

# SCIENCE

9 February 1962

Vol. 135, No. 3502

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





*New  
developments  
in the*  
**ANALYTICAL  
ULTRACENTRIFUGE...**

**A Sharper Eye in the UV**

Biochemists measuring molecular properties with the ultracentrifuge usually select either schlieren optics or interference optics to record the behavior of molecules in the centrifugal field.

More recently, the instrument's third optical system—ultraviolet absorption—has become increasingly favored because of developments both in instrumentation and technique. The instrumentation consists of a more precise absorption optical system built into the Beckman ultracentrifuge which gives sharper UV patterns, allows more sophisticated UV measurements.

The techniques are principally: density gradient centrifugation, the new and popular method of separating nearly identical materials by taking advantage of minute differences in density; and molecular weight measurements at very low solute concentrations of strongly UV-absorbing materials such as nucleic acids and viruses.

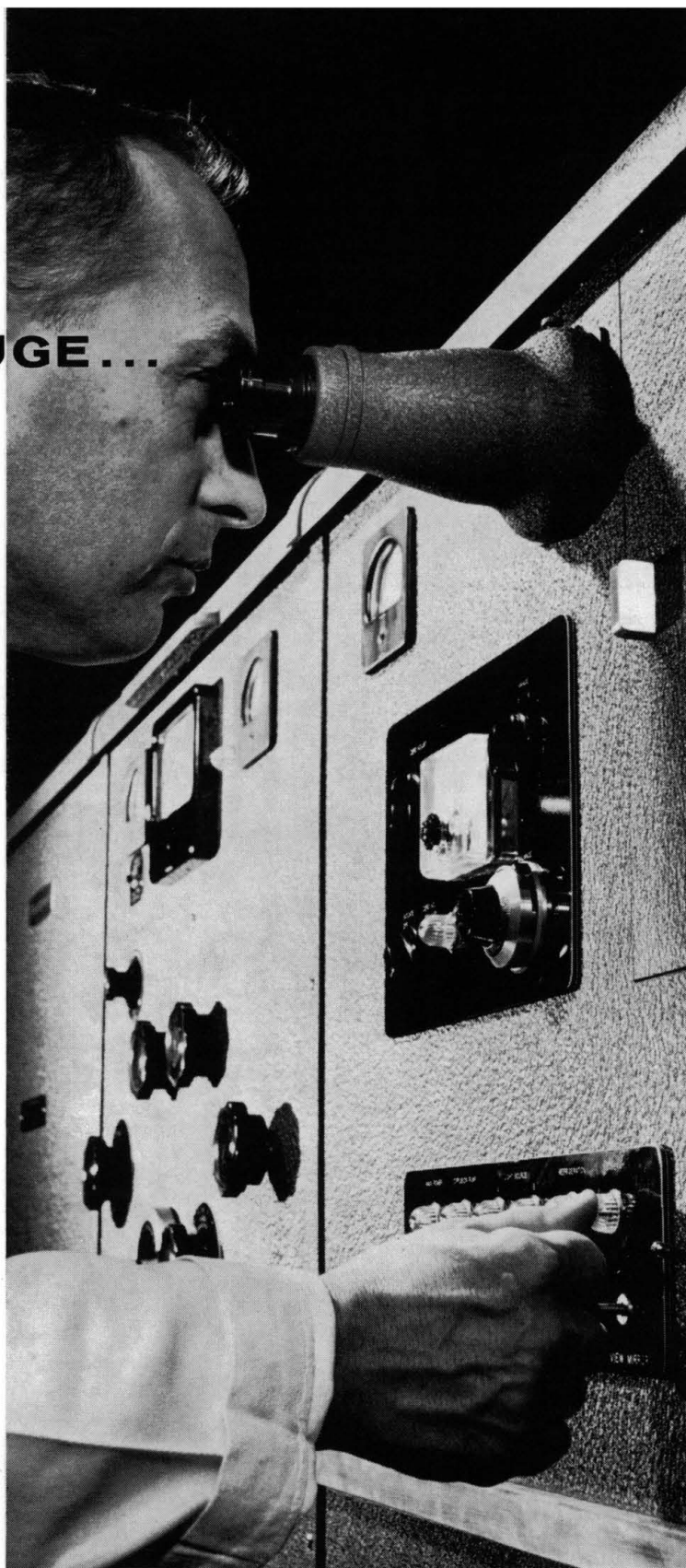
Absorption optics, having come of age, promise to be increasingly useful in molecular research with the ultracentrifuge.

**Windows of Sapphire**

High-speed studies using interference optics are now practical with the development of sapphire windows for the ultracentrifuge cell. Quartz, the usual cell window material, begins to distort under extreme centrifugal forces, causing optical patterns to blur. The new sapphire windows are much stronger, and give clear fringes throughout the centrifugal force range of interference cells.

**Low-speed Equilibrium Rotor**

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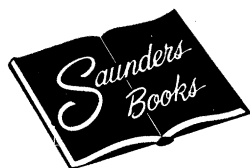
*If you are not familiar with the ultracentrifuge, we will be happy to send you copies of "An Introduction to Ultracentrifuge Techniques" and the latest issue of "Fractions," a periodical sent to owners of Beckman ultracentrifuges, electrophoresis-diffusion instruments and amino acid analyzers. Write:*

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March  
and April

## Frobisher—Fundamentals of Microbiology

**New (7th) Edition**—A superbly clear and up-to-date presentation of every aspect of microbiology. The text fully explains: *principal characteristics of the major groups of microorganisms—methods used in the observation, propagation and study of microorganisms—practical applications of microbiology to daily life.*

This new edition is virtually a new book. Every chapter has been extensively revised or entirely rewritten with a view to modernization, accuracy and clarity. Material on *energy transformations in biological oxidation, chemosynthesis and photosynthesis*, and on *nutrition, meta-*

*bolism*, and *cultivation* has been completely revised. You will find fully rewritten and revised sections on viruses, microbial variation, sexuality, PPLO, morphology and structure, tissue culture, genus *Bacillus* and its spores, genus *Streptococcus*, tribe *Lactobacillae* and related organisms, microscopy, etc. More emphasis is placed on industrial and other practical aspects of microbiology.

By MARTIN FROBISHER, JR., Sc.D., Special Consultant, Laboratory Branch, Communicable Disease Center, U.S. Public Health Service. About 672 pages, 6" x 9 1/4", with 350 illustrations, some in color.

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## Hutchinson—Physical Chemistry

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catalysis and adsorption. The final portion of the book deals with details of atomic and molecular processes; atomic and molecular spectra; wave mechanics and chemical bonding. Features to be noted: authoritative treatment of colloid and surface chemistry (the author's specialty)—a rigorous treatment of electrochemistry previously not found in texts—an entire chapter devoted to the determination of molecular shape and size for a wide variety of substances, ranging from small molecules to polymers.

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## Harrow and Mazur—Textbook of Biochemistry

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By BENJAMIN F. HARROW, Ph.D., Professor of Chemistry Emeritus and ABRAHAM MAZUR, Ph.D., Associate Professor of Chemistry; Both at the College of the City of New York. About 608 pages, 6" x 9 1/4", with about 116 illustrations.

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By CARL R. NOLLER, Ph.D., Professor of Chemistry, Stanford University. 255 pages, 6" x 9 1/4", illustrated.

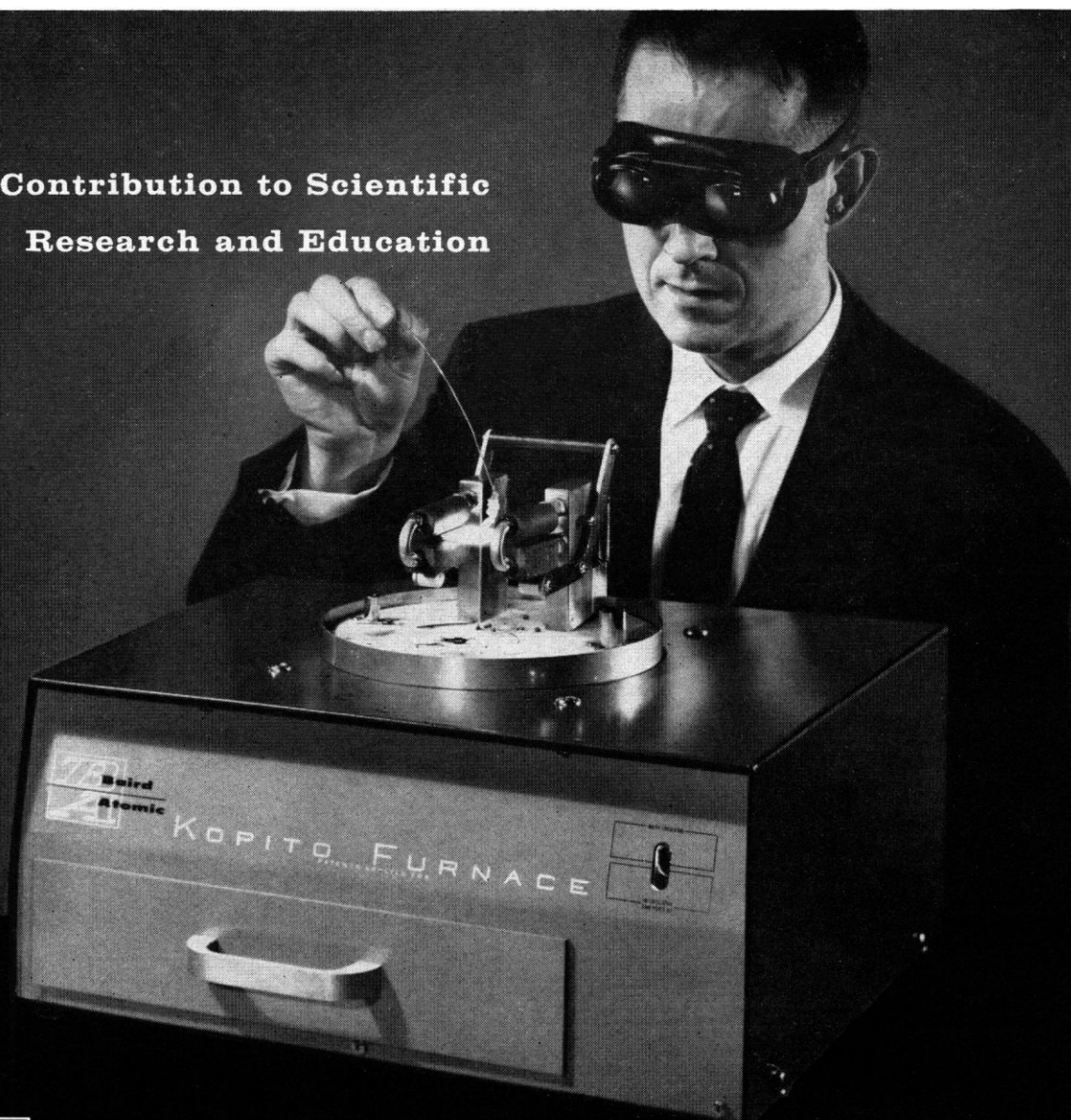
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Edited by: Abraham M. Shanes.  
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## #55. Photoperiodism and Related Phenomena in Plants and Animals.

1959, 2nd printing 1961. 922 pages. 256 illustrations.  
Edited by: Robert B. Withrow.  
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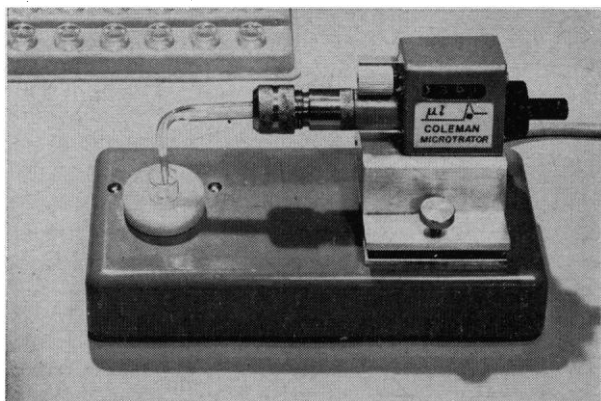
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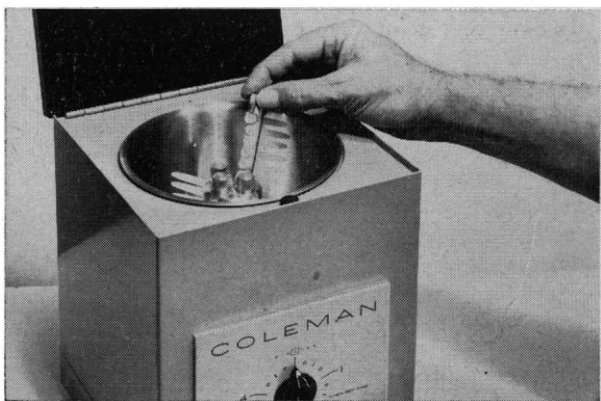
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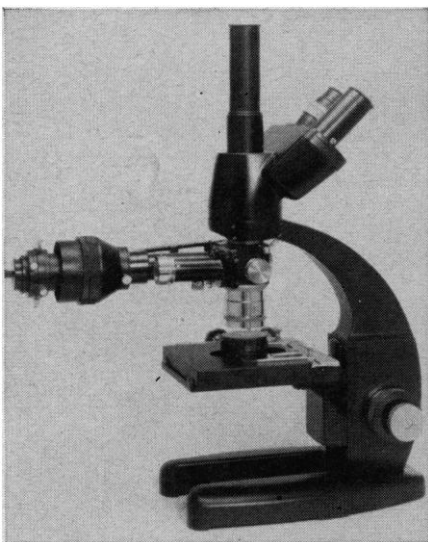
## COOKE BRIEFS

### *Instruments and Applications*

#### **Routine and research versatility of the M12 "universal" microscope**

The M12 Metallurgical Microscope is carefully designed for full convertibility to allow use in the wide range of optical techniques usually associated with a "Universal" microscope.

The model shown is fitted for the examination and photography of opaque surfaces in bright field and dark field, the built-on light source being very intense and capable of photographic use at the highest powers.

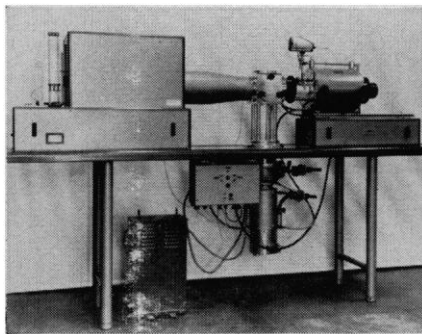


By mounting a substage motion, at little additional cost, the instrument can be used for transmitted light studies in bright field, dark ground, phase contrast and polarized light. Mixed illumination (simultaneous normal incident and transmitted) can be used. In this form, the microscope may be employed on the widest possible variety of specimens.

Alternatively a less expensive stage, normal incident illuminator and body may be chosen, if the user requires a comparatively limited but inexpensive instrument for routine or educational purposes.

#### **A high temperature vacuum dilatometer**

To meet the needs of those interested in dilatation studies of modern special metal alloys, Chevenard has produced the HT-60 Dilatometer.



With this instrument dilatation characteristics at temperatures up to 1500°C and in a very high vacuum can be determined.

A photo-electric spot-follower principle of recording is employed and either "expansion vs. temperature" or "expansion vs. time" (the specimen being held at a constant temperature) curves can be obtained.

#### **Design features of the Metalette microscope**

This new metallurgical microscope has several innovations in stand design which improve optical performance and convenience in use.

The gliding stage is mounted to a fixed limb of ample proportions. Stage and specimen do not move during focusing, thus eliminating a common

source of wear and fine vibrations as well as permitting the examination of very heavy specimens.

Coarse and fine adjustments are centrally located at top front of base. No control knobs project outside limb or base and controls are accessible with equal ease to each hand. In this instrument the fine adjustment control is the outside larger knob, the use of which facilitates the very small and precise motions required of it. All controls for adjustment of illumination are in easy reach just behind the focusing controls.



Ball bearing focusing slides, carrying objectives, illuminator and body are of unusual width. These slides subtend the wide angle of 114° at the optical axis — in comparison to a usual value of about 34° in conventional microscopes. This gives the microscope a rigidity which other designs cannot provide.

#### **A long working distance objective suitable for use with heating stages**

For work under such condition, the M7817 20X Long Working Distance Objective may be useful. Numerical aperture is low for an objective of this power, being 0.28, however, this objective is most versatile. A working distance of 14mm is provided; the lens can be used in either transmitted or normal incident light; it can be employed on specimens with or without cover glass (of whatever thickness), immersed or dry.

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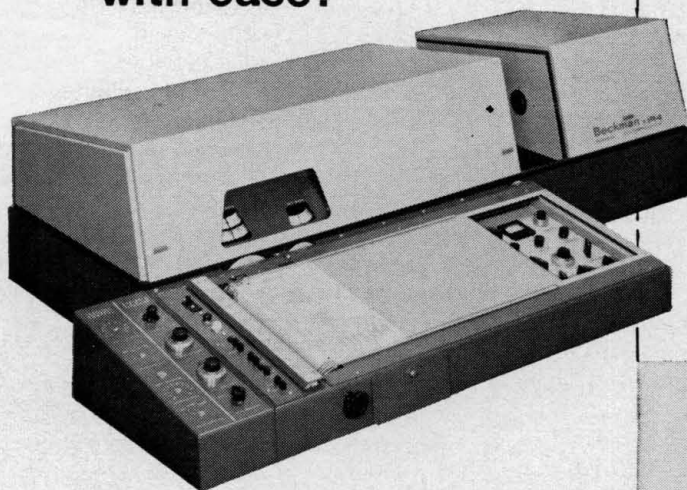


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- B. **EXTERNAL SOURCE STUDIES** • Use the IR-4 to analyze radiation from sources outside the instrument. Example: measuring infrared radiation from jet aircraft exhausts in order to minimize the tracking ability of enemy missiles.
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- D. **EXTERNAL DETECTOR MONITORING** • External detector optical systems permit the study of detector response as a function of wavelength. Example: checking the performance level of infrared tracking detectors in the nose cones of our missiles.

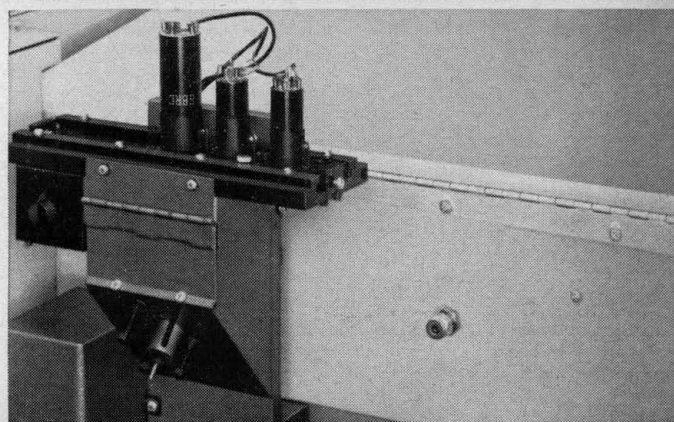
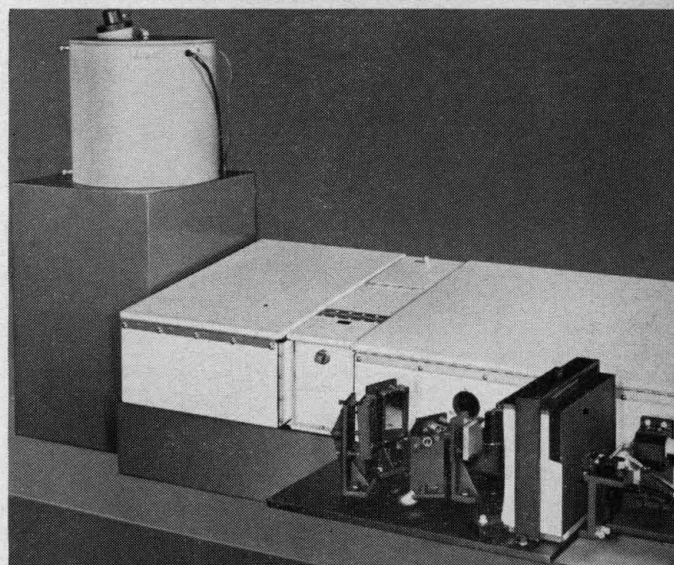
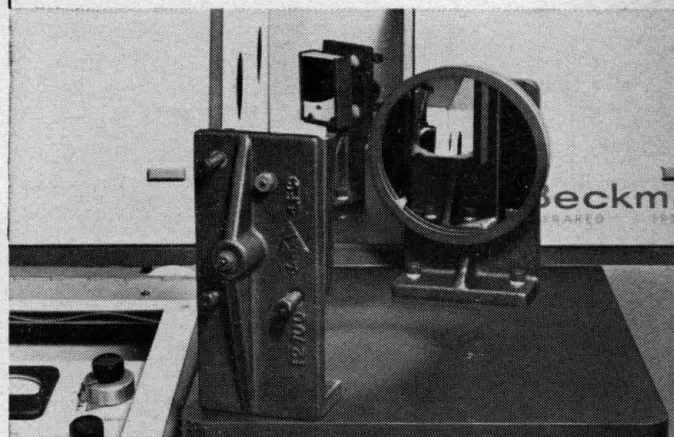
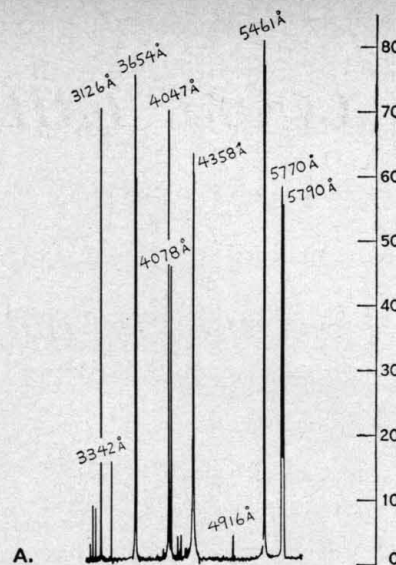
NOTE: Attachments for above studies are also available with Beckman IR-5 and IR-7 spectrophotometers.



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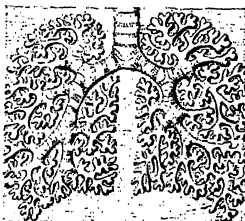
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# IT HAPPENED THIS MONTH...

*a glance at yesterday in relation to today*



IN FEBRUARY—(1810)—in answer to critics of his work, Mr. J. Acton defends the thesis that seeds, plants, and animals, during their respective functions of germination, vegetation, and respiration, absorb oxygen gas and emit carbonic acid gas. There are some who believe that living organisms emit solid carbon which then unites with oxygen externally. Acton attempts to prove oxygen absorption by demonstrating changes in the color of the viscera of animals killed in an atmosphere of oxygen gas. He feels that oxygen uptake by the blood accounts for the formation of the carbonic acid gas, which must surely be more easily emitted in an aeriform rather than a solid state.<sup>1</sup>

*Acton's critics were soon silenced and attention shifted to the details of the metabolic processes associated with the gas exchange. If Acton — like modern workers — had had  $C^{14}$  and  $O^{18}$  to work with, his ideas might have won acceptance more readily. Use of these isotopes has contributed enormously to our knowledge of respiratory and vegetative functions. For example,  $C^{14}$  compounds have played a key role in studies on photosynthesis. Schwarz BioResearch makes a wide variety of  $C^{14}$ -labeled biochemicals; our most recent addition is a group of  $C^{14}$ -labeled 5'-nucleotides.*



IN FEBRUARY—(1938)—D. Breese Jones and his associates<sup>2</sup> report on some studies concerned with *Phaseolus vulgaris*, the “black turtle soup” bean of the Mayas. Anthropologists have reported that the Mayas subsist almost entirely upon this bean and maize, and yet are a strong, healthy race. Jones' findings indicate a supplemental relationship between the bean and maize protein: the relatively large content of lysine, tryptophane, histidine, and cystine in the bean protein contrasts sharply with low concentrations in maize.

*If you are studying the physical, chemical or biological properties of proteins, Schwarz BioResearch does not offer you beans, but we do offer an array of optically standardized amino acids and derivatives labeled with  $C^{14}$ ,  $H^3$ ,  $N^{15}$ , or  $O^{18}$ ... and many CBZY amino acids, amino acid esters and polyamino acids that we distribute for Yeda of Israel.*



IN FEBRUARY—(1961)—a short communication from the Mirsky group discusses nuclear “amino acid-transfer” RNA. Their previous work had shown that isolated thymus nuclei contain amino acid activating enzymes and are capable of sustained amino acid incorporation into nuclear protein. Now they have incubated  $C^{14}$ -labeled leucine with a nuclear fraction containing RNA and activating enzymes. After incubation the mixture was hydrolyzed with ribonuclease and a radioactive leucine-adenosine complex isolated by paper electrophoresis and chromatography. This indicates that the receptor group of nuclear (like cytoplasmic) “transfer” RNA is adenosine.<sup>3</sup>

*Whether you work with nucleus or cytoplasm, RNA or DNA, radioactive or non-radioactive compounds, check the Schwarz catalog. If you do not have a copy, write for it.*

1. Acton, J.: Further remarks on respiration, in answer to J. F. J. Nat. Phil., Chem., and the Arts 25:88 (Feb.) 1810. 2. Jones, D. B.; Gersdorff, C. E. F., and Phillips, S.: Proteins of the black bean of the Mayas, *Phaseolus vulgaris*. J. Biol. Chem. 122:745 (Feb.) 1938. 3. Hopkins, J. W., Allfrey, V. G., and Mirsky, A. E.: Adenosine as the receptor end group in nuclear amino acid transfer RNA. *Biochim. et Biophys. Acta* 47:194 (Feb. 12) 1961.



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## Alas, a Lack, or Why English Slept

Almost anyone can think up ways to improve high school teaching of English. We can do without memorizing *The Rime of the Ancient Mariner*. It stoppeth one, if not two, of three students. And instead of retracing the trials of Silas Marner at the pace at which they were lived, one could read more rapidly a few contemporary novels. Use of paperback books, in their variety and availability, should permit students and teachers to satisfy individual tastes. And for students going to college, more demanding instruction in composition should eliminate the need for that perennial hodgepodge, Freshman English.

What is really needed to improve English instruction, however, is not random thoughts but a systematic study of the curriculum, from elementary school through the first year or two of college. Such an effort is now under way in the U.S. Office of Education's Project English. Plans call for setting up curriculum study centers at three universities this spring. The curricula, borrowed or invented, will be designed to teach students to read with comprehension and to write with clarity. Literature will be included as it bears on these goals. The most promising feature of the project is the effort to draw upon the talents of university people outside, as well as inside, the schools of education.

Use of persons who are not professors of education does not, of course, make this English program unique. The program bears some similarity to the now familiar efforts at reform in teaching science and foreign languages, which are supported by the National Science Foundation and, under the National Defense Education Act, by the Office of Education. The main idea is also to put a little more emphasis on rigor and a little less emphasis on "life-adjustment." Actually, most students are not fortunate enough to have suffered even the abuses of rigor illustrated in the examples in the first paragraph above.

Project English is starting on a makeshift basis, and it includes other efforts about which it is harder to be enthusiastic. It includes, for example, educational research of the kind that, if it succeeds at all, can only demonstrate the obvious — such as the bearing of vocabulary size on reading comprehension. The key idea of the project, however, is the establishment of the curriculum centers. As the project grows, the hope is to establish more centers. And as blocs of sensible yet imaginative curricula start coming from the centers, the hope is to set up institutes for retraining teachers. These institutes would be similar to those already established for science teachers and foreign language teachers. To move to this final stage, however, will require not only a great deal more money from Congress but also special legislation.

The director of the project is J. N. Hook, who recently came to Washington on leave from the department of English of the University of Illinois. Being in the Office of Education, Hook will work more closely, of course, with the personnel of that office than did his counterparts in some of the earlier work on science teaching. But with reform in education gaining respectability, this could operate to the advantage of the program. The Office of Education had been growing famous for taking the education out of education. Perhaps it will now grow famous for putting it back.—J.T.





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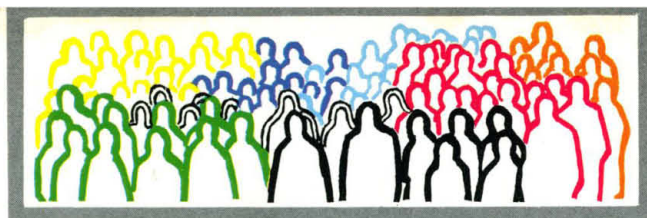


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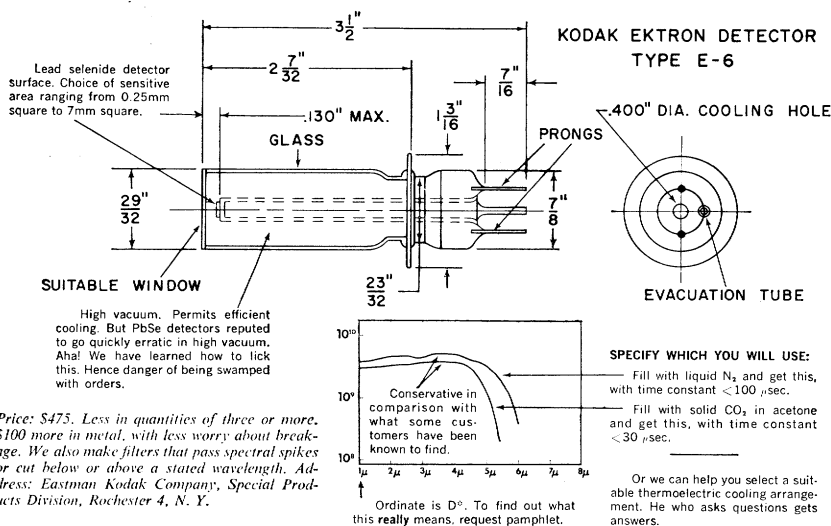


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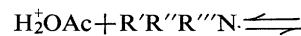
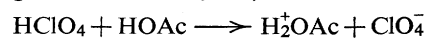
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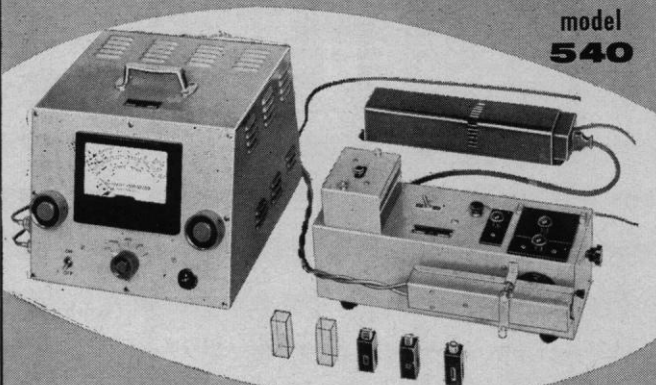
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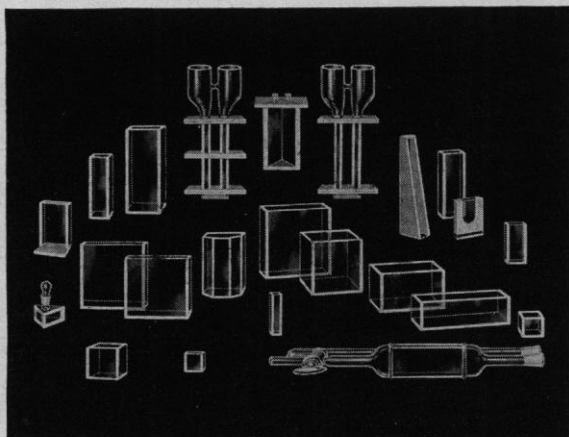
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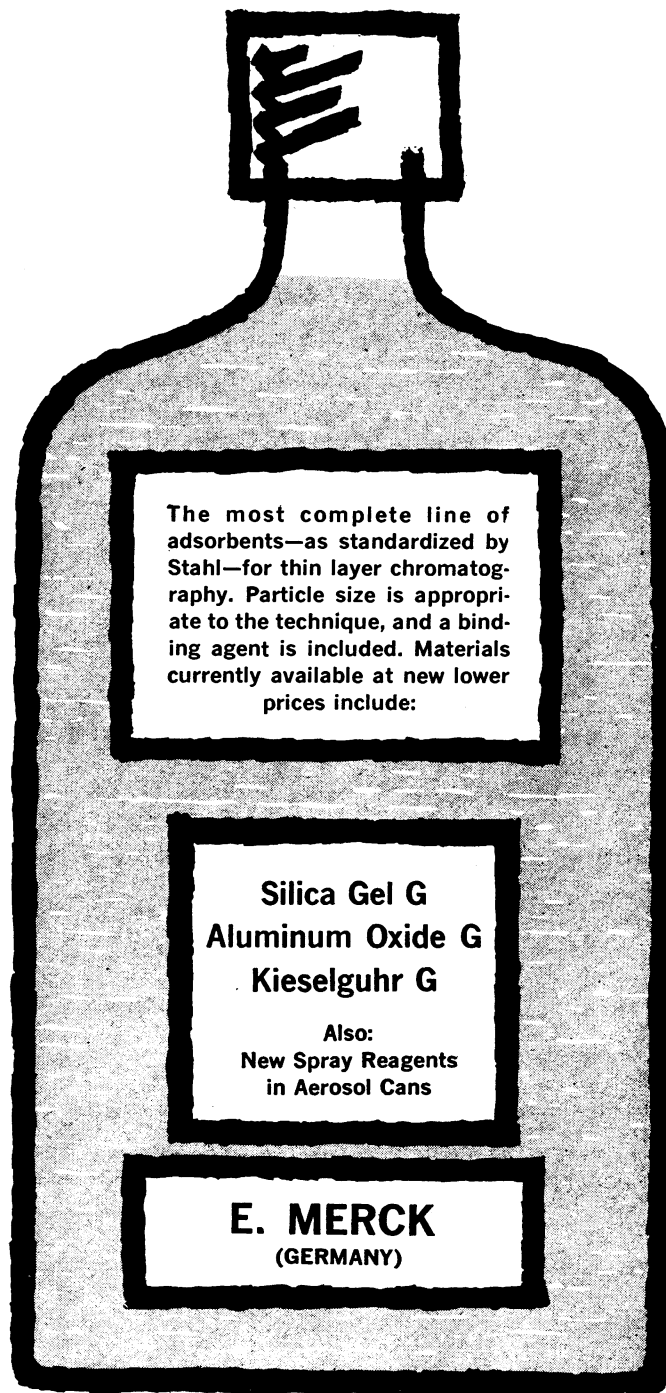
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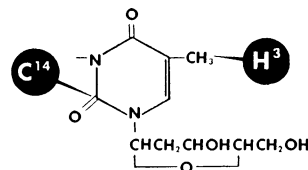
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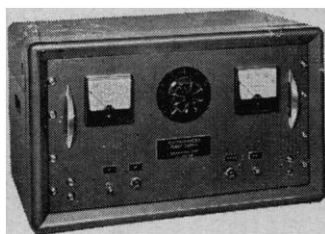
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The full proceedings of the symposium on respiration and fermentation will be published by the Ronald Press. The abstracts of the symposium papers and the shorter contributed papers are scheduled to appear in the January issue of the *Journal of General Physiology*, currently the official publication organ of the Society of General Physiologists.

Newly elected officers are Albert Tyler, president; Teru Hayashi, vice-president; David Bishop, secretary; and Barry Commoner and Andrew Szent-Györgyi, councilors. Thirty-eight new members were voted into the society.

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## Forthcoming Events

### February

26-2. Current Trends in Nuclear Power, symp., Tucson, Ariz. (L. Weaver, Nuclear Engineering Dept., Univ. of Arizona, Tucson)

27-1. Application of Switching Theory in Space Technology, symp., Palo Alto, Calif. (J. P. Nach, Lockheed Aircraft Corp., Sunnyvale, Calif.)

### March

1-3. Florida Acad. of Sciences, Gainesville. (J. B. Lackey, Dept. of Civil Engineering, Phelps Laboratory, Univ. of Florida, Gainesville)

1-3. Fundamental Cancer Research. Conceptual Advances in Immunology and Oncology, symp., annual, Houston, Tex. (Univ. of Texas, Anderson Hospital and Tumor Inst., Houston 25)

1-3. Scintillation and Semiconductor Counters, 8th symp., Washington, D.C. (G. A. Morton, RCA Laboratories, Princeton, N.J.)

2-4. National Wildlife Federation, Denver, Colo. (T. L. Kimball, 1412 16 St., NW, Washington 6)

4-7. Association for Higher Learning, Chicago, Ill. (Chief of Information, Dept. of the Army, Washington 25)

4-8. Association for Supervision and Curriculum Development, Las Vegas, Nev. (Chief of Information, Dept. of the Army, Washington 25)

4-8. Conference on Gas Turbine Power-

Process Industries, American Soc. of Mechanical Engineers, Houston, Tex. (A. B. Conlin, Jr., ASME, 29 W. 39 St., New York 18)

5-9. Analytical Chemistry and Applied Spectroscopy, conf. and exposition of modern laboratory equipment, Pittsburgh, Pa. (C. F. Glick, Applied Research Laboratory, U.S. Steel Corp., Monroeville, Pa.)

5-16. United Nations Economic and Social Council, Committee for Industrial Development, New York, N.Y. (U.N., New York)

8. Problems Relating to Food and Feed Additives, Assoc. of Vitamin Chemists, Chicago, Ill. (H. S. Perdue, Abbott Laboratories, N. Chicago)

9-14. National Science Teachers Assoc., annual, San Francisco, Calif. (M. T. Ballou, Ball State Teachers College, Muncie, Ind.)

10-13. Microminiaturization Congr., New York, N.Y. (C. G. Sedan, American Watchmakers Inst., 18465 James Couzens Hwy., Detroit 35, Mich.)

11-17. American Congr. on Surveying and Mapping—Amer. Soc. of Photogrammetry, annual, Washington, D.C. (G. K. Emminizer, Jr., 106 Valley Rd., Ellicott City, Md.)

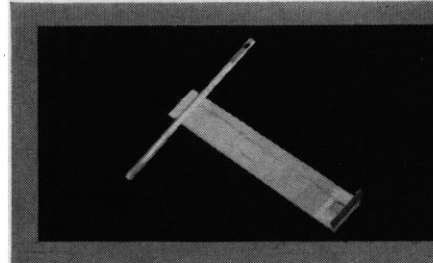
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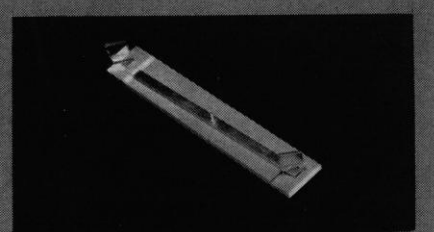
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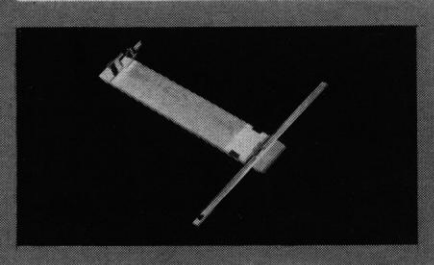


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