

SCIENCE

10 December 1965

Vol. 150, No. 3702

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



**At
65,000 rpm
new
things
are
happening
here**



The Type 65 Fixed Angle Rotor. 65,000 rpm. 368,000 g.



The SW65 Swinging Bucket Rotor. 65,000 rpm. 420,000 g.

The kinds of things that happen in the rotor chamber of the new Beckman Model L2-65 Preparative Ultracentrifuge may well be worth your consideration. With rotors going to 65,000 rpm, you can subject samples to greater forces than ever before—up to 420,000 g. Sedimentation times are reduced to speed your research. Separations are noticeably better to give you purer fractions in preparative work and more exact measurements when you use swinging buckets for analytical work. It is highly possible, too, that you will find some unexpected particles in zones, pellets, or supernatants.

If this extra centrifugal “muscle” would benefit any part of your investigations, put a Model L2-65 in your laboratory. Two 65,000 rpm rotors are already available for it. More are on their way. In addition, the L2-65 accepts all Beckman Model L and L2-50 rotors for an unprecedented variety of speeds, forces, and capacities. The L2-65 is built by Spinco Division of Beckman, the people who have been serving the scientific world with dependable ultracentrifuges for nearly 20 years; you can depend on this new one. For more details, write for Data File L2-65-5.

Beckman®

INSTRUMENTS, INC.

SPINCO DIVISION

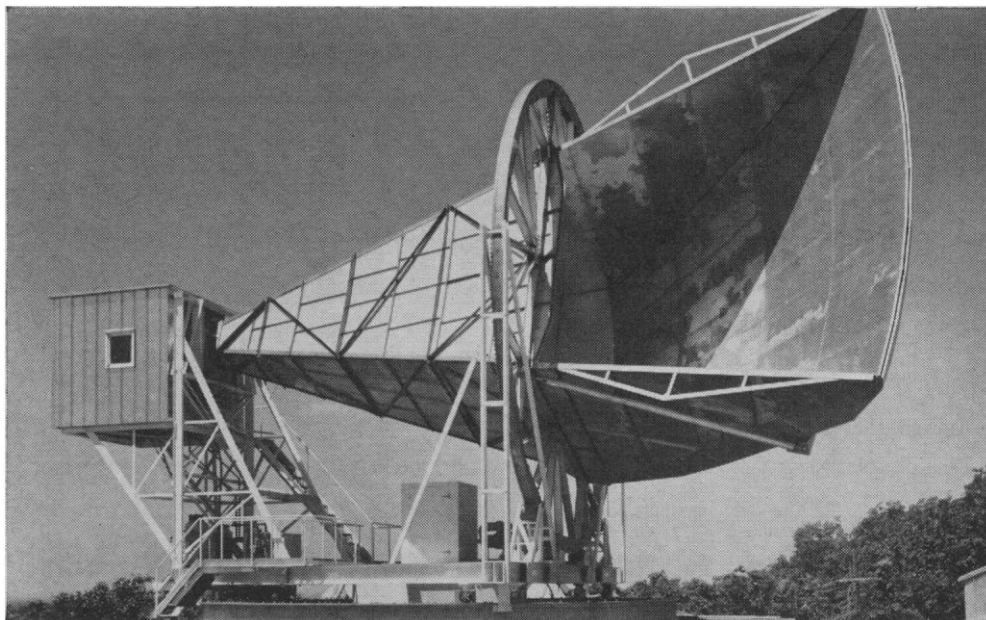
PALO ALTO, CALIFORNIA • 94304

INTERNATIONAL SUBSIDIARIES: GENEVA; MUNICH; GLENROTHES, SCOTLAND; TOKYO; PARIS; CAPETOWN; LONDON

Report from

BELL LABORATORIES

Bell Laboratories' horn-reflector antenna located at Holmdel, New Jersey. It is coupled to a traveling-wave maser receiver through a waveguide switch which permits comparison of received noises and noise from a reference source.



A radio problem that may have a ten-billion-year-old solution

Activities in technology sometimes have surprising implications. For example, recent antenna tests conducted by Bell Telephone Laboratories at Holmdel, New Jersey, have apparently produced evidence about the early history of the universe.

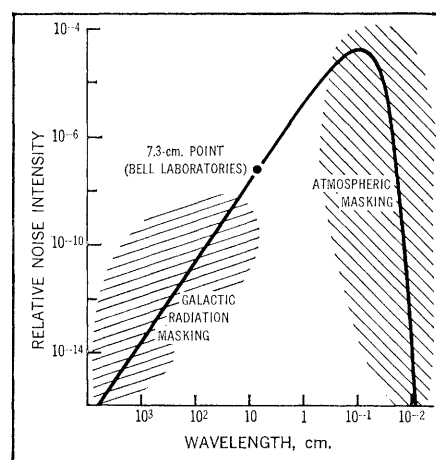
In their radio communications studies, Bell Laboratories scientists had been using a horn-reflector antenna (employed on Project Echo and Telstar® experiments) to measure the radio noise emitted by Cassiopeia A, an exploded star now surrounded by fiery gas. This and other similar measurements require accurate knowledge about or elimination of noise produced by the atmosphere, the ground, and the components of the antenna system itself. Now, noise from the Earth's atmosphere can be accurately measured and the antenna is so directional that ground noise is negligible (verified through a series of tests with a mobile transmitter). The electrical joints in the antenna system and waveguide were reworked and sealed to eliminate any possible noise due to leakage. And, an extremely accurate noise-level reference source—the best produced so far—was designed and built especially for this project.

But there was some noise which could not be explained. It was stronger than that radiated by the distant fixed stars. It showed none of the patterns typical of man-made interference. Drs. A. A. Penzias and R. W. Wilson were frankly puzzled. Strangely enough, similar unex-

plained noise, of the same order of magnitude, had been suspected by Bell scientists during the Project Echo and Telstar experiments. At that time, though, measurement techniques were not sufficiently perfected to allow them to be certain of their suspicions.

Not far away, however, at Princeton University, an explanation was being devised without knowledge of the Bell experiments. A group under Prof. R. H. Dicke was seeking information about the relationship between gravity and the recession of distant galaxies from us and from each other. The original composition of our galaxy (inferred from spectral lines of "old" stars) and the belief—held by many astronomers—that all matter was once compressed into a vastly smaller volume than at present suggested to the group that the universe was at that time much hotter—a veritable fireball. Such a fireball would emit a characteristic "black-body" radiation which—after cooling through billions of years of expansion—would have fallen in frequency from about 10^{20} cps. to about 10^{10} cps. It would thus lie in the radio spectrum, at wavelengths of a few centimeters. This was very much like the noise which was puzzling the men at Bell Laboratories.

A mutual acquaintance saw a possible connection and put Bell in touch with Princeton. Result: the signal received at Bell Laboratories has enabled Prof. P. J. Peebles of Princeton to draw the hypothetical radiation spectrum shown in the figure. Future



Virtually all of the "black-body" radiation which might have come from the supposed primordial fireball is concentrated between wavelengths of 7500 cm. and 0.01 cm. However, the long-wave end of the spectrum is masked by the galactic radiation to which radio astronomers listen and the short-wave end is masked by the Earth's warm-air atmosphere. Therefore, only the portion of the curve between about 20 cm. and 1 cm. can be studied. Bell Laboratories has supplied a point at the Telstar wavelength (7.3 cm.). Bell and Princeton scientists will next look for other points along the same curve. If these points are found, they will be powerful evidence of such radiation and, in turn, of the former existence of the fireball itself.

measurements at other wavelengths within this spectrum are planned at both Bell and Princeton to determine whether there was a primordial fireball. If so, it will be the first reliable view man has had of events 10 billion years ago.



Bell Telephone Laboratories
Research and Development Unit of the Bell System

10 December 1965
Vol. 150, No. 3702

SCIENCE

LETTERS	Referees: Anonymity and Other Problems: <i>V. G. Springer; A. S. Relman; J. S. Greenstein; P. H. Wright; B. J. Powell</i> ; Competence in the Universities: <i>K. A. Grant</i> ; Antiunion: <i>M. Leider</i> ; Erratum: <i>G. S. Stent</i>	1407
EDITORIAL	Future Administrators	1411
ARTICLES	Transpiration and the Stomata of Leaves: <i>P. E. Waggoner and I. Zelitch</i>	1413
	The Schools Lectures at the Royal Institution: <i>L. Bragg</i>	1420
	Vertical Density Currents: <i>W. H. Bradley</i>	1423
NEWS AND COMMENT	Foreign Affairs Research: Aftermath of Camelot—Birth Control: Money and Argument—International Cooperation: White House Conference	1429
	<i>Report from Europe</i> : Blackett Chosen President of Royal Society: <i>V. K. McElheny</i> . .	1437
BOOK REVIEWS	Primate Behavior in Review: <i>S. A. Altmann</i>	1440
	<i>Röntgen- und Kernphysik für Mediziner und Biophysiker</i> , reviewed by <i>L. H. Lanzl</i> ; other reviews by <i>C. F. Ehret, B. J. Pettis, V. F. Ray, J. W. Graham, N. H. Horowitz</i>	1442
REPORTS	Atmosphere of Mars: <i>F. S. Johnson</i>	1445
	Electron Density and Electronic Properties in Noble-Metal Transition Elements: <i>M. A. Jensen, B. T. Matthias, K. Andres</i>	1448
	Comparison of Messenger RNA in Photoperiodically Induced and Noninduced <i>Xanthium</i> Buds: <i>J. H. Cherry and R. B. van Huystee</i>	1450
	Retina: Pathology of Neodymium and Ruby Laser Burns: <i>M. L. Wolbarsht, K. E. Fligsten, J. R. Hayes</i>	1453
	Hemoglobin and Transferrin Electrophoresis and Relationships of Island Populations of <i>Anolis</i> Lizards: <i>G. C. Gorman and H. C. Dessauer</i>	1454
	Stress and the Toxicity of Venoms: <i>H. L. Stahnke</i>	1456
	<i>Dendroctonus pseudotsugae</i> : A Hypothesis Regarding Its Primary Attractant: <i>H. J. Heikkinen and B. F. Hrutfiord</i>	1457
	Microsaccades and the Velocity-Amplitude Relationship for Saccadic Eye Movements: <i>B. L. Zuber, L. Stark, G. Cook</i>	1459

BOARD OF DIRECTORS

LAURENCE M. GOULD
Retiring President, Chairman

HENRY EYRING
President

ALFRED S. ROMER
President Elect

H. BENTLEY GLASS

DAVID R. GODDARD
MINA S. REES

VICE PRESIDENTS AND SECTION SECRETARIES

MATHEMATICS (A)
Bernard Friedman
Wallace Givens

PHYSICS (B)
Emilio G. Segrè
Stanley S. Ballard

CHEMISTRY (C)
A. H. Batchelder
Milton Orchin

ASTRONOMY (D)
John W. Evans
Frank Bradshaw Wood

ANTHROPOLOGY (H)
Albert C. Spaulding
Eleanor Leacock

PSYCHOLOGY (I)
Benton J. Underwood
Frank W. Finger

SOCIAL AND ECONOMIC SCIENCES (K)
Thorsten Sellin
Ithiel de Sola Pool

HISTORY AND PHILOSOPHY OF SCIENCE (J)
C. West Churchman
Norwood Russell Hanson

PHARMACEUTICAL SCIENCES (Np)
John E. Christian
Joseph P. Buckley

AGRICULTURE (O)
R. H. Shaw
Howard B. Sprague

INDUSTRIAL SCIENCE (P)
Allen T. Bonnell
Burton V. Dean

EDUCATION (Q)
James Rutledge
Frederic B. Du

DIVISIONS

ALASKA DIVISION

Richard M. Hurd
President

Eleanor Viereck
Executive Secretary

PACIFIC DIVISION

Daniel S. Aldrich, Jr.
President

Robert C. Miller
Secretary

SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

Earl D. Camp
President

Marlowe G. Anderson
Executive Secretary

SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington, D.C. 20005. Now combined with *The Scientific Monthly*. Second-class postage paid at Washington, D.C. Copyright © 1965 by the American Association for the Advancement of Science. Annual subscriptions \$8.50; foreign postage, \$1.50; Canadian postage, 75¢; single copies, 35¢, except *Guide to Scientific Instruments*, which is \$1.00. School year subscriptions: 9 months, \$7.10 months, \$7.50. Provide 4 weeks' notice for change of address, giving new and old address and zip numbers. Send a return address label. SCIENCE is indexed in the *Reader's Guide to Periodical Literature*.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Mitosis: Induction by Cultures of Human Peripheral Lymphocytes: *N. Hashem* 1460

Diapause Induction in *Daphnia* Requires Two Stimuli: *R. G. Stross* and *J. C. Hill* 1462

Adrenaline Synthesis: Control by the Pituitary Gland and Adrenal Glucocorticoids:
R. J. Wurtman and *J. Axelrod* 1464

Thyrocalcitonin: Inhibitor of Bone Resorption in Tissue Culture:
J. Friedman and *L. G. Raisz* 1465

Genetic Adaptation of *Caenorhabditis elegans* (Nematoda) to High Temperatures:
J. Brun 1467

Antibodies in Gastric Juice: *J. M. Fisher, C. Rees, K. B. Taylor* 1467

Second Mutant Gene Affecting the Amino Acid Pattern of Maize Endosperm Proteins:
O. E. Nelson, E. T. Mertz, L. S. Bates 1469

Biosynthesis of Histones and Acidic Nuclear Proteins under Different Conditions of
Growth: *L. S. Hnilica, H. A. Kappler, V. S. Hnilica* 1470

Parkinsonism: Electromyographic Studies of Monosynaptic Reflex: *M. Ioku et al.* . . 1472

Pogonophora: Living Species Found off the Coast of Florida: *C. Nielsen* 1475

Airborne Particulates in Pittsburgh: Association with *p,p'*-DDT:
P. Antommaria, M. Corn, L. DeMaio 1476

Spectral Sensitivity of Color Mechanisms: Derivation from Fluctuations of Color
Appearance near Threshold: *J. Krauskopf* and *R. Srebro* 1477

Differential Classical Conditioning: Verbalization of Stimulus Contingencies:
M. J. Fuhrer and *P. E. Baer* 1479

Temperature Effects on the Peripheral Auditory Apparatus: *A. C. Coats* 1481

Comments on Reports: Optical Communication: Heterodyne Detection Scheme:
H. Malamud; Single Point Mutation or Chromosomal Rearrangement:
D. W. Talmage; F. W. Putnam and *K. Titani* 1484

ASSOCIATION AFFAIRS Art in Science: *D. G. Barry* 1486

MEETINGS Carbon-14 and Tritium Dating: *E. A. Olson* and *R. M. Chatters*; Forthcoming Events . . 1488

DEPARTMENTS New Products 1499

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

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

COVER

One behavior pattern observed in young chimpanzees is clinging. It characteristically includes grasping and ventral contact with a social stimulus. The occasional posture of young chimpanzees, sitting with the arms folded across the chest while the hands grasp a contralateral limb, may be a self-directed form (huddling) of this pattern. See review of *Behavior of Nonhuman Primates*, vol. 2, page 1440. [Willa Martin, Covington, Louisiana]



Please don't steal our Spectroquality® process

... we'll give it to you! We hear rumors that competitors would like to make solvents that approach the standard set by MC&B Spectroquality solvents. We wish to advise all concerned that there is nothing at all esoteric about the manufacturing procedure we use. Spectroquality solvents are the best solvents for spectrophotometry and fluorometry simply because our Lab Director and his crew have devoted a tremendous amount of time and effort to making them superior. They use a combination of chemical, extraction and distillation techniques in production, and maintain quality thru the use of the most modern, sophisticated instrumentation. If there is a "Spectroquality Secret" it is the determination of our Norwood laboratories to produce the very best line of solvents for spectrophotometry.

There are presently 46 solvents in the Spectroquality line. All are promptly available from MC&B distributors.

Write for new booklet "Spectroquality Solvents—Spectra, Physical Properties, Specifications, Uses."



Division of Matheson Co. Inc., Norwood, Ohio, E. Rutherford, N. J., Los Angeles

What every Ph.D. should know about cage sanitation:

Anything less than a spotlessly clean cage can cause a fatal infection to an experimental animal during his post-operative recovery period and negate all your test results.

One major cause of unsanitary machine-washed cages is *overfoaming* in the machine, caused by the reaction of the detergent with the high protein soil loads resulting from the animal's feed and waste matter. This overfoaming cuts pump and wash pressure in the machine, thereby preventing it from doing its sanitation job.

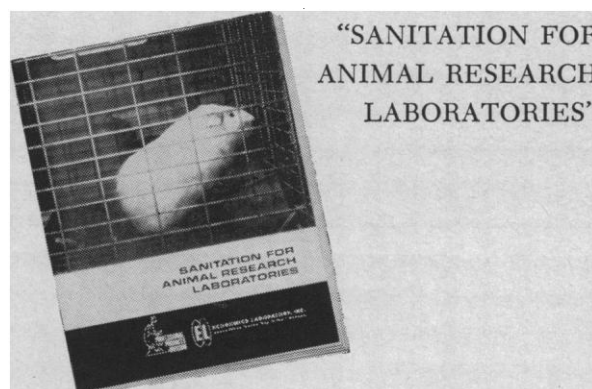
But now, a new Economics Laboratory defoaming agent built into two detergents *completely eliminates foam*, enabling you to eliminate this major cause of unsanitary conditions. It's called EL F-58, and it may mean the difference between success and failure in your next experimental operation. It is now available in two powerful detergents, **EVENT** and **SPEARHEAD**, both of which contain polyphosphate to hold soils in suspension for their complete removal during the final rinse.

The first, **EVENT**, is recommended for non-aluminum, non-galvanized metal or plastic cages. It is a highly alkaline, non-chlorinated detergent for removing high organic soil loads and is recommended whenever heavy duty cleaning is required.

The second, **SPEARHEAD**, is recommended for aluminum and galvanized metal

cages and racks. Equally effective in hard and soft water, it contains a unique combination of metal corrosion inhibitors. It, too, completely eliminates foaming where organic soil loads are encountered.

For more comprehensive information on cage sanitation, return the coupon below *today* for your *free* copy of this new, up-to-the-minute manual,



ECONOMICS LABORATORY, INC.

Economics Laboratory, Inc., Dept. 142-L
250 Park Ave., N.Y., N.Y. 10017

- ☐ Please send free copy of new manual immediately.
☐ Have my local EL Sanitation Expert phone for an appointment.

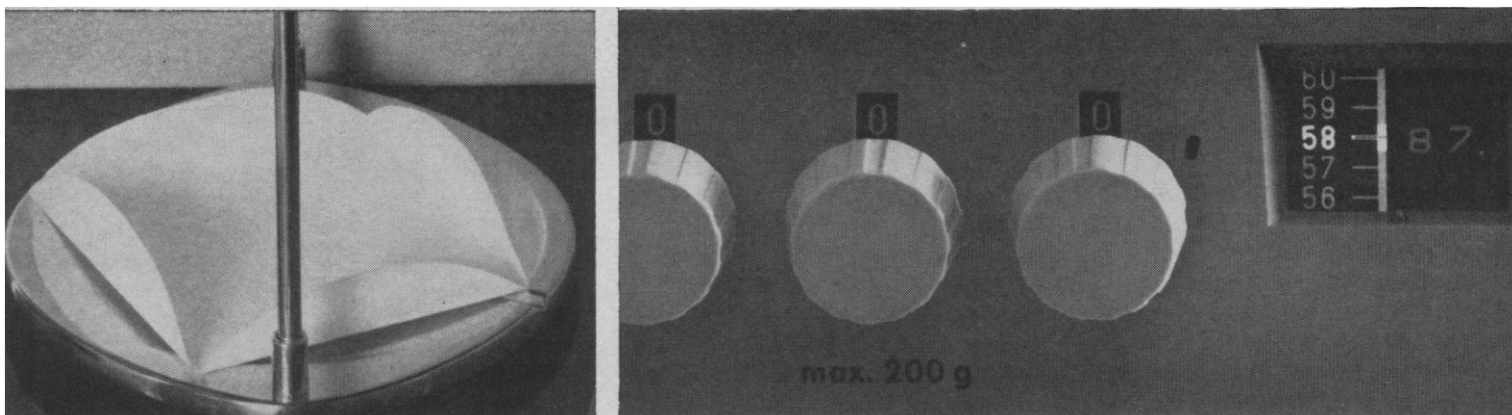
NAME _____ TITLE _____

ORGANIZATION _____

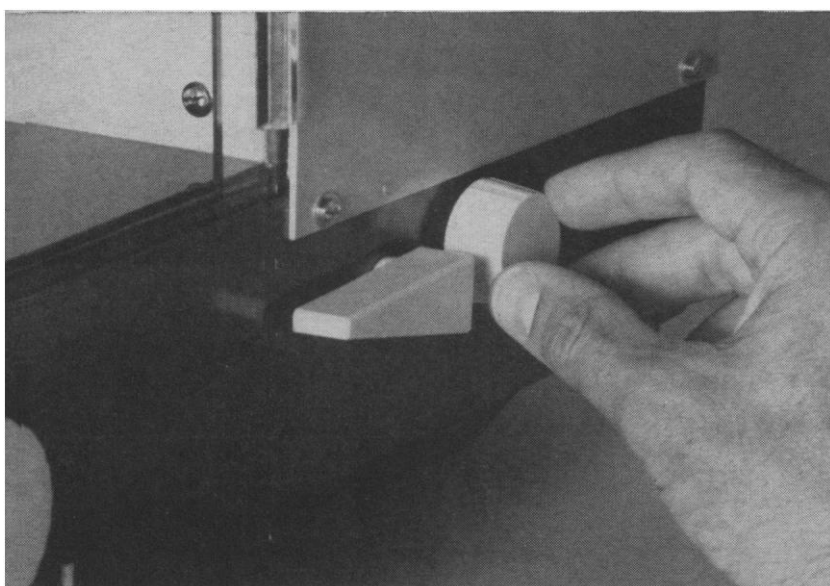
ADDRESS _____

CITY _____ STATE _____ ZIP _____

before mechanical taring — the weight of the filter paper cup on the pan would normally be 0.5887 grams after setting the micrometer.

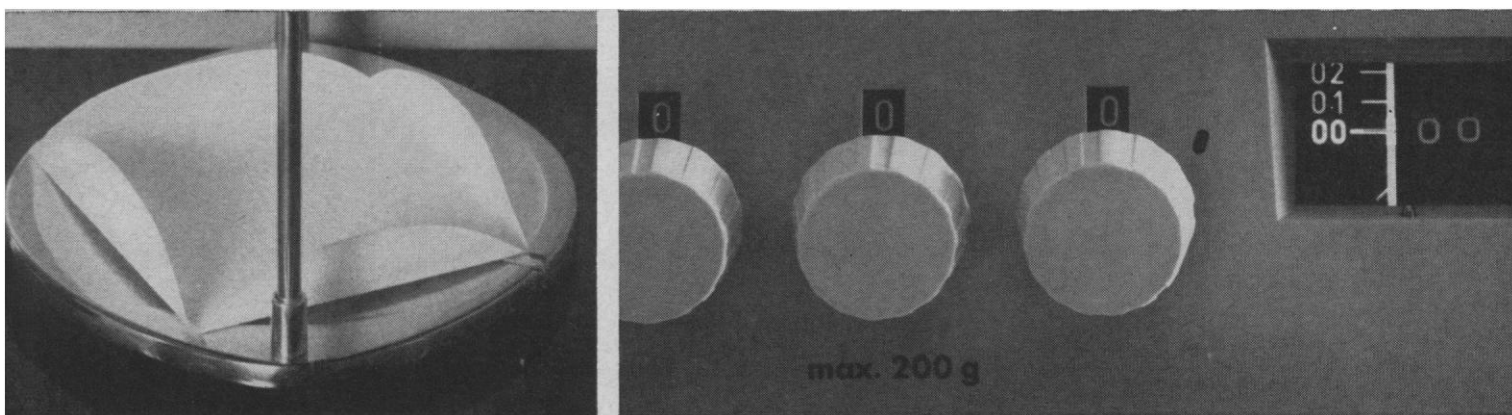


INTRODUCING THE FASTEST, SIMPLEST MECHANICAL TARING EVER DEvised.



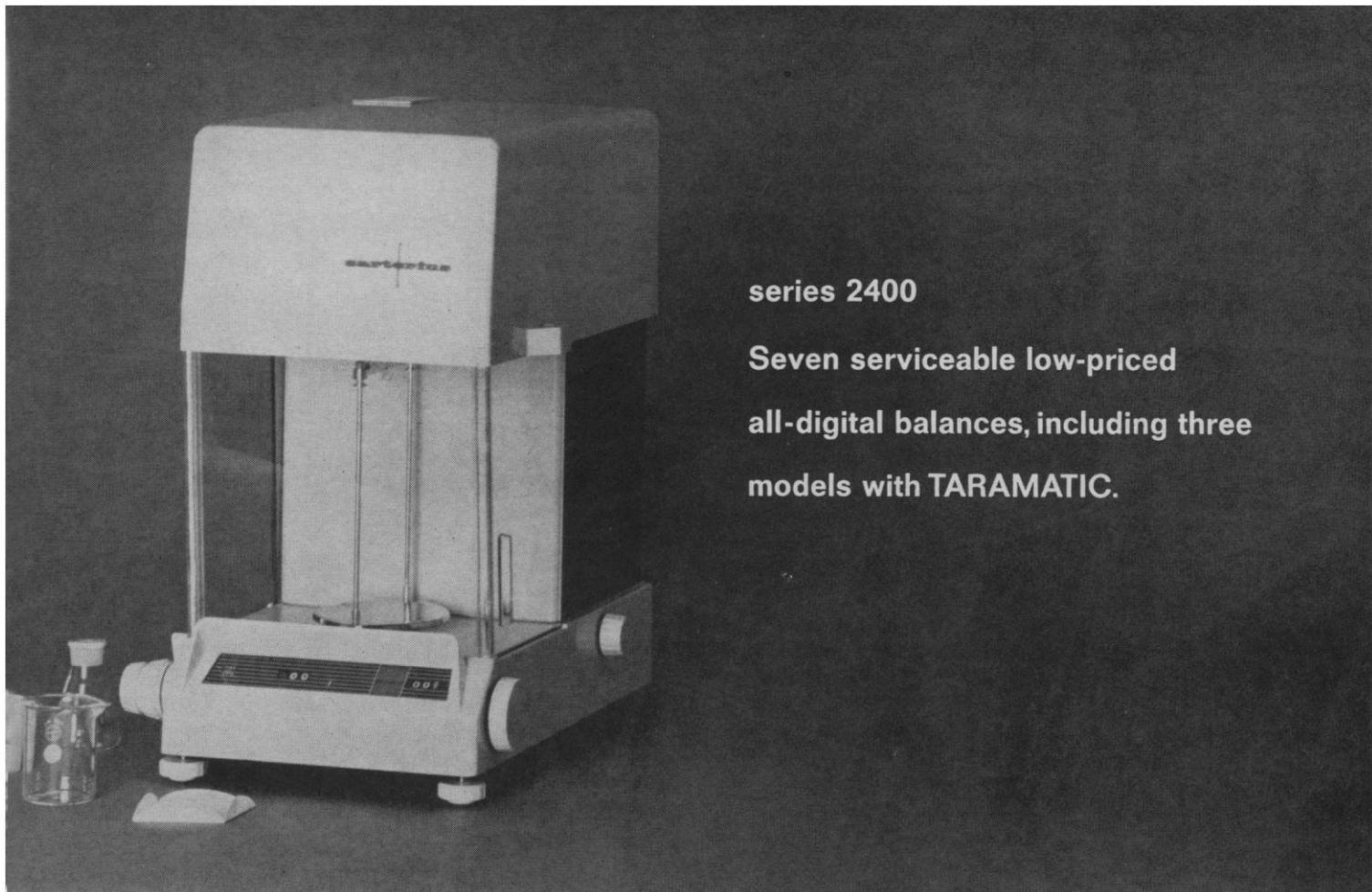
taramatic®

the mechanical tare—instead of weighing the cup, use the TARAMATIC control knob to bring the optical scale back to zero.



after mechanical taring — with filter paper cup on the pan, all systems now read zero.

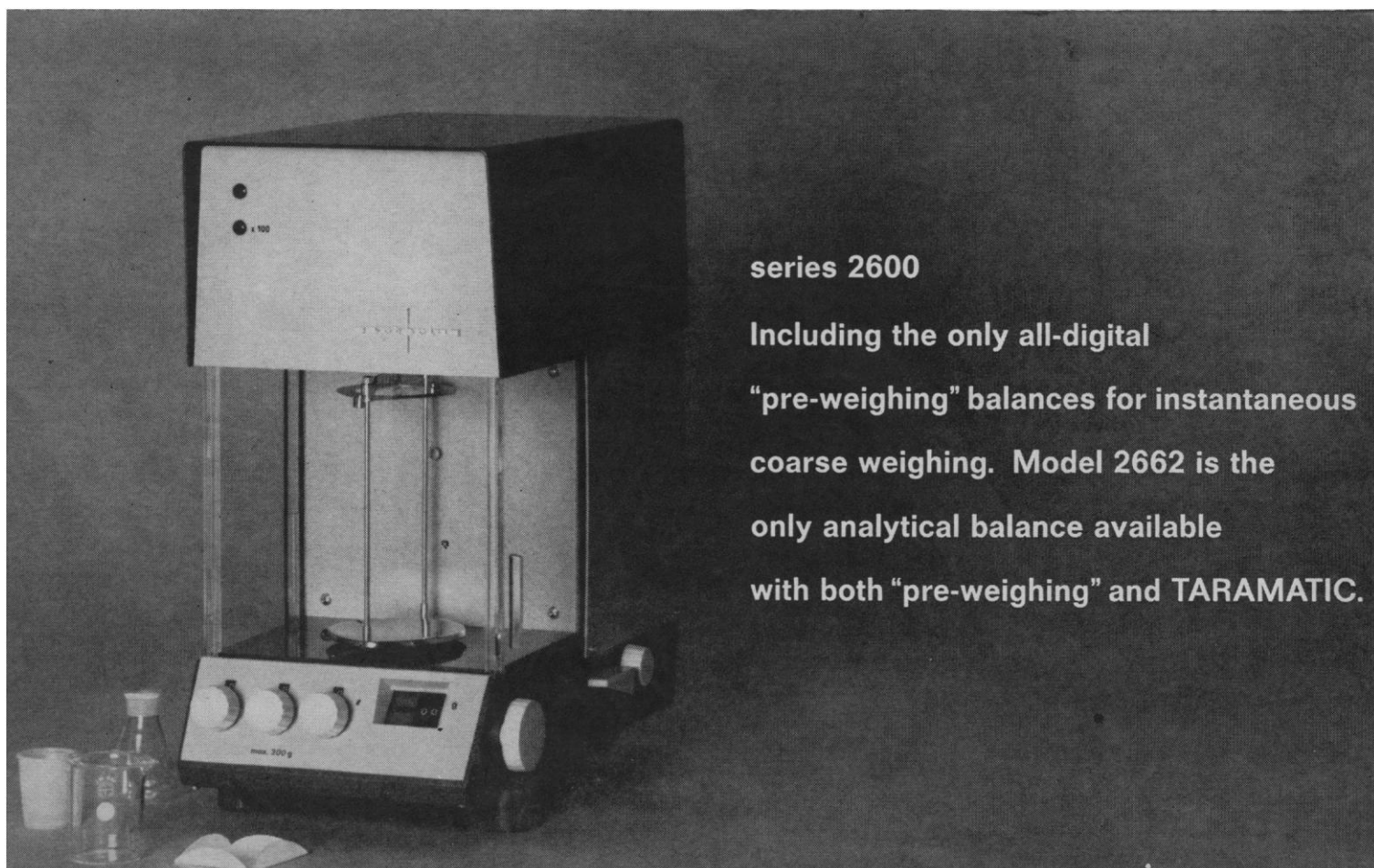
For more detailed information on these and other Sartorius balances, write to
sartorius
 Division of Brinkmann Instruments, Inc., Cantiague Road, Westbury, L. I., New York 11590



series 2400

Seven serviceable low-priced
all-digital balances, including three
models with TARAMATIC.

takes the arithmetic out of analytical weighing



series 2600

Including the only all-digital
"pre-weighing" balances for instantaneous
coarse weighing. Model 2662 is the
only analytical balance available
with both "pre-weighing" and TARAMATIC.

AMBILOG 200 — the computer chosen to solve these signal processing problems

BIOMEDICAL MONITORING

An Adage AMBILOG™ 200 system is in use at the University of Virginia School of Medicine as an intensive-care patient monitor following complex operations such as open-heart surgery.

A "flood" of biomedical data is acquired and processed on line from 40 input sources such as electrocardiograms, continuous biochemical and blood gas determinations, cardiovascular pressures, and multi-point temperatures. Instantaneous analysis of these complex waveforms — detection of maxima and minima, slopes and discontinuities, and measurement of their times of occurrence — provides secondary and derived data such as pulse propagation time, lung compliance, work of breathing, and cardiac output. Visual presentation of selected variables is provided attending physicians by an array of digital and analog displays under AMBILOG 200 control. Patient data is also stored on digital magnetic tape for off-line use in studies of cardiovascular and pulmonary control systems.

A completely new kind of signal processor, the AMBILOG 200 is designed from the ground up to exploit the best of both analog and digital techniques. It combines parallel hybrid arithmetic with stored-program sequential operation: the first true hybrid. High processing speeds (often many times faster than comparably-priced conventional machines) and extensive input/output for both analog and digital data make AMBILOG 200 ideal for **Telemetry data processing • Wind tunnel and test stand instrumentation • Display generation • Space-vehicle simulation • Laboratory research • Radar signal processing • Communications research • Flight trainer control • Automatic test and check-out** — among others.

SONAR SIGNAL PROCESSING

At the U.S. Navy Underwater Sound Laboratory, New London, Ct., an AMBILOG 200 system calculates power spectral density functions of sonar signals to obtain norms for sea noises.

The computer acquires data by reading directly from analog tape, sampling at a real-time rate of 83 kc. The desired signal is selected from any of 14 channels, passed through a parallel bank of 40 narrow-band logit filters, digitized, squared and integrated.

A double table look-up algorithm and a specially-designed bank of logarithmic amplifiers calculate PSD components to an accuracy of 1 db over a range of 60 db signal amplitude. The PSD solutions are formatted and recorded on digital magnetic tape.

All operations, from initial acquiring of data to final recording, are under stored-program control.

Complete user services for the AMBILOG 200 are provided. The program library includes ASA Basic FORTRAN, an assembly system, applications programs, source language editing, on-line symbolic debugging and control programs, and a wide range of subroutines. Full system documentation, programmer and maintenance training, and installation and maintenance services are furnished.

For technical reports describing in detail these and similar AMBILOG 200 applications, or for a demonstration, write Irving Schwartz, Vice President, 1079 Commonwealth Avenue, Boston, Mass. 02215.

SEISMIC RESEARCH

The California Institute of Technology's Kresge Seismological Laboratory and The Institute of Geophysics and Planetary Physics of the University of California (San Diego) are using AMBILOG 200 computers in research programs aimed at recognizing underground nuclear explosions by distinguishing their tremors from other seismic events.

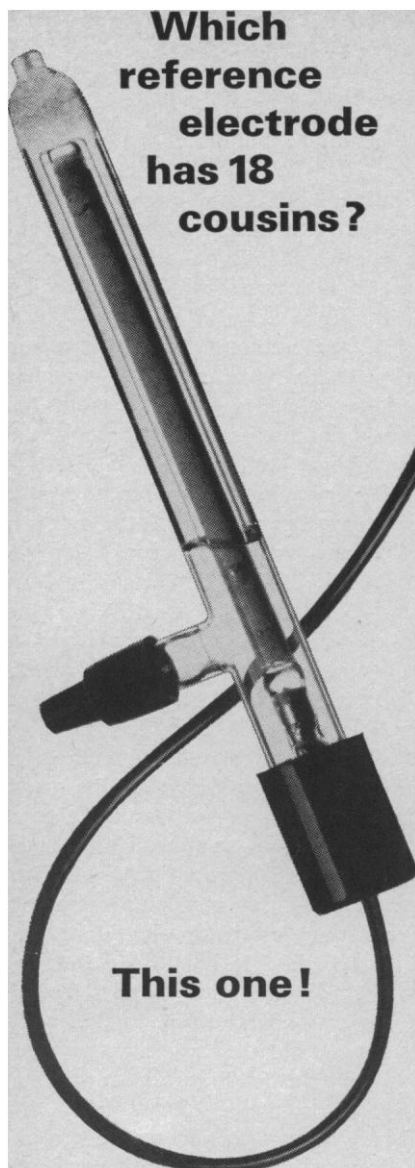
The Caltech system acquires and processes seismic signals read from a multi-channel FM analog tape unit and filtered through a Butterworth array. Time records written in VELA format are decoded. The computer performs time-domain digital filtering for accomplishing waveform pattern recognition. Digitized raw data and processed results are recorded on a magnetic tape, with provision made for "quick look" and analog playback.

The Institute of Geophysics and Planetary Physics' system has been processing seismic signals on line — sensor outputs are fed directly to the computer — at the Tonto Forest Seismological Observatory. Data from multi-channel inputs is multiplexed, edited (scaled, offset and monitored), digitized, and formatted for tape recording. The machine is also programmed to produce Fourier transformations of selected signals.

Adage
INC.

Boston / Whitestone, N.Y.
Silver Spring, Md. / Des Plaines, Ill.
Huntsville, Ala. / Dallas / Fullerton
Los Angeles / Los Altos, Calif.





There are nineteen members in the family of Beckman Reference Electrodes—just so you can select the one best related to your requirements. There are four different types of reference junctions to pick from— asbestos fibre, palladium wire, ground glass sleeve, and porous frit. Each can be properly matched to your specific application for highly reliable determinations.

In all, there are 121 Beckman electrodes immediately available. Call your local Beckman Sales Engineer or write for the Electrode Catalog.

Beckman® INSTRUMENTS, INC.

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

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

only nine lines. Much of the literature published today is obscure and ungrammatical, and these faults will only be corrected when the rules of grammar are applied and clarity of expression is set high on the list of standards by which a manuscript is judged.

Forscher omits to mention that the referee has a responsibility to the author, who is entitled in this highly competitive age to prompt consideration of his manuscript. If a referee is too busy or too lazy to fulfill his obligations within a reasonable time, he should not be entrusted with the responsibility. . . .

If it is the editor's responsibility to make the final decision about publication, it should also be his responsibility to weigh the advice of his referees. He need transmit to the author only those comments that he deems necessary for the improvement of the manuscript or for justifying its rejection; this he can do without disclosing the referees' names.

PETER H. WRIGHT
*Indiana University Medical Center,
1100 West Michigan Street, Indianapolis*

Forscher's suggestion that verbatim comments from the referee be accompanied by his name appears to offer one way to curb the tendency of some referees to make unsupported judgments such as "naive," "superficial," or, in an extreme case, "stupid."

Moreover, communication of the author with the referee could in some instances prove to be mutually beneficial.

BARBARA J. POWELL
759 Day Street, Galesburg, Illinois

Competence in the Universities

With regard to the Reuss subcommittee's inquiry into the relation between federal support for basic research and the quality of university science teaching (News and Comment, 22 Oct., p. 464), I offer the following observation: Having completed some 20-odd undergraduate and graduate courses in botany and genetics at four institutions (Washington University, the University of Michigan, Claremont Graduate School, and the University of California at Berkeley) during the pre- and post-Sputnik era, I have encountered teaching ranging from excellent to very poor. In every case the good-to-excellent teachers were those who were actively engaged

in significant basic research, whereas the poor teachers were also ineffectual as researchers. Thus my experience does not bear out the assumption that teaching and basic research are antagonistic duties of the university scientist. One might better regard poor teaching as simply one more aspect of professional incompetence.

KAREN A. GRANT
*135 East Seventh Street,
Claremont, California*

Antiunion

In the issue of 15 October (p. 292) there is a letter headed "No antineoplastic effects." Now, what can *an-ti-n'e-plas-tik* mean? I get it! It means *anti-neoplastic*.

Why is the hyphen so avoided? The dashed little dash makes for clarity. How can one pronounce and divine the meaning of *picornaviruses* without hyphens? It's easy when you write it right: *pico-RNA-viruses*. That does for many another inelegant formulation born out of the modern, hasty need for neologisms and nonce words.

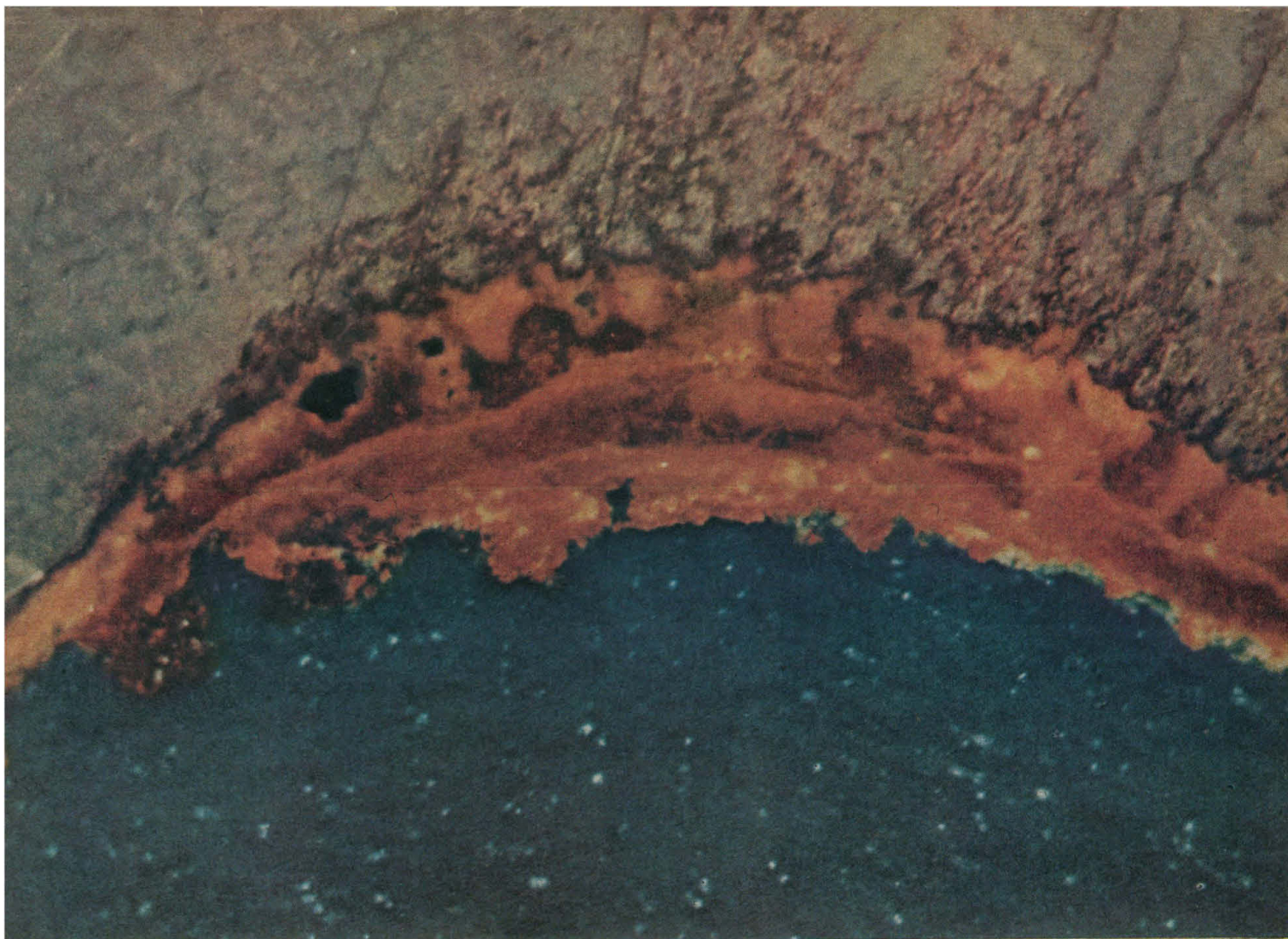
There ought to be a law: Dash it! As for acronyms: To hell with them.

MORRIS LEIDER
*New York University Medical Center,
562 First Avenue, New York 10016*

Erratum

The 22 October issue presents the wildly improbable coincidence of containing both a letter about parapsychology and "spontaneous cases" (p. 436) and a "spontaneous case." For on page 463, as part of my comments on the 1965 Nobel Laureates in Medicine or Physiology, there appears the phrase "The operator 'loses'. . .," though what I had actually written was "The operator 'closes'. . . ." Now since I happen to have some doubts about the validity of the operator concept, doubts that I certainly would not consciously have wished to introduce on this happy occasion [though I did voice them earlier in *Science* 144, 816 (1964)], this strange error can be explained only as a Freudian slip by a member of the editorial staff of *Science* acting under the telekinetic influence of an author's psyche.

GUNTHER S. STENT
*Department of Molecular Biology,
University of California, Berkeley*



“POLAROID” & “POLACOLOR” ®

***Polacolor film made this
picture of a corrosion pit
in 60 seconds.***

It took the photographer exactly 60 seconds to be sure he had the photomicrograph he wanted.

And that's the prime advantage of Polaroid color film.

If your first shot isn't exactly right, you can take another immediately.

You don't go through the tedium of dark-room procedure only to find the shot isn't right. And you never run the risk of having to repeat a difficult and time-consuming photomicrographic setup.

You also get a finished print that's easy to study, file, or clip to a report.

And since metallography is an extremely delicate science to begin with, seeing the picture seconds after the shutter clicks is critically important.

You know if the exposure is correct.

You know if the filtration is correct.

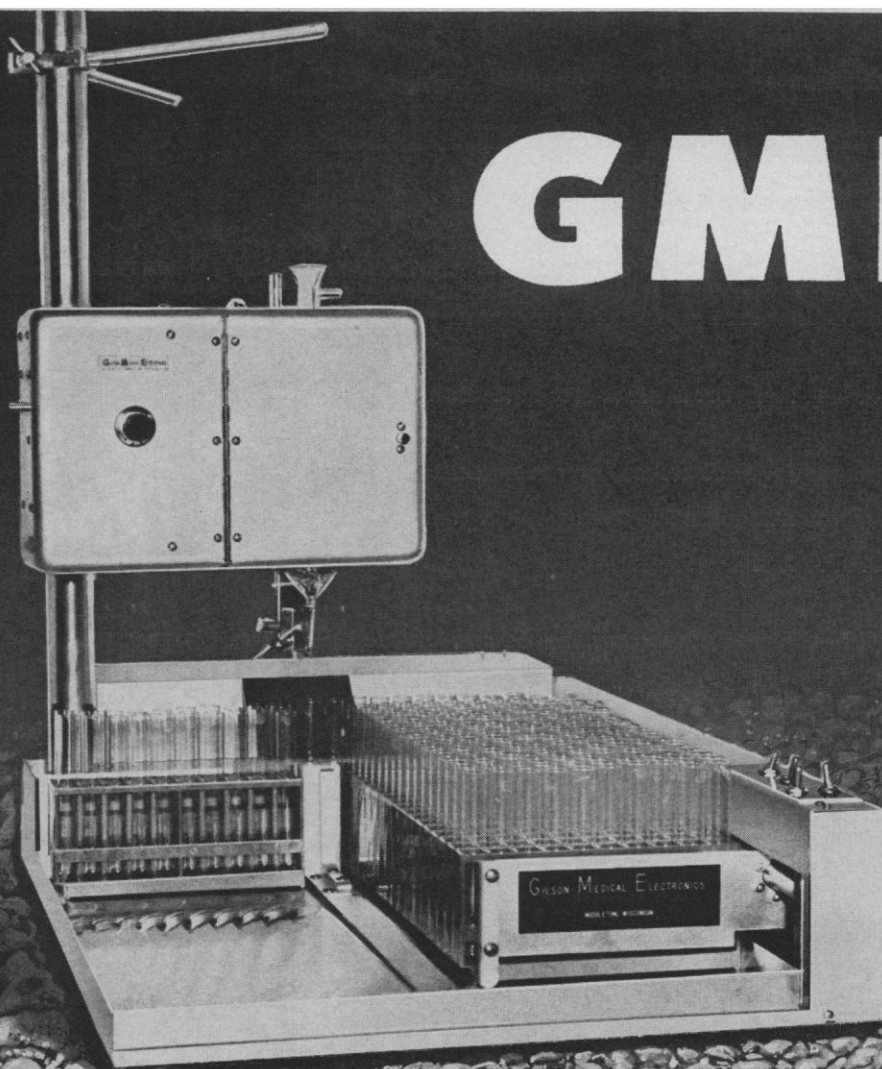
You know if the color reproduction of the subject is correct.

And you know all of these things in exactly 60 seconds.

POLAROID CORPORATION
Cambridge, Mass.



GME



TAKE OFF 10 FRACTIONS

as soon as they are collected, and 10 more, and 10 more, and 10 more —————→ ∞ . As long as empty test tubes in handsome red polypropylene racks (holding 10 each) are supplied on the right, the same may be removed from the left — with enclosed fractions, of course. Twenty (20) racks can be put in the apparatus for the period of unattended run. Write **GILSON MEDICAL ELECTRONICS**, Middleton, Wisconsin, for data on the

GME LINEAR FRACTIONATOR

**AMERICAN ASSOCIATION FOR
THE ADVANCEMENT OF SCIENCE**

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Editorial Board

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

Editorial Staff**Editor**

PHILIP H. ABELSON

Publisher

DAEL WOLFE

Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES**Assistant Editors:** ELLEN E. MURPHY, JOHN E. RINGLE**Assistant to the Editor:** NANCY TEIMOURIAN**News and Comment:** DANIEL S. GREENBERG, JOHN WALSH, ELINOR LANGER, LUTHER J. CARTER, MARION ZEIGER, JANE AYRES**Europe:** VICTOR K. McELHENY, Flat 3, 18 Kensington Court Place, London, W.8, England (Western 5360)**Book Reviews:** SARAH S. DEES**Editorial Assistants:** ISABELLA BOULDIN, ELEANORE BUTZ, BEN CARLIN, SYLVIA EBERHART, GRAYCE FINGER, NANCY HAMILTON, OLIVER HEATWOLE, ANNE HOLDSWORTH, ELLEN KOLANSKY, KATHERINE LIVINGSTON, BARBARA SHEFFER**Advertising Staff****Director**

EARL J. SCHERAGO

Production Manager

RAYMONDE SALAMA

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

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

Chicago, Ill., 6 W. Ontario St. (312-DE-7-4973); HERBERT BURKLUND

Los Angeles 45, Calif., 8255 Beverly Blvd. (213-653-9817); WINN NANCE

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: *Advancesci*, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.**Future Administrators**

Under a grant from the Ford Foundation, the American Council on Education is in the second year of a 5-year program of providing internships in academic administration to selected faculty members who would like to sample the administrative life. Next fall "fifty persons judged to have high potential for successful careers in academic administration in colleges and universities will be selected for administrative internships in fifty host institutions."

Traditionally, it has not been quite respectable to aspire openly to a position in college or university administration. The assistant professor who is good in his field usually thinks of a professorship in a major university as the top rung on his ladder. Later on, some change their minds; many a scholar who knows that his best work is behind him or that he will never quite achieve as much in his own field as he once hoped has successfully traded the known satisfactions of a largely self-directed life of teaching and research for the frustrations and uncertainties and also the rewards and larger scope of an administrative position. Some have combined eminence in their own fields with high talents as educational philosophers and leaders.

Unfortunately, there are not enough such men and women to provide all of the presidents, provosts, deans, directors, and other administrators needed by the wide range of institutions involved in education beyond the high school level—community and junior colleges, liberal arts and teacher-training and other specialized colleges, great universities and lesser ones—and to direct the variety of new responsibilities that have been assumed or accepted by the universities—sponsored research, international cooperation, and public service duties.

Some of these posts will be filled by persons who defy the academic mores by frankly aspiring to administrative careers, for it seems—although not altogether happily—that a new breed will grow in number, the men who hope and prepare for administrative posts as devotedly as the lieutenant who hopes to become a general, the businessman who wants to become company president, or the school teacher who aspires to a superintendency. These persons are likely to be considered academic climbers and looked on with suspicion by many of their colleagues, but they exist.

For some of them and also for some who follow the more traditional route, a year spent in close association with an established administrator may provide a valuable opportunity for self-appraisal in a new role and an opportunity to be tried out, with no permanent commitment on either side. It may well be that none of the interns in this program will become Harpers, or Elliots, or Conants. But a number of men in their 30's and 40's will learn some of the problems, the temptations, the frustrations, and the constructive opportunities to be found in administrative responsibility. Some will be repelled or will demonstrate their ineptness. Others will find satisfaction and will impress their preceptors as good candidates for future administrative appointments.

This program is worth watching, not only in terms of its own objectives but also, if it works well, as a possible model for selecting and training some of the growing number of science administrators who are needed on campuses, in industry, and in government. Here too there is a problem of finding the men and women who can contribute most effectively, and with personal satisfaction, by transferring from the laboratory to the administrative office.—DAEL WOLFE

TRI-CARB[®] Liquid Scintillation Spectrometers available now . . . in three different price ranges



The image displays three different models of Packard TRI-CARB Liquid Scintillation Spectrometers. On the left is the 2000 Series, a compact unit with a control panel and a sample tray. In the center is the 3000 Series, featuring a control panel mounted on a stand above a large sample tray. On the right is the 4000 Series, a tall, multi-bay unit with a control panel and a large sample tray. The units are arranged in a row, with the 3000 Series in the center and the 2000 and 4000 Series on either side.

2000 SERIES
New, Low Price Systems, starting about \$5,000

- Room Temperature
- One and Two Channel Spectrometers
- Semi-Automatic and Automatic
- 100 Sample Capacity

3000 SERIES
Most Widely Used Systems in the World Today

- Controlled Temperature
- Three Channel Spectrometers
- 200 Sample Capacity
- Automatic External Standardization
- Typewritten Data Sheets

4000 SERIES
Finest Large Capacity or Multiple-User Systems

- 15 Color-Coded Sample Trays
- 360 Sample Capacity
- True Electronic Computation

All Three Series of Tri-Carb Spectrometers Are Now In Volume Production and Available for Prompt Delivery. Ask your Packard Sales Engineer for complete details or write to Packard Instrument Company, Inc., 2200 Warrenville Road, Downers Grove, Illinois 60515.



2000-3000-4000 SERIES TRI-CARB SPECTROMETERS

Meet All Liquid Scintillation Counting Requirements

ethane as his counting gas in order to introduce twice the amount of carbon into a liter-atmosphere of sample gas; counting 24 liter-atmospheres of ethane for 6 days allows him to measure, without isotopic enrichment, samples 60,000 years old. Unfortunately a very small amount of sample contamination is very significant in this range and may make statistical calculations of range purely academic. Badly needed for evaluating contamination is a series of samples extending from around 20,000 years, where C^{14} ages should be reliable, back to 75,000 years or beyond.

Finally, Oeschger (Bern) described a very small gas counter having a volume of 40 cm³, designed to analyze CO₂ extracted from glacial ice. Even with so small a detector almost one ton of ice must be melted to yield sufficient CO₂ for radiocarbon measurement.

In the field of natural tritium measurement, it is often necessary to enrich the H³ prior to counting in order to attain adequate sensitivity. Customarily this has been done by water electrolysis, one installation of which was described by Cameron and Payne (International Atomic Energy Agency,

Vienna). Enrichment using thermal diffusion has lately been considered; the conference heard reports on this technique from Sellschop (South Africa) and von Buttlar and Wiik (Darmstadt). Enrichment by use of a gas chromatographic column was described by Smith and Ahktar (Tennessee) but is not as yet applicable to natural levels.

Isotopic enrichment is often unnecessary where bomb-produced tritium is sufficiently abundant. In this case proportional counting has been used without enrichment. Von Buttlar, Wohlfahrt, and Farzine (Darmstadt) generate hydrogen from natural waters and use it to hydrogenate inactive ethylene to ethane, which they count. Lal (Bombay) described a process to produce tritiated methane from water in one stage. His reactor is loaded with sample water, zinc metal, and inactive CO₂ gas; the net reaction is $CO_2 + 2H_2O + 4Zn \rightarrow 4ZnO + CH_4$. This same reaction can be used for C^{14} measurements, in which case the CO₂ is sample-derived and the water is inactive.

The conferees considered the question of the best half-life to use in reporting C^{14} ages to the journal *Ra-*

diocarbon. A similar discussion was held during the 1962 Cambridge Conference as a result of three new measurements of half-life (1) that showed the accepted value of 5568 years to be low by 3 percent. Majority opinion in both the Cambridge (2) and Pullman (3) conferences was for retaining the old value for the sake of uniformity in publication while at the same time suggesting a correction factor of 1.03 to be applied for greater accuracy.

One of the highlights for many was the all-day field trip which provided a change of pace in the middle of the conference week. The itinerary included the Palouse hills of Pleistocene loess deposits, the channeled scablands where Pleistocene flood waters have exposed and scoured Tertiary basalt flows of the Columbia Plateau, and the Marmes Rock Shelter at the confluence of the Palouse and Snake Rivers. The latter has been excavated by Washington State University archeologists who have exhumed several human skeletons antedating the Mazama ash fall of 6500 years ago. Guides for the field trip were Richard Daugherty in archeology, Roald Fryxell in geology, and James Crosby in geohydrology.

EDWIN A. OLSON

Whitworth College,
Spokane, Washington

R. M. CHATTERS

Washington State University, Pullman

References

1. W. B. Mann, W. F. Marlow, E. E. Hughes, *Intern. J. Appl. Radiation Isotopes*, **11**, 57 (1961); I. U. Olsson, I. Karlen, A. H. Turnbull, N. J. D. Prosser, *Arkiv Fysik* **22**, 237 (1962); D. E. Watt, D. Ramsden, H. W. Wilson, *Intern. J. Appl. Radiation Isotopes* **11**, 68 (1961).
2. H. Godwin, *Nature* **195**, 984 (1962).
3. F. Johnson, *Science* **149**, 1325 (1965).

Forthcoming Events

December

20-21. **Molecular Transport and Rate Phenomena**, 32nd annual chemical engineering symp., Stanford Univ., Stanford, Calif. (A. Acrivos, Dept. of Chemical Engineering, Stanford Univ., Stanford, Calif.)

20-21. **Nuclear Medicine**, 2nd natl. congr., Tel Aviv, Israel. (P. Czerniak, Israel Atomic Commission, Soreq Nuclear Research Center, Doar Yavne)

20-22. **British Biophysical Soc.**, 20th winter meeting, London, England. (R. E. Burge, Physics Dept., Queen Elizabeth College, Campden Hill Rd., London W.8)

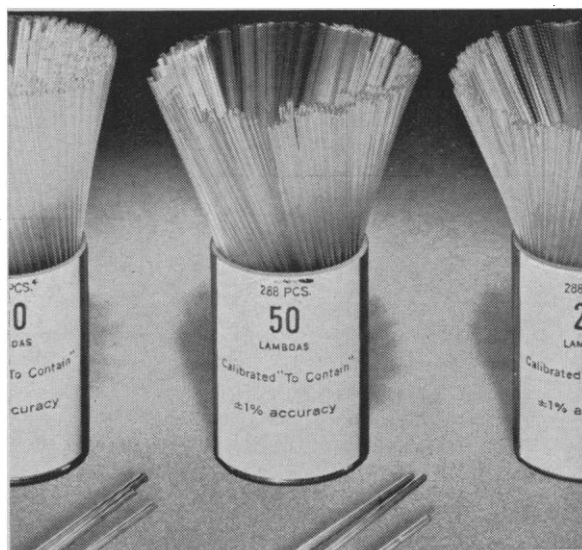
20-22. **American Physical Soc.**, Los Angeles, Calif. (W. Whaling, California Inst. of Technology, Pasadena 91109)

When
little
things
mean
a lot



scientific
products

GENERAL OFFICES:
1210 LEON PLACE
EVANSTON, ILLINOIS



Because they mean a lot to you, they mean a lot to us. That's why S/P maintains 16 distribution centers, offers more than 30,000 items. For example — disposable, color-coded diSPo Pipets for micro sampling—calibrated to contain to $\pm 1\%$. We guarantee you'll enjoy using them. They can mean a lot in your laboratory.

No. P4518X—diSPo® Micro Pipets

Capacity, ml.

0.02 (20λ)
0.025 (25λ)
0.05 (50λ)
0.1 (100λ)

Package
of 288

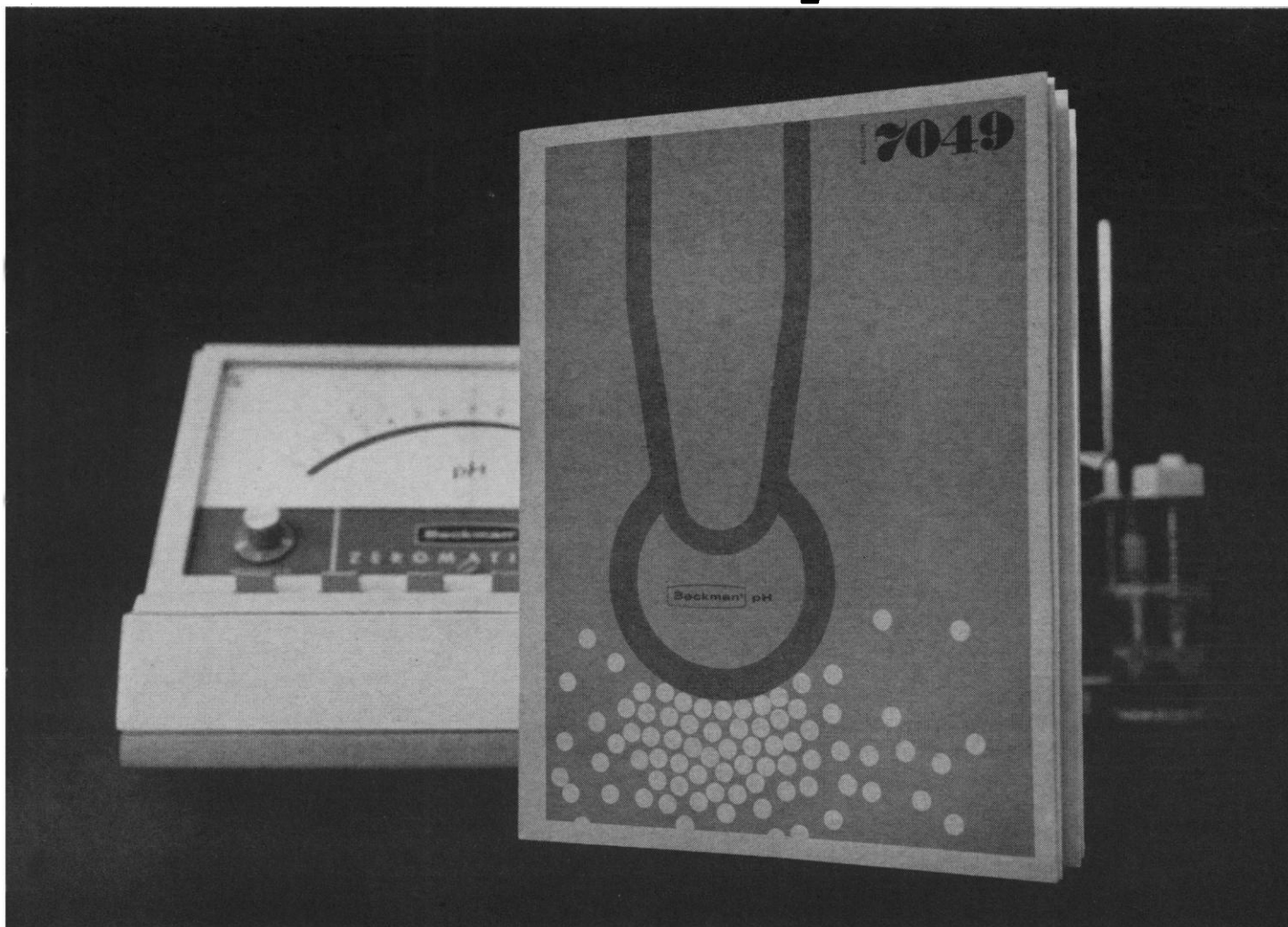
\$14.40
(5¢ each)

6 pkgs.,
pkg.

\$12.30
(4.3¢ each)

Send for your free copy of the S/P 1965 Glassware Catalog.

The last word in pH



It's Beckman Bulletin 7049.

It contains the latest information on pH instrumentation, electrodes, and accessories. It offers comparison data to help you make the right equipment selections. It introduces you to the new concept of Beckman pH — total pH capability.

There are 60 pages to acquaint you with every facet of pH—pH meters, blood pH systems, accessories, electrodes, supplies, titrators—and the in-depth service which accompanies every Beckman product.

Add Bulletin 7049 to your reference shelf. You'll have a comprehensive source from which to order pH equipment as your particular needs arise. There's a free copy for you. Contact your Beckman Sales Engineer, or write for Data File LpH-165. You'll also receive the Beckman Catalog of pH Electrodes.

Get the last word in pH now
...it's from the first and foremost
manufacturer of pH equipment!

Beckman®

INSTRUMENTS, INC.
SCIENTIFIC AND PROCESS
INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA • 92634

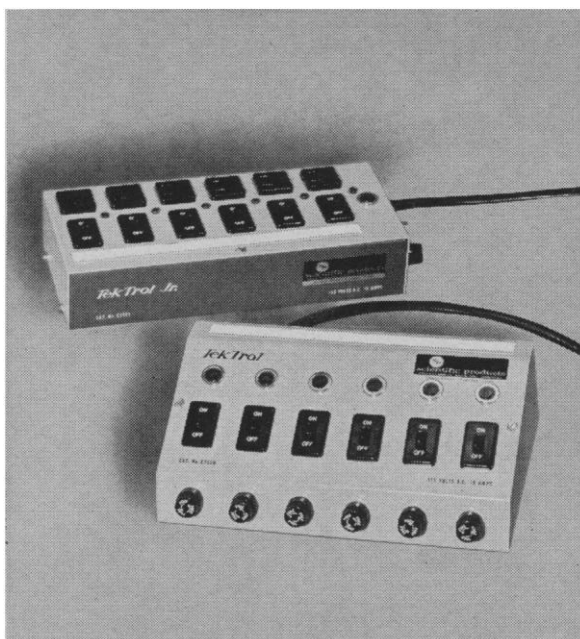
INTERNATIONAL SUBSIDIARIES: GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPE TOWN, SOUTH AFRICA

When
little
things
mean
a lot



scientific
products

GENERAL OFFICES:
1210 LEON PLACE
EVANSTON, ILLINOIS



Because they mean a lot to you, they mean a lot to us. That's why S/P maintains 16 distribution centers, offers more than 30,000 items. For example—compact TekTrol Outlet Boxes with six outlets. They provide an orderly system if you're a victim of inadequate laboratory outlets. They can mean a lot in your laboratory.

No. E2500X—S/P TekTrol, with 6 universal outlets individually fused, 30 amp rating, 115 volts A.C. Each\$27.50

No. E2501X—S/P TekTrol Jr., similar to E2500X but with one master 15 amp fuse. Each\$17.50

Order today—satisfaction guaranteed.

YOUR RESEARCH
DESERVES THE
BEST REAGENTS

NEW
REDUCED
PRICES on

6-Bromo-2-naphthyl-
alpha-D-glucoside

DPN DPNH

8-Hydroxyquinoline
glucuronide

TPN TPHN

Write for
SPECIAL PRICE LIST
to Department S-105.

Dajac LABORATORIES

The Borden Chemical Company
6000 Langdon Street • Box 9522
Philadelphia 24, Pa.

Anatol Rapoport
Albert M. Chammah

Prisoner's Dilemma

This book explores the nature of conflict in the deceptively simple game from which the book takes its title. If two players cooperate, they both win; if they don't, they both lose. But they can cooperate only if each trusts the other, and the game is so structured that there is no rational basis for trusting. Moving beyond game theory, *Prisoner's Dilemma* builds a bridge between scientific psychology (based on hard data and reproducible experiments) and the psychology of complex inner motivations which create conflict and human strife.

272 pages \$7.50



The University of Michigan Press
Ann Arbor

26-31. American Assoc. for the Advancement of Science, annual, Berkeley, Calif. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., NW, Washington, D.C. 20005)

In addition to the 20 sections of the Association and five AAAS committees, the following organizations have arranged sessions at the AAAS annual meeting 26-31 December at Berkeley:

Mathematics

American Mathematical Soc. (R. S. Pierce, Univ. of Washington, Seattle)

Association for Computing Machinery. (H. D. Huskey, Univ. of California, Berkeley)

National Council of Teachers of Mathematics. (J. D. Gates, 1201 16 St., NW, Washington, D.C.)

Society for Industrial and Applied Mathematics. (J. H. Griesmer, IBM, Yorktown Heights, N.Y.)

Physics

American Astronautical Soc. (P. B. Richards, General Precision, Little Falls, N.J.)

Chemistry

American Chemical Soc., California Section. (R. L. LeTourneau, Chevron Research Co., Richmond, Calif.)

Astronomy

American Astronomical Soc. (G. C. McVittie, Univ. of Illinois, Urbana)

Geology and Geography

Association of American Geographers. (M. Mikesell, Univ. of Chicago, Chicago, Ill.)

National Geographic Soc. (R. Gray, 17th & M Sts., NW, Washington, D.C.)

National Speleological Soc. (G. W. Moore, U.S. Geological Survey, Menlo Park, Calif.)

Zoological Sciences

American Fisheries Soc. (H. K. Chadwick, California Dept. of Fish and Game, Sacramento)

American Soc. of Zoologists. (A. G. Richards, Univ. of Minnesota, St. Paul)

Animal Behavior Soc. (E. M. Banks, Univ. of Illinois, Urbana)

Herpetologists' League. (F. B. Turner, Univ. of California, Los Angeles)

Society of Systematic Zoology. (J. G. Rozen, Jr., American Museum of Natural History, New York, N.Y.)

Zoological and Botanical Sciences

American Soc. of Naturalists. (C. Hubbs, Scripps Inst. of Oceanography, La Jolla, Calif.)

Ecological Soc. of America. (G. M. Woodwell, Brookhaven Natl. Laboratory, Upton, L.I., N.Y.)

Western Soc. of Naturalists. (J. M. Craig, San Jose State College, San Jose, Calif.)

Psychology

Western Psychological Assoc. (G. A. Mendelsohn, Univ. of California, Berkeley)

Does opportunity knock on a part-time basis? **YES!**

If you have had experience in a research library, a university library . . . or are a scientist, professor or documentalist in the technical field and have a desire to add to your present income . . .

Opportunity Is Knocking Right Now!

Do you know of a mass of information, unwieldy in its present form, which could be used effectively in your particular field if properly organized and reproduced on microforms? We are seeking people with ideas for such programs . . . people who not only have ideas but also the ability to convert ideas into profitable publishing programs.

If you are such a person, you'll be interested in what we have to offer. The opportunity is excellent . . . and can be handled exceptionally well without conflict with your present occupation. The people we select for this vital facet of our business will become associated with an active, aggressive, international company, a pioneer and leader in the microform industry.

All replies will be kept in strictest confidence. Please write, giving full details. If qualified, a personal interview will be arranged.

**Dept TT
2533 Eye Street
Washington, D.C. 20037**

Social and Economic Sciences

American Economic Assoc. (R. R. Nelson, RAND Corp., Santa Monica, Calif.)
American Political Science Assoc. (J. F. Triska, Stanford Univ., Stanford, Calif.)
American Soc. of Criminology. (C. Newman, Univ. of Louisville, Louisville, Ky.)
American Sociological Assoc. (W. Form, Michigan State Univ., East Lansing)
Metric Assoc. (R. Fischelis, Ohio Northern Univ., Ada)
National Inst. of Social and Behavioral Science. (D. P. Ray, 863 Benjamin Franklin Station, Washington, D.C.)
Population Assoc. of America. (E. S. Lee, Univ. of Pennsylvania, Philadelphia)
Society for the Scientific Study of Religion. (C. Y. Glock, Univ. of California, Berkeley)

History and Philosophy of Science

Philosophy of Science Assoc. (C. W. Churchman, Univ. of California, Berkeley)
Society for General Systems Research. (H. Thal-Larsen, Univ. of California, Berkeley)
Science Courses for Baccalaureate Education Project. (V. L. Parsegian, Rensselaer Polytechnic Inst., Troy, N.Y.)

Medical Sciences

Alpha Epsilon Delta. (M. L. Moore, 7 Brookside Circle, Bronxville, N.Y.)
American Assoc. of Bioanalysts, Western Region. (M. Menesini, 1287 Rudge Rd., Walnut Creek, Calif.)
American Physiological Soc. (R. M. Iverson, Univ. of Miami, Coral Gables, Fla.)
American Soc. for Microbiology, Northern California-Hawaiian Branch. (K. J. Taylor, Cutter Laboratories, Berkeley, Calif.)
California Veterinary Medical Assoc. (A. G. Edward, Univ. of California, Davis)
Society for Experimental Biology and Medicine, Pacific Coast Section. (E. L. Dobson, Donner Laboratories, Univ. of California, Berkeley)

Education

Commission on Science Education. (J. R. Mayor, AAAS, 1515 Massachusetts Ave., NW, Washington, D.C. 20005)
American Nature Study Soc. (H. E. Weaver, Univ. of Illinois, Urbana)
National Assoc. for Research in Science Teaching. (F. B. Dutton, Michigan State Univ., East Lansing)
National Assoc. of Biology Teachers. (H. K. Wong, Menlo-Atherton High School, Atherton, Calif.)
National Science Teachers Assoc. (A. F. Eiss, 1201 16 St., NW, Washington, D.C.)

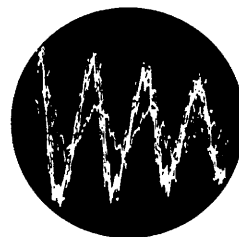
Information and Communication

National Assoc. of Science Writers. (L. S. Zahn, Hill and Knowlton Inc., 150 E. 42 St., New York, N.Y.)
Society of Technical Writers and Publishers. (G. Marx, Illinois Inst. of Technology, Chicago)

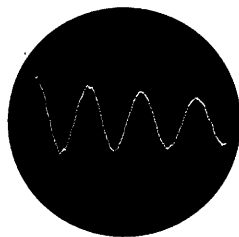
Statistics

BIO: Biomedical Information-Processing Organization. (M. Woodbury, New York Univ. Medical Center, New York, N.Y.)

we'd like to clear something up...



That's Noise! Your electronic signal may contain the information you want, but unrelated noise may be obscuring it. Regardless of the frequency range of the noise and signal, Enhancetron will clarify the picture.



That's Enhancetron! See how your signal comes through loud and clear. That's because Enhancetron 1024 Portable Signal Averaging Digital Computer adds everything up, noise included. Repetitive signals add in direct proportion to the number of samples taken; noise adds in proportion to the square root. The signal literally "grows" out of the noise.

This new measurement tool brings greater speed, accuracy, and efficiency to noise reduction in every branch of science—yet it costs much less than earlier models of lower resolving power.



ENHANCETRON® Portable Signal Averaging Digital Computer, with 1024-word magnetic core memory.

Let us clear up questions you have. Write us for ENHANCETRON literature.

Please send me more information on ND 800—Enhancetron 1024

Name

Company

Address

City State Zip

ND NUCLEAR DATA INC
120 WEST GOLF ROAD, PALATINE, ILL. 60067

FOUNDATIONS OF MODERN ORGANIC CHEMISTRY SERIES

Edited by **Kenneth L. Rinehart, Jr.**, University of Illinois

"The series approach to undergraduate organic chemistry offers . . . the considerable advantages of an authoritative treatment by teachers active in research, of frequent revision of the most active areas, of a treatment in depth of the most fundamental material, and of nearly complete flexibility in choice of topics to be covered. Individually, the volumes . . . provide introduction in depth to the basic areas of organic chemistry; together they comprise a contemporary survey of organic chemistry at an undergraduate level."—*from the Editor's Preface.*

1965 PUBLICATIONS

APPLICATIONS OF ABSORPTION SPECTROSCOPY OF ORGANIC COMPOUNDS

John R. Dyer, Georgia Institute of Technology.

This new book is devoted to the practical aspects of the interpretation of the three most common types of spectral data with which the organic chemist now deals—ultraviolet, infrared, and nuclear magnetic resonance spectroscopy. 143 pp., paper \$2.50, cloth \$5.50

IONIC ALIPHATIC REACTIONS

William H. Saunders, Jr., University of Rochester.

Studies of the several types of reactions in organic chemistry are encompassed by this book—ionic addition, substitution, and elimination reactions of aliphatic compounds; the characteristics of each are examined. Mechanistic considerations are a dominant theme. 113 pp., paper \$1.95, cloth \$4.50

STRUCTURES OF ORGANIC MOLECULES

Norman L. Allinger and Janet Allinger, both of Wayne State University. The first book at this level that divorces the structures of organic molecules from chemical reactions, this text discusses structure from the modern physical viewpoint. A brief review of atomic structure is included. 128 pp., paper \$2.50, cloth \$4.95

FORTHCOMING IN THE SERIES

FUNCTIONAL GROUPS IN ORGANIC COMPOUNDS, *Orville L. Chapman and Walter Trahanovsky*

INVESTIGATION OF ORGANIC REACTIONS, *Ross Stewart*
CHEMISTRY OF CARBONYL COMPOUNDS, *G. David Gutsche*
INTRODUCTION TO FREE RADICAL CHEMISTRY, *William A. Pryor*

AROMATIC SUBSTITUTION REACTIONS, *Leon M. Stock*

ORGANIC SYNTHESIS, *Robert E. Ireland*

COMPOUNDS OF NATURE, *Richard K. Hill*

OXIDATION AND REDUCTION OF ORGANIC COMPOUNDS

Kenneth L. Rinehart, Jr.

MOLECULAR REACTIONS AND PHOTOCHEMISTRY, *Charles H. DePuy*

RESEARCH IN ORGANIC CHEMISTRY, *Robert B. Bates and John P. Schaefer*

HETEROCYCLIC COMPOUNDS, *Edward C. Taylor*

ORGANIC CHEMISTRY OF BIOLOGICAL COMPOUNDS, *Robert Barker*

INDUSTRIAL ORGANIC CHEMISTRY, *John K. Stille*

X-RAY CRYSTALLOGRAPHY AND MASS SPECTROMETRY OF ORGANIC COMPOUNDS, *Kenneth L. Rinehart and George A. Sim*

For approval copies, write: Box 903

PRENTICE-HALL
Englewood Cliffs, N.J.

NEW LABELED NUCLEOSIDES

Specific
Activity

Deoxyadenosine-8-C¹⁴ > 30 mc/mM

Deoxycytidine-2-C¹⁴ 20-30 mc/mM

Deoxyuridine-2-C¹⁴ 20-30 mc/mM

Deoxyuridine-6-H³ > 5 Curies/mM

Write for prices



HAncock 6-7311

NEW ENGLAND NUCLEAR CORP.
575 ALBANY STREET, BOSTON 18, MASSACHUSETTS

Miniature Micromanipulator

with metal rod assembly



This Manipulator is indispensable where limited space is available. It has smooth precise "X" "Y" and "Z" movements, each graduated with scales and verniers. \$150.

eric  **sobotka company, inc.**
IMPORTERS AND DISTRIBUTORS OF MICROSCOPES AND SCIENTIFIC INSTRUMENTS

110 WEST 40TH STREET, NEW YORK, NEW YORK 10018, • AREA CODE 212 WISCONSIN 7-9216