

# SCIENCE

23 October 1964

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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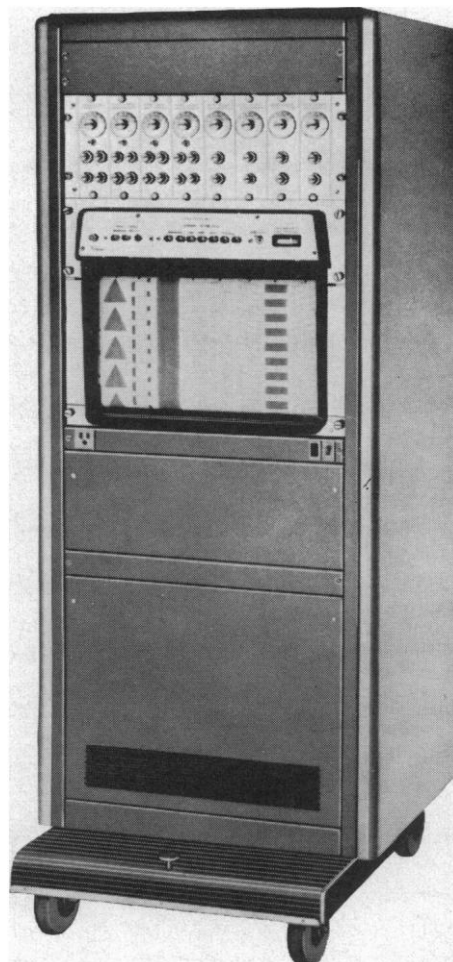
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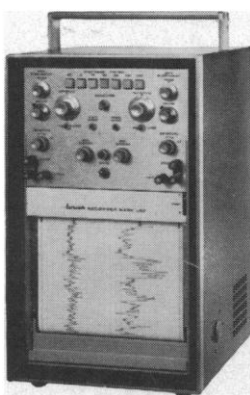
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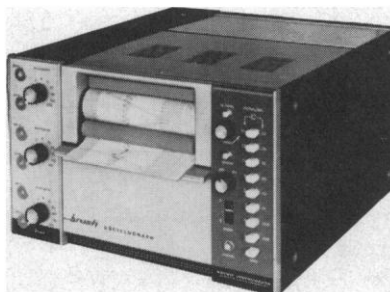
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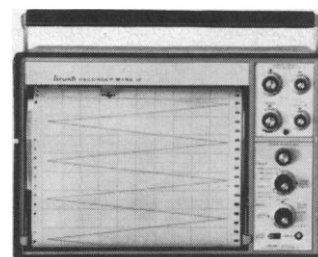
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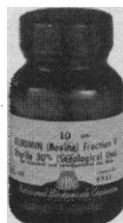


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**Reference:** Cohn et. al., J.A.C.S., 60, 1753, (1947).

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Nitrogen Compounds (as N)	0.0006
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Sulfate (SO <sub>4</sub> )	0.0005
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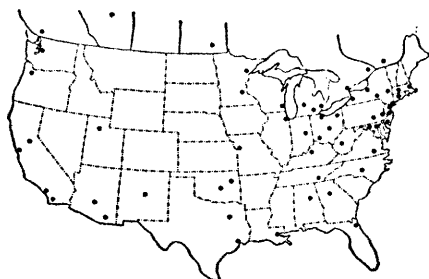
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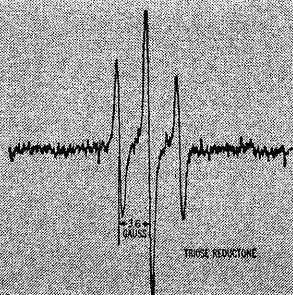
# EPR

IN THE WORLD OF

# BIOCHEMISTRY

$$\begin{array}{c} \text{SUBSTRATE} \\ \text{H} - \overset{\text{OH}}{\underset{|}{\text{C}}} = \overset{\text{OH}}{\underset{|}{\text{C}}} - \overset{\text{O}}{\underset{||}{\text{C}}} - \text{H} \end{array} + \text{ENZYME} \longrightarrow \text{FREE RADICAL}$$

One of the most intriguing areas of investigation in free radical chemistry today is in the area pertaining to the role of "free radicals" in biological redox systems. One of the most important questions asked by investigators in this field is, "Is there a technique that can conclusively determine the presence of free radicals in biological reactions?" The extreme sensitivity and rapid response capabilities of EPR have provided a "yes" answer to this question.



The example at left illustrates one of the first positive demonstrations of the detection of free radical intermediates in an enzymatic oxidation-reduction. The substrate triose reductone was oxidized by a one electron transfer by the enzyme horse-radish peroxidase-H<sub>2</sub>O<sub>2</sub> to a free radical. The spectrum for the free radical as illustrated on the left was formed instantly in the steady state during a continuous flow experiment. This spectrum was positively identified as the triose reductate free radical.

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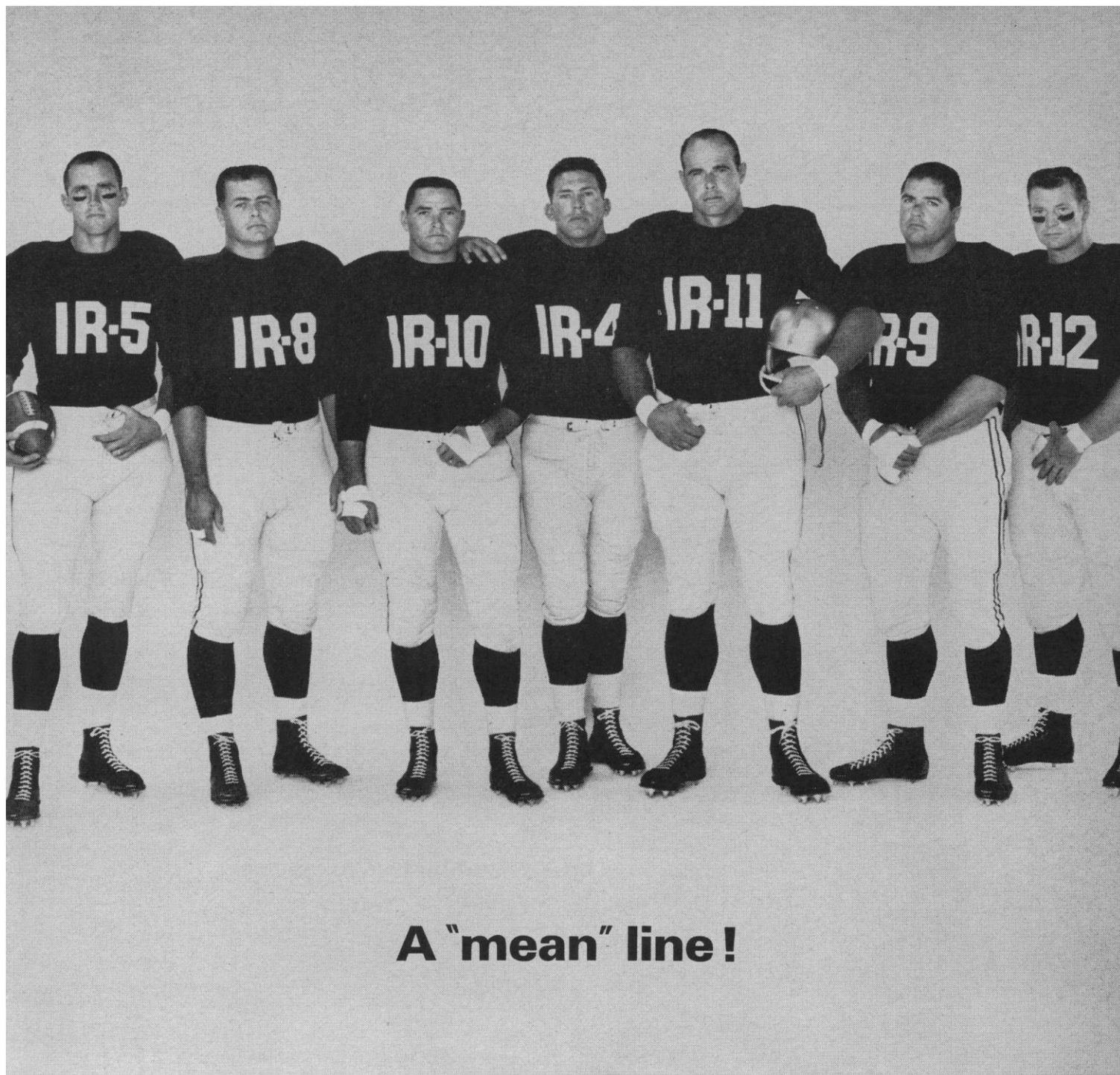


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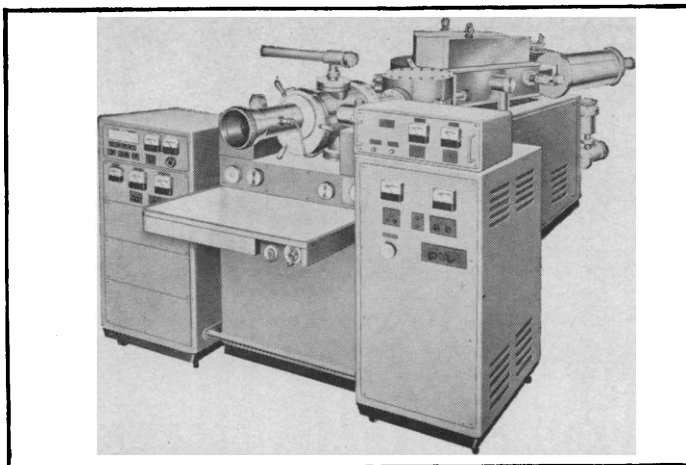
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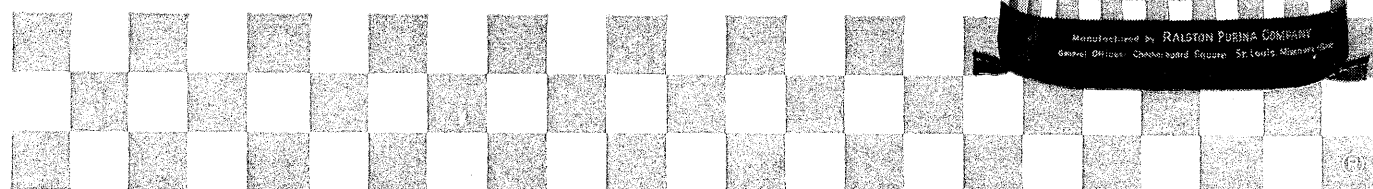
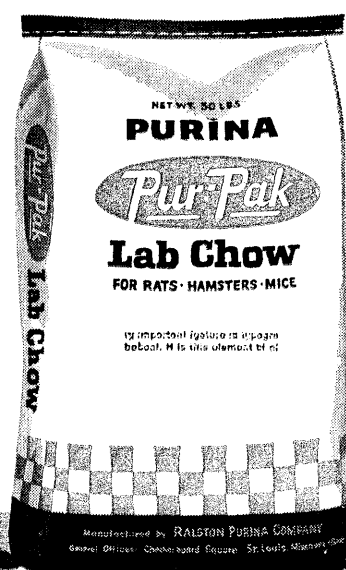
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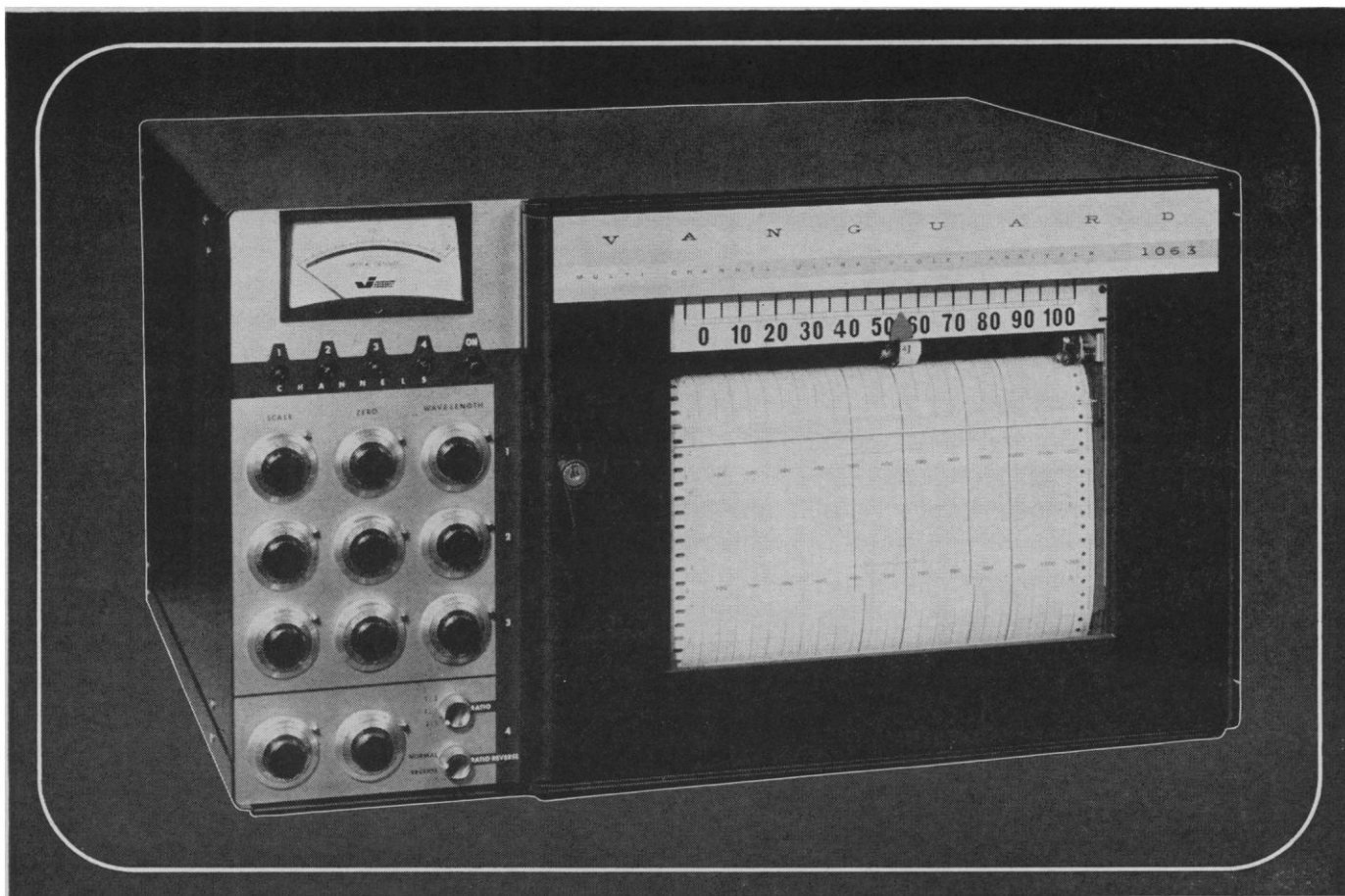
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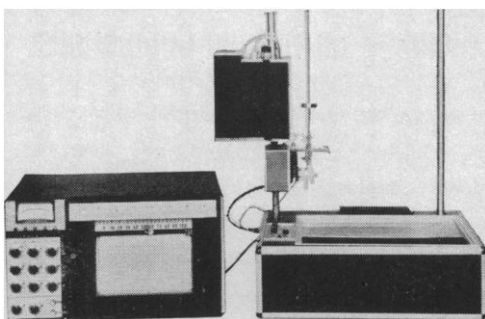


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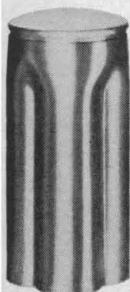
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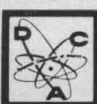


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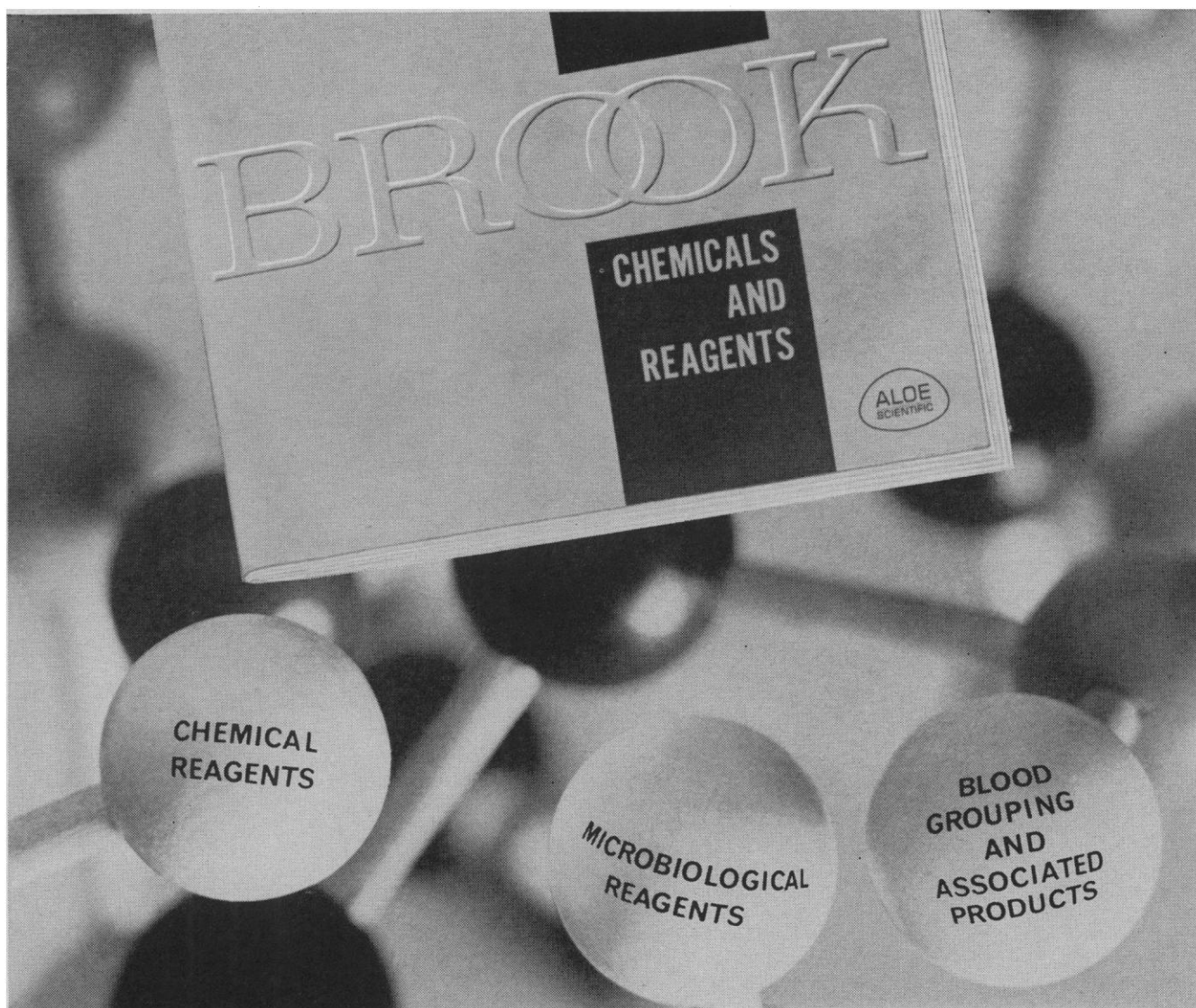


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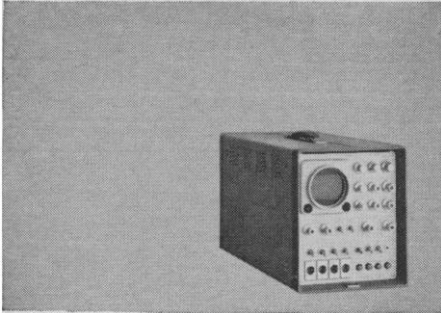
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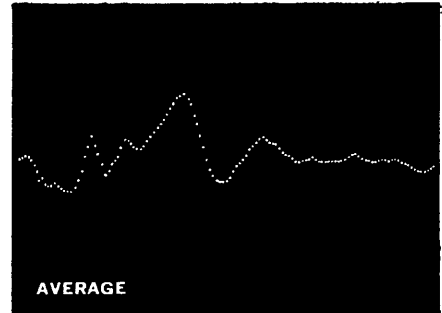
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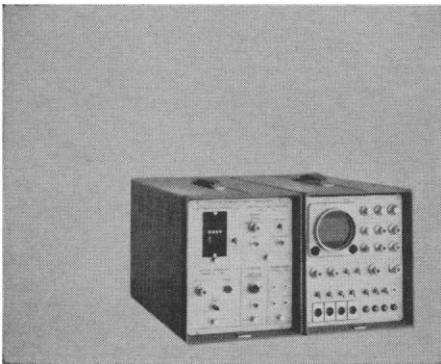
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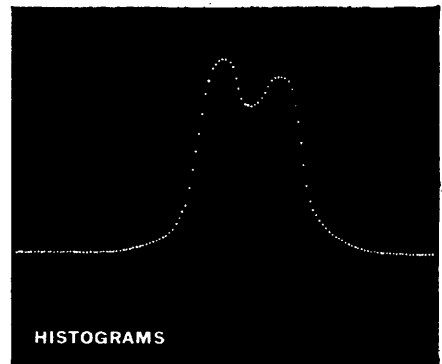
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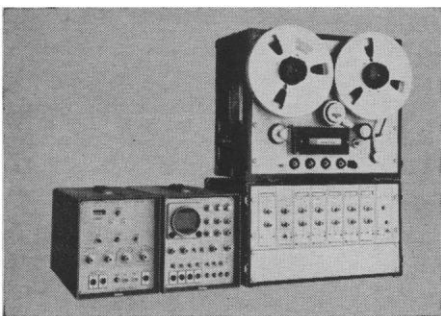
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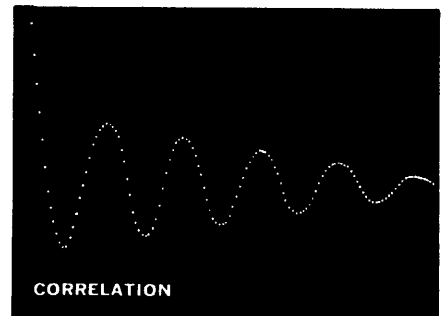
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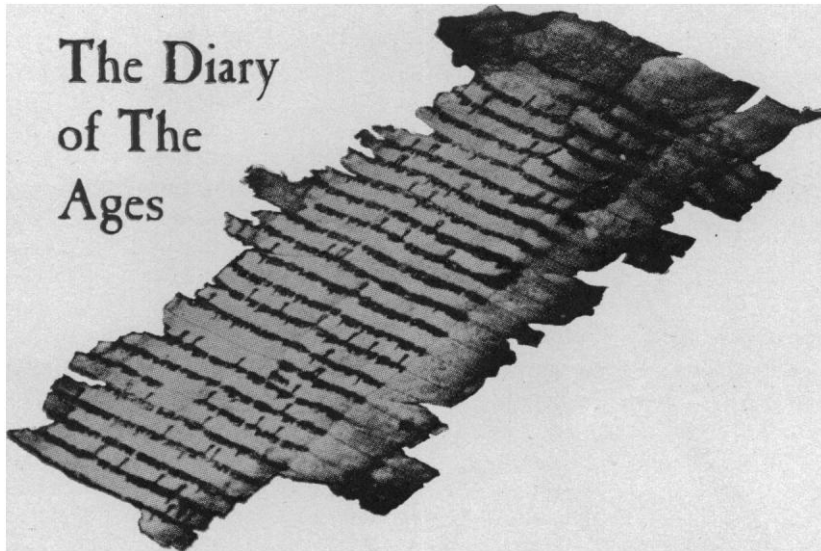
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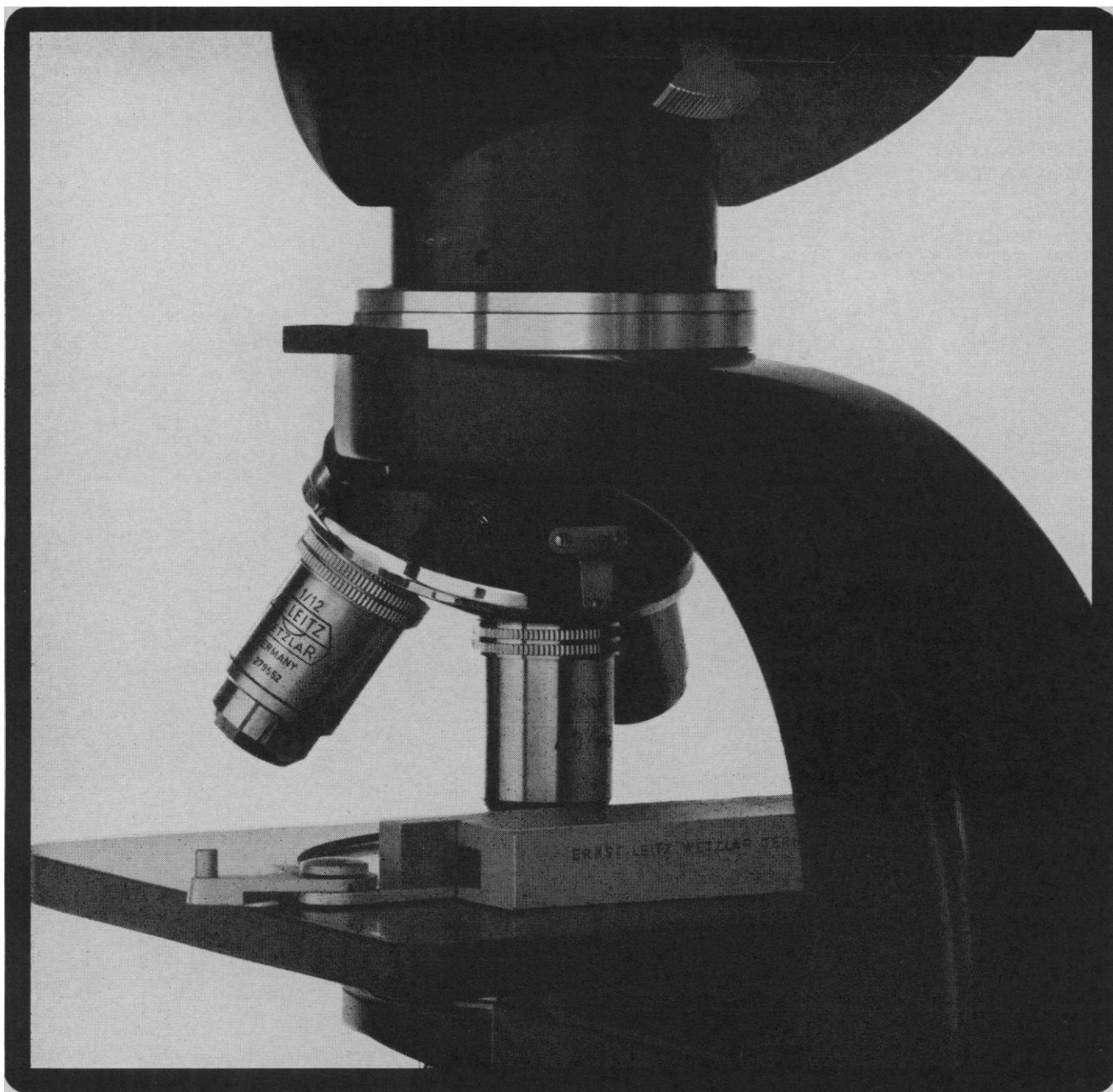
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## Advice for Congress

The House Committee on Science and Astronautics has asked the National Academy of Sciences to answer two difficult questions:

"What level of Federal support is needed to maintain for the United States a position of leadership through basic research in the advancement of science and technology and their economic, cultural, and military applications?"

"What judgment can be reached on the balance of support now being given by the Federal Government to the various fields of scientific endeavor, and on adjustments that should be considered, either within existing levels of over-all support or under conditions of increased or decreased over-all support?"

These questions constitute the first use of a new arrangement for the National Academy of Sciences to provide Congress with information and advice upon request. To answer the two questions, the Academy has appointed a committee of 15 distinguished members.

The committee's replies will be used by Congress in conjunction with the advice it receives from other sources. Congress will continue to receive the budget requests of the executive agencies. It will continue to hold legislative hearings and to seek the views of selected advisers. It will get plenty of advice on political, jurisdictional, and similar aspects from the executive agencies and its own members. Special scientific and technical programs will have their ardent supporters. And critics of the recommendations from any of these sources will get their day in court. Scientists should therefore have no feeling of surprise or offense if recommendations of the Academy committee are not all adopted.

Nevertheless, the establishment of the new arrangement constitutes a highly significant development in government-science relationships and presents the Academy with an opportunity to render Congress a valuable and distinctive service that it does not receive from any other source.

If the committee members were to submit individual answers, little would be gained over having 15 witnesses testify individually in legislative hearings. If the committee were to report only what it could agree upon quickly, it would not add substantially to what Congress might learn from other sources.

There is opportunity to do a far more penetrating job, one that will require much solid work by committee and staff, but one that will much more distinctively fulfill the challenging role of scientific adviser to Congress. A thoroughly helpful answer to the first question—on the level of support necessary to maintain leadership—will require analysis of trends in Germany, Japan, the U.S.S.R., and elsewhere, as well as in the U.S. A comparable answer to the second question—on balance of support among various fields—calls for an examination of each field in terms of the existing state of knowledge, the kinds of problems that are ripe for further study, the personnel and other resources available, and the possible or probable ramifications of further progress in understanding.

Answers at this level would provide Congress—and scientists also—with information that can be obtained from no other source and with guidance that would most assuredly have a constructive influence on future legislation.—DAEL WOLFLE

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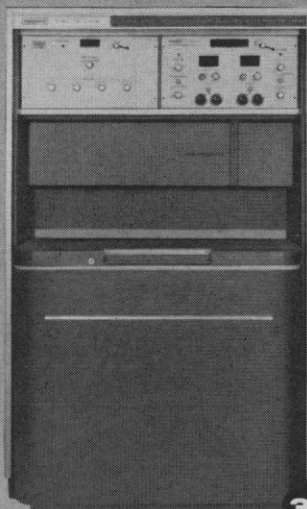
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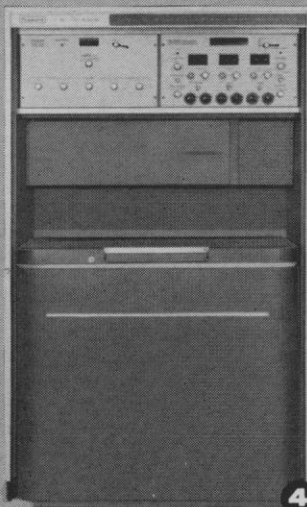
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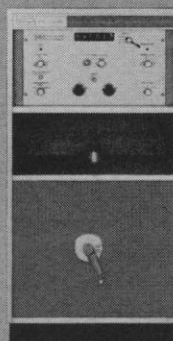


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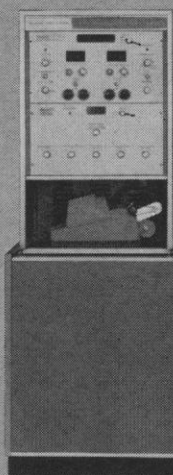


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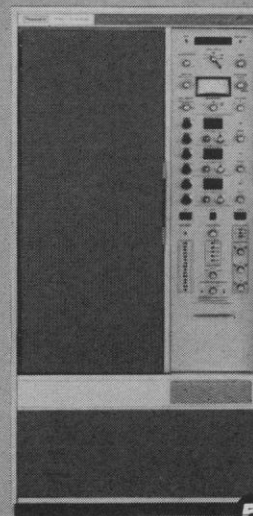
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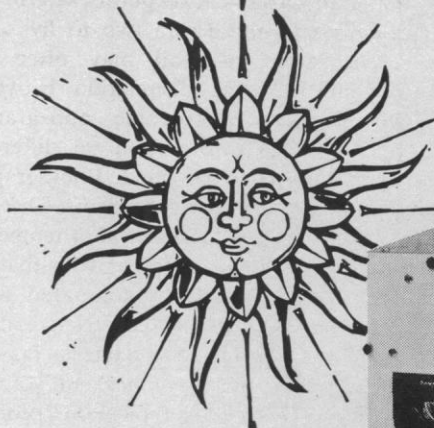
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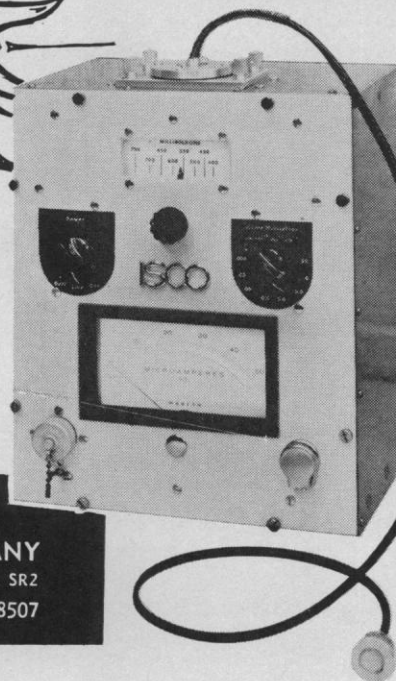
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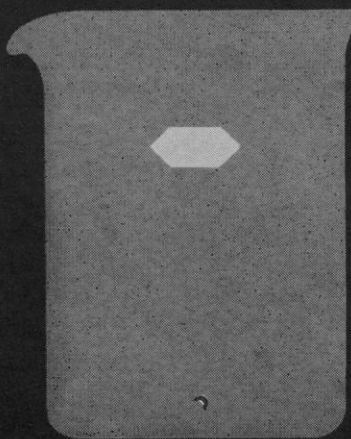
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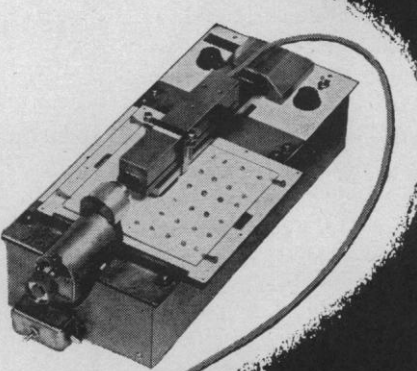
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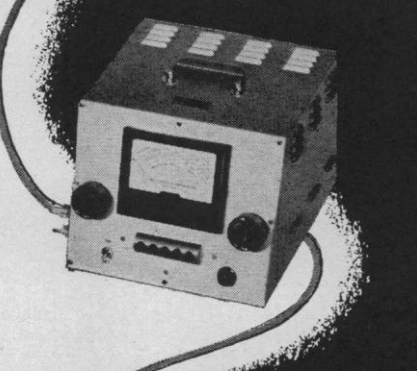
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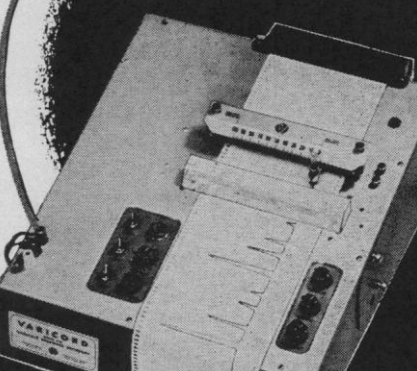
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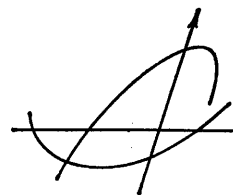


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Western Ontario) disagreed. He referred to (i) the model of Ryter and Jacob by which the mesosome separates replicating DNA into two masses and to (ii) his own serial sections that show these organelles separating the chromatin by their attachments to the transverse septa at each end of the cell. He presented additional information on mesosome structure, position, and integrity derived from sections of *Bacillus* in penicillin, during spore formation, during the natural synchrony of spore germination, and in chilled and warmed cells. The suggestion was made that continuously replicating DNA may be continuously separated through its mesosomal attachment to the continuously expanding membrane-wall exoskeleton.

W. van Iterson (University of Amsterdam) reviewed the general structure of cytoplasm and compared the structure of bacteria with that of higher cells. Bacterial mesosomes (or membranous organelles) have been generally presumed absent in gram-negative bacteria and prominent in gram-positive organisms. Reduction of tellurite takes place in these "chondrioids" or "mitochondrial equivalents," and the bound reduced product can be detected in

the electron microscope. It was also seen (in *Bacillus subtilis*) as thin rods at the cell periphery—although in *Proteus* it was found only as conglomerates of small elements contiguous with the plasma membrane. She suggested that the peripheral structures in both bacteria may function as basal granules or the cytoplasmic bases of flagella. She presented other micrographs suggesting that ribonucleoprotein does not usually occur in bacteria as separate rounded particles, but may be in linear arrays with numerous anastomoses. Ribonucleoprotein may be contiguous with the plasma membrane and possibly with the mesosome when present. In some organisms, helical fibrils from the nucleoplasm enter the cytoplasm and appear to participate in forming its net-like structure.

In his discussion, G. B. Chapman (Georgetown University) emphasized the bacterial cytoplasmic membrane and particularly its functions as the membrane septum and the mesosome. He noted the apparent absence of the latter in many bacteria (but not in *Escherichia coli*, as remarked by others) and their easy demonstrability in gram-positive bacteria. Discussions dealt with other derivatives of the

plasma membrane (including chromatophores) and other constituents of the bacterial cytoplasm such as ribosomes and polysomes, fibrous structures, and various inclusions.

B. A. D. Stocker (Lister Institute, London) and H. Koffler (Purdue University) discussed bacterial flagella. These locomotor organelles can be seen by electron microscopy to be spiral filaments. Their subunits consist of proteins (flagellins). However, the organization of such proteins into "fibrils" or strands, the numbers of such fibrils about the hollow axis, and the coiling and pitch are variable or uncertain. Flagella arise from spheres or mushroom-shaped basal submembranous structures to which they are attached by hooks. Regions near the flagellar insertions reduce tellurite (discussed by van Iterson) and the hooks may contain RNA.

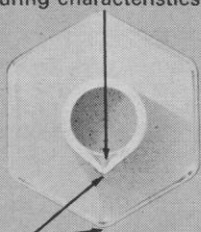
The flagellins, which have molecular weights from 20,000 to 40,000, lack cysteine, cystine and tryptophan; often contain an unspecified carbohydrate; and seem to lack most common mineral elements in any quantity. Those from thermophilic bacteria are more stable to heat and to a variety of denaturing agents than are those from

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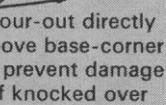
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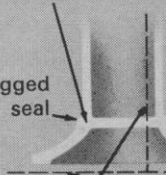
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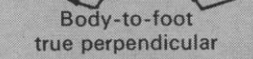
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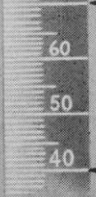
Rugged seal

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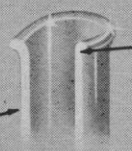
Body-to-foot true perpendicular



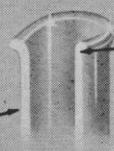
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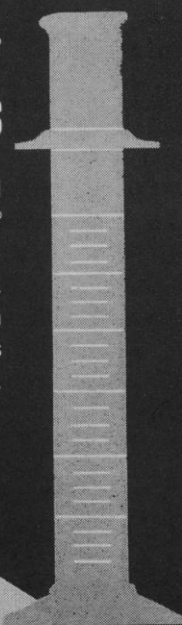
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mesophiles. They contain less aspartic and glutamic acids. After acid disintegration of flagella, the flagellins can be reassembled under suitable conditions to reform spiral filaments which are indistinguishable from native flagella. Flagellar synthesis *in vivo* can be prevented in some strains by elevated incubation temperatures, and by inhibition of protein synthesis (for example, by chloramphenicol). The question of an intracellular pool of flagellin or of precursor is unsettled and may differ among genera of flagellated bacteria.

Additional surface components of some bacteria, the pili (or fimbriae), were discussed by C. C. Brinton, Jr. (University of Pittsburgh). He reviewed their chemical and morphologic nature, their inheritance, replication and development, and possible functions. Of particular interest was the discussion of the role of pili in phage resistance in some strains of *E. coli*, and the description of a new third type of pilus which is the apparent attachment site for Hf phage.

R. M. Cole (National Institutes of Health, Bethesda) reviewed the nature of bacterial cell wall replication as seen by the aid of specific immuno-

fluorescence to wall antigens. The site and mode of initiation of wall replication differ in different bacteria (for example, a discrete single equatorial origin in *Streptococcus pyogenes* as opposed to multiple intercalated sites in *Salmonella typhosa*). Problems discussed in the light of this information concerned the nature of insertion of new wall and its relation to the mesosome; the simultaneity of time and site of synthesis of all the wall components as well as surface antigens; the differences between growth of peripheral wall and of septa, as seen in induced filament formation; and the need for other mechanisms to explain such phenomena as the overall thickening of walls of *Streptococcus fecalis*, which may occur under some conditions.

The latter was explained by G. D. Shockman (Temple University) as an example of an unbalanced growth situation. It did not essentially alter the concepts of normal replicatory mechanisms derived from immunofluorescent studies of cells growing in balanced steady states. Such wall thickening, first noted in the absence of essential precursors, (for example, valine or threonine) can also be produced by addition of selective inhibitors such as

chloramphenicol. Also discussed was the possible manner of production of a site of weakness in the insoluble matrix of the replicating wall to allow insertion of new material; the role of autolytic enzymes in such a process and the sites and timing of their actions; and the need and existence of a primer or template for mucopeptide synthesis.

It can be said that the bacterial mesosome, in one relation or another, was the single topic of most concern to most participants and discussants. The importance of its occurrence (or ready demonstrability) in some organisms and not others is not known, nor is its actual relation to cell wall replication, to DNA replication, and to nucleoid separation. Its ability to reduce tellurite renews the question of "mitochondrial equivalence," but leaves unanswered the role of peripheral sites of tellurite reduction which appear related to flagellar origins. The reasons for complex and orderly substructure in walls of gram-negative bacteria, as opposed to those of most gram-positive organisms, are as obscure as the reasons for the seeming differences in their modes of wall replication and of cell separation after division. The na-

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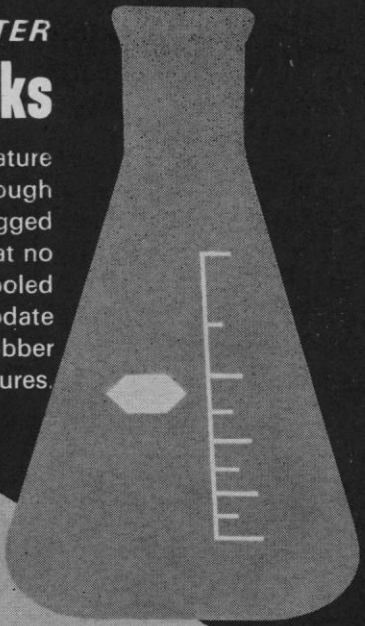
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ture of the arrangement of bacterial DNA is not entirely clear, nor is it certain that it is actually linked to mesosome or to linear arrangements of ribonucleoprotein within the cytoplasm. Finally, further information is needed on correlation of anatomic and enzymatic data in cell wall replication, with particular emphasis on "normal" growth in balanced situations as compared with the mechanisms in unbalanced and "abnormal" states.

The participation of our European colleagues was generously supported by the National Science Foundation. Most of the presentations and pertinent discussion will be published in a forthcoming issue of *Bacteriological Reviews*.

ROGER M. COLE

*National Institute of Allergy and Infectious Diseases,  
Bethesda, Maryland*

### Subunit Structure of Proteins

Biochemical and genetic aspects of the subunit structure of proteins was the topic of the annual symposium in biology held at Brookhaven National Labo-

ratory, Upton, New York, 1-3 June 1964. Investigators from the fields of genetics and biochemistry convened to review progress in their particular areas and to integrate their findings into an understanding of proteins composed of two or more polypeptide chains and of the genes which govern such structures.

Of great importance, genetically, is the phenomenon of allelic complementation. Two differently mutated forms of a gene governing a single polypeptide chain cooperate to restore a function which is absent in cells containing only one of the defective genes. The biochemical explanation of such findings is that the function involved depends on an enzyme composed of identical polypeptides. A protein composed of two such polypeptides, altered in different places, may exhibit activity absent in a dimer composed only of identically altered chains. D. G. Catchside's presentation of this phenomenon also pointed to the prevalence of proteins composed of identical subunits; he found that among 30 carefully analyzed genes in *Neurospora* more than one-half showed allelic complementation. It may well be that, aside from secretory proteins, the majority of proteins pro-

duced by the cell are composed of identical subunits.

One of the most intensively studied gene systems has been the histidine biosynthetic region of *Salmonella*. J. Loper, in discussing this system, pointed out that of eight enzymes governed by the region, four appear to be composed of subunits. Only two of the corresponding loci, however, exhibit allelic complementation. This indicates that dimeric composition, although essential for such complementation, does not by itself assure that the appropriate interactions will occur.

An interesting comparison of the histidine loci of *Neurospora* with those of *Salmonella* was made by Catchside. Two corresponding loci in *Neurospora* and in *Salmonella* showed complementation in both cases. In addition, the loci corresponding to the two other *Salmonella* loci, which produce oligomeric products, did, in *Neurospora*, show the phenomenon. The other four histidine loci failed to show allelic complementation in either organism. However, in an analysis of a histidine locus in *Neurospora*, A. Ahmed pointed out possible pitfalls in this area; "polarity" mutants, which interfere with the for-

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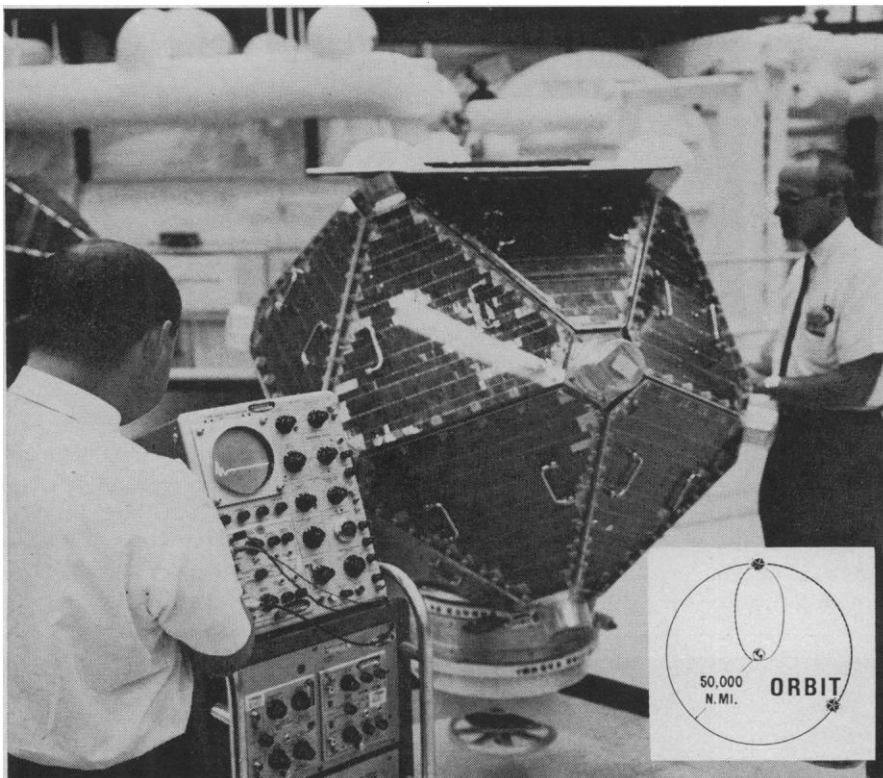
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mation of products from several adjacent cistrons, might be erroneously used as evidence for a single cistron exhibiting allelic complementation.

Complementation between differently defective polypeptide subunits has been demonstrated in vitro. In a further analysis of the mechanism involved in the case of *E. coli* alkaline phosphatase, M. Schlesinger elaborated the conditions necessary for dimerization of which the most striking is a requirement for zinc ion. The conditions for dissociation and reassociation of another enzyme, pig heart fumarase, were reported by R. L. Hill and L. Kanarek. They presented strong evidence for the existence of four identical subunits in the enzyme molecule.

H. A. Itano reviewed his work on the genetics and biochemistry of hemoglobin, a protein which contains two pairs of identical chains and can be symbolized as  $\alpha\beta\beta\alpha$ . One mystery with regard to hemoglobin appears to have been resolved at the conference. Although in most cases nearly identical polypeptide subunits appear to associate randomly in the cytoplasm, it has not been possible to isolate molecules with mixed  $\beta$ -chains in hemoglobin. This failure has now been attributed to the rapid equilibria which exist between associated and dissociated forms, and lead to the disappearance by continual separation of any mixed  $\beta$ -structures in the course of separative procedures such as electrophoresis.

An interesting approach to the identification of the bonds holding subunits together was discussed by C. Tanford. Such identification involves comparison of free energy differences between associated and dissociated protein subunits in various solvents. The free energy of solution of protein side chains is in the same solvents in order to identify the side chains newly released on dissociation and hence presumably bound together in the associated form.

With regard to the kinetics of association, K. E. Van Holde presented an intriguing picture of the situation in squid hemocyanin, which, in the electron microscope, appears as a radially symmetrical disk composed of five dimeric components. Together with L. B. Cohen he was able to demonstrate, in the ultracentrifuge, breakdown of the decamer to dimers and monomers in response to changes in the pH. Analysis of the rate of reformation of the complete protein indicated that intermediate linear poly-



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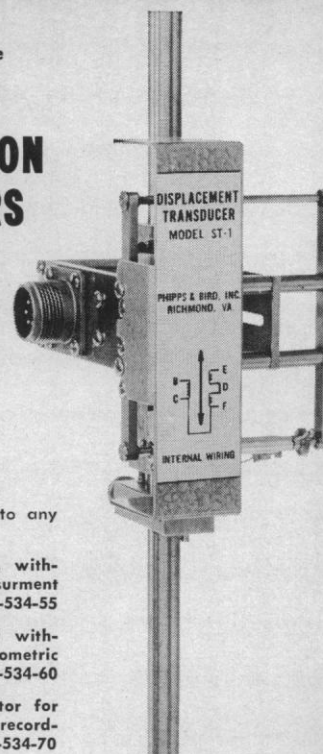
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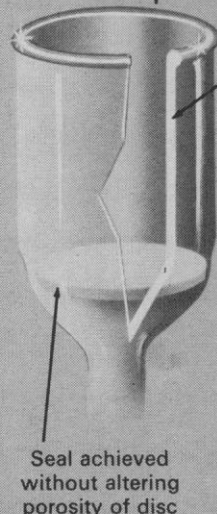
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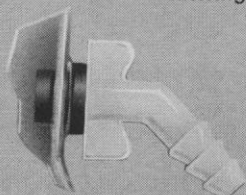


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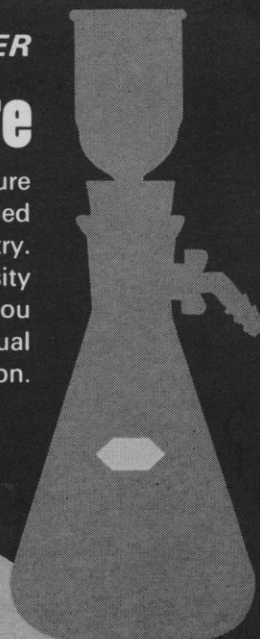
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mers of dimers were unstable until insertion of the fifth member which effectively locked the structure in the stable cyclic decamer form.

Subunit structure is the basis of one class of isozymes (enzymes of similar function but different composition). C. R. Shaw demonstrated how genetic analysis could be used to predict and verify the subunit composition of isozymes. A single mutation, for example, increases the number of isozymes of lactic dehydrogenase to 15. Lactic dehydrogenase normally exists in five forms composed of all possible tetrameric combinations of two different subunits. N. O. Kaplan proposed that the subunit composition of lactic dehydrogenase was related to cellular requirements for aerobic or anerobic metabolism. He has found that the forms of the isozymes composed of identical chains are differently adapted to these two functions.

From the reports of C. Frieden, J. C. Gerhart, and J.-P. Changeux, the subunit structure of enzymes appears to be intimately related to the control of their activity in cellular metabolism. Gerhart has succeeded in dissociating into subunits an enzyme, aspartate transcarbamylase, which is subject to feed-back inhibition.

He is now analyzing the properties of the subunits with regard to binding of substrate and inhibitor. Such allosteric effects in general, in which a metabolite is specifically bound and enhances or impedes the activity of an enzyme, appear to involve, in all cases, a protein composed of subunits. Changeux put forward a theory for this phenomenon based on a shifting of the equilibrium between loose and compact states of the protein by the metabolite exerting the allosteric effect. One of the states could bind substrate less readily so that, depending on the shift in equilibrium, activation or inhibition would result.

One class of proteins of which the function of their subunit structure is readily apparent is antibodies. A dimeric structure composed of identical subunits would provide the specific bivalency needed for precipitate formation. In a review of antibody structure, A. Nisonoff presented evidence for an ABBA configuration reminiscent of that found for hemoglobin. From his own work it is clear that a single binding site is present on each AB subunit of a specific antibody. He was able to form only univalent antibody by reassociating such fragments with

AB fragments of normal gamma globulin.

A panel discussion, chaired by R. D. Hotchkiss, provided an opportunity for speculation about the significance of subunit structure. Clearly, the occurrence of allelic complementation in diploid organisms would allow an increased variability and plasticity of the genetic makeup. Similarly, the quaternary structure of proteins offers a new dimension for the control of cellular processes.

The proceedings of the conference will be published as volume 17 of the *Brookhaven Symposia in Biology*.

S. LACKS

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## Forthcoming Events

### October

29-31. Society for the Scientific Study of Religion, Washington, D.C. (S. Z. Klausner, SSSR, 1424 16th St., NW, Washington, D.C.)

30-31. Nuclear Medicine Clinical Applications, symp., Shaker Heights, Ohio. (Cleveland Nuclear Medicine Symp., P.O. Box 7084, Cleveland, Ohio 44128)

30-1. Meteoritical Soc., 27th meeting,

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Arizona State Univ., Tempe. (C. B. Moore, Dept. of Geochemistry, Arizona State Univ., Tempe)

## November

1-7. **Plant Scientists of Latin America**, 6th meeting, Lima, Peru. (M. Paulette, Universidad Agraria, Apartado 456, Lima)

2-4. **Society of Engineering Science**, 2nd technical meeting, Michigan State Univ., East Lansing. (A. C. Eringen, School of Aeronautical and Engineering Sciences, Purdue Univ., West Lafayette, Ind. 47907)

2-6. **United Nations, Drug Supervisory Body**, 62nd session, Geneva, Switzerland. (UN, Palais des Nations, Geneva)

2-9. **Natural Gas in Production of Petrochemicals**, seminar, Teheran. (U.N. Economic Commission for Asia and the Far East, Sala Santitham, Rajadamnern Av., Bangkok, Thailand)

3-5. **Liquification in Mine Chambers**, conf., Ostrava, Czechoslovakia. (Mrs. E. Vergeinerova, Czechoslovak Scientific and Technical Soc., Siroka 5, Prague 1)

4-6. **Diffraction**, 22nd Pittsburgh conf., Pittsburgh, Pa. (W. M. Biagas, Pittsburgh Diffraction Conf., Crucible Steel Co., P.O. Box 7257, Pittsburgh 15213)

4-6. **Design of Experiments**, 10th conf., (by invitation only), Washington, D.C. (F. G. Dressel, Army Research Office-Durham, Box CM, Duke Station, Durham, N.C.)

4-6. **Northeast Electronics Research and Engineering** meeting (NEREM), Boston, Mass. (J. E. Storer, Inst. of Electrical

and Electronics Engineers, 313 Washington St., Newton 58, Mass.)

4-6. **Manned Space Flight**, 3rd, American Inst. of Aeronautics and Astronautics, NASA Manned Spacecraft Center, Houston, Tex. (AIAA, 141 E. 44 St., New York 17)

4-7. **American Physical Soc., Plasma Physics Div.**, New York, N.Y. (S. J. Buchsbaum, Bell Telephone Laboratories, Murray Hill, N.J.)

4-7. **American Soc. of Tropical Medicine and Hygiene**, New York, N.Y. (G. M. Jeffrey, Box 295, Kensington, Md.)

4-7. **French Soc. of Orthopedics and Traumatology**, 39th congr., Paris. (Secretariat, Pavillon Ollier, Hôpital Cochin, 27, rue du Faubourg Saint-Jacques, Paris 14<sup>e</sup>)

5-6. **U.S. Army Materiel Command, Inst. of Environmental Sciences**, joint meeting, Aberdeen Proving Ground, Md. (A. Armstrong, 104 Bliss Lane, Glen Burnie, Md.)

5-7. **Nutrition Hygiene Conf.**, Brno, Czechoslovakia. (K. Halacka, Hygiene Section, Czechoslovak Medical Soc., Sokolska 31, Prague 2)

6-7. **Biochemistry**, 7th annual West Central States conf., State Univ. of Iowa, Iowa City. (G. F. Lata, Dept. of Biochemistry, State Univ. of Iowa, Iowa City)

6-7. **Experimental Methodology and Applied Immunology in Allergy Research**, symp., Erfurt, East Germany. (H. D. Faulhaber, Gesellschaft für Experimentelle Medizin der D.D.R., Littenstr. 78, Berlin C.2, East Germany)

6-7. **Central Soc. for Clinical Research**,

Chicago, Ill. (J. F. Hammarsten, Ancker Hospital, St. Paul 1, Minn.)

7. **International Acad. of Oral Pathology**, 2nd conf., San Francisco, Calif. (J. L. Bernier, Dental School, Georgetown Univ., Washington, D.C. 20007)

7-14. **International Dental Federation**, 52nd meeting, San Francisco, Calif. (G. H. Leatherman, 35 Devonshire Pl., London, W.1)

8-14. **Switching Circuit Theory and Logical Design**, 5th annual symp., Princeton Univ., Princeton, N.J. (T. H. Crowley, Bell Telephone Laboratories, Murray Hill, N.J.)

9-11. **Flexural Mechanics of Reinforced Concrete**, intern. symp., Miami, Fla. (H. A. Sawyer, Dept. of Civil Engineering, Univ. of Florida, Gainesville)

9-12. **American Dental Assoc.**, San Francisco, Calif. (H. Hillenbrand, 222 E. Superior St., Chicago, Ill.)

9-13. **Institute of Neurosurgery**, 25th anniversary, Santiago, Chile. (C. Villavicencio, Casilla 70-D, Santiago)

9-13. **Mathematical Education**, seminar Dalat, South Vietnam. (Assoc. of Southeast Asian Insts. of Higher Learning, Rattasatra Bldg., Chulalongkorn Univ., Race Course Rd., Bangkok, Thailand)

10. **American College of Dentists**, San Francisco, Calif. (O. W. Brandhorst, 4236 Lindell Blvd., St. Louis, Mo.)

10-11. **Quality Control**, seminar, Cleveland, Ohio. (R. C. Schultz, American Soc. of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38, Mich.)

11-12. **Use of Plastics in Machine Construction**, conf., Hungary. (Hungarian Soc.

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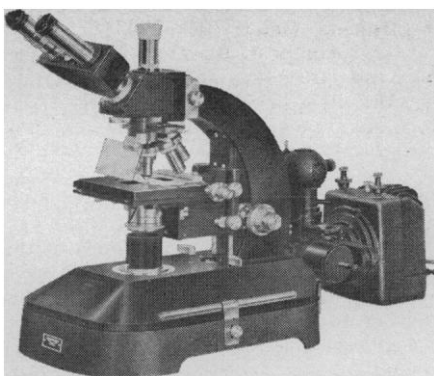
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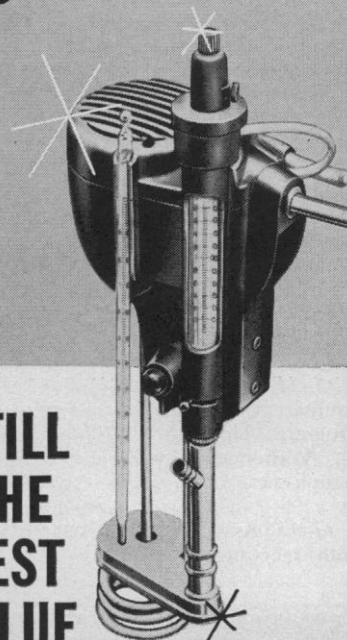
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of Mechanical Engineers, Szabadsag ter 17, Budapest 5)

11-13. Eastern Analytical symp., New York, N.Y. (M. Margoshes, Room 3, Chemistry Bldg., Natl. Bureau of Standards, Washington, D.C. 20234)

11-13. American Soc. for Cell Biology, Cleveland, Ohio. (D. E. Green, Inst. for Enzyme Research, 1710 University Ave., Madison 6, Wis.)

11-13. American Concrete Inst., fall meeting, Miami, Fla. (W. T. Eefting, 3332 Pan American Dr., Miami)

11-14. American Acad. of Neurological Surgery, Miami, Fla. (E. W. Davis, 806 S.W. Broadway, Portland, Ore.)

11-14. Models for the Perception of Speech and Visual Forms, symp., Boston, Mass. (Symp. Committee, Data Sciences Laboratory, Air Force Cambridge Research Laboratory, Bedford, Mass. 01731)

12-13. American Soc. of Cytology, 12th annual, Pittsburgh, Pa. (W. R. Lang, 1012 Walnut St., Philadelphia, Pa. 19107)

12-13. Nerve as a Tissue, conf., Lankenau Hospital, Philadelphia, Pa. (K. Rodahl, Lankenau Hospital, Philadelphia 51)

12-13. Netherlands Nuclear Forum, intern. congr., Amsterdam. (Nederlands Atoomforum, Scheveningseweg 112, The Hague, Netherlands)

12-14. Paleomagnetism, 2nd U.S.-Japan seminar, U.S.-Japan Cooperative Science Program, Univ. of California, Berkeley. (J. Verhoogen, Dept. of Geology and Geophysics, Univ. of California, Berkeley 4)

13-15. Association of Clinical Scientists, 26th meeting, Washington, D.C. (F. W.

Sunderman, Jr., Univ. of Florida, College of Medicine, Gainesville 32603)

14-19. American Acad. of Ophthalmology and Otolaryngology, Chicago, Ill. (W. L. Benedict, 15 Second St., SW, Rochester, Minn. 55901)

14-21. Pan American Medical Women's Alliance, 9th congr., Los Angeles, Calif. (E. M. Hohl, 1234 N. Vermont Ave., Hollywood, Calif.)

15-17. Water in the Arid Zones of the Old World, symp., Halle an der Saale, East Germany. (Deutsche Akademie der Naturforscher Leopoldina, August-Bebel Str. 50 a, Halle an der Saale)

15-19. American Soc. of Agronomy, Crop Science Soc. of America, Soil Science Soc. of America, annual, Kansas City, Mo. (L. A. Richards, American Soc. of Agronomy, 677 S. Segoe Rd., Madison 11, Wis.)

15-19. Society of Exploration Geophysicists, Los Angeles, Calif. (C. G. Ferris, E. V. McCollum & Co., 515 Thompson Bldg., Tulsa, Okla.)

16-17. Basic Sciences, 3rd annual conf., New York, N.Y. (A. Gelbart, Yeshiva Univ., Amsterdam Ave. and 186th St., New York)

16-19. Gulf and Caribbean Fisheries Inst., conf., Ocho Rios, Jamaica. (Executive Secretary, Gulf and Caribbean Fisheries Inst., 1 Rickenbacker Causeway, Miami, Fla. 33149)

16-19. Magnetism and Magnetic Materials, Minneapolis, Minn. (J. B. Goodenough, Lincoln Laboratory C182, Lexington, Mass. 02173)

16-20. Interagency Chemical Rocket

Propulsion Group, Mechanical Behavior Working Group, 3rd annual, Redstone Arsenal, Ala. (T. H. Duerr, AMSMI-RKP, Redstone Arsenal, Ala. 35809)

16-20. Soil Science Soc. of America, annual, Kansas City, Mo. (W. E. Jeske, 7515 N.E. Ankeny Rd., Ankeny, Iowa)

17-18. Allied Air Force Medical Conf., 10th annual, Fontainebleau, France. (Officier Administratif, Division Médicale d'Aircent, Camp Guynemer, Fontainebleau)

18-20. Northeastern States Navy Research and Development Clinic, Philadelphia, Pa. (N. R. Droulard, Franklin Inst. Laboratories, 20th and Parkway, Philadelphia, Pa. 19103)

18-21. Neurological Surgeons, Bal Harbour, Fla. (J. R. Russell, 1815 N. Capitol Ave., Indianapolis, Ind. 46202)

19-21. Geological Soc. of America, Miami Beach, Fla. (J. W. Peoples, 10 Wesleyan Place, Middletown, Conn.)

19-21. Paleontological Soc., Miami Beach, Fla. (R. L. Langenheim, Jr., Dept. of Geology, Univ. of Illinois, Urbana)

19-21. National Council of Teachers of Mathematics, Atlanta, Ga. (J. D. Gates, 1201 16th St., NW, Washington, D.C.)

19-22. American Anthropological Assoc., 63rd annual, Detroit, Mich. (E. R. Service, Dept. of Anthropology, Univ. of Michigan, Ann Arbor)

21-22. American Geological Inst., Miami Beach, Fla. (L. Hoover, 1444 N St., NW, Washington, D.C. 20005)

21-24. American Speech and Hearing Assoc., San Francisco, Calif. (K. O. Johnson, 1001 Connecticut Ave., NW, Washington, D.C.)

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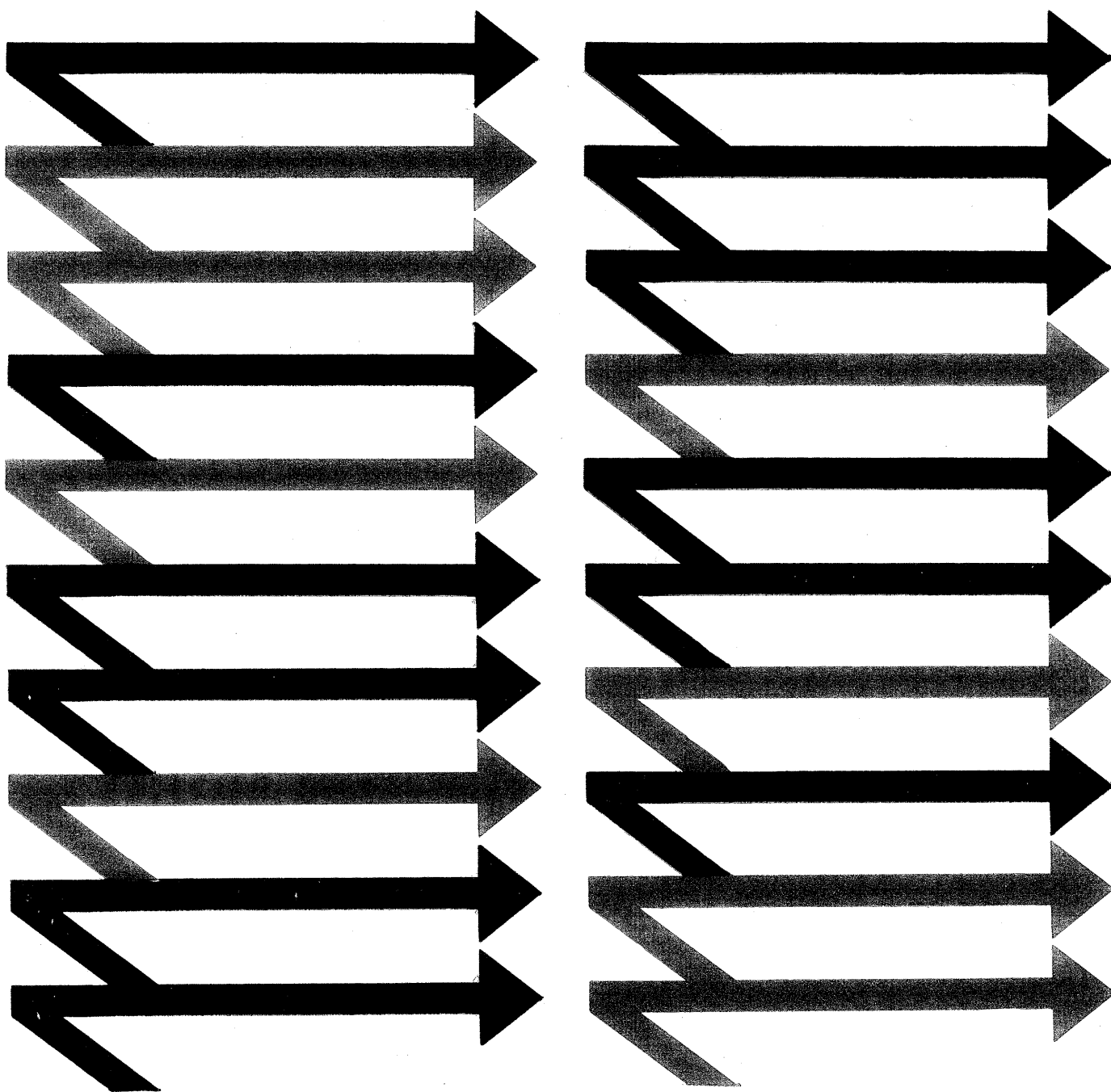
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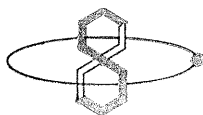
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Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washington 25, D.C. (physics, computing, electronics, and nuclear equipment).

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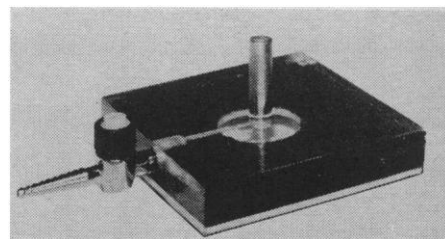
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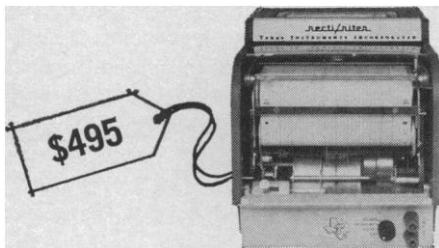
**Microtome-cryostat handbook** discusses techniques and methods for the preparation, freezing, sectioning, mounting, and staining of tissue sections. The work is published by the International Equipment Company and its instruments form the basis for discussion. However, the information is presented for its general usefulness in all cryostat work. Black-and-white photographs are used often to illustrate specific points, and color photomicrographs of frozen and paraffin sectioning facilitate comparison of the two methods. Temperature control information includes a detailed chart of recommended temperatures for sectioning various types of tissue. Equipment operating efficiency is stressed with special reference to microtome knives, accessories, and routine maintenance. A bibliography and literature references are found on the last pages of the 28-page booklet. This handbook is available at no charge.—D.J.P. (International Equipment Co., 300 Second Ave., Needham Heights, Mass. 02194)

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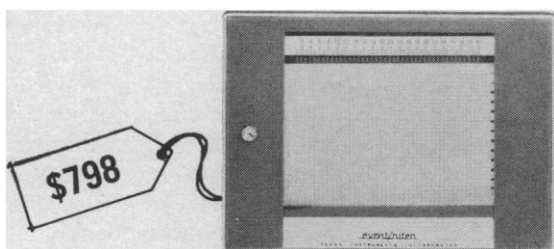


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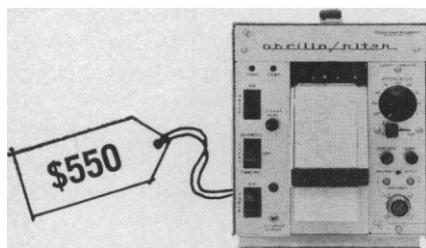
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venting valve to one side. The plate is made of clear acrylic plastic 1 inch thick to resist deformation and has a ¼-inch-thick neoprene surface securely bonded to the plastic except for a clear window around the vacuum port. The soft, thick neoprene permits good seals to be made to any thick-rim vessel that fits the plate and can hold the vacuum. The device is said to obviate the need for special lyophilizing glassware and is adaptable for degassing suction filtering.—R.L.B. (Refrigeration for Science, Inc., 3441 Fifth St., Oceanside, L.I., N.Y.)

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**Infusion rate control** device can be set to deliver from 5 to 150 drops per minute from standard intravenous (I.V.) equipment. The instrument, which contains no pump, simply regulates the gravity flow of infusion fluid from the I.V. bottle to the patient. It consists of a photoelectric drop detector which fits on the drop chamber of the I.V. set and an electronic control unit which mounts on the I.V. stand. This control unit has a clamping gate into which the tubing between the I.V. bottle and patient is placed. This gate opens when a drop is called for by the rate set, and closes after the drop detector has signaled that a drop has formed and fallen in the drop chamber. A slide calculator mounted on this unit facilitates the calculation of rate in drops per minute, from milliliters of fluid to be administered and time. This rate is then set on a knob on the front panel. Conditions which would prevent proper delivery cause the unit to alarm and close the control gate. Such conditions are infiltration, clogged needle, empty bottle, kinked tubing, or power failure. An optional elapsed-time control permits administration of a portion of the I.V. bottle with automatic shutdown and alarm at the end of the preset period.—D.J.P. (Corbin-Farnsworth Inc., 440 Page Mill Rd., Palo Alto, Calif.)

Circle 6 on Readers' Service card

**Phonocatheter** for the intracardiac detection of heart sounds consists of a subminiature microphone in the end of a woven dacron catheter. This sensor, located 3 mm from the distal tip of the catheter, is a two-section ceramic piezoelectric element encased in stainless steel and connected to a shielded cable incorporated into the catheter wall. It exhibits a frequency response of 1.5 to 10,000 cy/sec ( $\pm 8$  db), a sensitivity of  $-135$  db referred to 1



volt/dyne cm<sup>2</sup> at 1000 cy/sec, and a capacitance of 500 pf (500  $\mu\mu\text{f}$ ). It measures 0.050 inch in diameter by 0.75 inch long and weighs 0.10 g. To couple this high-impedance source to standard low-impedance recording equipment, an accessory low-noise, high-impedance (750 megohms) amplifier is available. Use of such an amplifier assures that the full frequency range of the sensor will be presented to the recorder. Though a probe is available with the phonosensor only, by far a more useful device is the phonocatheter, which also has a lumen with a separate female luer fitting. This permits the simultaneous recording of pressure data or the collecting of blood samples. Both devices can be cold sterilized, gas sterilized, or autoclaved.—D.J.P. (United States Catheter and Instrument Corp., Glens Falls, N.Y.)

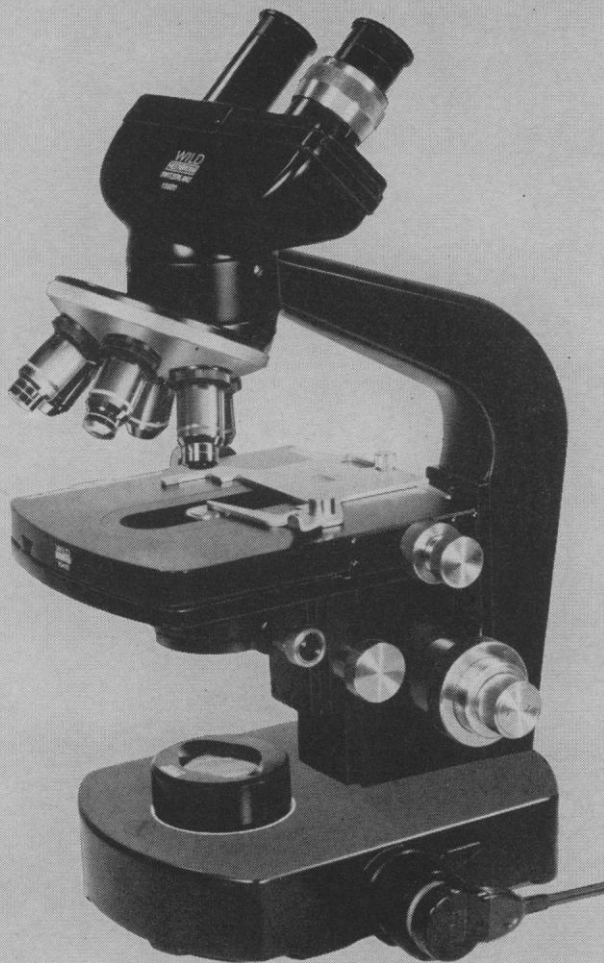
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**Gradients of pH or solution concentration** in the eluting buffer of ion exchange chromatography can be established by a new device called the Vari-grad. The gradient-producing device is fabricated of precision-machined, chemically inert, clear plastic. There are nine water-tight chambers in the device, all connected through stainless-steel toggle valves with Teflon diaphragms, so that contaminating materials are never in contact with the buffer solution. The shape of the gradient can be altered by modifying the proportions of solutions used in the chambers or by varying the number of chambers used in sequential combination by closing the appropriate connecting channels. In use, all of the chambers are in hydrostatic equilibrium which is constantly being reestablished in response to the removal of liquid from a chamber at one end of the series. Maximum working capacity of the device is approximately 1.2 lit. A centrally mounted paddle arrangement for simultaneous stirring of all nine chambers is actuated by a high-torque, synchronous motor which is mounted on a removable plate at one end of the unit. A plastic cover plate incorporates a level indicator that allows quick and positive leveling by adjustment of the three knurled stainless-steel legs. A unique transmission between the drive motor and the paddle-stirrer allows easy stroke adjustment of the paddle-stirrer.—D.J.P. (Phoenix Precision Instruments Co., Inc., 3803-05 N. Fifth St., Philadelphia, Pa.)

Circle 8 on Readers' Service card

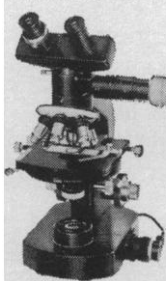
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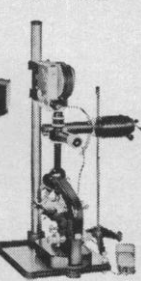


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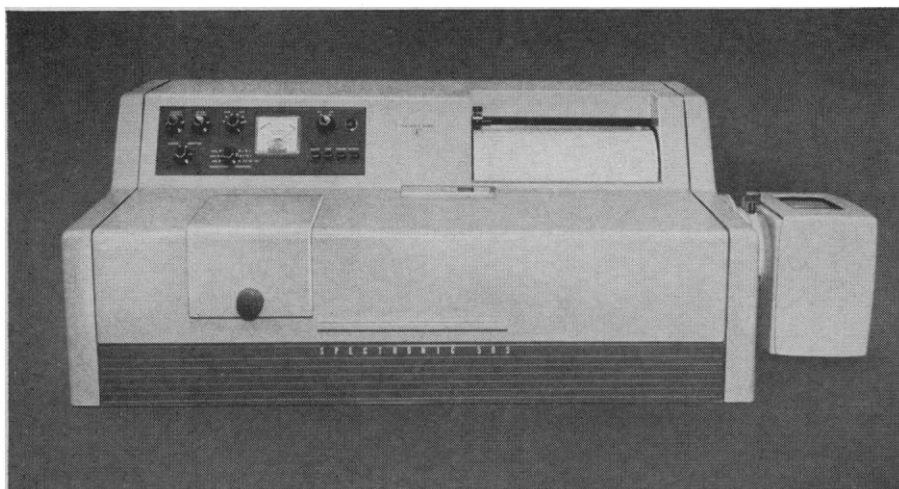


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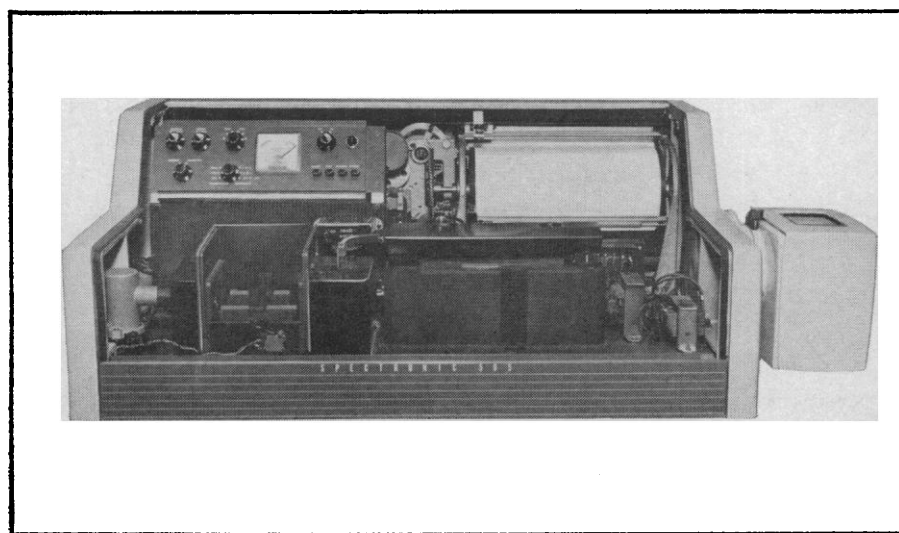
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## NEW BOOKS

(Continued from page 513)

Clarke. Davis, Philadelphia, ed. 2, 1964. 397 pp. Illus. \$9.

**Herzinsuffizienz: Hämodynamik und Stoffwechsel.** An international symposium (Würzburg), July 1963. E. Wollheim and K. W. Schneider, Eds. Thieme, Stuttgart, Germany, 1964. 374 pp. Illus. Paper, DM. 68.

**Humangenetik.** Ein kurzes Handbuch in fünf Bänden. vol. 3, pt. 1, *Stoffwechsel, Innere Sekretion, Urogenitalsystem, Myopathien, Allergie, Rheumatischer Formenkreis, Infektionskrankheiten, Maligne Tumoren*. P. E. Becker, Ed. Thieme, Stuttgart, 1964. 737 pp. Illus. DM. 215.

**Ichneumon-Flies of America North of Mexico.** pt. 4, *Subfamily Gelinae, Tribe Hemigasterini*, Henry Townes and Virendra K. Gupta, 309 pp., Illus., \$9.50 (1962); pt. 5, *Subfamily Diplazontinae*, Clement E. Dasch, 308 pp., Illus., \$9.50 (1964). American Entomological Inst., Ann Arbor, Mich.

**Insects of Campbell Island (Pacific Insects Monogr., No. 7).** J. Linsley Gressitt et al. Bishop Museum Press, Honolulu, 1964. 663 pp. Illus. Paper, \$9; cloth, \$10.

**An Introduction to Physical Biochemistry.** Henry B. Bull. Davis, Philadelphia, 1964. 445 pp. Illus. \$8.50.

**The Matter of Mendelian Heredity.** K. R. Lewis and B. John. Little, Brown, Boston, 1964. 269 pp. Illus. \$10.

**Le Métabolisme de la Phosphorylcréatine et de l'Adénosine Triphosphate durant la Contraction Musculaire.** Georges Maréchal. Editions Arscia, Bruxelles; Librairie Maloine, Paris, 1964. 184 pp. Illus. Paper.

**Monographic Studies in Cassia (Leguminosae-Caesalpinioideae).** pt. 1, *Section Serocalyx (Mem. N.Y. Bot. Garden 12, No. 1)*. Howard S. Irwin, Jr., New York Botanical Garden, New York, 1964. 114 pp. Illus. \$6.

**New Biochemical Separations.** A. T. James and L. J. Morris, Eds. Van Nostrand, Princeton, N.J., 1964. 434 pp. Illus. \$12.50.

**Photo-Neuro-Endocrine Effects in Circadian Systems, with Particular Reference to the Eye (Ann. N.Y. Acad. Sciences 117, art. 1).** Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1964. 645 pp. Illus. Paper. \$9.

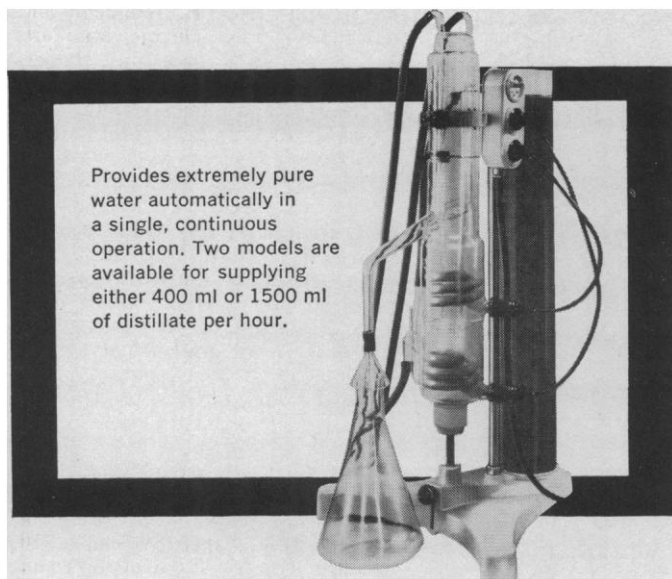
**Plants in Perspective.** A laboratory manual of modern biology. Eldon H. Newcomb, Gerald C. Gerloff, and William F. Whittingham. Freeman, San Francisco, 1964. 226 pp. Illus. Paper, \$3.75.

**Principles and Applications in Aquatic Microbiology.** Proceedings, Rudolfs Research Conference (New Brunswick, N.J.). H. Heukelekian and Norman C. Dondero, Eds. Wiley, New York, 1964. 466 pp. Illus. \$10. Twenty-one papers presented at the conference and one paper, "Trends and needs of research in aquatic microbiology," which was presented at the conference, *Global Aspects of Applied Microbiology* (Stockholm, 1963).

**Reproductive Physiology.** Comparative reproductive physiology of domestic animals, laboratory animals, and man. A. V. Nalbandov. Freeman, San Francisco, ed. 2, 1964. 330 pp. Illus. \$7.50.

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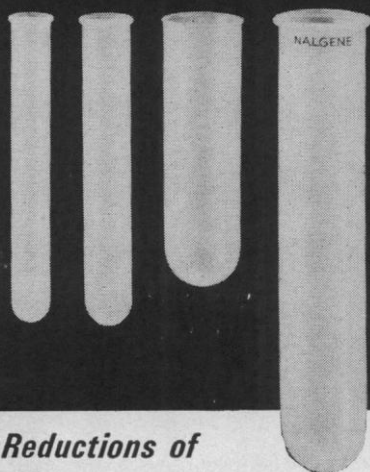
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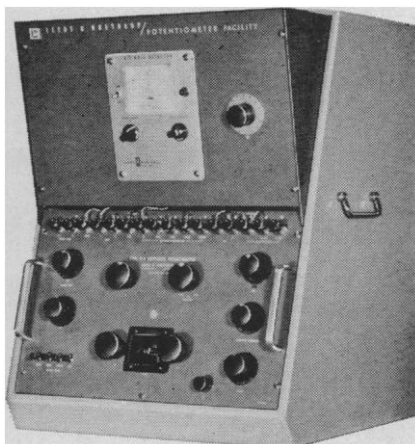
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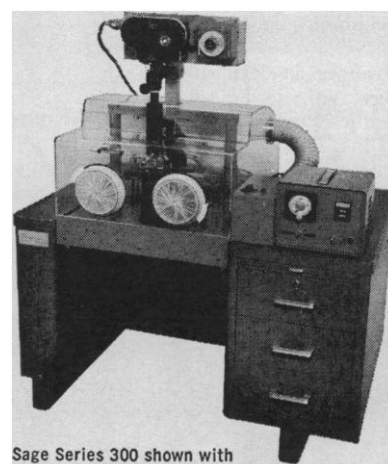


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**Retention of Functional Differentiation in Cultured Cells** (*Wistar Inst. Symp. Monogr.*, No. 1). A symposium (Philadelphia, Pa.), March 1964. Vittorio Defendi, Ed. Wistar Inst. Press, Philadelphia, 1964. 130 pp. Illus. Paper, \$5. Twelve papers presented at a symposium in honor of Margaret and Warren H. Lewis.

**Steroid Drugs**, vol. 2, *Index of Biologically Active Steroids*. Norman Applezweig. Holden-Day, San Francisco, Calif., 1964. 459 pp. Illus. \$10.50.

**Studies of Macromolecular Biosynthesis**. Richard B. Roberts, Ed. Carnegie Institution of Washington, Washington, D.C., 1964. 716 pp. Illus. \$7.

**A Textbook of General Physiology**. Hugh Davson. Little, Brown, Boston, ed. 3, 1964. 1182 pp. Illus. \$19.75.

**The Thymus** (*Wistar Inst. Symp. Monogr.*, No. 2). A symposium (Philadelphia, Pa.), April 1964. Vittorio Defendi and Donald Metcalf, Eds. Wistar Inst. Press, Philadelphia, 1964. 153 pp. Illus. Paper, \$5. Eleven papers.

#### Economics and the Social Sciences

**Advances in Experimental Social Psychology**, vol. 1. Leonard Berkowitz, Ed. Academic Press, New York, 1964. 333 pp. Illus. \$9. Eight papers: "Cultural influences upon cognitive processes" by Harry C. Triandis; "The interaction of cognitive and physiological determinants of emotional state" by Stanley Schachter; "Experimental studies of coalition forma-

tion" by William A. Gamson; "Communication networks" by Marvin E. Shaw; "A contingency model of leadership effectiveness" by Fred E. Fiedler; "Inducing resistance to persuasion: some contemporary approaches" by William J. McGuire; "Social motivation, dependency, and susceptibility to social influence" by Richard H. Walters and Ross D. Parke; and "Sociability and social organization in monkeys and apes" by William A. Mason.

**Africa: A Study in Tropical Development**. L. Dudley Stamp. Wiley, New York, ed. 2, 1964. 544 pp. Illus. \$10.95.

**Africa and the Islands**. R. J. Harrison Church, John I. Clarke, P. J. H. Clarke, and H. J. R. Henderson. Wiley, New York, 1964. 510 pp. Illus. \$9.75.

**Ancient Races of Baluchistan, Panjab, and Sind**. S. S. Sarkar. Bookland, Calcutta, India, 1964. 119 pp. Illus. Rs. 10.

**Anthropology**. Eric R. Wolf. Prentice-Hall, Englewood Cliffs, N.J., 1964. 127 pp. \$4.95.

**The Archeology of Cape Denbigh**. J. L. Giddings. Brown Univ. Press, Providence, R.I., 1964. 347 pp. Illus. Plates. \$12.50.

**The Australian Aborigines**. A. P. Elkin. Doubleday, Garden City, N.Y., 1964. 395 pp. Illus. Paper, \$1.95.

**The Birth of Western Civilization: Greece and Rome**. Michael Grant, Ed. McGraw-Hill, New York, 1964. 360 pp. Illus. \$28.50.

**Categories of Human Learning**. Arthur W. Melton, Ed. Academic Press, New York, 1964. 372 pp. Illus. \$8.50.

**Choice, Strategy, and Utility**. Sidney

Siegel. McGraw-Hill, New York, 1964. 192 pp. Illus. \$5.95.

**Conduct of the New Diplomacy**. James L. McCamy. Harper and Row, New York, 1964. 315 pp. \$6.50.

**Continuity and Change in Latin America**. John J. Johnson, Ed. Stanford Univ. Press, Stanford, Calif., 1964. 296 pp. \$6.75.

**The Control of Human Fertility in Jamaica**. J. Mayone Stycos and Kurt W. Back. Cornell Univ. Press, Ithaca, N.Y., 1964. 391 pp. \$7.50.

**Cross-Cultural Understanding: Epistemology in Anthropology**. F. S. C. Northrop and Helen H. Livingston, Eds. Harper and Row, New York, 1964. 412 pp. \$7.50.

**Culture Change in Tribal Bihar: Munda and Oraon**. Sachchidananda. Bookland, Calcutta, India, 1964. 161 pp. Illus. Rs. 12. A study sponsored by the Research Programmes Committee, Planning Commission, Government of India.

**Tests and Measurements**. Leona E. Tyler. Prentice-Hall, Englewood Cliffs, N.J., 1963. 128 pp. Illus. Paper, \$1.50; cloth, \$3.95.

**Understanding Minority Groups**. Joseph B. Gittler, Ed. Wiley, New York, 1964 (© 1956). 148 pp. Paper, \$1.45. Essays by Wayne A. R. Leys, John LaFarge, John Collier and Theodore H. Hass, Oscar Handlin, Ira de A. Reid, Dorothy Swaine Thomas, Clarence Senior, and Joseph B. Gittler.

**U.S.A. and Its Economic Future**. Arnold B. Barach. Twentieth Century Fund, New York, 1964. 156 pp. Illus. Paper, \$1.95.

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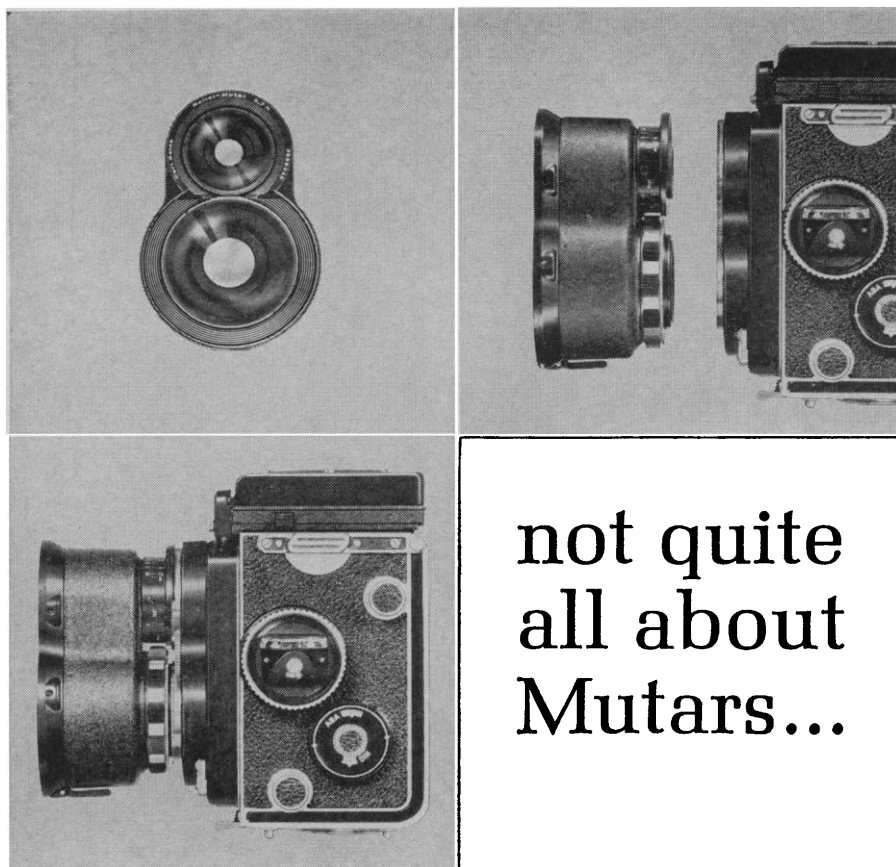
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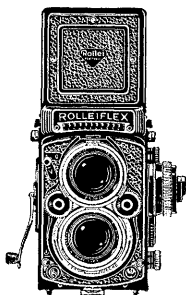


A complete description of the new Rollei-Mutar quick change lenses would be in very small type in a space this size. But we have available a very interesting article about the two new Mutars written by Dr. Hans Sauer of Carl Zeiss. Rollei owners and those considering the purchase of a  $2\frac{1}{4}$ " x  $2\frac{1}{4}$ " camera will find it an absorbing and comprehensive treatment.

Dr. Sauer describes the history of accessory lens systems. He tells how Rollei-Mutars instantly change the focal length of the basic Rollei by .7x (wide-angle) or 1.5x (telephoto) as quickly as you would change a filter. And he tells how this is done without sacrificing any of the great features of the Rollei. He notes, for instance, that unlike other systems, the Mutars do not require smaller apertures for satisfactory image definition, but provide highest resolution at apertures f/5.6 through f/22.

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## NEWS AND COMMENT

(Continued from page 509)

neering, a major factor in progress and prosperity." It did go on to add a bit of caution by quoting President Eisenhower's Farewell Address warning that "the prospect of domination of the nation's scholars by Federal employment, project allocations and the power of money is ever present, and is gravely to be regarded." And it also quoted Eisenhower's assertion that "in holding scientific research and discovery in respect, as we should, we must also be alert to the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite."

It is not in style for Democrats to quote Republican Presidents approvingly, but it is not unlikely that Scientists and Engineers for Johnson-Humphrey are in agreement with the substance of Eisenhower's views.

In releasing its statement of principles, Scientists and Engineers for Goldwater also expanded the list of members which was carried in this space on 9 October. The additional members are:

Roger Adams, professor emeritus and former head of the chemistry department, University of Illinois;

R. L. Anthony, professor of physics, Notre Dame University;

John C. Bailar, head of the department of inorganic chemistry, University of Illinois.

Carl Barnes, former vice president for research, 3-M Company;

Robert R. Bennett, program director, Space Technology Laboratory;

F. N. M. Brown, professor of aeronautical engineering, Notre Dame University;

William Burrows, professor of microbiology, University of Chicago;

Carl J. Christensen, professor of chemistry, University of Utah;

George L. Clark, professor emeritus, department of chemistry, University of Illinois;

Gilmore D. Clarke, consulting engineer, Gilmore D. Clarke-Michael Rapuano;

Walter A. Compton, vice president, Miles Laboratories;

A. Scott Crossfield, aeronautical engineer, North American Aviation;

Ray P. Dinsmore, former vice president, Goodyear Tire Company;

Roy Dorcus, former dean, school of life sciences, University of California, Los Angeles;

Louis Dunn, consultant to Aerospace Industries;

Max Dunn, vice president, International Chemical & Nuclear;

Lawrence H. Flett, consultant, Western Reserve;

W. M. Flowers, president, Sinclair Research, Inc.;

H. Close Hesseltine, professor, obstetrics and gynecology, University of Chicago Medical School;

James C. Hodge, president and director, the Warner-Swasey Company;

E. C. Hughes, vice president for research, Standard Oil Company of Ohio;

Carl Keyser, professor of mechanical engineering, University of Massachusetts;

Sidney D. Kirkpatrick, consulting editor, McGraw-Hill Book Company;

Guenther W. Lehmann, design engineer, Lockheed, Missile and Space Division;

Dewey M. McCain, head, department of civil engineering, Mississippi State University;

Admiral Ben Moreell, former president, Jones-Laughlin Steel;

Daniel E. Noble, executive vice president, Motorola, Technical Products Division;

John K. Northrop, founder, Northrop Aviation;

Jan Oostermeyer, chemical consultant and president, Applied Solar Energy Association;

George L. Parkhurst, vice president, Standard Oil Company of California;

Abbott L. Penniman, Jr., consulting engineer;

Roland I. Pritikin, ophthalmologist;

Louis Ruthenburg, former chairman of the board, Servel, Inc.;

G. Frederick Smith, professor emeritus, department of chemistry, University of Illinois;

Cornelia T. Snell, research chemist and author;

Foster Dee Snell, chairman of the board, Foster Dee Snell, Inc.;

Lincoln Thompson, president, Raymond Engineering Laboratories, Inc.;

J. Carlton Ward, Jr., former president, Fairchild Aircraft;

General T. A. Weyher, dean, school of engineering, University of Miami, Coral Gables, Florida;

J. C. Witt, former director of research, Portland Cement Company;

Lt. Gen. Laurence C. Craigie, vice president, American Machine & Foundry;

John H. Nair, consultant, Chemetron Corporation.—D.S.G.

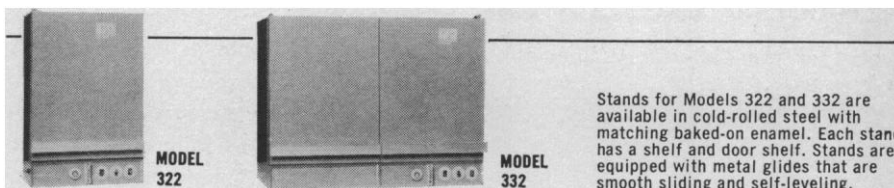
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- Can be used as a standard laboratory Incubator with close temperature control up to 65°C without CO<sub>2</sub> atmosphere by the turn of a valve
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Compiled by the  
AAAS Committee on  
Desert and  
Arid Zones Research

AAAS Symposium Volume No. 74

Editor: Carle Hodge, Associate Editor:  
Peter C. Duisberg. 604 pages, 98 illustrations, references, index.

December 1963. Price: \$12.00.  
AAAS Member's cash orders: \$10.00.

The book sums up the United States experience with its arid lands: historical background; geographical background; research and technology, both failures and successes; recommendations; predictions for the future.

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## Nobel Laureates Issue Statement Supporting Johnson and Humphrey

Thirty-two recipients of the Nobel prize announced their support for President Johnson last week. At a press conference held in New York, the group, composed largely of scientists, issued a statement saying that "the great issue of the impending election is the issue of war and peace."

"If he is to help secure the future of freedom and of humanity," the statement reads in part, "the next President of the United States must be responsible. He must understand that the processes of peace are complex and gradual. He must not delude others—or himself—into thinking that the massive problems of the world will yield to once-and-for-all solutions, whether through slogans, ultimatums or the force of arms."

The statement also cites "patience" and understanding of "the nature of a nuclear age" as qualities essential to presidential leadership, and concludes that "President Johnson meets these qualifications and that his opponent does not." It also offers a warm endorsement of Senator Humphrey as "a proven champion of reason and vision in world affairs."

The statement was signed by the following Nobel laureates: Carl D. Anderson, John Bardeen, Felix Bloch, Konrad Bloch, Melvin Calvin, Owen Chamberlain, Carl F. Cori, Andre F. Cournand, Peter J. W. Debye, Joseph Erlanger, Donald A. Glaser, Robert Hofstadter, Edward C. Kendall, Arthur Kornberg, Polykarp Kusch, Fritz A. Lipmann, Maria Goeppert Mayer, Hermann J. Muller, Severo Ochoa, Edward M. Purcell, Isidor I. Rabi, Dickinson W. Richards, Jr., Frederick Robbins, Emilio Segré, John Steinbeck, Otto Stern, Albert von Szent-Gyorgyi, Edward L. Tatum, Harold Urey, James D. Watson, Chen Ning Yang, and Tsung Dao Lee.—E.L.

## Announcements

Those pursuing or contemplating research in the **evaluation of translations** are invited to make use of materials held by the Automatic Language Processing Advisory Committee, National Academy of Sciences.

These materials, which will be made available without charge, consist of excerpts from *Mashina i Mysl'* (*Machine and Thought*), Z. Rovenskii, A.

Uemov, and E. Uemova (Moscow, 1960), in the original Russian and nine human and machine translations into English.

Requests should be sent to A. Hood Roberts, Executive Secretary, Automatic Language Processing Advisory Committee, National Academy of Sciences, 2101 Constitution Ave., NW, Washington, D.C. 20418.

The American Association of Petroleum Geologists has announced the introduction of a certification-procedure program. Its purpose is to provide a review of the qualifications of the geologist, coupled with an evaluation by his colleagues. Further information about the program is available from Grover E. Murray, Louisiana State University, Baton Rouge, Louisiana.

### Courses

The Second U.S.—Japan Seminar on Paleomagnetism, under the auspices of the U.S.—Japan Cooperative Science Program, will be held 12–14 November at the University of California, Berkeley, to discuss results obtained by present participants in the program and plans for the future. (J. Verhoogen, Department of Geology and Geophysics, University of California, Berkeley 4.)

### Meeting Notes

The 8th European Congress on Molecular Spectroscopy will be held 14–20 August in Copenhagen. It will be sponsored by the International Union of Pure and Applied Chemistry and the Royal Danish Academy of Sciences. Papers on raman, infrared, ultraviolet, or microwave spectra, or nuclear magnetic resonance spectra, electron spin resonance spectra, spectral theory, and novel analytical applications are invited. Persons wishing to submit papers must complete a provisional registration form supplied by the Congress. Deadline for receipt of this form in Copenhagen: 15 December. (8th European Congress on Molecular Spectroscopy, Universitetsparken 5, København Ø, Denmark).

The 10th symposium on microwave theory and techniques will be held 5–7 May in Clearwater, Florida. The Institute of Electrical and Electronics Engineers will sponsor it. Topics to

# omit



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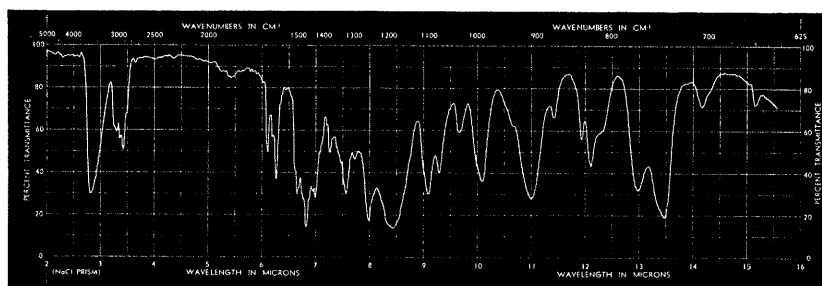
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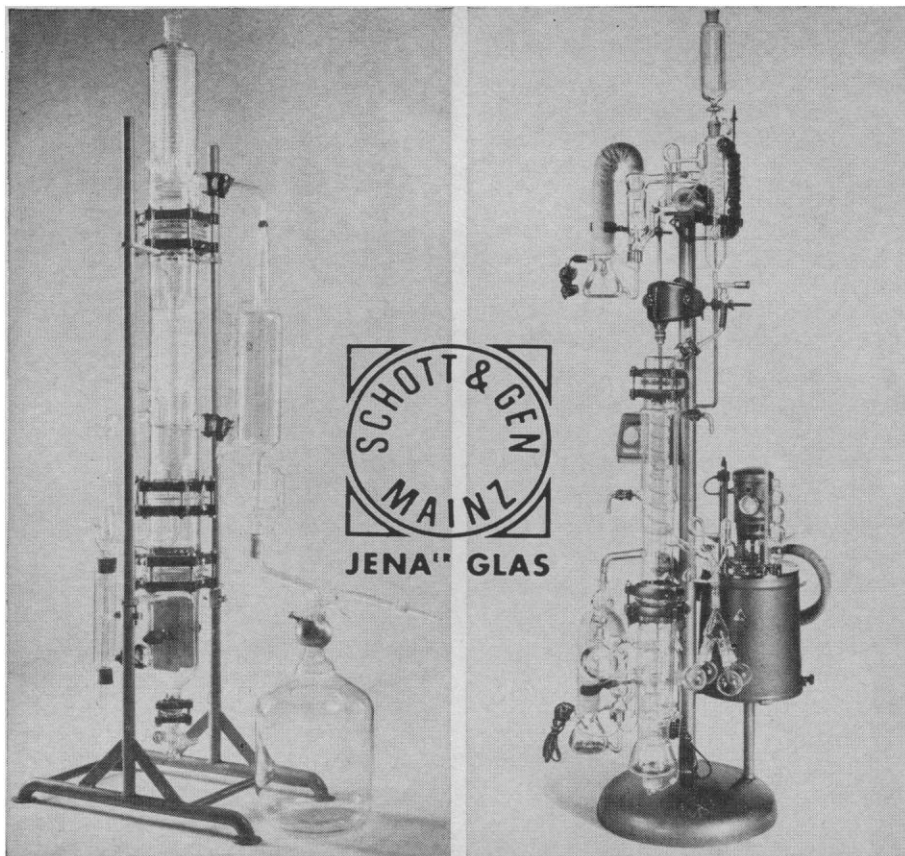


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be included are microwave acoustics, microwave components for phased arrays and space applications, active and passive microwave solid-state devices, and components and techniques for millimeter through optical wavelengths. Deadline for summaries and abstracts: *15 November*. (J. E. Pippin, Chairman, Technical Program Committee, Sperry Microwave Electronics Company, Box 1828, Clearwater).

#### Scientists in the News

**Jeremiah P. Freeman**, formerly with the Redstone Arsenal Laboratories, Rohm and Haas Company, has been named an associate professor of chemistry at the University of Notre Dame.

The new chairman of the department of pharmaceutical sciences at St. John's University, is **John J. Sciarra**, professor of pharmaceutical chemistry at the school.

**Herbert G. Stoenner**, assistant director of the Rocky Mountain Laboratory, National Institute of Allergy and Infectious Diseases, has been appointed director of the laboratory.

At the University of Illinois:

**William E. Adams**, head of the anatomy department, University of Otago, Dunedin, New Zealand, is a visiting professor for the coming academic year.

**James C. Plagge**, anatomy professor, has been appointed coordinator for the university's Chiangmai project, in Thailand, for the next 2 years.

**I. Estermann**, formerly chief scientist and scientific director of the Office of Naval Research, London, has been appointed to the Lidow chair in solid-state physics at Technion, Israel Institute of Technology in Haifa. He will be succeeded in the London position by **Peter King**, formerly associate director of the Naval Research Laboratory, Washington.

*Erratum.* In the index to volume 145 of *Science* (published 25 September) the surname of Wacław Szybalski was misspelled "Szbalski." This error was repeated under the entries for "Iyer" and "Mitomycin."

*Erratum:* In the report "Visual evoked potentials as a function of flash luminance and duration" by Wicke, Donchin, and Lindsay (2 Oct., p. 83), the last sentence of the first paragraph of column 3 on p. 84 should have read: "These data indicate that the waveform and amplitude of the average evoked potentials depend on the total luminous energy of the flash and further suggest a relationship to apparent brightness, in accordance with Bloch's law."