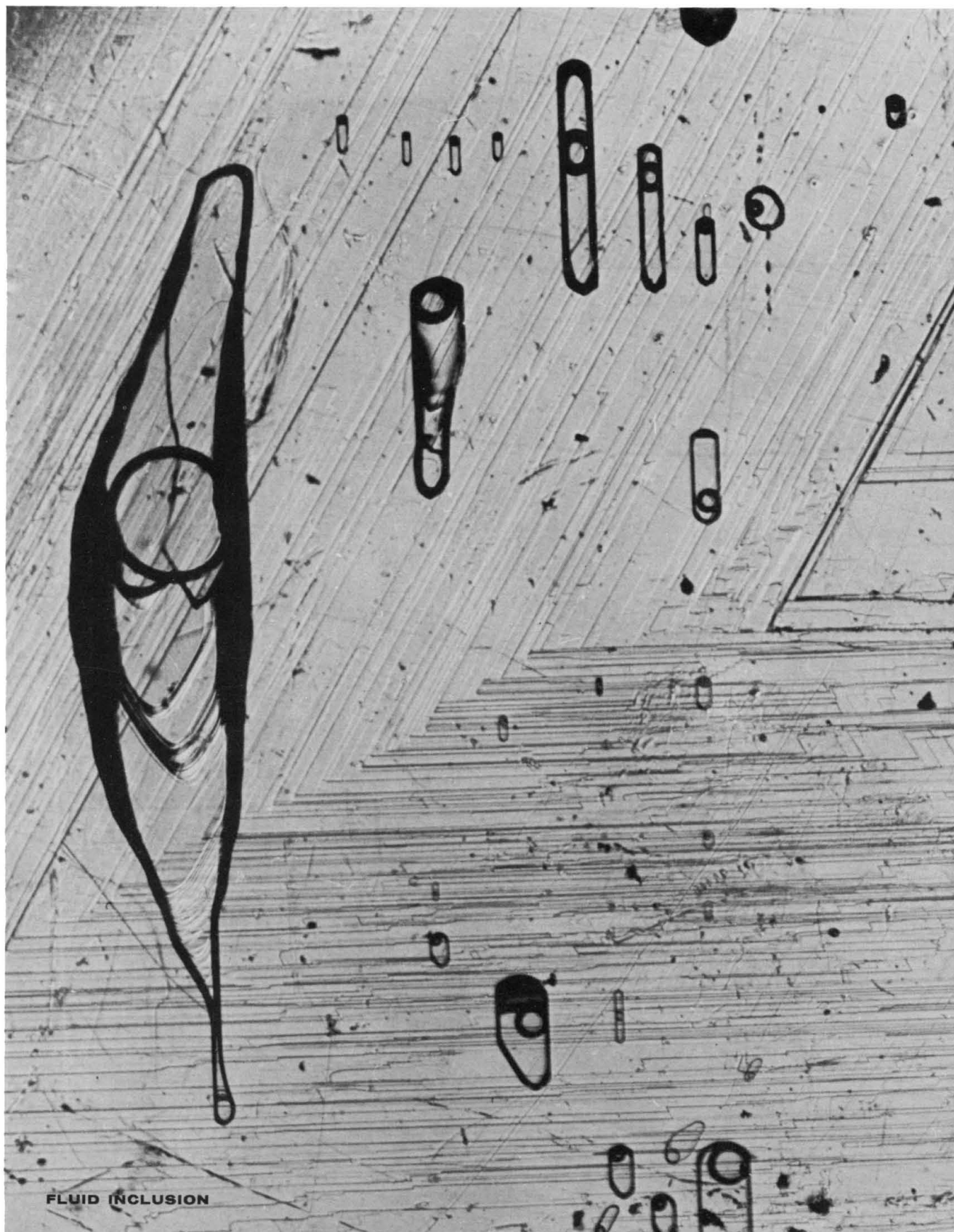


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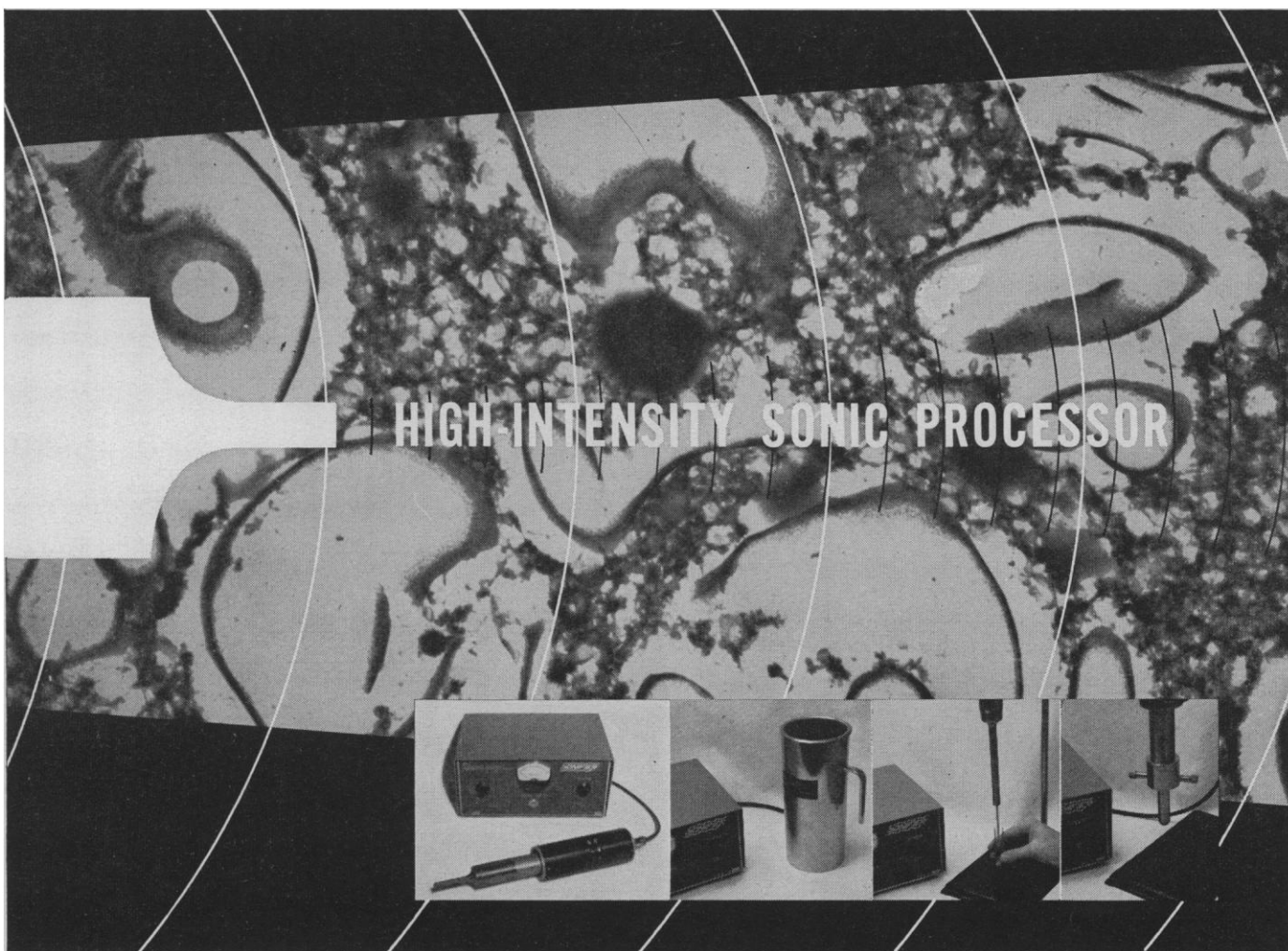
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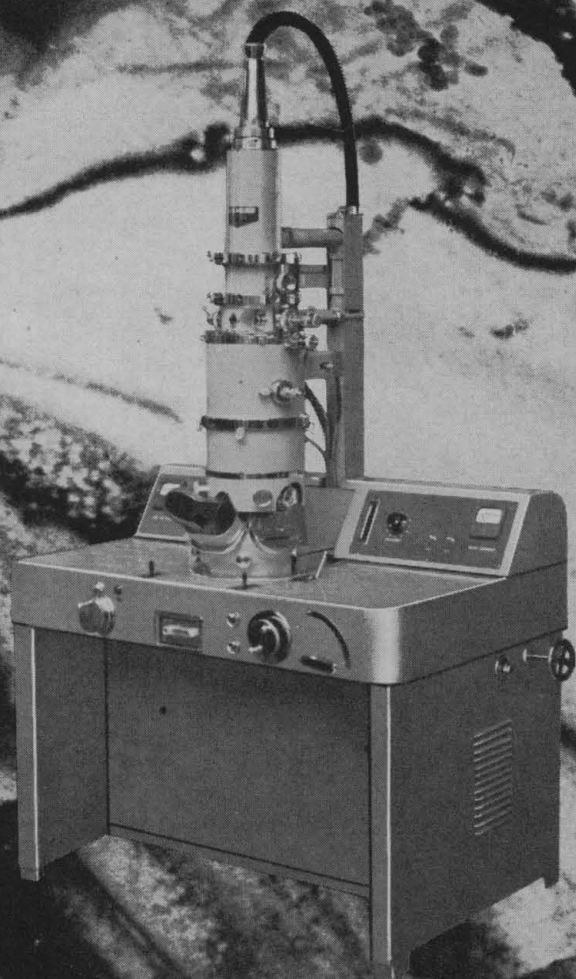
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The background is a microphotograph of aluminum foil, taken at 70,000x

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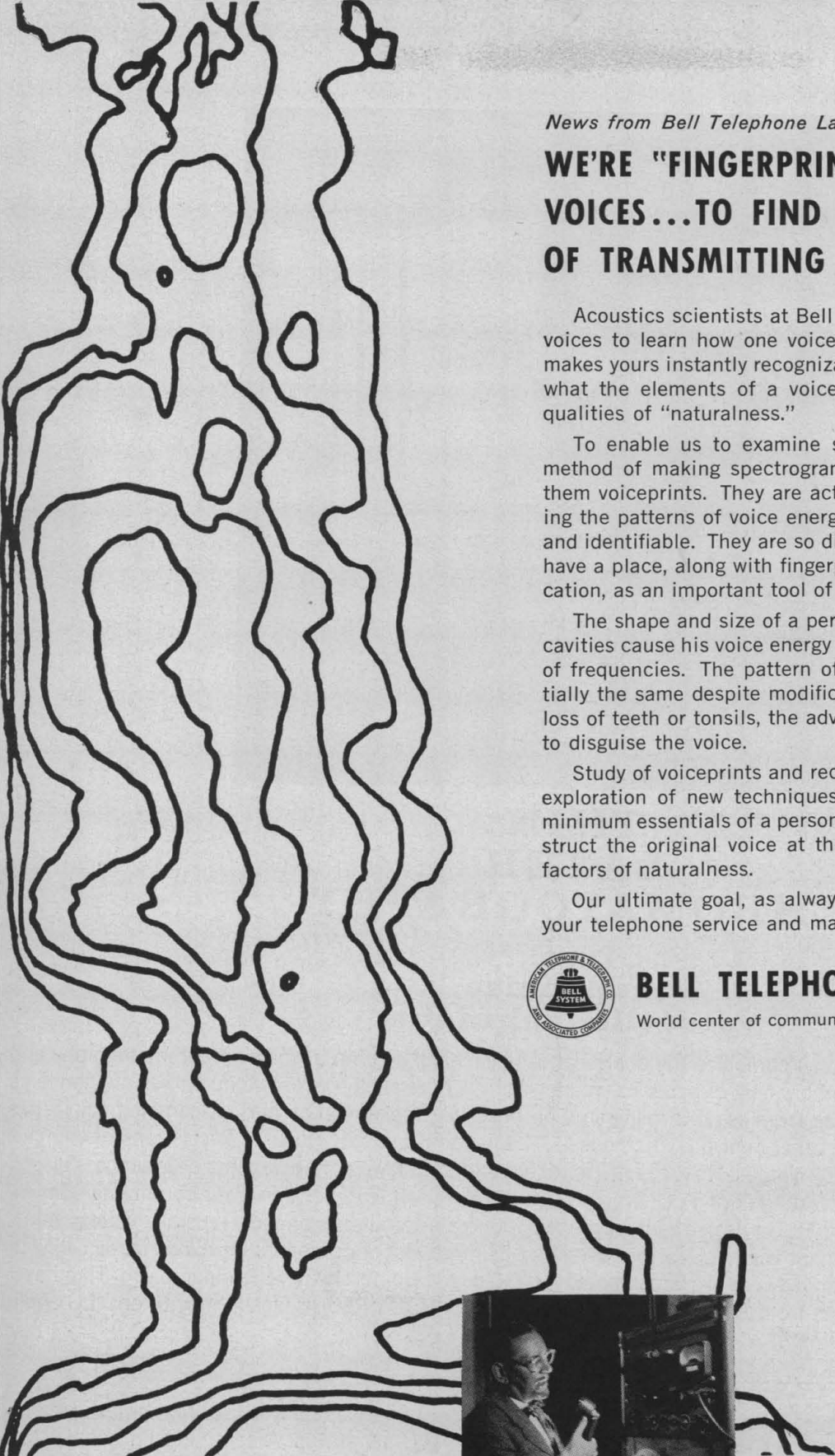
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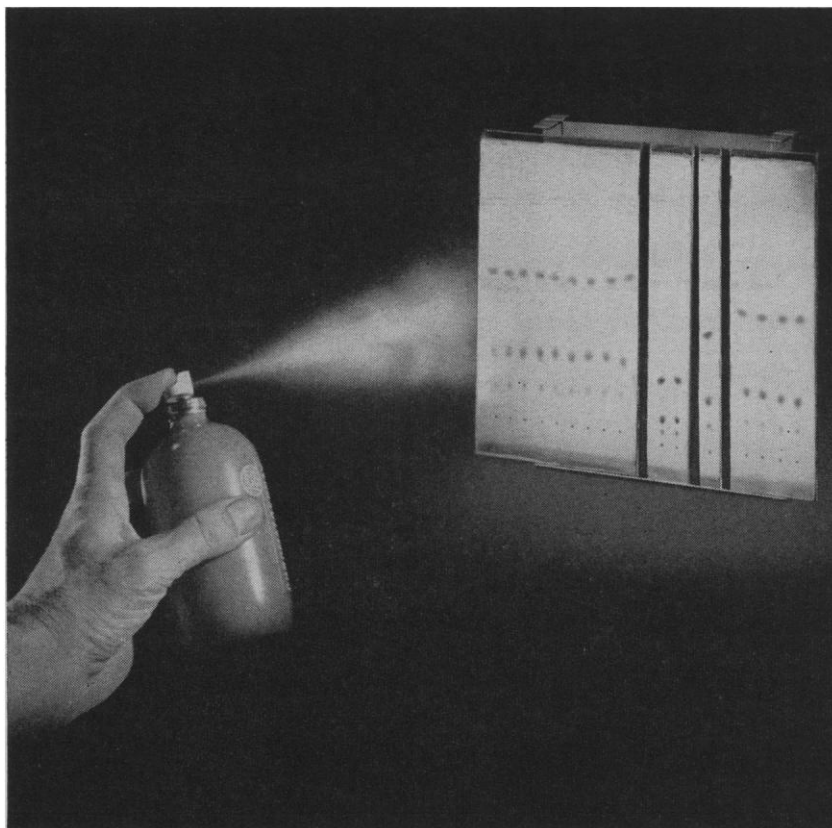


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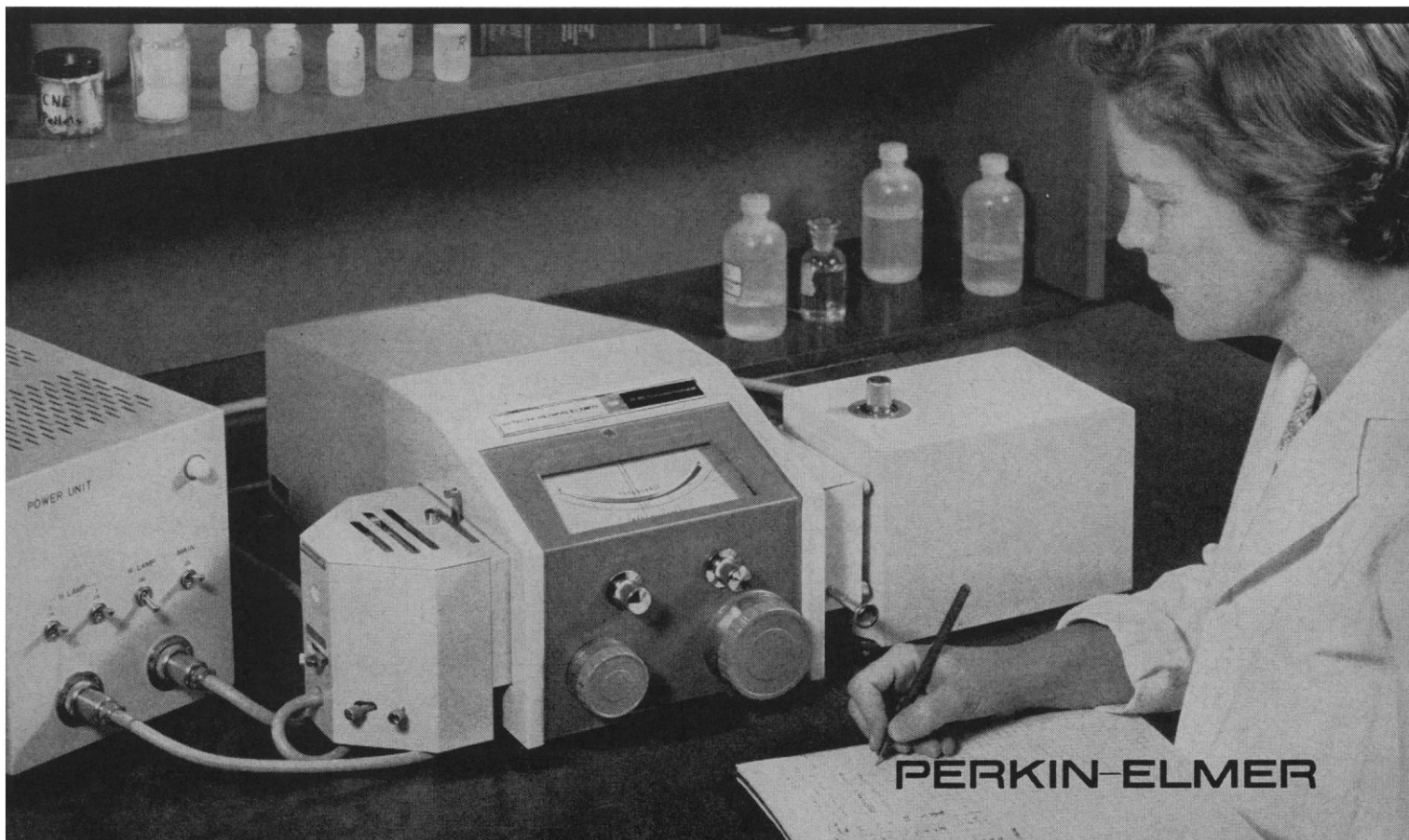
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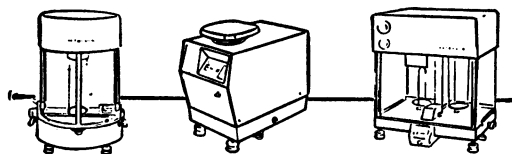
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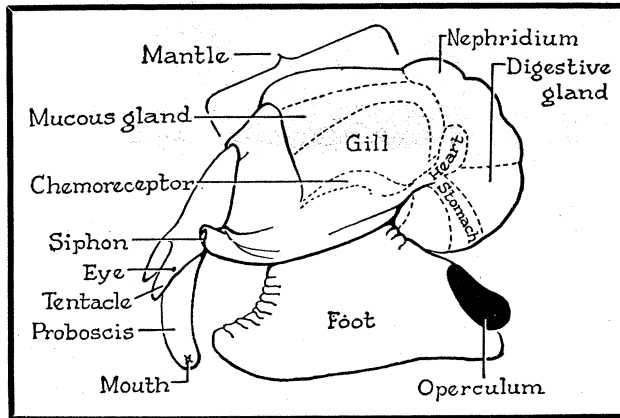


Figure 14.5. (A) Anatomy of *Busycon canaliculatum*—Left side, showing external organs and internal organs visible through the integument.

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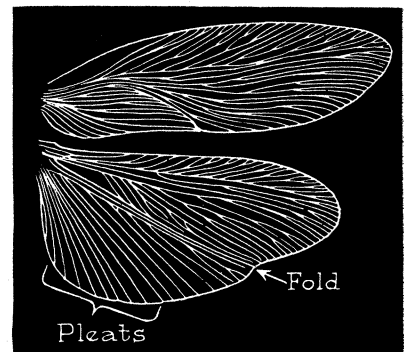


Figure 16.19. Wings of the cockroach, showing the numerous veins characteristic of the more primitive insects.

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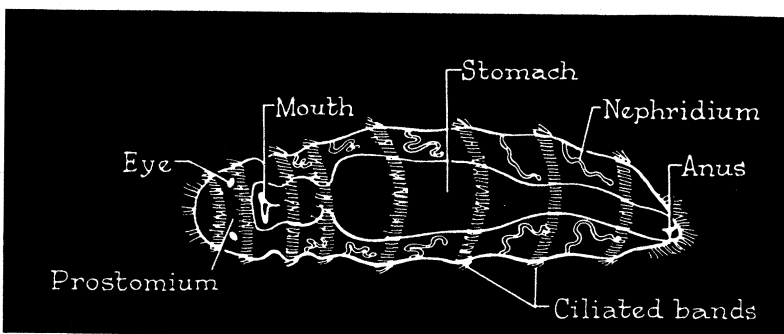


Figure 15.2. An example of the class Archiannelida. *Dinophilus*, a diminutive annelid that lacks external segmentation but has a metameric arrangement of body organs typical of the phylum. (After Meyer.)

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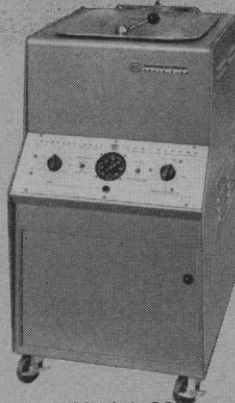
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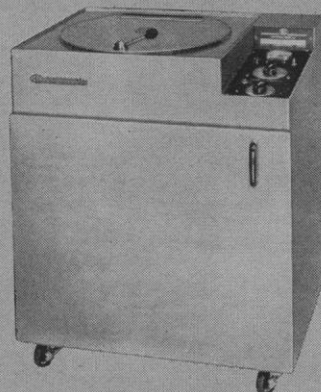


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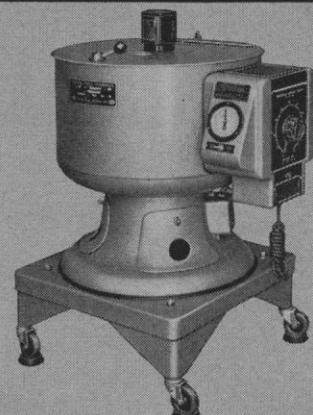
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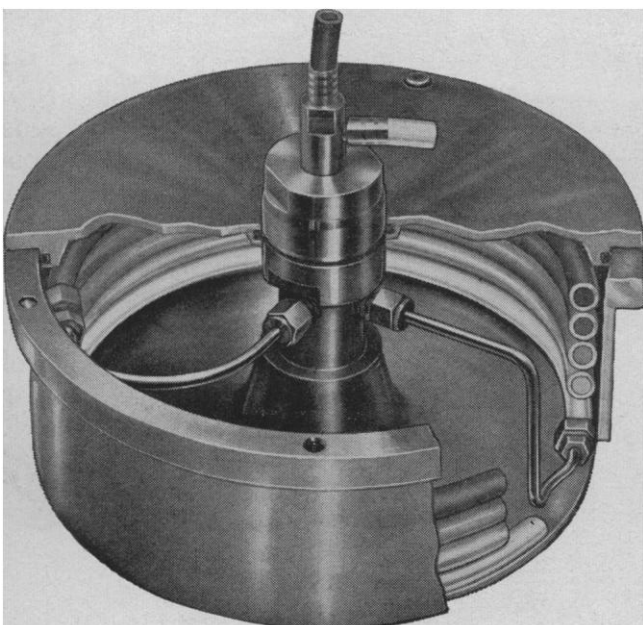


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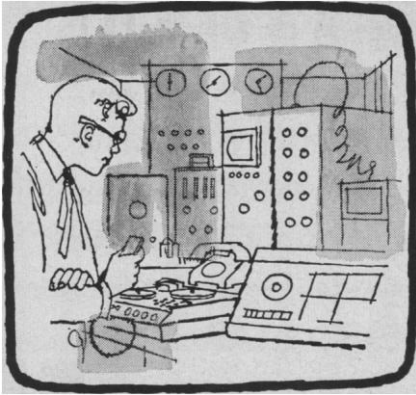
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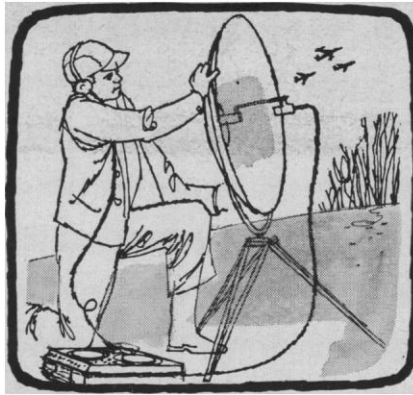
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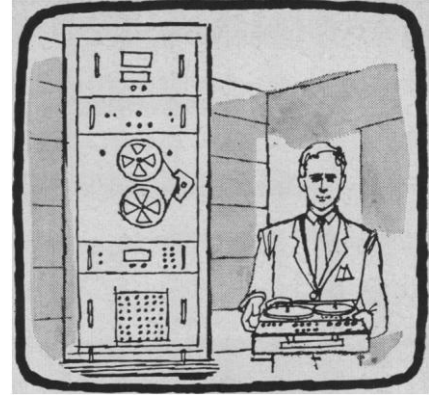




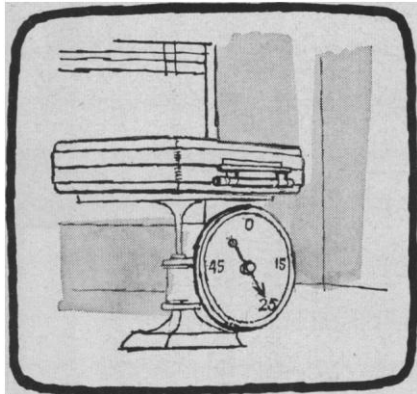
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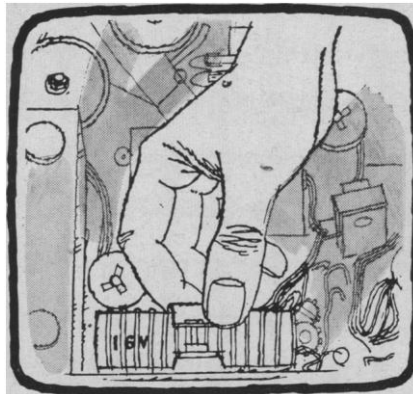
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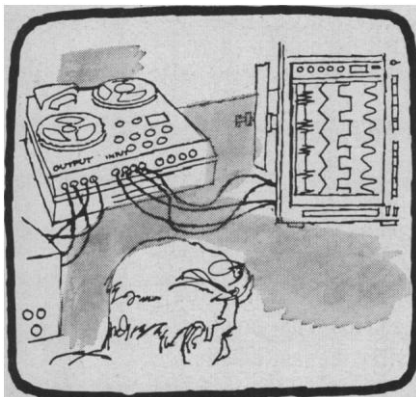
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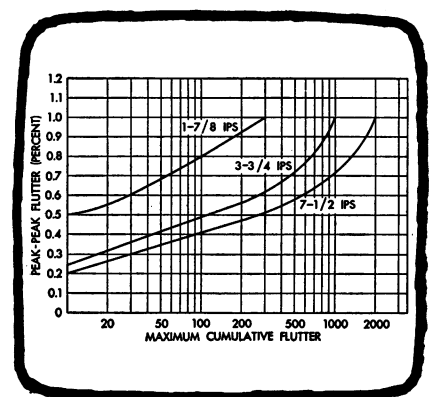
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3 3/4	50-10,000
7 1/2	50-20,000

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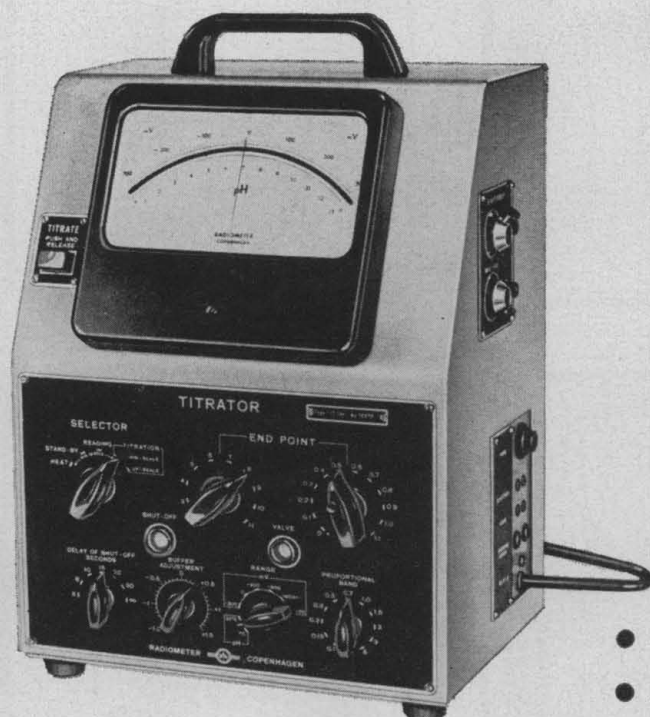
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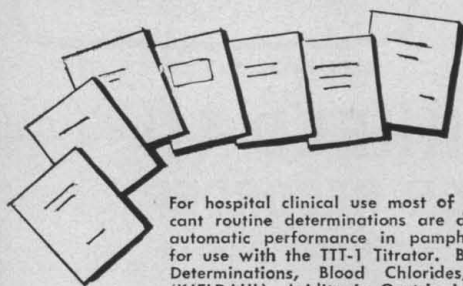
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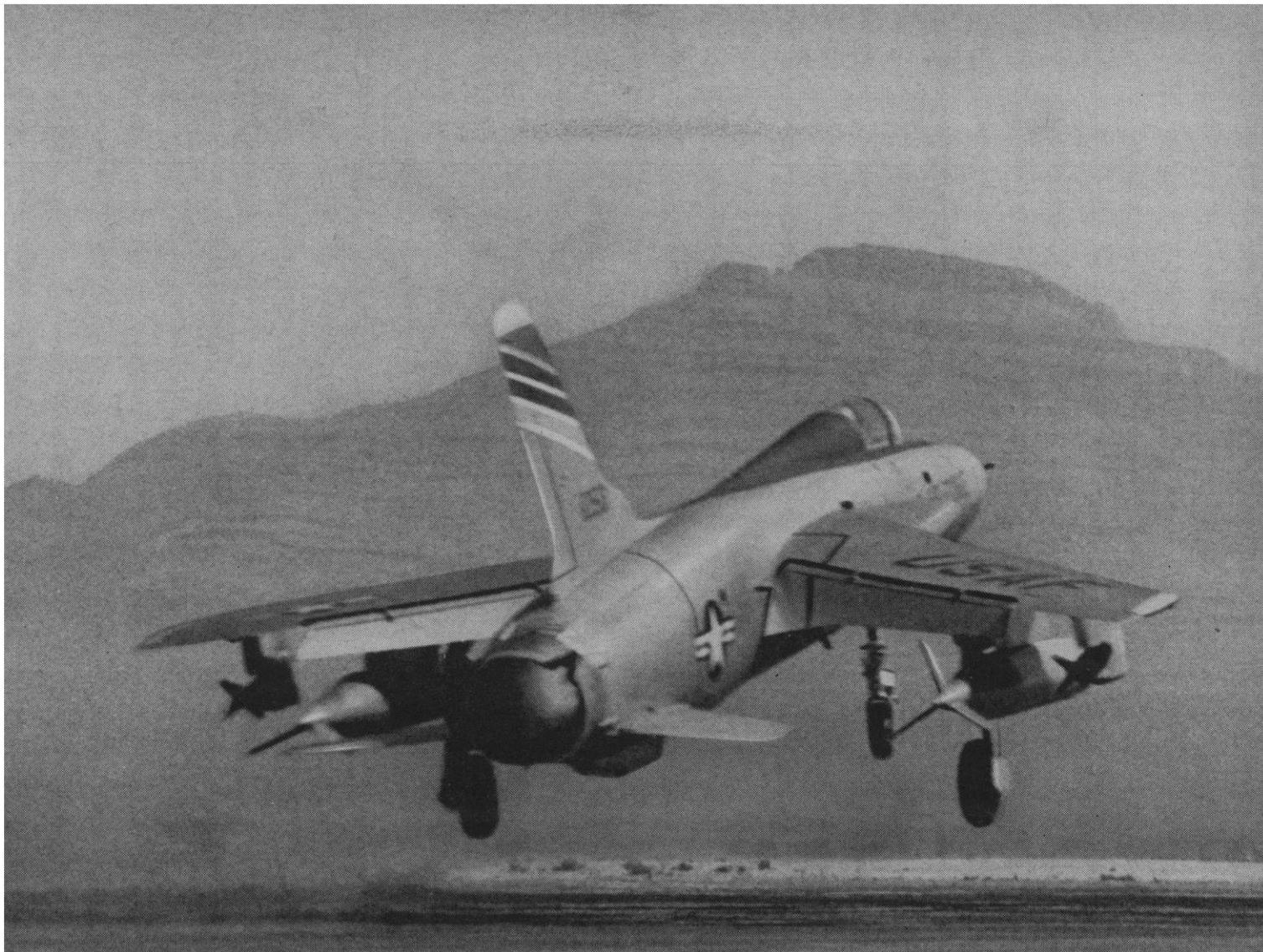


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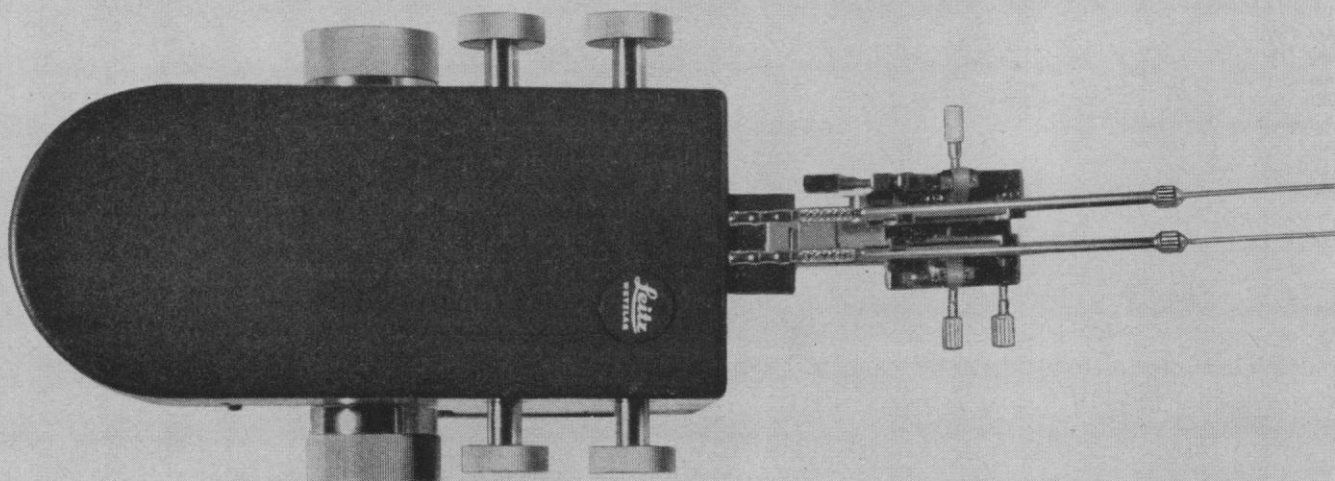
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The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion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

Piecework Pay for Professors

Some faculty members have only their salaries as professional income. Others receive additional income from other sources. Indeed some medical schools allow faculty members to receive most of their income from private practice. Faculty members from many departments receive honoraria as consultants to industry or government. Research grants provide an additional source of income.

When external grants constituted only a small fraction of a university's income, the funds were used to supplement the university's resources. The investigator's salary was generally paid from the university's own funds. But as government funds have multiplied to become a large fraction of the income of many universities, the practice of charging a portion of the investigator's salary to the grant has become widely established.

Thus we have gradually arrived at a situation in which many a professor is paid on a kind of piecework basis, with so much from this grant and so much from that, \$50 a day for service on one government advisory committee and \$75 a day for service on another, other fees for industrial consulting, perhaps some book royalties, and in some cases participation in the earnings of a profit-making company formed to exploit a useful development that grew out of earlier research—and, of course, some salary from the general university budget. One reason for this situation is that academic salaries have been too low. To help to raise them there has been a deliberate, even if not always announced, policy of using external funds to supplement what the college or university could pay from its own resources.

The income increases are good, but the means of achieving them have brought divided loyalties, an unhealthy diversity of standards in the use of grant funds, and the competitive use of extra-earning privileges. On one campus a man may supplement his regular salary from grant funds during the academic year; on another he may not. On one campus summer work on a research grant augments regular salary by two-ninths; on another campus, by some other fraction. We have heard of one university that computes academic duties in terms of days and allows a faculty member to augment his salary at the rate of so much per day for each Saturday, Sunday, holiday, or summer day devoted to research supported by an external grant.

The situation has now reached a fair degree of chaos and may be settled by the imposition of rules formulated by the grant-making agencies of government. Last week (p. 284) John Walsh discussed the American Council on Education recommendations on supplementation of salaries from grant funds. We hope these recommendations will be carefully considered, for it would be better for all concerned if the solution were to come from the colleges and universities through general adoption of a set of principles that both the faculty community and those who supply the external funds consider equitable.—D.W.

The Packard Model 830 Tri-Carb® Gas Fraction Collector enables quantitative collection of the individual organic components in a gas chromatographic effluent stream. It is suitable for use with any gas chromatograph using a non-destructive mass detector. Precise measurement of the radioactivity in component peaks can be made after collection.

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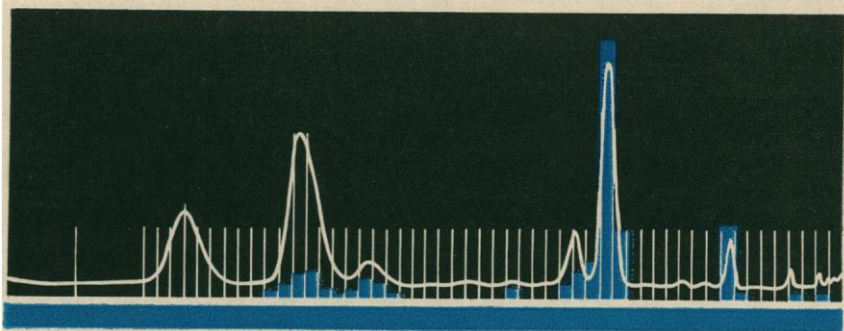
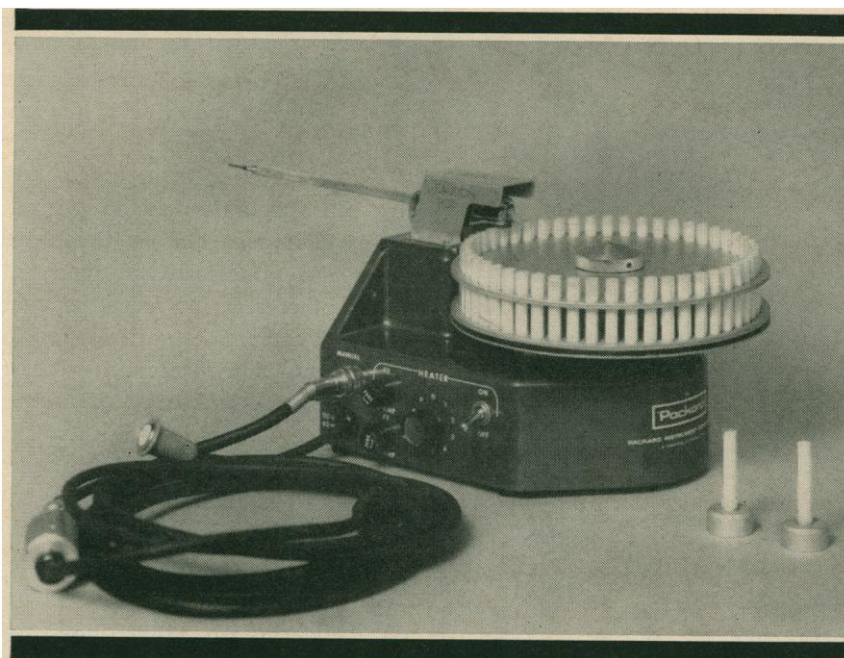
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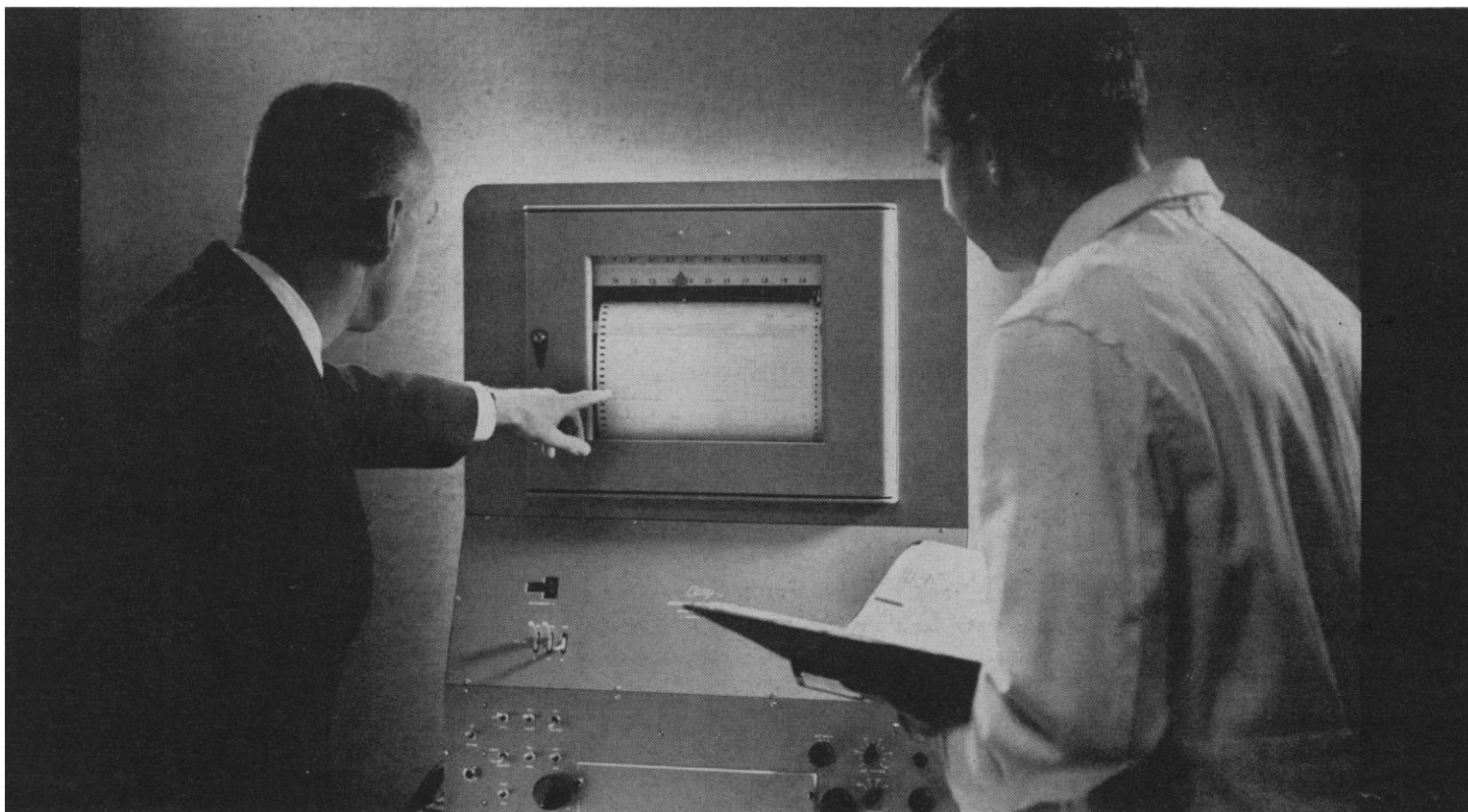
Precise measurement of radioactivity in gas chromatography effluents



Analysis of methyl esters labeled with carbon-14. The curves represent the output of a mass detector. The white vertical lines represent the times at which the fraction collector was actuated. The bar graph represents the radioactivity in each fraction in counts per minute, determined by a 10-minute count. (Ref.: *Journal of Lipid Research* 3, No. 1, 44, January, 1962)

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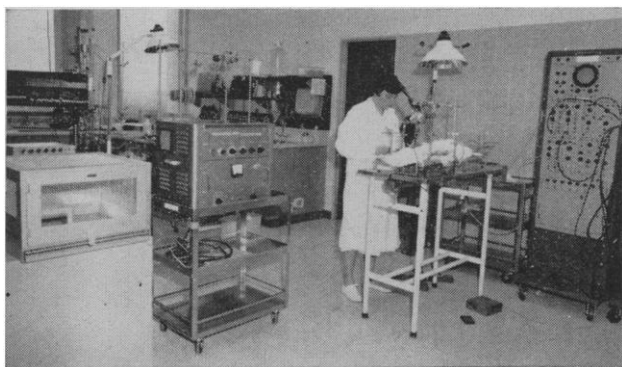
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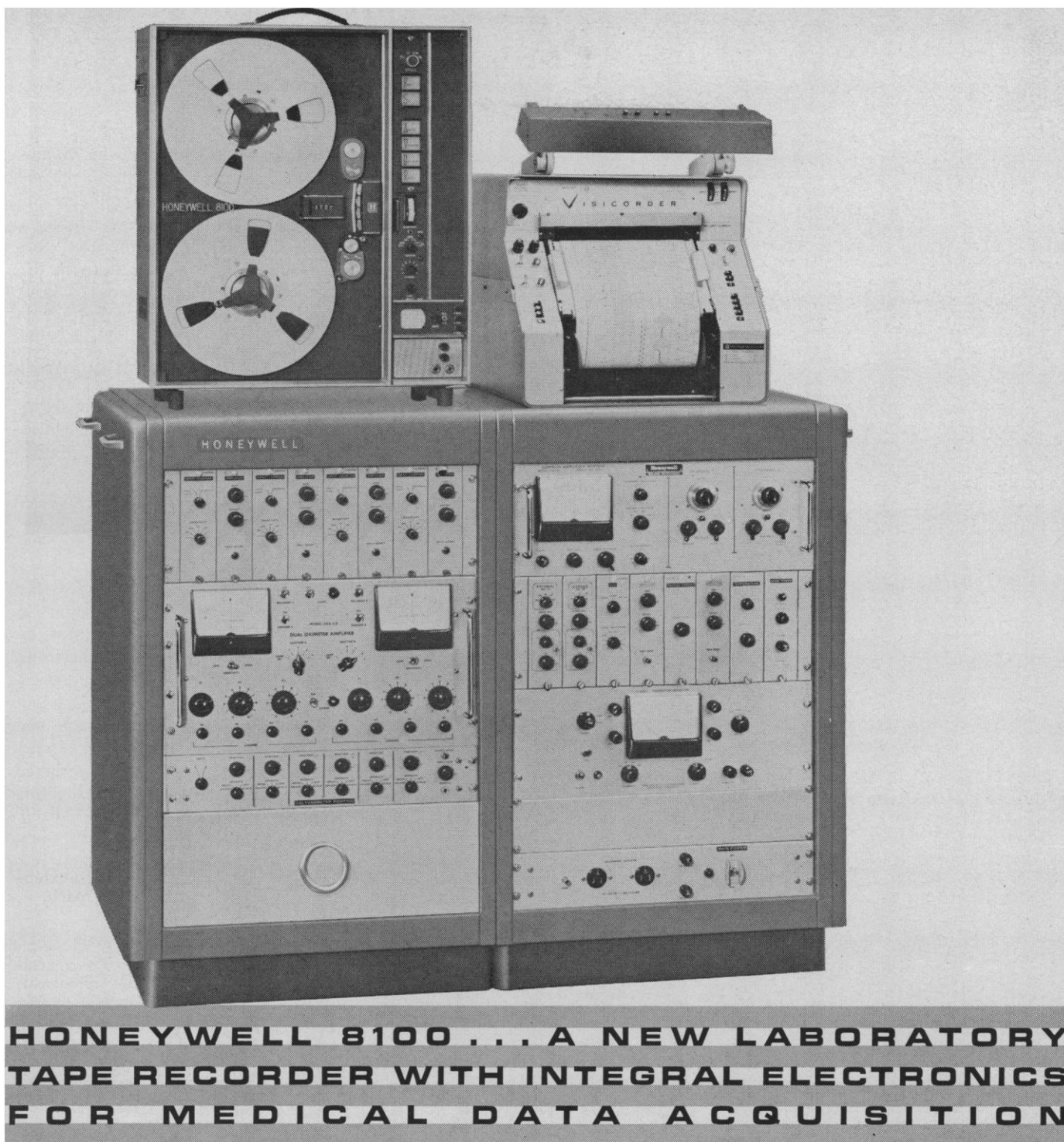
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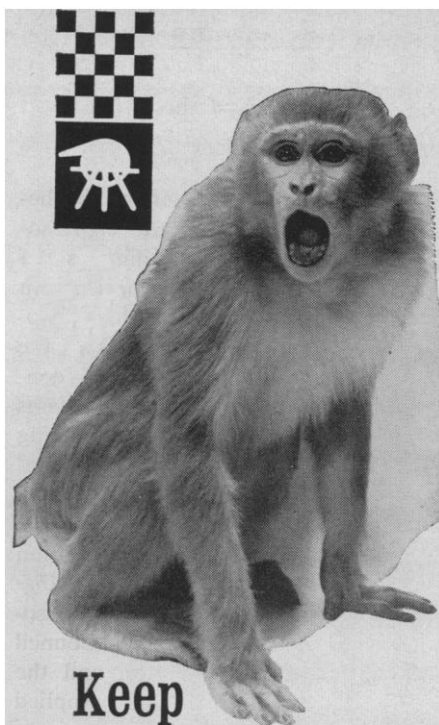
ASSOCIATION AFFAIRS

Conference Board of the Mathematical Sciences

The Conference Board of the Mathematical Sciences, one of the eight societies named as new affiliates of AAAS at the Philadelphia meetings in December 1962, is designed to provide mathematical organizations in the United States with a means of consultation and cooperation on problems inherent in the rapidly broadening scope of mathematical activity. Members of this society include: American Mathematical Society, Association for Computing Machinery, Association for Symbolic Logic, Institute of Mathematical Statistics, Mathematical Association of America, National Council of Teachers of Mathematics, and the Society for Industrial and Applied Mathematics.

The historical antecedents of the Board begin with the formation in 1942 of the War Policy Committee, by the American Mathematical Society and the Mathematical Association of America, to deal with problems arising out of World War II. The Committee was provided with funds by the Rockefeller Foundation; Marshall H. Stone served as its representative in Washington. During 1945-46 the War Policy Committee was replaced by the Policy Committee for Mathematics and representation was extended to other mathematical organizations. By 1957 all but one of the present constituents were represented.

During 1958-59 the Policy Committee, faced with the increasing demands made upon its six member organizations by the growth of mathematical research, education, and technology, formalized its structure as the Conference Board of the Mathematical Sciences with its own constitution and by-laws. In the same period the Mathematical Association of America acted to establish an office in Washington and received a grant from the Carnegie Corporation of New York for its initial support. Subsequently, the Association recommended, with the approval of the Carnegie Corporation and the Conference Board, that the funds provided by the grant be used for the establishment of the office of the Conference Board in Washington. This decision led to the incorporation of the Conference Board of the Mathematical Sciences in the District of Columbia



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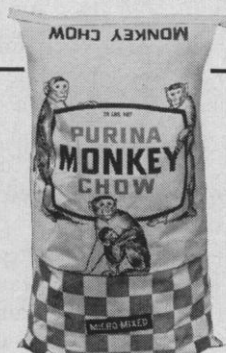
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in 1960. The Association for Computing Machinery became the seventh member in 1962.

The governing board of CBMS is its council which meets twice a year. Recommendations of the Council which are approved by the constituent organizations are carried out under the guidance of advisory committees with assistance from the office of the Conference Board. The officers are: J. Barkley Rosser (Cornell University), chairman; John L. Kelley (University of California, Berkeley), vice chairman; John R. Mayor (AAAS), secretary and Treasurer; and Leon W. Cohen (University of Maryland), executive secretary.

Present plans of the Board include: (i) sponsoring the preparation and distribution of a report on buildings and facilities for the mathematical sciences to be published by the Columbia University Press; (ii) planning four programs in cooperation with AAAS on television communication among scientists; (iii) arranging a conference on the Gilliland Report of PSAC as it affects the mathematical sciences; and (iv) the preparation and distribution of career booklets reflecting the current outlook for employment in mathematical disciplines.

LEON W. COHEN
Conference Board of the Mathematical Sciences, 309 Mills Building, 17th and Pennsylvania Avenue, NW, Washington, D.C.

Forthcoming Events

May

26-27. Society for **Industrial and Applied Mathematics**, Menlo Park, Calif. (R. D. Gaskell, Dept. of Mathematics, Oregon State Univ., Corvallis)

26-29. Institute of **Food Technologists**, Detroit, Mich. (C. L. Willey, Inst. of Food Technologists, 176 W. Adams St., Chicago 3, Ill.)

26-31. American **Physical Therapy Assoc.**, New York, N.Y. (L. Blair, APTA, 1790 Broadway, New York 19)

26-1. **Mineral Processing**, 6th intern. Congr., Cannes, France. (D. A. Dahlstrom, Eimco Corp., 301 S. Hicks Rd., Palatine, Ill.)

27. **Operations Research Soc. of America**, Transportation Science Section, Cleveland, Ohio. (L. C. Edie, Port of New York Authority, 111 Eighth Ave., New York 11)

27-29. Canadian **Nuclear Assoc.**, 2nd intern. conf., Montreal, Canada. (CNA, 19 Richmond St., W., Toronto 1, Ont., Canada)

27-29. **Frequency Control**, 17th annual



NEW HONEYWELL LABORATORY TAPE RECORDER IS TRULY PORTABLE

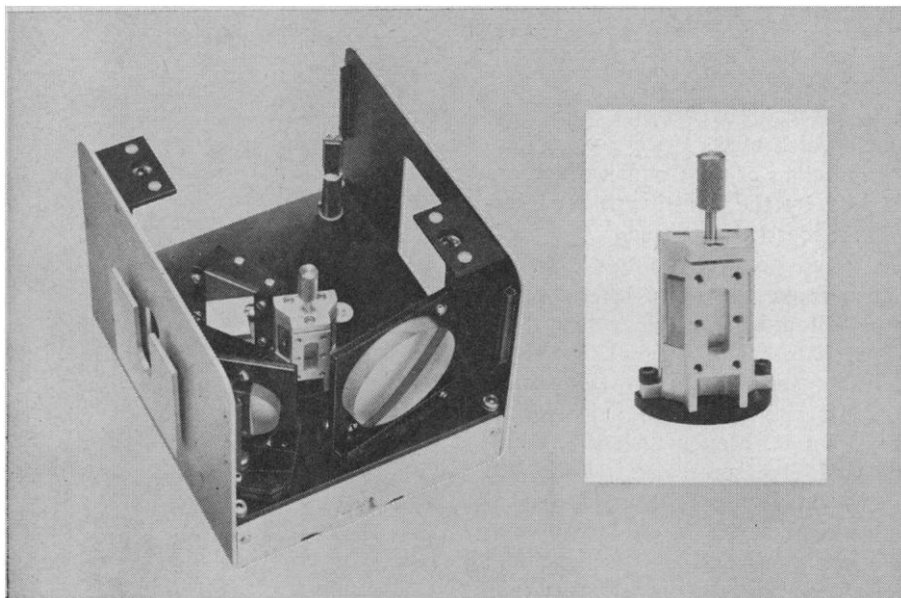
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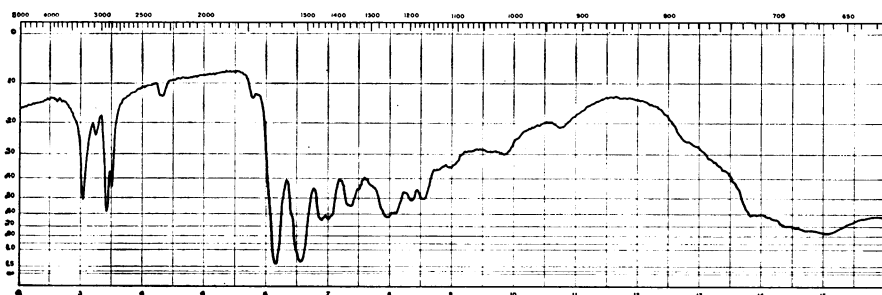
At the same single reflection price! Obtains improved, more sensitive ATR spectra of even the most "impossible" solid samples.

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symp., Atlantic City, N.J. (Headquarters, U.S. Army Electronics Research and Development Laboratory, Fort Monmouth, N.J.)

27-30. **Tissue Culture Assoc.**, 14th annual, Boston, Mass. (R. L. Sidman, Laboratory of Cellular Neuropathology, Harvard Medical School, 25 Shattuck St., Boston 15)

30-2. Society for **Applied Anthropology**, Albany, N.Y. (T. McCorkle, Div. of Behavioral Science, Pennsylvania Department of Health, Post Office Box 90, Harrisburg)

30-2. **Stochastic Processes in Mathematical Physics and Engineering**, symp. New York, N.Y. (Soc. for Industrial and Applied Mathematics, P.O. Box 7541, Philadelphia, Pa.)

31-4. **Child Psychiatry**, 2nd European Congr., Rome, Italy. (Secretariat, Casella Postale No. 7130, Rome)

31-5. Cell Reactions in Adaptations of **Metazoa** to Environmental Temperature, intern. symp., Leningrad, U.S.S.R. (A. S. Troshin, U.S.S.R. Acad. of Sciences, Inst. of Cytology, Prosp. Maklina 32, Leningrad)

June

1-8. International **Electrotechnical Commission**, Venice, Italy. (American Standards Assoc., 10 E. 40 St., New York 16)

2-5. Society of **Aerospace Material and Process Engineers**, Philadelphia, Pa. (A. F. Feldbush, Box 613, Azusa, Calif.)

2-5. International Soc. for the Study of Diseases of the **Colon and Rectum**, 1st Congr., Athens, Greece. (H. E. Bacon, Dept. of Colon and Rectal Surgery, Temple Univ. Medical Center, Philadelphia 40, Pa.)

3-11. **Space Science**, 4th intern. symp., Warsaw, Poland. (J. R. Beaulieu, COSPAR, 28 Nieuwe Schoolstraat, The Hague, Netherlands)

4-6. National **Electronic Packaging and Production**, conf., New York, N.Y. (J. McGrath, T. C. Gams & Associates, 250 Elizabeth Ave., Newark, N.J.)

4-6. Technical Assoc. of the **Pulp and Paper Industry**, 1st water conf., Cincinnati, Ohio. (H. O. Teeple, TAPPI, 360 Lexington Ave., New York 17)

4-7. European Federation of **Corrosion**, 3rd Congr., Brussels, Belgium. (G. Biva, Société de Chimie Industrielle, 32, rue Joseph-II, Brussels 4)

4-8. Society of **Physical Chemistry**, 13th annual, Paris, France. (G. Emschwiller, Société de Chimie Physique, 10, rue Vauquelin, Paris 5)

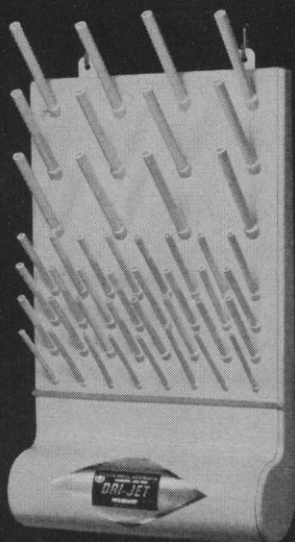
4-10. Operating Experience with **Power Reactors**, conf., Vienna, Austria. (H. Storhaug, IAEA, Div. of Scientific and Technical Information, 11 Kärtner Ring, Vienna 1)

5-6. European Federation of **Chemical Engineering**, 46th, Frankfurt-am-Main, Germany. Secretariat, Deutschen Arbeitskreises Vakuum, 6 Frankfurt am Main 7, Rheingau-Allee 25, Germany)

5-7. International Symp. on **Zone Melting**, Karlsruhe, Germany. (H. Schildkrecht, Institut für Organische Chemie, Universität Erlangen, Fahrstr. 17, Erlangen, Germany)

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9-15. **National Speleological Soc.**, Mountain Lake, Va. (J. R. Holsinger, 115 W. Cameron Rd., Falls Church, Va.)

10-11. **American Vacuum Soc.**, annual conf., New York, N.Y. (W. G. Matheson, P.O. Box 1282, Boston 9, Mass.)

10-13. **German Metallurgical Soc.**, general assembly, Berlin. (Deutsche Gesellschaft für Metallkunde, Alteburger Str. 402, Köln-Marienburg, Germany)

10-14. **Health Physics Soc.**, annual, New York, N.Y. (L. Gemmell, Brookhaven Natl. Laboratory, Upton, N.Y.)

10-14. **Molecular Structure and Spectroscopy**, symp., Columbus, Ohio. (H. H. Nielsen, Dept. of Physics and Astronomy, Ohio State Univ., 174 W. 18th Ave., Columbus 10)

10-15. **Engineering Societies of Western Europe and the U.S.**, 8th plenary assembly, Munich, Germany. (E. Hianne, Société Royale Belge des Ingénieurs et des Industriels, 3 rue Ravenstein, Brussels 1, Belgium)

10-21. **Analog Computation**, Washington, D.C. (B. P. Shah, Dept. of Mechanical Engineering, Catholic Univ. of America, Washington 17)

11-13. **Stimulus Generalization**, Boston, Mass. (D. Mostofsky, Boston Univ., 332 Bay State Rd., Boston 15)

12-14. **Heat Transfer and Fluid Mechanics Inst.**, Pasadena, Calif. (J. J. Harford, American Rocket Soc., 500 Fifth Ave., New York 36)

12-14. **Stochastic Models in Medicine and Biology**, Madison, Wis. (J. Gurland, Mathematics Research Center, U.S. Army, Univ. of Wisconsin, Madison 6)

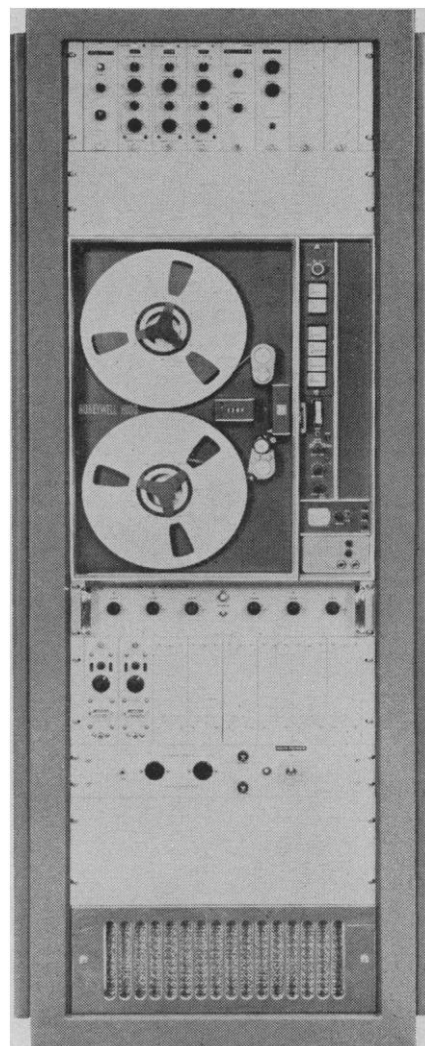
13-14. **American Rheumatism Assoc.**, Atlantic City, N.J. (J. A. Coss, Jr., 20 E. 76 St., New York 21)

13-15. **American Soc. of Limnology and Oceanography**, Ann Arbor, Mich. (G. H. Lauff, Sapelo Island Research Foundation, Sapelo Island, Ga.)

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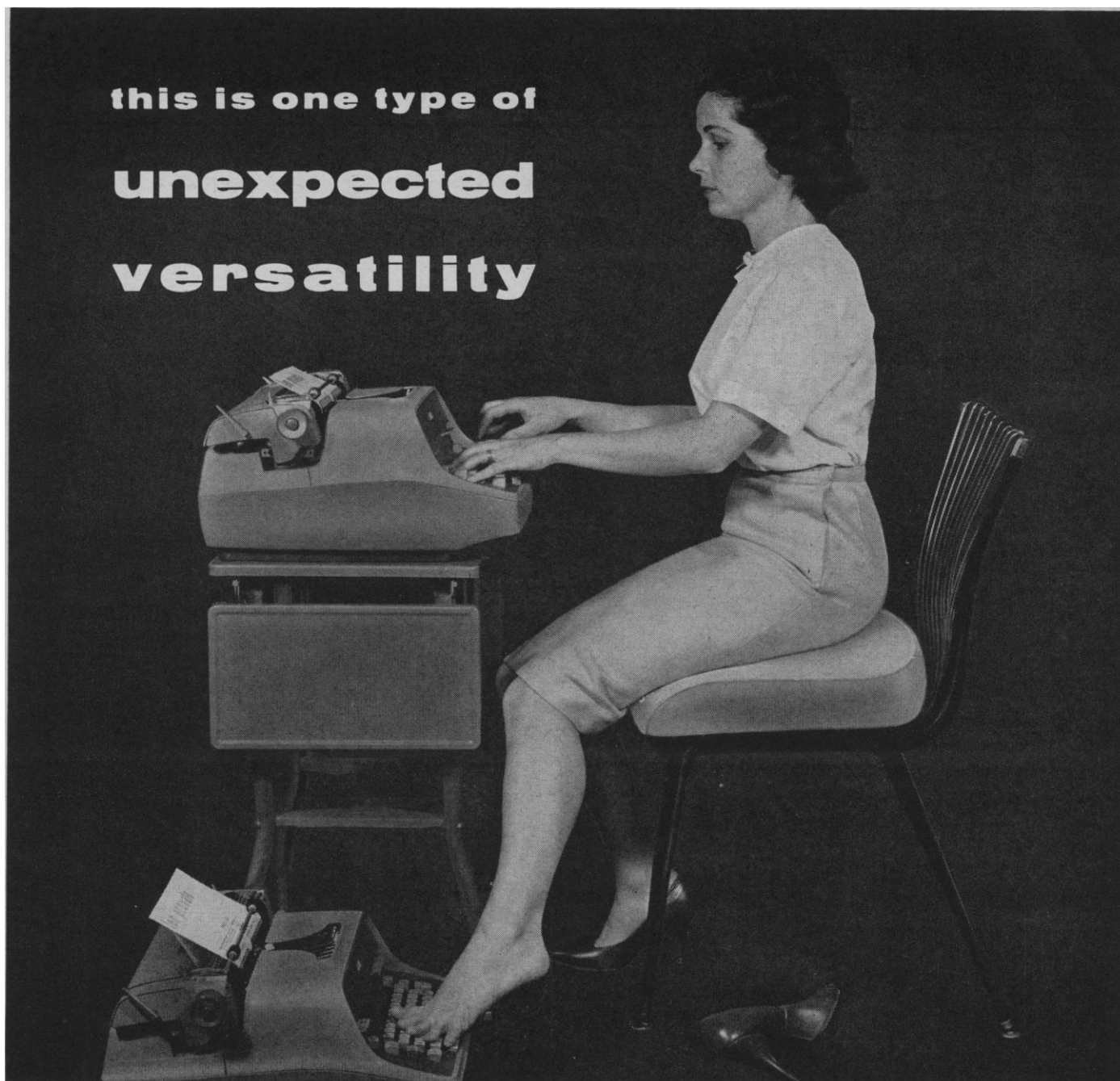
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14-15. Institute of Mathematical Statistics, 95th Madison, Wis. (J. Gurland, Mathematics Research Center, U.S. Army, Univ. of Wisconsin, Madison 6)

14-17. Instrument Soc. of America, Los Angeles, Calif. (W. H. Kushnick, 530 William Penn Pl., Pittsburgh 19, Pa.)

15-16. Advancement of Private Practice in Social Work, 2nd conf., Denver, Colo. (P. Ledbetter, ACSW, Suite 1520, Medical Arts Bldg., Houston 2, Tex.)

16-19. Northeastern Section, Botanical Soc. of America, summer field meeting, Pittsburgh, Pa. (L. K. Henry, Section of Plants, Carnegie Museum, Pittsburgh 13)

16-20. American Medical Assoc., Atlantic City, N.J. (R. M. McKeown, 510 Hall Bldg., Coos Bay, Ore.)

16-20. American Nuclear Soc., Salt Lake City, Utah. (O. J. DuTemple, 244 E. Ogden Ave., Hinsdale, Ill.)

16-21. American Inst. of Electrical Engineers, general meeting, Toronto, Ont., Canada. (R. M. Magee, Bendix Systems Div., Ann Arbor, Mich.)

16-22. Medical Librarianship, 2nd intern. congr., Washington, D.C. (R. MacDonald, Natl. Library of Medicine, Bethesda 14, Md.)

17-18. Learning, Adaptation, and Control in Information Systems, symp., Evanston, Ill. (J. T. Tou, Computer Sciences Laboratory, Technological Inst., Northwestern Univ., Evanston, Ill.)

17-19. American Dairy Science Assoc., Lafayette, Ind. (H. F. Judkins, 32 Ridgeway Circle, White Plains, N.Y.)

17-19. Canadian Federation of Biological Societies, London, Ont. (A. H. Neufeld, CFBS, Faculty of Medicine, Univ. of Western Ontario, London, Ont.)

17-19. Hanford Symp. on Biology of Radioiodine, Richland, Wash. (L. K. Bustad, Biology Laboratory, General Electric Co., Richland)

17-19. Society for the Study of Development and Growth, Storrs, Conn. (W. A. Jensen, Dept. of Botany, Univ. of California, Berkeley 4)

17-21. American Soc. for Engineering Education, Philadelphia, Pa. (W. L. Collins, American Soc. for Engineering Education, Univ. of Illinois, Urbana)

17-21. Gas Chromatography, 4th intern. symp., Ann Arbor, Mich. (Instrument Soc. of America, 530 William Penn Pl., Pittsburgh 19, Pa.)

17-22. Pacific Division, AAAS, San Francisco, Calif. (R. C. Miller, California Acad. of Sciences, Golden Gate Park, San Francisco)

17-22. International Congr. of Engineers, 4th, Munich, Germany. (Deutscher Verband Technisch-Wirtschaftlicher Vereine, Prinz-Georg-Str. 79, Düsseldorf, Germany)

17-23. Nuclear Energy, 8th intern. congr., Rome, Italy. (Ufficio Congressi e Mostre CNEN, Via Belisario 15, Rome, Italy)

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19-21. Joint Automatic Control conf., Minneapolis, Minn. (T. J. Williams, Monsanto Chemical Co., St. Louis, Mo.)

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19-26. World Petroleum Congr., 6th, Frankfurt-am-Main, Germany. (U.S. Natl. Committee, 15 W. 51 St., New York, N.Y.)

20-21. Institute of Mathematical Statistics, 96th, Eugene, Ore. (D. G. Chapman, Dept. of Mathematics, Univ. of Washington, Seattle 5)

20-21. Nutrition Soc. of Canada, 6th annual, London, Ont. (E. V. Evans, Dept. of Nutrition, Ontario Agricultural College, Guelph, Ont., Canada)

22-23. Ukrainian Medical Assoc. of North America, Kerhonkson, N.Y. (R. W. Sochynsky, UMA, 2 E. 79 St., New York 21)

23-26. American Soc. of Agricultural Engineers, Miami Beach, Fla. (J. L. Butt, P.O. Box 229, St. Joseph, Mich.)

23-29. American Soc. for Horticultural Science, Caribbean region, 11th annual, Mexico City, Mexico (E. H. Cásseres, Calle Londres 40, Mexico 6, D.F.)

23-26. American Soc. of Mechanical Engineers, Ithaca, N.Y. (A. B. Conlin, Jr., 345 E. 47 St., New York, N.Y.)

23-28. American Soc. for Testing and Materials, 66th annual, Atlantic City, N.J. (ASTM, 1916 Race St., Philadelphia 3, Pa.)

24-26. International Astrophysical Symp., 12th, Liège, Belgium. (M. Migeotte, Institut d'Astrophysique, Cointe-Sclessin, Belgium)

24-26. American Soc. of Heating, Refrigerating and Air Conditioning Engineers, Milwaukee, Wis. (R. C. Cross, 345 E. 47 St., New York 17)

25-28. American Home Economics Assoc., Kansas City, Mo. (D. S. Miller, 3705 Van Buren Ave., Corvallis, Ore.)

26-27. Computers and Data Processing, Estes Park, Colo. (W. H. Eichelberger, Denver Research Inst., Univ. of Denver, Denver 10, Colo.)

26-28. Wind Effects on Buildings and Structures, Teddington, Middlesex, England. (Mrs. S. M. Russell, Aerodynamics Div., Natl. Physical Laboratory, Teddington)

26-29. American Assoc. of Bioanalysts, annual, Chicago, Ill. (R. Thornburg, 720 N. Michigan Ave., Chicago 11)

26-29. Society of Nuclear Medicine, Montreal, Quebec, Canada. (S. N. Turiel, SNM, 333 N. Michigan Ave., Chicago 1, Ill.)

26-29. National Soc. of Professional Engineers, Cleveland, Ohio. (P. H. Robbins, 2029 K St., NW, Washington, D.C.)

28-1. Psychosomatic Approach to Chronic Illness, congr., Chamonix, France. (French Soc. of Psychosomatic Medicine, 15, rue Santerre, Paris 12)



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LETTERS

Cross-Cultural Differences

In their paper "Cultural differences in the perception of geometric illusions" [*Science* 139, 769 (22 Feb. 1963)] Segall *et al.* state that an "inference habit . . . could enhance, or even produce, the Müller-Lyer and Sander Parallelogram illusions." I would like to register some objections.

In their own data, if I read them correctly, children are more susceptible to these illusions than adults. Other investigators have found this to be the case with the Müller-Lyer illusion. If these illusions are due to ". . . habits of perceptual inference which relate to cultural . . . factors . . ." it is difficult to understand why adults, who are presumably more acculturized, have smaller illusions.

Winslow [*Arch. Psychol.* No. 153, 1 (1933)] has reported that chicks are susceptible to the Müller-Lyer illusion. It is inconceivable that chicks succumbed so rapidly to our Western cultural influences. It is just as possible that the Müller-Lyer and Sander illusions are induced by natural electro-

chemical brain processes propagated by the contours of the figure and that there are physiological differences between the groups. The horizontal-vertical illusion might be induced by some other physiological process or may in fact represent cultural differences. Piaget's centration effect may play a larger role in this illusion, and the groups may differ, for whatever reason, in the time spent looking at the vertical bar.

This is not to say that one or another interpretation is the correct one, but only that the "cultural inference" interpretation runs into difficulties, and that alternative nonenvironmental explanations were unstated.

HERMAN H. SPITZ

State Training and Research Center,
Bordentown, New Jersey

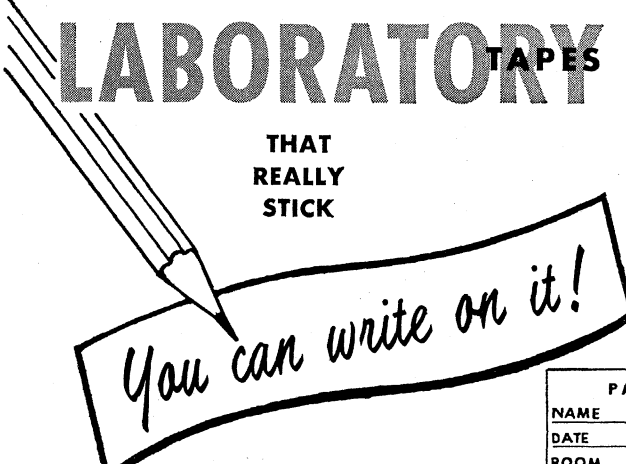
Spitz objects on several grounds to the empiricistic interpretation of cross-cultural differences reported in our paper. In so doing, he notes correctly some complexities in our data, thus underlining the magnitude of the research program required before we can claim fully to understand the phenomena in question. In particular, Spitz is correct in pointing out that age trends

in studies with the Müller-Lyer figures complicate our interpretive efforts. Existing data show children to be more susceptible than adults, and our line of reasoning demands that somewhere during the life span there must be an increase in susceptibility with age. Research has failed to uncover such an increase, but in no studies reported have children under 3 years of age been used as subjects. We believe that the visual inference habit we assume to be involved in the Müller-Lyer illusion (and others) is well established by the time hand-eye coordination and locomotive skills are achieved (before 3 years of age). It is also assumed that the degree of illusion susceptibility established by that age is a maximum, with the subsequent reduction resulting from an increase in analytic ability, particularly as the individual learns to inhibit form-constancy effects in drawing three-dimensional objects on two-dimensional surfaces. These hypotheses are to be tested in laboratory studies with young children at the University of Iowa Psychology Laboratory, but until we have data to support them, Spitz's point on age trends is well taken.

His other substantive point that chicks are susceptible to the Müller-Lyer illusion, and that this fact throws our interpretive position into serious doubt, is less well taken. In the paper cited by Spitz, Winslow did not demonstrate that chicks are susceptible to the Müller-Lyer illusion. His study involved training five chicks to choose the shorter of each of five pairs of stimuli, and then they were tested on eight Müller-Lyer figures. Winslow reasoned correctly that the chicks having been trained to choose the short member of stimulus pairs would, if susceptible to the illusion, tend to select the usually underestimated portion (the enclosed segment) of the test figures. However, his conclusion that the chicks were susceptible was, in our view, erroneous, because only two of the eight test figures provided appropriate tests of the illusion and on both of these the response tendency clearly was to choose the typically overestimated segment. The chicks tended to choose the usually underestimated segment only when it and its surround was actually shorter than the other segment and its surround. Thus, Winslow's study demonstrated at most that chicks could be taught a discriminative response habit which could transfer to a second set of stimuli.

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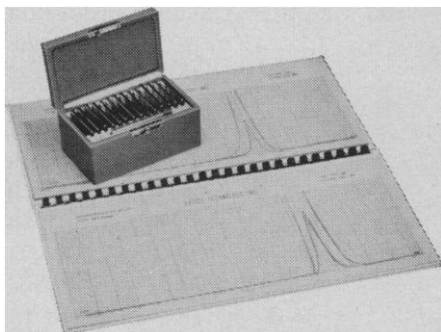
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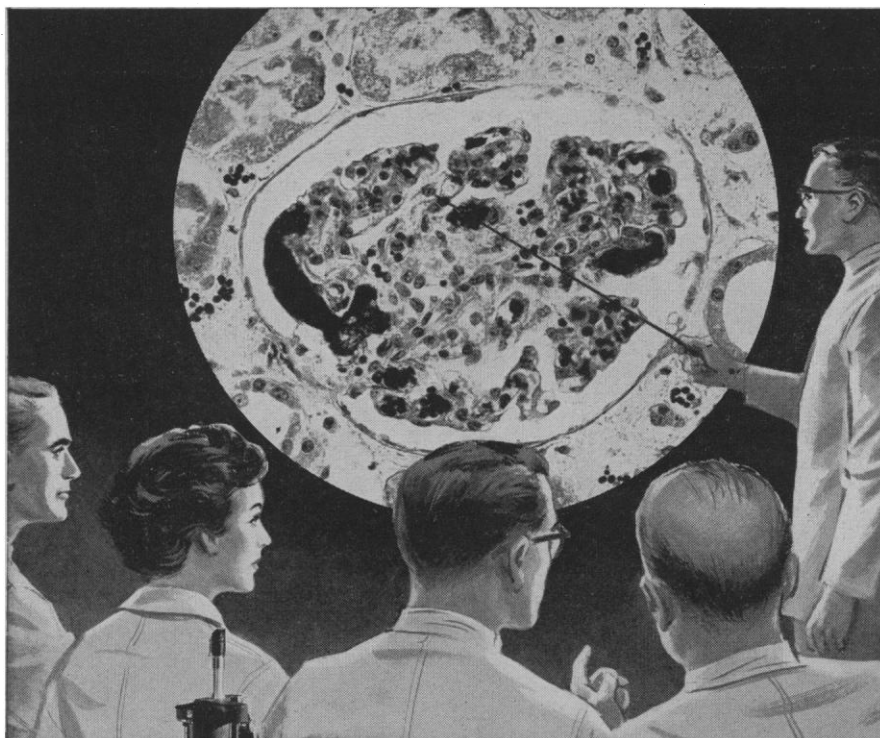
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Even if illusion susceptibility in chicks had been demonstrated, our interpretation of illusion-responses as incidental manifestations of usually valid visual inference habits would not be undermined. One could extend our general argument to other animals who could conceivably learn habits that are ecologically valid for them in a manner analogous to that we hypothesize for humans. Our thesis is simply that various features of the visual environment affect the probability that certain inference habits rather than others will be learned and that these habits will, under certain unusual conditions, lead to nonveridical perceptions. Stimulus configurations like those we have come to call geometric illusions are examples of such unusual conditions.

It is of course still conceivable that physiological processes, perhaps due to hereditary or dietary factors, may explain our data. However, even genetic explanations these days require analysis of the environmental factors which through differential selection contribute to genetic variation over time. We nonetheless accept as fair Spitz's comment that we did not state alternative nonenvironmental explanations. We would welcome attempts to spell out differences in "natural electrochemical brain processes" or other such factors which could account for the complex, bi-directional differences we reported.

MARSHALL H. SEGALL

*Department of Psychology,
University of Iowa, Iowa City*

DONALD T. CAMPBELL

*Department of Psychology,
Northwestern University,
Evanston, Illinois*

Independent Research Institutes

I am writing to express my concern over your recent editorial "Unnecessary research institutes" [*Science* 139, 563 (15 Feb. 1963)]. Although I respect your right to "editorialize" as you see fit, I do feel that you used a "shotgun" approach. In an attempt to point out real abuses, you have (unwittingly I am sure) stigmatized a number of respectable institutions. Specifically, your editorial in effect equates small size and financial problems with inability to conduct good research or with motives for establishment based on "pleasure, profit or aggrandizement."

I take issue with this interpretation, which I feel could all too easily be de-



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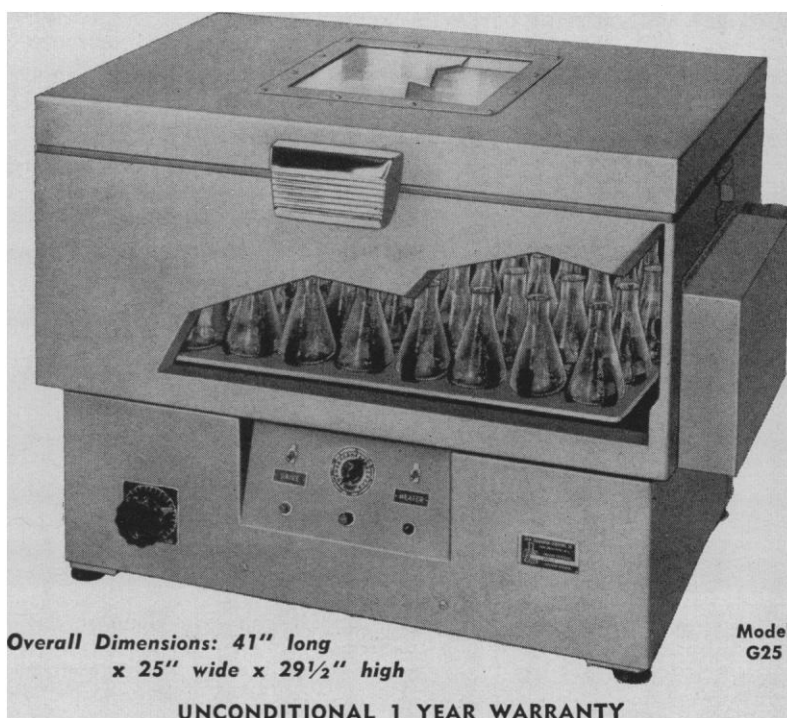
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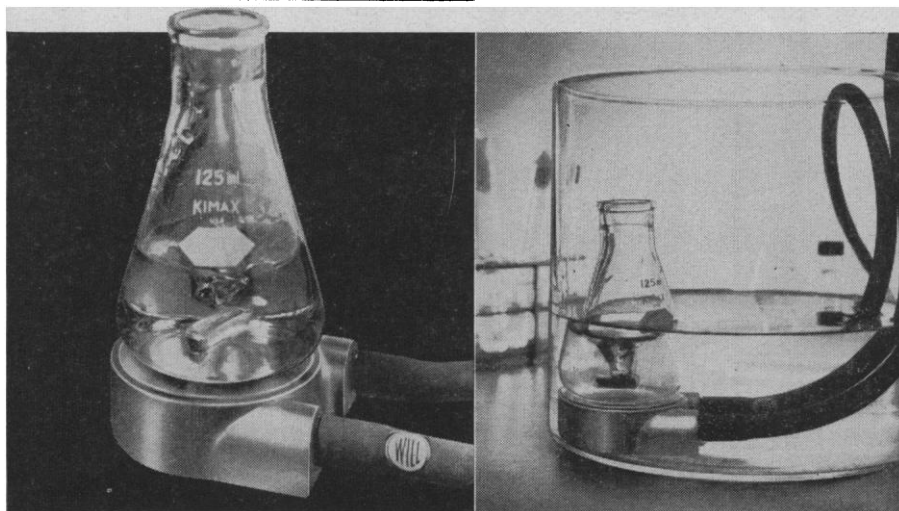
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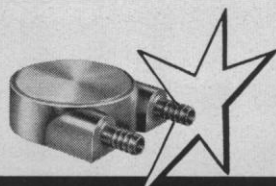
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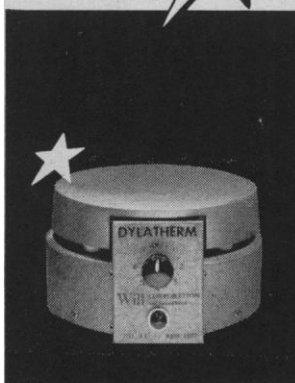
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rived from your editorial, for the following reasons:

1) Many research institutes which are now financially stable and very large in size do excellent work and yet rely on government contracts for their existence. At one time all of these organizations were small and no doubt had financial problems.

2) Universities are relying more and more on government grants for support of graduate research and facilities. Without such funding, graduate research in all but a handful of schools would be crippled.

3) There are research institutes, such as the one of which I am a member, that definitely were not founded for unworthy motives, that have good research facilities and are attracting and holding good scientists, but are still young and small. We rely heavily on government contracts. Most of our contracts are renewed, primarily because our work performance has been good.

4) Many of the abuses to which you refer are probably found in small *privately owned* companies which exist on government contracts.

I believe your editorial was written in an effort to point out some bad situations which undoubtedly do exist, but feel your attack will unfortunately damage legitimate and "necessary institutes" along with the targets of your editorial. I hope that my letter may persuade you to take another look at this subject and possibly you may see fit to write not a retraction, but an extension or redefinition of your first editorial.

MONROE E. WALL

*Research Triangle Institute,
Durham, North Carolina*

[Your editorial] . . . is extremely important and very timely, and I sincerely hope that it will be acted upon by those "gate keepers" who are crucial in controlling the flow of funds to such research institutes. There have already been embarrassing episodes involving such institutes, and I believe there will be more unless the kind of action you call for is taken.

RENSIS LIKERT

*Institute for Social Research,
University of Michigan, Ann Arbor*

. . . I strongly contend that, in our particular society, it is essential that the small independent research institute continue to exist, even though it must subsist entirely on government grants. Anything that will help to break the

stranglehold which the large and well-established research and development organizations have on the individual scientist can't be all bad. In my somewhat considerable experience with these 'sound' establishments, I have found your vaunted freedom to be almost nonexistent and the atmosphere to be oppressive. . . .

JOSEPH FUGGER

P.O. Box 1405, Pittsburgh, Pennsylvania

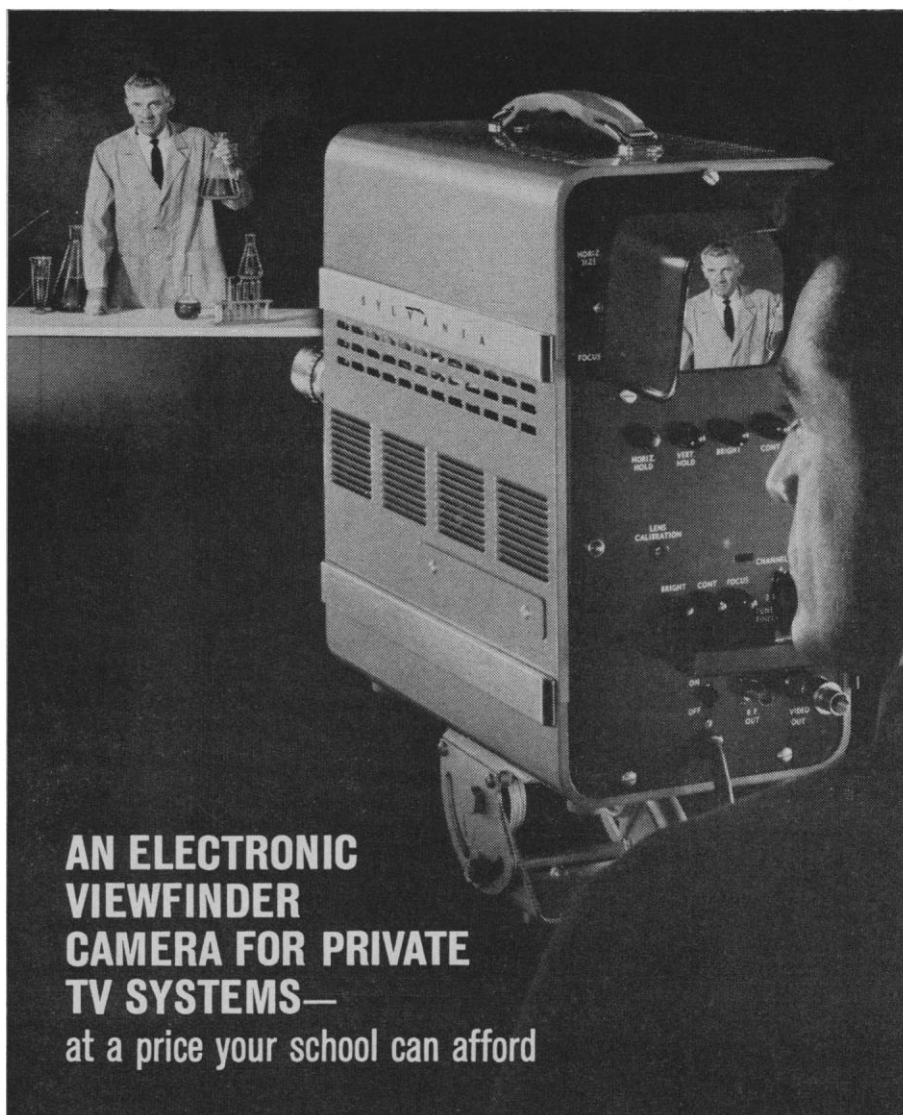
. . . I would like to add a word about a different class of small research establishment, namely those which are formed to explore a field or an idea which has not yet broken through to the point needed for major support. . . . The very large governmental and academic organizations require much time for moving and a small, independent foundation may be fully justified and very useful as an intermediate step for pump-priming and pioneering work because of freedom from the inertia which makes larger organizations slow to react.

JOHAN BJORKSTEN

Bjorksten Research Foundation,
Madison 1, Wisconsin

Responses to the editorial entitled "Unnecessary research institutes" ranged from, "Since when is it permissible to use the American Association for the Advancement of Science and its official publication as a means of propaganda in opposition to the free enterprise system upon which our country is founded?" (from a three-page letter from the president and founder of an institution bearing his name) to, "Toward the end of each month some administrator . . . sits down to juggle the time sheets. . . . As a former project leader, I was frequently amazed when I received a list of the charges made against some of my projects at the end of each month. At times I was supporting people who hadn't spent one hour working on the project" (from one of the letters that came from present or former staff members who asked that their names not be used).

The 15 February editorial dealt with a specific type of research institute: "the small, inadequately financed one that is formed to secure government grants and contracts and to live on the proceeds of such support." The variety of comment provoked by the editorial indicates that there is both concern and controversy over the place of such institutes in the scientific enterprise.—D.W.



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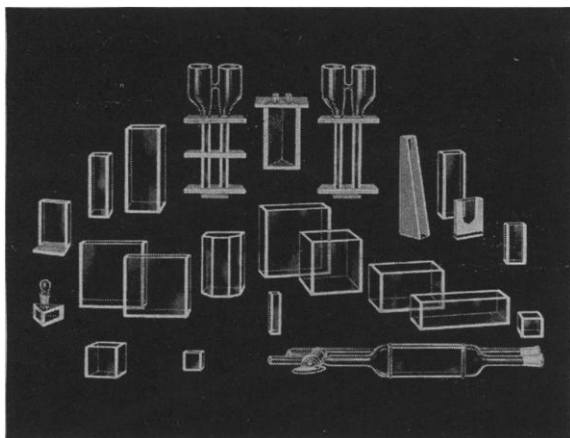
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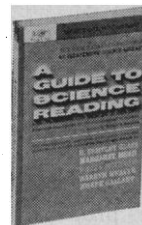
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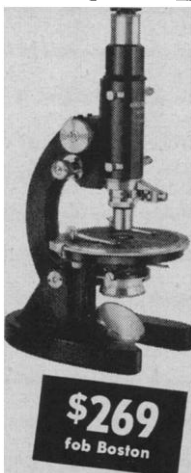
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NEWS AND COMMENT

(Continued from page 373)

other agencies which typically charge relatively small amounts for their public documents. The wisdom of making an exception of a single agency on behalf of a single company seems debatable.

The proposal has implications for air safety, too, and raises a question of the relation of safety to competition in the field of navigation aids. According to Melvin Tyrrell, chief of FAA's Flight Information Division, FAA is not alarmed by the price rise proposed now, since it is a fairly small one, but introducing the principle of competitive prices raises the possibility that cost may interfere with availability of the charts sometime in the future. This would worry the FAA a good deal.

Underlying the pricing problem is a more basic one that, so far, no one has openly tackled—whether there should be two sets of charts in use at all. Admiral Karo testified last year that "the man in the cockpit of a plane and the man in the control tower should be speaking from the same sort of compilation so that there is no chance of error," but his remarks got little notice. The FAA, which seems to want to avoid appearing hostile to private enterprise, maintains that the charts are so similar that, despite variations in format, their simultaneous use is no cause for alarm. Nonetheless, the FAA would not be averse to a unified system or even, in the long run, to providing charts free of cost to all users of the airways.

The idea of competition, however, dies hard. The Carroll Committee, while paying its respects to federal responsibilities, given the inadequacies of existing commercial capacity, paid greater respects to the benefits of competition. "It is preferable that there be two or more sources of chart supply in order that all the usual benefits of competition may be received," the report says. "Ideally, this competition would involve two or more private producers, but it can be between a private producer and the Government."

Thus, in its heart, the committee really favored more competition rather than less, and only as a second best, supported government participation at all. From the point of view of safety, however, and not of ideology, it seems questionable that the goal should be increasing diversity rather than increasing uniformity. Although the FAA also

feels that competition between the government and Jeppesen has been useful, so far the benefits of competition do not seem to have been weighed against the possible hazards of non-uniform flight information.

Coast and Geodetic Survey is not happy about the turn of events, but it is not a very powerful agency and will go along gracefully if the Senate passes Allott's bill. Agency officials would still prefer to go in the direction of greater standardization.

Finally it should be pointed out that this case is not an isolated one. Smaller companies in many fields of mapping have fallen on difficult times and raised a cry of "government competition" in several places recently. The Geological Survey last year only narrowly rescued its request for aircraft for aerial survey operations over the objections of some small surveying companies who thought the work should be contracted to them; a USGS program of mapping in Kentucky has been much attacked by private companies, who claim, though the Survey disagrees, that they could do the job as well or better. These companies are now trying to figure out ways to improve their services and reverse the trend of government's in-house mapping activities. These efforts, however, have fewer implications for public safety than Jeppesen's campaign on aeronautical charts.—ELINOR LANGER

Announcements

The Direct Relief Foundation is soliciting **surgical, medical, and hospital supplies** for use in underdeveloped areas of the free world. The supplies are sent to doctors, hospitals, or clinics overseas and must be used free of charge for indigent patients. Doctors are recommended by the American Medical Association to receive these materials. (Direct Relief Foundation, Warehouse MR, 700-702 N. Milpas St., Santa Barbara, Calif.)

The National Science Foundation invites letters from U.S. scientists interested in participating in the **U.S.-Japan Cooperative Science Programs**. Emphasis is on joint activity in scientific investigation of the Pacific Ocean, and animal and plant geography and ecology of the Pacific area. Scientists who are working with the Japanese in these areas, or who are interested in doing so, are asked to write to NSF, giving a

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brief description of their research projects, ways in which they are cooperating with Japan, and, if possible, the names of Japanese scientists who would be involved.

A study of Hawaiian volcanoes, scheduled to begin this spring, is the first project to be undertaken in the cooperative program. The U.S. portion of the research is financed by a NSF grant to the U.S. Geological Survey.

Further information on the program is available from the U.S.-Japan Cooperative Science Programs, NSF, Washington 25.

Meetings Notes

Papers are invited on scientific and engineering aspects of **electronics** for presentation at the National Electronics Conference, 28-30 October, in Chicago. Authors must submit four copies of a 150-word abstract, and two copies of either the completed paper or a 700-word summary. Papers are eligible for two \$500 awards for the best paper, and an award of merit, amounting to \$750. Deadline: *15 May*. (H. W. Faris, Electrical Engineering Dept., Univ. of Michigan, Ann Arbor)

Neural-physiological mechanisms underlying **motivated behavior** is the subject for a symposium to be held at Wayne State University, 17-18 May. Reservations for attendance are available. (D. Asdourian, Dept. of Psychology, Wayne State University, Detroit 2, Mich.)

Papers are invited for two **American Heart Association** meetings, scheduled for October. The Council on Arteriosclerosis will meet 23-24 October, in Los Angeles, Calif.; sessions are open to nonmembers. This conference will be followed 25-29 October by the annual meeting and scientific sessions of AHA, also in Los Angeles, for which papers must be based on original studies in, or related to, cardiovascular diseases. Deadline for receipt of abstracts for both conferences: *15 May*. (R. E. Hurley, AHA, 44 E. 23rd St., New York 10)

The tenth conference on **religion in an age of science** is scheduled for 27 July to 3 August, at Star Island, Portsmouth, N.H. The main topic for discussion will be the condition of man in society, as seen by scientists and theologians. The conference fee is \$20. (I.R.A.S., 280 Newton St., Brookline 46, Mass.)

The Engineering Foundation **research conferences** will be held 5-30 August in Andover, N.H. Topics covered will include technology and the civilian economy, comminution, engineering in medicine, and urban transportation research. Attendance is limited to 100 persons, and is by invitation or acceptance of application. The conferences are patterned after and assisted by the Gordon Research Conferences. (H. K. Work, Engineering Foundation, 345 E. 47 St., New York 17)

Scientists in the News

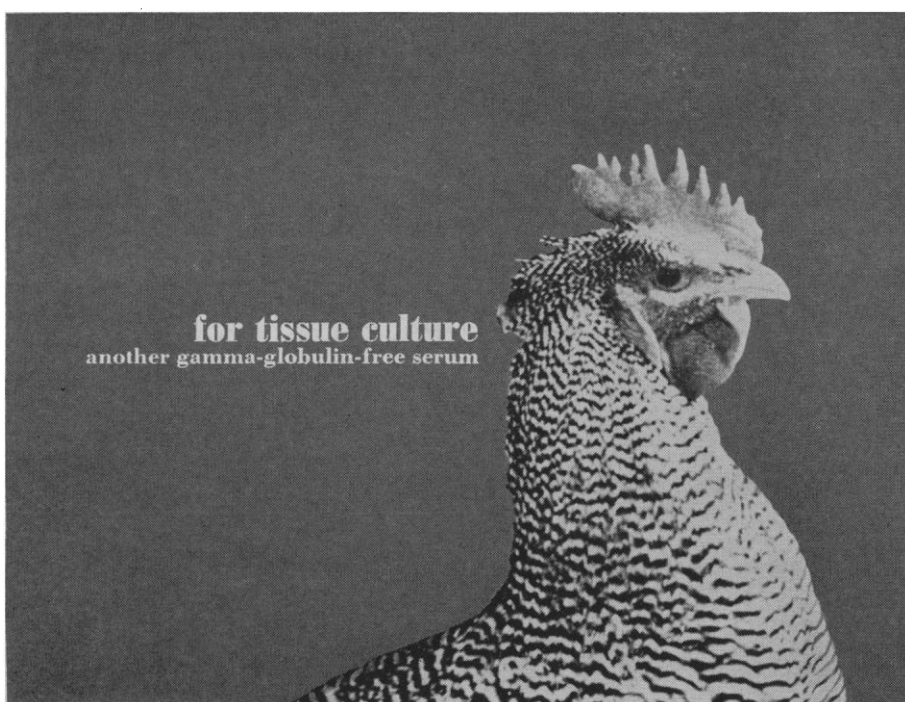
The following scientists were elected this week to membership in the National Academy of Sciences:

Christian B. Anfinsen, professor of biological chemistry, Harvard Medical School.

Theodore H. Bullock, professor of zoology, University of California, Los Angeles.

Robert E. Connick, professor of chemistry, University of California, Berkeley.

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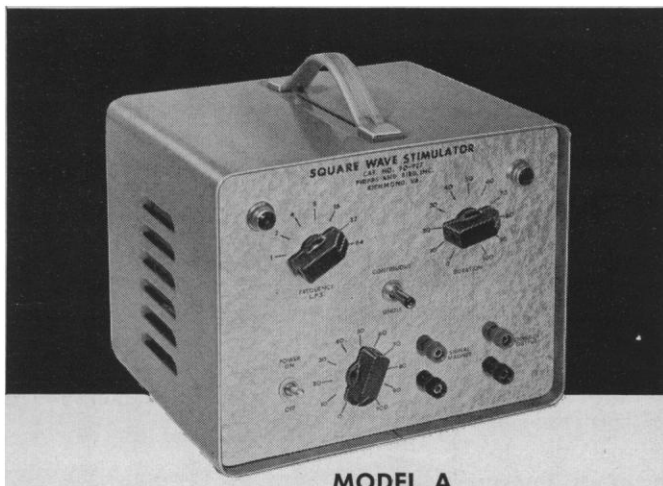


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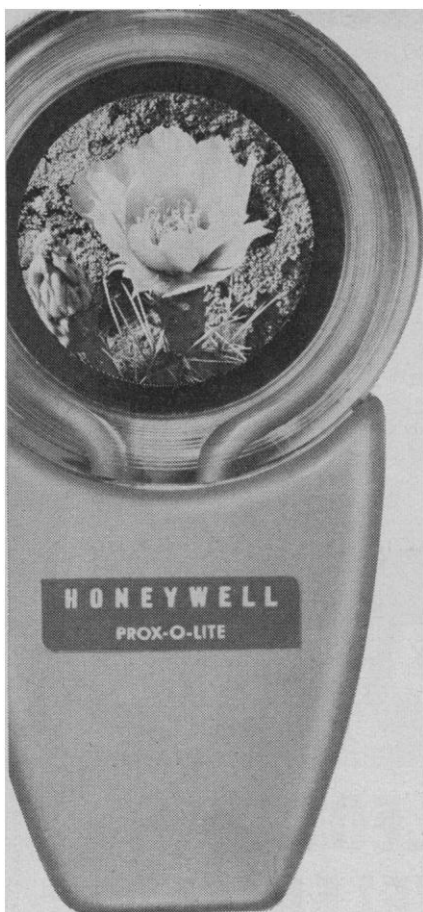
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Sherwood L. Washburn, professor and chairman, department of anthropology, University of California, Berkeley.

Gian-Carlo Wick, senior scientist, Brookhaven National Laboratory.

Raymond L. Wilder, research professor of mathematics, University of Michigan.

Abel Wolman, professor of sanitary engineering, Johns Hopkins University.

Hans A. Bethe, physics professor at Cornell University, has received the Rumford Premium from the American Academy of Arts and Sciences. He was cited for his "contributions to the theory of energy production in stars." The award consists of two medals and a \$5000 honorarium.

Newly elected president of the National Wildlife Federation is **Ross L. Leffler**, a regional director of the federation.

George M. Hunt, retired director of the U.S. Forest Products Laboratory, USDA, Madison, Wis., has gone to Mérida, Venezuela to help establish a forest products research laboratory there.

Ven Te Chow, professor of hydraulic engineering at the University of Illinois, has received the 1962 research prize of the American Society of Civil Engineers. He was cited for an "outstanding contribution to the knowledge of flood control and farm drainage."

Robert A. Aldrich, former chairman of the pediatrics department in the University of Washington's medical school, has been named director of the new National Institute of Child Health and Human Development at NIH.

Richard C. Greulich, associate professor of anatomy at the University of California, Los Angeles, has been named recipient of the International Association for Dental Research award for basic research. The prize carries a \$1000 honorarium.