SCIENCE

27 September 1963

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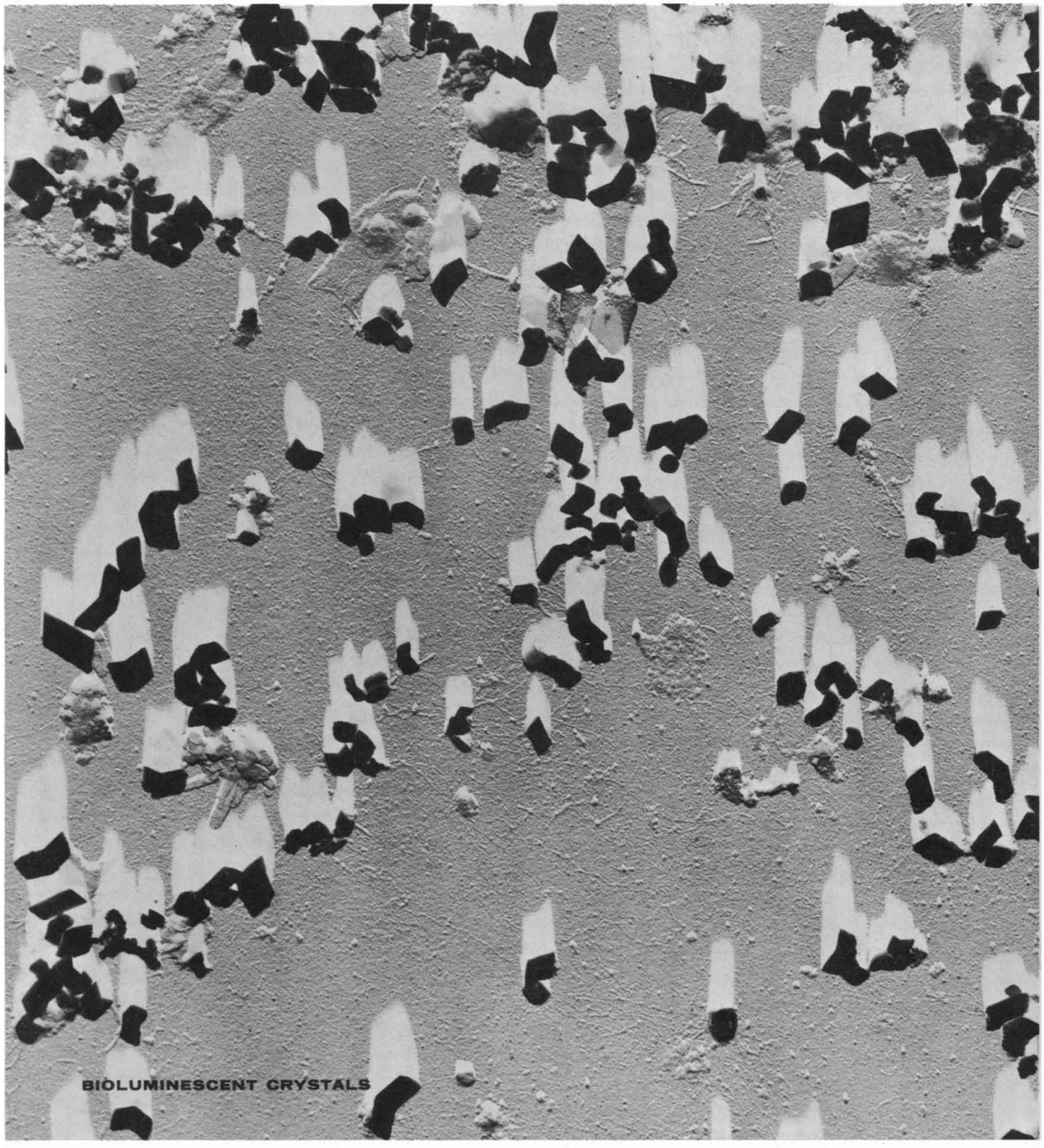
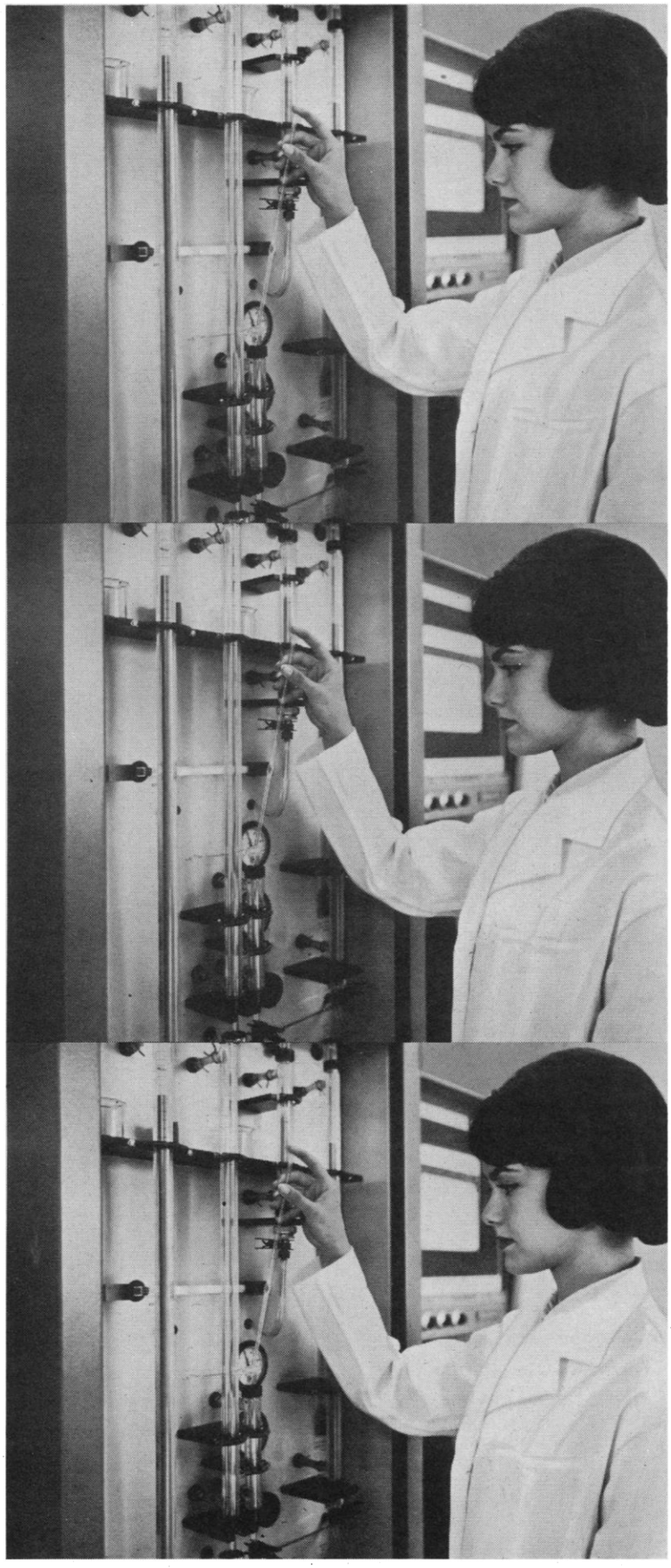
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



BIOLUMINESCENT CRYSTALS

Index Issue



NOW YOU CAN GET THREE COMPLETE AMINO ACID ANALYSES A DAY

(—and use smaller samples to do it!)

The Model 120B Amino Acid Analyzer with the new Accelerated Analysis procedure cuts the time for analyzing a protein hydrolyzate from 22 hours to 6½ hours. This new procedure means you can complete the first run by early afternoon, and get a second run programmed for automatic completion—all in the same working day. A third complete analysis is possible by coming in for two hours in the evening.

Equally good news—you now need less of your valuable sample. As little as 0.05 micromole (less than half the size formerly required with the Model 120B) gives the same accurate results.

Laboratories presently owning Beckman Amino Acid Analyzers (and some own as many as three) can employ the new Accelerated Analysis procedure with only minor changes.

If your work involves analyzing protein hydrolyzates, body fluids, tissue extracts, foods or pharmaceuticals, why not let the Beckman Analyzer take over the repetitive work for you. For more information, write for Data File 120-5.

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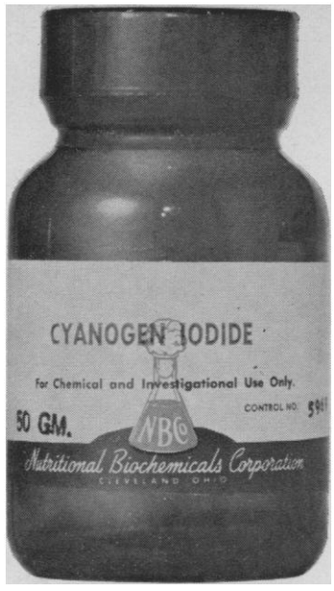
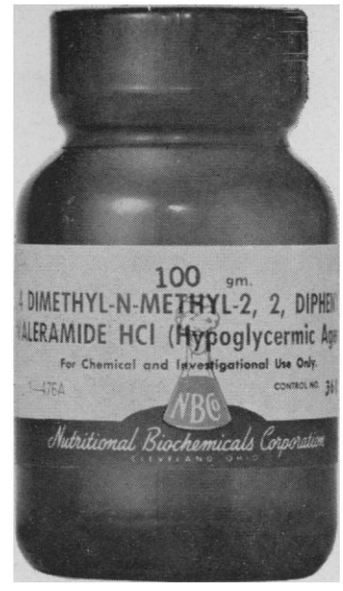


Two from N·B·C !



ICN MIMICS EFFECTS OF THYROXINE ON ISOLATED LIVER MITOCHONDRIA

Cyanogen Iodide (ICN) has been found to mimic in most respects Thyroxine's effects on isolated liver mitochondria (1). It is stable in water and serves as a donor of I+.

ICN behaves like Thyroxine in these respects:

1. A quantity as small as 10^{-6}M produces substantial water uptake and swelling in rat liver mitochondria. As with Thyroxine, ICN-produced swelling is inhibited by serum albumin and strong sucrose (0.75M).

2. Antimycin A, Amytal and Cyanide also inhibit ICN-produced swelling. Thyroxine has been reported to display similar properties. (2,3).

3. EDTA is effective against ICN-produced swelling. It is also effective against thyroxine (4).

4. ATP causes rapid shrinking of ICN-swollen mitochondria. It behaves exactly the same with Thyroxine-caused swelling. (5).

25-gram bottle, $1.50 gm. 5-gram bottle, $1.90 gm.
1-gram bottle, $2.25 gm.

(1) J. E. Rall, J. Roche, R. Michel, O. Michel, S. Varonne, Biochem. Biophys. Acta. 62, 622, (1962). (2) A. L. Lehninger, B. L. Ray, M. Schneider, J. Biophys. Biochem. Cytol. 5, 97, (1959). (3) A. L. Lehninger, B. L. Ray, Biochem. Biophys. Acta. 26, 643, (1957). (4) D. F. Tapley, J. Biol. Chem. 222, 325, (1956). (5) A. L. Lehninger, Ibid. 234, 2187, (1959).

UNIQUE HYPOGLYCEMIC AGENT FOUND FOUR TIMES AS POTENT AS TOLBUTAMIDE

4 Dimethyl Amino-N-Methyl 2, 2 Diphenyl Valeramide HCl was recently reported to be four times as potent as tolbutamide in lowering blood sugars.

It appears to act through a different mechanism than hypoglycemic agents which increase the oxidation of glucose.

Dulin, et. al. conclude that 4 D.M.D.V. appears to act by inhibiting liver glucose output—not by glucose oxidation or inhibition of metabolic effect of adrenal hormones. (1)

10-gram bottle, $4.50 gm. 5-gram bottle, $4.90 gm.
1-gram bottle, $5.50 gm.

(1) W. E. Dulin, F. L. Schmidt, M. C. Blanks, G. H. Luna, Proc. Soc. Exptl. Biol. Med. 109, 729, (1962).

All chemicals described are for chemical and investigational use only. They are not offered for clinical or drug use. The literature reference should not be interpreted as either an endorsement or disapproval of the biochemical by the cited investigator.

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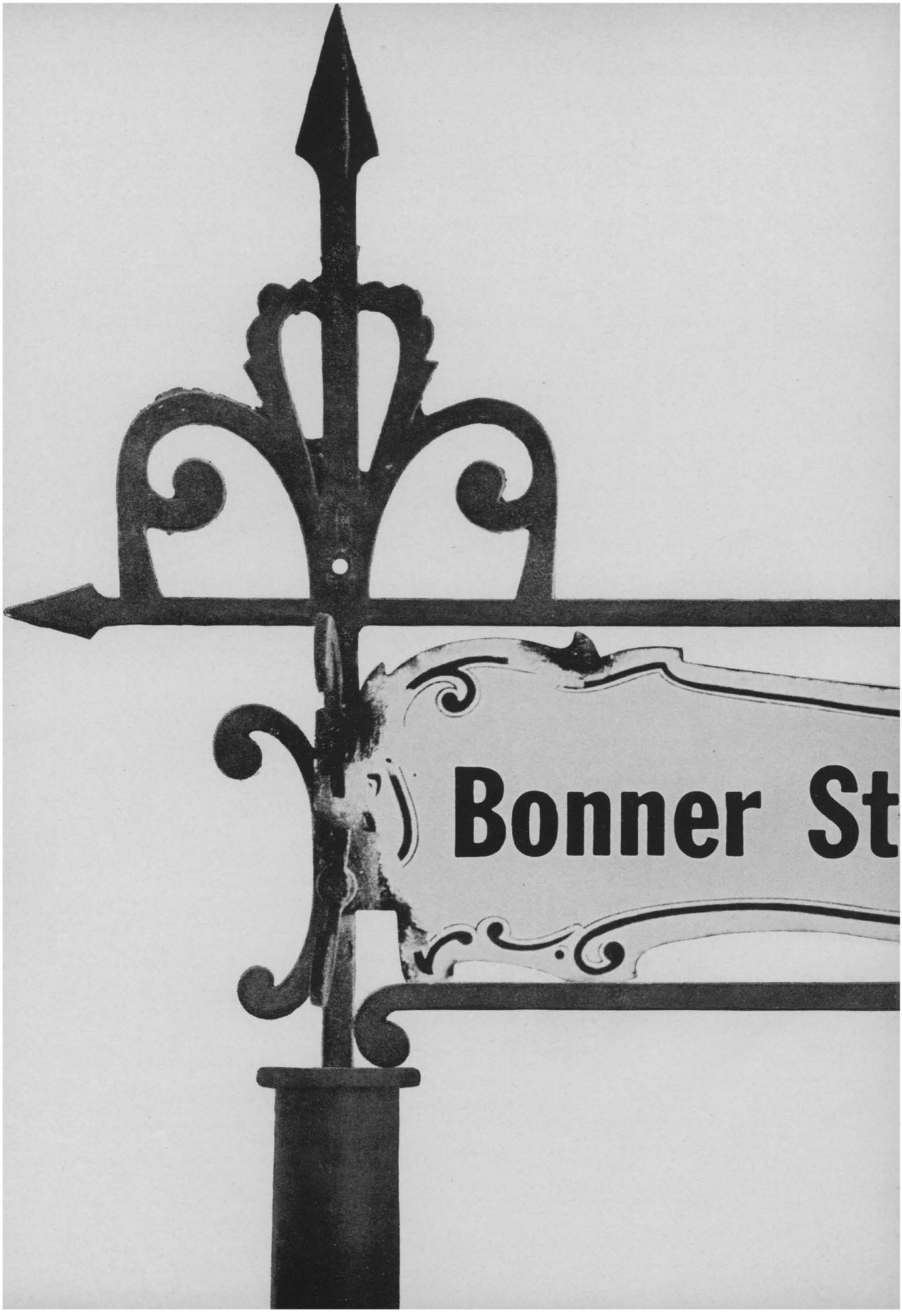
COVER

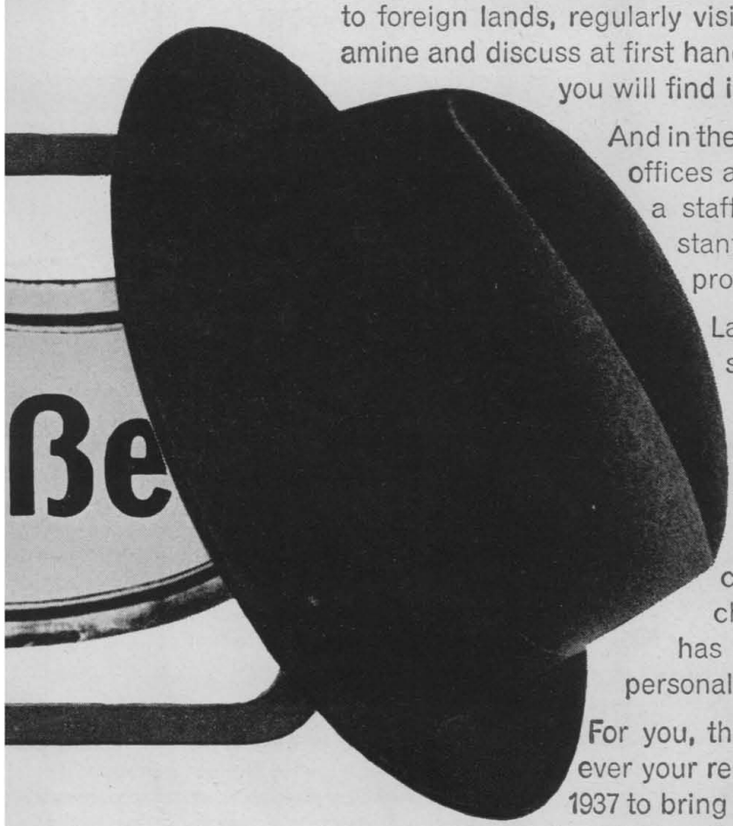
Electron micrograph of a newly discovered type of biologically active crystalline particle isolated from the dinoflagellate *Gonyaulax polyedra*. The organism is responsible for much of the bioluminescence seen in the ocean when the water is disturbed. The micrograph was obtained from a partially purified fraction of these particles that had been dried on a collodion film and shadowed (about × 24,000). See page 1269.


Bonner St

the last time we saw Mr. LaPine he was in Köln

His destination—E. Leybold's Nachfolger, where a line of world-famous high vacuum pumps is being manufactured for distribution in the U.S. exclusively through the LaPine Scientific Company.

As president of the LaPine Scientific Company, Mr. LaPine travels often to foreign lands, regularly visits American manufacturing plants, to examine and discuss at first hand the instruments, equipment and supplies you will find in LaPine catalogs and brochures.



And in the Chicago, New York and Berkeley, California offices and warehouses of the LaPine organization, a staff of equally dedicated men are also constantly on the lookout for the finest in scientific products to meet your needs.

LaPine is big—big enough to maintain its own specialty items manufacturing facilities, its own instrument testing and service department and an installation department ready at all times to install equipment in your laboratory or plant. Big enough to stock for your convenience a vast array of physics, chemistry and teaching apparatus in a wide choice of models and brands. Yet LaPine has never deviated from its basic concept of personal service to its customers.

For you, this means an always reliable source, whatever your requirements—an organization established in 1937 to bring to the scientific community, to schools and to industry, the most advanced, most sophisticated, yet most practical and economical equipment and supplies.

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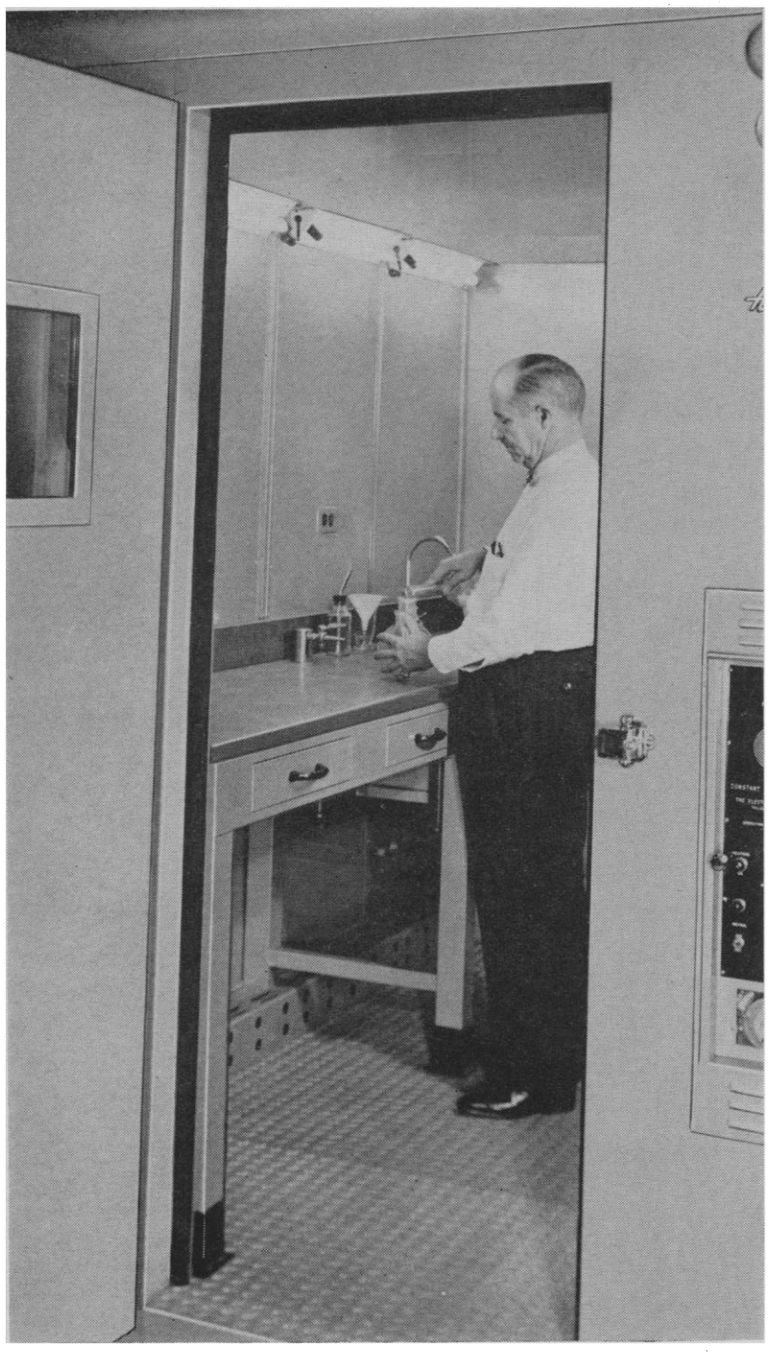


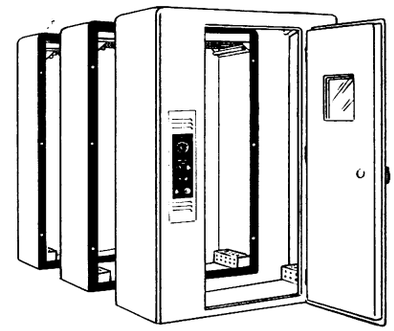
Hotpack walk-in Environmental Rooms are easily modified with built-in sinks, work benches of standard laboratory sizes. In addition, all utilities (water, gas, receptacles) are available to your specification. Standard rooms include six tiers of adjustable shelving on three walls . . . at no extra cost.

A FEW COMMON USES OF HOTPACK ROOMS

Working cold labs / Weather rooms / Moisture vapor transmission / Incubation / Animal studies / Insect rearing / Human factor studies / Plant growth / Dermatology studies / B.O.D. / Shelf testing.

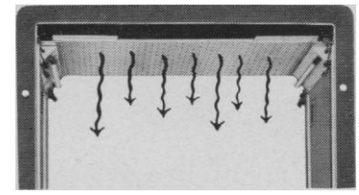
How standard Hotpack walk-in environmental rooms are easily modified to your special conditions.

Modifying Hotpack Walk-in Environmental room to your requirements, either in size or environment, is a relatively simple matter. Because these rooms are constructed in 4 ft. and 6 ft. wide modular sections, by adding standard center sections future expansion or reduction is easy, economical!



FLEXIBLE, MODULAR DESIGN

Doors may be hinged on the left or righthand, and even centered on the side for more width area! Shelving, too, is supplied along three walls and completely adjustable. Each room section is fully prewired and lighted by two fluorescent lamps. Sections bolt together quickly.



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Only Hotpack walk-in rooms have a unipass ceiling for maximum air circulation and temperature uniformity. The full length and width ceiling is perforated allowing pre-conditioned air to reach every section of the room. There are no "hot" or "dead air" spots!

- **0° to 40°C**
- **35° to 60°C**
- **—20° to +10°C**
- **10 to 98% Relative Humidity**

Hotpack rooms offer a full "world" of controlled environmental conditions in standard models! Temperature and humidity ranges have proved reliable in more than ten years of actual daily lab use and guaranteed pilot plant test results! Hotpack is the first name in walk-in environmental rooms.

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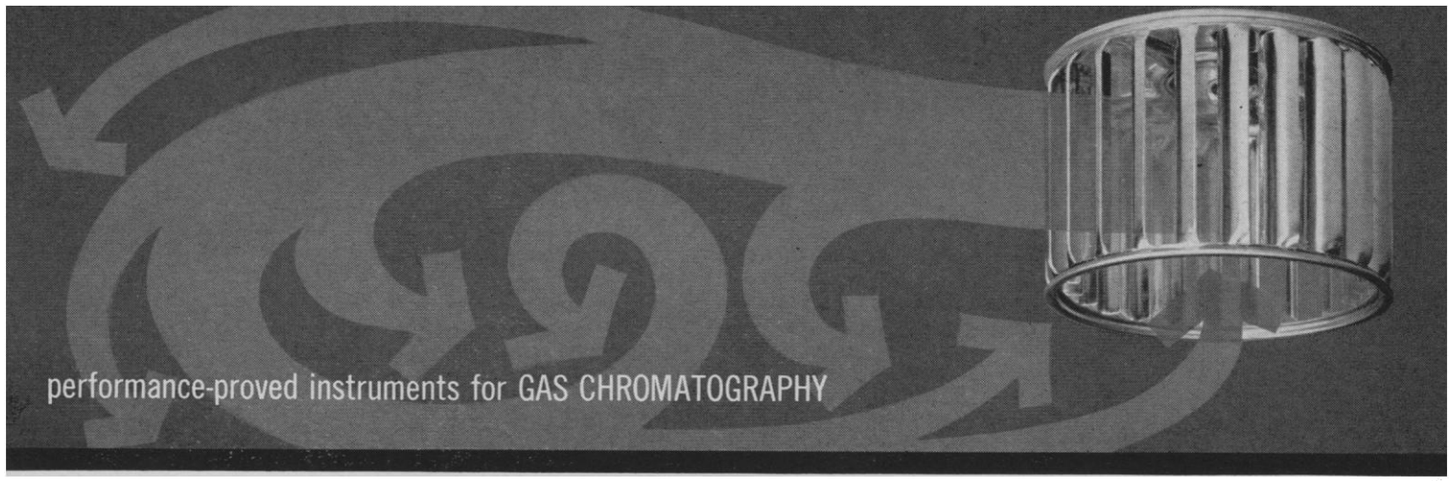

TWO NEW PERKIN-ELMER® GAS CHROMATOGRAPHS— WITH DYNATHERMAL FEATURE— AS LOW AS $1500

Both have it: the new "dynathermal" concept of programmed-temperature control that circulates air *five times a second,* giving you faster heating and cooling of columns — elimination of temperature gradients — and precise, simple temperature programming.

Both are dual-column instruments for baseline stability through automatic compensation of substrate bleeding in programmed analysis. Both have dual sample injectors to permit independent use of two different column materials when compensation is not needed. Both can perform temperature-programmed or isothermal analyses up to 350°C. And both cost far less than comparable instruments with similar capabilities.

Model 810: a differential flame detector instrument. Independent control of injection block and column oven temperatures. Uses packed and capillary columns. Costs $1,695.00. Delivery: now.

Model 820: equipped with a four-filament hot wire detector. Independent control of injection block, oven and detector temperatures. Operates with 1/8" packed columns up to 60 feet in length, or 1/4" packed columns up to 30 feet long. Provision for external sample collection. Price: $1,495.00. Delivery: now.

For details on these two low-cost instruments, and other gas chromatography products, write to Instrument Division, Perkin-Elmer Corporation, 910 Main Avenue, Norwalk, Connecticut.

Model R7 Recipro-Glide Shaker
Variable speed range: 65-200 strokes per min. Uniform 1½″ reciprocal stroke. Available with box carrier (illustrated), as well as with a variety of shaker platforms. Larger capacity model also offered. Holds 40/250-ml flasks*.

What Type of Shaker Do You Prefer?

Gyrotory®, reciprocating, water bath or incubator... there is a New Brunswick shaker to meet your particular requirements.

Over 25 different models are available with numerous holding devices and interchangeable shaking platforms for flask sizes from 10-ml to 6 liters, test tubes, separatory funnels, 5-gallon carboys, or other containers.

Ranging in size from bench-top shakers to large, 4-tier industrial models, this apparatus is available in a wide range of speeds and strokes. Some units are equipped with facilities for gassing; others are refrigerated and illuminated for low temperature and photosynthesis studies.

NBS shakers are precision-built with powerful drives for *continuous* operation and long life. Performance is smooth, quiet, and dependable regardless of speed and loading conditions. The apparatus is unconditionally warranted for one full year.

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NBS **New Brunswick Scientific Co., Inc.**
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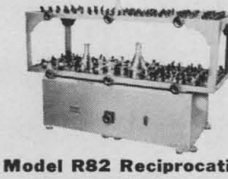
Manufacturers and Distributors of Precision Laboratory Apparatus

Model S-3 Gyrotory Shaker
Variable speed range: 85-285 rpm or 140-400 rpm. Uniform ¾″ stroke. Holds 25/250-ml flasks*.

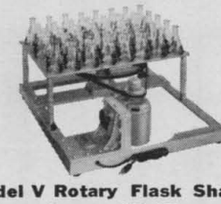
Model G76 Gyrotory Water Bath Shaker
Speed ranges: 85-285 rpm or 140-400 rpm. ½″ stroke. Temperature adjustable to 100° C ± 0.5 C. Cooling coil and gassing hood optional. Models available with reciprocal agitation. Holds 9/250-ml flasks*.

Model G10 Gyrotory Shaker
Variable speed range: 140-400 rpm or 50-150 rpm. Uniform 1″ stroke. Holds 40/250-ml flasks*. Larger platform holds 70/250-ml flasks*.

Model G25 Gyrotory Incubator-Shaker
Variable speed range: 140-400 rpm or 50-150 rpm. Uniform 1″ stroke. Thermostatic temperature control to 60° C ± 0.5° C. Optional connections for gassing. Larger refrigerated models also available. Holds 40/250-ml flasks*.

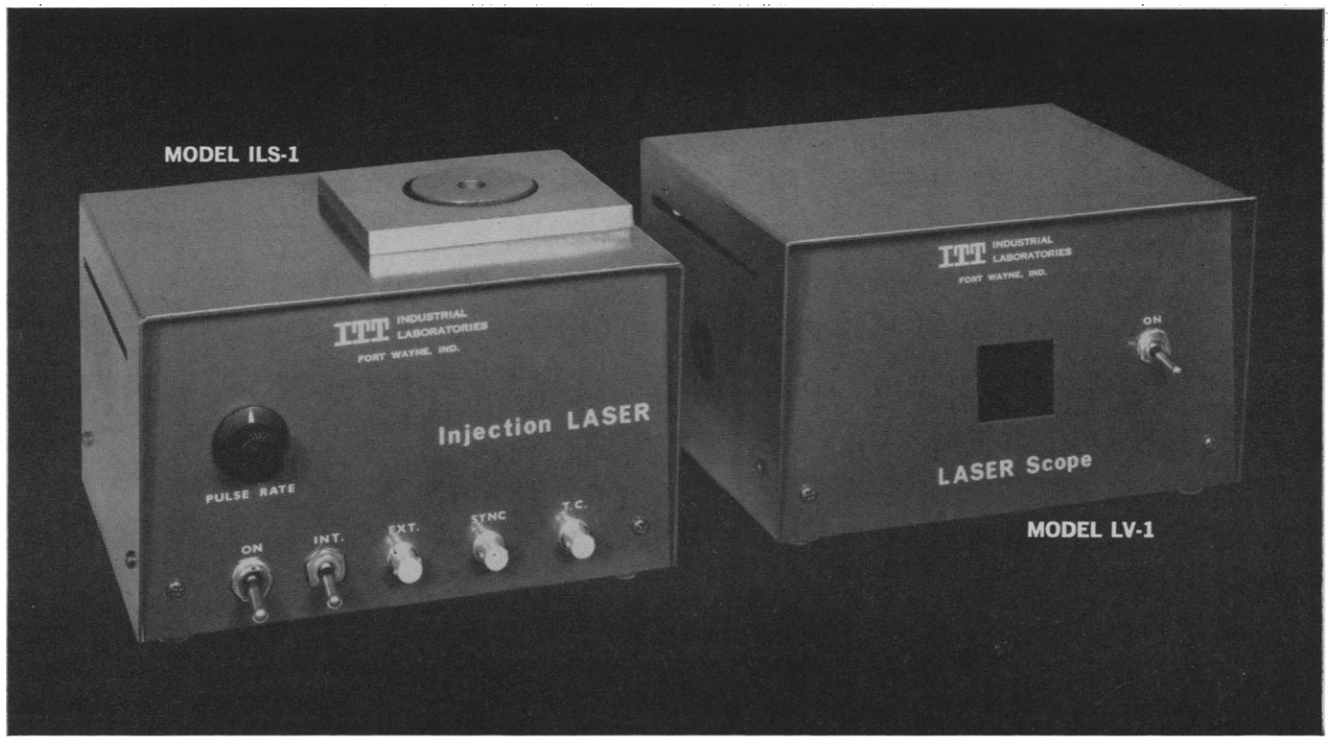


Model R82 Reciprocating Tier Shaker
Speed range: 35-200 strokes per min. Continuously adjustable stroke from 0-4″. Holds 192/250-ml flasks on 6 removable trays*.



Model V Rotary Flask Shaker
Variable speed range: 160-400 rpm or 100-250 rpm. 1″ stroke. Holds 40/250-ml flasks*.

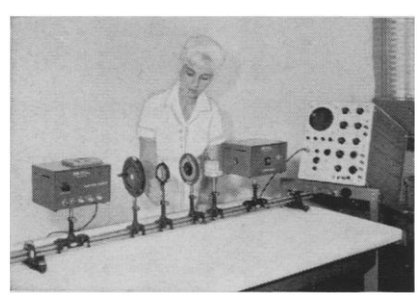
*** Accommodates a variety of flask sizes. 250-ml size used for comparing shaker capacities.**



New—GaAs injection laser system battery powered for portability—only $1690

Now, ITT Industrial Laboratories introduces a portable gallium arsenide injection laser system for only $1690. This "ready-to-use" laser system is especially designed for infrared optical study and research, particularly in the areas of communications and range-finding.

The system consists of laser and laser scope. Both laser and laser scope measure just 5″ x 6″ x 8″. The laser is powered by three penlite batteries and one 45-volt battery. Power supply for the laser scope consists of a single penlite battery. Maximum output is 90 mw at 8740 A. Peak power is more than 4 watts. Low threshold of only 4 amps at liquid nitrogen temperatures is possible because of the geometry of the gallium arsenide crystal.



ITT GaAs laser provides compact source for study of coherent infrared light

At liquid helium temperatures the diode will emit coherent cw and at liquid nitrogen temperatures it gives pulsed emission which can be varied from 100 to 1,000 pps. Pulse width is only 1.0 microsecond.

Both laser (Model ILS-1) and laser scope (Model LV-1) are available for immediate delivery. Laser is priced at $995. Laser scope, available separately for $695, can be adapted as a monitor for any source of infrared laser light. Send coupon today for further information. ITT Industrial Laboratories, a division of International Telephone and Telegraph Corporation, Fort Wayne, Indiana.

ITT

ITT INDUSTRIAL LABORATORIES, Dept. 61300
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Please send me more information on the GaAs injection laser system. The application I have in mind is:

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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.

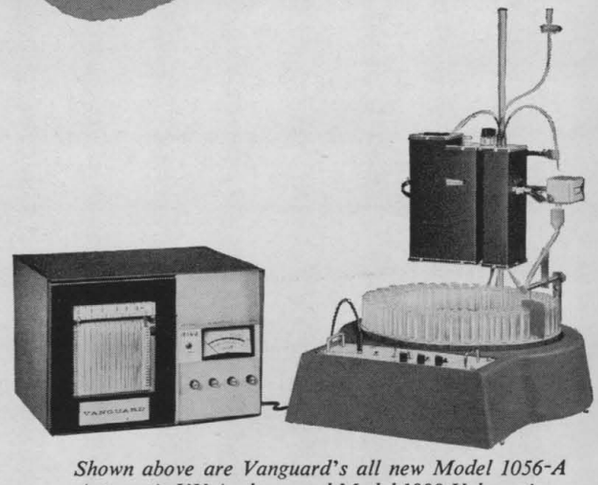
Q. How does the Vanguard Volumatic Fraction Collector affect hold-up and mixing?
A. In volumetrically controlled separations, hold-up and mixing are virtually eliminated between fractions.

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.

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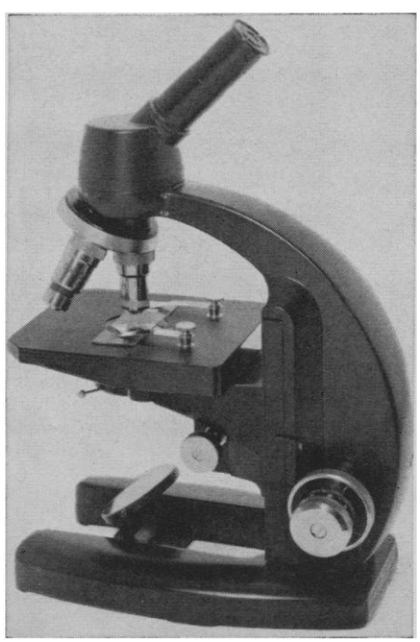
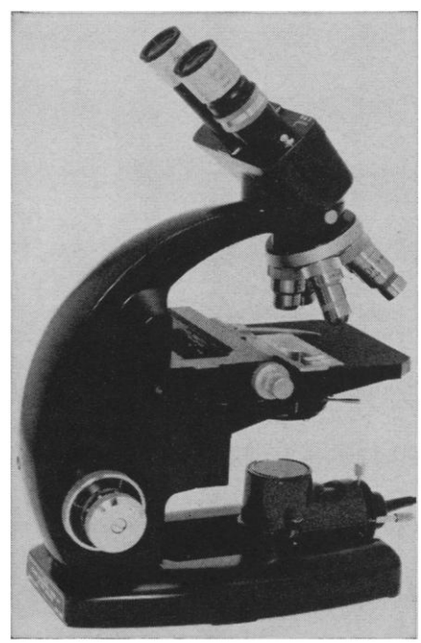
The M15 Microscope has proven itself as a robust, stable stand, fitted to meet modern standards of convenience and to stand up under many years of continuous routine use. The same stand is used for "student" models as for routine and semi-research binocular instruments. A wide selection of body tubes, stages, substages, objectives and eyepieces is available so that, commencing with a simple microscope, almost any degree of elaboration of optical capability can be achieved.

In redesign our first concern has been to produce an instrument of outstandingly superior stability. This has been achieved by fitting extra-long (5½") ball bearing focusing slides, set far apart so that they subtend an unusually wide angle at the optical axis. Thirty-two 3/16" dia. balls are used in the bearing tracks to assure smoothness of focusing, combined with a rigidity that is not approached in most so-called "research" microscope stands.



M15AR (Magnifications 100X — 400X) $266.

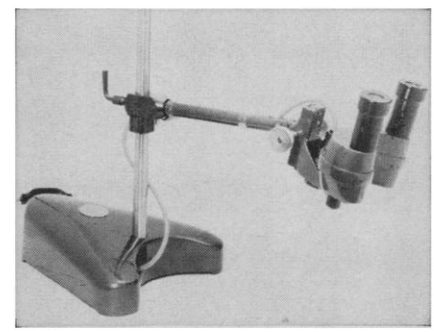
For those considering the M15 for teaching purposes we call attention to its hard wearing qualities and the built-in safeguards against accidental damage to focusing mechanism, specimen or optics. A friction clutch is fitted to the focusing motion; high power objectives are spring-mounted; it is impossible for an operator to damage the focusing mechanism, break a slide, push out an objective front lens or chip a condenser. The stand is finished in an exceedingly hard and durable epoxy black.



M15AM (Magnifications 50X — 1000X) $608.
(Including Microplan 40x objective and 10X Complan eyepieces)

An important reason for the M15's widening acceptance as a laboratory and hospital microscope is the MICROPLAN 40x flat-field objective and the COMPLAN 10X wide-and-flat-field eyepieces (with true compensating correction). The MICROPLAN gives an amazingly flat field — without any sacrifice of resolution or contrast. Moreover its design is such that it can be made comparatively inexpensively. It costs only seventeen dollars more than the standard 40X high-dry achromat — in contrast to the very high prices of the other flat-field designs available.

The Sterimag (Stereoscopic Microscope)



Sterimag (10X or 20X models) $175.

This instrument is widely used in industrial inspection work, but has also an important application as a student tool in teaching laboratories. Image quality is excellent, working distances are unusually large. Field of view diameters equal or exceed those obtained with more elaborate and more expensive stereoscopic microscopes.

Either a 10X or 20X model can be supplied; magnifications are fixed and cannot be changed. For routine observations and dissection, these magnifications are usually sufficient.

The eyepieces and objectives are locked in place and the instrument is virtually student-proof. A ruggedly constructed, universally adjustable pillar stand with heavy base increases its capabilities, as well as its suitability for student use.

A built-in light source, with focusable condensing system and adjustable mounting, gives high quality illumination conveniently and without the complications which come from use of an exterior lamp. Transformer for the lamp is mounted inside the base.

Low-priced, the Sterimag has many positive advantages for student and routine use.

Chicago Office

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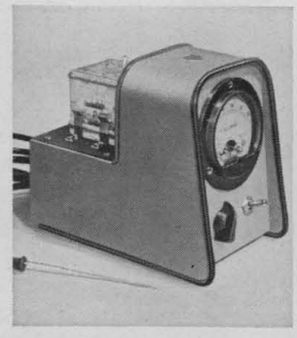

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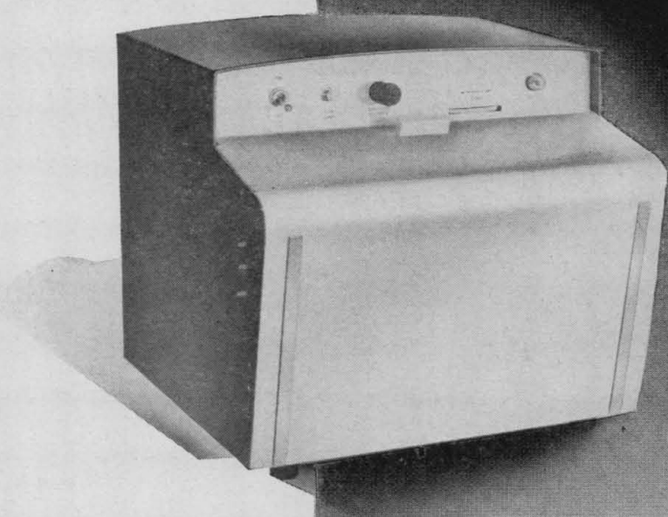

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*"*An Automated Fluorometric Method for the Determination of Serum Magnesium*" John B. Hill, Department of Pharmacology, University of North Carolina Medical School, Chapel Hill, N. C. Annals of New York Academy of Sciences, Vol. 102, Oct. 1962
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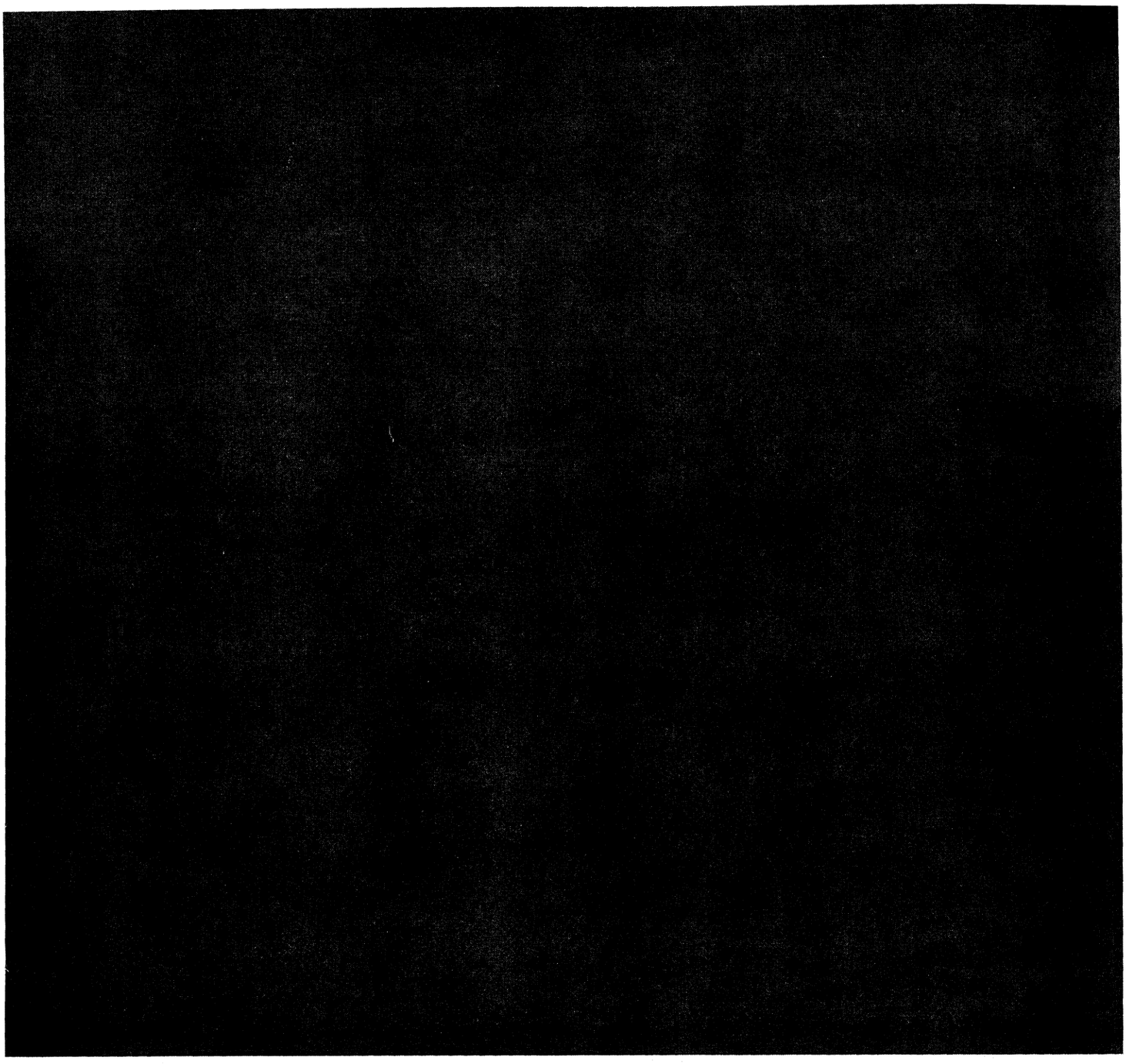

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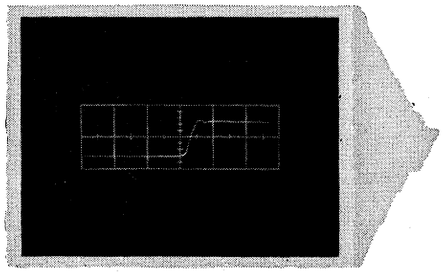

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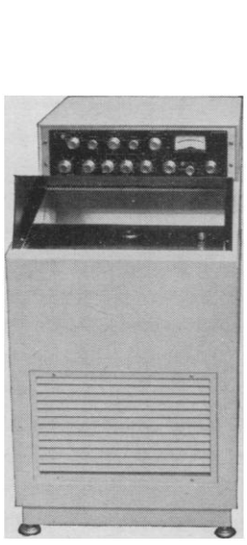

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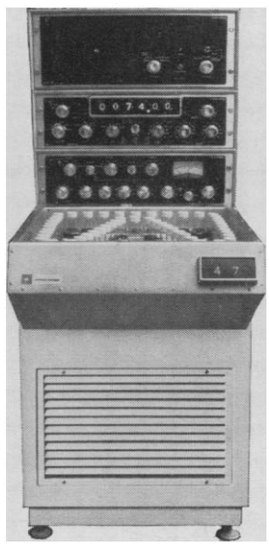

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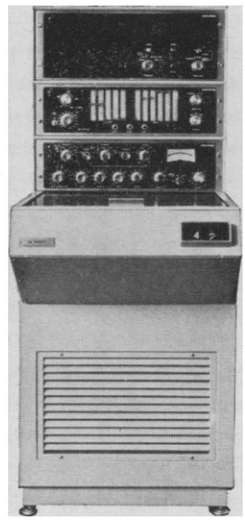

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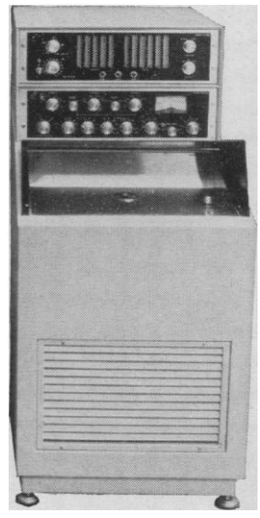

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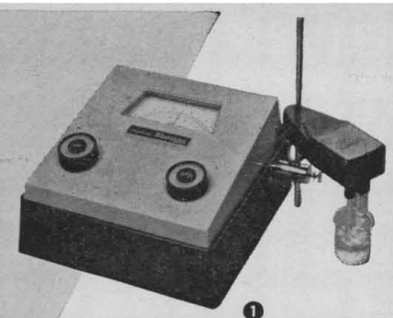

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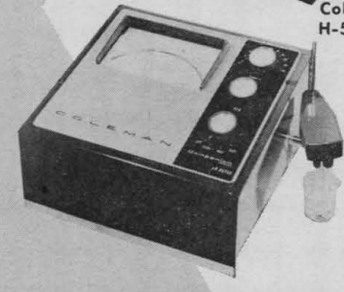

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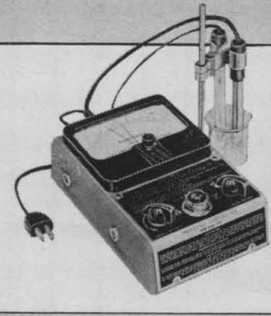

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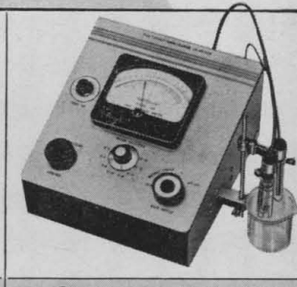

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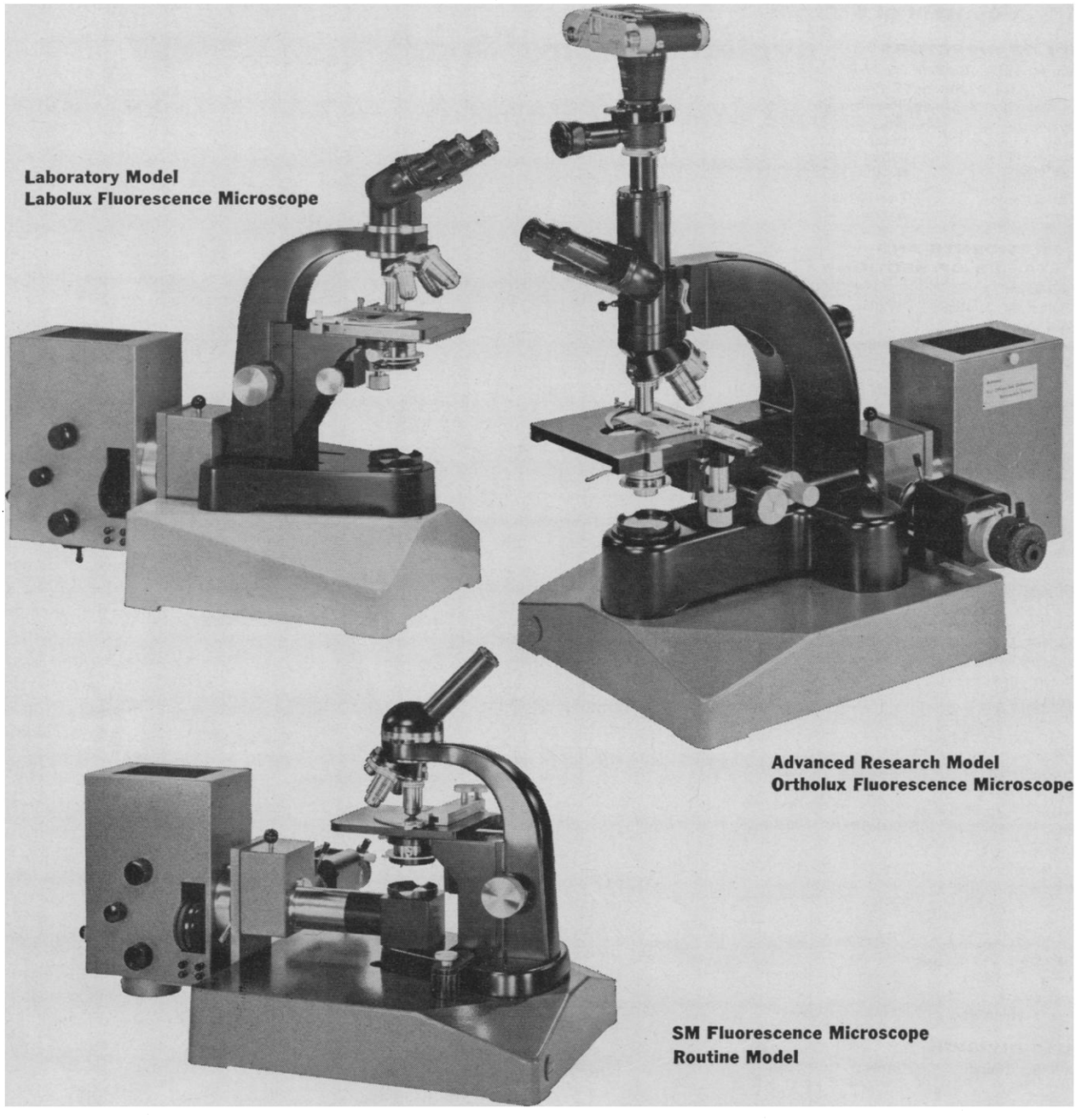

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27 September 1963, Volume 141, Number 3587 **SCIENCE**

Changing Attitudes toward Research

After years of repeated votes of confidence in the value of research and development, the House of Representatives has now indicated a changing attitude. Formally this was expressed by action in approving H.R. 504, which authorizes appointment of a Select Committee to Investigate Research Programs. The committee is to investigate "(1) the overall total amount of annual expenditures on research programs; (2) what departments and agencies of the Government are conducting research and at what costs; (3) the amounts being expended by the various agencies and departments in grants and contracts for research to colleges, private industry, and every form of student scholarships: (4) what facilities, if any, exist for coordinating the various and sundry research programs, including grants to colleges and universities as well as scholarship grants."

This mandate seems fairly innocuous. Items 1 to 3 represent inventory-taking. Item 4 appears to imply that the tens of thousands of government research projects might or should be coordinated.

One measure of the new attitude is the majority by which the resolution passed—336 to 0, with 47 pairs. More significant is the quality of the discussion which preceded the authorization in the Rules Committee hearing and on the floor of the House. The comments of the legislators showed limited perception of the values and modes of conducting research and indicated conviction that money is being wasted on it.

The most alarming aspect of the congressional discussion is that it was the small research fraction of the total research and development budget which drew almost all the adverse comment. In hearings before the Rules Committee, Chairman Howard W. Smith ridiculed the titles of some National Science Foundation grants. One of the items which he found worthy of comment had a budget of $1300. A perusal of other congressional comments concerning the resolution shows that Smith's remarks reflect a considerable body of opinion.

A change from the congressional attitudes of the past 20 years was certain to come. In 1940 the federal government spent $74 million on research and development programs. This fiscal year the figure will be about $14.9 billion. Over the 24 years, expenditures have increased with a doubling time of between 3 and 4 years. Few would insist that the increase in expenditures led to commensurate increase in rate of progress. In the end, some kind of brake will be applied, since such growth cannot go on indefinitely. The problem will be to insure that the braking process is guided by intelligence—not by ignorance and worse.

The Select Committee has before it an almost impossible task. In order to appear effective, it will feel under pressure to create newsworthy releases. The obvious and easy way will be to engage in anti-intellectualism. No one can predict what course of action the Select Committee will take. The new investigation could have profound effects; it could come to nothing. The potentialities, however, are so important that all scientists should be seriously concerned. During the next year the scientific community may find itself appearing before a hostile court. We can, if we will, present a strong case. Prudence indicates that we should prepare, and prepare well.—P.H.A.

on Chemical Thermodynamics, 1951–61; American Chemical Society: chairman, Committee on Constitution and By-laws, 1949–50, chairman, Division of Petroleum Chemistry, 1954; Sigma Xi: Executive Committee, 1953–58, president, 1963–64; National Academy of Sciences–National Research Council: chairman, Division of Chemistry and Chemical Technology, 1955–58, member, Executive Committee, 1958–60, chairman, Executive Committee of the Office of Critical Tables, 1963–; National Science Foundation: Committee for the Division of Mathematical, Physical and Engineering Sciences, 1955–59, Advisory Panel for Graduate-Level Research Facilities in the Physical Sciences, 1959–62; president, Albertus Magnus Guild, 1961–; received Hillebrand Award, Chemical Society of Washington, 1934; Gold Medal Exceptional Service Award, Department of Commerce, 1950; Pittsburgh Award, American Chemical Society, 1959; member, National Academy of Sciences.

AAAS activities: Council, 1951–52, 1963–.

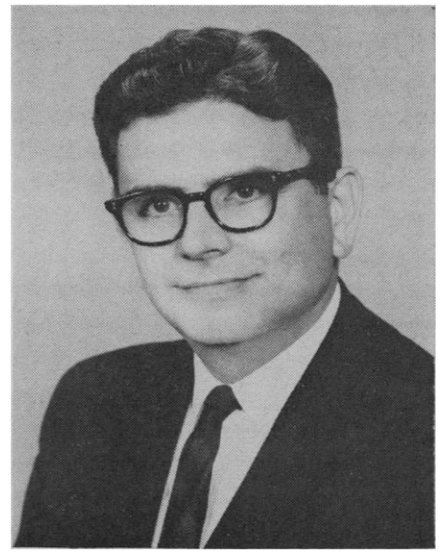
Randall M. Whaley

Randall M. Whaley, 48 (physics), instructor to professor, Purdue University, 1945–60, associate dean, School of Science, Education and Humanities and acting research director, Research Foundation, 1959–60; vice president for graduate studies and research, Wayne State University, 1960–; Board of Directors, Midwestern Universities Research Association, 1955–57; National Academy of Sciences–National Research Council: executive director, Advisory Board on Education, 1957–59, chairman, Committee on Laboratory Science in South-East Asia, Office of Scientific Personnel, 1960–62; president, American Science Film Association, 1961–; vice president, International Scientific Film Association, 1962–; trustee, Cranbrook Institute of Science, 1962–.

AAAS activities: Council, 1961–; chairman, Council Study Committee on Graduate Science Education and Standards, 1961–.

William A. Wildhack

William A. Wildhack, 55 (physics), assistant in physics, University of Colorado, 1931–34; instructor, engineering and mathematics, Boise Junior College, 1934–35; physicist to special assistant to director, National Bureau



Randall M. Whaley

of Standards, 1935–61, associate director, 1961–; Editorial Board, *Review of Scientific Instruments*; chairman, Committee on Scientific Equipment, National Research Council, 1947–52; vice president, Instrument Society of America, 1951, secretary, 1953, president, 1954, first fellow, 1960; chairman, Data Processing Committee, U.S. National Committee for the International Geophysical Year, 1956; editor, Engineering and Instrumentation Section, *NBS Journal of Research*, 1959–62; general chairman, International Symposium on Temperature, 1961; Panel on Exchange of Scientific Information and Materials, U.S.–Japan Committee on Scientific Cooperation, 1962–; general chairman, International Symposium on Humidity and Moisture, 1963; chairman, U.S.

William A. Wildhack

Delegation, U.S.–U.S.S.R. Metrology Exchange, 1963; received Medal, Royal Swedish Academy of Engineering Sciences, 1949.

AAAS activities: chairman, Gordon Research Conference on Instrumentation, 1953; Council, 1954–; chairman, Council Agenda and Resolutions Committee, 1958; chairman, Committee on Council Activities and Organization, 1959–60; Committee on Council Affairs, 1961–63.

Southwestern and Rocky Mountain Division

The Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science held its 39th annual meeting in Albuquerque, N.M., 28 April to 2 May, 1963.

Eighty individual research papers were included on the programs of the sections of the division, and 12 reports were made on undergraduate research projects by student members of Beta Beta Beta, which held a concurrent district meeting.

Special symposiums consisting of invited papers included "Aridity and man," under the sponsorship of the Committee on Desert and Arid Zones Research, and "Improvement of science teaching," sponsored by the divisional committee concerned with subject.

The 30th John Wesley Powell memorial lecture, a public event featured in each year's meetings of the division, was given by Kirtley F. Mather on "The earth sciences in the sixties."

In an address at the opening session of the meetings, Alan T. Waterman, president of the Association, delivered a very penetrating analysis of "The national and regional role of the AAAS."

Anton H. Berkman, president of the division, diverted from the usual pattern of a presidential address and conducted a panel discussion on the challenge to the division of arid land studies. Members of the Committee on Desert and Arid Zones Research made up the panel. The president's program was further featured by the presentation of the first annual award of a certificate of merit for outstanding contributions in the field of arid zones progress. This award was made posthumously to Clayton W. Botkin, a past president of the division, and was accepted in his name by his son Charles Botkin.

At the close of the meeting Edwin R. Helwig of the University of Colorado succeeded to the presidency of the division. Aden B. Meinel of the University of Arizona was selected as president-elect, and Howard J. Dittmer of the University of New Mexico as a member of the Executive Committee. Marlowe G. Anderson, New Mexico State University, will continue as secretary-treasurer and council representative. The next annual meeting of the Southwestern and Rocky Mountain Division will be held in Lubbock, Texas, 26–30 April 1964.

MARLOWE G. ANDERSON
New Mexico State University, Albuquerque

Society for General Systems Research

One of the eight societies elected at the 129th AAAS annual meeting 30 December 1962, as an affiliate of the Association, was the Society for General Systems Research.

The principal aim of the society is to encourage the development of theoretical systems which are applicable to more than one of the traditional departments of knowledge. All sciences develop theoretical systems of concepts, relationships, and models. Many of these systems are isomorphic, but their similarity is undetected because of differences in terminology and of other barriers to communication among specialists. Furthermore, systems which have been well worked out can be of assistance in the development of others.

The major functions of general systems research are therefore: (i) to investigate the isomorphy of concepts, laws, and models in various fields, and to help in useful transfers from one field to another; (ii) to encourage the development of adequate theoretical models in the fields which lack them; (iii) to minimize the duplication of theoretical effort in different fields; and (iv) to promote the unity of science through improving communication among specialists.

The feeling that such a scientific society would fill an evident need crystallized at the Center for Advanced Study in the Behavioral Sciences, Stanford, California. The response to the issuance of a manifesto in 1954 was extremely encouraging. Therefore, at the 1954 AAAS meeting in Berkeley, the Society for the Advancement of General Systems Theory was started.

A founding and organizing committee was approved which consisted of Ludwig von Bertalanffy, K. E. Boulding, Ralph W. Gerard, and Anatol Rapoport. Annual meetings have been held thereafter in conjunction with Section L of the AAAS. In 1958, Jerzy Neyman and Elizabeth L. Scott read a paper at the annual meeting which was awarded the AAAS Newcomb Cleveland Prize.

The first *General Systems Yearbook* appeared in 1956 and contained both original contributions and reprints of useful articles from out-of-the-way sources. Succeeding issues of the yearbook have been received with enthusiasm by the scientific community, as indicated by the annual increase of citations in a variety of scholarly publications.

The name originally chosen occasionally gave the impression that a theory already existed and merely needed propagation. Therefore the name was changed in 1957 to the Society for General Systems Research. At the same time the first election of officers was conducted. Kenneth E. Boulding was named president; Ludwig von Bertalanffy, vice president; and Richard L. Meier, secretary-treasurer. Currently, Anatol Rapoport and Milton D. Rubin are the society's representatives on the AAAS Council.

Other officers, past and present, include Charles A. McClelland, Albert Shapero, and Gerald M. Weinberg. The current president is W. Ross Ashby, University of Illinois.

The membership is, as might be expected, a diverse assemblage of persons. They range from mathematicians, physical scientists, and engineers to psychologists and social scientists, but quite a few psychiatrists and medical researchers are also included. There is an interesting minority which cannot be adequately described even with a compound title. By mid-1963 the total membership was approximately 750, and the seventh yearbook had a distribution of over 1000 volumes.

GERALD M. WEINBERG
I.B.M. Systems Research Institute, New York, New York

Forthcoming Events

October

5. **Paleontological Research** Inst., Ithaca, N.Y. (K. Caster, Geology Dept., Univ. of Cincinnati, Cincinnati, Ohio)

7–10. **Instruments and Research Equipment**, symp. and exhibit, 13th annual,

Bethesda, Md. (J. B. Davis, National Institutes of Health, Bethesda 14)

7–11. American Soc. of **Civil Engineers**, annual, San Francisco, Calif. (ASCE, 345 E. 47 St., New York 17)

7–11. Biological Effects of **Neutron Irradiations**, intern. symp., Upton, N.Y. (C. W. Pelzer, Div. of Special Projects, U.S. Atomic Energy Commission, Washington 25)

7–12. **Communication**, 11th intern. congr., Genoa, Italy. (Civico Instituto Colombiano, Palazzo Tursi, Genoa)

8–10. **Analytical Chemistry** in Nuclear Technology, 7th conf., Gatlinburg, Tenn. (C. D. Susano, Oak Ridge Natl. Lab., P.O. Box X, Oak Ridge, Tenn.)

5–6. New England Intercollegiate **Geological Conf.**, Providence, R.I. (J. Rogers, Dept. of Geology, Yale Univ., Box 2161 Yale Station, New Haven, Conn.)

6–9. **Process Engineers**, annual, Hanover, Germany. (German Engineering Assoc., Rheingau Allee 25, Frankfurt-am-Main)

6–10. **Water Pollution** Control Federation, Seattle, Wash. (to be reconvened 13–16 Oct., Honolulu, Hawaii). (R. E. Furman, WPCF, 4435 Wisconsin Ave., NW, Washington, D.C.)

6–12. Clinical **Pathology**, 5th intern. congr., Mexico City, Mexico. (E. Cervera B., Asociacion Mexicana de Laboratorio Clìnico, Durango 213, Mexico 7)

7. **Pediatric Radiology**, Montreal, P.Q., Canada. (R. G. Lester, Box 151, Medical College Station, Richmond, Va.)

8–10. Ciba Foundation Colloquium on **Endocrinology and Aetiology of Diabetes Mellitis** and Its Complications, London, England. (Ciba Foundation, 41 Portland Pl., London W.1)

8–10. **Science and Engineering**, 10th annual symp., U.S. Air Force Academy, Colo. (Maj. J. Shafer, RROND, U.S. Office of Aerospace Research, Washington, D.C.)

8–11. **Electromagnetic Relays**, intern. conf., Sendai, Japan. (C. F. Cameron, School of Electrical Engineering, Oklahoma State Univ., Stillwater)

8–11. American **Roentgen Ray** Soc., Montreal, P.Q., Canada. (American College of Radiology, 20 N. Wacker Dr., Chicago 6, Ill.)

8–12. **Neurological Surgeons**, 13th congr., Denver, Colo. (J. R. Russell, 1815 North Capitol Ave., Indianapolis 2, Ind.)

9. American Acad. of **Arts and Sciences**, Brookline, Mass. (R. W. Burhoe, American Acad. of Arts and Sciences, 280 Newton St., Brookline Station, Boston, Mass.)

9–11. **Aerospace Electronics**, exposition and conf., Los Angeles, Calif. (E. Niles, Aerospace Electrical Soc., 3540 Wilshire Blvd., Los Angeles 5)

9–13. **Cytophotometry** and Interference Microscopy, symp., Giessen, Germany. (W. Sandritter, Pathologisches Institut, Justus Liebig Universität, Giessen)

10–11. Bioassay and Analytical **Chemistry**, 9th conf., San Diego, Calif. (G. Bucolo, General Atomic Div., General Dynamics Corp., P.O. Box 608, San Diego 12)

10–11. **Engineering** conf., Long Beach, Calif. (Natl. Soc. of Professional Engineers, 2029 K St. NW, Washington, D.C. 20006)

10–11. **Kidney**, 15th annual conf., New York, N.Y. (Natl. Kidney Disease Foundation, 342 Madison Ave., New York 17)

10–11. **Lipid Transport**, intern. symp., Nashville, Tenn. (H. C. Meng, Vanderbilt Univ. School of Medicine, Nashville)

10–13. American Soc. of **Clinical Hypnosis**, 6th, San Francisco, Calif. (W. T. Heron, American Soc. of Clinical Hypnosis, 800 Washington Ave., SE, Minneapolis 14, Minn.)

13. American College of **Dentists**, Atlantic City, N.J. (O. W. Brandhorst, 4236 Lindell Blvd., St. Louis, Mo.)

13–17. **Neurosurgery**, 10th Latin American conf., Buenos Aires, Argentina. (R. Morea, Callao 1685. Buenos Aires)

13–18. Society of **Motion Picture and Television Engineers**, 94th technical conf., Boston, Mass. (H. J. Hall, Itek Corp., Lexington, Mass.)

13–18. **Plastic Surgery**, 3rd intern. congr., Washington, D.C. (Capt. Joseph Connelly, Bethesda Naval Hospital, Bethesda 14, Md.)

14–16. **Geological Sciences**, intern. union, Rome, Italy. (T. Sorgenfrei, Tranegaardsvej 20, Hellerup, Denmark)

14–16. **Systems and Procedures** Assoc. of America, intern., Milwaukee, Wis. (R. L. Irwin, 7890 Brookside Dr., Cleveland 38, Ohio)

14–18. **Audio Engineering** Soc., 15th, New York, N.Y. (J. Harvey, Harvey Associates, 580 Fifth Ave., New York 36)

14–17. Association of Official **Agricultural Chemists**, Washington, D.C. (L. G. Ensminger, AOAC, Box 540, Benjamin Franklin Station, Washington 44)

14–18. American **Rocket** Soc., 18th annual, New York, N.Y. (ARS, 500 Fifth Ave., New York 36)

14–19. **Anatomical Pathology**, 4th Latin American congr., San Salvador, El Salvador. (F. K. Mostofi, Armed Forces Inst. of Pathology, Washington 25)

15. Oak Ridge Inst. of **Nuclear Studies**, Oak Ridge, Tenn. (W. G. Pollard, ORINS, Oak Ridge)

15–16. **Reactor Operations**, symp., American Nuclear Soc., Ottawa, Ont., Canada. (ANS, 244 E. Ogden Ave., Hinsdale, Ill.)

15–17. Progress in **Metallography**, seminar, Leoben, Austria. (Eisenhütte Osterreich, Eisenhütteninstitut, Montanistische Hochschule, Leoben)

15–18. American **Dietetic** Assoc., 46th annual, Philadelphia, Pa. (ADA, 620 N. Michigan Ave., Chicago 11, Ill.)

16–18. Ballistic **Missile and Space** Technology, San Diego, Calif. (C. T. Morrow, Aerospace Corp., P.O. Box 95085, Los Angeles, Calif.)

16–18. **Calorimetry**, 19th conf., Bartlesville, Okla. (G. T. Armstrong, Natl. Bureau of Standards, Washington, D.C.)

16–18. **Gaseous Electronics**, 16th annual conf., Pittsburgh, Pa. (G. J. Schulz, Westinghouse Research and Development Center, Pittsburgh 35)

16–18. American **Vacuum** Soc., 10th natl. symp., Boston, Mass. (AVS, Box 1282, Boston 4)

17–18. Industrial **Hydraulics**, natl. conf., Chicago, Ill. (E. Hansen, Illinois Inst. of Technology, Chicago 16)

17–18. American Soc. of **Tool and Manufacturing Engineers**, Pittsburgh, Pa.

(H. E. Conrad, 10700 Puritan Ave., Detroit, Mich.)

17–19. Society of **Photographic Scientists and Engineers**, Washington, D.C. (E. Ostroff, SPSE, Box 1609, Main Post Office, Washington, D.C.)

17–20. **British Medical Assoc.**, annual clinical meeting, Stoke on Trent, England. (D. Gullick, BMA, Tavistock Sq., London W.C.2, England)

17–22. Anglo-American **Aeronautical** Conf., Cambridge, Mass., and Montreal, Canada. (American Inst. of Aeronautics and Astronautics, 500 Fifth Ave., New York, N.Y.)

18–19. American Soc. of **Opthalmologic and Otolaryngologic Allergy**, New York, N.Y. (J. Hampsey, Grant Bldg., Pittsburgh 19, Pa.)

18–19. American **Physical** Soc., Chicago, Ill. (K. K. Darrow, American Physical Soc., Columbia Univ., New York 27)

19. Research in Blindness and Severe **Visual Impairment**, symp., New York, N.Y. (Natl. Committee for Research in Ophthalmology and Blindness, 406-C S. Blvd., Evanston, Ill.)

19–23. **Chemical Engineering** conf., Montreal, P.Q., Canada. (N. E. Cooke, P.O. Box 10, Montreal)

20–23. Society of American **Foresters**, Boston, Mass. (H. Clepper, 704 17th St., NW, Washington, D.C. 20006)

20–25. **Exploration Geophysicists**, 33rd intern., New Orleans, La. (J. S. Johnson, California Company Bldg., New Orleans 12)

20–25. Pan American Congress of **Neurology**, Lima, Peru. (J. O. Trelles, Organizing Committee, Apartado 5117, Lima)

21–23. Direct **Aeronomic Measurements** in the Lower Ionosphere, Urbana, Ill. (S. A. Bowhill, Dept. of Electrical Engineering, Univ. of Illinois, Urbana)

21–23. **Aerospace and Navigational Electronics**, 10th East Coast conf., Baltimore, Md. (R. J. Allen, Research and Advanced Technology Dept., Martin Co., Baltimore 3)

21–23. Pathology of **Laboratory Animals**, New York, N.Y. (Office of Medical Education, New York Acad. of Medicine, 2 E. 103 St., New York 29)

21–25. **Beryllium Oxide**, intern. conf., Lucas Heights, New South Wales, Australia. (Secretary, AAEC, Research Establishment, Private Mail Bag, Sutherland, N.S.W., Australia)

21–25. American Soc. for **Metals**, metals and materials show, Cleveland, Ohio. (ASM, Metals Park, Ohio)

21–25. **Protein Rich Foods** in Developing Areas, intern. conf., Food and Agriculture Organization, United Nations, Rome, Italy. (FAO, Rome)

21–25. Society for **Nondestructive Testing**, 23rd natl., Cleveland, Ohio. (P. D. Johnson, 914 Chicago Ave., Evanston, Ill.)

22–25. Society for **Clinical and Experimental Hypnosis**, New York, N.Y. (SCEH, 200 W. 57 St., New York, N.Y. 10019)

22–28. **Medical Radiation**, seminar, Geneva, Switzerland. (WHO, Palais des Nations, Geneva)

23–24. **Industrial Hygiene** Foundation, 28th annual, Pittsburgh, Pa. (R. T. P. de-Treville, 4400 Fifth Ave., Pittsburgh 13)

23–25. **Design of Experiments** (invitation only), Huntsville, Ala. (F. G. Dressel, Army Research Office, Durham, Box CM, Duke Station, Durham, N.C.)

23–25. **Human Factors** Soc., Palo Alto, Calif. (J. A. Kraft, Bioastronautics Organization, 50-03, Lockheed Missiles and Space Co., Sunnyvale, Calif.)

23–25. **Optical** Soc. of America, 48th annual, Chicago, Ill. (OSA, 1155 16th St., NW, Washington 6)

23–1. Association of **American Medical Colleges**, Chicago, Ill. (R. H. Young, 303 E. Chicago, Chicago 11)

25. **Transport Mechanisms**, symp., St. Louis, Mo. (R. Rubright, Jewish Hospital of St. Louis, 216 S. Kings Highway, St. Louis 10)

25–27. **American Heart Assoc.**, 36th annual, Los Angeles, Calif. (American Heart Assoc., 44 E. 23 St., New York 10)

27–1. American College of **Surgeons**, 49th annual clinical congr., San Francisco, Calif. (ACS, 40 E. Erie St., Chicago 11, Ill.)

28. American Soc. of **Safety Engineers**, Chicago, Ill. (A. C. Blackman, ASSE, 5 N. Wabash Ave., Chicago 2)

28–29. **Combustion** Inst., western states section, Los Angeles, Calif. (A. S. Gordon, Code 5059, U.S. Naval Ordnance Test Station, China Lake, Calif.)

28–29. **Pediatric Surgery**, intern., Paris, France. (D. Pellerin, Hôpital des Enfants-Malades, 149, rue de Sèvres, Paris 15e)

28–30. **Antimicrobial Agents and Chemotherapy**, 3rd interscience conf., Washington, D.C. (E. E. Tretbar, American Soc. for Microbiology, 230 N. Michigan Ave., Chicago 1, Ill.)

28–30. **Electronics**, 19th natl. conf. and exhibition, Chicago, Ill. (NEC, 228 N. LaSalle St., Chicago 1)

28–30. National Council for **Geographic Education**, Columbus, Ohio. (L. Kennamer, Univ. of Texas, Austin)

28–31. Technical Association of the **Pulp and Paper Industry**, 18th engineering conf., New Orleans, La. (C. E. Green, B. L. Montague Co., Drawer 5428, Station B, Greenville, S.C.)

28–1. American Inst. of **Aeronautics and Astronautics**, 1st, Atlantic City, N.J. (Meetings Dept., AIAA, 500 Fifth Ave., New York 36)

28–2. **Stable Isotopes**, working conf., Leipzig, Germany. (Institut für Physikalische Stofftrennung, Deutsche Akademie der Wissenschaften, Permoserstr. 15, Leipzig 05)

29–31. **Aerospace** Nuclear Propulsion and Power, 2nd intern. symp., San Diego, Calif. (IEEE, Box A, Lenox Hill Station, New York 21)

29–1. **Plasma** Phenomena and Measurement, intern. symp., San Diego, Calif. (D. J. Niehaus, Bendix Corp., Research Laboratories Division, Southfield, Mich.)

30–1. Gulf Coast Assoc. of **Geological** Soc., 13th annual, Shreveport, La. (T. E. Godfrey, 201 Oil and Gas Bldg., Shreveport)

30–1. **Parenteral Drug** Assoc., annual conv., New York, N.Y. (PDA, Broad and Chestnut St., Philadelphia 7, Pa.)

31. American Federation for **Clinical Research**, midwestern section, Chicago, Ill. (D. R. Korst, St. Joseph Mercy Hospital, Ann Arbor, Mich.)

New Products

Slide and tissue washer is designed specifically for removing acids, stains, and fixatives from blocks of tissue, or tissue sections on slides. Operating by pressure from the water connection, the washer contains a siphon arrangement which completely changes the water at intervals which can be varied from 3 to 6 min. A perforated platform at the bottom diffuses the water, distributing it evenly throughout the washing chamber. This chamber has a capacity of up to six large baskets totaling 24 compartments, 12 small baskets totaling 96 compartments, or can be used without baskets for washing larger biological specimens. The basket perforations are small enough to prevent the escape of small specimens and the baskets have metal tabs which facilitate handling.—D.J.P. (Lab-Line Instruments, Inc., 3070 W. Grand Ave., Chicago 22, Ill.)

Circle 1 on Readers' Service card

Low-frequency quartz crystal units are available in three types: DJC, 200 cy to 15 kcy/sec; LPC, 3.7 to 100 kcy/sec; and FJCF x-cut flexure crystals. The crystal units are designed to replace tuning-fork units as stable frequency elements. Frequency adjustment over a small range can be made by suitable choice of capacitor. The range of adjustment available is usually limited to approximately 50 to 100 parts in 10^6 and the crystal plate must be preadjusted to an initial tolerance of 0.005 percent. A typical 10 kcy/sec duplex unit subjected to 100 successive shock impacts of 40*g* is said to have shown a frequency deviation of 30 parts in 10^6 and to have returned to the original frequency after a short period. Design and application information, including general frequency deviation versus temperature characteristics, point of zero temperature coefficient versus operation frequency, typical trimming curves, circuit application, and range of standard crystal units are provided by a 24-page booklet.—J.S. (Connoly & Co., 914 Rengstorff Ave., Mountain View, Calif.)

Circle 2 on Readers' Service card

Electron-probe x-ray microanalyzer, (model JXA-3), originally designed for the qualitative and quantitative analysis of metals, semiconductors, ceramics, minerals, and other inorganic solids, the JXA-3 is also proving to have a host of applications in biochemical, biophysical, and medical research. The JXA-3 provides several important kinds of information: (i) a complete element-by-element qualitative analysis of any microvolume (2 to 5 μ^3 microns) at the specimen surface; (ii) simultaneous quantitive determinations of any two elements in this volume (then another pair, and another, on through the periodic table, from magnesium to uranium); (iii) images, on two 10-cm-square cathode-ray tubes, of the point-by-point distribution of each element in the pair, over the face of the specimen; (iv) also, simultaneously, an image of the distribution of back-scattered electrons, and (v) an image of electrons absorbed by the specimen. All of these cathode-ray tube images are easily photographed, either with the camera supplied with the JXA-3, or an auxiliary camera. Magnification of the screened images can be varied (300, 600, or 1200×), thus showing varying areas of the specimen (330, 170, 80 μ, respectively). Specimen is always visible through an optical microscope (operating through a prism system so that no x-rays reach the operator). This 400× view can also be photographed for comparison with the x-ray images. What happens is this: an electron beam, as little as 1 μ in diameter, is focused on the specimen by a two-stage magnetic-lens system exactly like that of an electron microscope. The operator can vary the accelerating voltage in nine steps, from 10,000 to 50,000 volts. Striking the specimen, the electrons give up their energy to the atoms in a microvolume just under the surface. The atoms, in turn, emit this energy in the form of x-rays, each element emitting x-rays of a characteristic wavelength. A crystal lattice in the spectrometer acts as a diffraction grating to disperse the x-rays into a spectrum so that each wavelength can be measured separately (for quantitative analysis), or the entire spectrum (0.88 to 12.7 Å) can be scanned. In the latter case, each element will show a peak on the recorded spectrum, like the lines in a conventional spectrogram. A gas-flow proportional counter and scintillation counter (supplied with the JXA-3) are used to measure x-ray intensity. Electrons scattered from the specimen surface are recorded by another counter, and the intensity of the absorbed electrons by a micro-microammeter. The complete instrument begins with the main operating console and its vacuum and power supply systems. It has two x-ray spectrometers (both covering the entire range), to determine two elements simultaneously. Twin counters measure the x-ray and electron intensities; a high-speed recorder charts the functions measured. The scanner produces the x-ray and electron distribution images. (Two scanning rates can be used—10 and 20 μ/min—or the instrument can be set to scan repeatedly across a feature of the specimen, superimposing the intensity-trace for one element in the distribution image.) A 35-mm camera-assembly that locks over the cathode-ray screens is supplied with the scanner. Polaroid camera assembly is also available.—R.L.B. (Fisher Scientific Co., 415 Fisher Bldg., Pittsburgh 19, Pa.)

Circle 3 on Readers' Service card

Vacuum and pressure gage (type 77) is a taut diaphragm instrument that measures pressure in the range 10^{-4} to 10^3 mm-Hg. Readout is provided by a multirange meter or by direct reading dials. The gage uses a thin metal diaphragm stretched under high tension.

The material in this section is prepared by the following contributing writers:

Robert L. Bowman (R.L.B.), with the assistance of Denis J. Prager (D.J.P.), Laboratory of Technical Development, National Heart Institute, Bethesda 14, Md. (medical electronics and biomedical laboratory equipment).

Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washington 25, D.C. (physics, computing, electronics, and nuclear equipment).

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Neither *Science* nor the writers assume responsibility for the accuracy of the information. A Readers' Service card for use in mailing inquiries concerning the items listed is included on pages 1235 and 1301. Circle the department number of the items in which you are interested on this card.

Capacitive electrodes are precisely spaced on each side of the diaphragm. Hysteresis is said to be less than 0.003 percent of full scale; zero drift less than 0.0002 percent per degree centigrade; and sensitivity in the most sensitive range, 1 part per million. Transfer standard accuracy is said to be from ±0.03 to ±0.15 percent in both absolute and differential measurement. The full range of the instrument is covered by interchangeable sensing heads available in full-scale ranges of 30, 100, 300, and 1000 mm-Hg. The indicator operates through a balanced bridge permitting readout to five places on decade dials. The meter scale can be expanded by eight ranges so that full range of the gage down to 0.0003 of full range is displayed as full scale on the meter. This permits the operator to offset pressure and then expand the scale as much as 1000 times.—J.S. (MKS Instruments, Inc., 45 Middlesex Turnpike, Burlington, Mass.)

Circle 4 on Readers' Service card

Digital comparator (model 404) compares a binary-coded-decimal number obtained, for example, from the printer output of an electronic counter, with two selected preset numbers stored in the comparator. It provides visual display in the form of high, low, and in-limits lights, as well as contact-closure outputs for control applications. Limits are set into the comparator by means of thumb wheel switches or, optionally, by remote adjustment. Specifications furnished by the manufacturer include: 4 to 8 digits optionally available; input code 1-2-4-8 binary-coded-decimal; zero input 0 ± 0.2 volts; unity input −5 to −12 volts; input impedance 18 kohm; power requirement 115 or 230 volts ±10 percent, 50 to 60 cy/sec, 45 watts.—J.S. (Computer Measurements Corp., 12790 Bradley Ave., San Fernando, Calif.)

Circle 5 on Readers' Service card

Tiselius electrophoresis apparatus in a new portable model uses a method widely applicable to analysis of protein mixtures and fractional purifications in the fields of biology, pathology, biochemistry, and physical chemistry. Physiological fluids such as blood sera and plasmas, hemoglobins, tissue extracts, cell extracts, cerebro-spinal fluid, synovial fluid, egg and milk components, urine, lymph, chyle, and aqueous and vitreous humor can be analyzed. It is also useful for isolating and testing the purity of pharmaceuticals, hor-

mones, antigens, venoms, viruses, gamma globulin, antibodies, enzymes, liver extracts, polymers, and latex compounds. The technique is based on the migration phenomenon of ions and charged particles under the influence of a charged electric field; electrophoretic separations and measurements are dependent on the varying mobilities of the component molecules in a solution. A viewing port with ground-glass screen is conveniently located on the front panel. Changes in patterns and boundary formation can be continually observed by the operator, who can see the exact pattern which he may wish to photograph. Two light sources—a mercury lamp for Raleigh fringe work and a tungsten lamp for Schlieren work—are built into the instrument, with selection via control panel switch. An electrophoresis cell of the type developed by Tiselius is used to contain the sample and form the boundaries of sample components. Narrowness of the cell used—with optical channels 2 mm wide, 15 mm along the optical path, and 75 mm high—is advantageous in that a relatively large amount of heat may be generated by passage of current within it without causing convection and permitting higher field strength and more rapid analysis. While the cell is wide enough to prevent electro-osmosis, its size permits analyses and separations to be made with a minimum of materials. The instrument weighs 91 kg. Single-phase power of 117 volts, 60 cycles is used.—R.L.B. (Instrument Div., Perkin-Elmer Corp., Main Ave., Norwalk, Conn.)

Circle 6 on Readers' Service card

Isolated d-c power supply is said to be useful where extreme isolation from the power line and its common-mode noise is required. According to the manufacturer, measured noise is less than 2 namp when the supply is loaded with a 300-ohm floating bridge. Output voltage is adjustable between 0 and 30 volts with adjustable current limiting from 10 to 500 ma. Specifications stated by the manufacturer include: ripple and noise less than 1 mv peak-to-peak; regulation for power line voltage of 105 to 125 volts, 0.02 percent or 2 mv; output impedance 0.01 ohm or less at d-c, 0.04 ohm or less to 10 kcy/sec, 1 ohm at 1 Mcy/sec; effective capacitance from the power line to the output terminals 0.1 pf or less; temperature stability 0.002 percent of output plus 100 μv/°C; inherent stability 0.02 percent or 2 mv, which-

ever is greater, for 40 hr at constant ambient. The supply has provision for sensing voltage delivered at a remote location and regulating its value.—J.S. (Topaz, Inc., 3802 Houston St., San Diego 10, Calif.)

Circle 7 on Readers' Service card

Timer is electrically operated by a synchronous motor and has a timing range of from 1 to 72 hours. Designed to start or stop laboratory equipment during weekends and holidays, the timer has two three-prong, 110-volt a-c outlets on the front panel: one for turning on and one for turning off equipment after the time cycle. The time selector dial is calibrated in 1-hour divisions and either a light, a buzzer, or both, signal when the time cycle is completed. The timer, which can handle up to 10 amp, is ideal for turning on analytical instruments after the weekend so that they will be warmed up and ready before work begins.—D.J.P. (Lab-Line Instruments, Inc., 3070 W. Grand Ave., Chicago 22, Ill.)

Circle 8 on Readers' Service card

Spectrographic laboratory assembly consists of four basic units: a spectrograph, an ignited d-c source unit, an excitation stand, and a viewer-comparator. The spectrograph utilizes a modified Wadsworth mounting with focal length 0.855 m. A grating of 960 lines/mm gives wavelength coverage of 4500 to 9300 Å in the first order and 2250 to 4650 Å in the second order. Dispersion is 6.08 Å/mm in the second order. A built-in racking mechanism permits up to 18 spectrograms on a single length of 35-mm film. A film processing unit is included that eliminates the need for darkroom facilities. The source unit and excitation stand are closely coupled to the spectrograph to simplify installation. The complete spectrograph is desk-top size.—J.S. (Applied Research Laboratories, Inc., Box 1710, Glendale 5, Calif.)

Circle 9 on Readers' Service card

Designed for tensile testing of single crystal whiskers, the TECAM **microtensile testing machine** is capable of measuring extensions down to 10^{-6} mm in specimens 0.5 to 13 mm long and of cross sectional area 10^{-6} to 10^{-2} mm^2 under a maximum load of 400 g. Minimum load increment is 1 mg. Linearity is said to be better than 0.1 percent and reproducibility better than 4.3 Å at constant temperature. The specimen is glued into position for measurement while under observation with a built-in traveling microscope. Tensile load is applied to the specimen by means of four interchangeable torsion wires that cover respectively the ranges to 900 mg, 3500 mg, 95 g, and 45 g. Extensions are detected by a mirror and telescope system operating as a null detector. The extension detector is said to be independent of all motions other than the specimen extension and a zeroing adjustment. A complete set of ten points can be read and recorded in 90 sec, according to the manufacturer. —J.S. (Lapine Scientific Co., 600 S. Knox Ave., Chicago 29, Ill.)

Circle 10 on Readers' Service card

Test table (model 252) is designed to test gyros of the 0.0001 deg/hr drift class as well as accelerometers and guidance platforms. Stiction-free operation and reduction of variations in running friction are achieved by use of an extremely stiff air suspension effected through the use of the table structure as an integral part of the bearing system. The supporting yoke is wide enough so that the table with a 25.4-cm-high test package can be rotated 360° about the tilt axis. In gyro testing, the gyros servo the table and table rate is determined automatically by a ½-sec Inductosyn attached to the table axis. Accelerometers are tested by tilting the table so that they sense part of the earth's gravity field. Platforms are tested by using the table as a positioning fixture and an earth-rate isolation device. The test system consists of a turntable that is driven by an a-c torque motor servo system that can receive inputs from the test gyro or from a table-mounted Inductosyn. The latter can be used to generate rates.—J.S. (Fecker Division, American Optical Co., 4709 Baum Blvd., Pittsburgh 13, Pa.)

Circle 11 on Readers' Service card

Tubular light source has adjustable focus to permit sharp focus of a small spot of light at short range or light projection up to 6 ft. Two concentric cylinders interlock for proper focusing and a locknut provides for positive locking or mounting in a 3/8-inch hole. The unit uses a 6.3-volt, 200-mil replaceable lamp with a life rating of 5000 hours. The black aluminum housing encloses a plano-convex glass lens which focuses the light. Applications include small spot illumination of biological specimens during experimenta-

tion or on the microscope, photoelectric control where space is limited, and use as source for light pipe illumination.—D.J.P. (Farmer Electric Products Company, Tech Circle, Natick, Mass.)

Circle 12 on Readers' Service card

Fast neutron spectrometer capable of producing differential spectra from below 1 Mev to 6 Mev consists of two surface barrier detectors with He^3 gas between, forming a sandwich geometry. The distance between the detectors is 1 mm and the sensitive volume is 280 mm^2. Fast neutrons incident on the assembly produce the reaction $He^3 + n = p + H^3 + 0.76$ Mev. The proton and triton are detected in the two surface barrier detectors, and the total energy shared by these particles is obtained by summing the output pulses of the two counters. The amplitude of the sum pulse is directly proportional to the energy of the incident neutron. The spectrometer is supplied with gas handling equipment that includes 1.5 lit. of He^3 gas at a pressure of 20 atm to allow approximately 75 spectrometer fillings on one tank when detector filling is the normal maximum of 5 atm. At these pressures, efficiency is said to be approximately 10^{-2} for thermal neutrons and approximately 10^{-3} for Mev neutrons.—J.S. (Oak Ridge Technical Enterprises Corp., P.O. Box 485, Oak Ridge, Tenn.)

Circle 13 on Readers' Service card

Piezoelectric accelerometer (type 4–280) incorporates miniature impedance-matching electronics as an integral part of the transducer, combining the sensing element and an emitter-follower into a single unit of less than 16.4 cm^2 volume. The accelerometer features 100-ohm output impedance and operates to 250g (peak) from 6 to 6000 cy/sec over the temperature range −65° to +200°F. Peak voltage sensitivity is 20 mv/g at 77°F and 100 cy/sec with a 50,000 ohm load. Output voltage is limited to 14 volts peak-to-peak without distortion at room temperature. The unit is stud mounted. Even distribution of compression across the crystal is achieved by using a seismic mass that is point loaded by a ball and a compliant diaphragm. Cross-axis response is 5 percent; amplitude linearity is 1 percent.—J.S. (Consolidated Electrodynamics Corp., 360 Sierra Madre Villa, Pasadena, Calif.)

Circle 14 on Readers' Service card

Alumina temperature transducer (type T4151) is designed for inclusion in an ablating material to determine the temperature gradients existing in the structure. The transducer consists of a platinum winding on an alumina card. The platinum wire is flame sprayed after winding with an aluminum oxide coating to provide high-temperature insulation resistance. The composition of the sprayed coating may be varied to obtain a thermal conductivity close to that of the material in which the transducer is installed. The stem of the transducer is sufficiently removed from the internal winding to avoid transmission of heat to or from the winding. Measurement range is 0 to 1200°F and brief transients to 1500°F can also be measured. Repeatability is said to be ±0.2 percent of range interval. Operating current is 15 ma. Thermal time constant is less than 500 msec when measured in agitated liquid. Weight is less than 7.1 g.—J.S. (Trans-Sonics, Inc., Burlington, Mass.)

Circle 15 on Readers' Service card

Solar simulators are available in a parallel-beam model (149–1) and divergent-beam models (149–2 and 149–3). The former features a 14-inch parallel beam at a nominal working distance of 3 ft from the exit port of the simulator. It delivers an intensity of 1.0 solar constant with uniformity said to be ±5 percent. Beam collimation is ±2.0 deg. A spectral range of 0.3 to 2.0 μ is obtained with a 4.0-kw xenon arc radiant source. The divergent beam model, 149–2, features an adjustable radiation cone with nominal cone angle from ±3.5 deg to ±7 deg within a nominal working range from 5 to 10 ft from the exit port. Beam power is 185 watts minimum, 1.0 solar constant over a 14.0-inch diameter. Uniformity is said to be ±10 percent and apparent source size from ± 0.75 deg to ± 1.5 deg. Spectral range and radiant source are the same as in the parallel-beam model. The model 149–3 furnishes a fixed radiation cone of nominal cone angle ±8.5 deg. Nominal working distance is 4 ft from the simulator port. Apparent source size is ±2.5 deg at the nominal working distance. Other specifications are similar to the model 149–2. Optionally available are five different types of radiation sources. All models are said to be capable of uninterrupted 30-day operation.—J.S. (Aerospace Controls Corp., 602 Colorado Ave., Santa Monica, Calif.)

Circle 16 on Readers' Service card

(Continued from page 1265)

being done, by local governments and through private initiative.

The debate, therefore, was largely carried on between two groups of shelter advocates, with the federal-buildings-only group losing out. Only in the closing stages of the debate, when permission to speak is doled out in 2-minute tots and the members are thinking about the final vote and dinner, was anything much heard from those who oppose any shelter program at all.

In his 2 minutes, Representative George E. Brown, Jr. (D-Calif.) put forward strategic and psychological arguments for opposing the shelter program. "By the time a shelter program could be completed," said Brown, "new weapons development could completely negate the purported saving of 25 million lives and in fact could increase the casualties beyond the 100 million figure. . . . If the U.S.S.R., or possibly other enemies, in the years to come, were to decide that their goal in an attack was to cause casualties to 100 million or 150 million, in all probability they will have the weapons to do it with."

Brown went on to say that a shelter program "creates a climate in which nuclear war becomes more credible, more reasonable, more acceptable to the American people." Brown said that, in his opinion, "the net result of a massive civilian defense program will be to increase chances of nuclear war by helping to establish a climate in which such war becomes acceptable."

One or two other members opposed to shelters asked to revise and extend their remarks in the *Congressional Record*, but there was no real debate on what might be termed larger issues of the shelter controversy.

Congress seems to have felt uneasy and uncertain about civil defense in general and shelters in particular in recent years, and it has been willing, perhaps even grateful, to take the advice of its own experts in the matter. Until last week, the House had looked mainly to the Thomas subcommittee of the Appropriations Committee for its leads. Last week the House was persuaded by what appeared to be conflicting advice from the Hébert subcommittee. Unless these apparent differences are reconciled, rank and file congressmen this year may find themselves faced with more difficult decisions on civil defense than they have been accustomed to.—JOHN WALSH

Announcements

Seven U.S. institutions and the University of Costa Rica have incorporated the **Organization for Tropical Studies** (OTS), to develop "a sound program of education and research . . . available to the entire academic community of the Americas." Initial plans call for a cooperative program in the biological sciences, with later efforts in the other scientific disciplines. Instruction will be in Spanish and English. The U.S. members are the universities of Miami, Florida, Kansas, Southern California, Washington, Michigan, and Harvard. Norman Hartweg, professor of zoology at the University of Michigan, is the first president. Further information on OTS is available from its executive secretary, Jay Savage, Apartado 16, Ciudad Universitario, Costa Rica.

The National Aeronautics and Space Administration is inviting proposals for **space experiments** to be performed on the two-man Gemini spacecraft. The experiments should require manned observation or manipulation, or recovery of the experimental package. The Gemini project will consist of a series of two-man missions to orbit the earth. Scientists should submit both technical, and management and cost proposals. Thirty copies should be sent to the Office of Grants and Research Contracts, Code SC (Gemini project), NASA Headquarters, Washington, D.C. Deadline: *15 October*. (Further information is available from J. R. Gill, Code SM, NASA Headquarters)

The ability of birds and mammals to adapt to cold will be studied at the University of Alaska's newly established **laboratory of zoophysiology**. The facility, supported by a grant from the National Institutes of Health, is the first unit of a planned Institute of Arctic Biology at the university. Its purpose is to analyze the processes by which animals, including man, become acclimated to the extremes of arctic winters and to the rapidly changing seasons. Laurence Irving, zoophysiology professor at the university, is head of the laboratory.

The University of Bridgeport, Conn., has begun a graduate program in **mechanical engineering**, leading to the master of science degree. Major work will be offered in solid mechanics, fluid

mechanics, or heat transfer and energy conversion. Registration is open to persons who have a bachelor's degree in engineering, mathematics, or physics from an accredited college. (W. P. Berggren, College of Engineering, University of Bridgeport, Bridgeport, Conn.)

Meeting Notes

A symposium on **organic geochemistry** is scheduled 10–12 October at the University of Texas, Austin. The topics to be discussed include the origin of petroleum, alkanes, Pre-Cambrian organic matter, geochemistry of stable isotopes, biological compounds formed under abiotic conditions, and organic constituents of sediments. (W. Shive, Chemistry Dept., University of Texas, Austin)

The American Meteorological Society has scheduled a national conference on the **physics and dynamics of clouds**, 24–26 March, in Chicago, Ill. Papers are invited on precipitation mechanisms, convection, thunderstorm electricity, cloud studies by satellite, and dynamics of cloud systems. Deadline for receipt of title and abstract: *4 November*. (D. L. Bradbury, Dept. of Geophysical Sciences, Univ. of Chicago, Chicago 37)

The first meeting of the **Society of Engineering Science** is scheduled 4–6 November in Lafayette, Indiana. Papers will be presented on continuum mechanics, plasma physics, transport theory, control processes, and systems analysis. The society was formed in January to "foster the advancement of engineering science and strengthen the bridge between scientific discoveries and engineering applications" through interdisciplinary research and collaboration on problems of common interest to scientists and engineers. (A. C. Eringen, Dept. of Aeronautical and Engineering Sciences, Purdue Univ., Lafayette, Ind.)

An international symposium on the thermal stability of **polymers** will be held at Battelle Memorial Institute, Columbus, Ohio, 5–6 December. Papers will be included on pyrolytic and thermal oxidative stabilities of polymeric structures, methods for studying thermal stabilities, and stabilizing various types of polymers. (P. B. Stickney, Battelle Memorial Inst., 505 King Ave., Columbus 1)

Scientists in the News

Bernard E. Brodie, head of the Laboratory of Pharmacology at the National Heart Institute, has been named recipient of the 1963 Torald Sollmann award in pharmacology. The $2500 prize is sponsored by the Wyeth Laboratories and the American Society for Pharmacology and Experimental Therapeutics, for "significant contemporary contributions to the advancement and extension of knowledge" in pharmacology.

Walter Auffenberg, associate director of the AIBS Biological Sciences Curriculum Study at the University of Colorado, Boulder, has become curator of natural sciences at the University of Florida. He is succeeded by **William V. Mayer**, associate dean of arts and sciences on leave from Wayne State University.

The new head of the department of organic research at the William S. Merrell Co., is **Robert W. Fleming**, formerly senior research chemist at Parke, Davis & Co.

Henry Irving Kohn, clinical professor of experimental radiology at the University of California, has been named first Alvan T. and Viola D. Fuller–American Cancer Society professor of radiology at Harvard University.

Robert W. Pennak, biology professor at the University of Colorado, has been elected chairman of the school's department of biology.

George B. Noland, associate professor of biology at the University of Dayton, has been apointed head of the school's biology department.

J. L. Franklin, research associate at Humble Oil and Refining Company, has been named Welch professor of chemistry at Rice University, on leave until 1 December.

The new president of the Ecological Society of America is **John F. Reed**, president of the Fort Lewis A&M College, Durango, Colo.

At Massachusetts Institute of Technology, **William S. von Arx** has been appointed professor of physical oceanography and **Henry M. Stommel** has been named professor of oceanography.

J. Robert Willson, professor and chairman of the department of obstetrics and gynecology at Temple University, has been named chairman of the obstetrics and gynecology department in the University of Michigan medical school.

Gertrude Rand Ferree, retired research associate in ophthalmology at the Knapp Foundation of the Columbia University College of Physicians and Surgeons, has been awarded the Gold Medal of the Illuminating Engineering Society. She is the first woman to receive the organization's highest honor.

Recent Deaths

William S. Chepil, 59; agronomy professor, University of Kansas, 6 September.

Mintin A. Chrysler, 91; research professor emeritus of botany, Rutgers University, 16 August.

Walter Cook, 64; dean of the college of education, University of Minnesota; 9 September.

Virginia Griffing, 46; chemistry professor, Catholic University, Washington, D.C.; 5 September.

Arthur Warren Hixson, 83; professor emeritus of chemical engineering, Columbia University; 8 August.

Donald S. King, 74; former professor of thoracic medicine, Harvard University; 30 August.

Walter S. Loewe, 79; research professor emeritus of pharmacology, University of Utah medical college; 24 August.

Sisir Kumar Mitra, 72; India's National Research Professor of Physics; 13 August.

Stephen Rothman, 68; professor emeritus of medicine, University of Chicago, 31 August.

Charles Seymour, 78; retired president of Yale University; 11 August.

Erratum: In the report "Relative dating of Arlington Springs Man," by K. P. Oakley [*Science* **141**, 1172 (20 Sept. 1963)], the value 10.4 in the line for Midland, Texas, in column 2 of Table 1 should have been 7.7.

Erratum: Several errors occurred in the announcement of awards for the Jane Coffin Childs Fund on page 894, 6 September. The announcement should have read:

The Jane Coffin Childs memorial fund for medical research is offering grants-in-aid and postdoctoral fellowships in the fundamental aspects of neoplastic growth. The awards are open to foreign as well as to U.S. citizens. Application deadlines for grants: 1 November, 1 March, and 1 September; for fellowships: 1 October (L. E. Lee, Jr., Childs Memorial Fund, 333 Cedar Street, New Haven 11, Conn.)