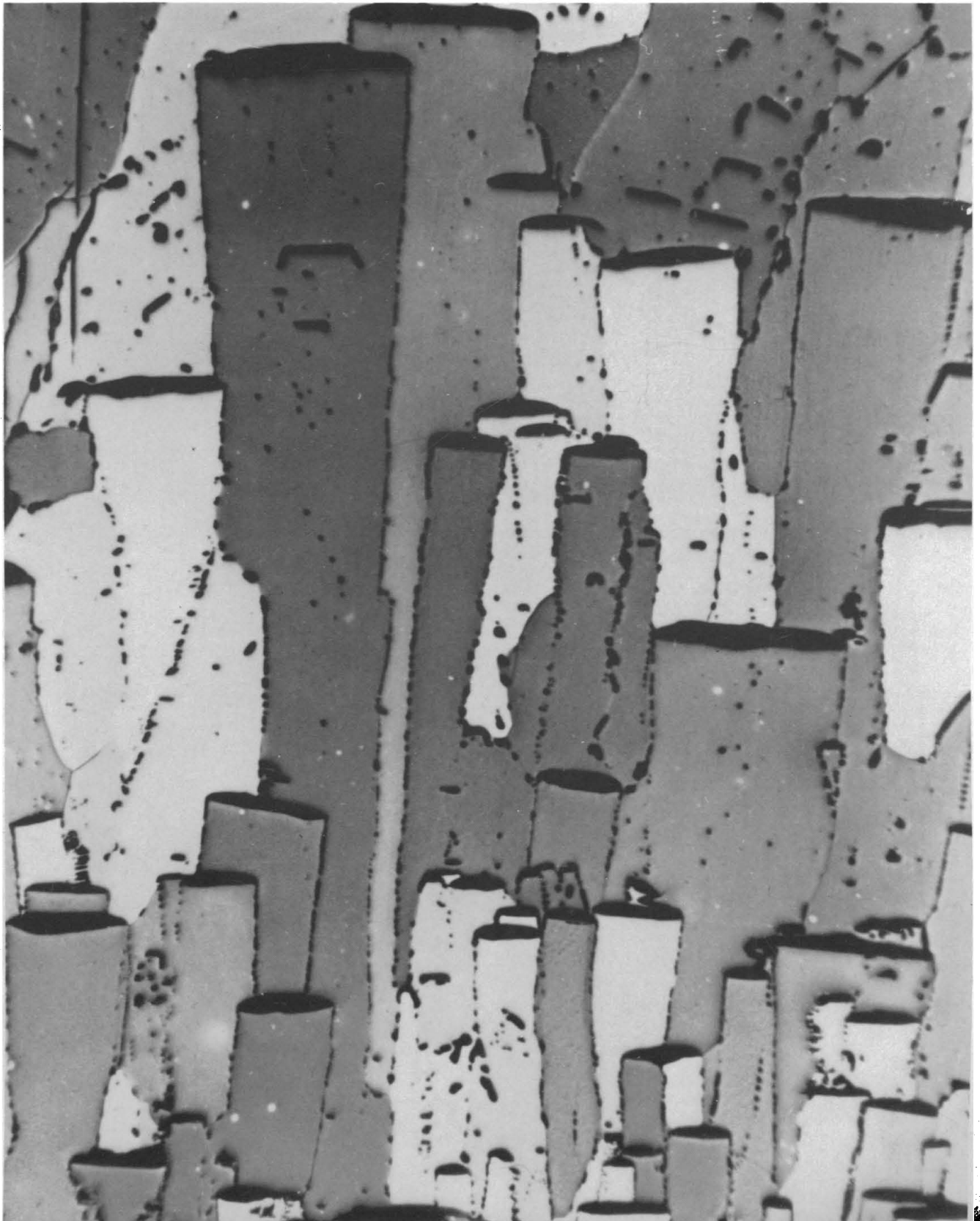


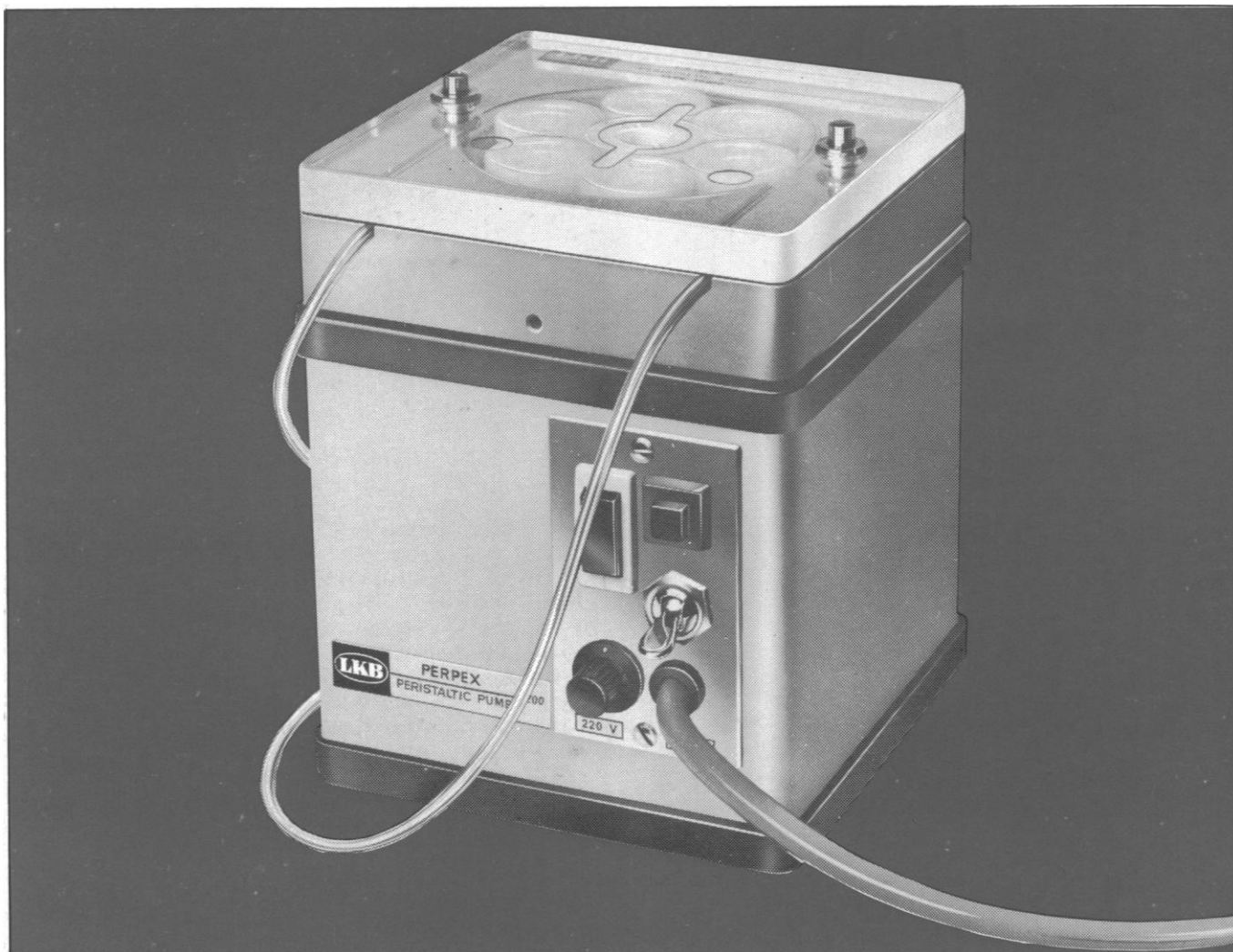
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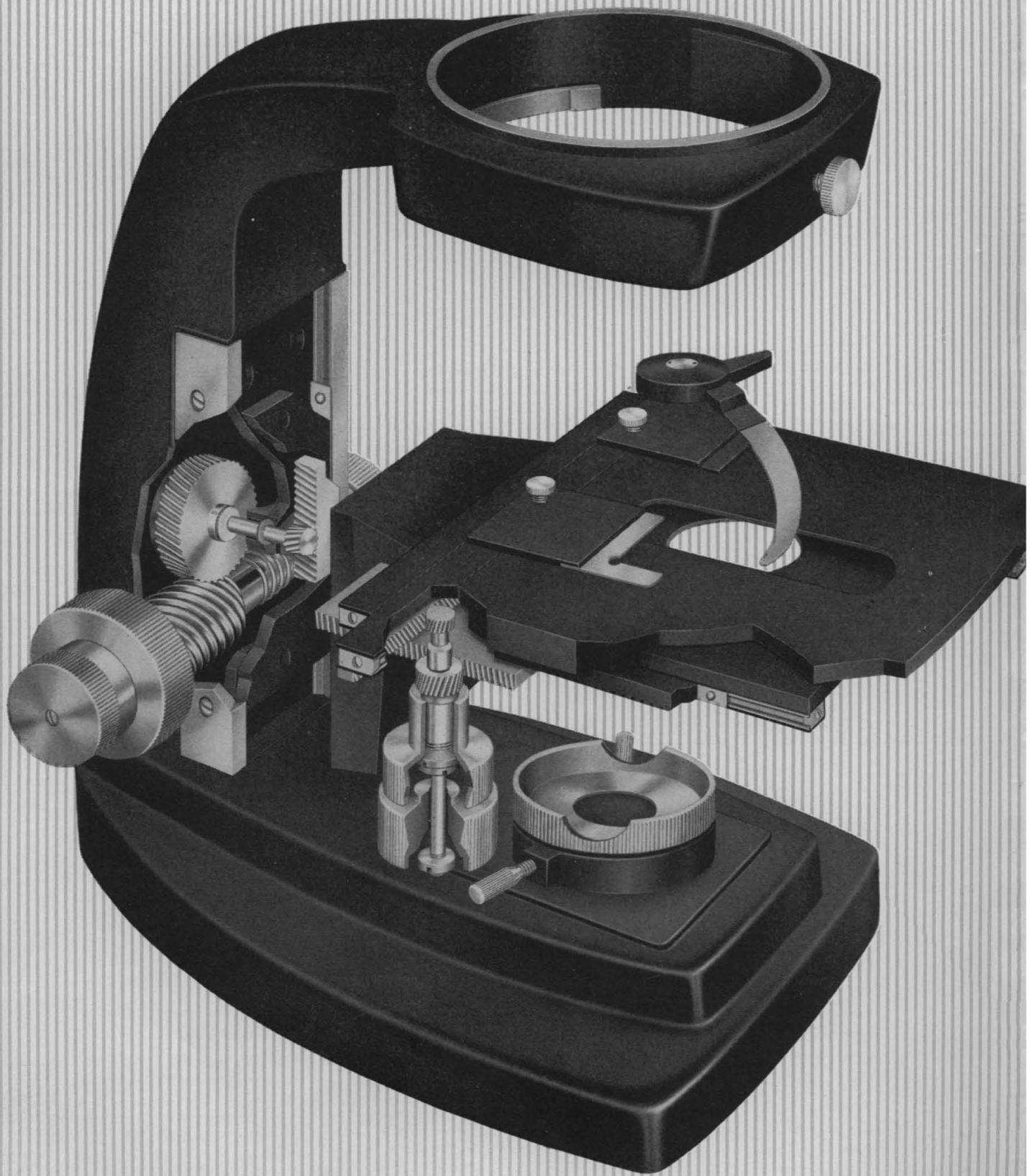
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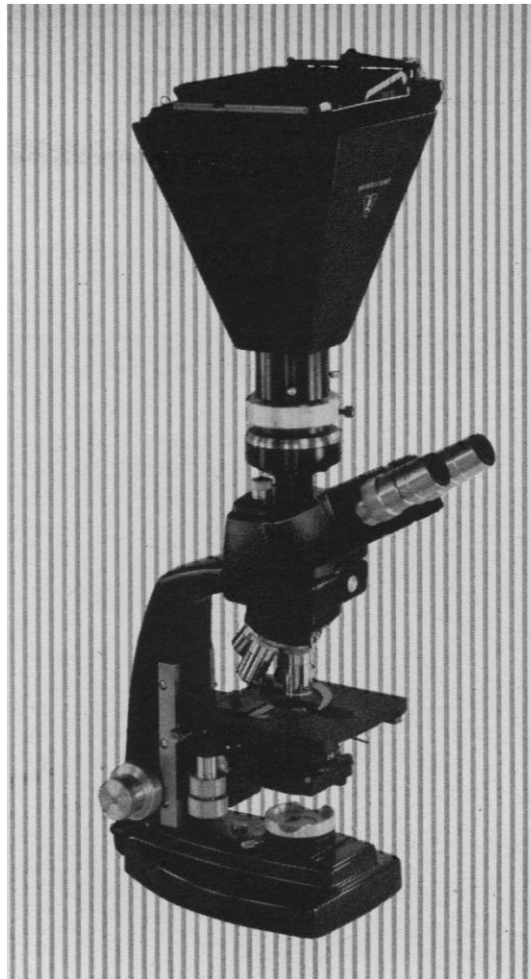
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Microstructure of uranium dioxide ceramic nuclear fuel produced in a laboratory simulation of operating conditions with a temperature gradient of about 8000°C per inch. Lenticular voids migrate up the temperature gradient to the top and "drag" grains behind them (about $\times 850$). See page 1205. [Dennis M. Rooney, Nucleonics Laboratory, General Electric Company]

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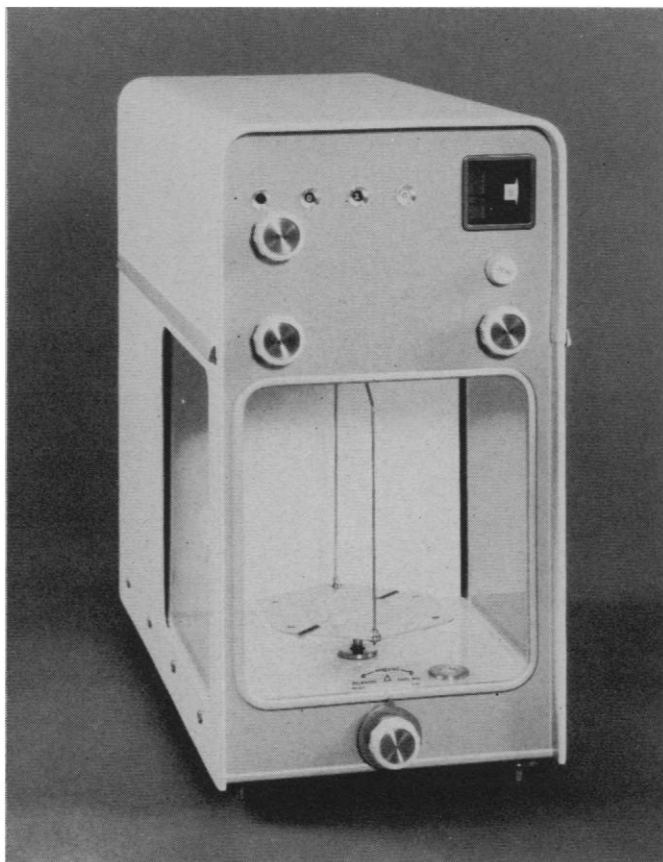
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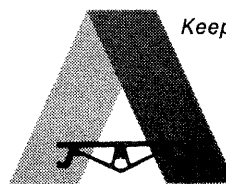


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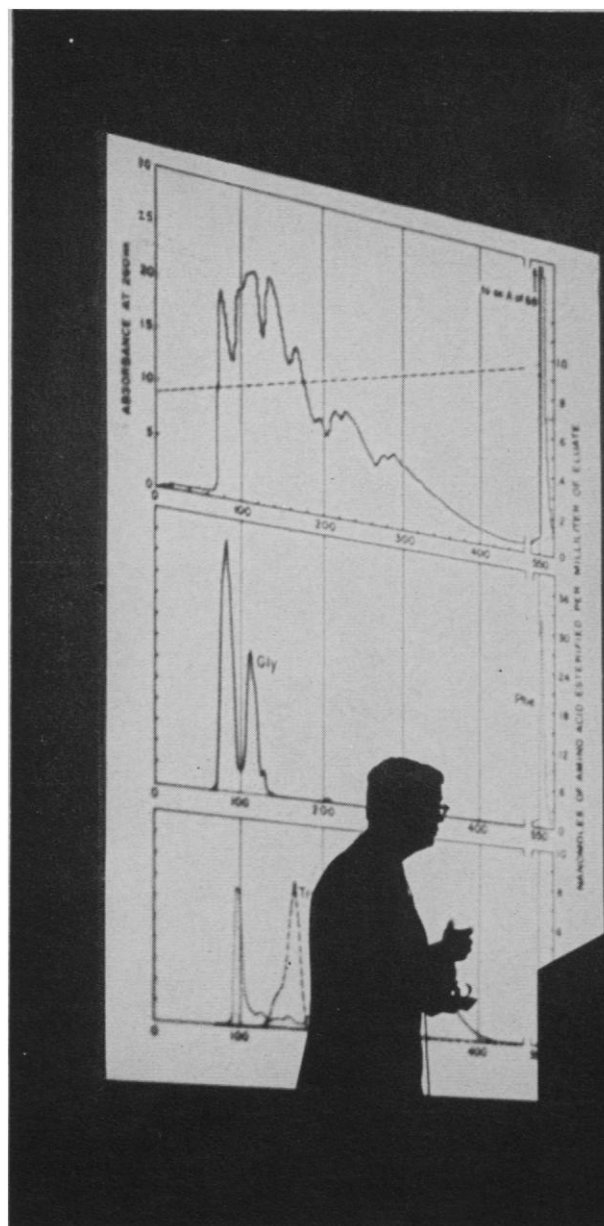
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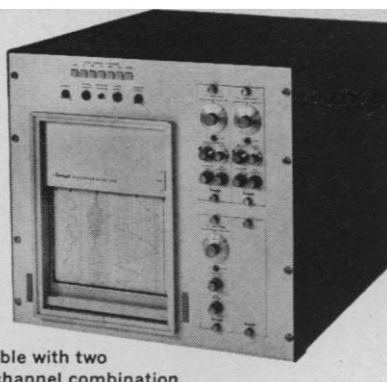
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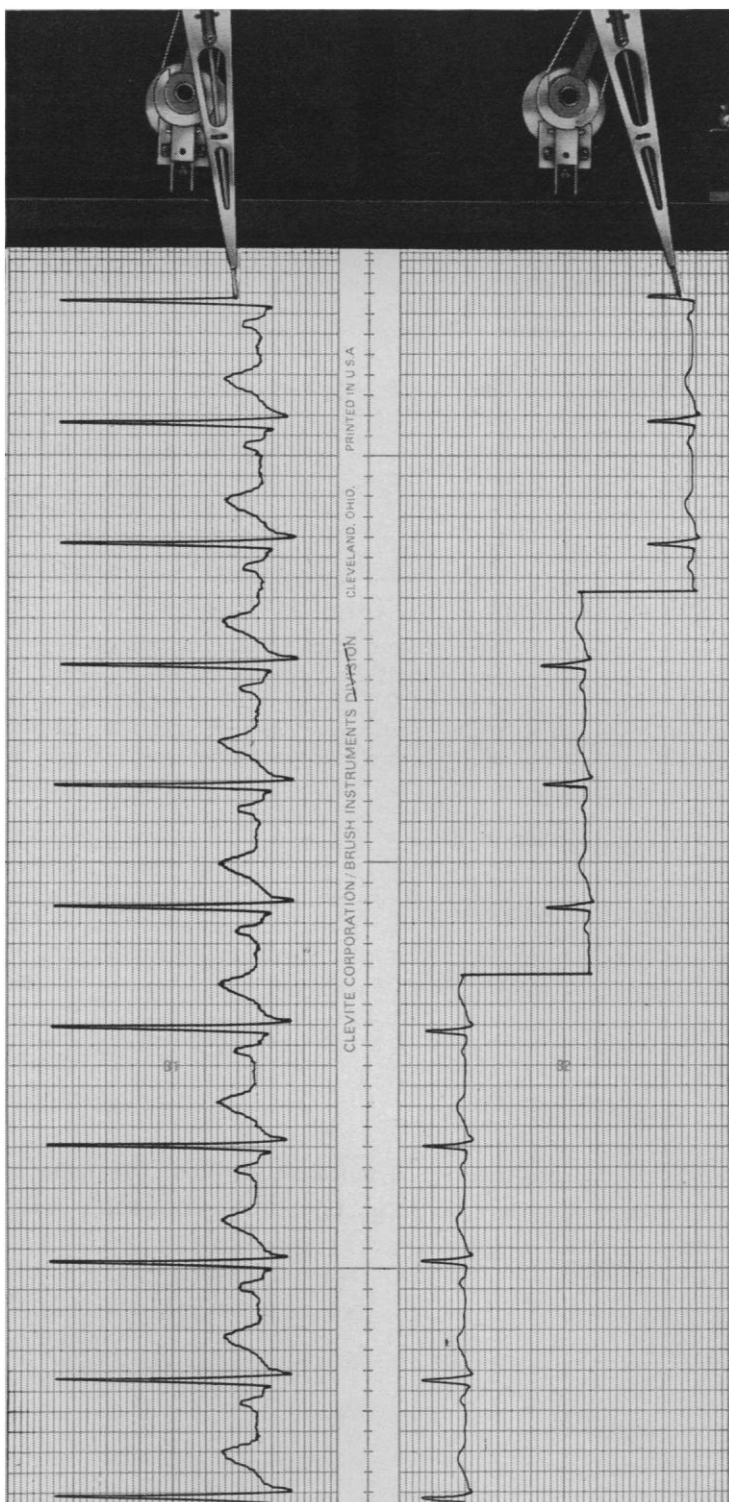
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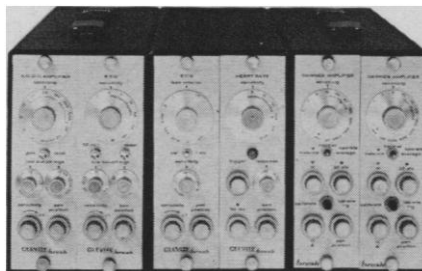
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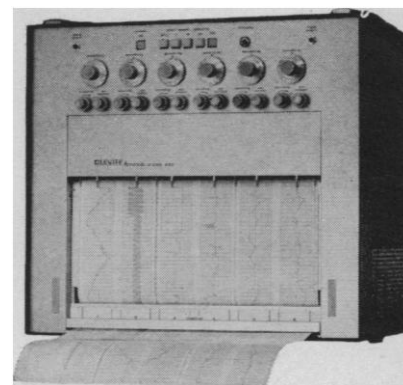
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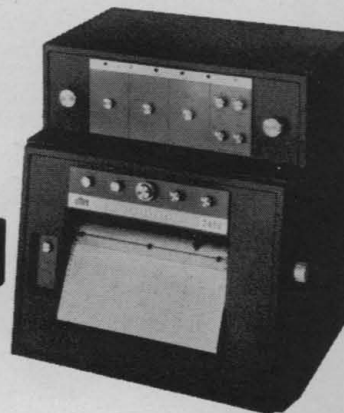
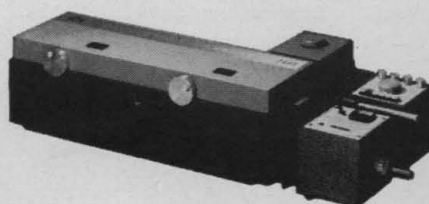
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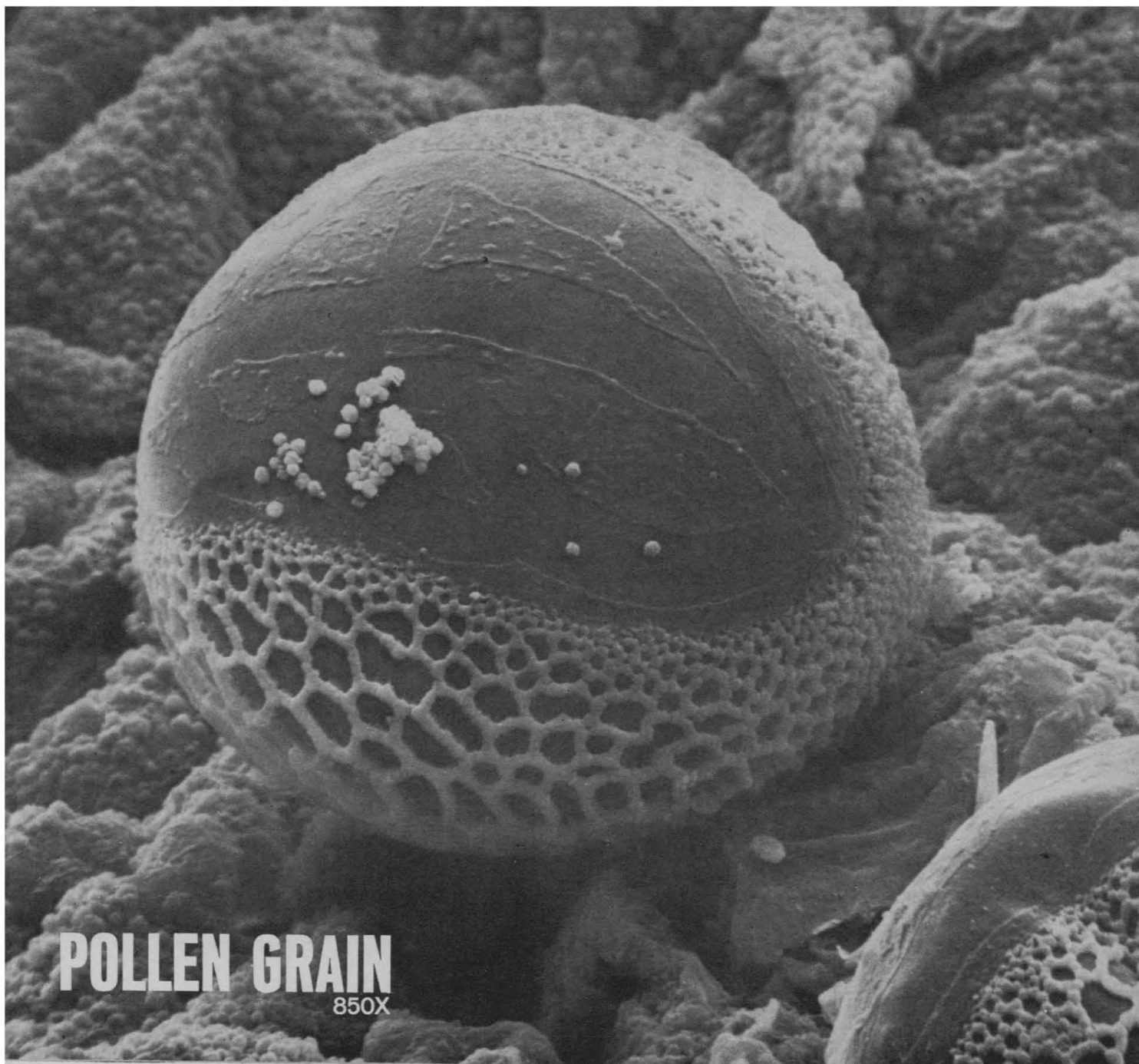
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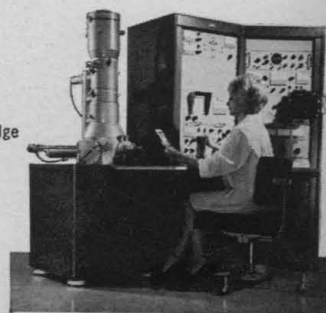
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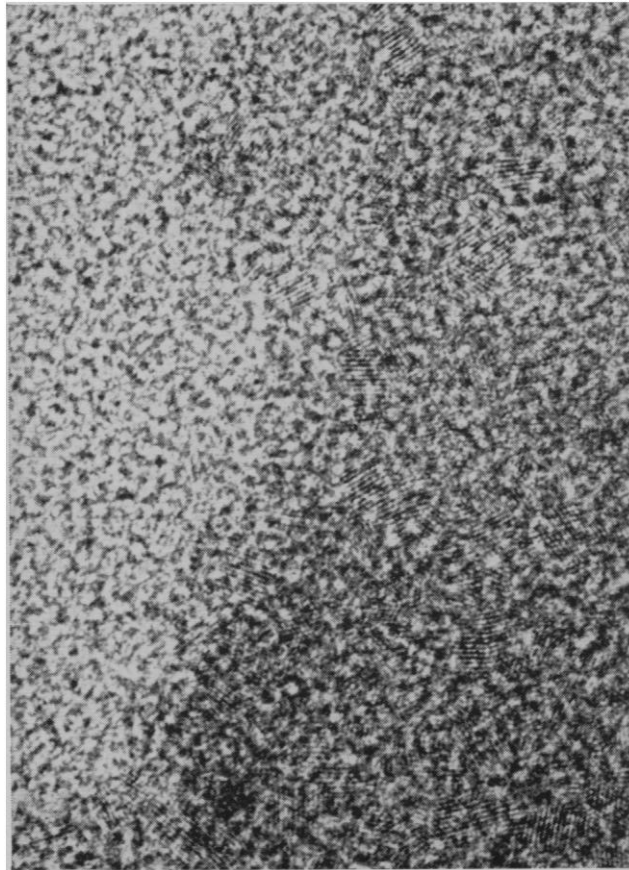
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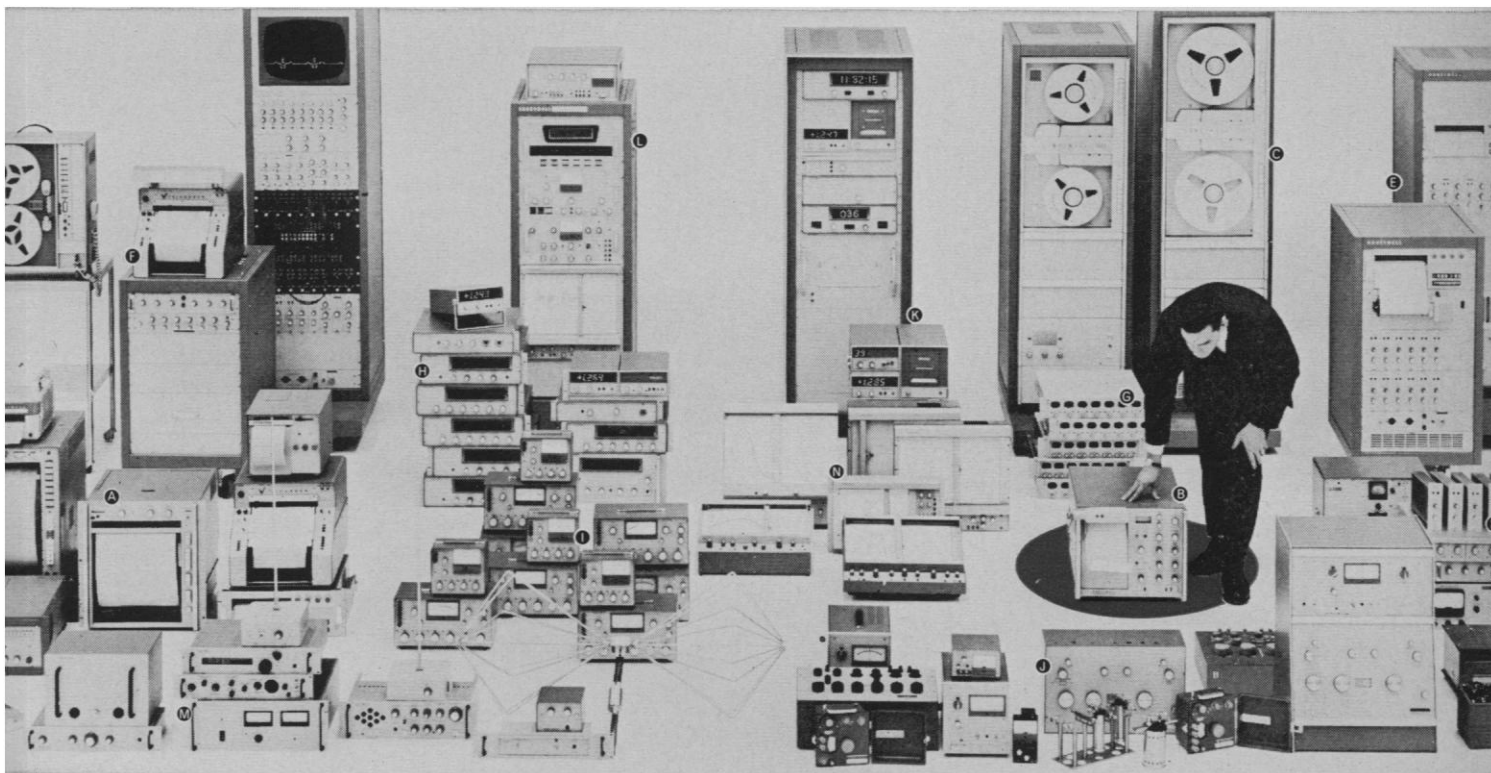
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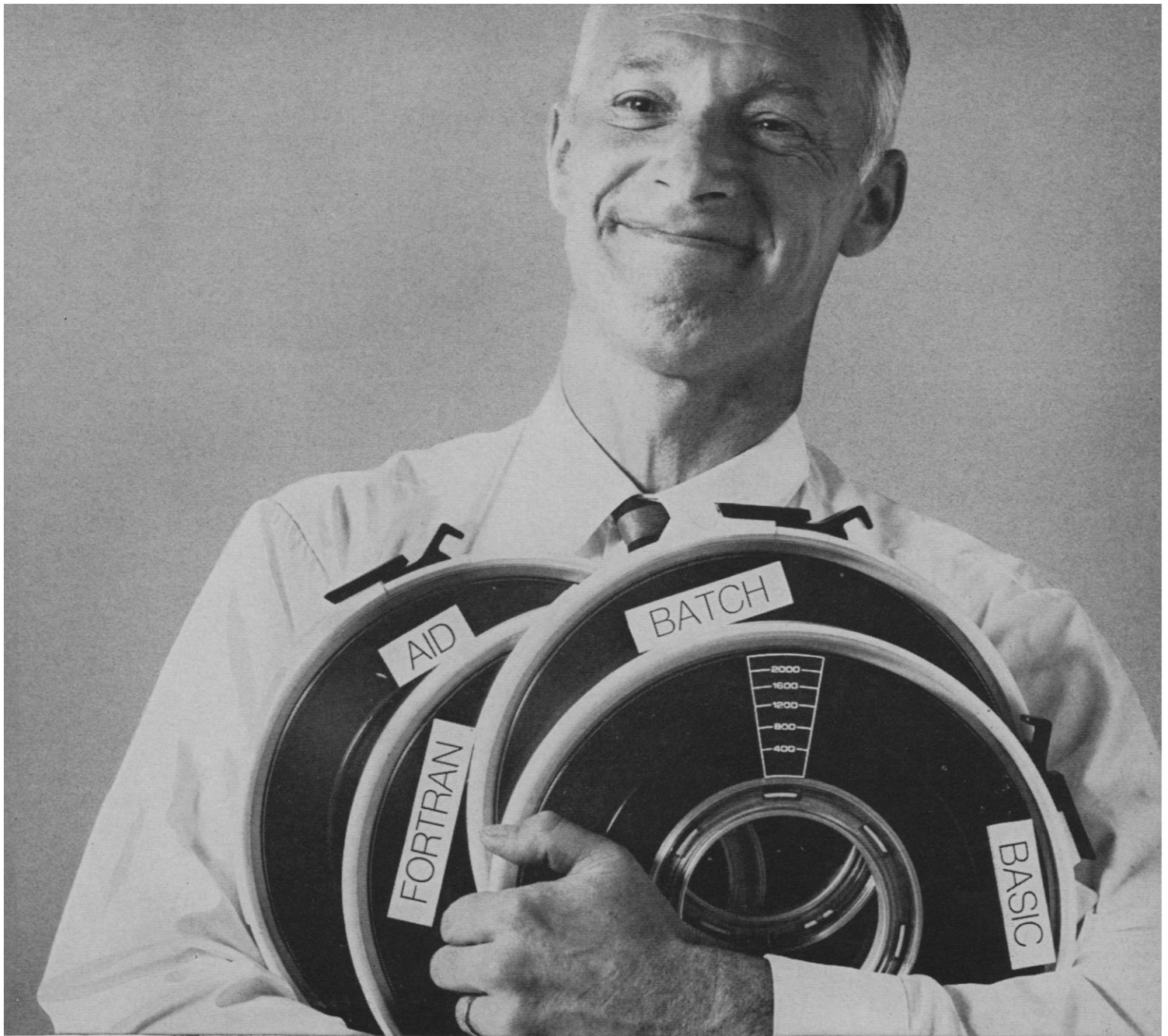
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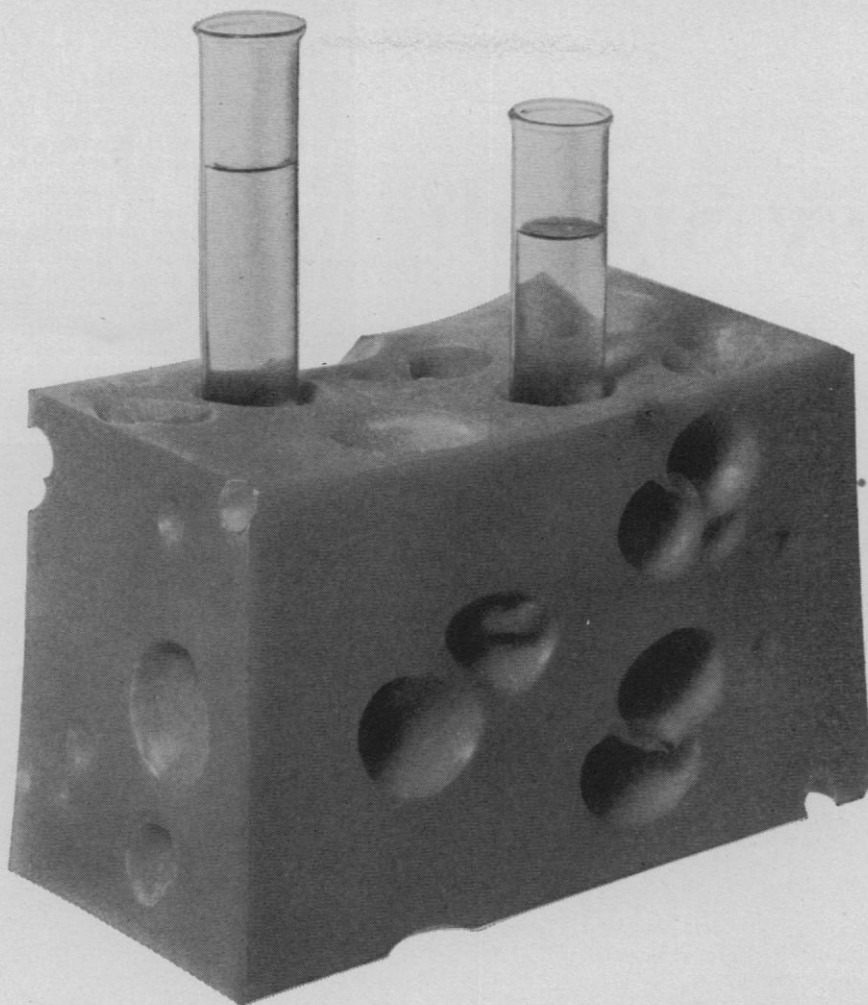
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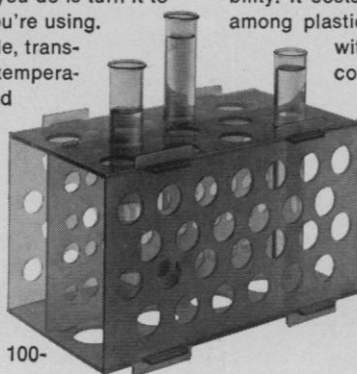
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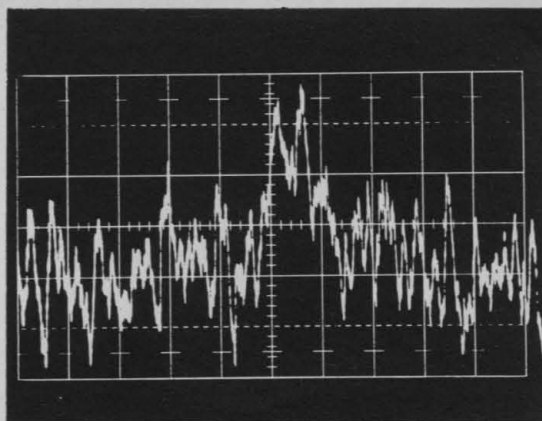
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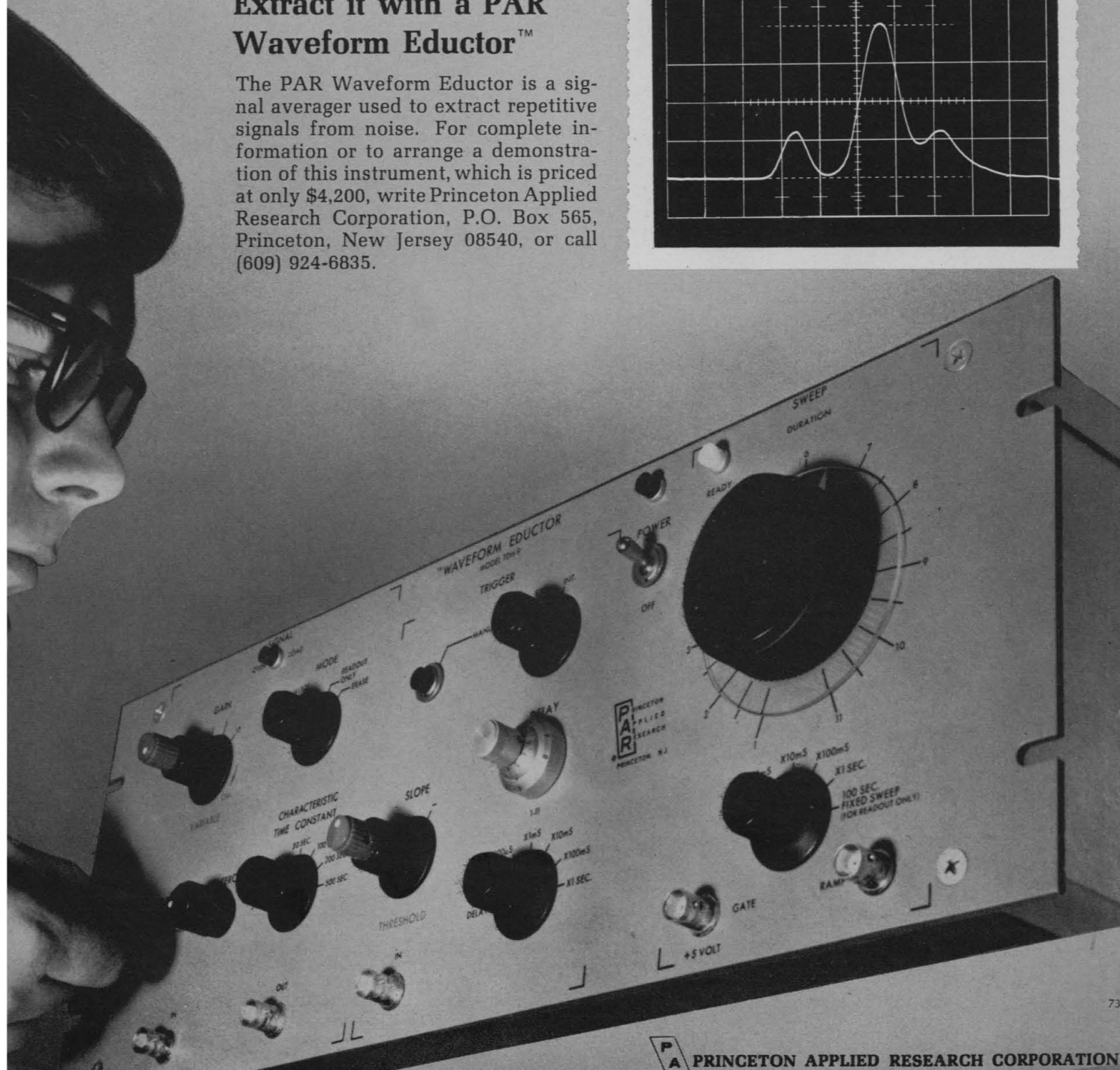
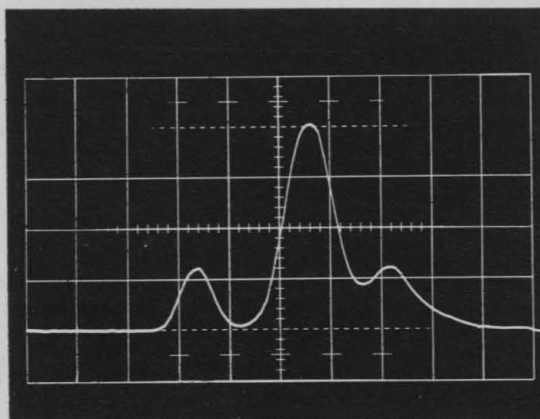
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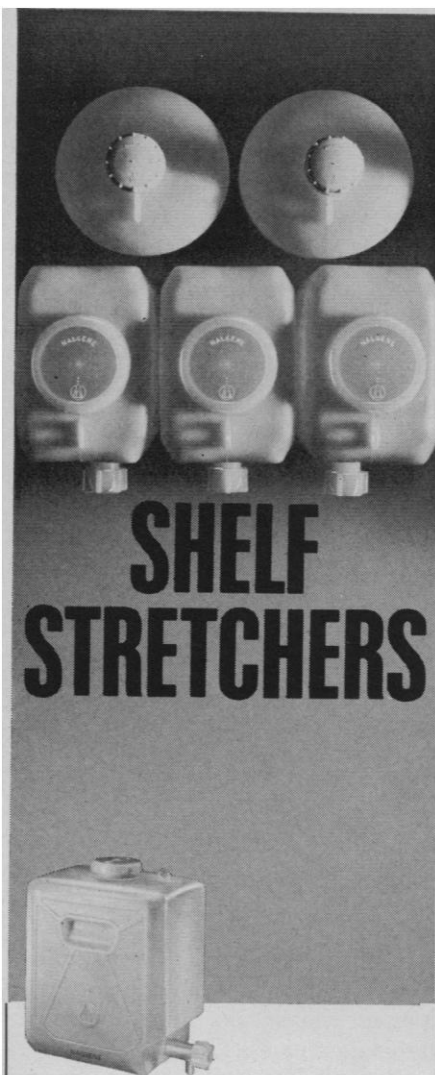
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The Fellows and all other social scientists should do some soul-searching on these points. I have no ready answers. I am afraid, however, that this proposed study is Orwellian rather than scientific, and that its findings should be subjected to careful study on both scientific and moral grounds.

E. N. ANDERSON, JR.

*Department of Anthropology,
University of California, Riverside*

The following "ancients" thought they had found a solution to student unrest and protests. When the studies by our behavioral scientists are completed, will we moderns do better?

Memorandum of 5-6 June 1819 from Gentz to Adam Muller (copy to Metternich):

It has long been, and still is, my belief—and, as I observe with delight, it is yours also—that the precedence of the positive sciences over the philosophical and critical sciences must be emphatically vindicated. Here lies one of the best means of re-establishing the predominance of authority over spurious freedom; for anyone can philosophize and criticize (and mysticize and poetize) as he pleases, but positive sciences have to be *learned*. Only when young people resolve to learn once more, in the true sense, will they again be capable of intellectual obedience, without which academic life is merely a prelude of the wild anarchy in which the entire political life of our day is lost (1).

GILBERT B. DEVEY

*National Academy of Engineering,
2101 Constitution Avenue, NW,
Washington, D.C. 20418*

Reference

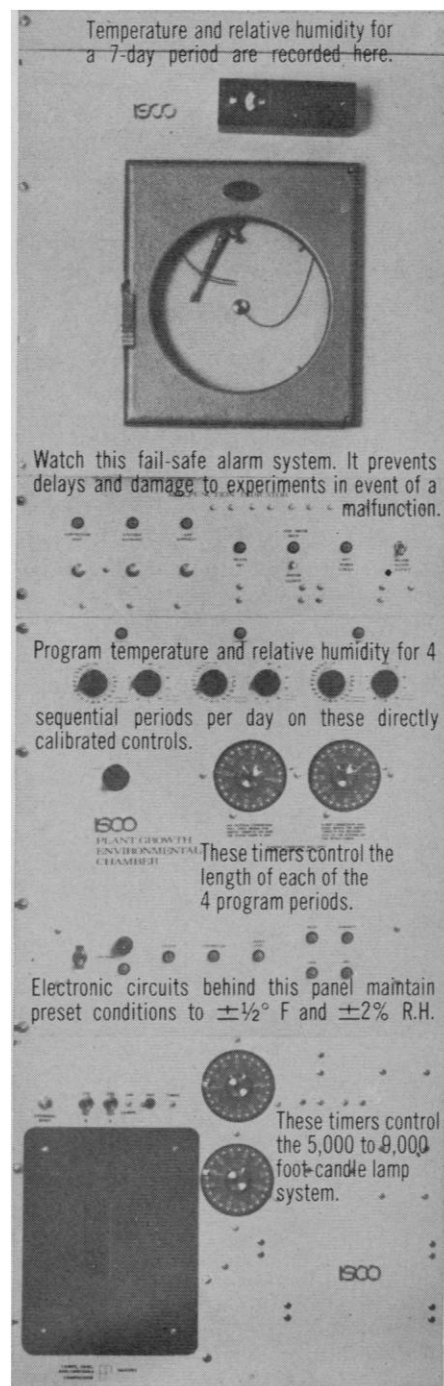
1. I. Barea, *Vienna* (Knopf, New York, 1966), p. 132.

Unvarying Climate at Lincoln

Nelson's report of Admiral Rickover's testimony to the Senate Foreign Relations Committee earlier this year includes the Admiral's discussion of DoD's Project Themis. He is reported to have said that "Project Lincoln at M.I.T." has seminars that "are held in pleasant places where the climate and the living conditions are good" ("Research probe: Rickover broadsides 'military-scientific complex,'" 2 Aug., p. 446).

Admiral Rickover's statement is incorrect. M.I.T. and Lincoln Laboratory do not receive any funds from Project Themis. Lincoln Laboratory conducts whatever staff meetings and seminars it

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has on the laboratory premises which are located in government-owned buildings in Lexington, Massachusetts, adjacent to Hanscom Air Force Base. The implication that Lincoln Laboratory runs seminars or meetings for its permanent staff or for visiting scientists at resort or vacation areas has no basis in fact.

J. P. RUINA

Massachusetts Institute of Technology,
Cambridge 02139

Contaminating Hamster Cells

The *Bulletin* of the Tissue Culture Association (September, 1967) lists several "Catastrophies in the tissue culture laboratory." I should like to call attention to our mistaken observation of "enhanced growth of human embryonic cells infected with adenovirus 12" (1).

The inadvertent presence of some contaminating hamster cells in cultures from the same human embryo received months apart was responsible ultimately for this "enhanced growth." A similar culture purchased from the same source but derived from a different embryo did not develop accelerated growth. It became clear that a few contaminating cells were transformed in the presence of virus and eventually replaced the human cell population as the latter was less resistant to killing. Identification of the hamster cells was by immunologic and karyotypic studies and by animal inoculation.

In order to test for the possibility that some of the human cells might have been similarly affected, a culture taken soon after infection was passaged under conditions designed to suppress or to eliminate hamster cells immunologically. At least some cells produced virus continuously and many contained T antigen. Growth was very slow and the effort was discontinued after 2 years.

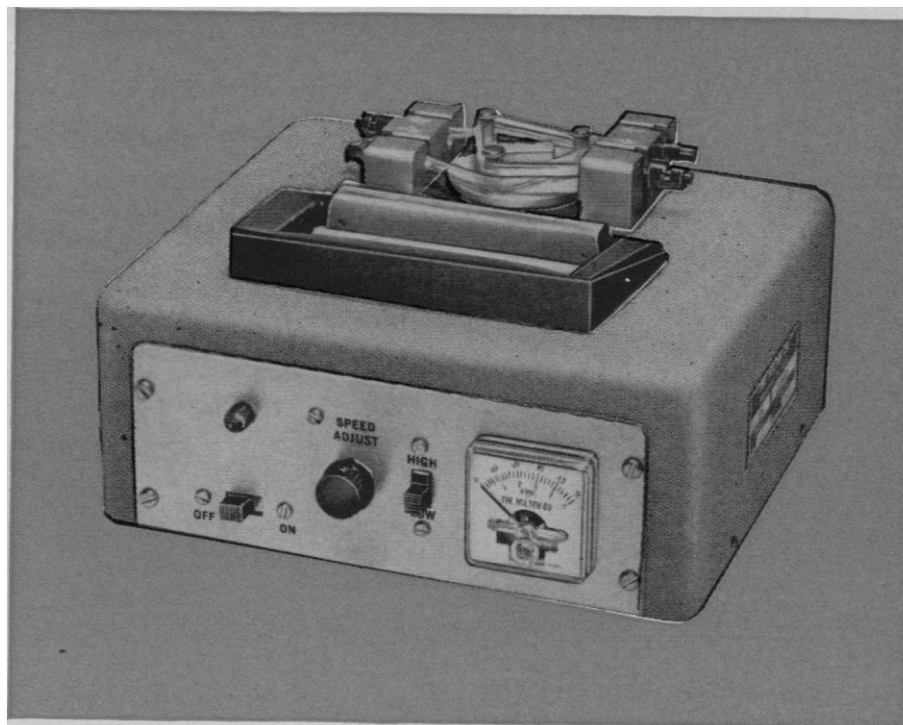
Although the source of the contaminating hamster cells was not rigorously established, attention is called again to the hazard of taking for granted the expected purity of species in cell cultures of this description.

GUSTAVE FREEMAN

Department of Medical Sciences,
Stanford Research Institute,
Menlo Park, California 94025

Reference

1. I. V. Sultanian and G. Freeman, *Science* **154**, 665 (1966).



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Are Grades Necessary?

College grades and grading systems have become targets of criticism for several reasons. Before the rules concerning student deferment were changed earlier this year, some students objected to the release of grades to draft boards. Grades have symbolized objective examinations, machine records, and other efficient devices and practices that critics have sometimes indicted as evidence of the dehumanization and regimentation of higher education. And students have objected to having permanent grade records given by instructors from whom they feel alienated for courses they consider irrelevant.

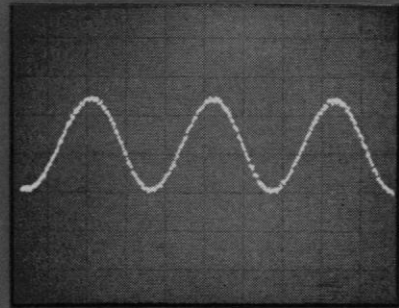
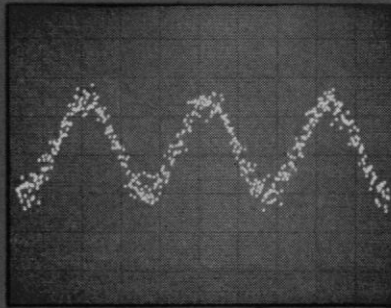
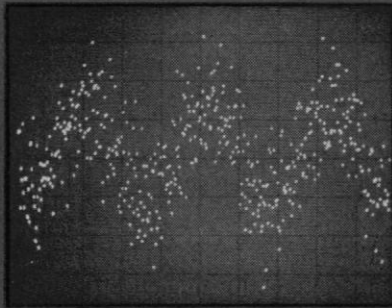
There is irony in this situation. Students sometimes complain of the impersonality of undergraduate instruction, and often justly so. Yet in the impersonality of language laboratories, computer-assisted instruction, and other "teaching stations" that provide the student with a range of instructional material and with rapid feedback to his responses is to be found the best hope of achieving the maximum individualization of instruction—an educational objective that would permit students to decide what and when they want to learn and would permit each to progress at his own self-determined rate. Under such conditions—in theory, although never completely in practice—each student (given the time he needed) could master each course he took. What then would course grades mean?

There is a further irony, for many instructors are also skeptical of the grading system. That grading standards vary widely among institutions, departments, and instructors is generally known; a student's grade in a particular course is at best an imperfect measure of what he knows of the course content. When college grades are used to predict success in later life, the correlations usually turn out to be too close to zero to be of much practical use. The scores received by graduating students on tests of the Graduate Record Examination, whether in the humanities, the natural sciences, or the social sciences, appear to be nearly independent of available measures of university or college quality or excellence, after account is taken of differences among students at the time of college admission (Alexander Astin, *Science*, 16 August 1968).

In short, a student's accomplishment in college and later is primarily determined by his own ability, knowledge, and motivation, and at best only slightly by the characteristics of his teachers and his college. This state of affairs is no excuse for abandoning efforts to improve teaching and educational facilities. But it does mean that instructors can be more relaxed about the necessity of assigning grades; that students cannot escape responsibility by explaining their own deficiencies in terms of instructor or college inadequacies; and that students can therefore be given substantial responsibility for deciding whether they are to be graded.

The practice of allowing students to take some courses without credit or without grades is spreading. The practice is not one to be made universal and mandatory, for grades provide some students with standards for self-appraisal and for motivation, and they provide the institution with comparative information concerning students. But educational effectiveness and the ability to make institutional decisions concerning the earning of college degrees do not require that grades be given to all students in all courses. A student has wide latitude in deciding which courses to take, how assiduously to apply himself, and how long to remain in a course or in college. Why should he not also be permitted to decide whether he is to be graded, and even whether he is to receive a certificate of enrollment for a specified period of time instead of a grade record and a degree?—DAEL WOLFLE

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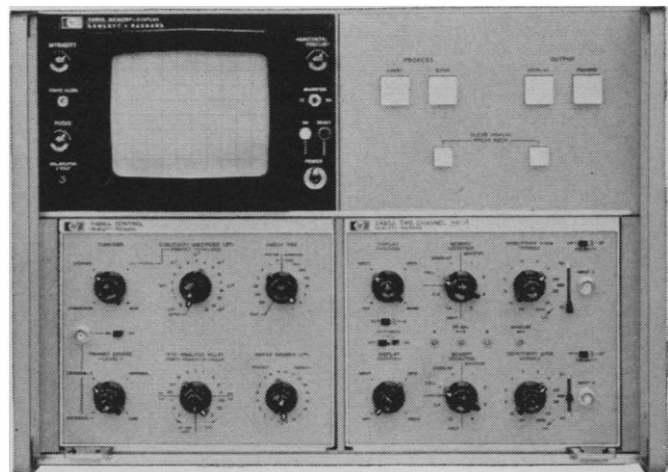
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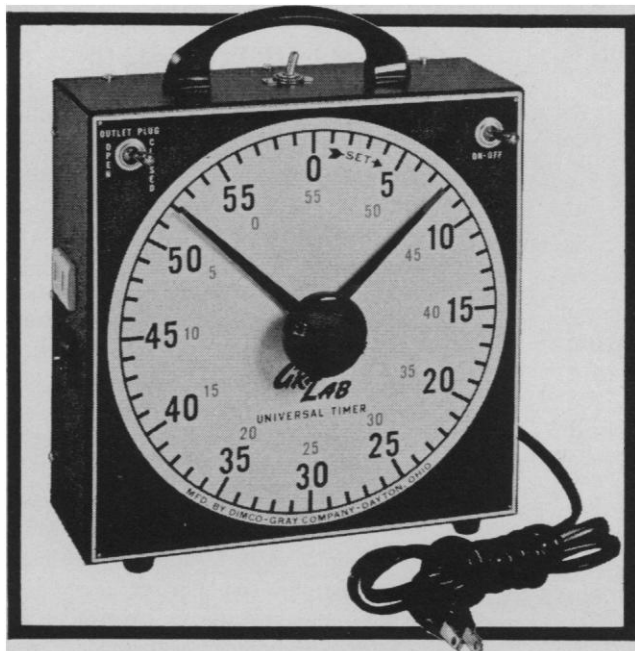
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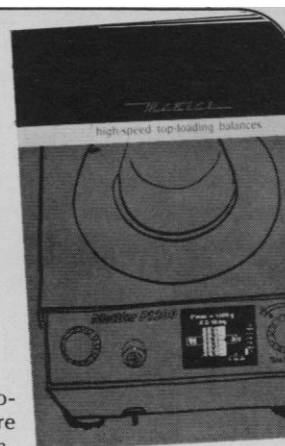
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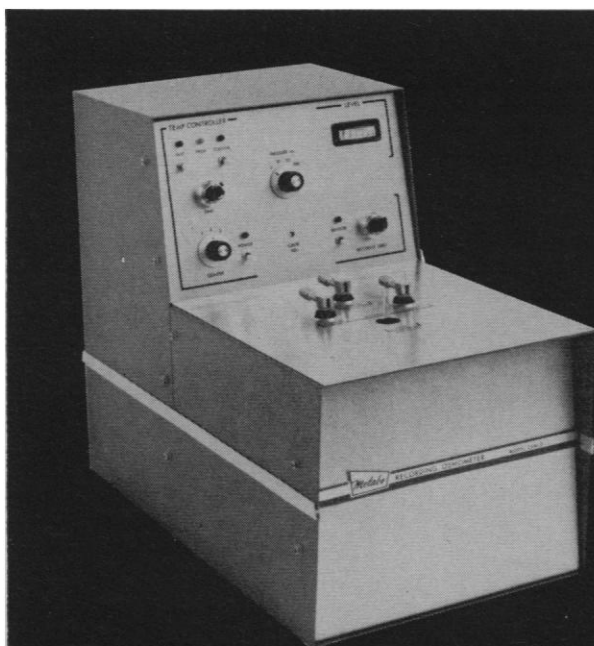
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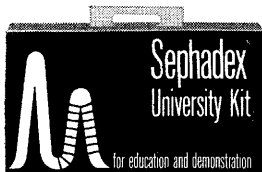
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A. M. Burt (Nashville). Plant tissue was found more difficult to prepare than animal tissue. The prevention of virus redistribution in plant cells during the preparation for autoradiography was discussed by D. E. Schlegel (Berkeley) and W. G. Langenberg (Lincoln). The superiority of section freeze-substitution in the preservation of certain enzyme reactions compared to classical fixation and embedding techniques was demonstrated by J. P. Chang (Houston). Although this method has been used for the tissue preparation in autoradiography, the application of an organic solvent, albeit at low temperature, may obviate its applicability in the autoradiography of diffusible compounds. The implications of freezing and thawing for maintaining tissue structure and viability were discussed in two papers by H. T. Meryman (Bethesda) and B. F. Trump (Durham). It was emphasized that ice crystal disruption and cryosmosis probably cannot be eliminated but may be minimized by rapid freezing and maintenance of low or ultralow temperatures during tissue preparation. Preliminary data on the utilization of low-temperature tissue cutting for electron-microscopic autoradiography were shown by T. C. Appleton (London) with a cryostat microtome and by A. K. Christensen (Stanford) with a freezing microtome. The subcellular morphology in the presented photomicrograms appeared different from those obtained by classical fixation and embedding procedures. Considerable improvement of technique will be needed, however, before judgments on authenticity can be made and classical pictures are challenged. Electron-microscope autoradiography of diffusible compounds will have to await the perfection of low-temperature tissue preparation and, as S. Ullberg (Stockholm) pointed out, the present situation is such that it is still not realizable but promising, as he stated 4 years ago at the conference on Isotopes in Pharmacology held at the University of Chicago, Center for Continuing Education, June 1964. That such hope is justified was eloquently demonstrated by M. M. Sallpeter (Ithaca) who provided models for a quantitative approach to the evaluation of resolution and sensitivity based on progress made in EMAR with classical preparative techniques.

WALTER E. STUMPF

Department of Pharmacology,
University of Chicago, 947 East 58
Street, Chicago, Illinois 60637

Calendar of Events

National Meetings

October

20-21. American Assoc. of **Poison Control Centers**, 11th, Chicago, Ill. (C. A. Walton, Drug Information Center, Univ. of Kentucky Medical Center, 800 Rose St., Lexington)

20-24. American Soc. for **Information Science**, 31st., Columbus, Ohio. (J. B. Fox, Chemical Abstracts Service, Ohio State Univ., Columbus 43210)

21-23. Interscience Conf. on **Antimicrobial Agents and Chemotherapy**, 8th, New York, N.Y. (American Soc. for Microbiology, 115 Huron View Blvd., Ann Arbor, Mich. 48103)

21-23. **Solar Energy Soc.**, Palo Alto, Calif. (The Society, Arizona State Univ., Tempe 85281)

21-24. Society for **Industrial and Applied Mathematics**, Philadelphia, Pa. (B. R. Agins, Courant Inst. of Mathematical Sciences, New York Univ., 251 Mercer St., New York 10012)

21-25. American Assoc. for **Lab. Animal Science**, 19th, Las Vegas, Nev. (J. J. Garvey, Box 10, Joliet, Ill. 60434)

22-24. **Shock and Vibration Symp.**, Monterey, Calif. (W. W. Mutch, Code 6020, Shock and Vibration Information Center, Naval Research Lab., Washington, D.C. 20390)

23. American Oil **Chemists Soc.**, New York, N.Y. (C. H. Hauber, The Society, 35 E. Wacker Dr., Chicago, Ill. 60601)

23-24. **Helium Applications Symp.**, Washington, D.C. (L. A. Gutkind, 725 Liberty, Pittsburgh, Pa. 15222)

23-25. American **Ceramic Soc.**, Pasadena, Calif. (H. L. Hedrick, Southern Counties Gas Co., 720 W. 8 St., Los Angeles, Calif. 90017)

23-25. **IEEE Nuclear Science Symp.**, Montreal, Canada. (O. L. Tiffany, Bendix Corp., Aerospace Systems Div., 3300 Plymouth Rd., Ann Arbor, Mich. 48107)

24-25. Metropolitan Engineers Council on **Air Resources**, New York, N.Y. (R. A. Fox, P.O. Box 270, Mount Vernon, N.Y. 10550)

24-26. Association for **Research in Ophthalmology**, Chicago, Ill. (Dept of Ophthalmology, Univ. of Florida College of Medicine, Gainesville 32601)

24-26. Society for the **Scientific Study of Religion**, Montreal, P.Q., Canada. (S. Z. Klausner, 3800 Locust St., Philadelphia, Pa. 19104)

25-26. **Orton Soc., Inc.**, New York N.Y. (M. B. Rawson, Orton Soc., Inc., Box 153, Pomfret, Conn. 06258)

26-27. American College of **Dentists**, Miami Beach, Fla. (O. W. Brandhorst, 4236 Lindell Blvd., St. Louis, Mo. 63108)

26-27. Southern **Electroencephalographic Soc.**, Birmingham, Ala. (G. S. Ferriss, 1542 Tulane Ave., New Orleans, La. 70112)

27-30. Computer Aided **Circuit Design and Analysis**, St. Charles, Ill. (Natl. Electronics Conf., Inc., Oak Brook Executive Plaza No. 2, 1211 W. 22 St., Oak Brook, Ill. 60521)

27-1. American Acad. of **Ophthalmology and Otolaryngology**, Chicago, Ill. (W. L.

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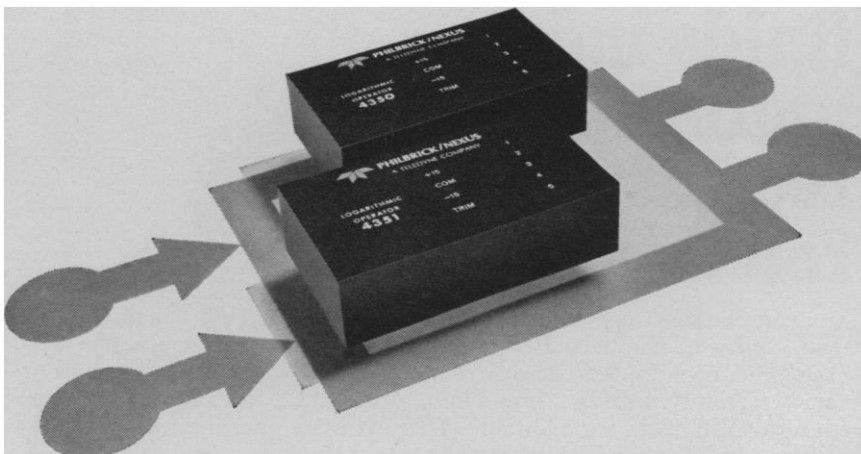
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27-1. American Soc. of Plastic and Reconstructive Surgeons, New Orleans, La. (P. P. Pickering, 2850 Sixth Ave., Suite B, San Diego, Calif. 92103)

28-29. Conference on Evaluation of Safety of Cosmetics, Washington, D.C. (AMA Committee on Cutaneous Health and Cosmetics, 535 N. Dearborn St., Chicago, Ill. 60610)

28-29. International Conf. on Materials, Pittsburgh, Pa. (R. B. Barnhart, Conf. Manager, Warner Hall 111, Carnegie-Mellon Univ., Pittsburgh)

28-30. Hybrid Microelectronics Symp., Chicago, Ill. (J. English, Cozzens and Cudahy, 9501 W. Devon Ave., Rosemont, Ill. 60018)

28-31. American Assoc. of Blood Banks, Washington, D.C. (L. J. James, 30 N. Michigan Ave., Chicago, Ill. 60602)

28-31. Instrument Soc. of America, New York, N.Y. (H. S. Kindler, The Society, 530 William Penn Pl., Pittsburgh, Pa. 15219)

28-1. Society for Experimental Stress Analysis, San Francisco, Calif. (The Society, 21 Bridge Sq., Westport, Conn. 06880)

29-31. Conference and Workshop on Applied Climatology, Asheville, N.C. (H. T. Harrison, Route 1, Box 266, Weather-ville, N.C. 28787)

31-1. Educational Conf., 33rd, New York, N. Y. (W. S. Litterick, Educational Records Bureau, 21 Audubon Ave., New York 10032)

31-1. Entomological Soc. of America, 40th, Philadelphia, Pa. (J. P. Johnson, Connecticut Agricultural Experiment Sta., Box 1106, New Haven 06504)

31-1. American Soc. for Microbiology, 8th, New York, N.Y. (R. W. Sarber, 115 Huron View Blvd., Ann Arbor, Mich.)

31-1. Symposium on Social Behavior, 2nd, Oxford, Ohio. (R. A. Hoppe, Dept. of Psychology, Miami Univ., Oxford 45056)

31-1. American Soc. of Tropical Medicine and Hygiene, Atlanta, Ga. (G. M. Jeffery, P.O. Box 295, Kensington, Md.)

31-2. Gerontological Soc., Denver, Colo. (The Society, 660 S. Euclid, St. Louis, Mo. 63110)

31-2. Society of Photographic Scientists and Engineers, Washington, D.C. (R. A. Jones, Papers Chairman, Mail Sta. 68, Perkin-Elmer Corp., Norwalk, Conn. 06852)

November

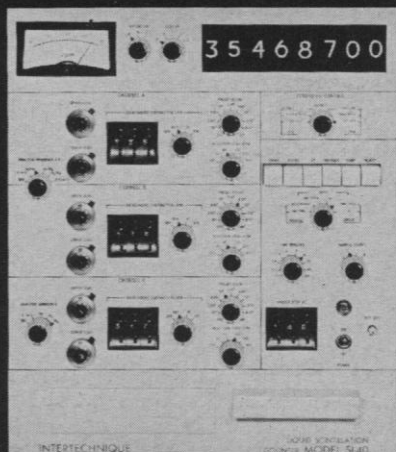
1-2. Central Soc. for Clinical Research, Chicago, Ill. (J. Eckstein, Dept. of Internal Medicine, Univ. of Iowa Hospitals, Iowa City 52240)

1-3. National Council for Geographic Education, 54th, Kansas City, Mo. (E. Eiselen, The Council, Room 1532, 111 W. Washington St., Chicago, Ill. 60602)

1-4. Research in Medical Education, 7th conf., Houston, Tex. (P. J. Sanazaro, Assoc. of American Medical Colleges, 2530 Ridge Avenue, Evanston, Ill. 60201)

6-8. Conference on Composition and Dynamics of the Upper Atmosphere, El Paso, Tex. (J. E. Morris, P.O. Box 26065, El Paso 79925)

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6-8. **Diffraction Conf.**, 26th, Pittsburgh, Pa. (S. Diamond, U.S. Steel Corp., Applied Research Lab., Monroeville, Pa. 15146)

6-8. **Northeast Electronics Research**, Mtg., Boston, Mass. (A. Uhler, Inst. of Electrical and Electronics Engineers, NEREM-68, 31 Channing St., Newton, Mass. 02158)

6-8. **International Spi Cellular Plastics Conf.**, New York, N.Y. (S. Steingiser, Monsanto Research Corp., Station B, Box 8, Dayton, Ohio 45407)

6-9. **American Ceramic Soc.**, Pittsburgh, Pa. (The Society, 4055 N. High St., Columbus, Ohio 43214)

6-9. **Operations Research Soc. of America**, 34th, Philadelphia, Pa. (J. H. Engel, c/o Center for Naval Analysis, 1401 Wilson Blvd., Arlington, Va. 22209)

6-9. **Conference on Respiratory Therapy**, Boston, Mass. (M. J. Nicholson, 605 Commonwealth Ave., Boston 02215)

7-9. **American Soc. of Cytology**, Cleveland, Ohio. (W. R. Lang, 1025 Walnut St., Philadelphia, Pa. 19107)

7-10. **Association of Clinical Scientists**, Washington, D.C. (R. P. MacFate, 300 N. State St., Chicago, Ill. 60610)

8-11. **American Physical Soc.**, Plasma Physics Div., Austin, Tex. (W. E. Drummond, Physics Bldg. 330. Univ. of Texas, Austin 78712)

10-15. **American Soc. of Agronomy**, New Orleans, La. (M. Stelly, c/o The Society, 677 S. Segoe Rd., Madison, Wis. 53711)

10-15. **Crop Science Soc. of America**, New Orleans, La. (Secretary, 677 S. Segoe Rd., Madison, Wis.)

10-15. **American Assoc. for Inhalation Therapy**, Houston, Tex. (M. T. Bowers, 4075 Main St., Riverside, Calif. 92501)

11-13. **Soc. of Engineering Science**, 6th technical mtg., Princeton, N.J. (A. C. Eringen, Dept. of Aerospace and Mechanical Sciences, Engineering Quadrangle, Princeton Univ., Princeton 08540)

11-13. **Genetics Soc. of America**, Boston, Mass. (B. Wallace, Dept. of Genetics, Cornell Univ., Ithaca, N.Y.)

11-14. **American Nuclear Soc.**, Washington, D.C. (Executive Secretary, 244 E. Ogden Ave., Hinsdale, Ill. 60521)

11-15. **American College of Preventive Medicine**, Detroit, Mich. (E. A. Piszcek, 6410 N. Leona Ave., Chicago, Ill. 60646)

11-15. **American Public Health Assoc.**, 96th, Detroit, Mich. (Executive Director, 1790 Broadway, New York, N.Y.)

13-15. **Eastern Analytical Symp.**, New York, N.Y. (L. M. Brancone, Lederle Labs., Pearl River, N.Y. 10965)

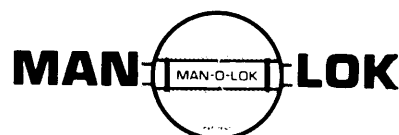
13-16. **National Easter Seal Soc. for Crippled Children and Adults**, Boston, Mass. (Nat'l. Easter Seal Soc., 2023 W. Ogden Ave., Chicago, Ill. 60612)

14-16. **Southern Thoracic Surgical Assoc.**, San Juan, Puerto Rico. (H. H. Seiler, 517 Bayshore Blvd., Tampa, Fla. 33606)

15-16. **American Psychiatric Assoc.**, Chicago, Ill. (L. Rudy, Illinois Psychiatric Inst., 1601 W. Taylor St., Chicago 60612)

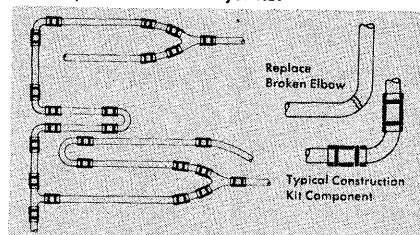
land, Ohio. (W. R. Lang, 1025 Walnut St., Ill. (The Institute, P.O. Box 1485, Pompano Beach, Fla. 33061)

17-20. **Academy of Pharmaceutical Sciences**, 5th, Washington, D.C. (S. W.



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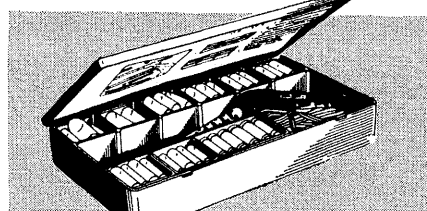
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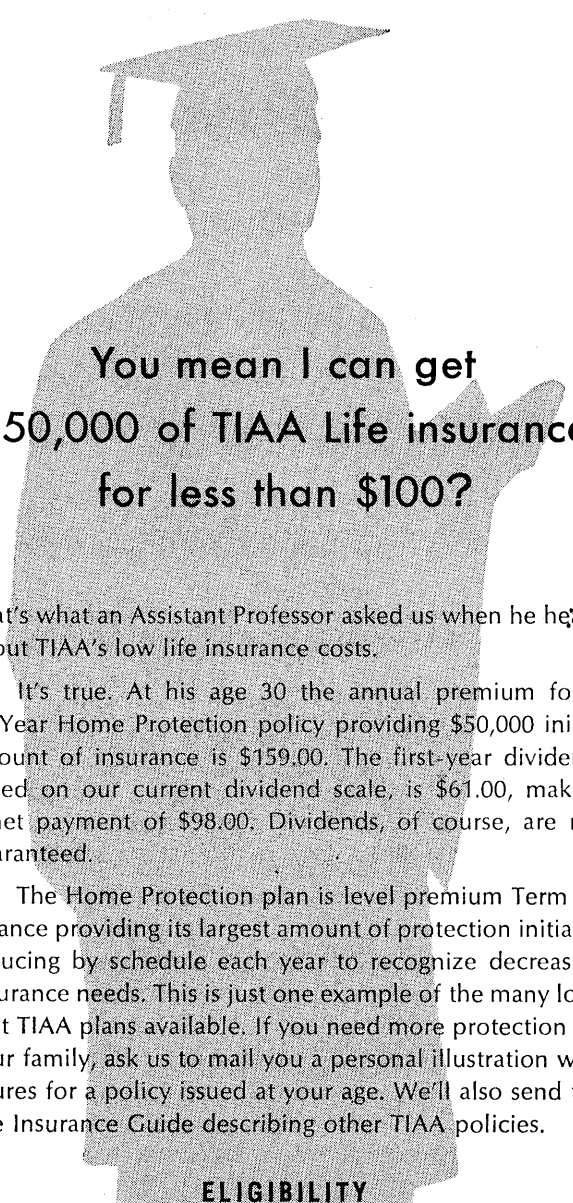


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18-20. Institute of **Electrical and Electronics Engineers**, 7th, Cocoa Beach, Fla. (L. E. Williams Aerospace Corp., P.O. Box 4007, Patrick Air Force Base, Fla. 32925)

18-20. American **Petroleum Inst.**, Chicago, Ill. (Secretary, Program Commission, 1271 Avenue of the Americas, New York 10020)

18-21. Symposium on **Basic Mechanisms of the Epilepsies**, Colorado Springs, Colo. (J. K. Penry, Section on Epilepsy, Room 8A-03, Bldg. 31, National Inst. of Neurological Diseases and Blindness, National Institutes of Health, Bethesda, Md. 20014)

18-21. Conference on **Engineering in Medicine and Biology**, Houston, Tex. (W. T. Maloney, Suite 620, 6 Beacon St., Boston, Mass. 02108)

18-21. Conference on **Magnetism and Magnetic Materials**, 14th, New York, N.Y. (D. T. Teaney, IBM Thomas J. Watson Research Center, Box 218, Yorktown Heights, N.Y. 10598)

18-22. Society of the **Plastics Industry**, Inc., Chicago, Ill. (The Society, 250 Park Ave., New York 10017)

18-22. American **Water Resources Conf.**, 4th, New York, N.Y. (P. Cohen, U.S. Geological Survey, 1505 Kellum Place, Mineola, N.Y. 11501)

19. **Air Pollution Control**, Columbia, Mo. (Extension Div., Whitten Hall, Univ. of Missouri, Columbia)

19-20. Council on **Arteriosclerosis** of the American Heart Assoc., Bal Harbour, Fla. (Dept. of Councils and International Program, American Heart Assoc. Natl. Office, 44 E. 23 St., New York 10010)

19-21. **Photovoltaic Specialists Conf.**, 7th, Pasadena, Calif. (R. E. Fischell, Applied Physics Lab., Johns Hopkins Univ., 8621 Georgia Ave., Silver Spring, Md. 20910)

19-22. **Acoustical Soc. of America**, Cleveland, Ohio. (The Society, 133 E. 45 St., New York 10017)

20-22. National Soc. for the **Prevention of Blindness**, Inc., New York, N.Y. (J. W. Ferree, 79 Madison Ave., New York 10016)

20-22. **Microelectronic Packaging and Interconnection Conf.**, Palo Alto, Calif. (D. H. O'Neill, Soc. of Automotive Engineers, 485 Lexington Ave., New York 10017)

20-24. Society for **Clinical and Experimental Hypnosis**, 20th, Chicago, Ill. (The Society, 353 W. 57 St., New York 10019)

21-22. **Chemical Kinetics Symp.**, Chapel Hill, N.C. (L. Pedersen, Dept. of Chemistry, Univ. of North Carolina, Chapel Hill 27514)

21-24. American **Anthropological Assoc.**, Seattle, Wash. (Executive Secretary, 1530 P St., NW, Washington, D.C. 20005)

25-27. American **Physical Soc.**, Miami, Fla. (Executive Secretary, 538 W. 120 St., New York 10027)

29-30. **Membrane Proteins Symp.**, New York, N.Y. (J. Newkirk, New York Heart Assoc., 2 E. 64 St., New York 10021)

29-30. National Federation of Catholic **Physicians' Guild**, Miami Beach, Fla. (R. H. Herzog, 2825 N. Mayfair Rd., Gelman, Wiley, New York, 1968. xiv + Milwaukee, Wis. 53222)

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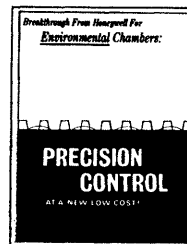
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International and Foreign Meetings

October

21-28. International Symp. on **Physico-chemical Mechanisms of Carcinogenesis**, Jerusalem, Israel. (E. D. Bergmann, Dept. of Chemistry, Hebrew Univ., Jerusalem, Israel, or B. Pullman, Institut de Biologie Physico-Chimique, 13, rue Pierre Curie, Paris 53, France)

31-1. Symposium on **Artificial Limbs**, London, England. (Public Relations Officer, Institution Soc. of America, 530 William Penn Pl., Pittsburgh, Pa. 15219)

November

3-8. **Israel Surgical Soc.**, 8th congr., Jerusalem. (Organizing Committee, 8th Congr. of the Israel Surgical Soc., P.O. Box 7276, Jerusalem)

4-8. Symposium on the Use of **Nuclear Techniques in the Prospecting and Development of Mineral Resources**, Lima, Peru. (S. Eklund, Intern. Atomic Energy Agency, Karnthner Ring 11, A-1010 Vienna, Austria)

4-9. **Canadian Heart Foundation**, Canadian Cardiovascular Society, Vancouver, B.C. (Secretary, Canadian Heart Foundation, 1130 Bay St., Toronto 5, Ont.)

11-13. **Geochemical Soc.**, Mexico City, Mexico. (E. C. T. Chao, c/o U.S. Geological Survey, Washington, D.C.)

11-13. **Geological Soc. of America**, Mexico City, Mexico. (R. C. Becker, The Society, Colorado Bldg., P.O. Box 1719, Boulder, Colo. 80302)

11-13. **Society of Economic Geologists**, Mexico City, Mexico. (R. A. Laurence, P.O. Box 1549, Knoxville, Tenn. 37901)

11-13. **Mineralogical Soc. of America**, Mexico City, Mexico. (I. J. Holmes, Dept. of Geology, Columbia Univ., New York, 10027)

11-13. **Paleontological Soc.**, Mexico City, Mexico. (R. L. Langenheim, Dept. of Geology, Univ. of Illinois, Urbana)

13-15. **International Reinforced Plastics Conf.**, London, England. (British Plastics Federation, Reinforced Plastics Group, 47-48 Piccadilly, London, W.1)

18-23. **International Seed Testing Assoc.**, 15th, Palmerston, New Zealand. (The Association, Binnenhaven 1, Wageningen, Netherlands)

19-20. Symposium on **Tribology in Railways**, London, England. (Public Relations Officer, Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, London)

20-24. **Pan American Congr. of Otorhinolaryngology and Bronchoesophagology**, Mar del Plata, Argentina. (C. Arauz, Casilla de Correo 45B, Suc. 53, Buenos Aires, or H. von Leden, 11600 Wilshire Blvd., Los Angeles, Calif. 90025)

20-26. **International Automation and Instrumentation Conf. and Exhibition**, 10th, Milan, Italy. (Studio A. Barbieri, Via Marcona, 49, 20129 Milan)

26-27. **International Aerospace Exposition**, Montreal, P.Q., Canada. (B. G. Newman, Dept. of Mechanical Engineering, McGill Univ., Montreal 2)

28. Symposium on **Hydrostatic and Hydromechanic Transmission**, London, England. (Public Relations Officer, Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, S.W.1, London)

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(Continued from page 1236)

nett, Jr. American Entomological Institute, Ann Arbor, Mich., 1968. xii + 1112 pp., illus. \$12. Second printing, with corrections, of the 1966 edition.

Boundary Value Problems for Second Order Elliptic Equations. A. V. Bitsadze. Translated from the Russian edition (Moscow, 1966) by Scripta Technica. M. J. Laird, Translation Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1968. xii + 211 pp. \$11. North-Holland Series in Applied Mathematics and Mechanics.

Calculus and the Computer Revolution. Richard W. Hamming, Houghton Mifflin, Boston, 1968. xii + 72 pp., illus. Paper, \$1.75.

Calculus of Vector Functions. Richard E. Williamson, Richard H. Crowell, and Hale F. Trotter. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1968. xii + 434 pp., illus. \$10.

Carbocyclic Ring Expansion Reactions. C. David Gutsche and Derek Redmore. Academic Press, New York, 1968. x + 243 pp., illus. \$13.50. Advances in Alicyclic Chemistry, supplement 1.

Chimie Nucléaire Appliquée. E. Roth. Masson, Paris, 1968. xi + 629 pp., illus. 98 F. Collection du Conservatoire National des Arts et Métiers.

Chirurgie des Gehirns und Rückenmarks im Kindes- und Jugendalter. Karl-August Bushe and Paul Glees, Eds. Hippokrates, Stuttgart, 1968 (distributed in the U.S. by Intercontinental Medical Book Corporation, New York). 1195 pp., illus. Figure legends in English and German. \$105.

Civil Service Reform in Brazil. Principles versus Practice. Lawrence S. Graham. Published for the Institute of Latin American Studies by the University of Texas Press, Austin, 1968. xiv + 234 pp. \$6.50. Latin American Monographs, No. 13.

Clinical Research in Alcoholism. Jonathan O. Cole, Ed. Papers presented at a conference, Washington, D.C., Dec. 1966. American Psychiatric Association, Washington, D.C., 1968. x + 178 pp., illus. Paper, \$5. Psychiatric Research Report No. 24.

Concepts of Science. A Philosophical Analysis. Peter Achinstein. Johns Hopkins Press, Baltimore, Md., 1968. xiv + 266 pp. \$8.95.

Contemporary Issues in Developmental Psychology. Norman S. Endler, Lawrence R. Boulter, and Harry Osner, Eds. Holt, Rinehart and Winston, New York, 1968. xx + 682 pp., illus. \$9.95.

Contemporary Theory and Research in Visual Perception. Ralph Norman Haber, Ed. Holt, Rinehart and Winston, New York, 1968. xiv + 814 pp., illus. \$14.95.

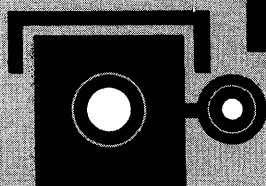
A Contemporary View of Elementary Physics. Sidney Borowitz and Lawrence A. Bornstein. McGraw-Hill, New York, 1968. xv + 896 pp., illus. \$12.

The Correspondence of Henry Oldenburg. Vol. 5, 1668-1669. Edited and translated by A. Rupert Hall and Marie Boas Hall. University of Wisconsin Press, Madison, 1968. xxvi + 604 pp. \$12.50.

Design for Security. Richard J. Healy.

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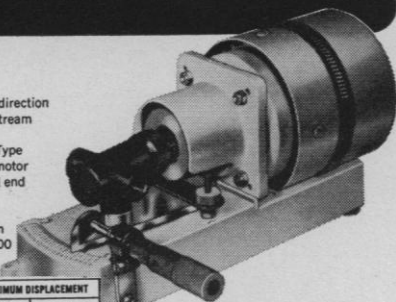
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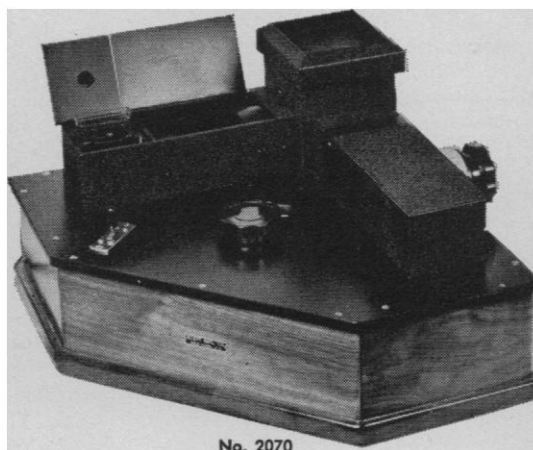
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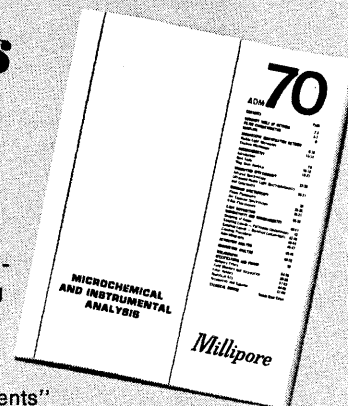
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Wiley, New York, 1968. x + 309 pp., illus. \$9.95.

Developmental Biology. A Laboratory Manual. Joseph W. Vanable, Jr., and James H. Clark. Burgess, Minneapolis, Minn., 1968. vii + 182 pp., illus. Paper, \$5.

Dictionary of Economic Plants. J. C. Th. Uphof. Cramer, Lehre, Germany, ed. 2, 1968 (distributed in the U.S. by Stechert-Hafner, New York). viii + 591 pp. \$17.50.

A Dictionary of Genetics. Robert C. King. Oxford University Press, New York, 1968. 292 pp., illus. Paper, \$3.95.

Dictionary of Organic Compounds. The constitution and physical, chemical and other properties of the principal carbon compounds and their derivatives, together with relevant literature references. R. Stevens, Ed. Oxford University Press, New York, ed. 4, 1968. 284 pp., illus. \$24.

Earl Morris and Southwestern Archaeology. Florence C. Lister and Robert H. Lister. University of New Mexico Press, Albuquerque, 1968. xviii + 204 pp., illus. \$7.95.

Early Experience and the Organization of Behavior. John Paul Scott. Brooks/Cole (Wadsworth), Belmont, Calif., 1968. x + 177 pp., illus. Paper, \$1.95. Developmental Processes and Behavior Series.

The Economics of Water Utilization in the Beet Sugar Industry. George O. G. Löf and Allen V. Kneese. Resources for the Future, Washington, D.C., 1968 (distributed by Johns Hopkins Press, Baltimore). x + 125 pp., illus. Paper, \$4.

Education and Economic Thought. George F. Kneller. Wiley, New York, 1968. xiv + 139 pp. Cloth, \$5; paper, \$2.95.

Experimental Techniques in Low-Temperature Physics. Guy Kendall White. Clarendon (Oxford University Press), New York, ed. 2, 1968. xi + 397 pp., illus. \$12. Monographs on the Physics and Chemistry of Materials.

Experiments in Chemistry. F. R. Longo, J. A. O'Malley, W. C. Oelke, and W. A. Nevill. McGraw-Hill, New York, 1968. viii + 295 pp., illus. Paper, \$4.50.

Experiments in Direct Current Circuits. Robert L. Reid and Thomas S. Kubala. Prentice-Hall, Englewood Cliffs, N.J., 1968. xii + 130 pp., illus. Paper, \$5.50. Prentice-Hall Series in Electronic Technology.

Food and Man. Miriam E. Lowenberg, E. Neige Todhunter, Eva D. Wilson, Moira C. Feeney, and Jane R. Savage. Wiley, New York, 1968. x + 341 pp., illus. \$7.95.

Foundations of Global Non-Linear Analysis. Richard S. Palais. Benjamin, New York, 1968. viii + 131 pp., illus. Cloth, \$8.50; paper, \$3.95.

Handbook to the Conservation Section of the International Biological Programme. E. M. Nicholson. International Biological Programme, London; Blackwell Scientific Publications, Oxford, 1968 (distributed in the U.S. by Davis, Philadelphia). x + 84 pp. Paper, \$2.25. IBP Handbook No. 5.

The Harvey Lectures, Series 62, delivered under the auspices of the Harvey Society of New York, 1966-1967. Academic Press, New York, 1968. xvii + 364 pp., illus. \$9.50.

Heavy Weather Sailing. K. Adlard Coles. John De Graff, Tuckahoe, N.Y., 1968. 304 pp., 20 plates, illus. \$12.50.

Hilbert Spaces of Entire Functions. Louis de Branges. Prentice-Hall, Englewood Cliffs, N.J., 1968. x + 326 pp. \$11. Prentice-Hall Series in Modern Analysis.

Inorganic Syntheses. Vol. 11, William L. Jolly, Ed. McGraw-Hill, New York, 1968. xiii + 231 pp., illus. \$10.50.

Inquiry Techniques for Teaching Science. William D. Romey. Prentice-Hall, Englewood Cliffs, N.J., 1968. x + 342 pp., illus. Cloth, \$7.25; paper, \$3.95.

Insect Abundance. Fourth Symposium of the Royal Entomological Society of London, Sept. 1967. T. R. E. Southwood, Ed. Published for the Society by Blackwell Scientific Publications, Oxford, England, 1968. viii + 160 pp., illus. \$9.

Insect Viruses. Karl Maramorosch, Ed. Springer-Verlag, New York, 1968. viii + 192 pp., illus. \$9. Current Topics in Microbiology and Immunology, vol. 42.

Ionospheric Radio Communications. Proceedings of a NATO Institute, Finse, Norway, April 1967. Kristen Folkestad, Ed. Plenum, New York, 1968. xii + 468 pp., illus. \$25.

Introduction to Chromatography. James M. Bobbitt, Arthur E. Schwarting, and Roy J. Gritter. Reinhold, New York, 1968. viii + 160 pp., illus. Paper, \$3.95. Reinhold Science Studies.

An Introduction to Finite Projective Planes. A. Adrian Albert and Reuben Sandler. Holt, Rinehart and Winston, New York, 1968. x + 98 pp., illus. \$5.50. Athena Series; Selected Topics in Mathematics.

Introduction to Fourier Optics. Joseph W. Goodman. McGraw-Hill, New York, 1968. xiv + 287 pp., illus. \$13.50. McGraw-Hill Physical and Quantum Electronics Series.

Introduction to Modern Biochemistry. P. Karlson. Third English edition, translated from the 6th German edition (Stuttgart, 1967) by Charles H. Doering. Academic Press, New York, 1968. xxii + 483 pp., illus. \$11.75.

Kinetics in Analytical Chemistry. Harry B. Mark, Jr., and Garry A. Rechnitz, with the assistance of Ronald A. Greinke. Interscience (Wiley), New York, 1968. xii + 339 pp., illus. \$16.95. Chemical Analysis, vol. 24.

Laboratory Manual for Food Microbiology. W. C. Frazier, E. H. Marth, and R. H. Deibel. Burgess, Minneapolis, Minn., ed. 4, 1968. v + 122 pp. Spiral bound.

Laboratory Studies in Developmental Anatomy. Theodore W. Torrey. Burgess, Minneapolis, Minn., ed. 3, 1968. viii + 145 pp., illus. Spiral bound, \$5.

The Laws of Large Numbers. Pál Révész. Academic Press, New York, 1968. 176 pp. \$9.50. Probability and Mathematical Statistics, vol. 4.

Learning and the Professors. Ohmer Milton and Edward Joseph Shoben, Jr., Eds. Ohio University Press, Athens, 1968. xvii + 216 pp. \$5.50.

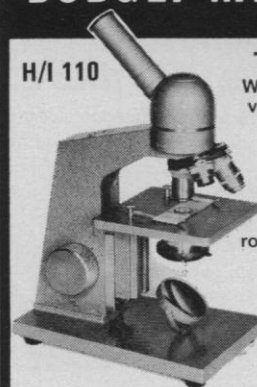
Legal Order in a Violent World. Richard A. Falk. Princeton University Press, Princeton, N.J., 1968. xvi + 610 pp. \$15.

Leonardo da Vinci. V. P. Zubov. Translated from the Russian edition (Moscow,

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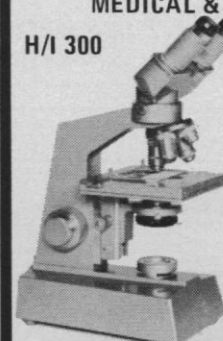
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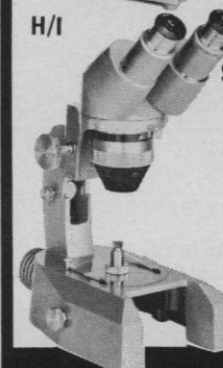
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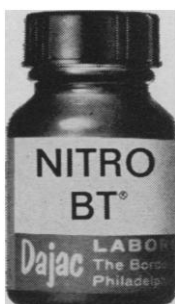
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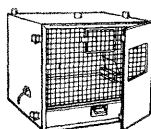
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The theoretical aspect of gas phase chromatography as applied to steroid methodology is stressed. First and foremost the monograph discusses what advantages and disadvantages gas phase chromatography has for the field of steroid methodology. The literature is up to date to May, 1967 and the monograph should be most helpful both for clinical and research laboratories interested in steroid methodology.

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Molecular Basis of Virology. H. Fraenkel-Conrat, Ed. Reinhold, New York, 1968. xiv + 642 pp., illus. \$18. American Chemical Society Monograph No. 164.

Molecular Control of Plant Growth. J. Eugene Fox. Dickenson, Belmont, Calif., 1968. x + 118 pp., illus. Paper, \$2.50. Dickenson Series on Contemporary Thought in Biological Science.

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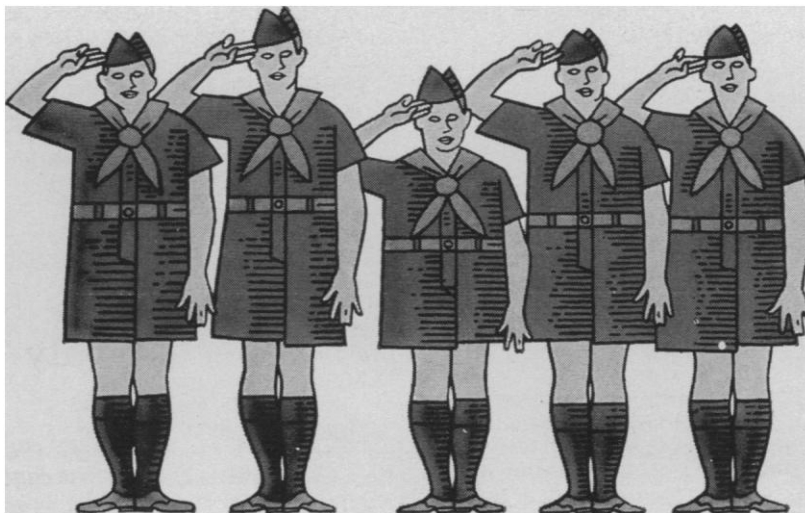
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Radical Ions. E. T. Kaiser and L. Kevan, Eds. Interscience (Wiley), New York, 1968. x + 800 pp., illus. \$30. Reactive Intermediates in Organic Chemistry.

Radioactive Nuclides in Medicine and Biology. Medicine. Solomon Silver. Lea and Febiger, Philadelphia, ed. 3, 1968. xvi + 539 pp., illus. \$12.50.

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RCA Receiving Tube Manual. RCA, Harrison, N.J., 1968. 657 pp., illus. Paper, \$1.75. Technical Series RC-26.

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Respiratory Function Tests in Pneumoconioses. Report and related papers of a meeting, Geneva, Sept. 1965. International Labour Organisation. International Labour Office, Geneva, 1966. vi + 173 pp., illus. Paper. Occupational Safety and Health Series, No. 6.

The Rockefeller Foundation President's Review and Annual Report 1967. Rockefeller Foundation, New York, 1968. xxii + 266 pp., illus. Paper.

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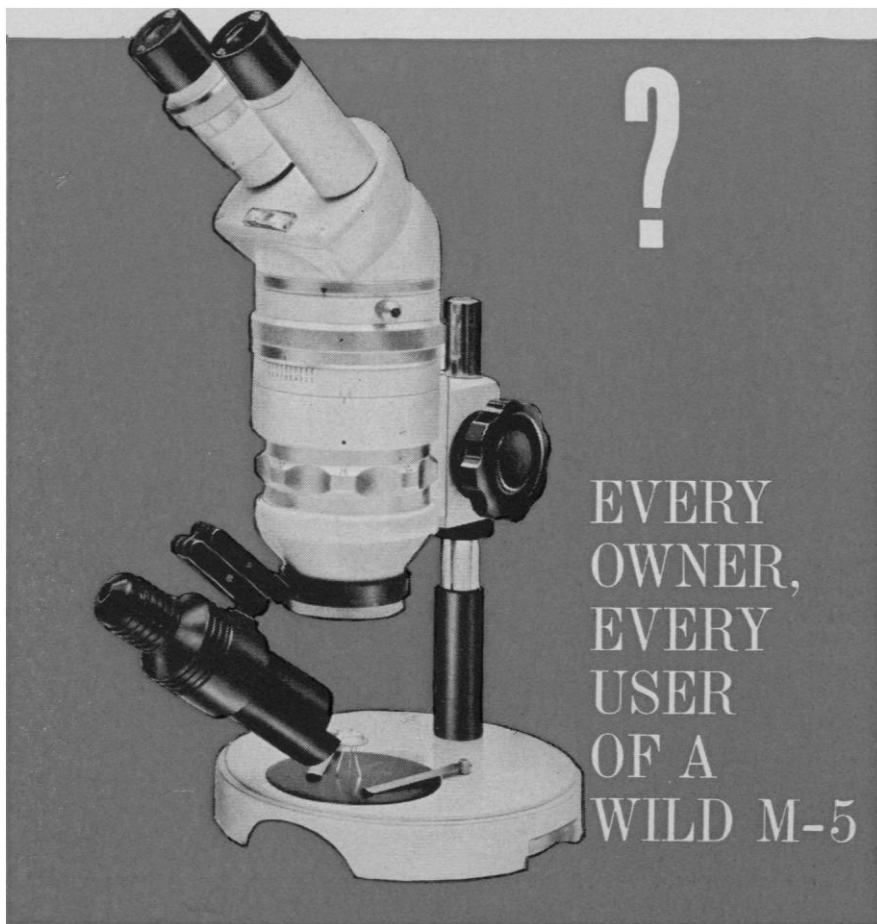
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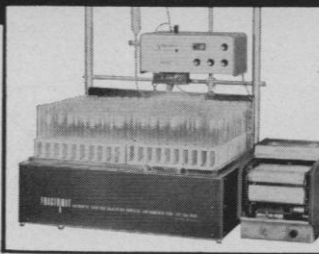


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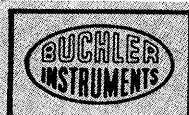
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Search for the Past. An Introduction to Paleontology. James R. Beerbower. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1968. xvi + 512 pp., illus. \$13.50.

The Second Ten Years of the World Health Organization, 1958-1967. World Health Organization, Geneva, 1968 (distributed in the U.S. by Columbia University Press, New York). xi + 414 pp., illus. Paper, \$8.75.

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Series Expansions for Mathematical Physicists. Herbert Meschkowski. Translated from the German edition (Mannheim, 1963) by Robert Schlapp. Oliver and Boyd, Edinburgh; Interscience (Wiley), New York, 1968. x + 174 pp., illus. \$4.

Simple and Complex Vibratory Systems. Eugene Skudrzyk. Pennsylvania State University Press, University Park, 1968. xlii + 514 pp., illus. \$24.50.

Simple Dense Fluids. H. L. Frisch and Z. W. Salsburg, Eds. Academic Press, New York, 1968. xviii + 430 pp., illus. \$19.50.

The Skeletal Biology of Earlier Human Populations. A symposium, London, Nov. 1965. D. R. Brothwell, Ed. Pergamon, New York, 1968. viii + 288 pp., illus. \$11. Symposia of the Society for the Study of Human Biology, vol. 8.

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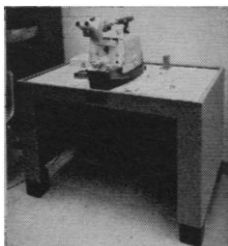
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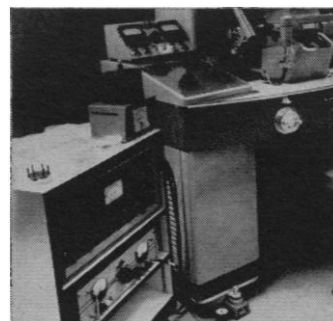
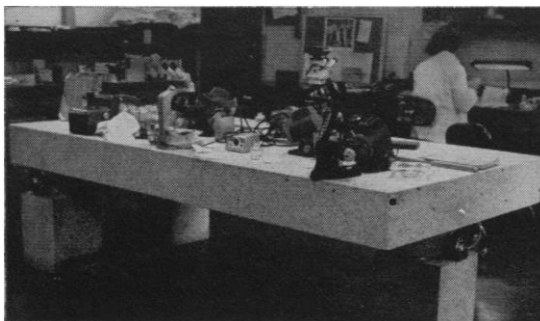
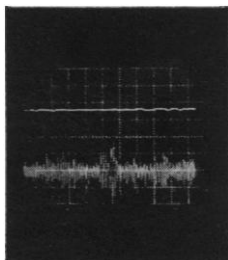
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Strain Gauges. Kinds and Uses. Hermann K. P. Neubert. Macmillan, London; St. Martin's New York, 1968. xii + 164 pp., illus. \$7.

Structural and Operational Schemes of National Science Policy. Conclusions and Recommendations of the Meeting. Third meeting on science policy and research organization in the countries of North Africa and the Middle East, Algiers, Sept. 1966. UNESCO, New York, 1967. 90 pp. Paper, \$1.25. Science Policy Studies and Documents, No. 6.

Structure and Change in Indian Society. Milton Singer and Bernard S. Cohn, Eds. Aldine, Chicago, 1968. xvi + 507 pp., illus. \$10. Viking Fund Publications in Anthropology, No. 47.

The Structure of Inference. D. A. S. Fraser. Wiley, New York, 1968. xiv + 344 pp., illus. \$16.

The Structure of the Quiet Photosphere and the Low Chromosphere. Proceedings of the "Bilderberg" Conference held near Arnhem, Holland, April 1967. C. de Jager, Ed. Springer-Verlag, New York; Reidel, Dordrecht, 1968. 240 pp., illus. \$9.

A Study of Franz Brentano. His Psychological Standpoint and His Significance in the History of Psychology. Anton C. Rancurello. Academic Press, New York, 1968. xiv + 178 pp. \$8.

The Study of Man. An Introduction to Human Biology. E. J. Clegg. Elsevier, New York, 1968. x + 212 pp., illus. \$4.75.

The Study of Personality. An Interdisciplinary Appraisal. Edward Norbeck, Douglass Price-Williams, and William M. McCord, Eds. Holt, Rinehart and Winston, New York, 1968. xii + 400 pp., illus. \$7.95.

Superconductivity in Science and Technology. Morrel H. Cohen, Ed. University of Chicago Press, Chicago, 1968. viii + 164 pp., illus. \$5.95.

Systems Analysis and Policy Planning. Applications in Defense. E. S. Quade and W. I. Boucher, Eds. Elsevier, New York, 1968. xxiv + 456 pp., illus. \$11.50.

Taxonomy of American Species of Linden (Tilia). George Neville Jones. University of Illinois Press, Urbana, 1968. 156 pp., illus. Paper, \$5.95. Illinois Biological Monographs, No. 39.

Teratology of the Central Nervous System. Induced and Spontaneous Malformations of Laboratory, Agricultural, and Domestic Mammals. Harold Kalter. University of Chicago Press, Chicago, 1968. xvi + 481 pp., illus. \$17.50.

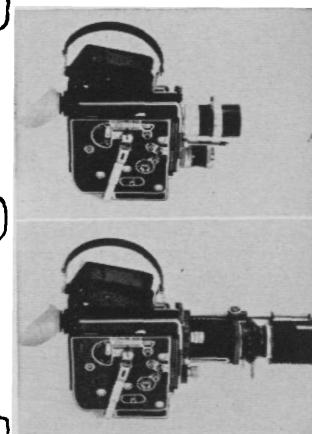
Thermochemical Kinetics. Methods for the Estimation of Thermochemical Data and Rate Parameters. Sidney W. Benson. Wiley, New York, 1968. xii + 223 pp., illus. \$9.95.

Thermoelasticity. Heinz Parkus. Blaisdell, Waltham, Mass., 1968. x + 112 pp., illus. \$5.50. A Blaisdell Book in Solid Mechanics.

Thermophysical Properties of Carbon Dioxide. M. P. Vukalovich and V. V. Altunin. Translated from the Russian edition (Moscow, 1965) under the direction of the United Kingdom Atomic Energy Authority. D. S. Gaunt, Ed. Collet's,

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