

SCIENCE

14 June 1974

Vol. 184, No. 4142

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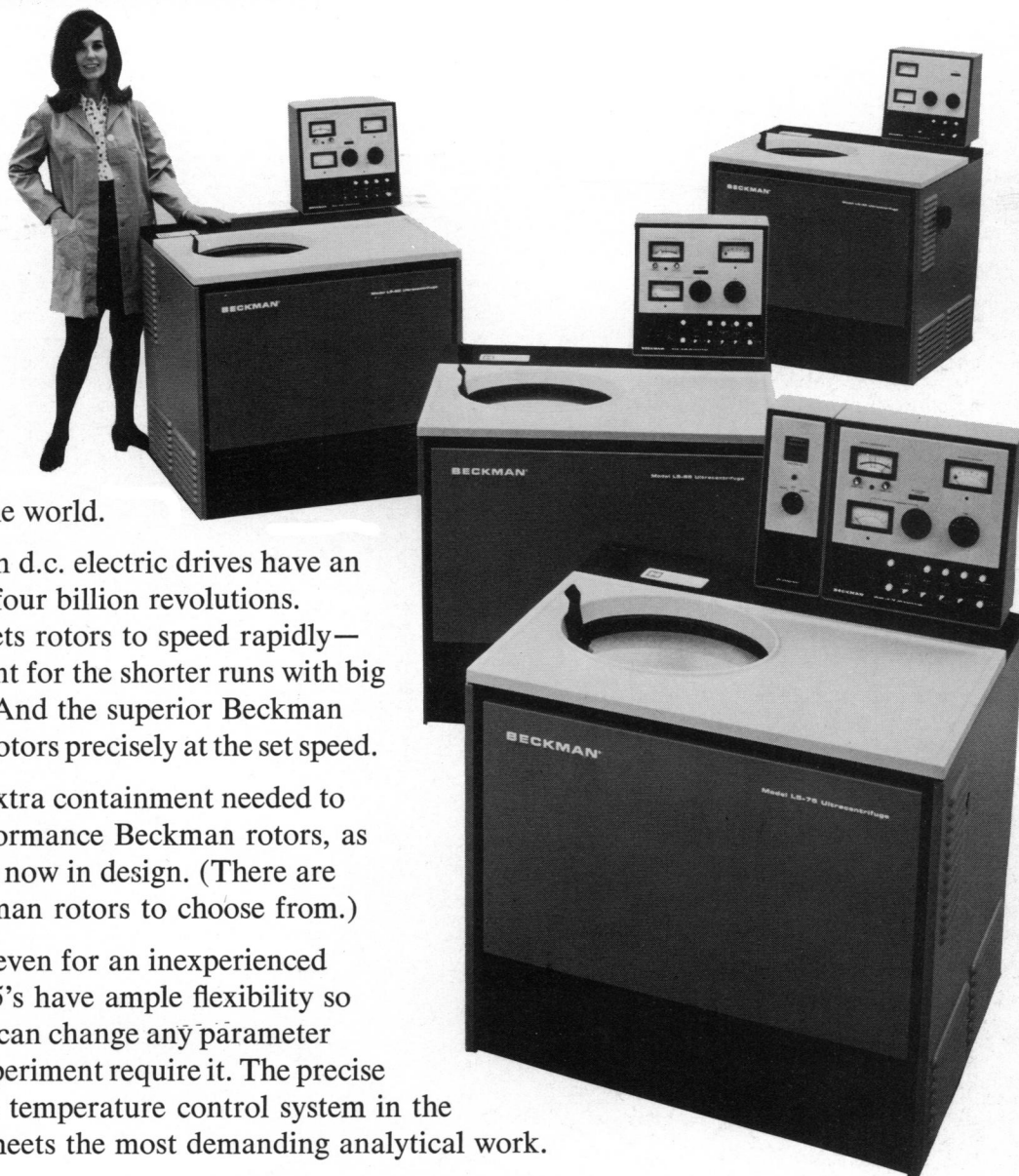
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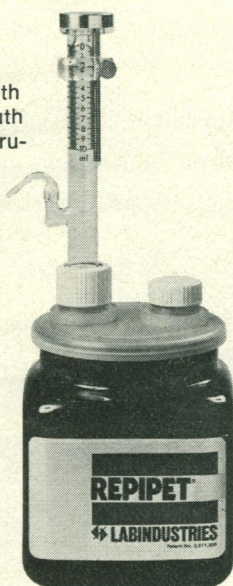
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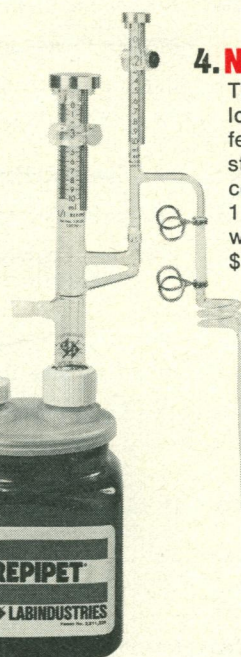
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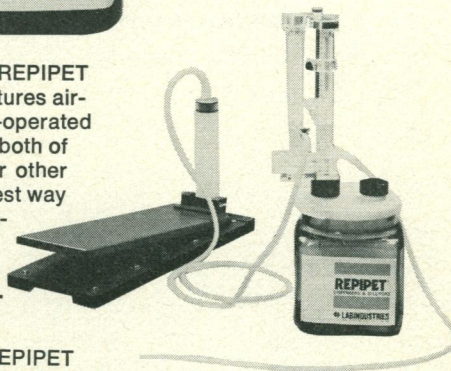
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COVER

Pigment mutants in the Mexican axolotl. (Left) White (d/d); (center) yellow albino (a/a, D/D); and (right) dark, wild type (D/D). See page 1142. [G. M. Malacinski, Indiana University, Bloomington]

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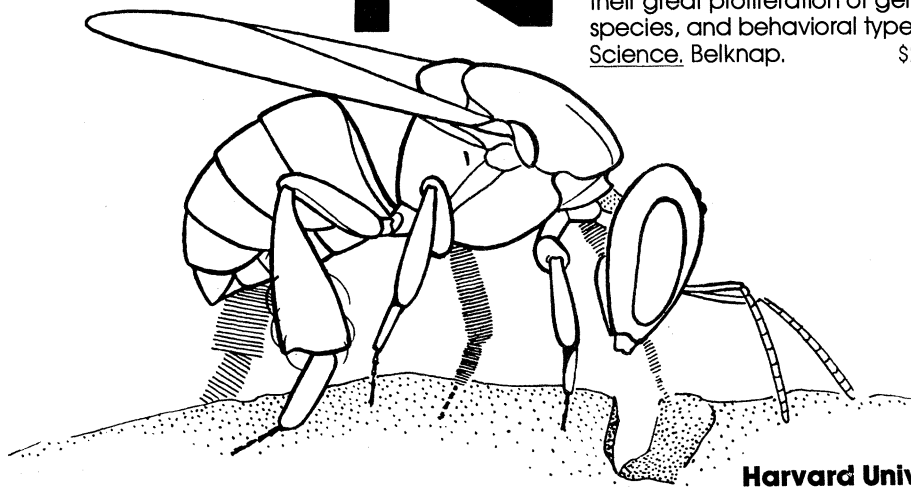
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Communication Among Social Bees

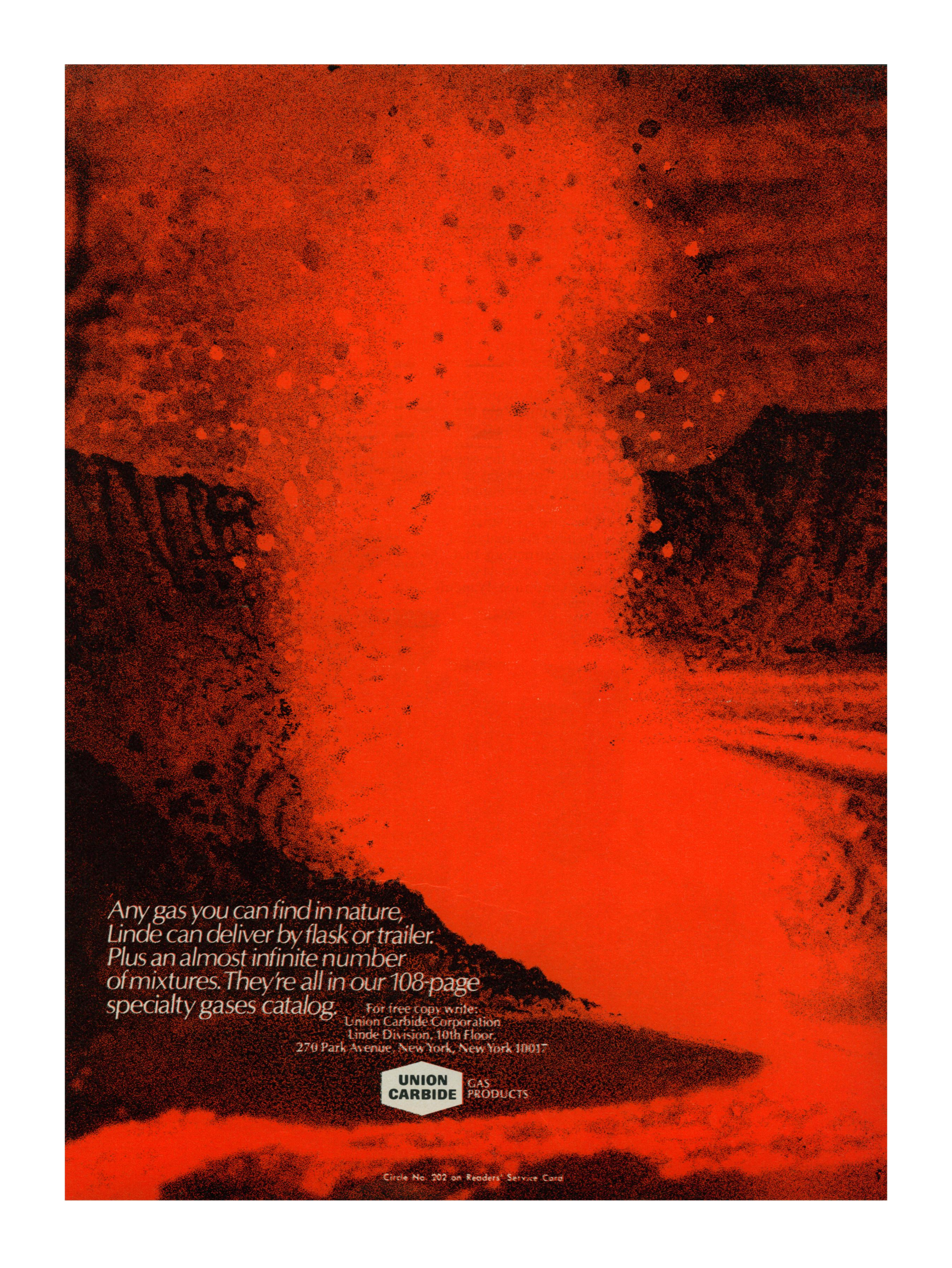
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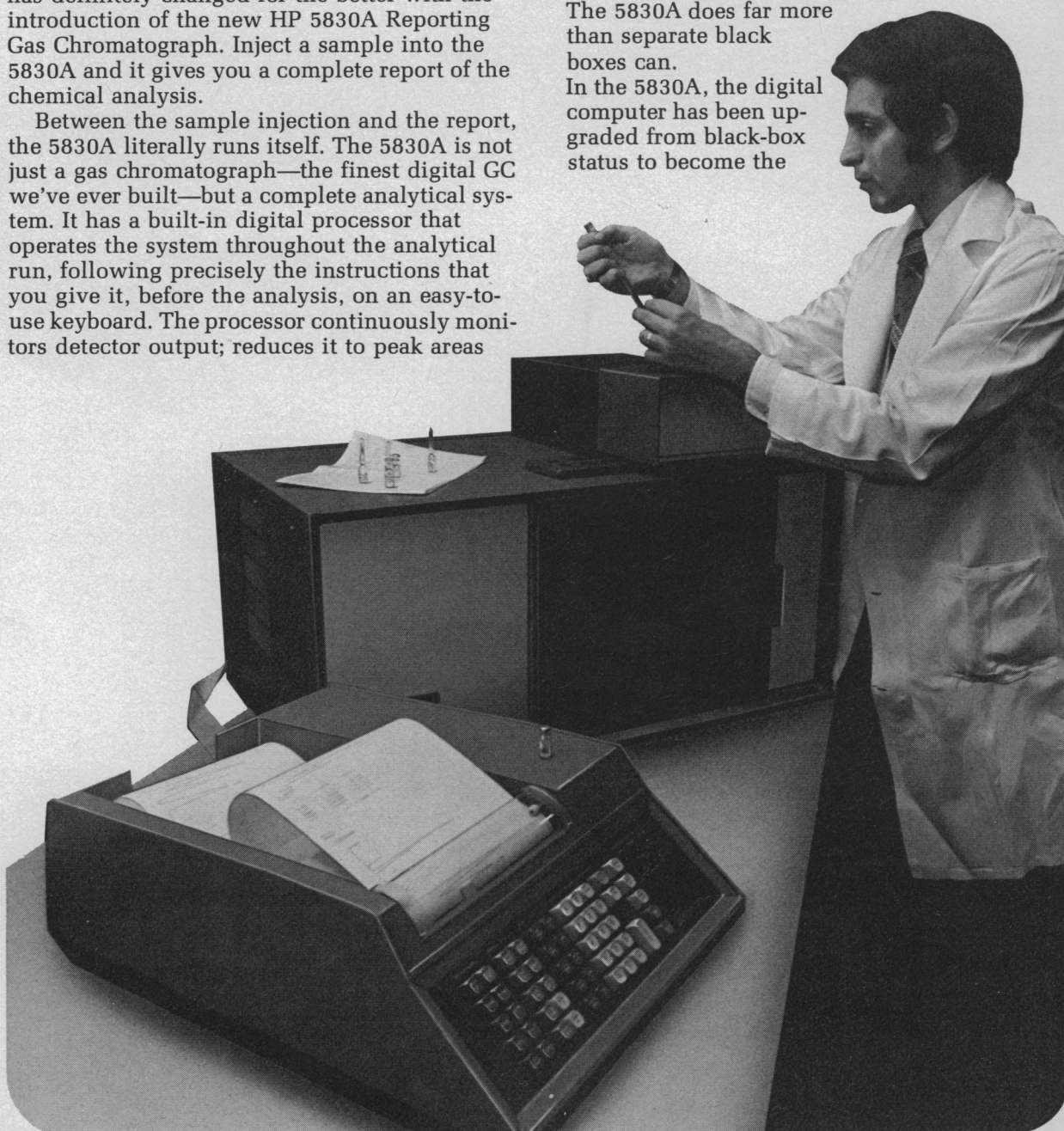
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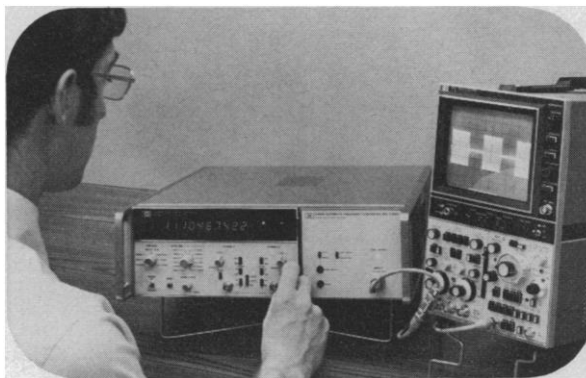
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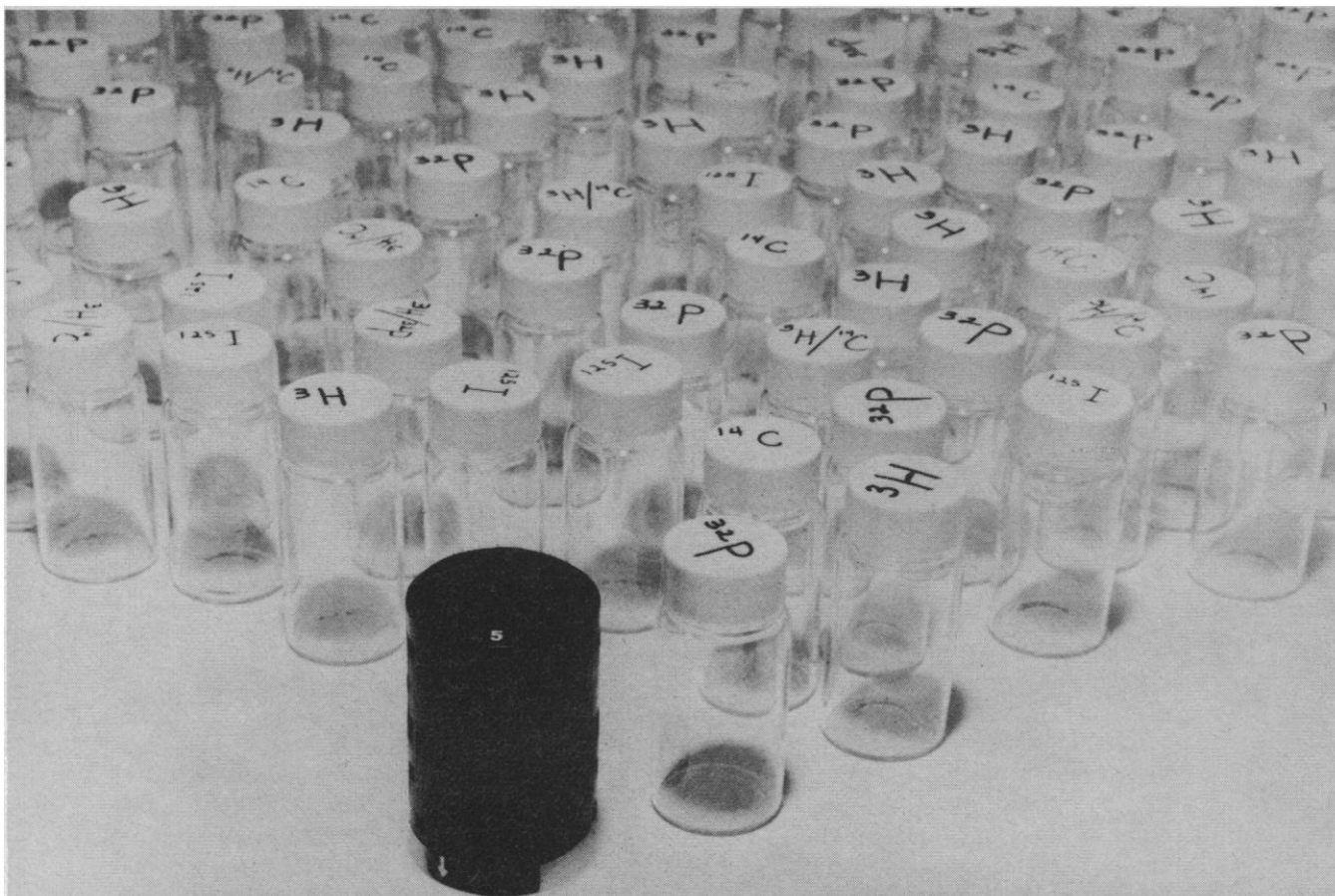
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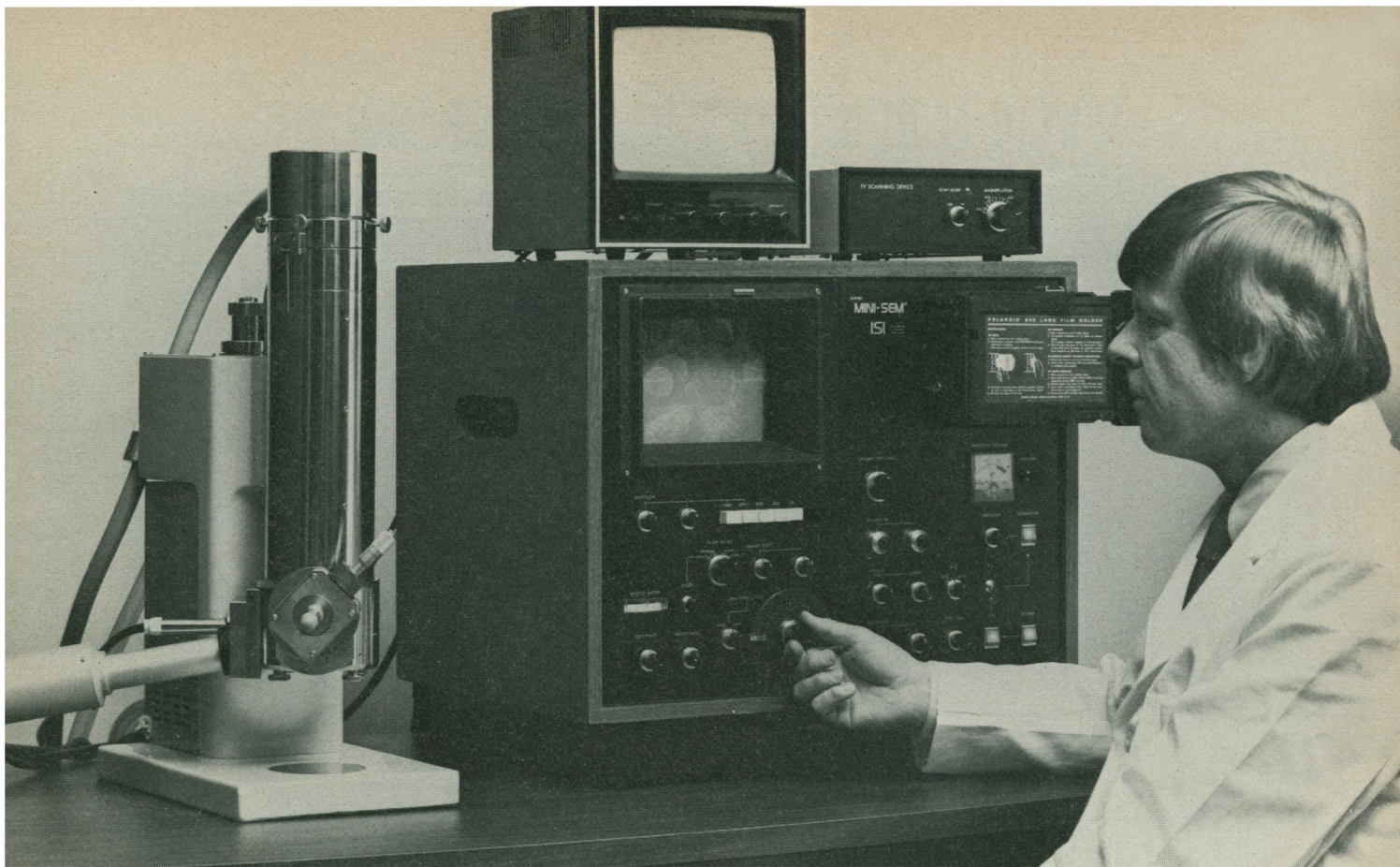
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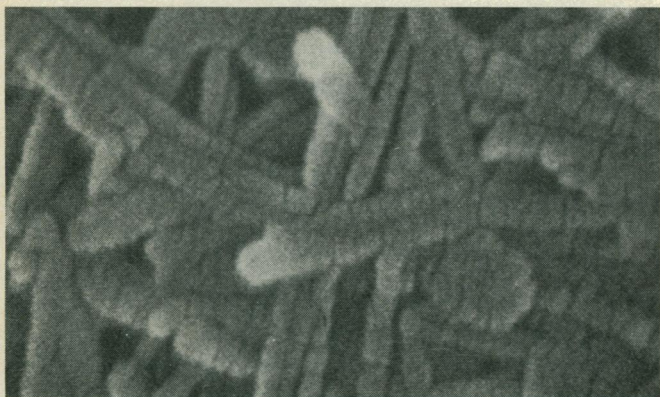
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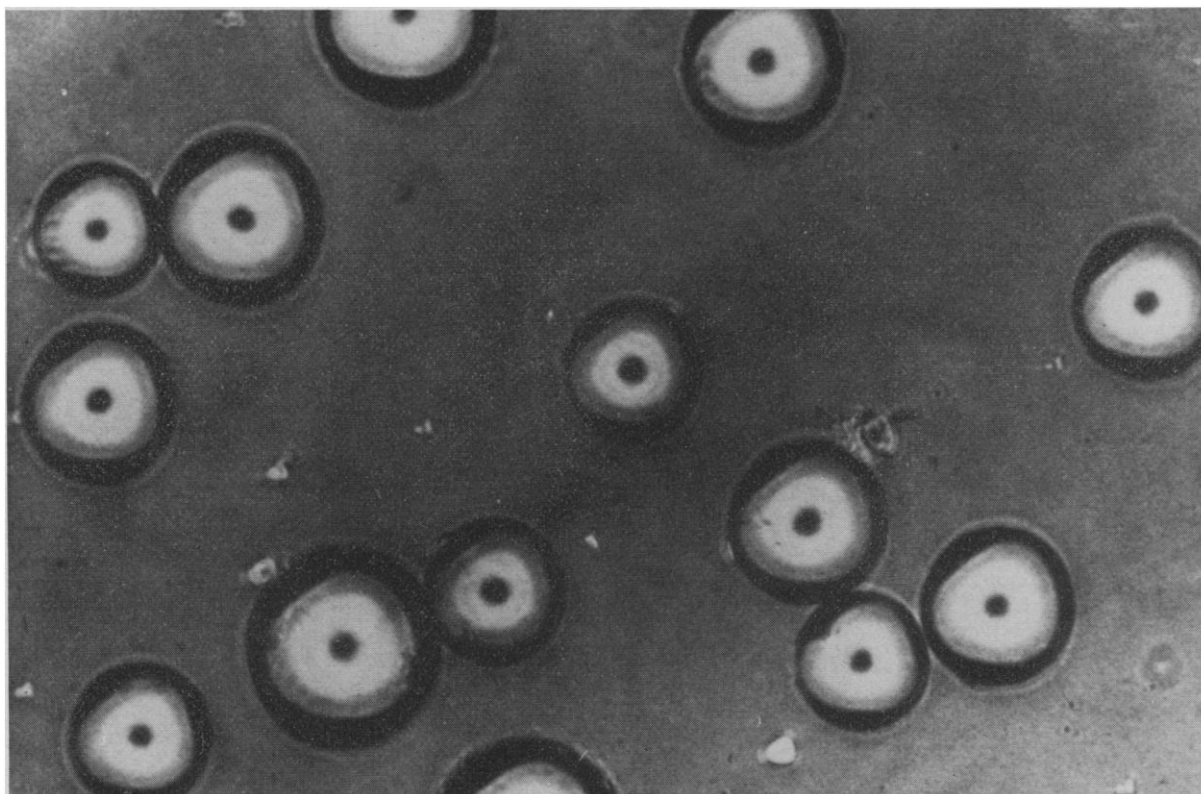
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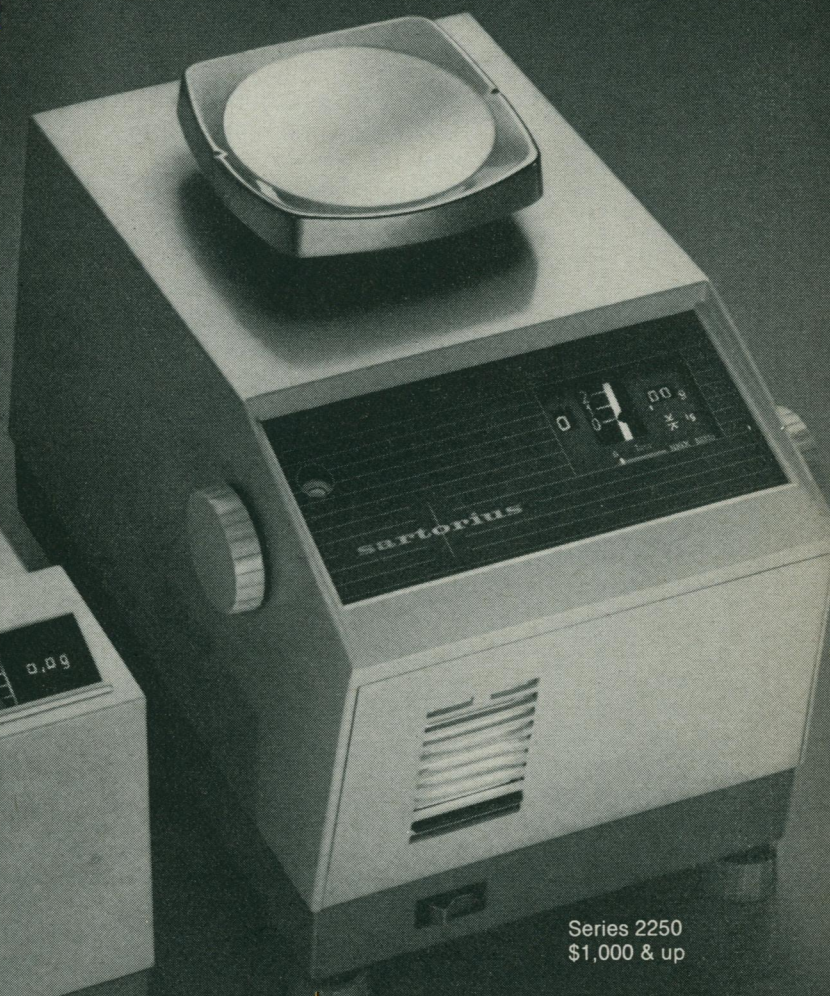
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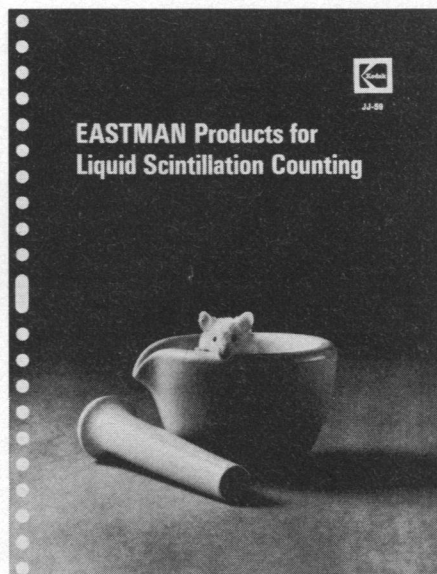
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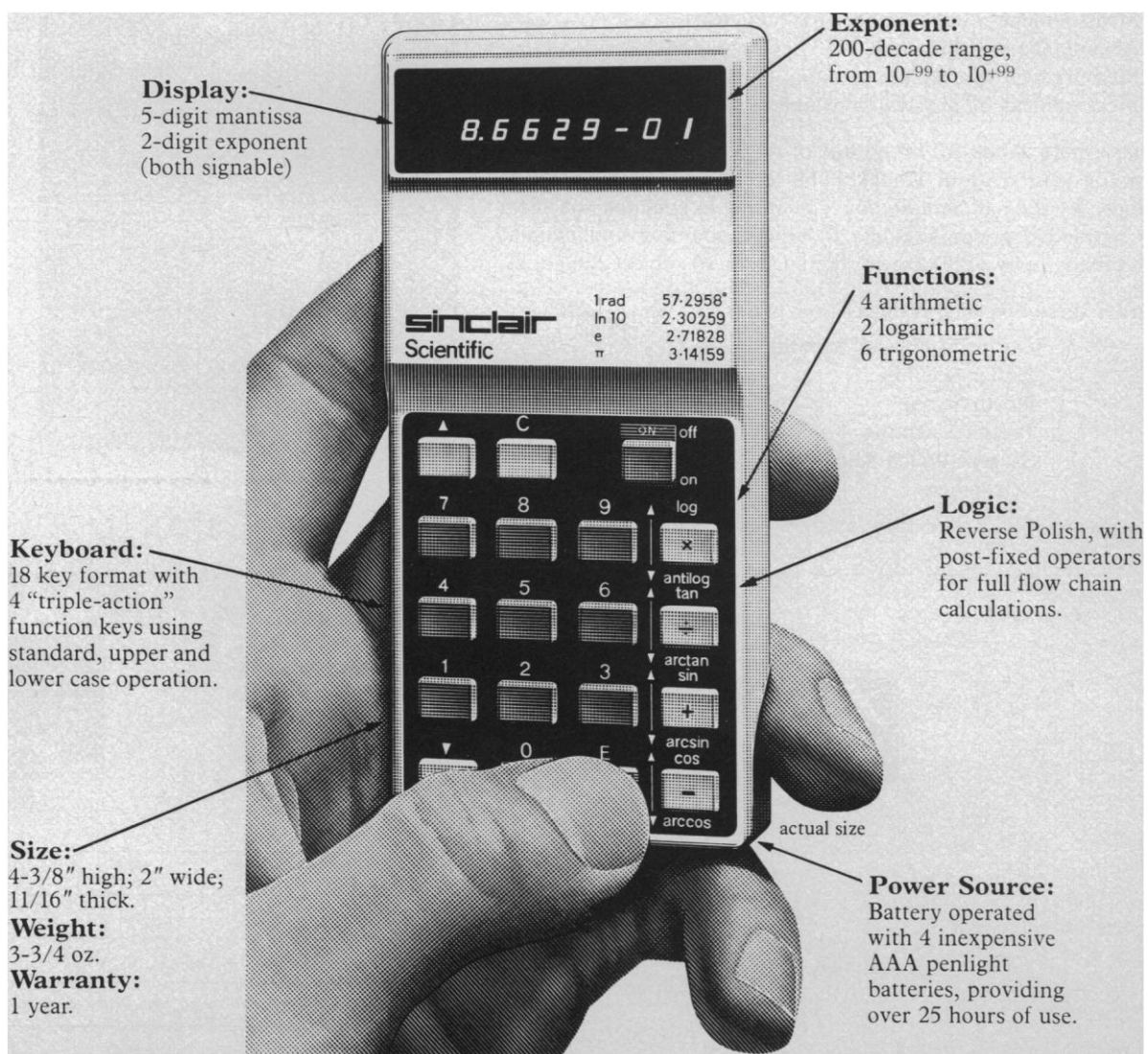
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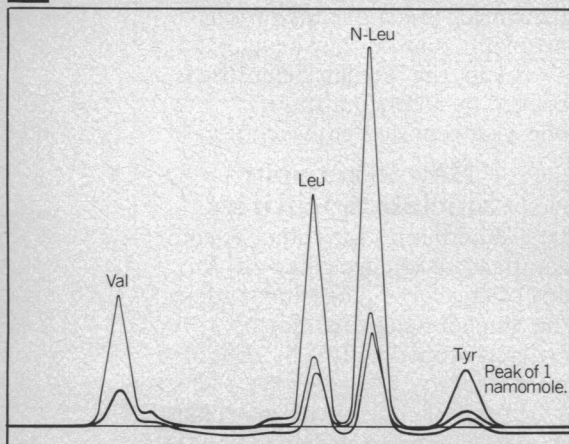
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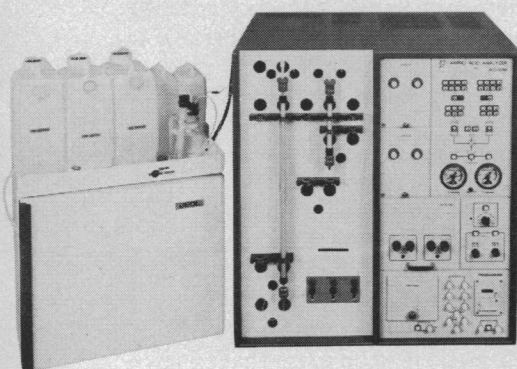
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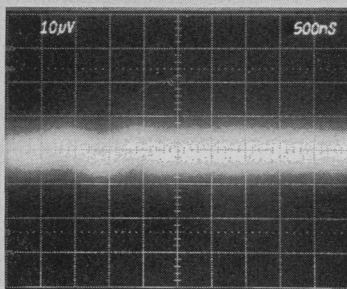
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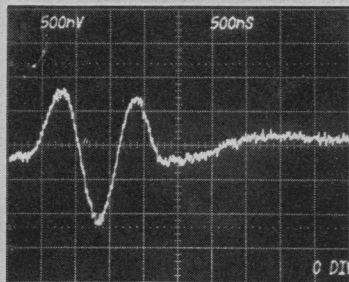
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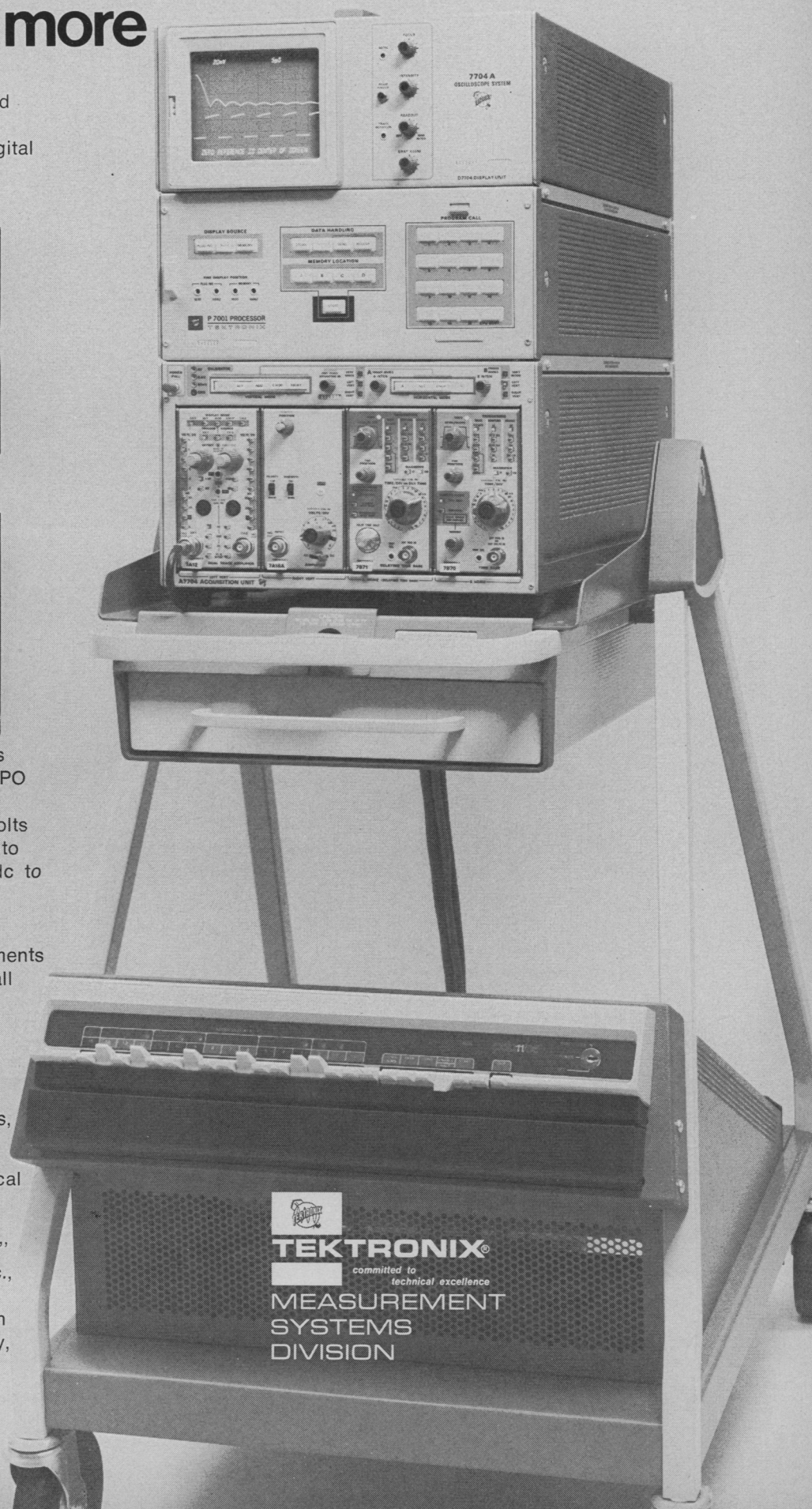


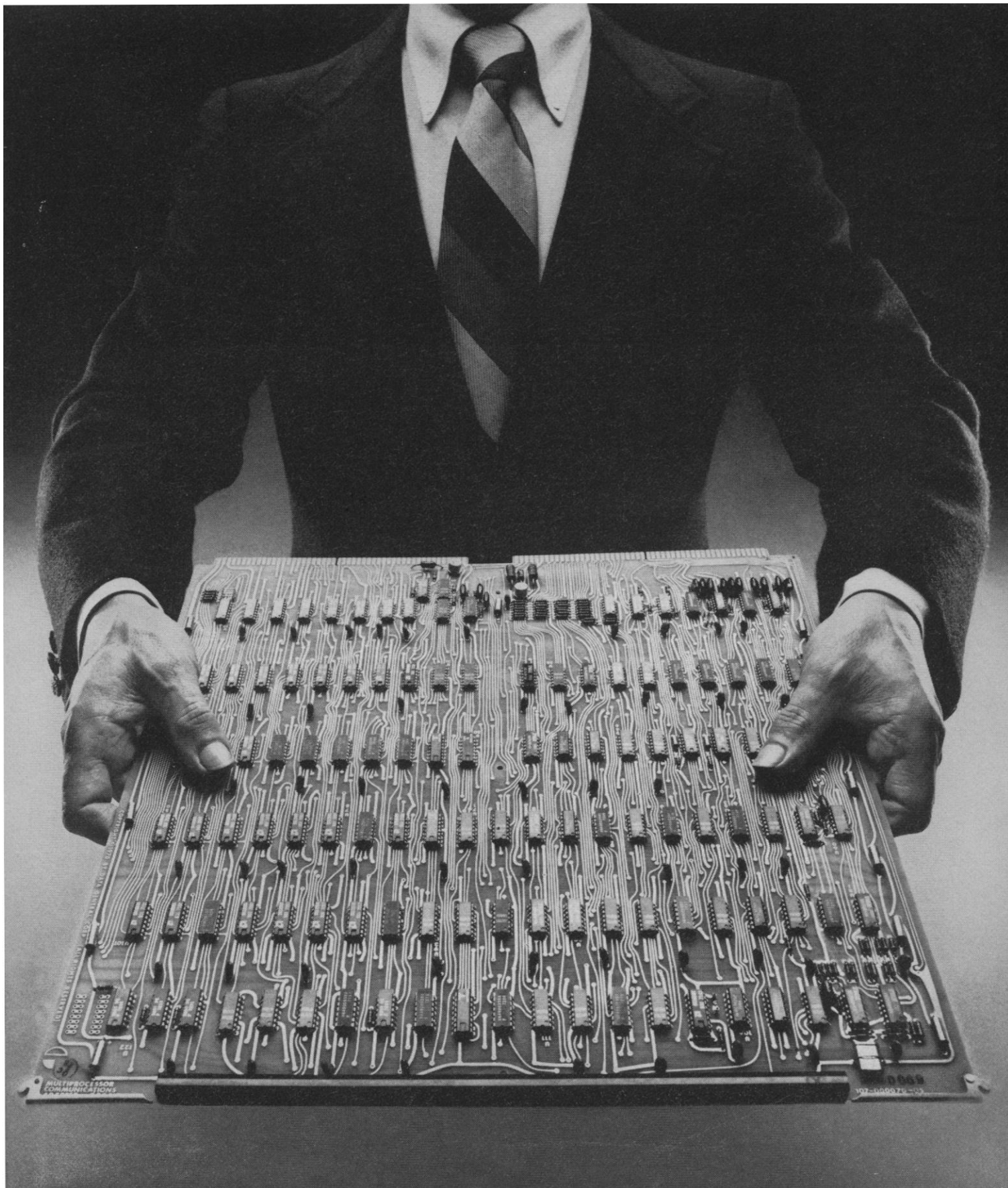
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



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1. R. M. May, *Stability and Complexity in Model Ecosystems* (Princeton Univ. Press, Princeton, N.J., 1973), p. 12. (The 19 percent of figures that are scaleless are diagrams of food webs, and the like, which do not admit of scaled axes: I can lay strong claim to being a scaler.)

Mr. Wonderfull's Surprise

Constance Holden's report "Food and nutrition: Is America due for a national policy?" (News and Comment, 3 May, p. 548) refers to "meetings [between nutritionists and] General Foods officials" about a cereal called Mr. Wonderfull's Surprise. She apparently got her generals confused. General Foods makes no such product, but General Mills does.

KEN FRANKLIN

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Landlubbing Admiral?

In Bruce C. Heezen's review (8 Feb., p. 504) of A. Hallam's book *A Revolution in the Earth Sciences* (1) the late Harry H. Hess is referred to as (in 1960) "the then-landlubber Princetonian geologist." Rear Admiral Hess, USNR, was such a low-keyed man that his modesty probably prevented some "high-seas" folk from realizing that, during World War II, he arranged for the preservation of data from recording fathometers on U.S. naval vessels plying the seas for other than oceanographic purposes.

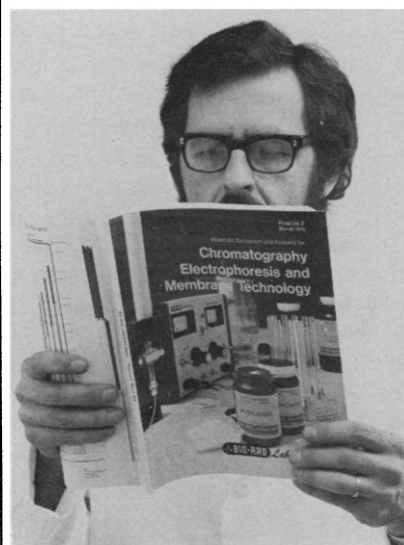
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References

1. A. Hallam, *A Revolution in the Earth Sciences* (Clarendon, New York, 1973).

The numerous important accomplishments and renowned abilities of the late Harry Hammond Hess were so solid and impressive that it would be sad to see his substantial record replaced by a fanciful legend. Contrary to what Hallam states in his book, Hess was not a submarine commander. He did command a World War II supply vessel (U.S.S. *Cape Johnson*) and ran a fathometer when the ship's mission took him to the unsounded areas of the western Pacific. To the flat-topped seamounts which abound there,

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he gave the name of the Princeton Geology Building (Guyot) (1). After the war, when he returned to his teaching post at Princeton, his seagoing days ended. He did, however, retain his reserve commission in the Navy, eventually rising to the rank of rear admiral. His annual reserve duty was often served at the U.S. Naval Hydrographic (later Oceanographic) Office, where he contoured deep-sea soundings that had been compiled. At Princeton Hess developed a vigorous research program on the geology of the lands surrounding the Caribbean, which provided stimulating thesis problems for a talented group of graduate students (2). He continued his active personal research in petrology. He also served in a variety of advisory capacities for national and international scientific endeavors.

It does not detract from his impressive record to point out that, contrary to popular belief, Hess played no active part in oceanographic research after World War II, preferring to play the role of critic. To be accurate, the contribution to post-World War II marine geology of Admiral Hess was made at a considerable distance from the sea by a "then landlubber."

BRUCE C. HEEZEN

Lamont-Doherty Geological
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1. H. H. Hess, *Am. J. Sci.* **224**, 772 (1946).
2. H. H. Hess, Ed., *Geol. Soc. Am. Mem.* **98**, 1 (1966).

Research Chemicals: Supply and Demand

Certain practices are occurring in the production and distribution of fine chemicals and biochemicals that should be of interest to a large number of scientific researchers dependent upon federal research grants. These practices are not limited to the United States; they are in fact a worldwide problem, occurring in Europe, Japan, and many other countries. Some supply houses, having determined that there is a market for a certain compound or enzyme but that they lack the necessary expertise to produce it themselves, are contacting and hiring as "consultants" scientists who supply them with the compound. Sometimes these compounds are produced in a university or research institute laboratory that is funded by

federal research grants. One example involved a university professor of chemistry who was also vice president of a chemical supply house. His federally funded research laboratory was literally a factory for his supply house, until he was caught and his wrist lightly slapped. These practices occur infrequently; research scientists as a group are relatively free of corruption, and in the United States, federal research funds are used with a high degree of cost-effectiveness.

What is the answer? The existing system, in which Professor X produces compound Y for supply house Z, is efficient and should be retained. Payment of Professor X "under the table" by supply house Z, however, is unethical and should be eliminated. As a practical solution, I propose that Professor X receive a fair payment (perhaps in the form of an honorarium) and that the balance be returned to Professor X's grantor, or Professor X's research fund. There may be better ways of handling the problem; it is basically a question of changing an unethical practice into an "above-board" practice.

R. L. KATZMAN

34 Gluskin, Rehovot, Israel

Telling Time

Recent discoveries indicate that birds and insects navigate by using polarized light, even in cloudy weather when the sun is obscured. I quote from a letter James Clerk Maxwell wrote to his father about a device he made in 1848 (1).

I have got a lucifer match box fitted up for polarising, thus. The rays suffer two reflections at the polarising angle from glasses A and B. . . . In the lid there is set a plate of mica, and so one observes the blue sky, and turns the box around till a particular colour appears, and then a line on the lid of the box points to the sun wherever he is. Thus one can find out the time of the day without the sun.

A diagram of the device is included. One is bound to ask whether the eyes of birds and (some) insects have the counterpart of Maxwell's invention in some biological structure.

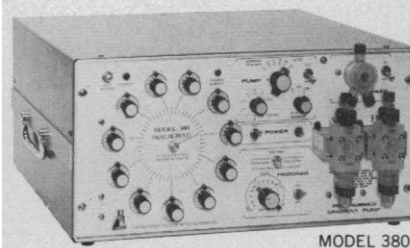
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References

1. L. Campbell and W. Garnett, *Life of James Clerk Maxwell* (Macmillan, London, 1882), p. 122.

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Will There Be Enough Food?

The ancient prayer, "Give us this day our daily bread," may have a desperate urgency for hundreds of millions of human beings during the next few years. World demand for cereals and plant proteins has been soaring, in part because of population growth in the poor countries and partly because of the use of beef in the rich countries as their per capita incomes rise. World grain reserves have fallen to their lowest level in two decades, equal to only about 27 days supply. At the same time the rise in petroleum prices has created a worldwide shortage of nitrogen fertilizers and has greatly lessened the ability of farmers in the poor countries to pump water for irrigation.

The United States, the leading supplier of food exports for the rest of the world, has brought all its idle cropland into production and with luck will produce a bumper crop this year. But most of our surplus will be sold to the other rich countries at prices the poor ones cannot afford, and food aid shipments are being severely reduced. Mankind may be drawing closer to a precipice where mass starvation occurs whenever drought or plant disease results in less-than-average crop production.

How can we draw back from the precipice? An obvious, difficult, but in the long run absolutely essential, way is through reducing rates of population growth. Supplies can be increased by three lines of action: for the short term, a world food bank; for the longer term, a modernization of agriculture in the poor countries; and finally, a sharp intensification of agricultural and food research.

A world food bank should have several components—stores of wheat and other cereals and of soybeans and other legumes; stores of fertilizers to enable crop production to be quickly expanded; reserves of land which can be put under the plow in emergencies; a bank of information and technology which can be used to increase crop yields; and stores of crop genes to enable seeds of new varieties to be quickly multiplied when the old varieties are stricken by pests or plant disease.

The modernization of agriculture in the poor countries has been shown to be technically feasible by the limited successes of the Green Revolution. But it requires much more than technology. The farmers must be able to buy the fertilizer, irrigation water, high-yielding seeds, plant protection, and knowledge necessary to increase their production; and benefits they receive from selling crops must be enough greater than the cost of inputs to provide incentives for increased production. Transportation, storage facilities, markets, and profitable prices are all essential components of modernization, as are reforms in land tenure systems, greater opportunities for rural employment, and mechanisms for transfer of technology to the farmer.

The modernization of agriculture depends on continuing agricultural research not only to produce new disease-resistant crop varieties but to increase the efficiency of water use, to find ways to combat soil deterioration and erosion, and in the long run to increase the efficiency of photosynthetic conversion of solar energy to food energy, proteins, and other nutrients that are acceptable components of human diets. Equally important are research and development on improved methods of food storage and processing, plant protection against pests and disease, and research which would permit crop diversification and lead to improved diets.

The United States has become the breadbasket of the world, in large part because of successful programs of research and application of research results. American agricultural researchers need to face an even greater future task—to use their methods and their insights to make possible a vast increase in food and fiber production throughout the world. In meeting this challenge they need reinforcement from the entire scientific community.—ROGER REVELLE

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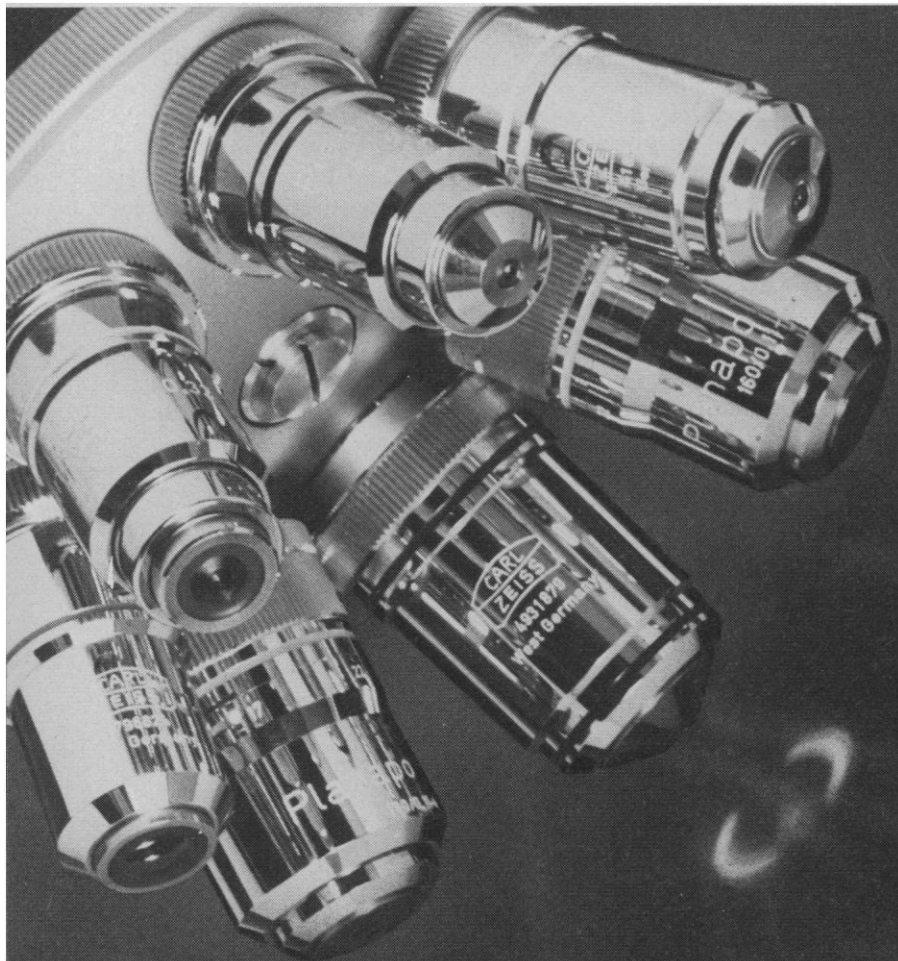
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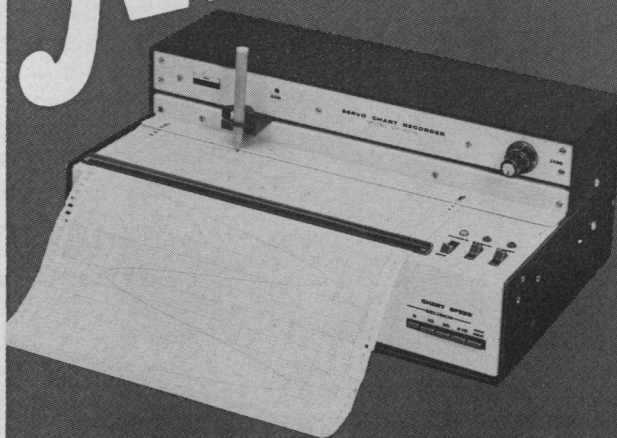
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77°K, although some work is being done at 4°K) by inorganic ions such as NO₃⁻ was discussed. Effects of solutes on the thermoluminescence observed from irradiated acid ices were also described. There was considerable discussion of evidences for tunneling of both trapped electrons and hydrogen atoms in experiments at low temperatures. The results of recent experiments on polymerization of formaldehyde at 4°K being conducted in the Institute of Chemical Physics (Moscow) were reported.

Discussions of the radiation chemistry of inorganic systems involved studies both in dilute solutions where abnormal oxidation and reduction states of metal ions were examined by pulse radiolysis techniques and in very concentrated solutions where considerable work is being done on effects of solutes on product formation. Studies on organic solutes focused around the oxidation of alcohols and other relatively simple oxygen-containing compounds (extensive work is in progress both in the Institute of Electrochemistry in Moscow and in the Department of Chemistry of the Byelorussian State University in Minsk). Papers were also presented on the radiolysis of aqueous solutions of both aliphatic and aromatic hydrocarbons. The sessions on biologically important systems were directed toward detailed examination of the products found in the radiolysis of solutions of various sugars, which are being studied in the Institute of Organic Chemistry in Moscow, and toward amino acids and proteins which are being studied in many of the Soviet laboratories.

All in all the symposium appeared to be very successful. As is usual for a conference of this type, considerable benefit was derived from the establishment of very fine personal contacts among the participants. The formal discussions of the presentations were somewhat limited due to lack of time but this seemed to be more than made up by extensive informal technical discussions during which the various scientists emphasized their common problems. While there may have been some reticence toward such informal discussion in cases where a language barrier existed, this reticence appeared to have been largely overcome by the assistance of many of the Soviet scientists who were able to act as interpreters.

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Forthcoming Events

July

1-2. National Symp. on **Water Resources Problems Related to Mining**, American Water Resources Assoc. and Colorado School of Mines, Golden. (D. T. Snow, Geology Dept., Colorado School of Mines, Golden 88040)

1-5. World Congr. of **Environmental Medicine and Biology**, Paris, France. (R. Abbou, Secretariat General et Scientifique, 115, rue de la Pompe, 75116 Paris)

1-5. British Council for **Rehabilitation of the Disabled**, 5th intern. seminar and exhibition, London, England. (I. R. Henderson, REHAB, Tavistock House (South), Tavistock Sq., London, WC1H 9LB)

3-5. European **Chemoreception Research Organization**, 1st congr., Paris-Orsay, France. (ECRO, Collège de France, 11 Place Marcelin Berthelot, 75231 Paris Cedex 05, France)

7-9. **Gamma Sigma Delta**, Brookings, S.D. (K. R. Keller, Agricultural Experiment Sta., 104 Patterson Hall, North Carolina State Univ., Raleigh 27607)

7-10. **Teratology Soc.**, 14th, Vancouver, B.C., Canada. (J. R. Miller, Dept. of Medical Genetics, Univ. of British Columbia, Vancouver)

7-11. **Health Physics Soc.**, 19th annual, Houston, Texas. (W. H. Parr, Physical Agents Branch/NIOSH, 1014 Broadway, Cincinnati, Ohio 45202)

7-12. **Neuropsychopharmacology**, 9th intern. congr., Paris, France. (J. R. Boissier, 2 rue d'Alesia, F75014 Paris)

7-13. **American Library Assoc.**, New York, N.Y. (D. H. Clift, ALA, 50 E. Huron St., Chicago, Ill. 60611)

7-13. **American College of Chest Physicians**, London, England. (A. Soffer, ACCP, 112 E. Chestnut St., Chicago, Ill. 60611)

8-10. **Society for Economic Botany**, East Lansing, Mich. (H. G. Wilkes, Biology Dept., College II, Univ. of Massachusetts, Boston 02125)

8-11. **Circumpolar Health**, 3rd intern. symp., Yellowknife, N.W.T., Canada. (O. Schaefer, Charles Camell Hospital, Edmonton, T5M 3A4, Alberta, Canada)

8-12. **International Conf. on Electron Lifetimes in Metals**, Natl. Science Foundation and U.S. Atomic Energy Commission, Eugene, Ore. (D. H. Lowndes, Dept. of Physics, Univ. of Oregon, Eugene 97403)

9-12. **Conference on Inter-Relation of Structure, Properties and Applications of Polymers**, Inst. of Physics, Nottingham, England. (Mtgs. Officer, IP, 47 Belgrave Sq., London, SW1X 80X, England)

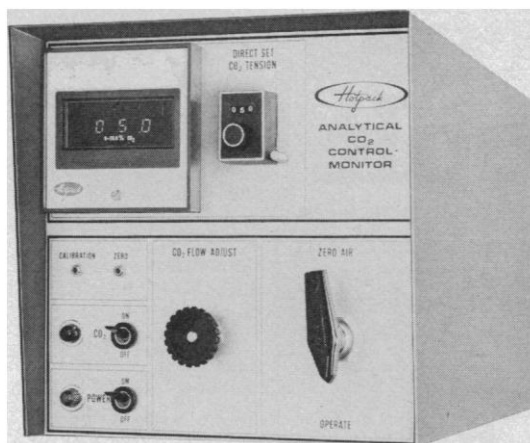
14-19. **Institute of Electrical and Electronics Engineers, Power Engineering Soc.**, summer mtg. and energy resources conf., Anaheim, Calif. (S. H. Gold, IEEE Energy Resources Conf., 345 E. 47 St., New York 10017)

14-19. **Illuminating Engineering Soc.**, New Orleans, La. (P. C. Ringgold, IES, 345 E. 47 St., New York 10017)

14-20. **Radiation Research Soc.**, 22nd annual, Seattle, Wash. (R. J. Burk, Jr., RRS, 4211 39th St., NW, Washington, D.C. 20016)

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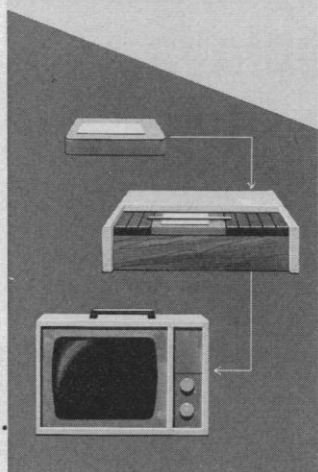
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15-16. **Advances in Fertility Regulation through Basic Research**, 3rd annual, New York, N.Y. (C. A. Gallaway, Population Council, Rockefeller Univ., New York 10021)

15-18. **Conference on Nuclear and Space Radiation Effects**, Institute of Electrical and Electronics Engineers, Fort Collins, Colo. (E. A. Burke, AFCRL LOR/Stop 30, L. G. Hanscom Field, Bedford, Mass. 01730)

15-19. **Dynamic Studies with Radioisotopes in Clinical Medicine and Research Symp.**, Intern. Atomic Energy Agency, Knoxville, Tenn. (R. A. Dudley, Medical Applications Section, IAEA, Kärntner Ring 11-13, P.O. Box 590, A-1011 Vienna, Austria)

15-19. **National Soc. of Professional Engineers**, Atlantic City, N.J. (P. H. Robbins, NSPE, 2029 K St., NW, Washington, D.C. 20006)

15-20. **American Soc. of Pharmacognosy with Acad. of Pharmaceutical Sciences** (Pharmacognosy and Natural Products Section), 14th, Jekyll Island, Ga. (J. D. Leary, Dept. of Chemistry, Massachusetts College of Pharmacy, 179 Longwood Ave., Boston 02115)

21-26. **American Soc. for Horticultural Science**, Guelph, Ont., Canada. (C. Blackwell, ASHS, P.O. Box 109, 914 Main St., St. Joseph, Mich. 49085)

21-26. **Conference on Process Design, Operation, and Control for Safety and Reliability**, Engineering Foundation, Henninger, N.H. (EF, United Engineering Center, 345 E. 47 St., New York 10017)

21-26. **Improving Indoor Air Quality Conf.**, Engineering Foundation, Rindge, N.H. (EF, United Engineering Center, 345 E. 47 St., New York 10017)

22-25. **Cancer of the Skin and Mouth-Advances in Diagnosis and Treatment**, Stanford, Calif. (P. H. Jacobs, Dept. of Dermatology, Stanford Univ. Medical Center, Stanford 94305)

22-25. **American Veterinary Medical Assoc.**, Denver, Colo. (D. A. Price, AVMA, 600 S. Michigan Ave., Chicago, Ill. 60605)

22-26. **American Soc. for Photobiology**, 2nd annual, Vancouver, B.C., Canada. (R. J. Burk, Jr., ASP, 4211 39th St., NW, Washington, D.C. 20016)

22-26. **Working Place, Home and Leisure Safety Conf.**, Scientific Affairs Div., North Atlantic Treaty Organization, Bad Grund, Germany. (M. Hagenkötter, Bundesanstalt für Arbeitsschutz und Unfallforschung, 46 Dortmund Marten, Postfach 25, Germany)

22-26. **Symposium on the Sterility Principle for Insect Control**, Food and Agriculture Organization of the United Nations and the Intern. Atomic Energy Agency, Vienna, Austria. (J. H. Kane, Office of Information Services, U.S. Atomic Energy Commission, Washington, D.C. 20545)

22-27. **Interallied Confederation of Medical Reserve Officers**, 28th annual, Oslo, Norway. (J. H. Kidder, 4545 Connecticut Ave., NW, Washington, D.C. 20008)

23-31. **International Congr. on Acoustics**, 8th, London, England. (Administrative-Secretary, ICA, 47 Belgrave Sq., London SW1X 8QX)

24-27. **Hormones, Homeostasis and the Brain**, 5th intern. congr., Intern. Soc. for Psychoneuroendocrinology, Utrecht, Netherlands. (D. de Wied, Rudolf Magnus Inst. for Pharmacology, Medical Faculty, Univ. of Utrecht, Vondellaan 6, Utrecht)

25-27. **Calorimetry Conf.**, 29th annual, Knoxville, Tenn. (H. Watts, Research & Development Dept., Dow Chemical of Canada, Ltd., P.O. Box 1012, Sarnia, Ont., N7T 7K7, Canada)

25-27. **American Electroencephalographic Soc.**, Seattle, Wash. (M. H. Henry, AES, 36391 Maple Grove Rd., Willoughby Hills, Ohio 44094)

26-2. **Applied Psychology**, 18th intern. congr., Montreal, P.Q., Canada. (G. Desautels, 195 Bloomfield, Outremont-Montreal)

28-31. **American Soc. of Animal Science**, Ithaca, N.Y. (T. J. Marlowe, Dept. of Animal Science, Virginia Polytechnic Inst., Blacksburg 24061)

28-31. **National Urban League Conf.**, San Francisco, Calif. (NUL, Inc., Conf. Div., 55 E. 52 St., New York 10022)

28-1. **National Medical Assoc.**, New Orleans, La. (R. D. Watkins, NMA, 2109 E St., NW, Washington, D.C. 20037)

28-2. **International Assoc. of Applied Psychology**, 18th congr., Montreal, P.Q., Canada. (G. DesAutels, IAAP, C.P. 242, Station Youville, Montreal)

28-2. **International Assoc. for Child Psychiatry and Allied Professions**, 8th congr., Philadelphia, Pa. (A. Solnit, IACPAP, P.O. Box 1974, Philadelphia 19105)

28-4. **Productivity Improvement in the Service Sector of the National Economy**, 3rd conf., Engineering Foundation, Natl. Commission on Productivity, Commerce Dept.'s Office of Telecommunications, and Natl. Bureau of Standards, Rindge, N.H. (EF, 345 E. 47 St., New York 10017)

29-2. **Conference on Dynamics of Molecular Collisions**, Santa Cruz, Calif. (J. L. Kinsey, Room 6-229, Massachusetts Inst. of Technology, Cambridge 02139)

30-1. **American Quaternary Assoc.**, Madison, Wis. (W. M. Wendland, AMQUA, Center for Climatic Research, 1225 W. Dayton St., Madison 53706)

31-3. **Wildlife Disease Assoc.**, Asilomar, Calif. (B. W. Hudson, Chief, Immunobiology Unit, Center for Disease Control, Ecological Investigations Program, Fort Collins Labs., P.O. Box 2087, Fort Collins, Colo. 80521)

August

1-4. **International Symp. on Microwave Acoustics**, Inst. of Physics, Lancaster, England. (J. K. Wigmore, Dept. of Physics, Univ. of Lancaster, Lancaster, LA1 4YB)

3-8. **American Pharmaceutical Assoc.**, 121st mtg., Chicago, Ill. (W. S. Apple, APA, 2215 Constitution Ave., NW, Washington, D.C. 20037)

3-9. **American Soc. of Hospital Pharmacists**, Chicago, Ill. (J. A. Oddis, ASHP, 4630 Montgomery Ave., Bethesda, Md. 20014)

4-9. **American Soc. of Parasitologists**, Kansas City, Mo. (D. V. Moore, Univ. of Texas Health Science Center, 5325 Harry Hines Blvd., Dallas 75235)