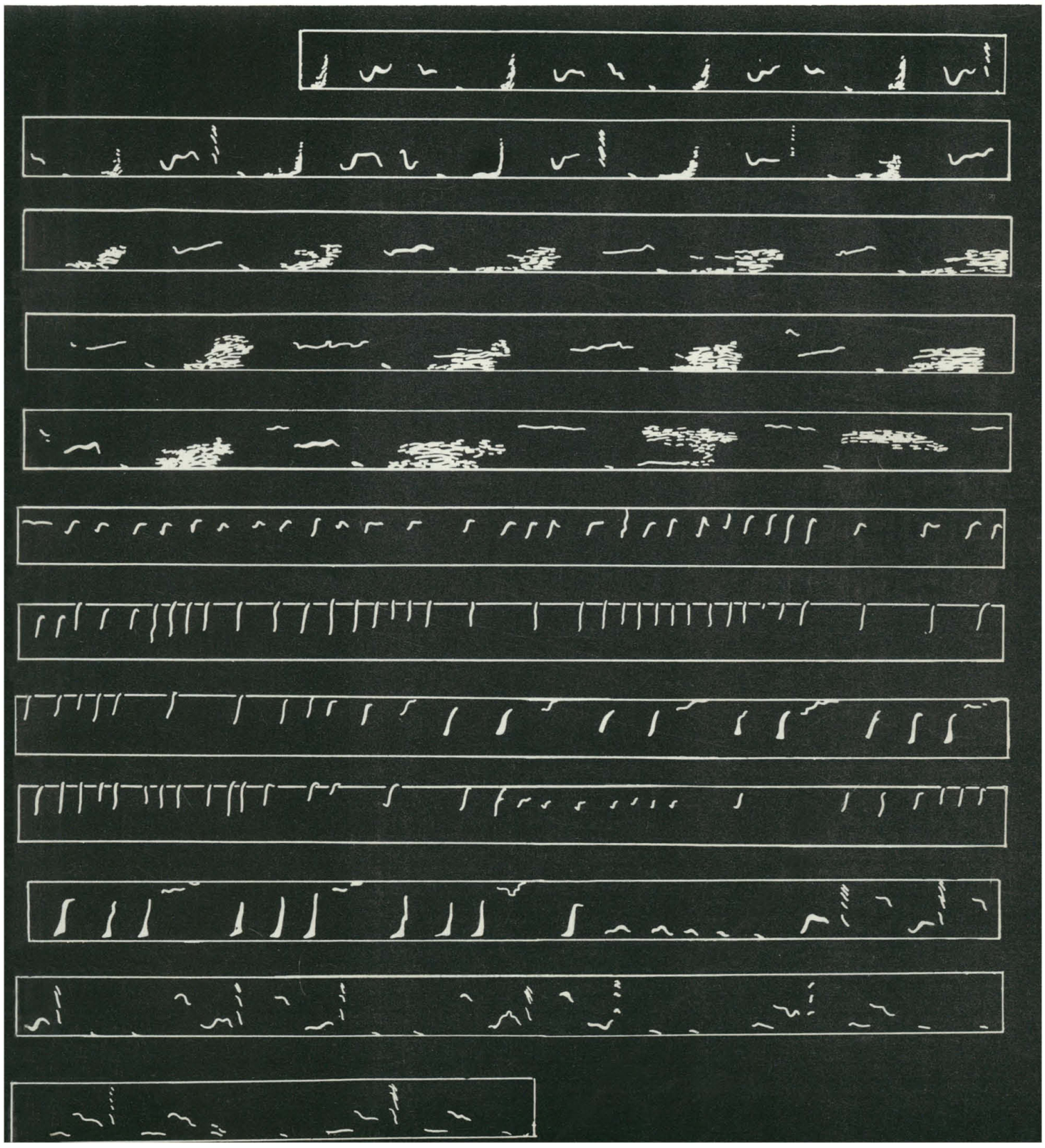
SCIENCE

13 August 1971

Vol. 173, No. 3997

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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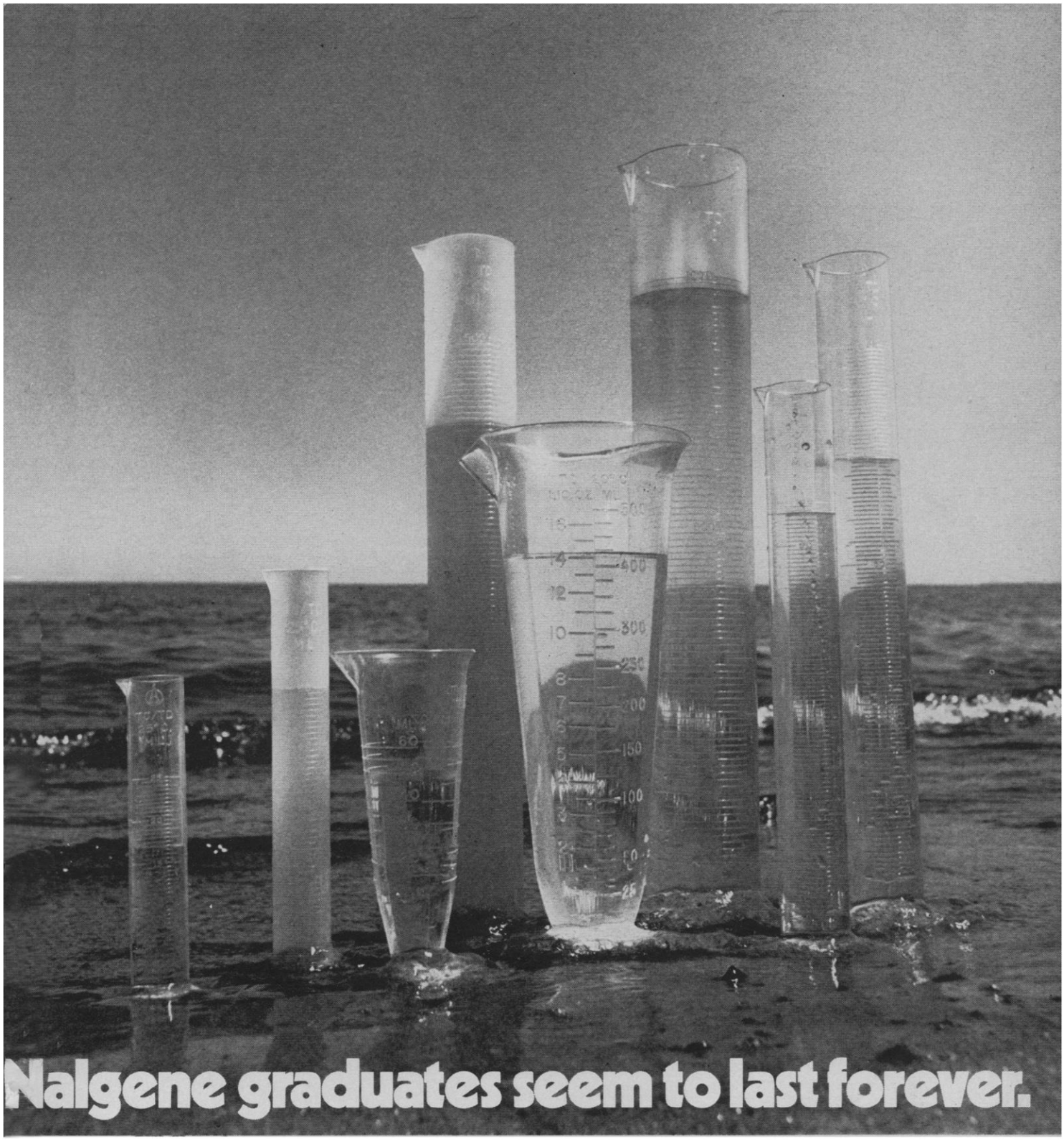

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

A tracing made from a sound spectrogram of the "song" of a humpback whale. See page 585. [Tracing made by Roger S. Payne, Rockefeller University, from original recording by Frank Watlington, Palisades Sofar Station, St. David's, Bermuda]

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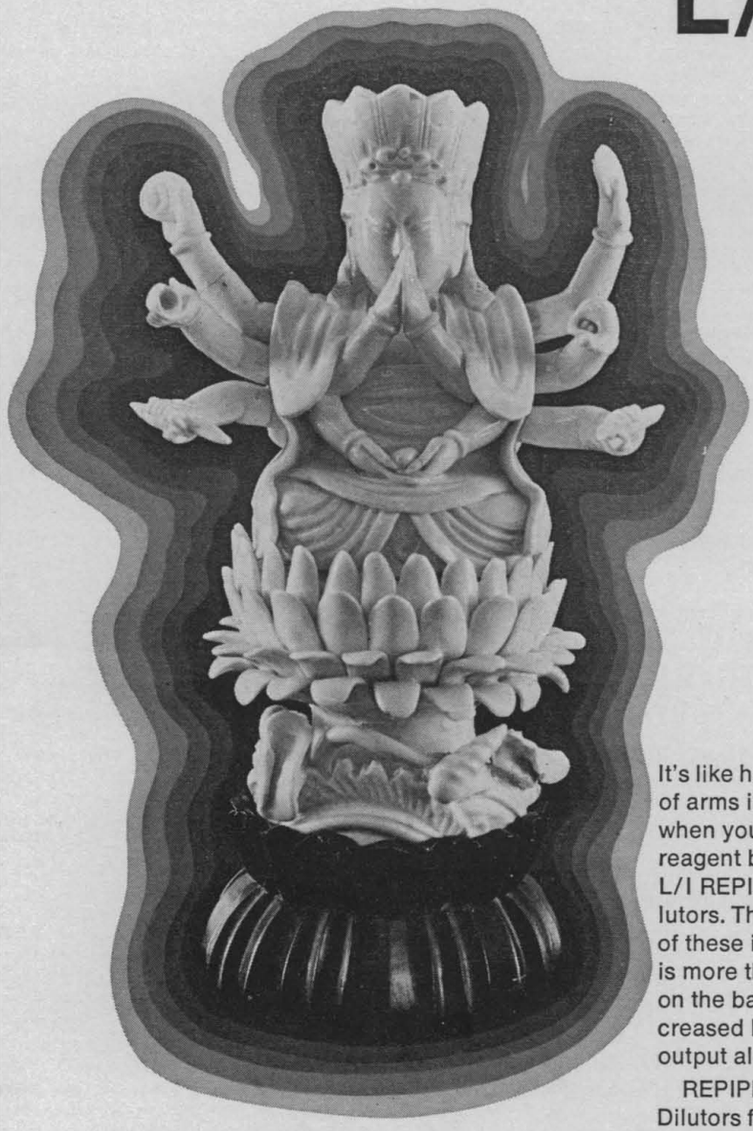

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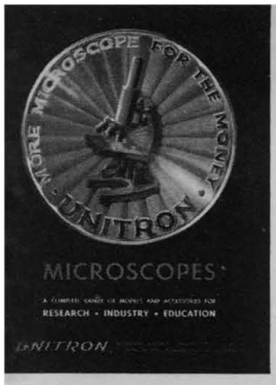

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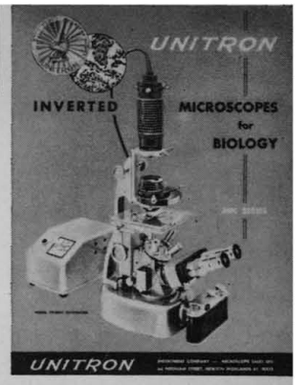

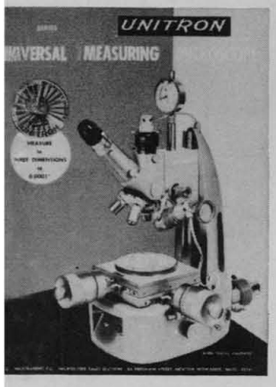

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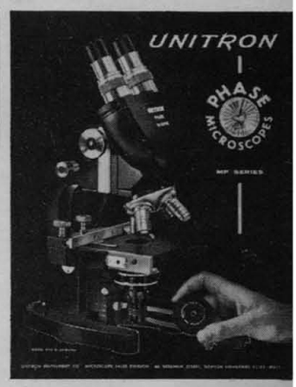

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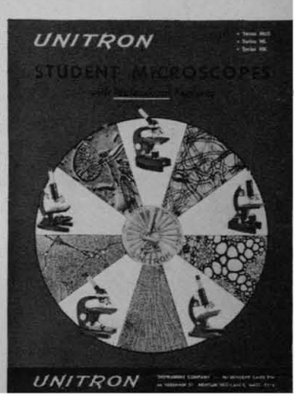

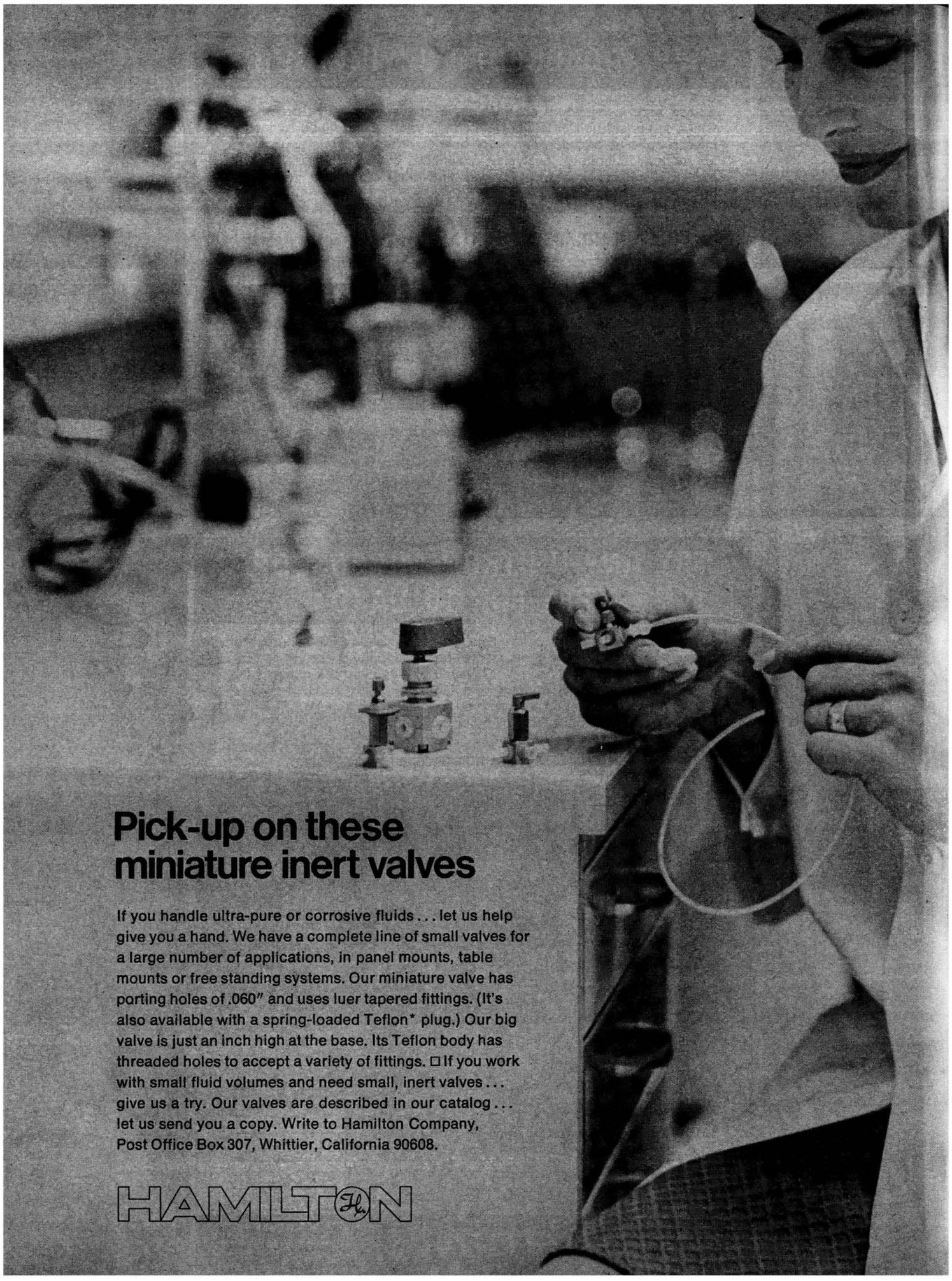

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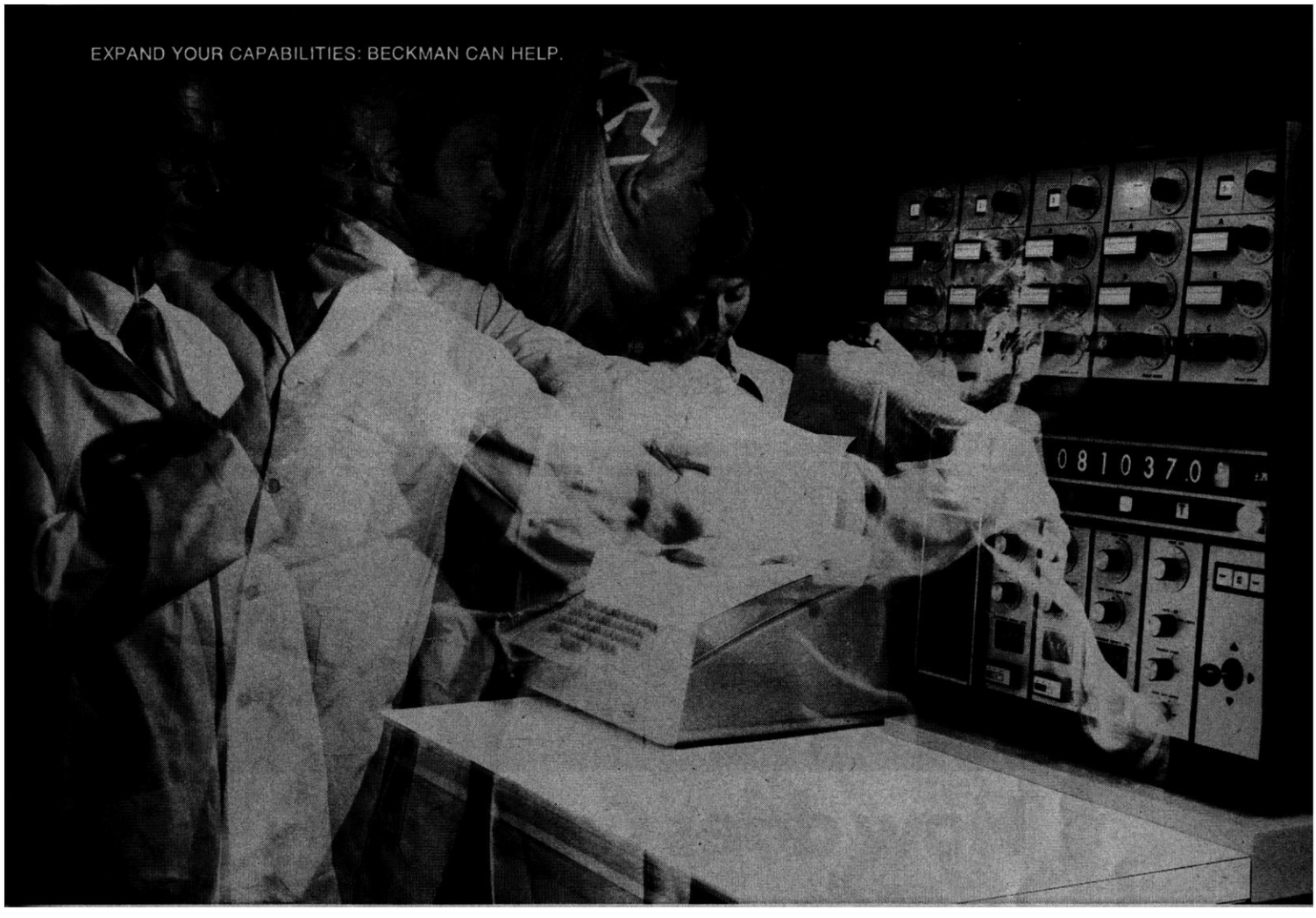

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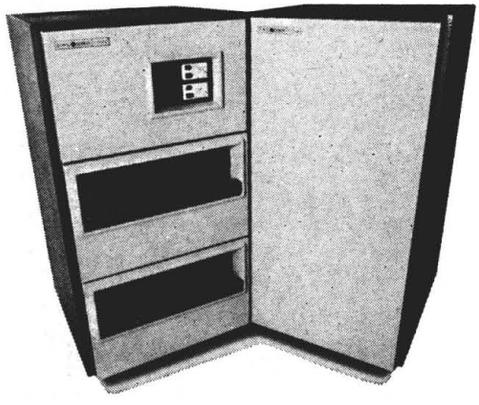

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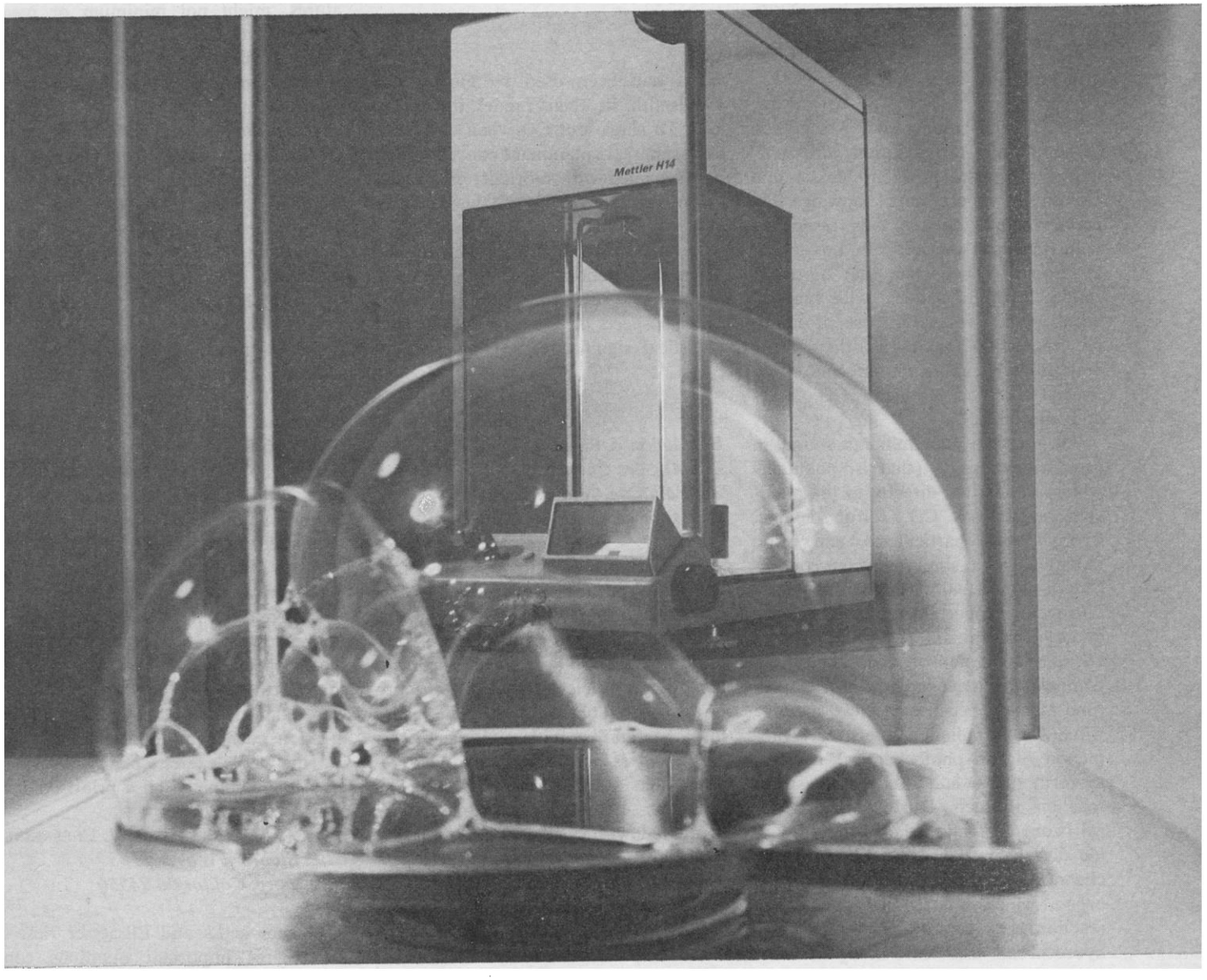

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shown a significant correlation with mortality. However, oxidant is also correlated with CO ($P < .00001$) but showed no association with mortality when substituted for CO or when added to the regression with CO. Our attention was directed to CO in preference to other primary pollutants because it is present in concentrations known to affect oxygen transport in the body. But we agree that NO, NO_2, sulfur dioxide, and the meteorological variables cited by Ellsaesser and others should be examined.

Minimum temperature can be ruled out; when substituted for maximum temperature in our regressions the mean square for residuals (MSE) and t for the CO coefficient were increased. Mean temperature gave a small decrease in MSE and in t, but this does not affect our conclusions.

Ellsaesser questions the consistency of our statement concerning reduction in variance with Table 1. The R^2 in the table is the ratio of the regression sum of squares to the total sum of squares, here $163,895/441,313 = .3714$. The reduction in variance for the regression is $(302.27 - 191.98)/302.27 = .3649$. These differ because MSE, a more conservative measure, takes into account the reduction in degrees of freedom resulting from the addition of terms to the regression.

Ellsaesser emphasizes that the model without CO "'explains' only" 0.4 percent less of the original variance than the model with CO. As stated in our report, the estimated contribution to mortality for Los Angeles County associated with CO may be a difference of as many as 11 deaths in one day, all other factors being equal. We do not think that contribution is trivial.

Ellsaesser is correct in stating that one would expect the regressor variables to "explain" a greater percentage of the original variance if the Fourier components of the dependent variable were not removed. But cyclic variables with the same periodicity will exhibit a nonzero correlation even if otherwise totally unrelated. To avoid this spurious association it was necessary to add Fourier terms to the regression. Otherwise, daily mortality in Los Angeles, uncorrected for the cyclic components, would be expected to exhibit a highly significant correlation with CO concentrations in Paris, hog prices in Quebec, maximum temperatures in Buenos Aires, or similar cyclic phenomena.

The observation that the mortality rate may have declined during the time that CO levels were increasing is correct but irrelevant. Analysis based on rates is both unnecessary and impossible—impossible because the required denominator data, classified by age, race and sex, are not available between census years, and unnecessary because analysis of the relationship between CO concentration and total mortality does not require knowledge of the denominator. We included trend terms to allow for population growth, changes in population structure, and secular changes in mortality. From the nature of regression analysis the trend terms provide a close fit at the beginning and end of the study period. Analysis of residuals for the model with trend, cyclic variation, and temperature removed showed no significant serial correlation, and a nonparametric test for fit (the "runs" test) was also negative. This indicates that no systematic deviation, such as would be caused by inadequate allowance for population changes, is present.

Ellsaesser suggests that automobile fatalities might be the source of the association. We looked at specific causes using the same regressions and found that most of the excess mortality is attributable to cardiovascular disease. The association of CO with automobile fatalities is actually negative; this is predictable, since CO concentrations are lowest on weekends when automobile accidents and fatalities are highest, although other factors also contribute.

With regard to Ellsaesser's final comment, perhaps we did not make our procedure sufficiently clear. We did indeed test a number of models before arriving at the regressions shown in our report. However, the testing was done *before* adding the CO and oxidant variables. The second of the three models shown provides an estimate of daily mortality which may be used in other applications of interest to us; development of this model gave us the opportunity to test CO and oxidant with little additional effort. We certainly had grounds for suspecting that CO and oxidant contribute to mortality. We found our suspicions confirmed for CO but not confirmed for oxidant.

We are well aware that demonstration of an association does not prove cause and effect. However, the maximum daily average for CO concentration observed in our study, 20 ppm, is sufficient to convert at equilibrium ap-

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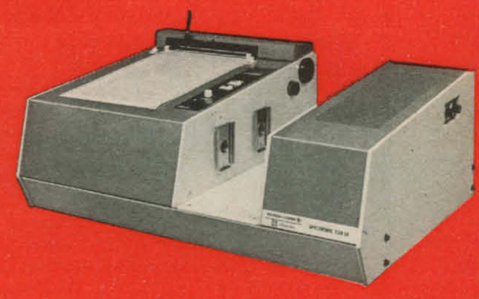

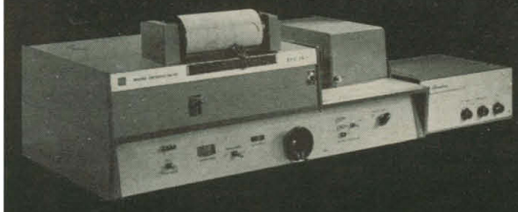

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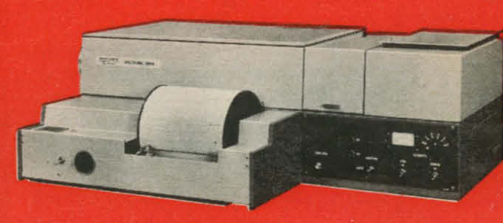

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proximately 3 percent of the blood hemoglobin to carboxyhemoglobin, with reduction in the oxygen-carrying capacity of the blood. Since the pollutant data are basin averages, some individuals were exposed to substantially higher levels.

ALFRED C. HEXTER
JOHN R. GOLDSMITH
California State Department of Public Health, Berkeley 94704

American in Japan

I have just returned from my 20th or so trip to Japan to find on my desk Chalmers Johnson's review (5 Feb., p. 467) of my book *The Emerging Japanese Superstate*. . . . It seems to me that I am almost obligated to quote and comment on one remarkable and characteristic paragraph of the review (*italics are mine*). "This book seems to be inspired by Kahn's *two* visits to Japan during which he gave lectures at Kyoto-Sangyo University (*which he apparently does not know is more of a Japanese Rand Corporation than a university*) and where he had several meetings of several members of *one segment* of the Japanese establishment who understandably were quite pleased when Kahn *went home and wrote down what they told him* without doing any further checking."

1) I have been making about two or three trips a year to Japan since 1965. Each of these trips was for the dual purpose of information gathering and information giving and, as a result, I have had a great deal of contact with every aspect of Japanese society, including students, laborers, union officials, all the political parties, and so on.

2) Kyoto-Sangyo University is a university. It has none of the characteristics of a "Japanese Rand Corporation" other than those any university may possess. I happen to be (along with Arnold Toynbee, Raymond Aron, and Hubert Humphrey) a member of its academic advisory board and have been at the university many times.

3) As is clearly pointed out, the first chapter of the book summarizes not only the talks I gave at Kyoto University but also the argumentation in the book. It would not have been possible to get this argumentation from what was then my audience.

4) . . . As I also bring out in the book, we did a serious study in the mid-1960's on long-range Japanese prospects. The argument of the book

is largely based on that study and was publicly presented and discussed, rather than derived, during my later visits to Japan, during which I gave the two talks at Kyoto-Sangyo University. This is a matter of public record as well as being discussed in the book. Johnson's charge that I "went home and wrote down what they told [me]" sheds more light on his review than on the book.

Johnson is correct that the Dodge Plan currency reform was made in 1949, not 1951, but this slip makes no difference to any of my arguments. I believe that my statement that Miss Kamba was the only person killed in the Japanese student riots was correct at the time I wrote it, although it is no longer correct. The information came from members of the Japanese police, but none of the students with whom I talked contradicted it (and many of them would have liked to). . . .

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Pavlov's Film

At the 14th International Congress of Physiology in Rome in 1932, Ivan P. Pavlov projected a film on "The Function of the Brain." After the congress Pavlov donated the film to my father, Carlo Foà, who was professor and chairman of the department of physiology at the University of Milan, and he used the film for many years. Upon my father's retirement, I brought the film to Detroit where, in collaboration with Ernest A. Gaynes and Robin A. Barraco, it was translated into English and transferred onto 16-mm safety film. The potentially explosive 35-mm original nitrate film was destroyed in compliance with fire and safety regulations. The film, black and white and silent, may appear elementary and sometimes rather naive by 1971 standards. However, it is of great historical interest because it depicts some of Pavlov's basic experiments on conditioned reflexes and some of his observations of behavioral development. The complete film lasts approximately 2½ hours, but two shortened versions with projection times of 45 and 60 minutes have been produced. I will provide further information upon request.

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13 August 1971, Volume 173, Number 3997 **SCIENCE**

On Stimulating the Gift of Blood

To meet their clinical needs for blood, hospitals in the United States rely upon three types of donor: the *volunteer* donor, who provides his blood free of charge; the *professional* donor, who supplies his blood directly to the user institution upon request and is reimbursed for it; and the *commercial* donor, who sells his blood to a commercial supplier.

Before being transfused, donor blood must be subjected to a comprehensive series of tests, including typing and antibody screening. In addition, an effort is made to detect diseases that may be transmitted through transfusion, such as serum hepatitis. And herein lies a major problem. At present, tests to detect serum hepatitis are highly unsatisfactory. Thus, if the donor is unaware of his illness or unwilling to acknowledge it, the likelihood is great that it will be passed on to someone else. Current estimates are that some 30,000 overt cases of hepatitis and 1500 to 3000 deaths each year in the United States result from blood transfusions.*

But the problem of infection through transfusion is not simply a question of inadequate tests. It is a matter of the system of distribution and of the demography of the donor population. Except in cases of unusual medical requirements, blood is assigned to recipients without reference to its source. And a very large proportion of the blood used in American hospitals comes from professional or commercial donors. In contrast to the volunteer donor, the commercial donor is likely to have an urgent need for his stipend, possess a reticence about his medical history, and be a carrier of hepatitis. A recent study at National Institutes of Health revealed that 51 percent of patients who received commercial blood during open-heart surgery contracted the disease but that none who received volunteer blood became infected.† Similarly, commercial blood is more likely to contain Australia antigen, a factor frequently found in the serum of hepatitis patients.‡

As a response to the clinical problem of diseased blood, Professor R. M. Titmuss in a recent book has advanced the case for institutionalizing the donor-recipient relationship on a totally voluntary basis.§ Although Titmuss's faith in the altruistic principle is not universally shared, many doctors agree that some means must be found for stimulating donors of the sort now generally found among volunteers. A useful approach has recently been proposed. A bill (H.R. 853), introduced by Edward I. Koch (D–N.Y.) and 22 other congressmen, is now before the Ways and Means Committee of the House. It provides that an individual may credit as a charitable contribution on his federal income tax declaration $25 for every pint of blood donated within the course of a year, with the total not to exceed $125. Although the bill might be made more effective by increasing (for instance, doubling) the allowable deduction, it provides the kind of incentive understood by persons in the volunteer class; it would not attract those motivated by on-the-spot cash. If a significant number of potential donors were to volunteer their blood (some 36 million federal returns were filed with itemized deductions in 1969), impressive progress would be made toward meeting the nation's need for blood. And, if nothing more, the Koch bill brings to the attention of Congress the nation's urgent need for an effective blood donor system. It is a good bill and worthy of support.—WILLIAM BEVAN

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* Committee on Plasma and Plasma Substitutes, Division of Medical Sciences, National Academy of Sciences–National Research Council, *Transfusion* **10**, 1 (1970). † J. H. Walsh, R. H. Purcell, A. G. Morrow, R. M. Chanock, P. J. Schmidt, *J. Amer. Med. Ass.* **211** (No. 2), 261 (1970). ‡ Ad hoc Committee on Hepatitis-Associated Antigen (HAA) Tests, Committee on Plasma and Plasma Substitutes, National Academy of Sciences–National Research Council, *Transfusion* **11**, 1 (1971). § R. M. Titmuss, *The Gift Relationship: From Human Blood to Social Policy* (Allen & Unwin, London, 1971).

The Brush 620 Data Logger converts multi-channel analog inputs to digital format, then records them on a ¼" endless-loop magnetic tape cartridge. The Brush Tape Reader (right) plays the cartridge for computer data reduction and presentation.

Thanks to the tape cartridge system you can put data loggers wherever you generate the analog input. The loggers are lightweight, portable, rugged, can be remotely-or intermittently-controlled, and are about as easy to operate as a car radio. Each logger accepts 18 channels of analog data and uses two additional channels for recording real time in hours, minutes and seconds at the start of each scan. The logger is expandable in increments of 10 channels to 118 channels. The continuous-loop cartridge will provide 60 minutes of continuous recording. As much as 1860 hours of operation are possible on a single tape in the one hour intermittent-recording mode.

The Tape Reader offers two data reduction modes. In the computer mode, the reader takes the tape generated by the logger and through an interface card, transmits the data directly to the computer input bus. In the tape-to-tape mode, the data reader feeds a ½" incremental tape recorder to produce a computer-compatible tape.

This new analog-to-digital system is ideally suited for such applications as process data logging, pollution monitoring, weather and climatalogical studies, medical, geophysical and other types of research. And like we said, it can chop hundreds of manhours from your analog data handling procedures.

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This portable analog data gatherer can save you hundreds of manhours.

Maya Classic way of life in the southern lowlands. Only a few very minor centers, such as the ones at Lake Peten and Lake Yaxha, date from the Postclassic period, but these are poor indeed compared to those of the Classic. For the most part, the area remained abandoned or drastically depopulated and culturally reduced. In Yucatan some significant new centers did spring up, undoubtedly attracting trade merchants, craftsmen, and peasants; however, the more important centers of the Postclassic period lay outside the Maya lowlands altogether. In effect, the Maya lowlands had been bypassed by the progress of Mesoamerican civilization whose main course was then firmly set by the social and political order of the new type that was propagated from central Mexico (*3*).

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References and Notes

1. For general introductory but authoritative works on Maya archeology the reader may consult J. E. S. Thompson, *The Rise and Fall of Maya Civilization* (Univ. of Oklahoma Press, Norman, ed. 2, 1966) and M. D. Coe, *The Maya* (Praeger, New York, 1966).
2. Maya Long Count or Initial Series dates are rendered into the Christian calendar by two principal correlations. The one most generally favored, and used throughout this summary, is known as the 11.16.0.0.0 or Goodman-Martinez-Thompson correlation. The 12.9.0.0.0 or Spinden correlation would place all the dates cited as 260 years earlier.
3. Participants of the symposium were T. P. Culbert (University of Arizona, organizer), G. R. Willey (Harvard University, chairman), R. E. W. Adams (University of Minnesota), E. W. Andrews IV (Tulane University), W. R. Bullard, Jr. (Florida State Museum), J. A. Graham (University of California, Berkeley), R. Rands (Southern Illinois University), J. A. Sabloff (Havard University), W. T. Sanders (Pennsylvania State University), D. B. Shimkin (University of Illinois), and M. Webb (Louisiana State University, New Orleans). A full report on the proceedings, including a series of data papers and a lengthy summary of the discussions, will be published in the near future as a monograph of the School of American Research.

Forthcoming Events

September

8–10. **Design Automation**, intern. conf., Toronto, Canada. (A. Seireg, Dept. of Mechanical Engineering, Univ. of Wisconsin, Madison 53706)

8–10. **Pharmacology of Antiepileptic Drugs**, Scottsdale, Ariz. (J. K. Penry, Bldg. 36, Room 5D-10, Natl. Inst. of Neurological Diseases and Stroke, Bethesda, Md. 20014)

8–10. Society of **Therapeutic Chemistry**, 8th intern., Lyon, France. (H. Pacherco, Service de Chimie Biologique, INSA 20 Ave. Albert Einstein, 69 Villeurbanne, Lyon)

8–10. **Urban Transportation**, 5th intern., Pittsburgh, Pa. (A. V. Harris, Pittsburgh Urban Transit Council, U.S. Dept. of Transportation, Transportation Research Inst. of Carnegie-Mellon Univ., P.O. Box 2149, Pittsburgh 15230)

8–11. **Drugs Affecting Lipid Metabolism**, 4th intern. symp., Philadelphia, Pa. (W. L. Holmes, Lankenau Hospital, Lancaster and City Line Aves., Philadelphia)

8–11. International Assoc. of **Gerontology**, Bern, Switzerland. (B. Steinmann, Medizinische Abteilung C. L. Laury-Haus, Inselspital Bern, 3008, Bern)

8–12. National Conf. on **Mechanical Vibrations**, 3rd annual, Toronto, Ont., Canada. (P. W. Curwen, Mechanical Tech. Inc., 968 Albany-Shaker Rd., Lathan, N.Y. 12110)

8–15. **Illumination.** 17th intern. conf., Barcelona, Spain. (Secretary, Intern. Commission on Illumination, 25 rue de la Pepiniere, Paris 8°, France)

9–10. **Aerospace Mechanisms**, 6th annual symp., Moffett Field, Calif. (G. G. Herzl, ORGN. 52-60, Bldg. 201, Lockheed Missiles and Space Co., 3251 Hanover St., Palo Alto, Calif. 94304)

9–11. **Cardiovascular** Soc., 10th intern., Moscow, U.S.S.R. (A. D. Callow, 171 Harrison Ave., Boston, Mass. 02111)

9–11. American Assoc. of **Obstetricians and Gynecologists**, Hot Springs, Va. (C. A. Hunter, Jr., Indiana Univ. Medical Center, 1100 W. Michigan St., Indianapolis, Ind. 46202)

9–11. **Parapsychological** Assoc., 14th, Durham, N.C. (J. G. Pratt, Box 152, University of Virginia School of Medicine, Charlottesville 22901)

9–11. **Photosensitization in Solids**, 3rd intern. conf., Sarlat, Dordogne, France. (J. Bourdon, Centre de Recherches Kodak-Pathe, 30 rue des Vignerons, 94 Vincennes, France)

9–15. Union of **Prehistoric and Protohistoric Sciences**, 8th intern., Belgrade, Yugoslavia. (A. Benac, Archeoloski Inst., Knez Mihajlova 35-11, Belgrade)

10–12. International Soc. of **Hematology**, Milan, Italy. (A. T. Maiolo, Istituto di Pathologia Medica, Via Pace 15, 20122 Milan)

10–12. **Pollution and Conservation of the Seventh Continent, Antarctica**, Blacksburg, Va. (B. C. Parker, Dept. of Biology, Virginia Polytechnic Inst. and State University, Blacksburg 24061)

12–15. Canadian **Agricultural Chemicals** Assoc., 12th annual, Montreal, P.Q., Canada. (J. Chevalier, Suite 1004, 1010 Ste. Catherine St., W., Montreal)

12–15. **Ceramic-Metal Systems** Div., American Ceramic Soc., St. Louis, Mo. (Secretary, ACS, 4055 N. High St., Columbus, Ohio 43214)

12–16. American Assoc. of **Blood Banks**, Chicago, Ill. (L. J. James, 30 N. Michigan Ave., Chicago 60602)

12–17. **American Chemical** Soc., 162nd natl. fall mtg., Washington, D.C. (F. T. Wall, ACS, 1155 16th St., NW, Washington, D.C. 20036)

12–17. **Gas Dynamics of Explosions and Reactive Systems**, 3rd intern. congr., Marseille, France. (H. van Gelder, Intern. Acad. of Astronautics, 250 rue St. Jacques, Paris, France 19159)

12–18. International Symp. on **Sexology**, Stockholm, Sweden. (Secretary, Swedish Assoc. for Sex Education, Box 17006, 104 62 Stockholm 17)

12–18. **Solid State Physics**, European Physical Soc., Florence, Italy. (A. B. Lidiard, Atomic Energy Research Establishment, Bldg. 89, Harwell, Didcot, Berkshire, England)

13–15. **Petroleum and Chemical Industry** Technical Conf., Atlanta, Ga. (Secretary, Inst. of Electrical and Electronics Engineers, 345 E. 47 St., New York 10017)

13–15. **Plant Engineering**, intern. conf., Anaheim, Calif. (G. Paula, 796 S. Earlham St., Orange, Calif. 92669)

13–15. **Surface Chemistry of Oxides**, London, England. (Secretary, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1)

13–16. Institute on **Hospital and Community Psychiatry**, Seattle, Wash. (R. L. Robinson, Public Information Officer, 1700 18th St., NW, Washington, D.C. 20009)

13–17. **Coal Workers Pneumoconiosis**, intern. conf., New York, N.Y. (L. R. Neville, New York Acad. of Sciences, 2 E. 63 St., New York 10021)

13–17. **Comparative Leukemia Research**, 5th intern. symp., Padova-Venice, Italy. (R. M. Dutcher, Leukemia Soc. of America, Inc., 211 E. 43 St., New York 10017)

13–17. World **Medical** Assoc., 25th assembly, Ottawa, Ont., Canada. (A. Z. Romualdez, 10 Columbus Circle, New York 10019)

13–17. **Photoelectric Image Devices**, 5th annual, London, England. (B. L. Morgan, Physics Dept., Imperial College, Prince Consort Rd., London, S.W.7)

13–17. Institute of **Water Pollution Control**, Brighton, Sussex, England. (Secretary, Inst. of Water Pollution Control, 49-55 Victoria St., London S.W.1, England)

13–18. **Biodeterioration**, 2nd intern. symp., Luntern, Netherlands. (Congress Secretariat, Holland Organizing Centre, 16 Lange Voorhout, The Hague, Netherlands)

13–18. **Dynamics of Ionized Gases**, Tokyo, Japan. (Prof. Sato, Inst. of Space and Aeronautical Sciences, Univ. of Tokyo, Komaba, Meguroku, Tokyo)

14–16. International Conf. on **Engineering in the Ocean Environment**, San Diego, Calif. (M. Nelles, Bissett-Berman Corp., 3939 Ruffin Rd., San Diego 92123)

14–16. **Solid State Devices**, 5th annual conf., Lancaster, England. (Secretary, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

14–17. International Union for **Pure and Applied Biophysics**, Baden near Vienna, Austria. (Mrs. E. Weidenhaus, Wiener Medizinische Akademia, Stadiongasse 6-8, A 1010 Vienna)

14–17. **Radioecology as Applied to the Protection of Man and His Environment**, Rome, Italy. (J. Smeets, Commission of the European Communities, 29, rue Aldringen, Luxemborg, Grand Duchy)

14–20. American **Electroencephalographic** Soc., Minneapolis, Minn. (P. T. White, Marquette School of Medicine,

8700 W. Wisconsin Ave., Milwaukee, Wis.)

15–17. **Engineering** Inst. of Canada, 85th annual, Quebec City, P.Q. (General Manager, EIC, 2050 Mansfield St., Montreal 110, P.Q., Canada)

15–17. American **Fisheries** Soc., Salt Lake City, Utah. (R. F. Hutton, AFS, Washington Bldg., Suite 1040, 15th and New York Ave., Washington, D.C. 20005)

15–17. Canadian **Informational Processing** Soc., Computer Show, Toronto, Ont. (J. Gillies, CIPS, P.O. Box 484, Waterloo, Ont., Canada)

15–18. American Assoc. of **Medical Clinics**, Cleveland, Ohio. (E. M. Wurzel, AAMC, 719 Prince St., Alexandria, Va. 22313)

15–19. **Drug, Chemical and Allied Trades** Assoc., Scottsdale, Ariz. (J. D. Madden, Suite 3014, 350 Fifth Ave., New York 10001)

15–19. American **Medical Writers** Assoc., Chicago, Ill. (W. W. Curtis, AMWA, Suite 417, 420 Lexington Ave., New York 10017)

17–18. **Eye Bank** Assoc. of America, Las Vegas, Nev. (W. B. Clark, EBAA, 1111 Tulane Ave., New Orleans, La. 70112)

17–18. Federation for **Unified Science Education**, Moline, Ill. (D. Fentem, Moline Senior High School, 3600 23rd Ave., Moline 61265)

17–18. Scandinavian **Neurosurgical** Soc., 23rd intern. congr., Lund, Sweden. (N. Lundberg, Neurosurgical Dept., University Hospital, 22005 Lund 5)

17–19. Mid-Continent **Psychiatric** Assoc., Columbia, Mo. (D. T. Collins, Menninger Foundation, Box 829, Topeka, Kan. 66601)

19–20. American Assoc. of **Ophthalmology**, Las Vegas, Nev. (L. A. Zupan, AAO, 1100 17th St., NW, Washington, D.C. 20036)

19–22. National **Agricultural Chemicals** Assoc., 38th annual, White Sulphur Springs, W.Va. (D. Hayley, 1155 15th St., NW, Washington, D.C. 20005)

19–22. American Soc. of **Chemical Engineers**, joint mtg., with Power Generation, St. Louis, Mo. (Secretary, Inst. of Electrical and Electronics Engineers, 345 E. 47 St., New York 10017)

19–23. **Electrical Insulation**, 9th annual conf., Chicago, Ill. (Office of the Activities Board, Inst. of Electrical and Electronics Engineers, 345 E. 47th St., New York 10017)

19–24. **Biological Efficiency of Protein Production**, Reading, England. (J. G. W. Jones, Dept. of Agriculture, Univ. of Reading, Earley Gate, Reading, Berkshire RG6 2AT)

19–26. World **Veterinary** Assoc., 19th intern. congr., Mexico City, Mexico. (Secretary, WVA, 137 Ave. Van Ostadelaan, Utrecht, Netherlands)

20–22. American Inst. of **Aeronautics and Astronautics**, joint conf. with Space Simulation, San Francisco, Calif. (Secretary, AIAA, 1290 Ave. of the Americas, New York 10019)

20–22. **Operational Research** Soc., Lancaster, England. (Mrs M. Kinnaird, ORS, 62-62 Cannon St., London, England)

20–23. **Paper Physics**, intern. conf., Mont Gabriel, P.Q., Canada. (Mr. Paterson, Canadian Pulp and Paper Assoc., 2300 Sun Life Bldg., Montreal 110, P.Q., Canada)

20–24. **High Energy Accelerators**, intern.

conf., Geneva, Switzerland. (K. Johnson, European Organisation for Nuclear Research, 1211 Geneva 23)

20–24. **Molecular Spectroscopy,** 5th conf., Brighton, England. (C. H. Maynard, Inst. of Petroleum, 61 New Cavendish St., London, S.W.1, England)

20–24. American Acad. of **Ophthalmology and Otolaryngology,** Las Vegas, Nev. (C. M. Kos, 15 Second St., SW, Rochester, Minn. 55901)

20–24. **Physics of Quiescent Plasmas,** intern. conf., Riso, Denmark. (V. O. Jensen Research Establishment, Riso, 4000-Roskilde, Denmark)

20–25. **Astronautical** Federation, 22nd intern., Brussels, Belgium. (P. Contensou, Intern. Astronautical Federation, 250, rue Saint-Jacques, 75 Paris 5°, France)

20–25. **Pharmaceutical Sciences,** intern. congr., Prague, Czechoslovakia. (Sekretariat des Internationalen Pharmazie Geschichtlichen Kongresses, Prague 2, Sokolska 31)

21–23. **Engineering in the Ocean Environment,** intern. conf., San Diego, Calif. (M. Nelles, Bissett-Berman Corp., P.O. Box 1447, San Diego 92112)

21–23. **Infra-Red Techniques,** Reading, England. (Secretary, Institution of Electronic and Radio Engineers, 8-9 Bedford Sq., London, W.C.1B, 3RG, England)

21–23. **Microscopy,** London, England. (S. Graft, McCrone Research Inst., 451 E. 31 St., Chicago, Ill. 60616)

21–23. **Noise in Active Semiconductor Devices,** intern. conf., Toulouse, France. (Secretary, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London S.W.1, England)

21–24. **Lead,** 4th intern. conf., Hamburg, Germany. (Secretary, Lead Development Assoc., 34 Berkeley St., London, WIX 6AJ, England)

21–24. American **Thyroid** Assoc., Birmingham, Ala. (W. M. McConahey, Mayo Clinic, Rochester, Minn. 55901)

21–27. **Thermodynamics and Electrochemical Kinetics,** 22nd intern., Dubrovnik, Yugoslavia. (H. Tannenberger Inst. Battelle, Centre de Recherche de Geneve, 7 route de Brize, 1227 Carouge-Geneve, Switzerland)

22–23. **High Voltage Electron Microscopy,** Teddington, England. (Secretary, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London S.W.1, England)

22–24. **Computer** Conf., 5th annual, Boston, Mass. (Secretary, CC, P.O. Box 245, Prudential Station, Boston 02199)

22–24. Society of **Mining Engineers,** Seattle, Wash. (American Inst. of Mining, Metallurgical and Petroleum Engineers, 345 E. 47 St., New York 10017)

22–24. **Nuclear and Particle Physics,** Oxford, England. (W. S. C. Williams, Nuclear Physics Lab., Oxford University, Keble Rd., Oxford OX1 3RH)

22–24. **Signal Processing and Display,** Lancaster, England. (Secretary, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

22–26. Alberta Soc. of **Petroleum Geologists,** Banff, Canada. (J. R. M. Berry, Canadian Industrial Gas and Oil Ltd., 640 Eighth Ave., SW, Calgary 2, Alberta)

23–25. Central Assoc. of **Obstetricians and Gynecologists,** White Sulphur Springs, W.Va. (D. G. Decker, CAOG, 200 First St., SW, Rochester, Minn. 55901)

24–26. **Sierra Club** Wilderness Conf., 12th annual, Washington, D.C. (J. P. Gilligan, 235 Massachusetts Ave., NE, Washington, D.C. 20002)

25–28. American **Roentgen Ray** Soc., Montreal, P.Q., Canada. (T. F. Leigh, Emory Univ. Clinic, Atlanta, Ga. 30322)

25–2. **Physicists Conf.,** 36th intern., Essen, Germany. (Secretary, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London S.W.1, England)

26. **Thermoanalysis,** Leicester, England. (Secretary, Inst. of Physics and Physical Soc., 47 Belgrave Sq., London, S.W.1, England)

26–27. Society for **Pediatric Radiology,** Boston, Mass. (J. L. Gwinn, Children's Hospital, 4650 Sunset Blvd., Los Angeles, Calif. 90027)

26–30. Society of **American Foresters,** Cleveland, Ohio. (H. R. Glascock, Jr., SAF, 1010 16th St., NW, Washington, D.C. 20036)

26–2. **Contributions of Multivariate Analysis to Psychological Theory,** 3rd annual, Banff, Alberta, Canada. (H. Bradbury, Center for Advanced Study in Theoretical Psychology, Univ. of Alberta, Edmonton 7, Alberta)

27–30. **Fracture Mechanics and Earthquake Source Mechanics,** Aspen, Colo. (R. E. Riecker, Air Force Cambridge Research Labs., Bedford, Mass. 01730)

27–30. Association of **Iron and Steel Engineers,** Chicago, Ill. (Managing Director, AISE, 1010 Empire Bldg., Pittsburgh, Pa., 15222)

27–30. **Underground Distribution,** Detroit, Mich. (B. E. Smith, Virginia Electric and Power Co., P.O. Box 1194, Richmond, Va.)

27–1. **Absorption Spectrometry and Atomic Fluorescence,** 3rd intern. congr., Paris, France. (Secretariat du Troisième CISAFA, Groupment pour l'Avancement des Methodes Spectrographiques, 1, rue Gaston-Boissier, 75-Paris 15°)

27–1. National **Aeronautics and Space Engineering and Manufacturing,** Los Angeles, Calif. (W. I. Marble, 2 Pennsylvania Pl., New York 10001)

27–2. **Pneumoconiosis,** 15th intern. conf., Bucharest, Romania. (Secretary, Ministerul Muncii Str. Scaune 1–3, Bucharest)

28–29. **Analysis of Organic Traces in Water,** Essen, Germany. (Secretary, GDC, Postfach 119075, Frankfurt/Main, Germany)

28–1. **Protein and Polypeptide Hormones,** 2nd annual, Liège, Belgium. (M. Margoulies, Inst. de Medecine, Blvd. de la Constitution 66, 4000 Liège)

28–1. American **Roentgen Ray** Soc., Boston, Mass. (T. F. Leigh, Emory Univ. Clinic, Atlanta, Ga. 30322)

28–1. **Therapeutics,** 11th intern. congr., Barcelona, Spain. (B. Glasson, Colegio Oficial de Medicos de Barcelona y Provincia P. de la Bonanova, 47, Barcelona)

28–1. **Thermal Conductivity,** 11th intern. conf., Albuquerque, N.M. (P. Wagner, CMB13, Los Alamos Scientific Lab., Los Alamos, N.M. 87544)

28–6. International Council for the **Exploration of the Sea,** 59th annual, Helsinki, Finland. (H. Tambs-Lyche, Char-

lottenlund Slot, 2920 Charlottenlund, Denmark)

30–9. International Standards Organization on **Rubber and Rubber-Like Materials**, 19th plenary meeting, Philadelphia, Pa. (W. H. King, Acushnet Co., New Bedford, Mass. 02742)

October

1–2. Wisconsin Acad. of **Sciences, Arts and Letters**, Baraboo. (J. R. Batt, 5001 University Ave., Madison, Wis.)

3–6. American **Ceramic** Soc., Electronics Div., Kiamesha Lake, N.Y. (L. C. Hoffman, E. I. du Pont de Nemours & Co., Inc., Bldg. 336, Experimental Sta., Wilmington, Del. 19898)

3–6. American **Oil Chemists'** Soc., Atlantic City, N.J. (J. C. Lyon, 508 S. 6 St., Champaign, Ill. 61820)

3–8. **Electrochemical** Soc., Cleveland, Ohio. (E. G. Enck, ES, P.O. Box 2071, Princeton, N.J. 08540)

3–8. **Water Pollution Control** Federation, 44th annual, San Francisco, Calif. (WPCF, 3900 Wisconsin Ave., Washington, D.C. 20016)

4–6. **Turbulence in Liquids**, Rolla, Mo. (G. K. Patterson, Dept. of Chemical Engineering, Univ. of Missouri, Rolla 65401)

4–7. **Instrument** Soc. of America, 26th annual, Chicago, Ill. (ISA, 530 William Penn Pl., Pittsburgh, Pa. 15219)

4–8. American **Dietetic** Assoc., 54th annual, Philadelphia, Pa. (R. M. Yakel, 620 N. Michigan Ave., Chicago, Ill. 60611)

5–8. **Optical** Soc. of America, Ottawa, Ont., Canada. (J. W. Quinn, OSA, 2100 Pennsylvania Ave., NW, Washington, D.C.

5–12. International Bureau of **Weights and Measures**, 14th general assembly, Paris, France. (J. Terrien, Pavillon de Breteuil, 92 Sevres, France)

8–10. Joint Conf. on **Sensing of Environmental Pollutants** (AIAA, ISA, ACS, IEEE, NASA, and NOAA), Palo Alto, Calif. (Instrument Soc. of America, 400 Stanwix St., Pittsburgh, Pa.)

9–10. American College of **Dentists**, Atlantic City, N.J. (R. J. Nelsen, ACD, 7316 Wisconsin Ave., Bethesda, Md. 20014)

10–15. Latin-American **Cancer** Congr., 5th, Caracas, Venezuela. (CILAC, Aptdo 1126, Caracas)

10–15. American **Chemical** Soc., intern. rubber conf., Cleveland, Ohio. (Rubber Div., ACS, 1155 16th St., NW, Washington, D.C. 20036)

11–13. **Electron Devices**, Institute of Electrical and Electronics Engineers, Inc., Washington, D.C. (H. D. Toombs, Texas Instruments, Inc., P.O. Box 5012, MS 922, Dallas, Tex. 75222)

11–13. Society for **Industrial and Applied Mathematics**, Madison, Wis. (SIAM, 33 S. 17 St., Philadelphia, Pa. 19103)

11–14. Association of **Official Analytical Chemists**, 85th annual, Washington, D. C. (L. G. Ensminger, AOAC, Box 540, Benjamin Franklin Sta., Washington, D.C. 20044)

11–15. National Bureau of Standards Inst. on **Materials Research**, Boston, Mass. (T. E. Madey, Surface Chemistry Section, Natl. Bureau of Standards, Washington, D.C. 20234)

11–15. American **Public Health** Assoc., Minneapolis, Minn. (J. R. Kimmey, 1740 Broadway, New York 10019)

11–15. American Assoc. for **Laboratory Animal Science**, New York, N.Y. (J. J. Garvey, AALAS, Central Office, Box 10, Joliet, Ill. 60434)

11–15. American **Vacuum** Soc., Boston, Mass. (Mrs. D. M. Hoffman, RCA Laboratories, Princeton, N.J. 08540)

12–13. **Industrial Health** Foundation, 36th annual, Pittsburgh, Pa. (R. T. P. deTreville, 5231 Center Ave., Pittsburgh)

12–13. **Methods for Predicting the Future**, Pomona, Calif. (Center for Executive Development, 1044 Concord St., Costa Mesa, Calif. 92626)

12–14. **Luminescence Dosimetry**, 3rd intern. conf., Riso, Denmark. (V. Majdahl, Atomic Energy Research Establishment, Riso)

12–15. Canadian **Chemical Engineering** Conf., 21st, Montreal, P.Q. (Chemical Inst. of Canada, Suite 906, 151 Slater St., Ottawa 4, Ont.)

12–15. **Neurological Surgeons**, Bal Harbor, Fla. (B. S. Patrick, University Medical Center, 2500 N. State St., Jackson, Miss. 39216)

13–15. **Rare Earth** Research, 9th conf., Blacksburg, Va. (A. F. Clifford, Dept. of Chemistry, Virginia Polytechnic Inst. and State University, Blacksburg 24061)

13–17. **Medical Soc. of the United States and Mexico**, 19th annual, Scottsdale, Ariz. (Mrs. V. E. Bryant, Executive Secretary, 333 W. Thomas Road, Phoenix)

14. **Fibrous Structures in Biomedical Applications**, Fiber Soc., Princeton, N.J. (L. Rebenfeld, P.O. Box 625, Princeton 08540)

15. **Medical Correctional** Assoc., New York, N.Y. (M. O. Tuchler, 4426 N. 36 St., Phoenix, Ariz. 85018)

16–17. **Groundwater Pollution** Conf., St. Louis, Mo. (W. Cate, Underwater Research Inst., 3411 Hampton Ave., St. Louis 63139)

16–20. National **Environmental Sanitation and Maintenance Management** Conf., Los Angeles, Calif. (Inst. of Sanitation Management, 1710 Drew St., Clearwater, Fla. 33515)

16–21. American Acad. of **Pediatrics**, 40th annual, Chicago, Ill. (R. G. Frazier, 1801 Hinman Ave., Evanston Ill. 60201)

17–21. American **Nuclear** Soc., Miami Beach, Fla. (O. J. Du Temple, ANS, 244 E. Ogden Ave., Hinsdale, Ill. 60521)

17–25. World Congr. on **Fertility and Sterility**, 7th, Tokyo and Kyoto, Japan. (M. Hayashi, Dept. of Obsteterics and Gynecology, Toho Univ., XI-I West 6, Omori, Otaku, Tokyo)

18–20. **Chemistry and Spectroscopy**, 10th Pacific congr., Anaheim, Calif. (sponsored by Society of Applied Spectroscopy and American Chemical Soc.) (A. Abu-Shumays, Cary Instruments, 2724 S. Peck Rd., Monrovia, Calif. 91016)

18–21. **Technology for Productivity**, Detroit, Mich. (R. J. Seman, American Soc. for Metals, Metals Park, Ohio 44073)

18–22. **Microdosimetry**, 2nd symp., Stresa, Italy. (H. G. Ebert, Direction Générale, Centre Commun de Recherche, C.C.E., rue de la Loi, 200, 1040 Bruxelles, Belgique)