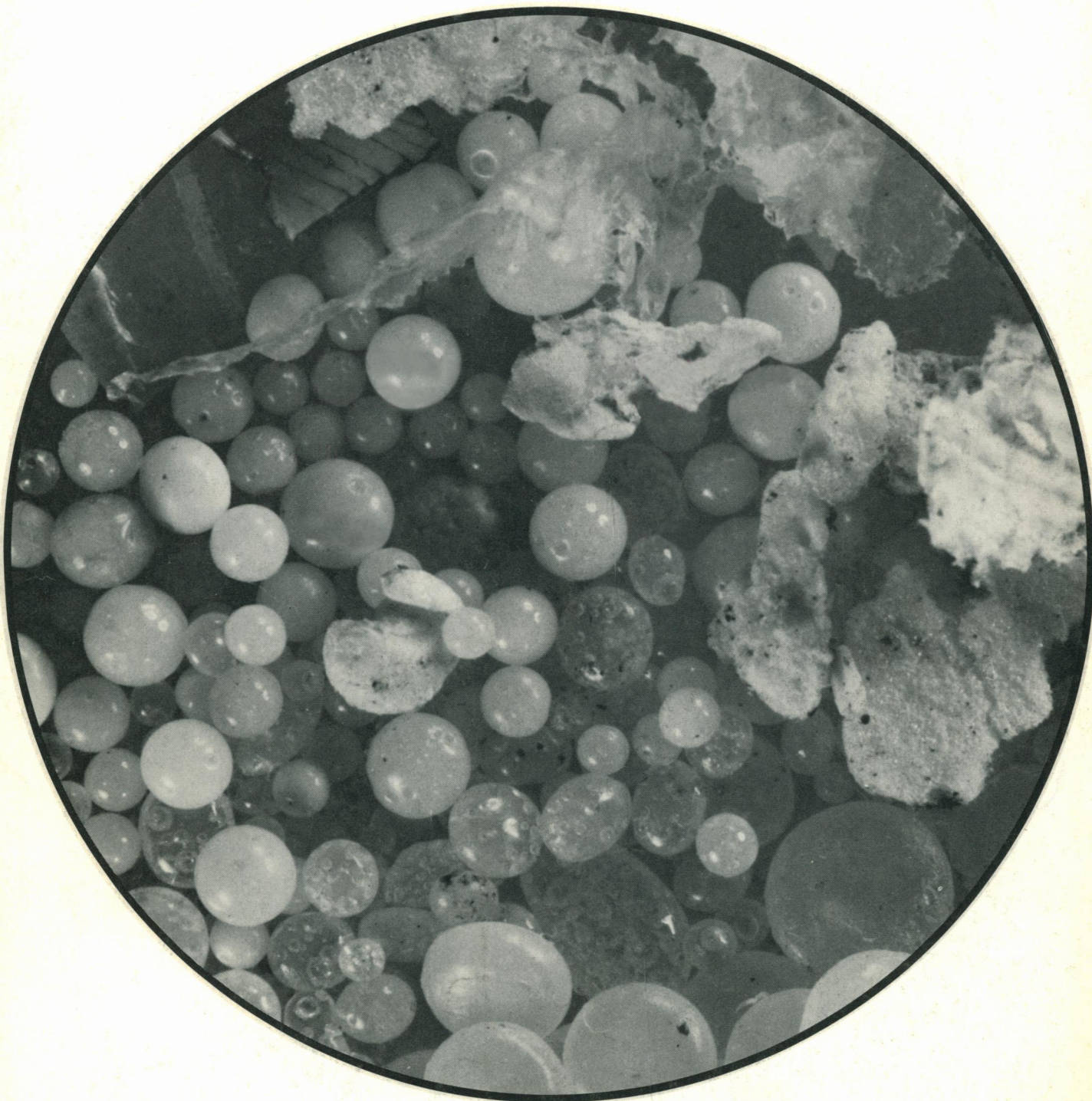


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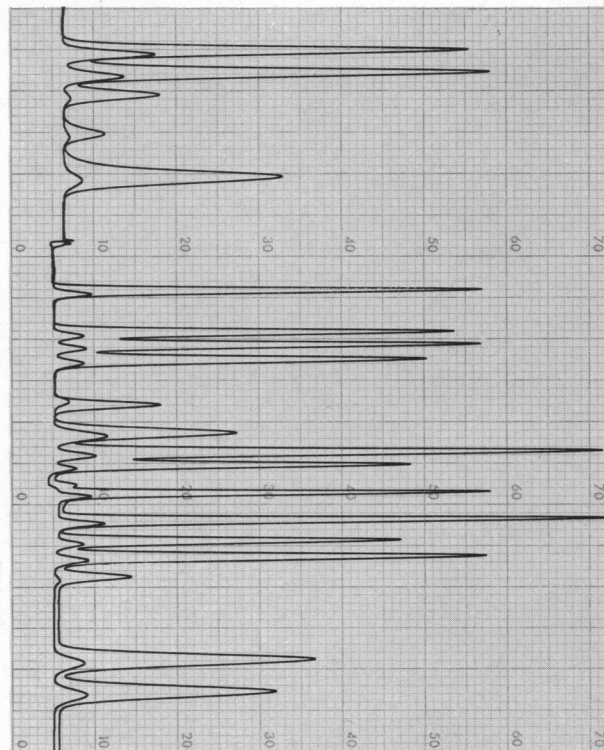
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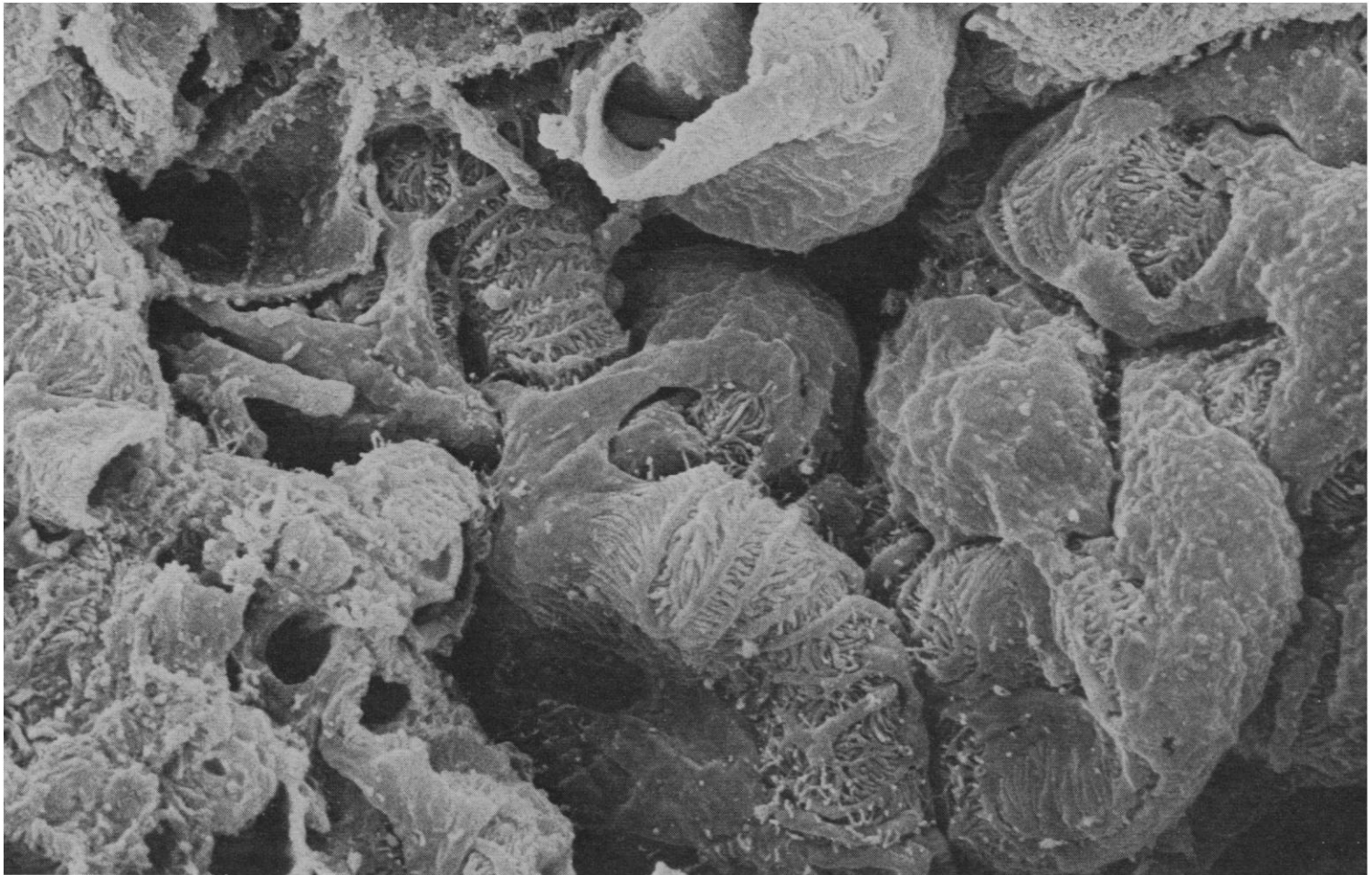
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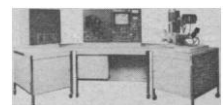
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EDITORIAL	Hemispheric Cooperation in Science	485
ARTICLES	Prospects for Detecting Blackbody X-rays from Neutron Stars: <i>G. Greenstein</i> and <i>J. E. McClintock</i>	487
	Plastic Particles in Surface Waters of the Northwestern Atlantic: <i>J. B. Colton, Jr., F. D. Knapp, B. R. Burns</i>	491
	Social Origins of American Scientists and Scholars: <i>K. R. Hardy</i>	497
NEWS AND COMMENT	Nuclear Testing Violations: Keeping It All in the Family	506
	Advising the Congress: OTA Council Faces Shakedown Problems	510
	British Choose Own Reactor for Nuclear Power Program	511
	Strip Mining: Congress Moves toward "Tough" Regulation	513
RESEARCH NEWS	Bright Spot: Better Seismological Indicators of Gas and Oil	515
	Control of Protein Synthesis (I): Poly(A) in the Cytoplasm	517
BOOK REVIEWS	The Maturing of American Science, reviewed by <i>A. K. Smith</i> ; Free-Radical Chemistry, <i>C. Walling</i> ; Biological Clocks in Marine Organisms, <i>J. T. Enright</i> ; Books Received	519

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORTS	Cellulose: Its Regeneration in the Native Lattice: <i>R. H. Atalla</i> and <i>S. C. Nagel</i>	522
	Mirex: An Unrecognized Contaminant of Fishes from Lake Ontario: <i>K. L. E. Kaiser</i>	523
	Mechanism for the Autocatalytic Formation of Optically Active Compounds under Abiotic Conditions: <i>B. S. Green</i> and <i>L. Heller</i>	525
	5-Hydroxyindoleacetic Acid in the Lumbar Fluid: A Specific Indicator of Spinal Cord Injury: <i>M. Bulat</i> et al.	527
	Free Radicals and Inflammation: Protection of Synovial Fluid by Superoxide Dismutase: <i>J. M. McCord</i>	529
	Chloral Hydrate: A Solvent for Biological Membranes: <i>B. Ballou</i> , <i>G. Sundharadas</i> , <i>M. L. Bach</i>	531
	Absence of REM Rebound after Barbiturate Withdrawal: <i>I. Feinberg</i> et al.	534
	Firing Patterns of Hypothalamic Supraoptic Neurons during Water Deprivation in Monkeys: <i>E. Arnould</i> , <i>J. D. Vincent</i> , <i>J. J. Dreifuss</i>	535
	Cerebral Dominance in Musicians and Nonmusicians: <i>T. G. Bever</i> and <i>R. J. Chiarello</i>	537
	Competition: A Theory Based on Realistic, General Equations of Population Growth: <i>R. G. Wiegert</i>	539
	<i>Technical Comments: Origin of the 260-Day Cycle in Mesoamerica: J. S. Henderson; A. G. Fitchett; V. H. Malmstrom; Possible Noninhibition of Cellular-Mediated Immunity in Marihuana Smokers: A. B. Segelman and F. P. Segelman; G. G. Nahas</i> et al.	542
MEETINGS	Anthropology Applied to Health Programs: <i>A. J. Rubel</i> ; Forthcoming Events	545
PRODUCTS AND MATERIALS	Medical Instrument Calibration System; Fourier Transform NMR Spectrometer; Mercury Ultraviolet Source; Krypton Laser; Literature	553

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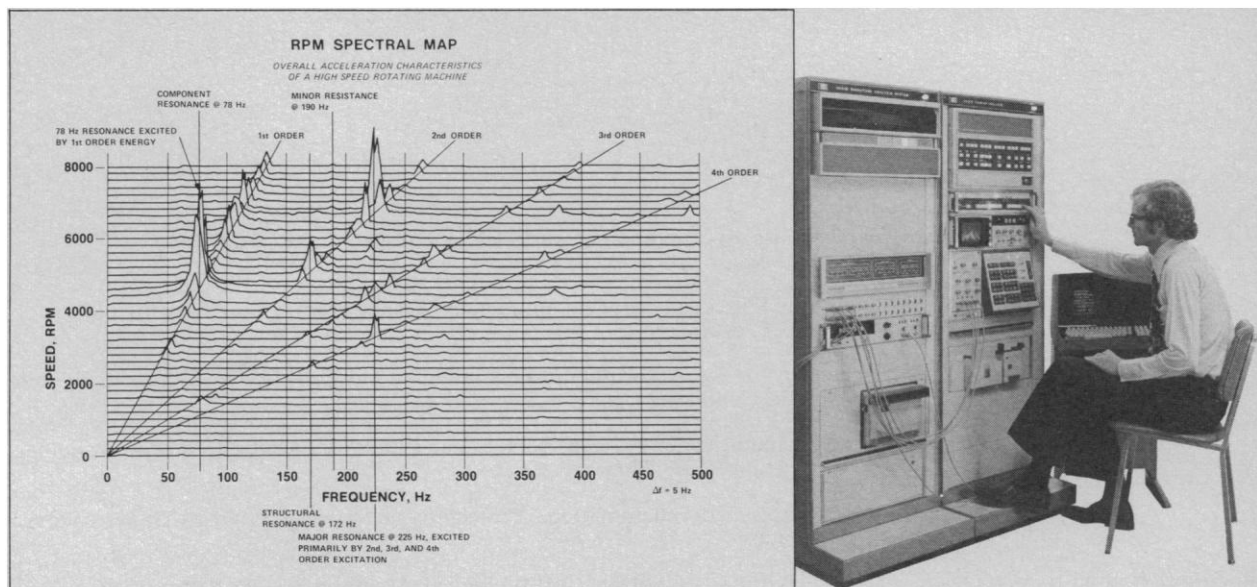
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Plastic particles collected in surface waters over a broad area of the north-west Atlantic Ocean. The background is the 0.947-millimeter nylon mesh used in the neuston collecting net. See page 491. [Harold L. Pratt, National Marine Fisheries Service, Narragansett Laboratory, Narragansett, Rhode Island]

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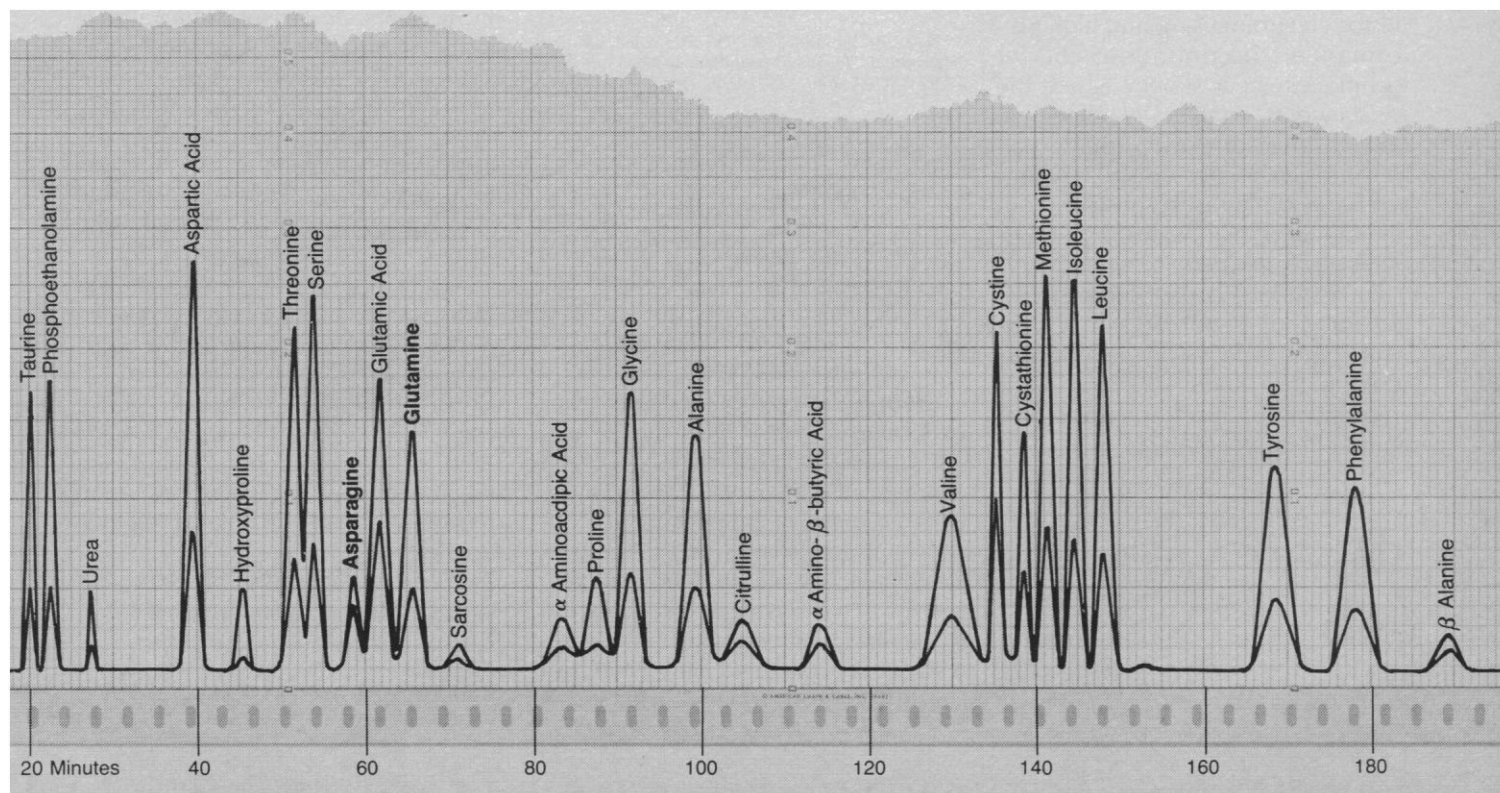
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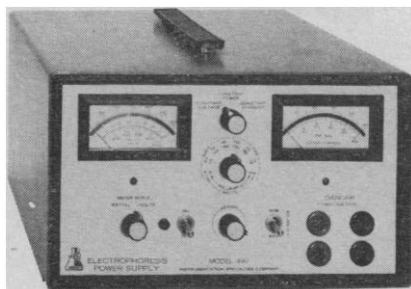
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uncertainty in the estimates of ΔP , while the increased cost of production can usually be passed on to the consumer.

2) An investment which is justified at current sales levels would not be justified if sales fall, since it would increase the fixed cost of the industry.

3) The high cost of capital discourages energy-saving investment, since it raises both ΔK and the minimum acceptable value of r .

Initial investments are often more effective than alternatives in conserving energy, yet, initially the uncertainties are greatest and hence additional investments less likely.

As Berg points out, small companies are least able to make energy-saving investments. Not only is capital harder and more expensive for them to obtain, but they run a higher risk than the larger corporations which have an established market. The paradox is that those companies for whom price competition makes investments which save energy advisable (and hence price cuts possible) are the least likely to be able to make the investments. Large corporations, such as automobile, steel, and so forth, are much more able to set prices where they receive the highest return and hence have the least incentive to make energy-saving investments.

G. THOMAS

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1. See, for example, R. G. D. Allen, *Macro-Economic Theory* (Macmillan, London, 1968).
2. *New York Times*, 24 January 1974, p. 1.

Energy and Food

I would like to correct two errors in the article by John S. Steinhart and Carol E. Steinhart (19 Apr., p. 307) on energy and food. They write, "A dramatic suggestion, to abandon chemical farming altogether, has been made by Chapman. His analysis shows. . ."

First, in the article they cite (1), I discussed the economic consequences of regulating or prohibiting various agriculture chemicals. I did not suggest abandoning "chemical farming altogether." Their error, however, is understandable, since my original title was replaced by the inaccurate title "An end to chemical farming?" without my

knowledge. Second, I discussed empirical results of other investigators; I undertook no new analysis. The points summarized by Steinhart and Steinhart are, however, worth considering. The consequences of high export demand and high energy prices will be in many respects similar to the effects of chemical regulation, namely, higher net income in farming, more acreage, less chemicals, and a retardation or reversal of emigration from agricultural areas. And, the competitive position of the family farm is improving vis-à-vis the corporate farm (2).

DUANE CHAPMAN

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1. D. Chapman, *Environment* (St. Louis) 15 (No. 2), 12 (1973).
2. B. F. Stanton, *Cornell Agricultural Economics Staff Paper No. 74-8* (Dept. of Agricultural Economics, Cornell Univ., Ithaca, N.Y., 1974).

The distinction between "coastal" and "distant" fishing in Steinhart and Steinhart's article should be clarified, as the reader may be left with the impression that coastal fisheries are more susceptible to overfishing than distant fisheries.

The overwhelming preponderance of catches in the world's fisheries is made in coastal waters. For example, the National Marine Fisheries Service estimates that some 77 percent of the 1973 U.S. catch was taken within 12 miles of U.S. shores. Distant fishing is rarely conducted in mid-ocean, as the term might imply. It is most often distant in the sense that it is conducted off someone else's shores. For example, the more than 300 Soviet vessels fishing off the United States in February were, from their point of view, engaged in distant fishing; from our point of view, a good percentage of them were engaged in coastal fishing.

Distant fishing frequently exploits stocks which have been underexploited by the contiguous country. It is energy-intensive for the obvious reason that it takes a lot of fuel to move the fleet a long distance to the fishing grounds and to move the catch back home. But distant fisheries are more prone to overfishing than traditional coastal fisheries.

ROBERT W. SCHONING

*National Marine Fisheries Service,
National Oceanic and Atmospheric
Administration, Department of
Commerce, Washington, D.C. 20235*

We regret any erroneous implication that Chapman was advocating the abandoning of chemical farming.

The point raised by Schoning is an important one. Even the proposed "distant" fishing for Antarctic krill is still coastal fishing (although off an unoccupied coast). Sometimes such fishing is in underexploited areas—as the Antarctic case would be—but, all too frequently, fishing distant shores is the first step in overexploitation and leads to political difficulties (as in Iceland), economic difficulties, and overfishing (as in Peru).

JOHN S. STEINHART
CAROL E. STEINHART

Marine Studies Center,
University of Wisconsin,
Madison 53706

Geothermal Resources: Prospects for Development

May I offer a footnote to Geoffrey R. Robson's fine review "Geothermal electricity production" (19 Apr., p. 371).

On 12 July 1973, Pacific Energy Corporation (the geothermal operating arm of Hughes Aircraft Company) entered into an agreement with Pacific Gas and Electric Company (PG & E) under which it agreed to sell PG & E its established geothermal steam reserves (149 hectares) and to develop additional reserves (1304 hectares), and PG & E agreed to buy all the steam produced in that area, located within The Geysers geothermal field in Sonoma County, California. An initial 55-megawatt power plant will be installed by PG & E by 1977; additional power plants will be installed as additional geothermal reserves are established. PG & E is presently paying geothermal steam suppliers 3.73 mills per kilowatt-hour for steam supply and effluent disposal services. The Pacific Energy Corporation also holds additional leases within The Geysers (about 6000 hectares) that are uncommitted and has applied for federal geothermal leases in Oregon, Washington, Idaho, and Utah.

Barbier and Fanelli (1) report that the installed capacity at Larderello-Travalle in Italy is 405.6 megawatts. The installed capacity at The Geysers will be 516 gigawatts by November 1974 (2). The 20-megawatt geothermal power plant at Matsukawa, Japan, is

owned and operated by the Japan Metals and Chemicals Company; a 10-megawatt plant has recently been installed there by Mitsubishi Mining Company.

While "dry (superheated) steam" field operation is relatively simple, as Robson notes, the work under way to demonstrate binary cycle systems is thought by several major companies to offer a more economical and efficient conversion process (3).

The dry steam produced at The Geysers is not only the result of encountering a vapor dominated reservoir. Superheating may also be a function of the thermodynamic process occurring in the well bore and the pipeline system.

One of the major obstacles to geothermal development in the United States is the fact that the federal tax laws do not refer to "geothermal resources" or provide any explicit tax treatment for exploration and drilling expenses.

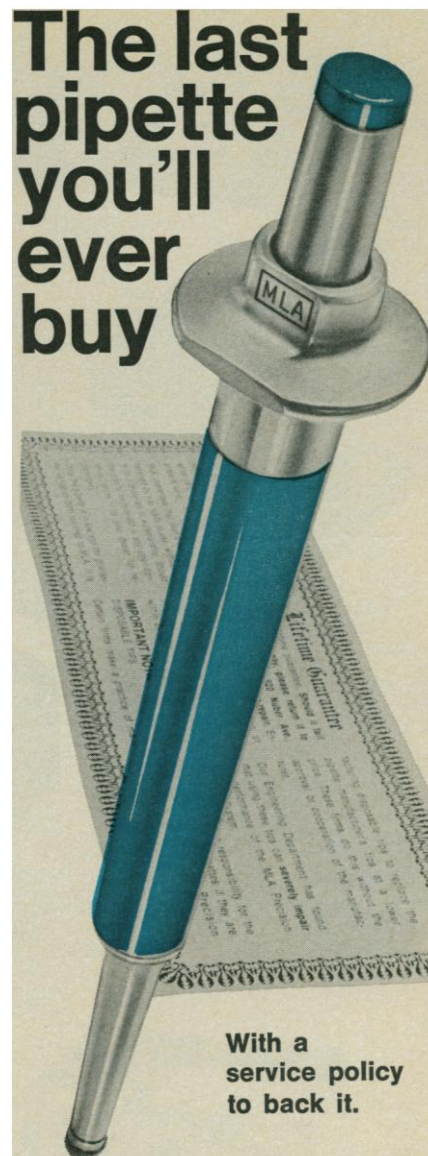
Congress is aware of this oversight, but the current political situation regarding the tax treatment of oil and gas companies has apparently prevented any consideration of the plight of the geothermal developer at this time. Until geothermal exploration costs can be confidently treated as current business deductions, it is unlikely that the rate of geothermal exploration will increase dramatically.

Some 100 companies, partnerships, and individuals have applied for federal geothermal leases (about 3.2 million hectares) since 1 January 1974, when the Federal Leasing Program began. It is hoped that the federal government will change the focus of its political attention and enact remedial legislation that will encourage the development of these lands.

DONALD F. X. FINN
Geothermal Energy Institute,
Suite 426, 680 Beach Street,
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References

1. E. Barbier and M. Fanelli, *Overview of Geothermal Exploration and Development in the World* (Istituto Internazionale per le Ricerche Geotermiche, Pisa, Italy, 1973), p. 3.
2. PG & E *Environmental Data Statement for Geysers Unit 15* (Pacific Gas and Electric Co., San Francisco, 1974).
3. D. H. Cortez, B. Holt, A. J. L. Hutchinson, *Energy Sourc. J.* 1, 1 (1974); a contrary opinion is held that "theoretically a refrigerant can promise more [electrical] output than does water in the single flash process . . . [but] it appears that double flash can about match anything that refrigerants can hope to attain and is eminently more practical" [B. Wood, in *Geothermal Energy*, N. C. H. Armstead, Ed. (Unesco, Paris, 1973), p. 121].



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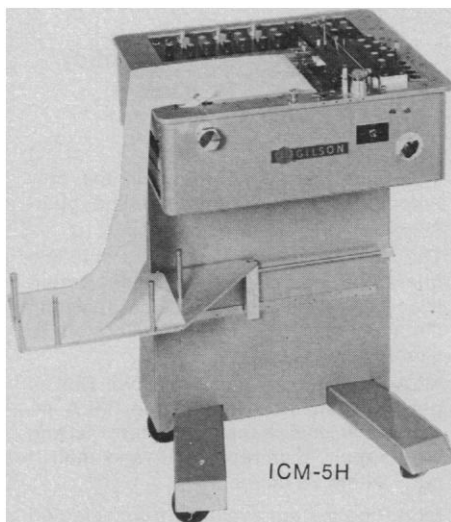
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Hemispheric Cooperation in Science

A new mechanism for facilitating enhanced cooperation among scientists of the Western Hemisphere was created on 10 July 1974 at a meeting in Recife, Brazil, attended by scientists from Argentina, Brazil, Colombia, Mexico, the United States, and Venezuela.* A Coordinating Committee of the Associations for the Advancement of Science in the Americas was formed whose purposes are (i) to unite the American scientific community, to serve the development of the nations and the well-being of their peoples; (ii) to promote, in a cooperative manner, the use of science for the benefit of the people of the hemisphere; (iii) to stimulate the formation of associations for the advancement of science in those countries of the hemisphere which do not have such an association.

Impetus for the formation of the Coordinating Committee was provided by the success of the international meeting held in Mexico City on 20 June to 4 July 1973. Organized around the theme "Science and Man in the Americas," the gathering brought together some of the leading scientists of the Americas. The agenda covered many of the areas in which science and technology interact with societal problems common to the countries of this hemisphere. In a speech at the meeting, Dr. Glenn T. Seaborg, then chairman of the Board of Directors of AAAS, proposed the creation of an Association of Associations for the Advancement of Science. A series of exploratory discussions followed at Mexico City, and later in Bogota and San Francisco. These revealed a common desire to move toward implementing Dr. Seaborg's proposal by improving communication among this hemisphere's scientists. Accordingly another international meeting with a repeat of the theme "Science and Man in the Americas" is likely to occur in 1977. There was also talk of smaller gatherings devoted to single topics such as energy.

Considerable enthusiasm greeted a proposal to establish a journal tentatively titled *Science for Development*. This would be similar in many respects to *Science* but without research reports. It would contain a substantial proportion of articles devoted to major problems of Latin America, for example, tropical agriculture, natural products, arid lands, population, and technology transfer and deal with science related to such problems. The journal would be trilingual—English, Portuguese, and Spanish. Articles would have abstracts in all three languages. There would be coeditors for each of the languages, and the journal would probably be printed in one of the Spanish-speaking countries.

The geography of Latin America, with its nearly impassable mountains and jungles, has long dictated the existence of isolated communities and countries. In former years letters traveled more rapidly from one Latin city to New York than to a nearby country. But times are changing. A Colombian scientist told me, "We have passed from the age of the mule to the age of the airplane in not much more than a decade." Attitudes toward social problems are also changing. Throughout the Western Hemisphere there is growing awareness of the potential role of science and technology in development. The circumstances of the times make this moment an unusually propitious one in which to initiate cooperative efforts.

The path to success in joint hemispheric ventures will not be an easy one. There are differences in language and culture and in tempo and modes of doing business that will be difficult to surmount. However, the exploratory discussions were conducted in a considerate and civilized way leading to the belief that the activities of the Coordinating Committee could foster a pleasant and continuing useful interchange.

—PHILIP H. ABELSON

* Those attending included Alberto C. Taquini and Luis Antonio Santalo, Argentina; Oscar Sala and Luiz Edmundo de Magalhães, Brazil; Carlos Perez Martinez, Colombia; Edmundo de Alba, Mexico; Leonard M. Rieser and Philip H. Abelson, United States; and Tulio Arends, Venezuela. Secretary of the Committee is Dr. Carlos Perez Martinez, Coordination Committee of the Associations for the Advancement of Science in the Americas, P.O. Box 783, Bucaramanga, Colombia.

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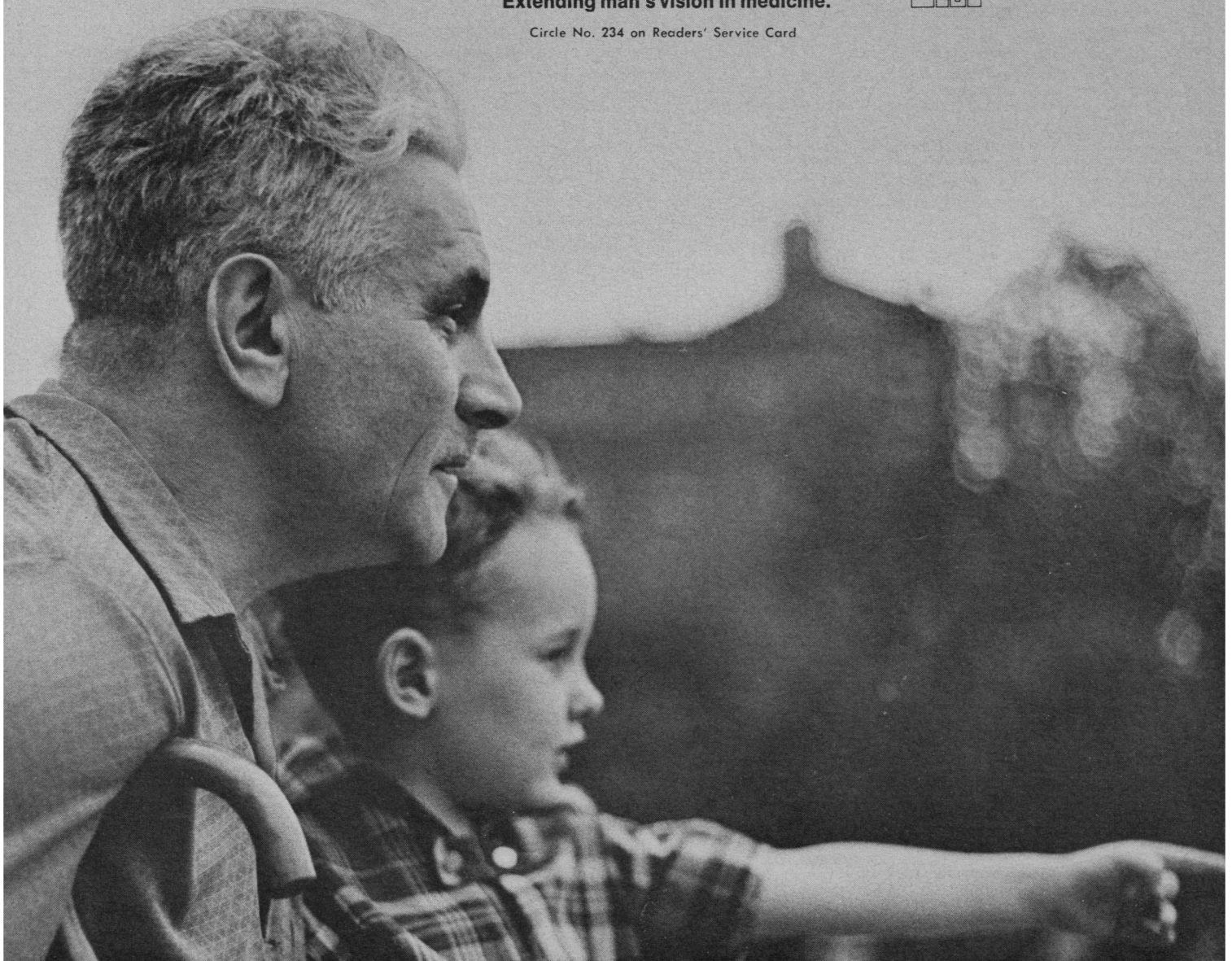
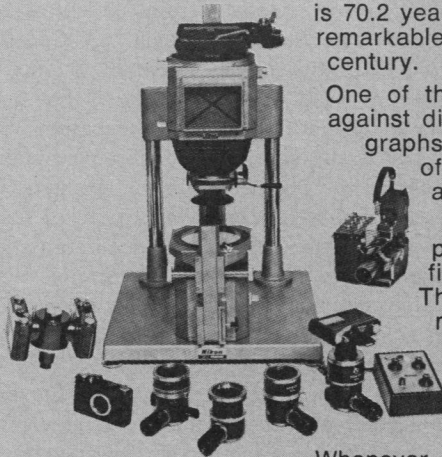
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9-13. **Nuclear Structure and Spectroscopy Conf.**, Intern. Union of Pure and Applied Physics, Amsterdam, Netherlands. (H. P. Blok, Natuurkundig Lab. der Vrije Univ. de Boelelaan 1081, Amsterdam)

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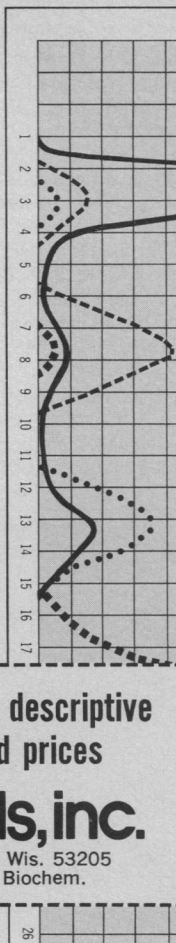
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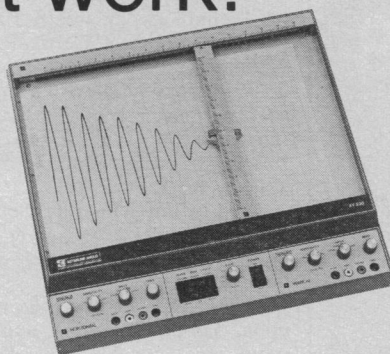
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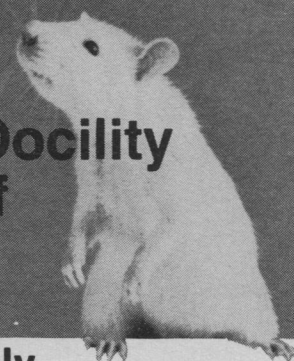
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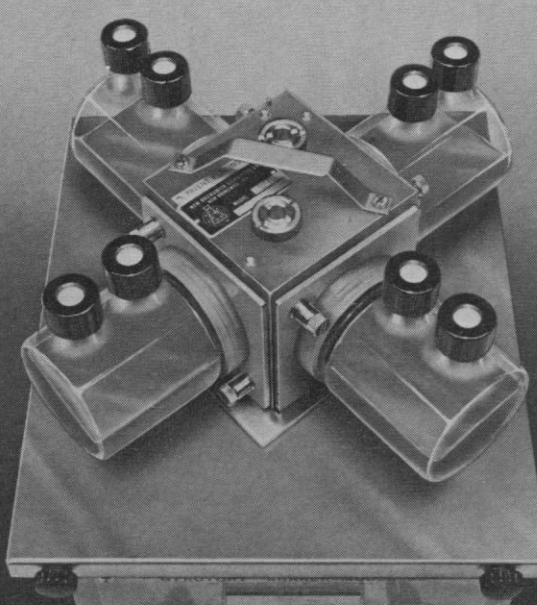
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7-11. **American Dietetic Assoc.**, Philadelphia, Pa. (R. M. Crum, ADA, 620 N. Michigan Ave., Chicago, Ill. 60611)

7-11. **International Working Conf. on Stored-Product Entomology**, Savannah, Ga. (Organizers, Working Conf. on Stored-Product Entomology, c/o Stored-Product Inst. Research and Development Lab., U.S. Dept. of Agriculture, P.O. Box 5125, Savannah 31403)

8-11. **American Vacuum Soc.**, 21st conf.,



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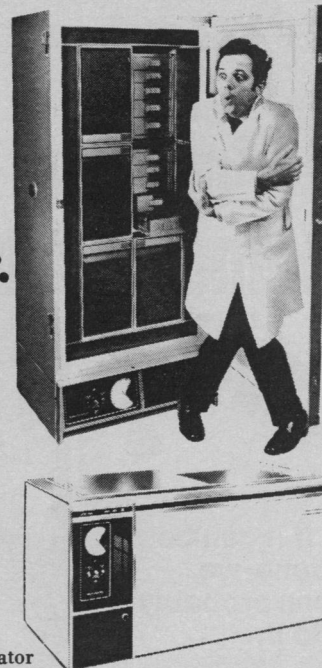
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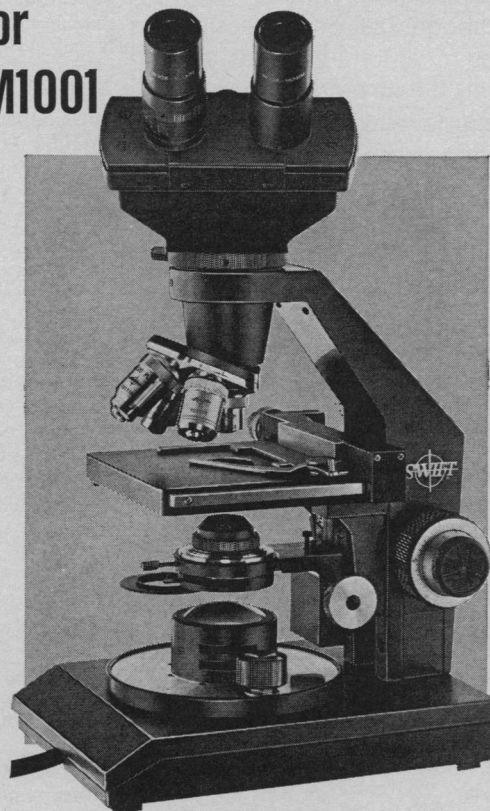
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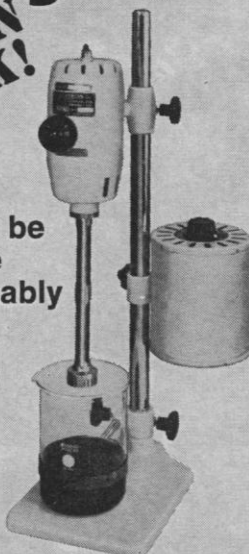
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8-13. Society for **Clinical and Experimental Hypnosis**, Montreal, P.Q., Canada. (M. Kenn, SCEH, Suite 1P, 205 West End Ave., New York 10023)

9-10. Conference on **Display Devices and Systems**, Electron Devices Group of the Inst. of Electrical and Electronics Engineers, Soc. for Information Display, and Advisory Group on Electron Devices, New York, N.Y. (T. Henion, Palisades Inst., 201 Varick St., New York 10014)

9-11. American **Ceramic Soc.**, Glass Div., Bedford, Pa. (F. P. Reid, ACS, 65 Ceramic Dr., Columbus, Ohio 43214)

9-11. International Symp. on **Electronic Structure of the Actinides**, Argonne National Lab., Argonne, Ill. (F. Y. Fradin, Materials Science Div., Argonne Natl. Lab., Argonne 64039)

9-11. International Congr. on **Obesity**, London, England. (K. Sollyl, 22 Montagu St., London W1H 2BR)

9-11. American Assoc. of **Textile Chemists and Colorists**, New Orleans, La. (W. R. Martin, Jr., P.O. Box 12215, Research Triangle Park, N.C. 27709)

10-11. **Geodesy/Solid-Earth and Ocean Physics Research**, 8th conf., American Geophysical Union, Defense Mapping Agency, Natl. Aeronautics and Space Administration, Natl. Oceanic and Atmospheric Administration, Ohio State Univ., U.S. Geological Survey, Columbus, Ohio. (AGU, 1707 L St., NW, Washington, D.C. 20036)

10-11. Midwest **Quality Control Conf.**, 29th, Automotive, Electronics, Inspection, and Aircraft and Missile Divs. of the American Soc. for Quality Control, Indianapolis, Ind. (D. L. Cheak, Code 410, Naval Avionics Facility, 21st and Arlington Ave., Indianapolis 46218)

10-12. Southern Soc. of **Anatomists**, Morgantown, W.Va. (D. S. Jones, West Virginia Univ. Medical Center, Morgantown 26506)

10-12. Western **Industrial Medical Assoc.**, Los Angeles, Calif. (H. J. Martin, WIMA, 354 21st St., Oakland, Calif. 94612)

10-13. International **Spore Conf.**, 6th, American Soc. for Microbiology, East Lansing, Mich. (R. N. Costilow, Kellogg Center for Continuing Education, Michigan State Univ., East Lansing 48824)

11-14. National Assoc. of **Biology Teachers**, New York, N.Y. (J. P. Lightner, NABT, 1420 N St., NW, Washington, D.C. 20005)

12. **Paleontological Research Institution**, Ithaca, N.Y. (K. V. W. Palmer, PRI, 1259 Trumansburg Rd., Ithaca 14850)

12-16. American Soc. of **Anesthesiologists**, Washington, D.C. (J. W. Andes, 515 Busse Hwy., Park Ridge, Ill. 60068)

12-16. American Soc. of **Oral Surgeons**, 56th annual, Las Vegas, Nev. (ASOS Committee on Scientific Sessions, Suite 930, 211 E. Chicago Ave., Chicago, Ill. 60611)

13-17. **Corrosion Problems in Energy Conversion and Generation Symp.**, Electrochemical Soc., New York, N.Y. (C. S. Tedmon, Jr., Room 3A48, Bldg. K-1, Research and Development Center, General Electric Co., P.O. Box 8, Schenectady, N.Y. 12301)

13-17. **Electrochemical Soc.**, 146th annual, New York, N.Y. (V. H. Branneky, P.O. Box 2071, Princeton, N.J. 08540)

13-17. American Soc. for **Information Science**, Atlanta, Ga. (J. I. Smith, ASIS, 1155 16th St., NW, Washington, D.C. 20036)

13-18. Pacific **Dermatologic Assoc.**, Las Vegas, Nev. (F. Beardsley, 180 Mark Twain Ave., Reno, Nev. 89502)

13-19. World Congr. of **Gastroenterology**, 5th, Mexico, D.F., Mexico. (WCG, Av. Veracruz 93, Mexico 11, D.F.)

14-17. American **Chemical Soc.**, 106th Rubber Div. mtg., Philadelphia, Pa. (H. W. Day, DuPont Co., 140 Federal St., Boston, Mass. 02110)

14-17. American Acad. of **Family Physicians**, Los Angeles, Calif. (R. Tusken, 1740 W. 92 St., Kansas City, Mo. 64114)

14-17. Association of American **Medical Colleges**, 85th annual, Chicago, Ill. (AAMC, Suite 200, 1 Dupont Circle, NW, Washington, D.C. 10036)

14-17. Association of **Official Analytical Chemists**, 88th annual, Washington, D.C. (L. G. Ensminger, AOAC, Box 540, Benjamin Franklin Sta., Washington, D.C. 20044)

14-18. American **Ornithologists' Union**, Norman, Okla. (G. E. Watson, Div. of Birds, Museum of Natural History, Smithsonian Inst., Washington, D.C. 20560)

14-18. Conference on the **Precipitation Scavenging of Atmospheric Aerosols and Gases**, U.S. Atomic Energy Commission, Champaign, Ill. (R. C. Semonin, Atmospheric Sciences Section, Illinois State Water Survey, Box 232, Urbana 61801)

14-19. Association of **Engineering Geologists**, Denver, Colo. (W. P. Rogers, AEG, Box 15124, Denver 80215)

14-19. **Psychology Soc.**, Paris, France. (P. C. Haber, 100 Beekman St., New York 10038)

15. Oak Ridge **Associated Universities**, Oak Ridge, Tenn. (W. G. Pollard, ORAU, P.O. Box 117, Oak Ridge 37830)

15-17. Conference on the **Atmosphere of Venus**, Goddard Inst. for Space Studies, New York, N.Y. (J. E. Hansen, 2880 Broadway, New York 10025)

15-17. **Biological Safety Conf.**, 17th, Research Triangle Park, N.C. (L. A. Taylor, Becton, Dickinson and Co. Research Center, P.O. Box 12016, Research Triangle Park 27709)

15-17. **Human Factors Soc.**, Huntsville, Ala. (M. G. Knowles, HFS, P.O. Box 1369, Santa Monica, Calif. 90406)

15-18. American **Chemical Soc.**, 10th western regional mtg., San Francisco, Calif. (P. C. Condit, Patent Dept., Chevron Research Co., 576 Standard Ave., Richmond, Calif. 94802)

15-18. Society for **Experimental Stress Analysis**, New Haven, Conn. (B. E. Rossi, SESA, 21 Bridge Sq., Westport, Conn. 06880)

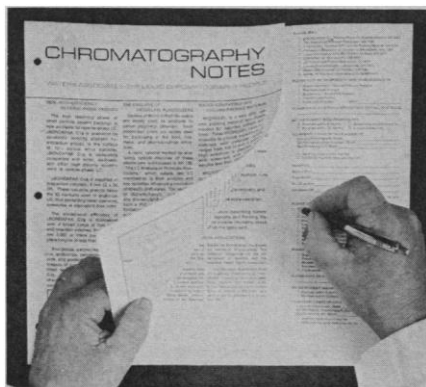
15-18. **Optical Soc. of America**, Houston, Tex. (J. W. Quinn, OSA, 2100 Pennsylvania Ave., NW, Washington, D.C. 20037)

15-19. American Assoc. of **Stratigraphic Palynologists**, 7th annual mtg., Calgary, Alberta, Canada. (L. V. Hills, Dept. of Geology, Univ. of Calgary, Calgary, T2N 0Z7)

16-18. **Biological Resources of the**

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16-18. **National Council of International Health**, Reston, Va. (J. S. Cowen, P.O. Box 4909, Chicago, Ill. 60680)

16-18. **Operations Research Soc. of America**, jointly with the Inst. of **Management Sciences**, San Juan, Puerto Rico. (A. Riesco, P.O. Box 2342, Mayaguez, P.R. 00708)

16-19. **American Soc. of Human Genetics**, Portland, Ore. (W. E. Nance, Dept. of Medical Genetics, Indiana Univ. Medical Center, Indianapolis 46202)

16-20. **Irish Otolaryngological Soc.**, Cork. (G. D. L. Symth, Eye and Ear Clinic, Falls Rd., Belfast 4, U.K.)

17-18. **European Soc. on Pediatric Hematology and Immunology** and **European Soc. of Pediatric Oncology**, Genoa, Italy. (W. H. Hitzig, Kinderspital, 8032 Zurich, Switzerland)

17-19. **Central Neuropsychiatric Assoc.**, Ann Arbor, Mich. (D. W. Sprague, 1417 Marlowe Ave., Lakewood, Ohio 44107)

17-19. **American Assoc. for the Surgery of Trauma**, Hot Springs, Va. (J. A. Boswick, Jr., Univ. of Colorado Medical Center, 4200 E. Ninth Ave., Denver, Colo. 80220)

17-19. **National Council of Teachers of Mathematics**, Southeastern section, Memphis, Tenn. (NCTM, 1906 Association Dr., Reston, Va. 22091)

18-20. **National Council of Teachers of Mathematics**, North central section, Minneapolis, Minn. (NCTM, 1906 Association Dr., Reston, Va. 22091)

19. **New Mexico Acad. of Science**, Las Vegas. (L. M. Shields, Environmental Health Div., New Mexico Highlands Univ., Las Vegas 87701)

19-22. **American Coke and Coal Chemicals Inst.**, White Sulphur Springs, W.Va. (L. C. Ferguson, ACCCI, 1010 16th St., NW, Washington, D.C. 20036)

19-24. **American Acad. of Pediatrics**, San Francisco, Calif. (R. G. Frazier, 1801 Hinman Ave., Evanston, Ill. 60204)

20-23. **Society for Neuroscience**, 4th annual mtg., St. Louis, Mo. (SN, Room 200A, Lee Bldg., 9650 Rockville Pike, Bethesda, Md. 20014)

20-24. **American Assoc. of Cereal Chemists**, Montreal, P.Q., Canada. (R. J. Tarleton, AACC, 3340 Pilot Knob Rd., St. Paul, Minn. 55121)

20-24. **American Public Health Assoc.**, 102nd annual mtg., New Orleans, La. (J. R. Kimmey, APHA, 1015 18th St., NW, Washington, D.C. 20036)

20-26. **International Cancer Congr.**, 11th, Intern. Union against Cancer, Florence, Italy. (P. A. Gardner, IUAC, Div. of Medical Sciences, Natl. Research Council, 2101 Constitution Ave., NW, Washington, D.C. 20418)

20-26. **Physiological Sciences**, 26th intern. congr., Intern. Union of Physiological Sciences, New Delhi, India. (S. K. Manchanda, Dept. of Physiology, All India Inst. of Medical Sciences, Ansari Nagar, New Delhi-16)

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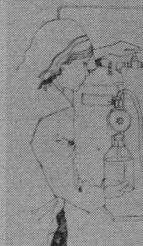


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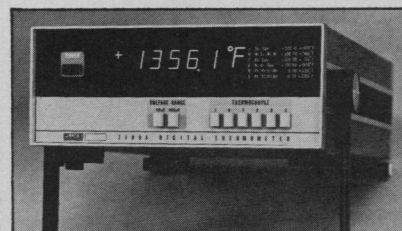
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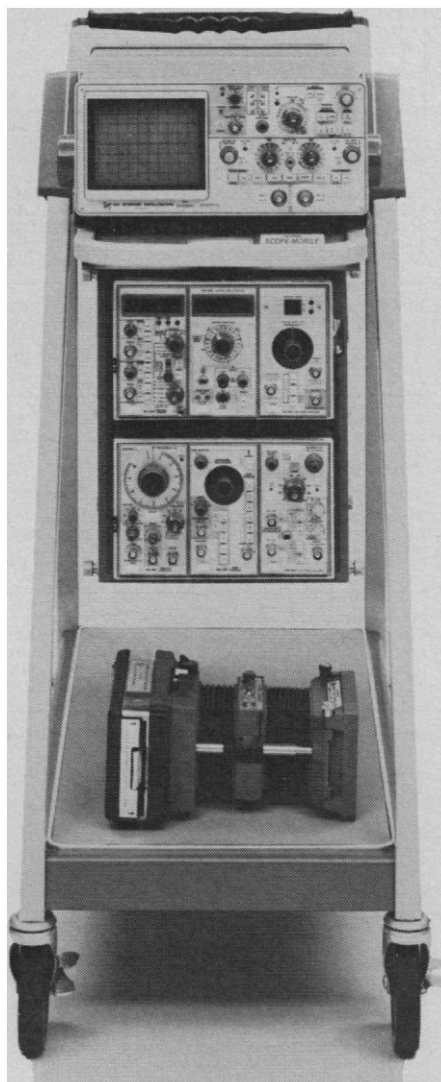


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