detectors are also available separately for use with your present Nuclear-Chicago Liquid Scintillation Spectrometer.

Liquid scintillation counting

The new Series 6700 LiquidScintillation Systems permit routine, accurate counting of any sequence of carbon-14 and tritium samples with differential efficiencies as high as 78% and 40% respectively. These systems offer important time-saving conveniences: fast data print-out, automatic calculation of counts per minute and channels ratios, large capacity sample changer, and selective sample programming.

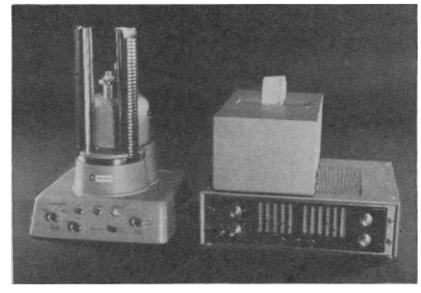


Models 6724 and 6725 are automatic systems with controlled-temperature chambers that maintain optimum counting environment for up to 150 samples. A solid-state, three-scaler/timer provides preset time, preset count, or time/count.

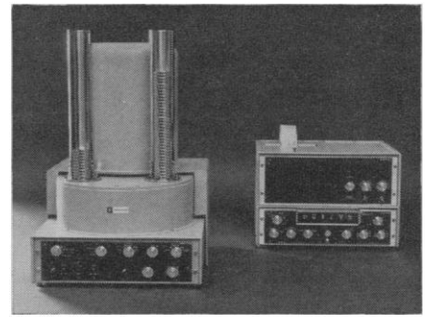
Model 6746 is an economical, single-scaler three-channel system that delivers high counting efficiency in room temperature operation. The compact single scaler/timer supplied with this 50 sample automatic system provides time and count print-out and can be used with other Nuclear-Chicago automatic equipment.

Automatic planchet counting

Nuclear-Chicago's automatic planchet counting systems for solid-phase beta emitting isotopes insure precise geometrical reproducibility for every sample. Each system is offered with monitoring instruments that provide fast digital read-out of time, count, and sample number, as well as automatic calculation of counts per minute.



Proved reliability has established Mode 1040 as the most widely accepted automatic changer for samples of 1¼ inch diameter or smaller. This instrument will handle over 70 samples, and it can be operated with a windowless or thin-window gas-flow detector. Included in the read-out options available with 1¼ inch planchet systems is the Model 8710 Decade Scaler. This versatile new instrument offers sample number, time, and count print-out at a modest price.



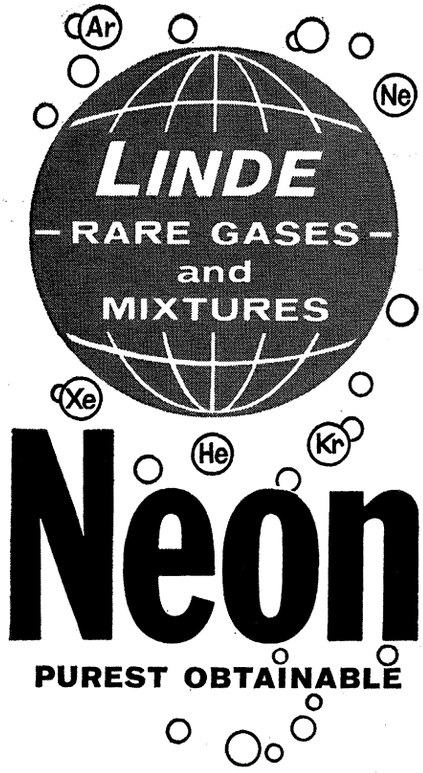
Low specific activity beta samples require minimum background rates for best accuracy. Nuclear-Chicago's new Spectro/Shield systems effectively deliver this accuracy by reducing net background to approximately one count per minute. The detector can be operated in either the window or windowless mode. Spectro/Shield's automatic changer accommodates up to 150 samples as large as 2 inches in diameter.

DEPENDABLE SERVICE EVERYWHERE

nuclear-chicago CORPORATION

349 East Howard Avenue, Des Plaines, Illinois • Telephone 312 827-4456

SALES OFFICES: New York, Boston, Washington, Philadelphia, Atlanta, Chicago, Minneapolis-St. Paul, Cleveland, Dallas, Los Angeles, San Francisco, Denver, Toronto, and throughout the world



PURER OBTAINABLE

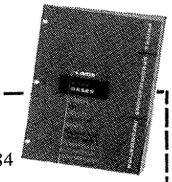
ALL YOU NEED

—from the foremost producer of atmospheric gases!

- **Produced under continuous mass spectrometer control.**
- **Fast nationwide delivery.**
- **Guaranteed ultra-high purity.**
- **Scientifically blended and tested mixtures for any need.**
- **Quality based on more than 50 years of rare gas know-how.**
- **Complete technical service.**

SEND FOR NEW 20-PAGE ONE-SOURCE RARE GAS BOOKLET

First comprehensive price and specification list for all rare gases and mixtures . . .



CLIP COUPON—ATTACH TO BUSINESS LETTERHEAD

Rare Gases, Dept. SC-84
Linde Company
Division of Union Carbide Corporation
270 Park Avenue, New York 17, N. Y.

☐ Please send a copy of your booklet listing prices, specifications, and information on LINDE Rare Gases.

☐ Have a representative contact me.

LINDE COMPANY UNION CARBIDE

"Linde" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

to C'3a, C'3c, and C'3b described by Nelson *et al.* An additional factor, C'3d, has also been described. This terminology, therefore, is complicated because it reflects both the behavior of these factors on DEAE-cellulose chromatography and the order in which they were discovered. Thus, the symbols bear no relationship to the sequence of action of the various factors. The committee was charged with the task of resolving these nomenclature problems on the basis of experimental evidence. It was agreed that the present symbols should be replaced by C'3, C'5, C'6, and C'7 when the members of the committee reach agreement concerning the identity and sequence of action of the several C'3 factors now recognized.

The meeting was sponsored by the Immunology Section, Diagnostic Research Branch, of the National Cancer Institute. It was attended by 84 persons. This report was prepared after consultation with the participants.

HERBERT J. RAPP
TIBOR BORSOS

National Institutes of Health,
National Cancer Institute,
Diagnostic Research Branch,
Bethesda 14, Maryland

Note

1. Complement (C') is a group of naturally occurring macromolecular serum factors which interact with antigen-antibody complexes. If the antigen (S) on the surface of an erythrocyte (E) is in combination with specific antibody (A), the complex (SA), or in cellular terms, EA, can interact with C' and as a result the cell is destroyed. The C' components act in the sequence C'1, C'4, C'2, C'3. The third component (C'3) is not a single factor. EAC'1 is a complex produced by interacting EA and C'1, similarly complexes reacting further in the sequence are designated EAC'1,4, EAC'1,4,2, and so forth. A cell which has reacted with A and all the components of C' is designated E*. Cells in the state E* release their hemoglobin at a rate dependent on temperature. In molecular terms, the symbol E is replaced by the symbol S. R_1, R_2, R_3, and R_4 refer to sera so treated that C'1, C'2, C'3, and C'4, respectively, are lacking. Terms beginning with the symbol β refer to components identified by immunoelectrophoretic analysis. See also E. A. Kabat and M. M. Mayer, *Experimental Immunochemistry* (Thomas, Springfield, Ill., ed. 2, 1961).

Thirst: Regulation of Body Water

Scientists representing many disciplines focused their attention on a common problem, water intake in the regulation of body fluids, at a conference held at Florida State University, Tallahassee, 1–3 May.

In the opening address E. R. Adolph (Rochester) discussed terminology, quantitative relations between water deficit and drinking, the history of these concepts, and the evolution of modern experimental methods. As there is no "unique stimulus" for drinking, Adolph emphasized the need to specify and determine the relationships between the multiple factors related to drinking and the regulation of volume and dilution in the animal body. The emphasis on the remarkable differences in water intake between species and among individuals was amplified by Hudson's (Rice) comprehensive treatment of water regulation in desert mammals and Cade's (Syracuse) analysis of water and salt balance in granivorous birds. The multiple-factor concept of the determination of water intake was confirmed by much of the evidence presented.

Minimal water requirements under conditions of heat and work were discussed by Henschel (U.S. Public Health Service, Cincinnati, Ohio). Although difficult to determine because of differences in individuals, conditions of work, and environment, considerable data are available and specific recommendations can be made for a variety of situations. Several physical and chemical methods have been developed to provide an adequate supply of water under unusual environmental conditions, such as shipwreck at sea or confinement for prolonged periods in an enclosed vehicle (Sendroy, U.S.N. Medical Research Institute, Bethesda). Interactions of water, food, and temperature regulation in the monkey during short-term heat and cold stress were described by Hamilton (Veterans Administration Hospital, Coatesville, Pennsylvania).

Holmes (Colorado) demonstrated that thirst is still a serious consideration in clinical medicine where the oral factors are important determinants of fluid intake. Interactions among osmotic pressure, salivary flow, vasopressin, plasma volume, and water intake were emphasized by Towbin (VA Hospital, Little Rock). He also speculated on the role of specific "taste" afferents in the determination of fluid intake. Towbin's discussion of the role of gastrointestinal factors in the absorption of water and satiety was followed by Jacobs (Illinois, Urbana) who reported on the experimental separation of oral and gastric factors in water-food ingestion in the rat. An interesting analysis of psychogenic polydipsia emphasized that without proper tests this condition can be confused with diabetes insipidus (Falk, Michigan). Effects of propylthiouracil, thiouracil, and methimazole

WATER AND AGRICULTURE

A symposium presented at the AAAS Washington Meeting, December 1958. Published June 1960.

Roy D. Hockensmith, Editor
6 x 9, 206 pp., 21 illus., cloth
$5.00 AAAS members' cash orders, $4.50

CONTENTS

Water for the future: E. A. Ackerman, C. A. Davis, C. B. Brown, and R. L. Nace

Water sources: W. C. Ackermann, H. T. Orville, C. H. M. Van Bavel, and G. L. Barger

Water planning and use: C. H. Wadleigh, H. C. Storey, W. D. Criddle, and W. I. Palmer

Water control: T. W. Edminster, F. L. Timmons, D. L. Klingman, G. E. Harbeck, Jr., and C. B. Tanner

British agents: Bailey Bros. & Swinfen, Ltd.
Hyde House, West Central Street
London, W.C.1

American Association for the Advancement of Science
1515 Massachusetts Avenue, NW
Washington, D.C. 20005

Antimicrobial Agents and Chemotherapy-1962

—Proceedings of the Second Interscience Conference on Antimicrobial Agents and Chemotherapy

—Chicago, October 31-November 2, 1962

—Sponsored by the American Society for Microbiology

Antimicrobial Agents and Chemotherapy—1962 represents a high level of communication among microbiologists, chemists, pharmacologists, biochemists, clinicians, and pathologists. It includes basic research on the following new antibiotics: lincomycin, capreomycin, the duazomycins, the zygomycins, bluensomycin, chelocardin, and cephalothin. It reports the results of clinical trials with antifungal agents such as griseofulvin, amphotericin B, and X-5079C, as well as many others. New clinical evaluations of the tetracyclines and penicillins are given. Infectious diseases and urinary tract infections are discussed. New aspects of cancer chemotherapy are reported. Much of the information is based on original research, thus making this volume a valuable reference work for both laboratories and libraries.

Edited by: J. C. Sylvester

884 pages *$12.00* *1963*

To: AMERICAN SOCIETY FOR MICROBIOLOGY
115 Huron View Blvd.
Ann Arbor, Michigan

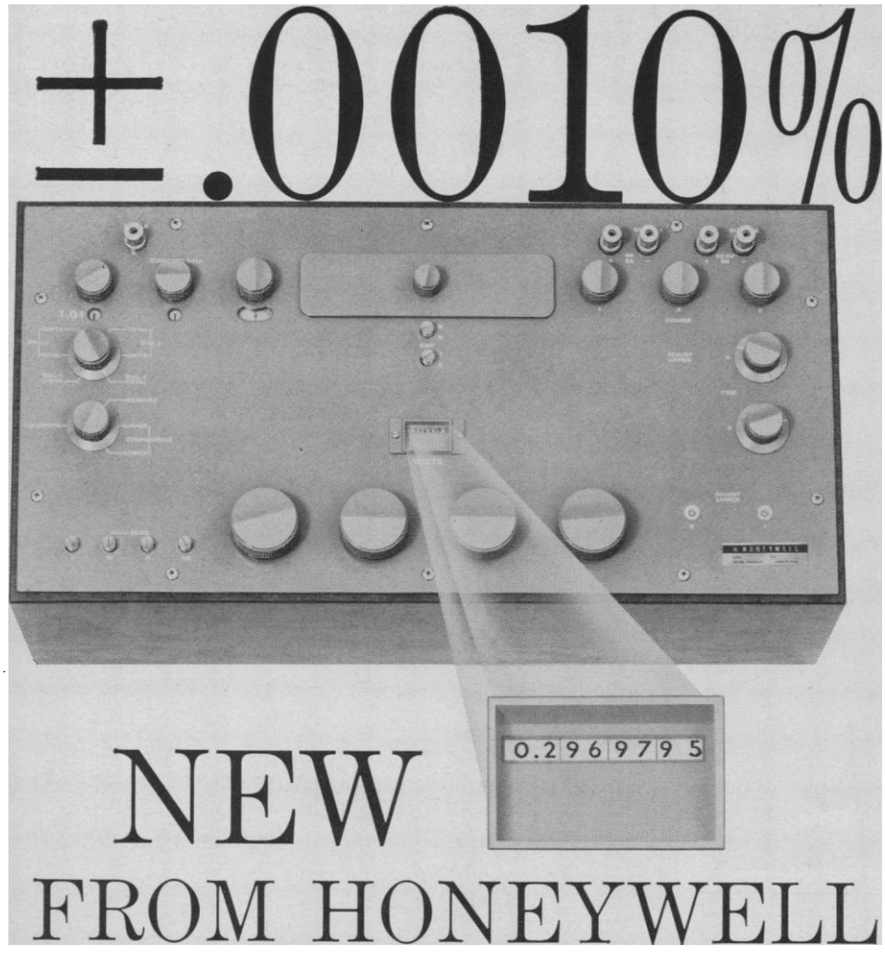
Please enter my order for ..... copy(s) of *Antimicrobial Agents and Chemotherapy—1962* at $12.00 per copy.

Please enter my order for ..... copy(s) of *Antimicrobial Agents and Chemotherapy—1961* at $10.00 per copy.

[ ] Bill me.
[ ] Payment enclosed (Make checks payable to American Society for Microbiology).

NAME_____

ADDRESS_____



THE MODEL 2802 LABORATORY POTENTIOMETER

The new Honeywell Model 2802 Laboratory Potentiometer will probably be the most accurate and easy-to-use instrument in your primary standards lab.

Calibrated accuracy of this new instrument is ±0.0010% of reading +0.1 microvolt. The range of the 2802 is from 0 to 2.0999999 volts, with only four measuring dials.

Its new improved single-window readout lets you read all eight digits without squinting or bending over the instrument. The built-in self-checking feature eliminates the chance of error that exists when you must compare one instrument with another. Both battery circuits are guarded, and the entire instrument is electrostatically shielded.

For complete specifications, contact your nearest Honeywell office or write Honeywell, Denver Division, Denver 10, Colo. In Canada: Honeywell Controls, Ltd., Toronto 17.

LABORATORY STANDARDS

Honeywell

indicate that thyroid hormone plays a role in the maintenance of renal tubular sensitivity both to antidiuretic hormone and to aldosterone. Fregly (Florida, Gainesville) suggested that the thyroid may be of greater significance in the maintenance of sodium and water balance than hitherto suspected. According to Novin (University of California at Los Angeles), insulin causes an increase in water intake and seems to be related to a reduction in extracellular volume. A relatively complete analysis of the effects of various drugs, particularly the barbiturates, on drinking was presented by Schmidt (Washington University).

The psychophysics of fluid intake and preference, isohedonic contour maps based on preference tests, and activity surfaces based on tongue contacts with a single fluid were described by Young and Trafton (Illinois, Urbana). Thirst was noted as a determinant of the reinforcing properties of various kinds of solutions (Collier, Rutgers). Adaptation to prolonged water deprivation (Kutscher, Syracuse) and the effects of consummatory behavior (Beck, Wake Forest) were reported. Campbell (Princton) discussed the effects of water and food deprivation on random activity in the rat. An increase in spinal reflex excitability associated with the intracarotid injection of hypertonic solutions was reported by Wayner (Florida, Tallahassee) and preliminary results on the central pathways involved in its mediation were presented by Ross (Syracuse).

The preoptic region plays an important role in the interaction among drinking, eating, and temperature regulatory activities (Andersson and Gale, Stockholm; Sundsten, Washington, Seattle). Effects of hypothalamic lesions on eating and drinking and the difficulty in achieving independent experimental manipulation of the pertinent variables were demonstrated by McCann and Smith (Pennsylvania), and Epstein and Teitelbaum (Pennsylvania). These support a multifactor explanation for water intake and the fact that some hypothalamic tissue is indispensible for normal regulation. The concept of "brain center" again received a number of shattering blows. The size of lesion, spread of electrical and chemical stimulation, and activity through associated neural structures and pathways were emphasized. Robinson (National Institute of Mental Health) discussed the difficulties, limitations, and statistical nature of the

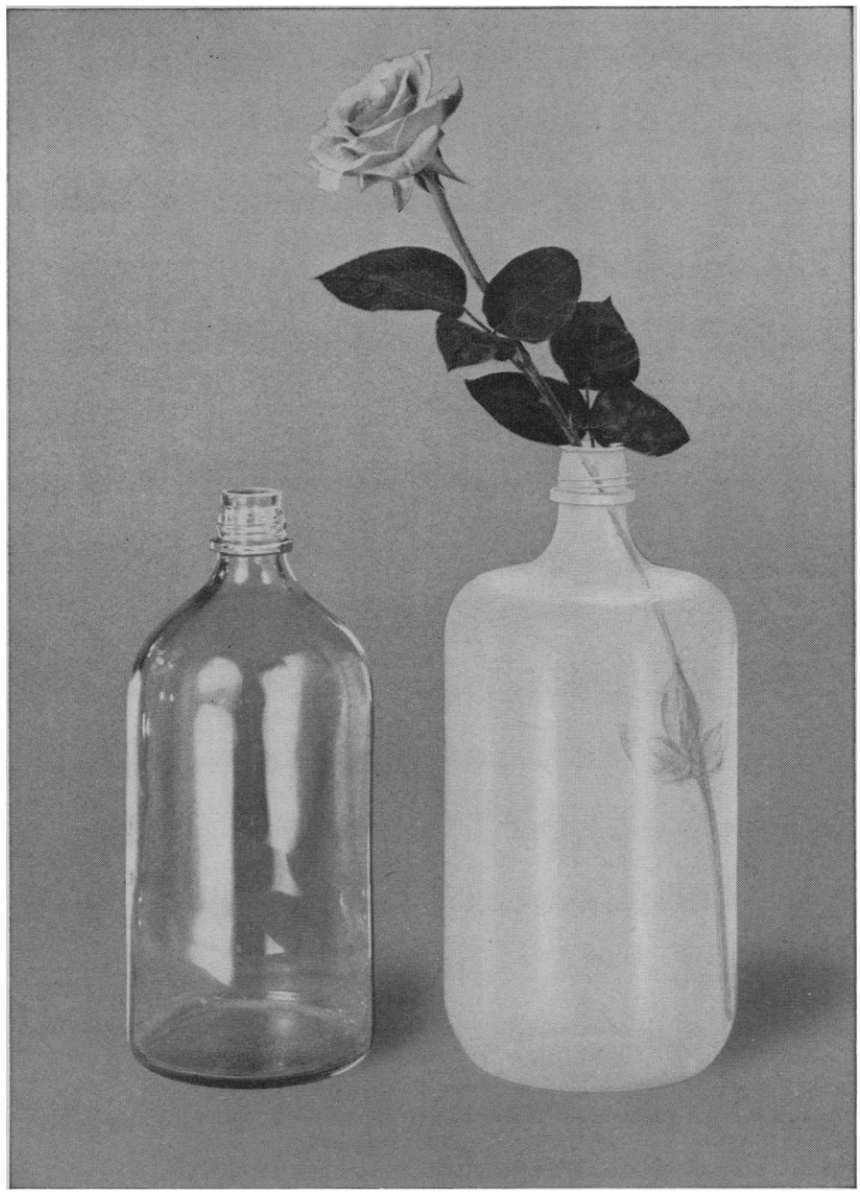
localization within specific structures in the monkey brain which affect drinking, eating, food ejection, and vomiting. He suggested a new set of organizational principles to explain these effects. The complexity of the anatomical correlates in drinking and thirst-motivated behavior was clearly illustrated by Morgane's (Brain Research Unit, Mexico City) description of the limbic-hypothalamic-midbrain structures involved in their mediation. While the subcommissural organ is involved in water-electrolyte balance (Gilbert, U.S. Air Force Hospital, Travis, Calif.), some data contradict this theory (Crow, Western Washington State).

Recent research on the neurochemical specificity of central mechanisms involved in drinking and eating was summarized by Grossman (Iowa) and Fisher (Pittsburgh). The effects of chemical stimulation have proved to be more complex than originally envisaged and indicate that the interaction between thirst and hunger may be determined centrally as well as peripherally. Repeated intracranial infusion (cerebrospinal fluid) of minute amounts of alcohol in the rat produced a permanent preference for alcohol solutions which animals had previously refused to ingest (Myers, Colgate). Stevenson (Western Ontario) summarized and reassessed the relative functions of the various hypothalamic mechanisms in drinking and the regulation of body water.

In spite of the research effort and the voluminous literature which has accumulated on drinking and the regulation of body fluids, no unifying concept or theory has evolved to explain drinking under all conditions. The results of this conference indicate that multiple factors such as osmotic pressure, solute, taste, timing, and heterologous stimuli and alimentary, nervous, and endocrine factors are involved. To borrow a few more terms from Adolph, we hope that in bringing the "sluicers" and "slicers" together we have provided the opportunity for some cross-fertilization and the germination of many ideas.

The conference was supported by the Life Sciences Division of the U.S. Army Research Office; the proceedings will be published by Pergamon Press, Inc.

MATTHEW J. WAYNER, JR.
Florida State University, Tallahassee
EUGENE M. SPORN
Life Sciences Division,
U.S. Army Research Office



THIS IS A BOTTLE

THIS IS A NALGENE® BOTTLE

And there's all the difference in the world between them. **NALGENE LABORATORY BOTTLES** are safer. They're made of unbreakable plastic. They save you the costs of breakage and replacement, the risks of injury, the loss of contents. And they're so easy to handle—as little as ⅓ the weight of glass, and non-slippery, wet or dry. Choose from the only complete line of plastic bottles developed to meet laboratory requirements—select polyethylene, Teflon® FEP, polypropylene or polycarbonate, narrow or wide mouth, natural or amber, in sizes from one ounce to thirteen gallons. Ask your laboratory supply dealer. Or write for our Catalog L-962. The Nalge Co., Inc., Dept. 2732, Rochester 2, N. Y.

NALGENE LABWARE
Leader in quality plastic labware since 1949

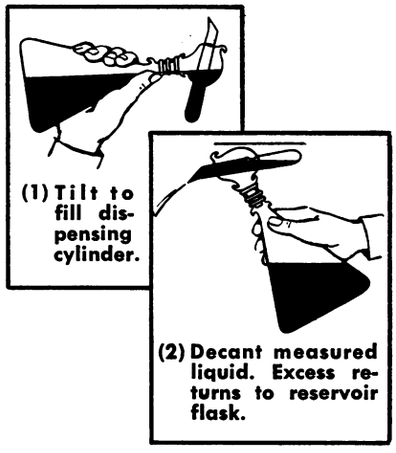
You're invited to visit our Booth No. 405, Chemical Exposition U. S. A. 1963, The New York Hilton, Sept. 10-12

New LABORATORY TIME-SAVERS by BUCHLER INSTRUMENTS

PIPETTER

Machine accuracy with a flick of the wrist!

Ingenious! Inexpensive! Accuracy better than 1% . . . equal to the reproducibility of the most costly automatic pipetting machine!



Dispensing heads (2 ml to 50 ml) plus flasks (500 ml to 1000 ml) $15.00 to $18.75

BULLETIN S 2-2000

TS CLAMPS

For SECURE holding of all commercially available standard tapered joints from TS 10/30 to TS 45/50

No more hooks and springs! No screws! Buchler stainless, corrosion-free, spring-steel clamps slip on or off with one easy motion!

ASSORTED, PACKAGE . . .

24-CLAMPS $13.50

Contains: 4 TS 10/30, 2 TS 12/30, 2 TS 14/35, 4 TS 19/38, 6 TS 24/40, 4 TS 29/42, 1 TS 34/45 & 1 TS 45/50

(Order from your laboratory supply dealer or direct from Buchler Instruments)

BULLETIN S 1-3600

BUCHLER INSTRUMENTS, INC.
LABORATORY APPARATUS PRECISION INSTRUMENTS
1327 16th Street, Fort Lee, New Jersey
Phone 201-945-1188 or call N.Y.C. direct LO 3-7844

Forthcoming Events

September

5–6. **Ellipsometer**—Measurement of Surfaces and Thin Films, Washington, D.C. (E. Passaglia, Natl. Bureau of Standards, Washington 25)

5–7. American Assoc. of **Obstetricians and Gynecologists**, Hot Springs, Va. (C. T. Beecham, 3911 Vaux St., Philadelphia 29, Pa.)

5–7. **Parapsychological** Assoc., New York, N.Y. (J. C. Pratt, 2744 McDowell St., Durham, N.C.)

6–7. **Plant Phenolics** Group of North America., 3rd, Toronto, Ont., Canada. (V. C. Runeckles, Imperial Tobacco Co. of Canada, P.O. Box 6500, Montreal, Quebec, Canada)

8–11. **High-temperature Technology**, intern. symp., Asilomar, Calif. (Dept. 493, Stanford Research Inst., Menlo Park, Calif.)

8–11. **Petroleum** Industry Conf., St. Louis, Mo. (R. G. Knaus, General Electric Co., 818 Olive St., St. Louis)

8–13. American **Chemical** Soc., 145th natl., New York, N.Y. (ACS, 1155 16th St., NW, Washington, D.C.)

8–13. **Illuminating Engineering** Soc., Detroit, Mich. (W. P. Lowell, Jr., Sylvania Electric Products, 60 Boston St., Salem, Mass.)

8–15. Function of **Esterases** in Animals and Plants, intern. symp., Pernambuco, Brazil. (S. L. Allen, Dept. of Zoology, Univ. of Michigan, Ann Arbor)

8–15. **Soil** Mechanics and Foundation Engineering, 6th intern. conf., Montreal, P.Q., Canada. (C. B. Crawford, Natl. Research Council, Ottawa, Ont., Canada)

8–15. **Thin-Film Optics**, Marseilles, France. (P. Rouard, Faculté de Sciences de Marseilles, Laboratoire de Physique Générale, P. Victor Hugo, Marseilles 3, France)

8–22. Brno Intern. **Trade Fair**, Brno, Czechoslovakia. (Czechoslovak Scientific and Technical Soc., Siroka C 5, Prague 1, Czechoslovakia)

9–10. Transport of **Radioactive Materials**, problems symp., Harwell, England. (Authority Health and Safety Branch, U.K. Atomic Energy Agency, 11 Charles II St., London S.W.1)

9–11. **Military Electronics**, 7th natl., Washington, D.C. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 21)

9–11. **Weak Interactions**, intern. conf., Brookhaven, N.Y. (G. C. Wick, Brookhaven Natl. Laboratory, Long Island, N.Y.)

9–11. **Soils**, Laboratory Shear Testing, Ottawa, Ont., Canada. (American Soc. for Testing and Materials, 1916 Race St., Philadelphia 3, Pa.)

9–12. **Production Engineering** Research, intern. conf., Pittsburgh, Pa. (Carnegie Inst. of Technology, Pittsburgh)

9–12. **Instrument-Automation** conf., exhibit, Chicago, Ill. (Instrument Soc. of America, T. A. Abbott, American Oil Co., 2400 New York Ave., Whiting, Ind.)

9–13. International Union against **Cancer**, conf., Amsterdam, Netherlands. (H. G. Kwa, UICC Cancer Conf., c/o Congresdienst Gemeente Amsterdam 4, St. Agnietenstraat, Amsterdam-C)

9–14. **Biometrics**, 5th intern. conf., Cambridge, England. (R. C. Campbell, School of Agriculture, Cambridge)

9–14. **Pharmaceutical** Sciences, 23rd intern. congr., Münster, Germany. (K. E. Schulte, Institut für Pharmazie und Lebensmittelchemie, Piusalle 7, 44 Münster)

9–18. **Crystallography**, intern. congr., Rome, Italy. (D. W. Smits, Mathematisch Inst., Univ. of Groningen, Reitdiepskade 4, Groningen, Netherlands)

10–12. **Space** Rendezvous, Rescue, and Recovery, symp., Edwards Air Force Base, Calif. (K. Irwin, AFFTC (FTFE), Edwards Air Force Base)

11–13. American **Fisheries** Soc., Minneapolis, Minn. (AFS, 1404 New York Ave., NW, Washington 5)

11–13. Administration of **Research**, 17th natl. conf., Estes Park, Colo. (S. A. Johnson, Jr., Denver Research Inst., Univ. of Denver, Denver, Colo.)

11–17. Pacific **Dermatologic** Assoc., Honolulu, Hawaii. (G. MacDonald, 4294 Orange St., Riverside, Calif.)

12–13. **Engineering Management**, 11th joint conf., Los Angeles, Calif. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 21)

12–14. **Chemical** Inst. of Canada, 6th western region conf., Trail, B.C., Canada. (D. A. Craw, Chemical Inst. of Canada, 48 Rideau St., Ottawa, Ont.)

12–14. Institute of **Management Sciences**, New York, N.Y. (H. C. Cauvet, P.O. Box 273. Pleasantville, N.Y.)

12–14. American Soc. of **Photogammetry**, Wellesly Island, N.Y. (J. Starks, Analytical and Photogammetric Sales, Bausch & Lomb Inc., Rochester 2, N.Y.)

15–21. Metabolism and Physiological Significance of **Lipids**, conf., Cambridge, England. (R. M. C. Dawson, Biochemistry Dept., Inst. of Animal Physiology, Babraham, Cambridge)

16–18. Applied **Spectroscopy**, 10th Ottawa symp., Ottawa, Ont., Canada. (J. Kelly, Steel Co. of Canada, Metallurgical and Chemical Laboratory, Wilcox St., Hamilton, Ont.)

16–20. **Electronic Information** Display Systems, 2nd inst., Washington, D.C. (M. F. Wofsey, Center for Technology and Administration, American Univ., 1901 F St., Washington, D.C.)

16–21. **Antarctic Geology**, symp., Cape Town, South Africa. (F. C. Truter, Geological Survey, P.O. Box 401, Pretoria, South Africa)

16–21. **Arid Regions**, Latin American conf., Buenos Aires, Argentina. (A. Sanchez Diaz, Academia de Ciencias Exactas, Las Heras 2545, Buenos Aires)

18. Arctic Branch, Alaska Div., **AAAS**, College. (J. Morrow, Univ. of Alaska, College)

18–19. **Industrial Electronics**, 12th symp., East Lansing, Mich. (T. Collins, Kellogg Center, Michigan State Univ., East Lansing)

18–25. **Information Retrieval** Cooperation among Examining Patent Offices, intern. committee meeting, Vienna, Austria. (H. Pfeffer, Office of Research and Development, U.S. Patent Office, Washington 25)

19–20. **Logistics** Symp., Washington, D.C. (A. Blumstein, Inst. for Defense Analyses, 1666 Connecticut Ave., NW, Washington, D.C.)